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Place du Portage, Phase III
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Gatineau, Québec K1A 0S5
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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
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Title - Sujet NMSO - COMPUTERS	
Solicitation No. - N° de l'invitation E60EJ-11000C/H	Date 2012-12-04
Client Reference No. - N° de référence du client E60EJ-11000C	Amendment No. - N° modif. 005
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-\$SEJ-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 2012-12-07	
Time Zone Fuseau horaire Eastern Daylight Saving Time EDT	
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.

005

File No. - N° du dossier

436ejE60EJ-11000C

Buyer ID - Id de l'acheteur

436ej

CCC No./N° CCC - FMS No/ N° VME

This amendment contains the following sections:

1. Question and Answer Set 2 revised as questions submitted were not addressed.
2. Revised Annexes A, B, and K.

Changes to the documents are yellow highlighted.

Note: some questions have been modified from their original form. Other questions have been deleted if they were addressed by a previous question. If a question you submitted has not been addressed, please resubmit it.

Revised versions replace previous version in their entirety.

Q1 Annex A, 5.1 Personnel Support – All Categories Except 4.0B & 4.1B

The Offeror must have on-staff, or through an authorized national dealer network, or through the manufacturer, 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 these must be direct employees of the system manufacturer.

In consideration of Annex A, clause 5.1 Personnel Support and Amendment #002, Q25/A25, Canada is stipulating that the OEM must provide the required certifications. In some cases this will require the OEM to invest significant time and dollars to have its employees attain these certifications on, in some cases, competitive products.

In light of that, would Canada consider the following:

1. Please accept certification numbers and remove the need to have the actual employee names submitted, due to regulatory requirements and laws that exist in multiple countries, thus restricting OEM organizations from being able to provide specific names;
2. Please reduce the number of certifications required to a total of 12 certifications made up of a combination of the Microsoft, Red Hat and VMware certifications, with a minimum of 2 in each of these;
3. Please grant 12 months from time of contract award to submit the certifications.

Clarification for point 2:

In the 5.1 Personnel Support requirement, of the twenty-five support personnel, a total of twenty-one certifications is requested, seven MCSE, seven RHCSA and seven VCP. We are respectfully asking Canada to reduce this total to twelve (12) certifications. To ensure that all three areas of certifications are represented, a minimum of two certifications per area (VMware, Windows, Linux) is required. The balance of the twelve certifications may be distributed across the areas as the manufacturer may want to invest in, not necessarily evenly.

Examples:

- 2 VCP, 4 RHCSA, 6 MCSE
- 2 VCP, 2 RHCSA, 8 MCSE
- 4 VCP, 4 RHCSA, 4 MCSE

A1 Response to Point 1 – This is acceptable provided the OEM includes the employee ID to properly ascertain the employment of said certificate holder.

Response to Point 2 – The requirement could be met by a minimum of five (5) certified individuals assuming the five have all three (3) of the required certifications. However, the requirement will be reduced to a total of fifteen (15) certifications, five (5) MCSE, five (5) RHCSA and five (5) VCP.

Response to Point 3 – The bidder has until the end of February 2013 to submit the certifications. PWGSC will reserve a “place” for any Product that qualifies for 60 days following NMSO award or until evidence of certification is provided, whichever is earlier.

Q2 Annex A, 5.4 Web Site Support and Amendment #002:

Q27 asked: Annex A, 5.4 Website Support, item (j) reads:

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.

For the website support, the features of articles (b) through (i) are contained on the OEM's website. Since the Manufacturer will not be the Offeror, would it be acceptable to the Crown that only article (a) is presented at the Offeror's website with links to the Manufacturer's website, so we may bid? Alternatively, would the Crown please remove this (a) requirement entirely?

The answer provided at A27 was, No. This requirement is not considered to be restrictive; therefore the specification will remain unchanged.

Also, item (a): Pages specific to the NMSO. These pages must contain details on the default system configuration, options, default system illustrations and pricing.

In A27 of Amendment #002, Canada responded that this requirement was not considered to be restrictive.

As it stands, this answer makes this Offeror non-compliant and will exclude a major manufacturer from participating on this standing offer.

Would Canada please reconsider their answer and respond in the affirmative that article (a) may be presented at the Offeror's website with links to the Manufacturer's website, as they have in the past Blades / x86 RFSO E60EJ-11000C/E and multiple other RFSOs?

E60EJ-11000C/E, Amendment #003, A231: If the offeror is not the manufacturer, it is acceptable to provide articles (a) and (i) to be presented at the offeror's website with links to the Manufacturer's website.

A2 Yes, if the Offeror is not the Manufacturer, it is acceptable to provide articles (a) and (i) to be presented at the Offeror's website with links to the Manufacturer's website.

Q3 Amendment 002, Answer A10 reads:

Yes, the specification will be amended. Under Annex A, 2.2(e), 2.3(e), 2.5(f), 2.6(e), 2.10(d), and 2.12(d) delete reference to PC3-12800 (DDR3-1600) or PC3-8500R (DDR3-1066) and replace with PC3-10600(DDR3-1333).

Would Canada please allow bidders to offer 32GB DIMMs that are PC3-8500 (DDR3-1066) memory as part of the initial bid, with the understanding that PC3-10600 will be substituted at the same bid price before the actual award of the NMSO? This will allow vendors more time to qualify the faster memory DIMMs.

A3 PC3-10600 (DDR3-1333) and PC3-12800 (DDR3-1600) have been available from the top server manufacturers for almost a year now and this is not considered to be restrictive. Therefore, the answer is no, the specification will remain unchanged.

Q4 Annex A, 2.9 Category 1.0B Blade Chassis / Enclosure, (b) Power Sub-System (Pooled), (i) Power (F)Hardware Maintenance Service

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.

As these chassis are designed to be installed in 19" racks, could Canada please confirm that this requirement may be met by the PDU of the rack?

A4 Confirmed.

Q5 Annex A, 2.9 Category 1.0B Blade Chassis / Enclosure, (c) Networking / Interconnect: Network, SAN & Fabric, (i) 10GbE Switch (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, SFP+ SR or LR transceivers, or passive DAC cables.

Would Canada please confirm that QSFPs (Quad Small Form-factor Ports) offering 40Gb/s ethernet is acceptable as long as the vendor can provide converter cables to connect from QSFP to 4 x SFP+?

A5 Confirmed.

Q6 Annex A, 7.10 Category 2.0B 2-Socket Blade and Annex A, 7.11 Category 2.1B 2-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.

Our blade servers are engineered to have the most efficient airflow possible in order to allow a high compute density. Blade solutions are typically purchased with the intent of being able to dynamically allocate resources on demand, and since removing a processor would disrupt airflow, we no longer offer reduced functionality 2 CPU blades as an option. Would Canada please remove this requirement so that we may bid in this category?

A6 Yes, the specification will be amended. Under Annex A, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.10, 7.11, 7.12, and 7.13, delete "Ability to be configured ..." in its entirety and replace with "No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided."

Q7 Would the Crown consider including an option for Proactive Services for NMSO Hardware such as Firmware Update Service, Enhanced Call Handling, System Health Checks and Quarterly Reporting on Service Issues?

A7 No; however, PWGSC will look into the feasibility of adding this type of feature through the substitution process following NMSO award, if all Offerors are interested in participating and a common 'baseline' can be established. Offerors would be consulted on how this would work prior to implementation."

Q8 In Reference to Answer 38 in Question Period 1.

According to the A38 the new definition of the (N+1) processor is "**Processor model that is the top bin from the processor OEM in terms of specification and performance. This must be maintained during the course of the standing offer.**" Please confirm that if the proposed server model does not offer the CPU upgrade to the highest bin processor listed by the processor OEM (as per the table included in the 'Instructions' to the 'List of Products') then this DOES NOT deem the server non-compliant. In addition we understand the bidder should leave the (N+1) processor upgrade line blank for the financial evaluation.

A8 Correct.

Q9 Annex A, Sections 2.6 b)

As per Q12 in Amendment 002, The Crown has requested "AMD Opteron 6284SE processors". Will the

Crown please modify this requirement to "AMD Opteron 6282SE processors" that we may bid?

As per A12 in Amendment 002, Yes, the specification will be amended. Under Annex A, delete the following in its entirety: 2.2 (b), 2.3 (b), 2.5 (c), 2.6 (b), 2.10 (a), 2.12 (a), and 2.13 (a).

Under Annex A, insert the following:

2.2 (b) Have two (2) Intel Xeon E5-2650 or two (2) AMD Opteron 6282SE or 6380 processors.

2.3 (b) Have two (2) Intel Xeon E5-2650 or two (2) AMD Opteron 6282SE or 6380 processors.

2.5 (c) Have two (2) Intel Xeon E5-2650 or two (2) AMD Opteron 6282SE or 6380 processors.

2.6 (b) Have four (4) Intel Xeon E5-4610 or four (4) AMD Opteron 6282SE or 6380 processors.

2.10 (a) Have two (2) Intel Xeon E5-2650 or two (2) AMD Opteron 6282SE or 6380 processors.

2.12 (a) Have four (4) Intel Xeon E5-4610 or four (4) AMD Opteron 6282SE or 6380 processors.

2.13 (a) Have four (4) Intel Xeon E7-8867L.

The Crown has changed a significant amount of the base servers. We will require additional time to gather equipment for bench testing. Will the Crown please consider extending the bid closure date, or alternatively, increase the bench system delivery from four days from bid closure date to 10 working days.

A9 Please see response to Q10.

Q10 RFSO Part 1, 1.3

In the release of the first set of questions the Crown modified the bid closing date to Dec 7th with benchmark drop off date set to three days following bid close. Would the Crown please consider extending the benchmark drop off date to five business days following bid close?

A10 Yes, the benchmark drop-off date will be revised. Under RFSO Part 1, 1.3 delete (f) in its entirety and replace with (f) Systems for Benchmark testing: Offerors will be given 5 days to deliver the requested systems following bid closing. Furthermore, given the use of similar system components (eg: processors, memory, and /or disk drives) in various categories, Offerors will be called-in for benchmark testing according to categories in order to give the Offeror opportunity to use said components for other categories if desired. The benchmark systems will be called-in in this order: Category 2.0S, 1.0S, 3.0S, 2.1S, 2.0B, 2.1B, 3.0B, 3.1B, and 4.0S.

Q11 Annex A Sections 2.2 Item (f), 2.3 Item (f), 2.4 Item (f), 2.5.Item (f), and 2.6 Item (f)

The Crown has requested RAID controllers for the default configurations that include support for specified RAID levels.

Would the Crown please clarify that these required supported RAID levels must be offered as functional by default and a user would not have to purchase additional hardware, warranty or license to make these RAID levels available for use?

A11 Correct, all mandatory RAID levels must be offered as functional by default and would not require additional hardware, warranty or license to make these RAID levels available for use.

Q12 Annex A, Section 2.4 c)

The Crown requests "no less than four (4) QPI links". Will the Crown please modify this requirement to "no less than two (2) QPI links" that we may bid?

A12 No.

Q13 Annex A, Section 2.5 o)

The Crown requests redundant hot-swap cooling fans. Our proposed system includes six fans. A single fan failure will not cause a machine failure, and will allow the system to continue operations until a planned outage may be arranged.

In order to provide its clients with the best value by offering a variety of vendor options, will the Crown please modify this requirement to "simple-swap / tool-less install, redundant cooling fans", so that we may bid?

A13 No.

Q14 Annex A, 2.6 e):

The Crown requests a minimum of 1TB of memory. Our system can not support more than 512GB of memory in a four-socket configuration. Will the Crown please reduce this requirement to 512GB so that we may bid?

A14 No.

Q15 Annex A, Section 2.6 j)

The Crown requests a minimum of 6 vacant PCI-e slots on the system. Given that the servers support a minimum of 4 onboard 1GbE nics (or 2x 10GbE nics) and that customers are moving to converged fabrics requiring fewer slots, will the Crown please reduce this requirement to 3 slots so that we may bid?

A15 No.

Q16 Annex A, Sections 2.10 d)

The Crown requests "384GB of Quad-Channel PC3-12800 (DDR3-1600)" memory. Will the Crown please change this requirement to 256GB of Quad-Channel PC3L-10600 (DDR3-1333) memory that we may bid?

A16 Yes, the specification will be amended. Under Annex A, 2.10 (d) delete reference to 384 and replace with 256.

Q17 Annex A, Section 2.5 q)

The "old" document (vendor set-up), specified "Operating System: Retail versions of Windows Enterprise Server 2008 Enterprise R2-SPI (64-bit) must be used."

It looks like the author of the document wants a physical Enterprise license to be attached on the test machine. Does it mean any other legit licensing version copy like VL (Volume License) copy or Microsoft authorized Demo copy is not considered as valid for test submission.

A17 Intertek requires only a single copy of the OS per Offeror and a demo copy is not acceptable.

Q18 Annex A, Section 1.0 b)

The Crown has stated that bid systems must "use a single chassis/enclosure". For Category 2.1B, our

proposed solution is composed of two physical chassis, bolted together to be inserted and removed as one unit, and operates under a single operating system (or hypervisor) image. Will the Crown please clarify if this will be considered compliant?

A18 Yes, this will be considered compliant.

Q19 Operating System

Would the Crown please confirm that Microsoft Windows 2008R2 Enterprise will be used for benchmark testing on all servers?

A19 Confirmed.

Q20 Operating System

Would the Crown indicate if the benchmark testing platform will migrate to Microsoft Windows 2012 during the life of the Server NMSO to accommodate changes in technology, as it is anticipated that Windows 2008 will become obsolete before the end of the lifespan of the resultant NMSO?

A20 If not 100% today, a great majority of PWGSC's clients run and continue to deploy Windows Server 2008 R2. Given our clients practices, they will continue to do so in the foreseeable future and we need to ensure systems offer stability and compatibility in their environment. That said however, should the need to change the benchmark to Windows 2012 and/or other 3rd party benchmark(s) become necessary, PWGSC will exercise the clause under the RFSO Part 1, 6.20 (m) Generational Changes.

Q21 Annex A, 2.5i:

In the original RFSO document and in Amendment #1, Annex A, Section 2.5i, stated: "...Have an integrated dual-port 100/1000Base-T or...". However, in Amendment #2 this specification was changed to read: "...have an integrated quad-port 100/1000Base-T or..."

This change in the requirement from an integrated dual-port NIC to an integrated quad-port NIC in this particular category has made our product non-compliant. Could the Crown please revise this specification so that it reads: "Have an integrated dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing."

A21 This was a typo, the specification will be amended accordingly. Under Annex A. 2.5 (i), delete in its entirety and replace with "Have an integrated dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing."

Q22 Annex C

In an elevated call up or Request for Volume Discount, we are requesting the crown allow as part of their standard terms and conditions that a prime bidder be allowed to designate multiple authorized resellers to fulfill the contract upon a successful bid. The prime bidder would provide an authorized agent or reseller certification form as part of the standard bid response.

If this is allowed, will the crown also allow invoicing from the authorised agent or reseller directly for their portion of the delivery of the contract?

A22 There is nothing preventing an Offeror from designating multiple authorized resellers on an RVD response. To ensure payment, invoices need to be issued by whoever the Contract holder is.

Q23 Due to the time lines of response to the second round of questions release (which is three weeks after submission), will the crown extend the due date from Dec 7th 2012 to Dec 14th.

A23 The estimated date for the release of the answer to Q2 was 3 weeks. However, the answers have been released in 2 weeks, therefore the NMSO closing date will remain December 7th, 2012.

Q24 The recent amendment #002 made several upward changes to the specifications that required additional questions, which depending on the answers, may require further clarifications and re-configurations in order to propose a compliant and comprehensive solution. Thus, would Canada please allow a third round of questions in order to assure that the best possible products are being offered?

A24 As a result of the number of questions received in response to the second round of questions, it has been decided that a third round of questions for this RFSO is not warranted.

Q25 3.2 OPERATING SYSTEM AND HYPERVISOR - ALL X86 CATEGORIES ONL

(c) Except for Category 1.0V, systems 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

VMware latest vSphere release the ESXi 5.1 brings significant new features and is considered a major release. Our software certification policy is targeting major operating system releases (N and N-1). Therefore our latest server products are certified with ESXi 5.0 and ESXi 5.1, Windows Server 2008R2 and Windows Server 2012, RHEL 6 and RHEL 5 etc.

Would the Crown please consider VMWare certifications for vSphere ESXi 5.0 and ESXi 5.1 as sufficient to meet the mandatory requirement for VMware and treat the ESXi 4.x certifications as optional so that we may bid our most recent products.

A25 Yes.

Q26 ANNEX B states that it is the OEM's top bin product, and not the processor OEM product that determines the N+1 and N-1 product selection. Also not all server categories are listed, for example we could use the chart for Category 3.0B and Category 3.1B.

A26 The chart is an example, therefore the logic may be applied to all categories. Please see revised Annex B, Instructions.

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.

- (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 E5-2650 or two (2) AMD Opteron 6282SE or 6380 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 PC3-10600 (DDR3-1333) 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 one (1) 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 E5-2650 or two (2) AMD Opteron 6282SE or 6380 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 PC3-10600 (DDR3-1333) 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 quad-port 100/1000Base-T or integrated dual-port 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).

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 E5-2650 or two (2) AMD Opteron 6282SE or 6380 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 PC3-10600 (DDR3-1333) 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 six (6) 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 E5-4610 or four (4) AMD Opteron 6282SE or 6380 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 1 Terabyte (TB) of Quad-Channel PC3-10600 (DDR3-1333) 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 quad-port 100/1000Base-T or integrated dual-port 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 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 Converged Network Adapters) or Option (3) 10GbE switch (discrete redundant 10Gb Ethernet switching device for blade systems that use separate network cards).
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Option 1:

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- (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, SFP+ SR or LR transceivers, or passive DAC 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.
- (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, SFP+ SR or LR transceivers, or passive DAC 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 E5-2650 or two (2) AMD Opteron 6282SE or 6380 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 256 Gigabyte (GB) of Quad-Channel PC3-10600 (DDR3-1333) 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 quad-port 100/1000Base-T or integrated dual-port 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 E5-4610 or four (4) AMD Opteron 6282SE or 6380 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 512 Gigabyte (GB) of Quad-Channel PC3-10600 (DDR3-1333) 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 E7-8867L.
- (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 quad-port 100/1000Base-T or integrated dual-port 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 or 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, or through the manufacturer, 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 five (5) must be (MCSE) Microsoft Certified Systems Engineer with MCITP for Windows Server 2008, a minimum of five (5) must be (RHCSA) Red Hat Certified System Administrator for RHEL 6, a minimum of five (5) must be (VCP4 or VCP5) VMware Certified Professional on vSphere 4 or 5, and these 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 contract 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 unilingual 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:

No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.

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

The system must have:

No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.

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

The system must have:

No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.

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

The system must have:

No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.

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

The system must have:

No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.

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

The system must have:

- No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.
- 7.8 CATEGORY 4.2S RACK-MOUNT ENTERPRISE 8-SOCKET 10U:**
The system must have:
No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.
- 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:
No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.
- 7.11 CATEGORY 2.1B 2-SOCKET ENTERPRISE BLADE:**
The system must have:
No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.
- 7.12 CATEGORY 3.0B 4-SOCKET BLADE:**
The system must have:
No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.
- 7.13 CATEGORY 3.1B 4-SOCKET ENTERPRISE BLADE:**
The system must have:
No less than half the maximum RAM available if the ability to be configured with half the number of CPU(s) is provided.
- 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.

Processor Definition:

N + 1 Processor model that is the top bin from the **processor OEM** in terms of specification and performance. This must be maintained during the course of the standing offer.

N Default Processor Model

N - 1 Processor model that is one step below the OEM's default model in terms of specification and performance.

	Category 2.1S	Category 4.1S	Category 4.2S	Category 2.1B	Category 2.0S
CPU Model Upgrade / Downgrade (where N = Default model)	Default is 2 x E7-2870	Default is 4 x E7-4870	Default is 8 x E7-8870	Default is 2 x E7-2870	Default is 2 x E5-2650 or 6282SE or 6380
UPGRADE to N + 1 (Maximum number of CPUs)	2 x E7-2890	4 x E7-4890	8 x E7-8890		2 x E5-2690 or 6284SE or 6386SE
UPGRADE to N + 1 (Half the number of CPUs)	1 x E7-2890	2 x E7-4890	4 x E7-8890		1 x E5-2690 or 6284SE or 6386SE
DOWNGRADE to half the number of N	1 x E7-2870	2 x E7-4870	4 x E7-8870	1 x E7-2870	1 x E5-2650 or 6282SE or 6380
DOWNGRADE to N - 1 (Maximum number of CPUs)	2 x E7-2860	4 x E7-4860	8 x E7-8850	2 x E7-2850	2 x E5-2640 or 6278 or 6378
DOWNGRADE to N - 1 (Half the number of CPUs)	1 x E7-2860	2 x E7-4860	4 x E7-8850	1 x E7-2850	1 x E5-2640 or 6278 or 6378

Example:

- If E7-xx90 is the available N+1 model, fill-in the corresponding line items, otherwise leave blank.
- If E7-xx60 or E7-xx50 is the immediate (N - 1) model below the OEM's default processor, fill-in the corresponding line items.

Annex B System Upgrade & System Component Instructions:

- Bidders must fill-in every line item, if available, in the OEM's product portfolio.
 - If an item does not exist in the OEM's product portfolio, the bidder must either enter a product that exceeds the requirement or leave the line blank. If left blank, for EVALUATION PRICE a price equal to highest price among all Offerors for this item in the category. This will occur during the RFSO financial phase and the on-going Call-up Limitation calculation during the life
- Example: There are 3 bidders in a category: Bidder A provides a complete Annex B (with a price of \$1000 for item 25); Bidder B provides a complete Annex B (with a price of \$1500 for item 25) left blank. When PWGSC calculates the Evaluation Price of each system, Bidder C will have a price of \$1500 added to item 25.

c. If an item is left blank in Annex B and is found to be available during technical evaluation, that system will be deemed non-compliant.

d. Items identified as 'Model A' and 'Model B' are understood to be two different products.

Category 4.0S
Default is 4 x E5-4610 or 6282SE or 6380
4 x E5-4650 or E5-4650L or 6284SE or 6386SE
2 x E5-4650 or E5-4650L or 6284SE or 6386SE
2x E5-4610 or 6282SE or 6380
4 x E5-4607 or 6278 or 6378
2 x E5-4607 or 6278 or 6378

E calculations, PWGSC will insert
a of the NMSO.

am 25); and Bidder C provides a

Category 1.0S Rack-Optimized 2-Socket 1U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	DEFAULT SYSTEM			
1	Base Unit			
2	2 x CPU			
3	128GB RAM			
4	Disk Controller w/ 256MB ECC Cache, RAID 0, 1, 5 & 6			
5	4 x 300GB 10K SAS HDD			
6	2 x 64-Bit PCI-e Gen 2 slots			
7	2 port 1Gb or 1 port 10Gb NIC			
8	One 8X DVD-ROM or ILO/ILOM			
9	2 x Power Supply (Redundant)			
10	Standard On-Site Maintenance Service: 3 Years			
	System Upgrade / Downgrade			
	CPU Model Upgrade / Downgrade (where N = Default model)			
11	UPGRADE to N + 1 (Maximum number of CPUs)			
12	UPGRADE to N + 1 (Half the number of CPUs)			
13	DOWNGRADE to half the number of N			
14	DOWNGRADE to N - 1 (Maximum number of CPUs)			
15	DOWNGRADE to N - 1 (Half the number of CPUs)			
	Disk Controller Upgrade			
16	Upgrade from 512MB cache to 1GB ECC BBWC (Battery-Backed-			
	Optical Drive Upgrade			
17	DOWNGRADE Optical Drive to 0			
	HDD Downgrade			
18	Dowgrade to 0 - HDD			
	Installation Upgrade			
19	System Installation at end user site			
	Warranty Upgrade			
20	Standard On-Site Maintenance Service: 4 Years			
21	Standard On-Site Maintenance Service: 5 Years			
22	4-hour response On-Site Maintenance Service: 3 Years			
23	4-hour response On-Site Maintenance Service: 4 Years			
24	4-hour response On-Site Maintenance Service: 5 Years			
25	Enhanced On-Site Maintenance Service: 3 Years			
26	Enhanced On-Site Maintenance Service: 4 Years			

Category 1.0S Rack-Optimized 2-Socket 1U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
27	Enhanced On-Site Maintenance Service: 5 Years			
	System Component			
	Component Group A			
	Memory (Single DIMM Module)			
28	4GB ECC SDRAM Memory - A			
29	4GB ECC SDRAM Memory - B			
30	8GB ECC SDRAM Memory - A			
31	8GB ECC SDRAM Memory - B			
32	16GB ECC SDRAM Memory - A			
33	16GB ECC SDRAM Memory - B			
34	32GB ECC SDRAM Memory - A			
35	32GB ECC SDRAM Memory - B			
	Component Group B			
	Disk Array Solution (HDDs, Cabinet, and Controller)			
36	PCI-e Controller supporting RAID 0, 1, 5, 10 w/ 512MB ECC BBWC			
37	12-Bay Rack-Mount (JBOD) Hot-Swap/Hot-Plug Drive Cabinet			
38	146GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
39	300GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
40	500GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
41	1TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
42	2TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
43	3TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
	System Disks			
44	DELETE			
45	DELETE			
46	300GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
47	500GB NL-SAS or SATA HDD w/ hot-swap drive carrier (7200 RPM) 2.5"			
48	900GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
49	100GB eMLC SATA-SSD			
50	100GB eMLC SAS-SSD			
51	200GB eMLC SATA-SSD			
52	200GB eMLC SAS-SSD			
53	400GB eMLC SATA-SSD			
54	400GB eMLC SAS-SSD			

Category 1.0S Rack-Optimized 2-Socket 1U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Component Group C			
	Host Bus Adapter			
55	PCI-e 8GB Single-port Fibre-Channel HBA			
56	PCI-e 8GB Dual-port Fibre-Channel HBA			
57	PCI-e 1GbE iSCSI Adapter			
58	10GbE CNA Dual Port			
59	DELETE			
60	DELETE			
61	DELETE			
62	DELETE			
63	DELETE			
	Network Adapters			
64	64-Bit PCI-e 1000 Base-T Server Adapter - Single port			
65	64-Bit PCI-e 1000 Base-T Server Adapter - Dual port			
66	64-Bit PCI-e 1000 Base-T Server Adapter - Quad port			
67	64-Bit PCI-e 1000 Base-SX Server Adapter - Single port			
68	64-Bit PCI-e 10GSFP+ Server Adapter - Dual port			
	Component Group D			
	Server Management			
69	Add-on or integrated Server Management Adapter with software			
	Power Supply			
70	Redundant Hot-swap/hot-plug Power Supply Kit			
	Display and Keyboard			
71	1U Rack-mountable 17" TFT fold away display with keyboard/pointing			
	KVM Switchbox			
72	8-port rack-mountable Analog KVM switch			
73	8-port rack-mountable Digital KVM switch with SNMP support			
74	16-port rack-mountable Analog KVM switch			
75	16-port rack-mountable Digital KVM switch with SNMP support			
76	32-port rack-mountable Analog KVM switch			
77	32-port rack-mountable Digital KVM switch with SNMP support			

Category 1.0S Rack-Optimized 2-Socket 1U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Uninterruptible Power Supplies w/ power cables			
78	Uninterruptible Power Supply 1.5KVA (1000W) - rack mount			
79	Uninterruptible Power Supply 3KVA (1920W) - rack mount			
80	Uninterruptible Power Supply 5KVA (3300W) - rack mount			
	Power Distribution Units (PDU) w/ respective power cables			
81	Power Distribution Unit - 110V - 15A			
82	Power Distribution Unit - 110V - 20A			
83	Power Distribution Unit - 220V - 20A			
84	Power Distribution Unit - 220V - 30A			
	19" Rack			
85	Minimum 41U Large-Rack w/ Side-Panels			

Category 2.0S Rack-Optimized 2-Socket 2U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	DEFAULT SYSTEM			
1	Base Unit			
2	2 x CPU			
3	128GB RAM			
4	Disk Controller w/ 512MB ECC Cache, RAID 0, 1, 5 & 6			
5	4 x 300GB 10K SAS HDD			
6	5 x 64-Bit PCI-e Gen 2 slots			
7	4 port 1Gb or 2 port 10Gb NIC			
8	One 8X DVD-ROM or ILO/ILOM			
9	2 x Power Supply (Redundant)			
10	Standard On-Site Maintenance Service: 3 Years			
	System Upgrade / Downgrade			
	CPU Model Upgrade / Downgrade (where N = Default model)			
11	UPGRADE to N + 1 (Maximum number of CPUs)			
12	UPGRADE to N + 1 (Half the number of CPUs)			
13	DOWNGRADE to half the number of N			
14	DOWNGRADE to N - 1 (Maximum number of CPUs)			
15	DOWNGRADE to N - 1 (Half the number of CPUs)			
	Disk Controller Upgrade			
16	Upgrade from 512MB cache to 1GB ECC BBWC (Battery-Backed-			
	Optical Drive Upgrade			
17	DOWNGRADE Optical Drive to 0			
	HDD Downgrade			
18	Dowgrade to 0 - HDD			
	Installation Upgrade			
19	System Installation at end user site			
	Warranty Upgrade			
20	Standard On-Site Maintenance Service: 4 Years			
21	Standard On-Site Maintenance Service: 5 Years			
22	4-hour response On-Site Maintenance Service: 3 Years			
23	4-hour response On-Site Maintenance Service: 4 Years			
24	4-hour response On-Site Maintenance Service: 5 Years			
25	Enhanced On-Site Maintenance Service: 3 Years			
26	Enhanced On-Site Maintenance Service: 4 Years			

Category 2.0S Rack-Optimized 2-Socket 2U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
27	Enhanced On-Site Maintenance Service: 5 Years			
	System Component			
	Component Group A			
	Memory (Single DIMM Module)			
28	4GB ECC SDRAM Memory - A			
29	4GB ECC SDRAM Memory - B			
30	8GB ECC SDRAM Memory - A			
31	8GB ECC SDRAM Memory - B			
32	16GB ECC SDRAM Memory - A			
33	16GB ECC SDRAM Memory - B			
34	32GB ECC SDRAM Memory - A			
35	32GB ECC SDRAM Memory - B			
	Component Group B			
	Disk Array Solution (HDDs, Cabinet, and Controller)			
36	PCI-e Controller supporting RAID 0, 1, 5, 10 w/ 512MB ECC BBWC			
37	12-Bay Rack-Mount (JBOD) Hot-Swap/Hot-Plug Drive Cabinet			
38	146GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
39	300GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
40	500GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
41	1TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
42	2TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
43	3TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
	System Disks			
44	DELETE			
45	DELETE			
46	300GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
47	500GB NL-SAS or SATA HDD w/ hot-swap drive carrier (7200 RPM) 2.5"			
48	900GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
49	100GB eMLC SATA-SSD			
50	100GB eMLC SAS-SSD			
51	200GB eMLC SATA-SSD			
52	200GB eMLC SAS-SSD			
53	400GB eMLC SATA-SSD			
54	400GB eMLC SAS-SSD			

Category 2.0S Rack-Optimized 2-Socket 2U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Component Group C			
	Host Bus Adapter			
55	PCI-e 8GB Single-port Fibre-Channel HBA			
56	PCI-e 8GB Dual-port Fibre-Channel HBA			
57	PCI-e 1GbE iSCSI Adapter			
58	10GbE CNA Dual Port			
59	300GB eMLC I/O Accelerator			
60	DELETE			
61	600GB eMLC I/O Accelerator			
62	DELETE			
63	1.2TB eMLC I/O Accelerator			
	Network Adapters			
64	64-Bit PCI-e 1000 Base-T Server Adapter - Single port			
65	64-Bit PCI-e 1000 Base-T Server Adapter - Dual port			
66	64-Bit PCI-e 1000 Base-T Server Adapter - Quad port			
67	64-Bit PCI-e 1000 Base-SX Server Adapter - Single port			
68	64-Bit PCI-e 10GSFP+ Server Adapter - Dual port			
	Component Group D			
	Server Management			
69	Add-on or integrated Server Management Adapter with software			
	Power Supply			
70	Redundant Hot-swap/hot-plug Power Supply Kit			
	Display and Keyboard			
71	1U Rack-mountable 17" TFT fold away display with keyboard/pointing			
	KVM Switchbox			
72	8-port rack-mountable Analog KVM switch			
73	8-port rack-mountable Digital KVM switch with SNMP support			
74	16-port rack-mountable Analog KVM switch			
75	16-port rack-mountable Digital KVM switch with SNMP support			
76	32-port rack-mountable Analog KVM switch			
77	32-port rack-mountable Digital KVM switch with SNMP support			

Category 2.0S Rack-Optimized 2-Socket 2U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Uninterruptible Power Supplies w/ power cables			
78	Uninterruptible Power Supply 1.5KVA (1000W) - rack mount			
79	Uninterruptible Power Supply 3KVA (1920W) - rack mount			
80	Uninterruptible Power Supply 5KVA (3300W) - rack mount			
	Power Distribution Units (PDU) w/ respective power cables			
81	Power Distribution Unit - 110V - 15A			
82	Power Distribution Unit - 110V - 20A			
83	Power Distribution Unit - 220V - 20A			
84	Power Distribution Unit - 220V - 30A			
	19" Rack			
85	Minimum 41U Large-Rack w/ Side-Panels			

Category 2.1S Rack-Optimized Enterprise 2-Socket 2U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	DEFAULT SYSTEM			
1	Base Unit			
2	2 x CPU			
3	256GB RAM			
4	Disk Controller w/ 512MB ECC Cache, RAID 0, 1, 5 & 6			
5	4 x 300GB 10K SAS HDD			
6	4 x 64-Bit PCI-e Gen 2 slots			
7	2 port 1Gb or 1 port 10Gb NIC			
8	One 8X DVD-ROM or ILO/ILOM			
9	2 x Power Supply (Redundant)			
10	Standard On-Site Maintenance Service: 3 Years			
	System Upgrade / Downgrade			
	CPU Model Upgrade / Downgrade (where N = Default model)			
11	UPGRADE to N + 1 (Maximum number of CPUs)			
12	UPGRADE to N + 1 (Half the number of CPUs)			
13	DOWNGRADE to half the number of N			
14	DOWNGRADE to N - 1 (Maximum number of CPUs)			
15	DOWNGRADE to N - 1 (Half the number of CPUs)			
	Disk Controller Upgrade			
16	Upgrade from 512MB cache to 1GB ECC BBWC (Battery-Backed-			
	Optical Drive Upgrade			
17	DOWNGRADE Optical Drive to 0			
	HDD Downgrade			
18	Dowgrade to 0 - HDD			
	Installation Upgrade			
19	System Installation at end user site			
	Warranty Upgrade			
20	Standard On-Site Maintenance Service: 4 Years			
21	Standard On-Site Maintenance Service: 5 Years			
22	4-hour response On-Site Maintenance Service: 3 Years			
23	4-hour response On-Site Maintenance Service: 4 Years			
24	4-hour response On-Site Maintenance Service: 5 Years			
25	Enhanced On-Site Maintenance Service: 3 Years			
26	Enhanced On-Site Maintenance Service: 4 Years			

Category 2.1S Rack-Optimized Enterprise 2-Socket 2U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
27	Enhanced On-Site Maintenance Service: 5 Years			
	System Component			
	Component Group A			
	Memory (Single DIMM Module)			
28	4GB ECC SDRAM Memory - A			
29	4GB ECC SDRAM Memory - B			
30	8GB ECC SDRAM Memory - A			
31	8GB ECC SDRAM Memory - B			
32	16GB ECC SDRAM Memory - A			
33	16GB ECC SDRAM Memory - B			
34	32GB ECC SDRAM Memory - A			
35	32GB ECC SDRAM Memory - B			
	Component Group B			
	Disk Array Solution (HDDs, Cabinet, and Controller)			
36	PCI-e Controller supporting RAID 0, 1, 5, 10 w/ 512MB ECC BBWC			
37	12-Bay Rack-Mount (JBOD) Hot-Swap/Hot-Plug Drive Cabinet			
38	146GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
39	300GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
40	500GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
41	1TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
42	2TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
43	3TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
	System Disks			
44	DELETE			
45	DELETE			
46	300GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
47	500GB NL-SAS or SATA HDD w/ hot-swap drive carrier (7200 RPM) 2.5"			
48	900GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
49	100GB eMLC SATA-SSD			
50	100GB eMLC SAS-SSD			
51	200GB eMLC SATA-SSD			
52	200GB eMLC SAS-SSD			
53	400GB eMLC SATA-SSD			
54	400GB eMLC SAS-SSD			

Category 2.1S Rack-Optimized Enterprise 2-Socket 2U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Component Group C			
	Host Bus Adapter			
55	PCI-e 8GB Single-port Fibre-Channel HBA			
56	PCI-e 8GB Dual-port Fibre-Channel HBA			
57	PCI-e 1GbE iSCSI Adapter			
58	10GbE CNA Dual Port			
59	300GB eMLC I/O Accelerator			
60	DELETE			
61	600GB eMLC I/O Accelerator			
62	DELETE			
63	1.2TB eMLC I/O Accelerator			
	Network Adapters			
64	64-Bit PCI-e 1000 Base-T Server Adapter - Single port			
65	64-Bit PCI-e 1000 Base-T Server Adapter - Dual port			
66	64-Bit PCI-e 1000 Base-T Server Adapter - Quad port			
67	64-Bit PCI-e 1000 Base-SX Server Adapter - Single port			
68	64-Bit PCI-e 10GSFP+ Server Adapter - Dual port			
	Component Group D			
	Server Management			
69	Add-on or integrated Server Management Adapter with software			
	Power Supply			
70	Redundant Hot-swap/hot-plug Power Supply Kit			
	Display and Keyboard			
71	1U Rack-mountable 17" TFT fold away display with keyboard/pointing			
	KVM Switchbox			
72	8-port rack-mountable Analog KVM switch			
73	8-port rack-mountable Digital KVM switch with SNMP support			
74	16-port rack-mountable Analog KVM switch			
75	16-port rack-mountable Digital KVM switch with SNMP support			
76	32-port rack-mountable Analog KVM switch			
77	32-port rack-mountable Digital KVM switch with SNMP support			

Category 2.1S Rack-Optimized Enterprise 2-Socket 2U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Uninterruptible Power Supplies w/ power cables			
78	Uninterruptible Power Supply 1.5KVA (1000W) - rack mount			
79	Uninterruptible Power Supply 3KVA (1920W) - rack mount			
80	Uninterruptible Power Supply 5KVA (3300W) - rack mount			
	Power Distribution Units (PDU) w/ respective power cables			
81	Power Distribution Unit - 110V - 15A			
82	Power Distribution Unit - 110V - 20A			
83	Power Distribution Unit - 220V - 20A			
84	Power Distribution Unit - 220V - 30A			
	19" Rack			
85	Minimum 41U Large-Rack w/ Side-Panels			

Category 3.0S Pedestal-To-Rack Convertible Departmental 2-So

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	DEFAULT SYSTEM			
1	Base Unit			
2	2 x CPU			
3	128GB RAM			
4	Disk Controller w/ 512MB ECC Cache, RAID 0, 1, 5 & 6			
5	4 x 300GB 10K SAS HDD			
6	7 x 64-Bit PCI-e Gen 2 slots			
7	2 port 1Gb or 1 port 10Gb NIC			
8	One 8X DVD-ROM or ILO/ILOM			
9	2 x Power Supply (Redundant)			
10	Standard On-Site Maintenance Service: 3 Years			
	System Upgrade / Downgrade			
	CPU Model Upgrade / Downgrade (where N = Default model)			
11	UPGRADE to N + 1 (Maximum number of CPUs)			
12	UPGRADE to N + 1 (Half the number of CPUs)			
13	DOWNGRADE to half the number of N			
14	DOWNGRADE to N - 1 (Maximum number of CPUs)			
15	DOWNGRADE to N - 1 (Half the number of CPUs)			
	Disk Controller Upgrade			
16	Upgrade from 512MB cache to 1GB ECC BBWC (Battery-Backed-			
	Optical Drive Upgrade			
17	DOWNGRADE Optical Drive to 0			
	HDD Downgrade			
18	Dowgrade to 0 - HDD			
	Installation Upgrade			
19	System Installation at end user site			
	Warranty Upgrade			
20	Standard On-Site Maintenance Service: 4 Years			
21	Standard On-Site Maintenance Service: 5 Years			
22	4-hour response On-Site Maintenance Service: 3 Years			
23	4-hour response On-Site Maintenance Service: 4 Years			
24	4-hour response On-Site Maintenance Service: 5 Years			
25	Enhanced On-Site Maintenance Service: 3 Years			
26	Enhanced On-Site Maintenance Service: 4 Years			

Category 3.0S Pedestal-To-Rack Convertible Departmental 2-So

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
27	Enhanced On-Site Maintenance Service: 5 Years			
	System Component			
	Component Group A			
	Memory (Single DIMM Module)			
28	4GB ECC SDRAM Memory - A			
29	4GB ECC SDRAM Memory - B			
30	8GB ECC SDRAM Memory - A			
31	8GB ECC SDRAM Memory - B			
32	16GB ECC SDRAM Memory - A			
33	16GB ECC SDRAM Memory - B			
34	32GB ECC SDRAM Memory - A			
35	32GB ECC SDRAM Memory - B			
	Component Group B			
	Disk Array Solution (HDDs, Cabinet, and Controller)			
36	PCI-e Controller supporting RAID 0, 1, 5, 10 w/ 512MB ECC BBWC			
37	12-Bay Rack-Mount (JBOD) Hot-Swap/Hot-Plug Drive Cabinet			
38	146GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
39	300GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
40	500GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
41	1TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
42	2TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
43	3TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
	System Disks			
44	DELETE			
45	DELETE			
46	300GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
47	500GB NL-SAS or SATA HDD w/ hot-swap drive carrier (7200 RPM) 2.5"			
48	900GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
49	100GB eMLC SATA-SSD			
50	100GB eMLC SAS-SSD			
51	200GB eMLC SATA-SSD			
52	200GB eMLC SAS-SSD			
53	400GB eMLC SATA-SSD			
54	400GB eMLC SAS-SSD			

Category 3.0S Pedestal-To-Rack Convertible Departmental 2-So

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Component Group C			
	Host Bus Adapter			
55	PCI-e 8GB Single-port Fibre-Channel HBA			
56	PCI-e 8GB Dual-port Fibre-Channel HBA			
57	PCI-e 1GbE iSCSI Adapter			
58	10GbE CNA Dual Port			
59	300GB eMLC I/O Accelerator			
60	DELETE			
61	600GB eMLC I/O Accelerator			
62	DELETE			
63	1.2TB eMLC I/O Accelerator			
	Network Adapters			
64	64-Bit PCI-e 1000 Base-T Server Adapter - Single port			
65	64-Bit PCI-e 1000 Base-T Server Adapter - Dual port			
66	64-Bit PCI-e 1000 Base-T Server Adapter - Quad port			
67	64-Bit PCI-e 1000 Base-SX Server Adapter - Single port			
68	64-Bit PCI-e 10GSFP+ Server Adapter - Dual port			
	Component Group D			
	Server Management			
69	Add-on or integrated Server Management Adapter with software			
	Power Supply			
70	Redundant Hot-swap/hot-plug Power Supply Kit			
	Display and Keyboard			
71	1U Rack-mountable 17" TFT fold away display with keyboard/pointing			
	KVM Switchbox			
72	8-port rack-mountable Analog KVM switch			
73	8-port rack-mountable Digital KVM switch with SNMP support			
74	16-port rack-mountable Analog KVM switch			
75	16-port rack-mountable Digital KVM switch with SNMP support			
76	32-port rack-mountable Analog KVM switch			
77	32-port rack-mountable Digital KVM switch with SNMP support			

Category 3.0S Pedestal-To-Rack Convertible Departmental 2-So

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Uninterruptible Power Supplies w/ power cables			
78	Uninterruptible Power Supply 1.5KVA (1000W) - rack mount			
79	Uninterruptible Power Supply 3KVA (1920W) - rack mount			
80	Uninterruptible Power Supply 5KVA (3300W) - rack mount			
	Power Distribution Units (PDU) w/ respective power cables			
81	Power Distribution Unit - 110V - 15A			
82	Power Distribution Unit - 110V - 20A			
83	Power Distribution Unit - 220V - 20A			
84	Power Distribution Unit - 220V - 30A			
	19" Rack			
85	Minimum 41U Large-Rack w/ Side-Panels			

Category 4.0S Rack-Mount Departmental 4-Socket 4U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	DEFAULT SYSTEM			
1	Base Unit			
2	4 x CPU			
3	256GB RAM			
4	Disk Controller w/ 512MB ECC Cache, RAID 0, 1, 5 & 6			
5	4 x 300GB 10K SAS HDD			
6	6 x 64-Bit PCI-e Gen 2 slots			
7	4 port 1Gb or 2 port 10Gb NIC			
8	One 8X DVD-ROM or ILO/ILOM			
9	2 x Power Supply (Redundant)			
10	Standard On-Site Maintenance Service: 3 Years			
	System Upgrade / Downgrade			
	CPU Model Upgrade / Downgrade (where N = Default model)			
11	UPGRADE to N + 1 (Maximum number of CPUs)			
12	UPGRADE to N + 1 (Half the number of CPUs)			
13	DOWNGRADE to half the number of N			
14	DOWNGRADE to N - 1 (Maximum number of CPUs)			
15	DOWNGRADE to N - 1 (Half the number of CPUs)			
	Disk Controller Upgrade			
16	Upgrade from 512MB cache to 1GB ECC BBWC (Battery-Backed-			
	Optical Drive Upgrade			
17	DOWNGRADE Optical Drive to 0			
	HDD Downgrade			
18	Dowgrade to 0 - HDD			
	Installation Upgrade			
19	System Installation at end user site			
	Warranty Upgrade			
20	Standard On-Site Maintenance Service: 4 Years			
21	Standard On-Site Maintenance Service: 5 Years			
22	4-hour response On-Site Maintenance Service: 3 Years			
23	4-hour response On-Site Maintenance Service: 4 Years			
24	4-hour response On-Site Maintenance Service: 5 Years			
25	Enhanced On-Site Maintenance Service: 3 Years			
26	Enhanced On-Site Maintenance Service: 4 Years			

Category 4.0S Rack-Mount Departmental 4-Socket 4U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
27	Enhanced On-Site Maintenance Service: 5 Years			
	System Component			
	Component Group A			
	Memory (Single DIMM Module)			
28	4GB ECC SDRAM Memory - A			
29	4GB ECC SDRAM Memory - B			
30	8GB ECC SDRAM Memory - A			
31	8GB ECC SDRAM Memory - B			
32	16GB ECC SDRAM Memory - A			
33	16GB ECC SDRAM Memory - B			
34	32GB ECC SDRAM Memory - A			
35	32GB ECC SDRAM Memory - B			
	Component Group B			
	Disk Array Solution (HDDs, Cabinet, and Controller)			
36	PCI-e Controller supporting RAID 0, 1, 5, 10 w/ 512MB ECC BBWC			
37	12-Bay Rack-Mount (JBOD) Hot-Swap/Hot-Plug Drive Cabinet			
38	146GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
39	300GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
40	500GB SAS HDD w/ hot-swap drive carrier (15K RPM)			
41	1TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
42	2TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
43	3TB SATA HDD w/ hot-swap drive carrier (7200 RPM)			
	System Disks			
44	DELETE			
45	DELETE			
46	300GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
47	500GB NL-SAS or SATA HDD w/ hot-swap drive carrier (7200 RPM) 2.5"			
48	900GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
49	100GB eMLC SATA-SSD			
50	100GB eMLC SAS-SSD			
51	200GB eMLC SATA-SSD			
52	200GB eMLC SAS-SSD			
53	400GB eMLC SATA-SSD			
54	400GB eMLC SAS-SSD			

Category 4.0S Rack-Mount Departmental 4-Socket 4U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Component Group C			
	Host Bus Adapter			
55	PCI-e 8GB Single-port Fibre-Channel HBA			
56	PCI-e 8GB Dual-port Fibre-Channel HBA			
57	PCI-e 1GbE iSCSI Adapter			
58	10GbE CNA Dual Port			
59	300GB eMLC I/O Accelerator			
60	DELETE			
61	600GB eMLC I/O Accelerator			
62	DELETE			
63	1.2TB eMLC I/O Accelerator			
	Network Adapters			
64	64-Bit PCI-e 1000 Base-T Server Adapter - Single port			
65	64-Bit PCI-e 1000 Base-T Server Adapter - Dual port			
66	64-Bit PCI-e 1000 Base-T Server Adapter - Quad port			
67	64-Bit PCI-e 1000 Base-SX Server Adapter - Single port			
68	64-Bit PCI-e 10GSFP+ Server Adapter - Dual port			
	Component Group D			
	Server Management			
69	Add-on or integrated Server Management Adapter with software			
	Power Supply			
70	Redundant Hot-swap/hot-plug Power Supply Kit			
	Display and Keyboard			
71	1U Rack-mountable 17" TFT fold away display with keyboard/pointing			
	KVM Switchbox			
72	8-port rack-mountable Analog KVM switch			
73	8-port rack-mountable Digital KVM switch with SNMP support			
74	16-port rack-mountable Analog KVM switch			
75	16-port rack-mountable Digital KVM switch with SNMP support			
76	32-port rack-mountable Analog KVM switch			
77	32-port rack-mountable Digital KVM switch with SNMP support			

Category 4.0S Rack-Mount Departmental 4-Socket 4U

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Uninterruptible Power Supplies w/ power cables			
78	Uninterruptible Power Supply 1.5KVA (1000W) - rack mount			
79	Uninterruptible Power Supply 3KVA (1920W) - rack mount			
80	Uninterruptible Power Supply 5KVA (3300W) - rack mount			
	Power Distribution Units (PDU) w/ respective power cables			
81	Power Distribution Unit - 110V - 15A			
82	Power Distribution Unit - 110V - 20A			
83	Power Distribution Unit - 220V - 20A			
84	Power Distribution Unit - 220V - 30A			
	19" Rack			
85	Minimum 41U Large-Rack w/ Side-Panels			

Category 1.0B Blade Chassis / Enclosure

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	DEFAULT SYSTEM			
1	Chassis / Enclosure			
2	Optical Drive Module or ILO / ILOM			
3	Redundant (Power & Cooling Sub-system)			
4	Standard On-Site Maintenance Service: 3 Years			
	System Upgrade / Downgrade			
	Installation Upgrade			
5	Chassis / Enclosure Installation at end user site			
	Warranty Upgrade			
6	Standard On-Site Maintenance Service: 4 Years			
7	Standard On-Site Maintenance Service: 5 Years			
8	4-hour response On-Site Maintenance Service: 3 Years			
9	4-hour response On-Site Maintenance Service: 4 Years			
10	4-hour response On-Site Maintenance Service: 5 Years			
11	Enhanced On-Site Maintenance Service: 3 Years			
12	Enhanced On-Site Maintenance Service: 4 Years			
13	Enhanced On-Site Maintenance Service: 5 Years			
	SYSTEM COMPONENTS			
	Component Group A			
	Chassis / Enclosure Expansion Modules			
14	Management Module			
14.1	Management software including Rapid-Deployment tools			
15	1Gb Copper ethernet (network) switch - Model A			
16	1Gb Copper ethernet (network) switch - Model B			
17	1Gb Fibre ethernet (network) switch - Model A			
18	1Gb Fibre ethernet (network) switch - Model B			
19	10GbE (network) switch with corresponding license - Model A			
19.1	10GbE (network) switch with corresponding license - Model B			
20	10-port 8Gb SAN Switch (including 10-port licenses) - Model A			
21	10-port 8Gb SAN Switch (including 10-port licenses) - Model B			
22	License for remaining 10-ports 8Gb SAN Switch - Model A			
23	License for remaining 10-ports 8Gb SAN Switch - Model B			
24	10Gb Ethernet Pass-Through Module			
25	8Gb Fibre-Channel Pass-Thru Module			

Category 1.0B Blade Chassis / Enclosure

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
25.5	FCoE Switch (including 10-port licenses)			
25.6	License for remaining 10-ports (FCoE)			
25.7	License per port (FCoE)			
	Component Group B			
	Expansion Module Tranceivers & Cables			
28	8Gb Short-Wave SFP Tranceiver			
29	8Gb Long-Wave SFP Tranceiver			
30	1M Twinax 10Gb cables			
31	3M Twinax 10Gb cables			
32	5M Twinax 10Gb cables			
33	10M Twinax 10Gb cables			
35	10Gb SR Optical tranceiver			
	Component Group C			
	Display and Keyboard			
36	1U Rack-mountable 17" TFT fold away display with keyboard/pointing			
	Uninterruptible Power Supplies w/ power cables			
37	Uninterruptible Power Supply 5KVA - rack mount			
	Power Distribution Units (PDU) w/ respective power cables			
38	Single-Phase Power Distribution Unit - 220V - 30A			
39	Three-Phase Power Distribution Unit - 220V - 60A			
	19" Rack			
40	Minimum 41U Large-Rack w/ Side-Panels			

Category 2.0B 2-Socket Blade

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	DEFAULT SYSTEM			
1	Base Unit			
2	2 x CPU			
3	128GB RAM			
4	Integrated Disk Controller w/ support for RAID 0 and 1			
5	2 x 100GB eMLC SSD			
6	1 x Mezzanine slot			
7	4 port 1Gb or 2 port 10Gb NIC			
8	Standard On-Site Maintenance Service: 3 Years			
	System Upgrade / Downgrade			
	CPU Model Upgrade / Downgrade (where N = Default model)			
9	UPGRADE to N + 1 (Maximum number of CPUs)			
10	UPGRADE to N + 1 (Half the number of CPUs)			
11	DOWNGRADE to half the number of N			
12	DOWNGRADE to N - 1 (Maximum number of CPUs)			
13	DOWNGRADE to N - 1 (Half the number of CPUs)			
	HDD Downgrade			
14	Dowgrade to 0 - HDD			
	Installation Upgrade			
15	System Installation at end user site			
	Warranty Upgrade			
16	Standard On-Site Maintenance Service: 4 Years			
17	Standard On-Site Maintenance Service: 5 Years			
18	4-hour response On-Site Maintenance Service: 3 Years			
19	4-hour response On-Site Maintenance Service: 4 Years			
20	4-hour response On-Site Maintenance Service: 5 Years			
21	Enhanced On-Site Maintenance Service: 3 Years			
22	Enhanced On-Site Maintenance Service: 4 Years			
23	Enhanced On-Site Maintenance Service: 5 Years			

Category 2.0B 2-Socket Blade

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	SYSTEM COMPONENTS			
	Component Group A			
	Memory (Single DIMM Module)			
24	4GB ECC SDRAM Memory - A			
25	4GB ECC SDRAM Memory - B			
26	8GB ECC SDRAM Memory - A			
27	8GB ECC SDRAM Memory - B			
28	16GB ECC SDRAM Memory - A			
29	16GB ECC SDRAM Memory - B			
30	32GB ECC SDRAM Memory - A			
31	32GB ECC SDRAM Memory - B			
	Component Group B			
	I/O Cards			
32	Multi-Port 8GB Fibre HBA Model A			
33	Multi-Port 8GB Fibre HBA Model B			
34	Multi-Port Infiniband HCA			
35	2-port Blade 1Gb Ethernet Expansion Card / Adapter			
36	4-port Blade 1Gb Ethernet Expansion Card / Adapter			
37	2-port Blade 10Gb Expansion Card / Adapter (Ethernet and/or Fibre) Model			
38	2-port Blade 10Gb Expansion Card / Adapter (Ethernet and/or Fibre) Model			
39	300GB eMLC I/O Accelerator			
40	DELETE			
41	600GB eMLC I/O Accelerator			
42	DELETE			

Category 2.0B 2-Socket Blade

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Component Group C			
	System Disks			
43	DELETE			
44	DELETE			
45	300GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
46	500GB NL-SAS or SATA HDD w/ hot-swap drive carrier (7200 RPM) 2.5"			
47	900GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
48	100GB eMLC SATA-SSD			
49	100GB eMLC SAS-SSD			
50	200GB eMLC SATA-SSD			
51	200GB eMLC SAS-SSD			
52	400GB eMLC SATA-SSD			
53	400GB eMLC SAS-SSD			

Category 2.1B 2-Socket Blade Enterprise

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	DEFAULT SYSTEM			
1	Base Unit			
2	2 x CPU			
3	128GB RAM			
4	Integrated Disk Controller w/ support for RAID 0 and 1			
5	2 x 100GB eMLC SSD			
6	1 x Mezzanine slot			
7	2 port 1Gb or 1 port 10Gb NIC			
8	Standard On-Site Maintenance Service: 3 Years			
	System Upgrade / Downgrade			
	CPU Model Upgrade / Downgrade (where N = Default model)			
9	UPGRADE to N + 1 (Maximum number of CPUs)			
10	UPGRADE to N + 1 (Half the number of CPUs)			
11	DOWNGRADE to half the number of N			
12	DOWNGRADE to N - 1 (Maximum number of CPUs)			
13	DOWNGRADE to N - 1 (Half the number of CPUs)			
	HDD Downgrade			
14	Dowgrade to 0 - HDD			
	Installation Upgrade			
15	System Installation at end user site			
	Warranty Upgrade			
16	Standard On-Site Maintenance Service: 4 Years			
17	Standard On-Site Maintenance Service: 5 Years			
18	4-hour response On-Site Maintenance Service: 3 Years			
19	4-hour response On-Site Maintenance Service: 4 Years			
20	4-hour response On-Site Maintenance Service: 5 Years			
21	Enhanced On-Site Maintenance Service: 3 Years			
22	Enhanced On-Site Maintenance Service: 4 Years			
23	Enhanced On-Site Maintenance Service: 5 Years			

Category 2.1B 2-Socket Blade Enterprise

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	SYSTEM COMPONENTS			
	Component Group A			
	Memory (Single DIMM Module)			
24	4GB ECC SDRAM Memory - A			
25	4GB ECC SDRAM Memory - B			
26	8GB ECC SDRAM Memory - A			
27	8GB ECC SDRAM Memory - B			
28	16GB ECC SDRAM Memory - A			
29	16GB ECC SDRAM Memory - B			
30	32GB ECC SDRAM Memory - A			
31	32GB ECC SDRAM Memory - B			
	Component Group B			
	I/O Cards			
32	Multi-Port 8GB Fibre HBA Model A			
33	Multi-Port 8GB Fibre HBA Model B			
34	Multi-Port Infiniband HCA			
35	2-port Blade 1Gb Ethernet Expansion Card / Adapter			
36	4-port Blade 1Gb Ethernet Expansion Card / Adapter			
37	2-port Blade 10Gb Expansion Card / Adapter (Ethernet and/or Fibre) Model			
38	2-port Blade 10Gb Expansion Card / Adapter (Ethernet and/or Fibre) Model			
39	300GB eMLC I/O Accelerator			
40	DELETE			
41	600GB eMLC I/O Accelerator			
42	DELETE			

Category 2.1B 2-Socket Blade Enterprise

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Component Group C			
	System Disks			
43	DELETE			
44	DELETE			
45	300GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
46	500GB NL-SAS or SATA HDD w/ hot-swap drive carrier (7200 RPM) 2.5"			
47	900GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
48	100GB eMLC SATA-SSD			
49	100GB eMLC SAS-SSD			
50	200GB eMLC SATA-SSD			
51	200GB eMLC SAS-SSD			
52	400GB eMLC SATA-SSD			
53	400GB eMLC SAS-SSD			

Category 3.0B 4-Socket Blade

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	DEFAULT SYSTEM			
1	Base Unit			
2	4 x CPU			
3	256GB RAM			
4	Integrated Disk Controller w/ support for RAID 0 and 1			
5	2 x 100GB eMLC SSD			
6	2 x Mezzanine slot			
7	2 port 1Gb or 1 port 10Gb NIC			
8	Standard On-Site Maintenance Service: 3 Years			
	System Upgrade / Downgrade			
	CPU Model Upgrade / Downgrade (where N = Default model)			
9	UPGRADE to N + 1 (Maximum number of CPUs)			
10	UPGRADE to N + 1 (Half the number of CPUs)			
11	DOWNGRADE to half the number of N			
12	DOWNGRADE to N - 1 (Maximum number of CPUs)			
13	DOWNGRADE to N - 1 (Half the number of CPUs)			
	HDD Downgrade			
14	Dowgrade to 0 - HDD			
	Installation Upgrade			
15	System Installation at end user site			
	Warranty Upgrade			
16	Standard On-Site Maintenance Service: 4 Years			
17	Standard On-Site Maintenance Service: 5 Years			
18	4-hour response On-Site Maintenance Service: 3 Years			
19	4-hour response On-Site Maintenance Service: 4 Years			
20	4-hour response On-Site Maintenance Service: 5 Years			
21	Enhanced On-Site Maintenance Service: 3 Years			
22	Enhanced On-Site Maintenance Service: 4 Years			
23	Enhanced On-Site Maintenance Service: 5 Years			

Category 3.0B 4-Socket Blade

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	SYSTEM COMPONENTS			
	Component Group A			
	Memory (Single DIMM Module)			
24	4GB ECC SDRAM Memory - A			
25	4GB ECC SDRAM Memory - B			
26	8GB ECC SDRAM Memory - A			
27	8GB ECC SDRAM Memory - B			
28	16GB ECC SDRAM Memory - A			
29	16GB ECC SDRAM Memory - B			
30	32GB ECC SDRAM Memory - A			
31	32GB ECC SDRAM Memory - B			
	Component Group B			
	I/O Cards			
32	Multi-Port 8GB Fibre HBA Model A			
33	Multi-Port 8GB Fibre HBA Model B			
34	Multi-Port Infiniband HCA			
35	2-port Blade 1Gb Ethernet Expansion Card / Adapter			
36	4-port Blade 1Gb Ethernet Expansion Card / Adapter			
37	2-port Blade 10Gb Expansion Card / Adapter (Ethernet and/or Fibre) Model			
38	2-port Blade 10Gb Expansion Card / Adapter (Ethernet and/or Fibre) Model			
39	300GB eMLC I/O Accelerator			
40	DELETE			
41	600GB eMLC I/O Accelerator			
42	DELETE			

Category 3.0B 4-Socket Blade

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Component Group C			
	System Disks			
43	DELETE			
44	DELETE			
45	300GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
46	500GB NL-SAS or SATA HDD w/ hot-swap drive carrier (7200 RPM) 2.5"			
47	900GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
48	100GB eMLC SATA-SSD			
49	100GB eMLC SAS-SSD			
50	200GB eMLC SATA-SSD			
51	200GB eMLC SAS-SSD			
52	400GB eMLC SATA-SSD			
53	400GB eMLC SAS-SSD			

Category 3.1B 4-Socket Blade Enterprise

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	DEFAULT SYSTEM			
1	Base Unit			
2	4 x CPU			
3	256GB RAM			
4	Integrated Disk Controller w/ support for RAID 0 and 1			
5	2 x 100GB eMLC SSD			
6	2 x Mezzanine slot			
7	4 port 1Gb or 2 port 10Gb NIC			
8	Standard On-Site Maintenance Service: 3 Years			
	System Upgrade / Downgrade			
	CPU Model Upgrade / Downgrade (where N = Default model)			
9	UPGRADE to N + 1 (Maximum number of CPUs)			
10	UPGRADE to N + 1 (Half the number of CPUs)			
11	DOWNGRADE to half the number of N			
12	DOWNGRADE to N - 1 (Maximum number of CPUs)			
13	DOWNGRADE to N - 1 (Half the number of CPUs)			
	HDD Downgrade			
14	Dowgrade to 0 - HDD			
	Installation Upgrade			
15	System Installation at end user site			
	Warranty Upgrade			
16	Standard On-Site Maintenance Service: 4 Years			
17	Standard On-Site Maintenance Service: 5 Years			
18	4-hour response On-Site Maintenance Service: 3 Years			
19	4-hour response On-Site Maintenance Service: 4 Years			
20	4-hour response On-Site Maintenance Service: 5 Years			
21	Enhanced On-Site Maintenance Service: 3 Years			
22	Enhanced On-Site Maintenance Service: 4 Years			
23	Enhanced On-Site Maintenance Service: 5 Years			

Category 3.1B 4-Socket Blade Enterprise

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	SYSTEM COMPONENTS			
	Component Group A			
	Memory (Single DIMM Module)			
24	4GB ECC SDRAM Memory - A			
25	4GB ECC SDRAM Memory - B			
26	8GB ECC SDRAM Memory - A			
27	8GB ECC SDRAM Memory - B			
28	16GB ECC SDRAM Memory - A			
29	16GB ECC SDRAM Memory - B			
30	32GB ECC SDRAM Memory - A			
31	32GB ECC SDRAM Memory - B			
	Component Group B			
	I/O Cards			
32	Multi-Port 8GB Fibre HBA Model A			
33	Multi-Port 8GB Fibre HBA Model B			
34	Multi-Port Infiniband HCA			
35	2-port Blade 1Gb Ethernet Expansion Card / Adapter			
36	4-port Blade 1Gb Ethernet Expansion Card / Adapter			
37	2-port Blade 10Gb Expansion Card / Adapter (Ethernet and/or Fibre) Model			
38	2-port Blade 10Gb Expansion Card / Adapter (Ethernet and/or Fibre) Model			
39	300GB eMLC I/O Accelerator			
40	DELETE			
41	600GB eMLC I/O Accelerator			
42	DELETE			

Category 3.1B 4-Socket Blade Enterprise

Item No.	Item Summary (see Annex A for full Specs)	Manufacturer and Model	Part #	URL for specifications
	Component Group C			
	System Disks			
43	DELETE			
44	DELETE			
45	300GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
46	500GB NL-SAS or SATA HDD w/ hot-swap drive carrier (7200 RPM) 2.5"			
47	900GB SAS HDD w/ hot-swap drive carrier (10K RPM) 2.5"			
48	100GB eMLC SATA-SSD			
49	100GB eMLC SAS-SSD			
50	200GB eMLC SATA-SSD			
51	200GB eMLC SAS-SSD			
52	400GB eMLC SATA-SSD			
53	400GB eMLC SAS-SSD			

ANNEX K: TECHNICAL OFFER**1.1** A complete technical offer consists of the following:

- (a) **Table of Contents (Requested at bid closing)**
- (b) **List of Products, without Pricing (Mandatory at bid closing):** The Technical Offer must include a complete list of Products with part numbers, quantities, etc., which is identical to that provided in the Financial Offer, but without pricing. Offerors are requested to use the Annex entitled "List of Products" to provide this information.

If an Offeror offers two Systems for the same Category, it can do so in the same offer. The Systems must be clearly labeled as different Systems (e.g., System A and System B).
- (c) **Substantiation of Compliance to Technical Specifications (Mandatory at bid closing):** The Technical Offer must substantiate the compliance of the Offeror and its Products to the requirements described in every subparagraph in the Annex entitled "Technical Specifications". To do this, Offerors are requested to use Form 4 – Substantiation of Compliance Matrix to provide this information (therefore, while providing the information is mandatory, use of this form is not). The substantiation must not simply be a repetition of Canada's requirement, but must explain and demonstrate how the Offeror's Products will meet all the requirements of the referenced subparagraph. Simply stating that the Offeror or its Product complies is not sufficient. Also, where any given subparagraph includes more than one requirement, the substantiation must address all of them. Where Canada determines that the substantiation for any given Product is not complete, the offer for that Category will be considered non-responsive and disqualified. The substantiation may refer to additional documentation submitted with the offer – this information can be referenced in the "Reference" column of Form 4, where Offerors are requested to include the precise location of the reference material, including the title of the document, and the page and paragraph numbers; where a reference is not sufficiently precise, Canada may request that the Offeror direct Canada to the appropriate location in the documentation submitted with the offer.
- (d) **Declaration of Conformity (Requested at bid closing, information mandatory on request):** All system units must comply with the emission limits and labeling requirements set out in the Interference Causing Standard ICES-003, "Digital Apparatus", published by Industry Canada. If requested, the Offeror must supply an original copy of the entire certification report from an approved laboratory referencing the system's model number complete with all component brand names, detailing speed of processor, motherboard / system board tested and original photographs of the system unit showing front and rear views of the device.
- (e) **List of User Documentation and Technical Manuals (Requested at bid closing, information mandatory on request):** Each System must include an operator/user manual(s) available in both official languages. These manuals must be comprehensive guides that contain instructions for setting up, installing and configuring all components of the default system. CD/DVD-ROM media is acceptable.
- (f) **Proof of ISO Registration (Mandatory at bid closing):** The Technical Offer must include proof that, in respect of each System being offered, the Manufacturer(s), whether this is the Offeror or a third party, is registered under ISO 9001: 2008 by an accredited registrar under the ISO 9001: 2008 Program for the manufacturing facility where each specific System being offered is manufactured. The Offeror must identify the facility location by providing the complete address where each proposed System is manufactured/ assembled. The scope of the registration must also be specified. The registration must be verifiable as current, valid and accurate. ISO registration of a facility after the closing date for this solicitation does NOT satisfy this requirement.
- (g) **Proof of Canadian Electrical Code, Part 1, certification (Mandatory at bid closing):** The Technical Offer must include proof that all electrical equipment being offered is certified or approved for use in accordance with the Canadian Electrical Code, Part 1, by a certification organization accredited by the Standards Council of Canada (SCC) and bears the certification logo that is applicable to the accredited agency. NOTE: Offerors may obtain further information by contacting the SCC at 613-238-3222.
- (h) **Proof of FCC Class A certification (Mandatory at bid closing):** The Technical Offer must include proof that for each Product being offered that includes a digital apparatus, an accredited agency has

certified that it does not exceed the FCC Class A limits for radio noise emissions set out in the Radio Interference Regulations and the Products must bear the certification logo of the appropriate accredited agency.

- (i) **Microsoft Windows Server logo (Mandatory for all categories except for Categories 4.0B and 4.1B):** 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. Proof of certification for each system must be provided in the form of a copy of the certification report or in the form of a printout from the Microsoft Windows Server Catalog website. See URL <http://www.windowsservercatalog.com/results.aspx?bCatID=1333&cpID=0&avc=10&OR=1>
- (j) **Linux certification (Mandatory for all categories except for Categories 4.0B and 4.1B):** 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. Proof of certification for each system must be provided in the form of a copy of the certification report or in the form of a printout from the Red Hat Certified Hardware website or NOVELL YES Certified Bulletin website. See <https://hardware.redhat.com/> and <http://developer.novell.com/yessearch/Search.jsp>
- (k) **VMWare Certification (Mandatory for all categories except for Categories 1.0V, 4.0B and 4.1B):** Systems must have the following VMWare certification: Certified for vSphere 4.X **or** 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. Proof of certification for each system must be provided in the form of a copy of the certification report or in the form of a printout from the VMWare Compatibility Guide. See <http://www.vmware.com/resources/compatibility/search.php?deviceCategory=server>
- (l) **VMWare I/O device certification (Mandatory for all categories except for categories 1.0V, 4.0B, and 4.1B):** Systems must have vSphere 4.X and 5.X I/O level certified devices. . Proof of certification for each system I/O must be provided in the form of a copy of the certification report or in the form of a printout from the VMWare Compatibility Guide. See <http://www.vmware.com/resources/compatibility/search.p?deviceCategory=ioio>
- (m) **Personnel Support:** The Offeror must demonstrate that the technical support personnel identified to fulfill the requirements have the supporting certifications.
- (n) **Environmental Stewardship (Mandatory at bid closing):** The Technical Offer must include the following:
 - (i) Proof that the OEM is committed to a comprehensive, nationally recognised environmental standard as per Annex A, 4.0 (a).
 - (ii) All systems must be RoHS Certified.
 - (iii) The OEM must be a member in good standing of EPSC – Electronic Product Stewardship of Canada..
 - (iv) The OEM must be ISO 14001 certified.
 - (v) The OEM must have a “Contributor Membership” level to www.thegreengrid.org in good standing.
 - (vi) The OEM must have a plan or strategy in place for achieving EPA’s evolving Energy Star compliancy requirements for all systems.
 - (vii) The OEM must have a plan or strategy in place for achieving 80 PLUS compliancy requirements for all systems.

Note to Offerors: To supplement the written Technical Offer, proposed Systems in Categories 1.0S, 2.0sS, 2.1S

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3.0S, 4.0S, 1.0B, 2.0B 2.1B, 3.0B and 3.1B will be subject to Benchmark Testing, as described in this solicitation. The Offeror is responsible for all costs associated with the benchmark testing, including delivery, installation, and removal of the equipment and testing fees. All costs associated with the benchmark testing are nonrefundable and nonnegotiable. All proposed Systems, including bilingual documentation, must be delivered to the Intertek Benchmark lab (4C2, Place du Portage, Phase III, contact point of entry: Jon Drummond at 819-956-8355 or Michel Poirier at 819- 956-7720) for benchmark testing, no later than three (3) days following bid closing.

Note to Offerors: For existing Offerors who are proposing the exact same systems that have already qualified for the NMSO and meet the mandatory technical specifications of this solicitation, the Technical Offer will not required to be submitted. As it has already been done, benchmark testing will not be required for these systems.