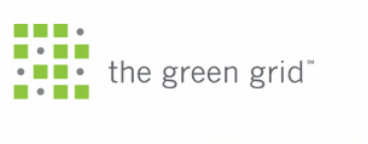

Response from The Green Grid to:

- **Revised ENERGY STAR® Computer Servers Definitions (4/25/08)**

The Green Grid Association, a consortium of industry leading companies welcomes the opportunity to comment on an early draft of topics under consideration for the ENERGY STAR for Computer Servers Specification. Some member companies of The Green Grid Association may in addition have provided additional considerations highlighted by their industry or company's particular perspective. Some members may have also provided their inputs through the Information Technology Industry Council (ITIC).

Introduction

Each of the Green Grid members welcomes the opportunity to comment and help clarify the definitions and characteristics of compute servers for the Energy Star™ program. Enclosed is a consensus response from the Green Grid membership and may not reflect a particular members' concern. We hope that this industry cross section and leadership organizations provides a representative view of the industry.

Overall

The Green Grid's feedback is focused on addressing and clarifying the two topics expressed in the memo sent 4/25/08 (appendix), regarding "computer server" definition and "qualifying products" for an Energy Star program. The Green Grid's overall view is that we should ensure we define describe all classes of servers in the "Definitions" section and highlight in the "Qualifying Products" section of the specification those classes that will be included in the program. TGG also recommends that the decision to include or not include a particular class of machine within the purview of the Energy Star for Servers program should be prioritized based on the availability industry standard metrics that address the energy efficiency of that class of sever. We look forward to further developing this and other portions of the specification. We continue to offer our assistance in the technical development and support future technical forums such as the July'08 workshop to facilitate this process. If you encounter any questions and/or desire additional support with these activities, please feel free to contact Henry ML Wong, henry.l.wong@intel.com or Don Tilton, dtilton@spraycool.com.

Please note that, although the comments reflect the consensus view of the Green Grid members, we do wish to note key points which have been voiced by individual members.

- One member noted that "volume" servers in several descriptions used in the market include 4 processor socket systems. The member did agree, however, that 4 processor socket systems generally contain increased resources, components and characteristics that increase its power consumption beyond a 1-2 processor socket system.
- A component manufacturer did believe that WOL may be an alternative to system management controller. The system manufacturers, however, all agree that WOL is not a substitute for a system management controller in a server.

A key point to note on "qualifying products", that, given the success of the ENERGY STAR brand, many customers are asking for Energy Star products even though they are not in scope. We would like to ensure that purchasers are educated in the program highlighting the fact that product categories not covered should not be considered inefficient or non-compliant, but, that the category is not in the program at this time.

Comments and Recommendation

Section 1. Definitions

The definition of "computer server" should be generic and not include a specification of the number of processor sockets Support for error-correcting code (ECC) and/or buffered memory for system memory should be included as a distinguishing characteristic for "computer servers." We would recommend that sub-categories of computer servers be established as follows:

a. Volume Server: 1-2 processor socket systems in 1-2U rack mount form factor
b. Blade Server: as described in the draft proposal, 3/25/08
c. Medium Server: 2-4 processor socket or more systems, with ≥16 GB of system memory
d. High-end Server: 4 processor socket or more systems, with ≥32 GB of system memory

The difference between these classifications of servers includes enhanced RAS (reliability, availability, and service-ability), I/O, networking, and/or data storage capabilities. The additional characteristics are, however, varied, application specific, and do not necessarily form sufficient descriptions to distinguish between the sub-categories. Each category requires additional or alternate capabilities within the systems and are not necessarily reflected in performance benchmarks. These differences in capabilities determine power levels that are only comparable in those sub-categories and should not be mixed in their evaluations. We do believe that the short description above will allow for enough of distinction to that class of machine without investigating the variations in the other attributes and features.

Addressing the question of WOL (Wake On LAN), we do not believe that a WOL feature is a substitute for a system management controller. A system management controller, whether a BMC or other configuration, provides for out-of-band and in-band management of the system operations to ensure business continuity. A WOL feature can be found on many computer systems including desktop PC's, and does not provide this level of system support, control or service level continuity.

With regard to the FCC Class A and EMC criteria, including a Class B (designed to be compliant for home use) is inconsistent with the motivation of including this general criteria. It is recognized that EMC (electro-magnetic compliance) criteria and Class-A description is somewhat orthogonal to the usage model of a server. The key aspect is a Class-A machine is designed to be applied for industrial applications as in a data center or enterprise server environment. As a result, one will not be able to use an FCC class A machine in areas like a home environment, where a desktop derived server is most applicable. Therefore, we recommend leaving the criteria as is, highlighting FCC Class A type systems.

We recommend the following enhancement to the network equipment description to further clarify the characteristics and application of this class of equipment.

Network Equipment: A product whose primary function is to provide data connectivity among the devices connected to its several ports. It does this by routing packets encapsulated according to Internet Protocol, Fibre Channel, InfiniBand or similar protocol. Common network equipment in data centers includes routers and switches.

Section 2. Qualifying Products (e.g. “Scope”)

We recommend that the list of classes of servers to be included within the purview of the specification be prioritized based on what class of machine can be “assessed” for energy efficiency. Prioritization is necessary to be able to balance both the scope of the specification and the schedules to implement the program. If an industry-standard energy efficiency assessment tool can not be developed for a sub-category of computer server, the sub-category should not be included in the specification scope until such time as an assessment tool is available.

We recommend the priority order of including a sub-category of server be the same as the order listed above for the “Definitions” section of the document. The priorities are consistent with prevalence of each class of system in the marketplace and the ability to assess the energy efficiency of the class.

We recognize that the availability of energy efficiency benchmarks for computer servers is very limited today. TGG also recognizes EPA’s desire to include some metric of energy efficiency beyond power supplies, as indicated by a request for a system Idle power limit. TGG recommends that to be consistent with consolidation and data center efficiencies, a system idle power specification not be used. If due to schedules, the EPA can not support SPEC’s timeline for a more comprehensive set of efficiency metrics, TGG does not believe a wide scope of products and system Idle is appropriate. We believe, however, that the appropriate option is to apply SPEC benchmarks after more work loads and categories can be addressed.

Given the apparent need for some limitation to the list of qualifying products, we recommend that the EPA explicitly highlight the categories not under consideration in the program, pending additional metrics to assess these categories. We would also recommend noting that the fact that these classes of computer servers do not have an Energy Star label only signifies that these machines are not being assessed at this time and in no-way reflects on whether the machines are more or less energy efficient.

Additional editorial comments

Section 1.F: "locked down" is jargon and should be explained.
Section 1.I: "high voltage" is generally in the range of 10-300 KV. Change to "higher voltage". "Must be separable from the main system" is misleading. An alternative may be: "is packaged in a separate unified chassis that may be separated from the main system, often while the computer server is in operation (i.e. "hot pluggable")."

Under "Storage Equipment", we would like to point out that archival is one of many processes of which storage may or may not be a part. So while not wrong, it is a little odd to call it out. "Data Replication" should be included as a sample storage application given its prevalence. We'd also suggest that "user-installed software" be clarified to read "user-provided software".

Note “Ac” and “Dc”, should be converted to “AC” and “DC” in the documentation.

Appendix

Document from EPA

ENERGY STAR® Revised Definitions for Computer Servers Based on Draft 1 Specification Comments

1) Definitions: Below are the definitions of the relevant terms in this document.

A. Computer Server: A computer that provides services and manages networked resources for client devices such as: desktop computers, notebook computers, thin clients, wireless devices, other computer servers and other networked devices. Computer servers primarily respond to requests and are accessed via network connections, and not through direct user input devices such as a keyboard, mouse, etc. For purposes of this specification, computer servers ***must include all*** of the following characteristics:

- Marketed and sold as a server;
- Designed and capable of having at most four processors (i.e., 1 - 4 individual processor sockets);
- Support for error-correcting code (ECC) and/or buffered memory;
- Dedicated management controller, such as Baseboard Management Controller (BMC), service processor, or ability to detect Wake On LAN (WOL) packets (Magic Packet and/or Directed Packet Filtering) to wake or power on from low power states;
- Include at least two ports for network communication capability, e.g., Ethernet, Fibre Channel, etc. (both ports can be the same technology);
- Include Reliability, Availability, Serviceability, and Manageability (RASM) features;
- Designed for and listed as supporting Server Operating Systems and/or Hypervisors, and targeted to run user-installed enterprise applications; and
- Designed and placed on the market as a Class A product as per EN55022:1994 under the EMC Directive 89/336.

Note: The purpose of including these detailed characteristics in the definition above is to (1) clearly delineate the types of computers covered by this specification and (2) separate servers covered by this specification from those products being addressed in the Version 5.0 computer specification, which is currently under development. Therefore, any "low end" computer server that does not meet the definition above will continue to be covered by the computer specification. For example, a desktop-derived server targeted to run user installed enterprise applications and which meets all of the requirements above is eligible for qualification under this server specification. All other desktop-derived servers, such as "home" or "media" servers, will continue to be covered by the computer specification. Lastly, servers with greater than four processor sockets are considered outside the scope of this specification, due primarily to their increased complexity, but may be considered in future revisions.

In the definition above, EPA is particularly interested in comments on:

(1) The use of Wake On LAN (WOL) as an alternative to a service processor or BMC

(2) The relevance of the Class A EMC designation and whether this should also refer to Class B under the directive.

Once this computer server definition has been established, EPA's next step will be to determine which types of servers will require further delineation based on their unique functionality and/or differences in energy performance. EPA has initiated this process as illustrated in the definitions for blade and appliance servers provided below.

B. Blade Chassis: An enclosure containing shared resources for the operation of blade servers and blade storage. These resources include power supply(s) for power conversion, dc power distribution, cooling, network hardware, and system management, and may also contain shared storage. A blade chassis contains multiple slots which can be populated with a number of blades of different sizes and are often capable of accommodating blades from different vendors.

C. Blade Server: A computer consisting of, at minimum, a processor and system memory that relies on certain shared resources (e.g., power supply, cooling, etc.). Blade servers are designed to be installed in a blade chassis and are incapable of operating independent of the chassis.

D. Blade Storage: A storage element that relies on certain shared resources, contained in a blade chassis. Blade storage units are incapable of operating independent of the blade chassis.

E. Direct Current (Dc) Server: A computer server designed to operate with a dc-dc power supply or a server which runs directly off dc voltage supplied to internal dc-dc converters from an external source.

F. Server Appliance: A self-contained server system bundled with a pre-installed operating system and application software that is used to perform a dedicated function or set of tightly coupled functions. Server appliances deliver services through one or more networks (e.g,. IP or SAN), and are typically locked down systems managed through a web interface. Server appliance hardware and software configurations are customized by the vendor to perform a specific task, and are not intended to execute user-supplied software. Example services that may be made available via a server appliance include: name services, firewall services, authentication services, and encryption services.

G. Storage Equipment: A system designed specifically to provide data storage external to the server and which may be part of an archival process. While storage equipment may contain an embedded processor, this processor is not made available to execute user- installed software applications, but may execute data specific applications, e.g. backup utilities, data compression, install agents, and other tasks.

H. Network Equipment: A product whose primary function is to route Internet Protocol traffic among ports connected to it. In data centers this includes switches and routers.

Note: Definitions for blade servers and server appliances were created because they may require the development of separate requirements in future drafts based on differences in design and functionality compared to the larger server population covered by this specification. Additional types of servers may be defined in future drafts, as necessary. For example, it was suggested that EPA include definitions for network and telecom servers. EPA also created definitions for storage equipment, blade storage, and network equipment to ensure that these product types are properly excluded. Several of these definitions have been modified based on the Draft 1 comments. EPA is interested in stakeholder feedback on the above definitions, as well as feedback on specific product types (e.g., network servers, firewall servers, etc.) and where they fit best based on the definitions outlined above.

Computer Server Power Supplies

I. Computer Server Power Supply: A server component designed to convert high voltage input power to lower voltage dc output(s) for the purpose of powering the server. A computer server power supply must be separable from the main system and must connect to the system via a removable or hard-wired male/female electrical connection, cable, cord or other wiring.

J. Ac-Dc Power Supply: A power supply designed to convert line voltage ac input power into lower voltage dc output(s) for use by the server.

K. Dc-Dc Power Supply: A power supply designed to convert dc input voltage from one level (including -48 V dc) into lower voltage dc output(s) for use by the server. Dc-to-dc converters (also known as voltage regulators) internal to the product and used to convert low dc voltage (e.g. 12 V dc) into other dc voltages for use by the individual server components are not considered dc-dc power supplies under this specification.

L. Single-Voltage Power Supply: A power supply designed to convert high voltage input power into only one single lower dc voltage output. Although single-voltage power supplies only provide one primary voltage for powering the server during operation, they may also include one or more lower voltage standby rails (typically 5 V dc) used only to initiate start-up when the main system is powered down.

M. Multi-Voltage Power Supply: A power supply designed to convert high voltage input power simultaneously into multiple different lower dc voltage outputs. There may be other low power DC output voltage(s) for standby power.

Note: This section has been revised to be more inclusive of dc-dc power supplies. EPA is continuing to investigate the technical feasibility of including servers that utilize dc-dc power supplies in this specification. The definition for single-voltage power supplies has been amended to indicate that power supplies with a dedicated standby rail are still considered single-voltage supplies for the purposes of this specification.

2) Qualifying Products: A computer server must meet the definition provided in Section 1.A, 1.B or 1.C above, to be eligible for ENERGY STAR qualification under this specification. Storage equipment, blade storage, and network equipment, as defined above, are not eligible for ENERGY STAR qualification under this specification.

Note: EPA plans to address storage equipment and network equipment under separate specification development initiatives. As a result, these product types are excluded from qualifying for ENERGY STAR under this specification.

When reviewing this document, stakeholders should consider the following important points:

- EPA's intention is to cover a broad array of server types that fit the technical definition provided in 1.A.
- EPA also intends to cover blade chassis and blade servers under this specification. However, since these server systems have a different approach and form factor from volume rack mount servers, EPA will have to determine which requirements might pertain to an ENERGY STAR qualified blade chassis (e.g., power supply efficiency) and which might pertain to a particular blade server itself (e.g., power management, idle, etc).
- EPA is also interested in the possibility of addressing servers using dc-dc power supplies in this specification. Feasibility for this approach will depend on the emergence of an appropriate and industry accepted test procedure that can be used to test these product types and determine comparable energy performance levels. If developed, EPA will consider using an amended power supply test procedure to accomplish this task.
- EPA will decide whether different types of servers may require separate energy performance criteria or levels. A decision to address these different types of servers will require the creation of separate "sub categories" of ENERGY STAR servers, with their own unique energy efficiency criteria and/or levels, and will be dependent on availability of energy performance data that supports this conclusion. Moreover, a justification for subcategories will be driven by significant differences in functionality and/or observable energy performance for a given workload.

Stakeholders are encouraged to provide feedback on this latest proposal to Rebecca Duff, ICF International, at rduff@icfi.com **by Friday, May 9, 2008.**