Pillar Data Systems response to the EPA request for comments on the Energy Star program for Computer Servers

The EPA has engaged with industries supplying equipment to data centers in order to achieve better energy efficiency in this arena with large and growing energy demands. The primary tool proposed for doing this is the Energy Star program, which establishes requirements within product classifications and enables market forces to operate to the benefit of those products which are more efficient.

Recently, the EPA published a draft specification for server systems and has requested comments from stakeholders. This comment addresses in particular the broader applicability of the approach outlined to storage systems and storage networking related equipment. [Draft 1 Energy Star Program Requirements for Computer Servers published Feb. 14, 2008.]

This is a response to that request for comments from Pillar Data Systems, a relatively recent entrant into the business of providing enterprise capable storage systems.

Pillar Data Systems supports the efforts that the Storage Networking Industry Association (SNIA) has been pursuing in this area. In particular representatives from Pillar have participated in the SNIA Technical Working Group on Green Storage since its inception. Progress is being made in this group to include definitions of energy efficiency related metrics applicable to storage systems. However, definitive conclusions are not yet ready for publication. In general the direction within this group has been to define productivity per unit of energy expended. Pillar supports this approach as we believe that the sort of tier 1 approach proposed for servers, to the extent that it focuses on means rather than ends, is not helpful in the longer term evolution of storage products or the marketplace generally.

Pillar has been a pioneer in providing storage systems that are more energy efficient than the systems generally sold by our major competitors. This claim is based on the performance we deliver from the higher capacity SATA drives used in almost all of the systems Pillar delivers. Many others offer SATA drives and Pillar also offers the higher speed, higher power FC drives. However, in terms of the systems actually delivered, because of our focus on delivering the best performance possible from energy efficient SATA drives, we can deliver performance that our competitors would propose using higher power drives to deliver.

Storage systems share some common components with servers but are different in a number of vital respects that make a straightforward application of the Tier 1 server criteria to storage systems inappropriate and potentially counterproductive. Further, **Pillar believes that hasty introduction of Tier 1 based Energy Star specifications will work to the economic disadvantage of smaller firms like Pillar.** This is because

pillar®
DATA SYSTEMS

we don't have the large volume of shipments over which to amortize changes to components like power supplies which require expensive tooling and a rigorous agency approval process. We recognize that Energy Star is a voluntary program but we also believe that the proposed action by the EPA with respect to including storage systems is contrary to the notion that the government should promote and maintain a level playing field – especially when government actions are contrary to innovation and the interests of smaller firms.

In the Draft 1 Energy Star Program Requirements for Computer Servers the program classifications were obviously difficult to specify precisely. However the draft specification succeeds in part because server computers have evolved into relatively generic compute engines which can be roughly categorized along a single scaling axis. That is to say – small systems will have smaller numbers of CPU sockets, smaller maximum memory capacity and smaller numbers of IO ports. And, over the broad range that EPA plans to include in the program, most of the systems at a particular scaling level can run most of the applications appropriate to that level.

These observations do not hold across the wider variety of storage system product categories. In contrast to servers, the design of storage systems is far more specific to their unique tasks, interfaces and the underlying technologies employed. Working groups within SNIA are currently discussing the taxonomies that may be used to appropriately segment the product families that facilitate measurement and feature set comparison necessary for crafting guidelines that promote energy efficiency while also being sufficiently technology neutral as to not hinder progress and competitiveness.

Another comparison with computer servers that tends to underscore the differences in these markets is that the product life cycles of storage products are typically longer that that of computer servers. This follows from the greater specialization of the product delivered to the customer and that the storage system product provides a specialized service in terms of block, file, or object storage accessed across a network of some sort. Typical storage systems would be compared to some number (usually at least two) computer servers integrated together with operating system and specialized application software such as a data base system.

The data storage industry is undergoing technology driven transformations at a rapid pace as made possible by the additional computing capabilities that the semiconductor industry has made possible. While the fundamental performance parameters of the rotating magnetic media have largely changed only along a single dimension of higher capacity per spindle over the last decade or more, new technology such as solid state storage and several new software techniques have emerged over the past 5 years which have the potential to alter the landscape considerably. Among these are techniques aimed directly at lowering energy requirements, such as MAID – massive arrays of idle disks, and others with other primary objectives that have energy savings as a secondary effect, such as storage consolidation, thin provisioning, and de-duplication. **Therefore, a set of criteria for Energy Star compliant storage systems based on the implementation mechanisms of today's products may inadvertently create an artificial barrier to entry of new product configurations that could be very helpful to higher level energy conservation goals.**

There are some areas in which the Tier 1 objectives of the Energy Star program for Computer Servers can be adapted to many but certainly not all storage products. For instance, storage systems should be designed with efficient power supplies. However the details of the power supply specifications will need to be adapted to the different design environment of storage systems. Two examples of this are:

1. The prevalence of redundancy to guarantee system availability within the power sub-system of storage products.

2. The current standard specification for disk drives which use the bulk of the power in typical systems require both a +5VDC and a +12 VDC supply. Such supplies are generally not available with the efficiency specifications of single rail computer server supplies. (For instance those which are the subject of the Climate-Savers goals program.)

The Tier 1 objectives of the Energy Star program in several cases are specified in terms that mandate the means to achieve energy efficiency rather than focusing on the end itself. In a sense, this approach may make compliance simpler within a narrowly defined scope but it makes applying these guidelines to adjacent fields more difficult. For instance the draft discusses power reporting by means of the DMTF / SMASH standards. In a storage arena, other reporting mechanisms, particularly ones based on SMI-S, may be more appropriate. A second example is a potential guideline for idle power usage. The draft standard seems to imply that servers spend a significant portion of their time in an idle state. While this statement may be true for both servers and storage systems in terms of externally applied workload, storage systems commonly perform many maintenance tasks and so are rarely truly idle. In this case, while objectives could be crafted for both storage and for servers, the parameters and test methodology would be very different.

Due to these and other factors Pillar recommends that the EPA:

• Consider storage products separately from computer servers.

• Consider developing several different sub-programs for the different categories of storage related equipment based on a SNIA-developed taxonomy.

• Continue to engage with SNIA as a partner in the effort to develop incentives to promote greater energy efficiency while acknowledging the realities of technology and the marketplace.

• Focus on establishing criteria based on performance and capacity delivered per energy consumed rather than on specifying the implementation methods.

Paul Boulay, Architect, Hardware, Office of the CTO, Pillar Data Systems.

pillar®
DATA SYSTEMS