May 20, 2009

Environmental Protection Agency
ENERGY STAR Program

We appreciate the ENERGY STAR program's efforts at standardizing energy efficiency and consumption of computing devices, as reflected in this ENERGY STAR Computer Server Version 2.0 Draft 1. We are pleased to submit our comment for your review.

Sincerely yours,
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We have reviewed the Energy Star Draft Data Center Storage Draft Specification and have the following comment:

Dell considers cooperation and support of the Energy Star standards to be an essential component in the ongoing efforts to reduce the impact of climate change. Dell considers the ENERGY STAR program our partner in this effort.

Detailed Comment and Recommendations for the ENERGY STAR for Data Center Storage Version 1.0 Draft 1Specification

Summary

Dell appreciates the efforts of the ENERGY STAR program to develop an ENERGY STAR specification for data center storage. We appreciate the opportunity to respond to the Version 1.0, Draft 1 specification.

Dell recognizes that this is a challenging and multifaceted product category, ranging across a wide variety of functions, performance, capabilities, and capacities. The diversity of data center storage solutions and the range of possible configurations have Dell concerned with the ENERGY STAR program approach for Version 1 of the Data Center Storage specification. Clear purpose and narrow focus on specific portions of this product space are needed to deliver timely and effective efficiency requirements. Narrowing the focus will allow the program and the industry to identify and measure the critical metrics for delivering efficiency for data center storage products.

It is expected that the initial draft of any ENERGY STAR specification document would be incomplete, and would need refining and specific information to support proposed metrics and measurements to be defined for the specification. The data center storage marketplace is broader than product types normally reviewed by the ENERGY STAR program. To be clear this Draft 1 specification left most of the critical measurements, metrics, approaches and levels undefined. Dell is challenged to offer specific comment, review and recommendations as a result.

Detailed Comment by Section

Definitions

The specification body identifies Storage Products, while its title and focus is exclusively on Data Center Storage products. It is crucial to assure that the specification addresses only products designed and intended for use in data centers, as opposed to the wide range of storage products intended for more general purpose and industry use. This distinction is significant: Data Center operations have specific requirements of storage products intended for the data center environment, such as; shared/networked access, connectivity methods, redundancy, serviceability, physical form factors (rack based), and others that drive packaging and functional design decisions. These data center

specific feature sets have an impact on energy consumption. It is essential that definitions and categories remain architecturally neutral, to reduce favoring specific solutions or limit innovation.

The proposed specification, methods and interpretations in development for active load energy consumption will be new to the market. Early narrow focus of product categories is needed before expanding to the broader data center storage marketplace. As data is developed about testing and the relationship to actual data center performance, the industry has an opportunity to investigate and innovate application of this standard to broader storage market.

Data Storage compression and de-duplication have both been identified and discussed as tools or features improving the efficiency of data center storage products. This area in particular is associated with many vendors and implementation-specific claims, and it is critical that architectural and implementation neutrality be maintained within the specification. Storage capacity reduction that fails to reduce the number of drives being powered may not generate energy savings.

The operational states conversation represented in the Draft 1 document appears to be more representative of the operation of servers and client systems. Dell has identified, online storage systems are primarily used in configurations shared across multiple servers and/or clients, and are: 1) responding to I/O requests from connected servers, 2) responding to backup requests from connected backup servers, or 3) performing data integrity or capacity optimization activities, all of which require media to be active and processing to be occurring. Storage architectures and usage will invalidate system modeling assumptions based on server and client systems. A fresh approach, separate form servers for identifying storage operating states will be needed to identify efficiency metrics for the proposed standard.

Removable media storage systems do have an inactive state; and enter this state after completing their primary function across a defined and shared storage system. This is a representative example that exists, of many known instances where the taxonomy categories differences have conspicuous impact on energy consumption and operational performance.

Energy Efficiency Criteria

Several significant differences exist between server and storage power supplies, such as the use of the PSU fan to provide cooling to the system enclosure. Also multi-output power supplies dominate the storage market, which is dissimilar to servers. This draft specification provided no guidance or strategy into how these differences will be addressed. Climate Savers Computing Initiative, 80Plus, and EPRI have provided guidance and identified power supply efficiency roadmaps in the past. Dell has been successful in working with these organizations, and recommends the ENERGY STAR

program work with these organizations to establish a workable industry efficiency roadmap for storage power suppliers.

Power management functions are a server and client concept that does not have an analogue in data center storage products. Products in some categories achieve power savings by powering down unused drives (in the case of near online storage, for example). Most techniques seen in the market today are specific to a particular architecture, implementation or category of storage.

Energy Efficient Ethernet

The standard is not currently released. As noted in other ENERGY STAR specification development efforts, Dell recommends waiting until the standard is generally available and silicon roadmaps exists before requiring availability.

Standard Information Reporting Requirements

Recent changes within the Energy Star program regarding reporting requirements have raised the complexity of submission substantially. The server power and performance data sheets and qualified product information forms have duplicated information in different formats, and coding that prevents copying similar information form one document to another. This invites error and duplication of effort, with no value to the Energy Star program or industry. Review of pertinent, suitable and organized data (identified in the PPDS and QPI) to customers and the Energy Star program requirements are needed to deliver meaningful and effective information with minimum effort.

Standard Performance Data Measurement and Output Requirements

After a review of systems in the market today, these features do not exist. The market is not driving these requirements. Is there a specific and measurable efficiency advantage to driving these features into data center storage systems? Or, is the requirement an artifact of an attempt to make the data center storage systems look like servers? Since the accuracy and report requirements appear to be similar to the server standard the question stands; are the reporting intervals requiring more reporting than necessary to support this management activity. Cooling and power latency requirements of data centers respond in minutes (greater than 10), and a requirement to measure every second, average over 30 seconds appears to be between 10 and 600 times the information needed to manage the facility. While underreporting could be a problem, over reporting has different but important consequences to data center management overhead and administration when spread across thousands of reporting devices within a data center.

Conclusion

Thank you for the opportunity to comment.

Dell is remains committed to our partnership and the shared development of the ENERGY STAR Data Center Storage Server Version 1.0 Draft 1 specification. I am available to explain and work in partnership on the development of the Version 1.0 specifications.

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