

To: Environment Protection Agency

Date: July2, 2009

Re: ENERGY STAR Enterprise Storage
Draft Specification Framework

I wish to provide some comments with respect to the proposed Energy Star Enterprise Storage specification. My employer, Dot Hill Systems, is a major OEM supplier of storage arrays to the industry, and I have been responsible for the design of power supplies used in storage arrays for over 25 years.

I believe the three primary objectives noted in your cover letter are exactly on target. Of the three, I think the second objective, to allow customers to objectively evaluate the energy consumption of storage arrays is the most challenging. The existing standards for efficiency that were developed for PCs and servers if applied to storage arrays without modification could easily lead to confusing and even erroneous evaluations of these products. To explain this comment I need to give some perspective on the engineering of storage arrays and their power supplies.

My experience has shown that two types of power supplies are likely to be used in a storage array. The power supply will be either a fully customized design intended specifically for the storage array or a power supply that was originally designed for use in a server application can be used. The primary difference between the two approaches will be in the number of outputs and in the performance of the cooling fans. Specifically, a fully custom storage array supply will likely have two primary outputs of 5V and 12V and will also have fans that are capable of cooling the entire array. A server type power supply will only have a 12V primary output and its fan is not capable of providing the cooling that the array requires. This means that elsewhere in the array an additional DC-DC module to provide 5V is needed and more powerful cooling fans will also be present.

Neither power supply approach has a significant inherent advantage in terms of overall efficiency, so it is extremely important that the criteria used to evaluate the storage array does not artificially favor one approach over the other. For example, if only the efficiency of the power supply is considered, the server type supply would appear to be more efficient because the loss associated with the DC-DC converter used to create 5V is not considered. Even more important is the power loss associated with the cooling fans. It is entirely appropriate to consider the internal fan in a server type supply as part of the inefficiency of the supply when it is used in a server application. However, if the same criteria is applied to a fully customized storage power supply which includes the far more powerful fans that are needed to cool the array, the customized supply would again appear to be far less efficient when in reality the integration of the system cooling fans into the power supply is actually the more efficient overall design.

To summarize, the efficiency standard that is created for storage system must allow for a meaningful comparison between systems with server type power supplies where significant power conversion and cooling elements are part of the system but separate from the supply, and power supplies where these elements are integrated into the supply.

Regards,
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