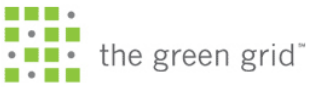

ENERGY STAR® for Data Center Storage Version 1.0 Final Draft Feedback and Recommendations (July 2013)

The Green Grid Association, a consortium of industry-leading companies, welcomes the opportunity to comment on an draft documents and topics under consideration for the ENERGY STAR for Data Center Storage specification.

Introduction

The Green Grid is a global consortium of companies, government agencies, educational institutions and individuals dedicated to advancing resource efficiency in information technology and data centers with a holistic approach, including all IT, facility and infrastructure systems. As the global authority on resource efficient information technology and data centers, The Green Grid spans the entire computing and communications ecosystem – from data centers to personal computers – and will continue to provide the global IT industry with metrics, tools and best practices to improve resource efficiency. We appreciate the opportunity to participate in the Version 1.0 development process for the ENERGY STAR for Data Center Storage specification.

Summary

The Green Grid acknowledges several significant positive steps made since Draft 4, and appreciates the inclusion of some of our recommendations into the Final Draft. We recognize that this draft moves the process much close to completion in a manner that greatly improves the likelihood of successful implementation.

We feel further discussion and exploration of alternatives in some areas will be helpful in delivering the solutions that will make it possible to finalize Version 1.0. The discussion below will outline our suggestions on how to approach these areas. We look forward to engaging with the EPA in driving these questions to closure.

Detailed Commentary and Feedback

Significant Improvements in the Final Draft

The Green Grid wishes to highlight several important changes that are embodied in the Final Draft of Version 1.0. These changes will result in a significantly improved program overall:

- The revised product family requirements with allowances for replacement drives makes testing more efficient and reduces the quantity of testing while still providing the data the EPA needs to evaluate and establish representative metrics to assess storage product energy efficiency.
- It is appropriate that EPA required reporting of SNIA Emerald Metric data, including Hot Band data, in Version 1 rather than trying to set specific performance/power thresholds. The newness of the SNIA metric and lack of industry and EPA experience with the results makes it important that a sufficient quantity of Emerald metrics results from a range of manufacturers and equipment types be collected before attempts are made to assess the data and establish efficiency thresholds.
- The Green Grid supports EPA's decision to allow the use of validated performance/power models for storage systems to generate qualification data for storage products (Section 3.5.4, lines 566-615). This offers manufacturers a simplified route to qualification of storage products.
- TGG appreciates that storage product temperature reporting to the network was made an optional capability for qualification. This provides storage product manufacturers time to incorporate temperature measurement capabilities into their systems.

- The flexible and mixed qualification approaches allow a much broader range of configurations to be qualified without excessive testing. This change will benefit all of the program's stakeholders.
- The Green Grid commends the EPA on its recognition that a Verification Program for Data Center Storage would not have provided significant benefits and would have faced substantial logistical hurdles.

Recommendations and Discussions: Qualified Configurations

The Green Grid recommends some enhancements to portions of the definition of qualified configuration optimum, min and max device counts:

- In Section 1.I.3, lines 241 to 259: Flexible Minimum, Maximum and Mixed Qualification Ranges, we encourage the EPA to allow manufacturers to set flexible limits below -20% and/or above +10% or higher for a configuration, even though these values may be between the -40% and +15% boundary points. Products that do not meet the 15% performance threshold at -40% or +15% may meet the threshold at -25% or +10%. In such a case, manufacturers should be able to expand the qualification range beyond the -20% and +5% stated in the requirements where they cannot meet the requirement broader testing range in the specification.
- In the option lists at Line 240 and 249, the phrase "(c) This number may be rounded up/down to the nearest drawer boundary." should be included.
- Language throughout Section 1.I.6 makes statements such as, "…maintain storage device percentages….," which is not always practical. TGG recommends that the wording in line 274 should be revised to read, "…maintain storage device percentages, as close as the configuration allows, in the same proportion…"
- The note in the comment box at line 298 should apply to Section 7 not 6
- In Table 7, the mechanics of the 70%/30% split on the sequential reads and writes and the methodology to incorporate the weighting into the published score are not clear. We assume that the sequential read score should be multiplied by 0.7 and the sequential write score by 0.3 and the two weighted scores should be added together to get a single weighted score. However, we recognize that we may be mistaken (are the two weighted scores reported individually? Or are the un-weighted scores reported to EPA and the weightings are publically reported?). The Final Requirements can benefit from a clarification of the methodology for calculating and reporting the weighted metrics. It is also not clear how, if at all, this weighting pertains to the optimum configuration's device count. This clarification should be provided in time for adequate discussion by all stakeholders.

ENERGY STAR Data Center Storage QPX and Reporting

There is significant concern among TGG members about several reporting items, and we believe further discussion is needed to provide an appropriate resolution:

- The data identified in Section 3.5.7.iii, lines 648 to 652 is submitted by the CB to EPA but that only the performance/power scores and the maximum and minimum power use for a given configuration will be reported on the public database. This section should be revised to read: "…qualified product families; minimum and maximum power

consumption for each configuration during the test process and the performance/power scores for each workload and transaction type along with…"

- Since the temperature and humidity readings at the time of each test are already recorded, and the EPA has not identified any specific data required in Line 655, this requirement should be removed from the specification.
- To get into the technical detail needed to evaluate replacement drives, CBs will need to review stakeholder-specific drive spec sheets under NDA to evaluate all the criteria detailed in section 3.6.2. EPA should require that the CB certify that the replacement drive criteria are met and agree that only the generic drive specification sheet(s) from the drive manufacturer's web site can be supplied to EPA to support the identification of the replacement drive types.

The Green Grid would like to recommend some minor modifications to several items in this portion of the specification:

- "Distributed Controller Storage Product," in Line 616 should be changed to "Scale-Out Storage Product."
- The text should indicate that time stamping is optional in Line 747
- Line 762 continues to refer to the PPDS.
- Temperature reporting should be noted as optional in Line 763
- The time period used for data averaging should be reported if a rolling average is provided (Line 764)
- Transfer speed is still listed as a variable that must not change (line 679) even though the Sustained Transfer Rate has been given flexibility (line 692-3). These two items would appear to be in contradiction. Note that a change to transfer speed from the disk to its interface may make no difference to the actual data transfer rate, as that is likely to be capped by device and bus interfaces.

Future Content

TGG understands EPA's interests in investigating various methodologies and technologies to improve storage product efficiency. We are concerned with the definitive technical focus of several of the items. We encourage EPA to approach these activities with a more general objective; to improve system efficiency recognizing that there are likely to be incremental and transformational changes in storage technologies over the next two to three years and that various right sizing and system management offerings involve tradeoffs between energy efficiency, expandability and system flexibility which has implications for both energy and material use. TGG looks forward to collaborating with EPA to evaluate options to improve and optimize the overall energy and resource efficiency of storage products.

Test Method

We recommend that Tables 1 and 2 include entries for 200V as Optional Japanese Supply Voltage. Similarly, we recommend that a 200V entry be added to Table 3. Finally, we would like to carry forward our recommendation on citing and/or updating reference specification revisions to this document as well as to the Specification itself.

Other Important Questions

The Green recognizes that a major benefit of the ENERGY STAR data publication process is the education of potential customers. While a part of that process includes supporting comparisons between systems, we believe that this would be better served by first ensuring that the data being displayed provides consistent, well-vetted results. To that end, we continue to request that the EPA consider a process of reviewing initial submissions with an industry body to ensure that the data about to be published meets these goals. This review period could cover the first several months of submissions, during which data would be made anonymous by either the CBs or an industry organization. Since there has not yet been a significant collection of data representing a substantial number of systems or vendors assembled, neither the EPA nor industry can predict the comparability of the data being published.

What about Unified systems?
While the Specification itself no longer directly addresses the question of how converged or unified systems (those containing Block and NAS functions) are to be tested, the Test Method does mention some members of this class of product in 5.1.C (Section 1.I6.vi addresses allocation of Block devices on NAS systems). The approach used in both cases addresses only those products that are marketed primarily as Networked Attached Storage products and also offer a Block I/O option. Many unified or converged products are actually marketed primarily as Block I/O systems to which NAS features can be added. It is very unclear under which circumstances one of these systems can be listed and sold as a qualified product. May it be sold as either Block or Unified if tested with minimal NAS enabled? Must it be tested this way to be sold as qualified in a Converged configuration? This should be addressed in the Specification itself to eliminate confusion among all parties to the Program.

In general, all references to other specifications, regardless of the source, should identify the specific revision number used in the development of the published specification. This will eliminate the potential for future ambiguity as the source documents continue to evolve.

Conclusion

The Green Grid recognizes that significant progress has been made in the development of the Final Draft. While we are pleased that some of our recommendations for Draft 4 have been incorporated, we believe that there is further work to be done to resolve the issues noted above. Data Center Storage continues to be a highly complex area with a substantial number of configuration and usage variations. We believe that our recommendations can help further the success of the ENERGY STAR for Data Center Storage program. For us to maximize the benefit of our industry knowledge, The Green Grid Storage Working Group intends to continue to work closely with the EPA on the remaining, challenging areas of family definition, data collection and review to bring the full benefit of our industry knowledge to bear to generate a workable specification which furthers the identification and availability of efficient ICT equipment.