Comments by Oracle Corporation on the EPA Energy Star Product Enhanced Testing and Verification Procedure

Introduction

Oracle applauds the EPA's efforts to add rigor and safeguards to the Energy Star submissions, qualification, and verification processes to preserve the integrity of the Energy Star program. Oracle would like to thank the EPA for the opportunity to provide comments on the EPA Energy Star product qualification procedure.

Oracle's products that are currently covered by Energy Star include the following:

- Thin Clients (covered under the Energy Star for Computers specifications)

- Servers (covered under the Energy Star for Servers specifications)

- Data Center Storage (expect to be covered under the Energy Star for Data Center Storage specification)

- Data Centers (expected to be covered under the Energy Star for Data Centers specification)

The following comments apply to all of the above products in their respective categories.

Clarification of Semantics

We request that the EPA formally define the following terms:

1. Qualification testing

2. Verification testing

3. Quality Assurance testing

The EPA seems to have used the terms "verification testing" and "quality assurance testing" interchangeably. The EPA has implied that verification testing only applies to consumer products that can be purchased off-the-shelf in the open market by the EPA from the retail channel, and quality assurance testing applies to data center equipment. Yet the EPA's presentation also suggests that they will apply verification testing to data center equipment. Oracle requests clarification as to the exact definition and implications of the process that will apply to data center IT equipment.

Characteristics of IT Equipment

It is Oracle's view that there is a very large difference, in many regards, between the consumer electronic devices that the Energy Star program has traditionally been concerned with and the information technology equipment that goes into enterprises and data centers, such as thin clients and servers.

Consumer electronics are usually produced and shipped in large volumes, come from many different vendors, and are manufactured in limited numbers of product configurations. Additionally, most consumer electronics devices do not require any special environment for testing and can simply be plugged into any electrical outlet for measuring purposes.

In contrast, enterprise and data center equipment is produced and shipped in small volumes, comes from relatively few vendors, and varies widely in the number of configurations available for a single piece of equipment. Furthermore, in order to measure the power drawn from a single piece of data center equipment you must replicate the entire data center environment because the power draw of each device is contingent upon multiple factors, such as compute load, network load, acoustics, ambient temperature, etc.

Therefore, very expensive and tightly controlled test environments are necessary to ensure standardized power measurements across multiple product configurations and product families.

Therefore, Oracle believes that at the top level, the EPA should make a distinction between products that are considered consumer electronic or office equipment (such as PCs, laptops, fax machines, copiers, and printers) and data center IT equipment (such as rack-mount servers, storage and switches) due to the inherent differences in the nature of compliance testing between these two product categories.

Existing Compliance Regimes for Data Center IT Equipment

Data center equipment vendors have a long history of compliance with many environmental standards. Our industry has manufactured and shipped products for years under these regulations using a self-certification process without any instances of fraud or abuse. Furthermore, data center equipment vendors have built a wealth of experience in complying with Energy Star specifications over the years as we have brought Energy Star compliant products to market, such as thin clients, workstations, monitors, desktop computers and laptop computers.

Additionally, data center equipment vendors have experience and competence in operating in-house testing facilities and maintaining the extensive documentation that is required for audits and verification from third party organizations that certify our products, such as Underwriter's Laboratory and the Federal Communications Commission.

Configuration Complexity of Data Center IT Equipment

As previously stated, data center products are complex and have a wide variability of configurations per product. Any third party that proposes to provide the measurements necessary to certify these products as Energy Star compliant will require an extensive amount of time to

develop the competence and maturity required to test multiple product configurations and product families in an efficient and accurate manner. This is especially true due to the fact that data center products change rapidly in terms of the technology they employ and the features they offer.

Given the expense of building data center products, both for development prototypes and for customer production, third party testing would be very expensive. Shipping data center products to third parties is expensive and cumbersome. The development costs are so expensive that frequently, even after a product design is final, our own performance engineers and our field engineers do not have access to a sufficient number of units for running standard benchmarks or demonstrating customer workloads. Typically there are no pre-production runs between the development prototypes and customer orders. We would have to commit a very precious unit to external testing.

Because of the nature of our business cycle, we have chosen instead to invest in in-house lab infrastructure as a way to accelerate our business cycle and control our development costs. To now have a part of our cycle require external labs effectively undermines our historic investment in in-house capability.

Thus, testing data center equipment in third-party facilities promises to become a long, drawn-out, and expensive proposition. Furthermore, for a third party, the capital costs of setting up a test environment that simulates a real data center, coupled with the relatively few vendors requiring this service, might not make the testing market economically viable for third party testing houses. In addition, the requirement on the equipment vendor to train the third party tester in the specific hardware configuration, firmware configuration, software configuration, test harnesses, and associated tooling is expensive and onerous.

History of Competitive Self-Policing

Self-certification has worked well so far for thin client products and data center products. Vendors in these equipment categories have demonstrated their competence and capability for self-certifying their products for existing environmental regulations as well as for the appropriate Energy Star standard.

This "culture of compliance" is further reinforced by the extremely competitive nature of the data center equipment market. Data center equipment vendors routinely self-police by performing competitive tear-downs (i.e. disassembly) of each other's products in order to verify compliance claims. Competitors also routinely test each other's products to verify benchmark claims in internal lab facilities already setup for testing their own products.

These competitive pressures make the likelihood of fraud minimal, because a competitor would almost immediately unmask any fraud attempted. These assertions are further supported by the fact that the recent GAO audit of Energy Star certification did not uncover any process holes with Energy Star for IT equipment.

Challenge Testing

Oracle believes that because of the small number of vendors in the enterprise IT

equipment industry, and because of the established practice among IT vendors to perform competitive evaluations of each other's equipment, there already exists a culture of self-monitoring and self-policing in this industry. There is no history among IT equipment vendors of fraudulent claims of Energy Star compliance, and any compliance that is incorrectly claimed by one vendor is immediately flagged by other vendors. History has shown that when such incorrect claims are discovered, the impacted vendor either corrects the claim or withdraws it.

As such, Oracle believes there is no need to formalize challenge testing for the IT equipment industry. The nature of competitive practices in the industry has had the effect of informally institutionalizing challenge testing already.

If challenge testing is instituted, Oracle recommends that the cost of the challenge test should not be borne equally by the two parties. Rather, the costs of the tests should be borne by the "loser" of the challenge test. This will ensure that the challenge test process will not be abused, either by willful fraudulent compliance claims, or by spurious or trivial challenges.

Power Calculators

Oracle takes the position that the task of modeling IT equipment power consumption through an analytical approach based on configuration of components is an interesting idea, and may work in future if there is sufficient innovation in the development of accurate power calculators that can simulate both idle and high-throughput conditions on servers.

However, the current state of maturity and accuracy of power calculators is not sufficient for us to recommend the use of power calculators for an analytical approach to Energy Star compliance based on component configuration. We advise the EPA to continue to study this approach in case it becomes feasible in the future.

Recommendations for Qualification and Verification Testing

Oracle's recommendations to the EPA in order of preference are as follows:

1. Continue the existing practice of permitting vendors of IT equipment to self-certify

2. If validation is desired, institute an "Energy Star Certified Witness" program. An Energy Star Certified Witness maybe any individual who has passed EPA's Energy Star Witness Certification tests. This individual witnesses test procedures and vouches for results of tests performed at in-house testing facilities. This individual may or may not be an employee of the company whose products are being tested. This process is similar to the Energy Star for Data Centers program, where the EPA allows a licensed Professional Engineer (P.E.), who maybe an employee of the Energy Star partner, to certify the power measurement and PUE calculations for a data center.

3. If independent third party validation is desired, institute an "Energy Star Professional Auditor" program. Under this option, an independent third party individual who has passed EPA's Energy Star Professional Auditor certification testing, may visit the

Energy Star partner's laboratory facilities to witness and certify the test process.

4. Accredit In-House Testing Facilities: EPA accredits the in-house laboratory facilities of the Energy Star data center IT equipment vendor based on their existing certification under ISO 17025, NVLAP, or other laboratory certification standards as deemed appropriate by the EPA.

5. The least desirable option is to require data center equipment vendors to ship their products to a third party testing laboratory, for reasons explained above.

Additional Recommendations

1. Oracle recommends that the EPA not create a challenge testing program for IT equipment

2. Oracle recommends that the EPA work with IT equipment vendors and other partners in the Department of Energy National Labs to come up with online simulation models of the power consumption of IT equipment under various loading conditions. This is to enable the future consideration of qualifying products for Energy Star compliance based on the analytical scrutiny of their component configurations.

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