4 February 2013

VIA ELECTRONIC MAIL

Mr. Robert Meyers
Product Manager
Energy Star Data Center Products
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

RE: Proposed Energy Star Specification for Large Network Equipment

Dear Mr. Meyers:

On behalf of Juniper Networks, I am submitting these comments in reference to U.S. Environmental Protection Agency (EPA) and U.S. Department of Energy (DOE) efforts to develop an Energy Star specification and testing method for Large Network Equipment (LNE).

By way of background, Juniper Networks develops high-performance networking hardware and software, spanning routing, switching, security applications, and firewalls. Our clients include telecommunications providers; commercial enterprises; and many Federal, state, and local government departments and agencies.

Juniper Networks supports the concept of a voluntary Energy Star program for LNE as a means of driving the development of energy-efficient network products. At the same time, we encourage the EPA and DOE to base LNE specifications on peer-reviewed and established metrics and test methodologies. To elaborate on this idea, we make the following recommendations.

I. THE ENERGY STAR SPECIFICATION SHOULD REFERENCE INDUSTRY TESTING METHODS

At the outset, we believe that an Energy Star specification should reference voluntary industry testing methods instead of crafting new test procedures. As an active participant of the Energy Consumption Rating Initiative (ECR), ATIS, and the International Telecommunications Union (ITU) workgroups, Juniper has observed that the network equipment industry has accumulated significant insight and understanding regarding energy efficiency testing that the government can leverage.

In particular, in the last five years, we have seen multiple contributions to standards development for efficiency testing from the top LNE suppliers that have enabled consensus and harmonization

between ITU (L.1310), ATIS (routers and switches, 2013 amendment) and the upcoming ETSI regulation of the same products.

We believe, therefore, that the state of knowledge of subject matter experts is both comprehensive and robust enough to serve as a foundation for an Energy Star program for large network equipment.

II. THE ENERGY STAR LNE SPECIFICATION SHOULD BE LIMITED TO PERFORMANCE-DRIVEN EQUIPMENT

An Energy Star specification for LNE should apply to packet-processing network equipment that is intended for corporate, professional, and commercial use. Such equipment has as its main modality performance at a given function. Home-user and small business equipment, on the other hand, typically is sold on the basis of functionality, with performance being of secondary or marginal interest and is best served under SNE program principles.

For equipment having performance as the main modality, efficiency can be defined as a ratio of energy used to the amount of information transferred. The main advantage of such a definition is that the resulting measurement is repeatable, continuous, and fungible. The measure of energy expended compared to the actual work performed allows the end-user to assess efficiency and energy budgets directly based on the planned network capacity, similar to the EPA miles-per-gallon methodology for automobiles.

A separate situation arises with respect to hybrid equipment types, where performance is combined with a secondary modality. For example, Power-over-Ethernet (PoE) devices can be seen as a combination of an Ethernet switch and remote power supply and should be judged by procedures suitable for such an amalgam.

III. THE SPECIFICATION SHOULD FOCUS ON EQUIPMENT HAVING EXISTING PERFORMANCE STANDARDS AND TEST PROCEDURES

We recommend that the EPA and DOE focus on equipment having existing energy performance specifications and subdivisions that already exist as part of the test procedures. Although there are a number of ways to define the taxonomy for packet-switching equipment (e.g. by vertical market - enterprise, datacenter, service provider; by role - aggregation, access, core; by function - router, switches), the overall success of an LNE energy efficiency program will be affected by two primary factors:

(a) The relevance, quality and rigor of methods to measure performance with respect to equipment utility; and

(b) The ability of end-users to interpret the provided information

With respect to the first factor, the consensus methodologies as published by ECR and ATIS currently address routers and switches, which comprise the majority of packet equipment types in

the field. Such equipment currently is documented for testing in two major topologies and with appropriate metrics. Other packet-switching equipment categories (such as firewalls, cache engines, load-balancers, etc.) do not benefit today from universally accepted procedures for testing. The lack of accepted testing procedures restricts such equipment to future revisions of LNE specifications and possibly signals the limited user interest in knowing the efficiencies of such products.

With respect to the second factor, the initial discussions within many study groups often reveal concerns about end-users comparing efficiency of incongruent equipment types (for example, low-end switches against core routers) and drawing inappropriate conclusions. Field experience with ECR, ATIS and ITU metrics mostly disproves this concern, though, as LNE customers consider efficiency a part of the larger RFP process and generally are not interested in gear that does not meet their project qualifications. When a using a clear and concise disclosure format, end-users should be able to identify the equipment tested, test conditions, and resulting measurements that are required for making informed decisions.

IV. MODULAR DEVICES SHOULD BE INCLUDED IN LNE SPECIFICATION

Today, the majority of LNE-class products are sold in “modular” form factor, although popular fixed configurations also are widely available. Exclusion of modular products from the LNE specification could weaken the impact of the program, which is why it is worth discussing the implications of modularity.

A product can be considered “fixed” if the performance (to be measured in the test) is fully defined by its part number (without any unnecessary extra components installed). For such equipment, the test procedure is straightforward and gives an energy performance number descriptive to the specimen that can be published and compared against competing products.

In a situation where an end-user can order extras for fixed equipment (such as larger power supplies or different transceiver types), a final product’s energy efficiency might change slightly but remain within the margins of the specification. This is analogous to a situation where an automobile might come with options that might change its mass and thus its fuel efficiency. Therefore, EPA should encourage vendors to publish energy disclosures on base versions of fixed products, one leaflet for every part number.

A different situation arises for “modular” equipment, where a box can be fully customized with different linecards and other hardware. When a base part number defines a barebones chassis with little or no capability, a vendor willing to publish efficiency data would have to assume certain fill options (linecards, port adapters, etc). A vendor typically would select the latest and fastest modules and build a representative modular system; understandably, it would not be in the interest of a vendor to choose older, slower and/or irrelevant-to-performance modules. If a given modular device tends to be deployed in several roles with different hardware, several such configurations can be developed. This is conceptually similar to publishing fuel efficiency numbers for a truck with different engine options. Therefore, the EPA should encourage vendors

to publish efficiency data on modular products along with the full disclosure of installed hardware, possibly for multiple “typical use” scenarios.

Finally, an end-user might be interested in efficiency data on a modular system that is not fully loaded or that is equipped with an arbitrary mix of components. Such changes can be very significant relative to “typical use” disclosures. Practically speaking, the energy performance of all custom configurations of modular devices cannot be established in general because the number of possible module combinations can be prohibitively large. In such cases, the EPA might recommend that end-users customers work with vendors to obtain additional disclosures or resort to private testing efforts using the published EPA guidelines.

V. ENERGY STAR SHOULD NOT FOCUS ON COMPONENT-SPECIFIC EFFICIENCIES

Juniper advises that the Energy Star program exercise extreme caution about focusing the efficiency of equipment subcomponents whenever energy performance can be measured at the system level. While sometimes it is possible to identify a component that has its own well-formed or well-known efficiency definition (such as routing engines, route processors, or power supplies), the energy performance of individual components does not guarantee good results for the entire device and may dilute the clarity of efficiency decisions.

This case is similar to equating the efficiency of passenger cars to the parameters of their energy-saving tires; while in general having such tires may be a good idea, the final energy footprint may be influenced largely by other contributors, such as the vehicle’s powerplant or body structure. If the end-user has a robust system-level efficiency measure, component efficiencies become much less interesting or useful.

VI. FINAL REMARKS

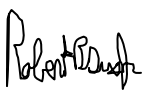
At Juniper Networks, we believe that the LNE Energy Star program is a step in the right direction and, when properly executed, should encourage innovation and competition in the industry. We also believe such innovation is best stimulated through customer-manufacturer dialogues that can be facilitated with consensus energy performance formats.

Therefore, the winning strategy for Energy Star with respect to LNE equipment would be to promote a disclosure label similar to the EPA label for automobiles. The information in this label should specify equipment energy performance (draw in Watts) under performance targets (in gigabits per second or Gbps) achieved in the test. The number of test points should be sufficient to formulate a variable-load metric such as ATIS TEER or ITU EER.

Additional stimulus towards energy savings can be achieved by disclosing extra information, such as performance under conditions that allow for partial capacity degradation under extended-idle load conditions. ITU EER-EX is an example of such an auxiliary metric.

Thank you for your consideration of our views on this important initiative. If have any questions regarding this submission, please feel free to contact me at (571) 203-2687 or rdix@juniper.net.

Sincerely,



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