



TELECOMMUNICATIONS
INDUSTRY ASSOCIATION

1320 N. Courthouse Rd., Suite 200
Arlington, VA 22201 USA
www.tiaonline.org

Tel: +1.703.907.7700
Fax: +1.703.907.7727

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Mr. Robert Meyers
ENERGY STAR Product Development
U.S. Environmental Protection Agency
Energy Star for Office Equipment
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Re: TIA Industry Comments: Energy STAR LNE Specification

Dear Mr. Meyers:

The Telecommunications Industry Association (TIA) hereby submits the following industry comments regarding the proposed scope and testing methodology for the draft ENERGY STAR Large Network Equipment (LNE) Specification Draft 1 Version 1.0 Specification and Draft 2 Test Method.¹ TIA and our members share EPA's goal that the ENERGY STAR LNE specification serve as an effective tool to educate customers and recognize and reward energy efficiency leaders in network equipment products. TIA's primary concerns in reviewing Draft 1 Version 1.0 and Draft 2 Test Method are EPA's intention to set levels for fixed network equipment at this stage and proposed deviations from the ATIS test methodology.

Over the last decade, product energy usage has become increasingly important both for customers and vendors of network equipment. Over the last decade, network equipment manufacturers have worked intensively both individually and collaboratively to identify ways to make fair comparisons between network equipment based on energy efficiency. Industry has gone through the same process and held the same discussions that EPA is currently undertaking with the top energy efficiency engineers from our companies to validate energy efficiency claims. For network equipment serving a large variety of domains (all equipment covered under the LNE specification), the industry consensus is that too much variability between both hardware and software of fixed network equipment and inherent differences in energy utilization among different types of networked systems will make it difficult if not impossible to make fair comparisons between comparable equipment, making the setting of minimum qualification levels untenable.

The result of forcing false comparisons and setting levels for either fixed or modular network equipment will be a failed specification that customers will ignore and seek waivers around and in which industry will have little incentive to participate. Setting minimum levels for fixed

¹ See ENERGY STAR Large Network Equipment Specification Draft 1 Version 1.0 Specification and Draft 2 Test Method, available at www.energystar.gov/products/specs/large_network_equipment_specification_version_1_0_pd.

network equipment will result in only the most basic routers that meet minimum performance requirements qualifying for the ENERGY STAR label, disqualifying routers that must meet more demanding performance requirements from the ENERGY STAR program.

Given the inability to make apples to apples comparisons, TIA strongly recommends that EPA follow industry's recommendation to rely on testing and reporting of energy usage data closely following the ATIS test methodology for both fixed and modular network equipment for Version 1.0. A test and report requirement will succeed in recognizing leaders in energy efficiency while educating customers procuring equipment in the scope of the LNE specification regarding the energy usage of equipment. This will also provide a strong incentive for both customers and industry to participate in the specification, which will result in EPA gathering and centralizing significant amounts of energy usage data that may signal where level setting may be feasible in future versions. EPA accumulating and publishing a significant amount of energy usage data for network equipment would be of significant value and is something industry has been unable to do effectively on its own.

TIA offers the following input in support of a test and report requirement for equipment covered under the LNE specification.

- 1. TIA strongly recommends that EPA utilize a test and report requirement for both fixed and modular network equipment covered under the ENERGY STAR LNE specification. At this stage, ENERGY STAR levels should not be set for either fixed or modular network equipment.**

In the comment response document, EPA explains its initial goals to set efficiency levels for fixed network equipment and include test and report requirements for modular network equipment as follows:

Response #16: For fixed products, EPA will continue to develop active state efficiency requirements in more detail in subsequent draft specifications, following the gathering of additional product data to support level setting. One of EPA's goals in creating this Version 1.0 specification is to develop a simple, easy-to-understand energy performance assessment for LNE products, which can be fairly and consistently applied to products and which can provide end users with an apples to apples product comparison. To that end, the ongoing gathering of data will ideally result in one or more measurements that are applicable across all LNE products within each product category. For modular products, EPA is proposing not to include active state efficiency requirements, but include the testing and reporting of the products, along with meeting other requirements in Sections 3.2 and 3.3.²

² See V1.0 LNE Framework Document Comment Response Document, Response 16, available at www.energystar.gov/sites/default/files/specs/V1.0%20LNE%20Framework%20Document%20Comment%20Response%20Document.pdf.

In previous comments, TIA stated our concerns regarding setting levels for fixed network equipment at this stage.³ In support of our previous comments, we would like to reiterate and add the following examples and explanations that highlight the problems that EPA will face in making comparisons and setting levels between fixed network equipment products.

- **Too much variability between both hardware and software of fixed network equipment and inherent differences in energy utilization among different types of networked systems will make it difficult if not impossible to make fair comparisons between comparable equipment for the purpose of setting minimum qualification levels.**

Network equipment, both fixed and modular, presents significant challenges beyond other products covered by the ENERGY STAR program in making fair comparisons between comparable equipment because of the inherent differences in energy utilization among different types of networked systems. To address the variability challenge while still enabling apples to apples comparisons between similar types of equipment, industry designed the ATIS standard to provide efficiency metric numbers that can allow comparisons between very similar products that can replace each other in the network. The ATIS standard recognizes the importance of the location of the equipment in the network as it applies to energy usage and allows comparisons between equipment types that are functionally the same for specific customer applications. An ENERGY STAR LNE specification that ignores functional differences and focuses on number of ports or similar visible variations to set limits will not be able to address variability and location in the network the way that the ATIS standard does.

Fixed network equipment serves a broad and varied market of users with diverse performance requirements based on the system being operated. If the LNE specification includes a broad variety of fixed network equipment, the data set will be comparing products that are too dissimilar in performance to make fair comparisons. For example, if a 48 port edge unmanaged switch, managed switch, datacenter switch and core switch are included in the same group, only the unmanaged switch would qualify for ENERGY STAR if a level is set between the the various products. On the other end of the spectrum, an accurate data set for the purposes of setting a limit would require that the number of products in the data set be narrowed to the point that the specification would lack an adequate number of comparable devices to achieve a statistically significant base.

Fixed network equipment is integrated into a wide variety of network systems including enterprise organizations (healthcare, financial, campus), public safety agencies (police, fire military), large commercial entities (utilities, petrochemical), data centers and service providers. Each network system domain will have its own specific performance requirements, which require different configurations and energy usage of the fixed network equipment integrated into the system. Examining the energy usage of a single piece of fixed network equipment in isolation from the system in which it operates will not provide an accurate enough representation of energy usage in the context of the performance requirements it must meet to enable a fair comparison with other network equipment. Setting minimum qualification levels for individual

³ See TIA Industry Comments: Energy STAR LNE Specification (Jan. 29, 2014), available at www.tiaonline.org/sites/default/files/pages/1-29-2014%20TIA%20Industry%20Comments%20ENERGY%20STAR%20LNE%20Specification_0.pdf.

pieces of fixed network equipment based on usage scenarios that do not accurately reflect their required deployment will result in higher net energy use in the vast majority of situations.

- **As proposed, the distinction between fixed and modular equipment will not be usable for many network equipment products and will further compound the problem of the specification comparing unlike products. TIA recommends that the definition of modular product be changed to be based on the ability of the product to accept modules and that the specification include a description of what should count as a module and what should not.**

The specification proposes to distinguish between fixed and modular products as follows:

- Fixed Product: An LNE product in which greater than half of the total number of available physical network ports in the product are not swappable or interchangeable.
- Modular Product: An LNE product in which half or more of the total number of available physical network ports in the product are swappable or interchangeable.⁴

This proposed distinction will inevitably result in many unlike products being compared with one another. The 50% line is arbitrary and not based on any known data to be a proper dividing line between equipment types. If EPA wishes to divide all LNE specification network equipment products into two categories, fixed and modular, a more appropriate line would be to define a modular product as any LNE product which can accept a module. The specification would then need to include a definition and exclusion list of what does or does not qualify as a module for purposes of the specification.

- **The product characteristics need to better define what is meant by managed products and recognize that utilization of ports is a consequence of their location in the network, not a means to define a core versus and edge product.**

The Product Characteristics section distinguishes between Processor and Network Managed products as follows:

- Processor Managed Product: An LNE product whose management is handled distinct co-management processor within the product itself that has independent control over the LNE Product
- Network Managed Product: An LNE product that is not Processor Managed, where management of the product is handled through processing power provided by a separate device within the network it is connected to.⁵

These distinctions do not adequately take into account that typically in networking, managed means networked management.

The Product Characteristics section also defines core and edge products as follows:

⁴ See ENERGY STAR Product Specification for LNE: Eligibility Criteria Draft 1 Version 1.0 (LNE Eligibility Criteria Draft 1 Version 1.0) Section 1, Lines 15-18, available at www.energystar.gov/sites/default/files/specs/Draft%201%20V1.0%20LNE%20Specification.pdf.

⁵ See LNE Eligibility Criteria Draft 1 Version 1.0, lines 45-57.

- Core Product: A product which commonly has all physical ports active and operates at a typical load of 20% or greater compared to its maximum capability.
- Edge Product: A product which typically only has a portion of its physical ports active and operates at a typical load of less than 20% compared to its maximum capability.⁶

With network equipment, core and edge are locations in the network. The utilization of ports is a consequence of where the equipment is utilized in the network, not a product characteristic that can be used to define a core versus and edge product.

- **The definition of Physical Network Ports will need to be clarified with regard to the exclusion of fiber-optic connections.**

A Physical Network Port is defined in the specification as follows:

- Physical Network Port: An integrated physical connection point primarily intended to accept IP or similar traffic via a cable. Fiber-optic connections are **not** considered Physical Network Ports for the purposes of this specification.⁷

As written, this would appear to remove from scope any device which is capable of having an optical/fiber port, which would include modular and core products with fiber-optic connections. TIA seeks clarification as to whether that is the intent of the exclusion.

- **The Product Family table would not be applicable to modular products where you can replace any part.**⁸
- **TIA recommends Power Supply Unit (PSU) requirements be excluded from the LNE eligibility criteria at this stage. Products should be tested as a whole with no specific efficiency requirements for internal and/or external PSU.**

EPA states as follows the intention to include PSU as eligibility criteria for the LNE specification:

EPA is proposing to use 80Plus Gold PSU levels, with an additional 80% efficiency requirement for the 10% load. EPA believes the 10% load requirement is vital to assess the performance of PSUs in products that supply PoE power or which may be bought with an overcapacity PSU to facilitate future expansion by the end user. These requirements (including the 10% load requirement) match those found in the current Version 2.0 ENERGY STAR Computer Servers Eligibility Criteria. EPA received stakeholder feedback stating that many LNE products share hardware similar to that of Computer Servers, and even that there is a growing trend to replace switches/routers with generic computer servers running software to mimic the aforementioned devices. As a result of this

⁶ See LNE Eligibility Criteria Draft 1 Version 1.0, lines 54-57.

⁷ See *id.* lines 187-189.

⁸ See *id.* lines 212-213.

feedback, EPA feels that setting levels at 80Plus Gold for LNE products is appropriate and welcomes additional PSU test data from LNE manufacturers.⁹

A major problem with utilizing 80Plus PSU certification for the LNE specification is that it excludes DC input devices, which make up a significant percentage of products covered under the LNE specification. 80Plus defines power supplies as follows:

Power supplies are the devices that power computer, servers and data center devices. They convert AC power from electric utilities into DC power used in most electronics. The 80Plus performance specification requires power supplies in computers and servers to be 80% or greater energy efficient at 10, 20, 50 and 100% of rated load with a true power factor of 0.9 or greater. This makes an 80 Plus certified power supply substantially more efficient than typical power supplies.¹⁰

80Plus PSU certification would be appropriate for other technologies but would not be realistic for products covered by the LNE specification. All certified 80Plus PSUs listed are 115/230VAC input. Since the focus of V. 1.0 of the specification appears to be primarily edge products, many of the products will have power supplies with a less than 300W rating making it unrealistic that many of these products will be able to achieve an 80Plus Gold rating. Deviation from the standard 80Plus test report will require additional testing for power supplies. TIA recommends that all PSU requirements be excluded from Version 1.0 of the LNE specification.

- **The Inlet Air Temperature requirement would require product redesign as fan controllers use boar temperature measurements, not inlet. Inlet temperature is a facility parameter, not an equipment parameter.**¹¹
- **The Test Method table must also reference ATIS 06000015.2013 as it includes all of the general requirements for 06000015.03.2013.**¹²
- **Setting an ENERGY STAR level for fixed network equipment, in many cases would result in increased energy consumption or will force customers to buy products with higher speed uplinks and increase expenses for sustaining their network.**

In previous comments, TIA pointed out concerns that setting levels would in many cases result in over buying by customers by requiring an agency to procure individual network equipment that meets the minimum ENERGY STAR threshold but when used in the system results in greater overall energy consumption.

For example, systems with the same edge port configuration but different uplink options will score differently on an efficiency test. It is inevitable that fixed levels applied across the

⁹ See *id.* lines 255-301.

¹⁰ See Plug Load Solutions 80 Plus Certified Power Supplies and Manufacturers, available at www.plugloadsolutions.com/80pluspowersupplies.aspx.

¹¹ See LNE Eligibility Criteria Draft 1 Version 1.0, Line 383.

¹² See *id.* line 428.

various configurations will either result in systems with high speed uplinks being passed while those with low speed uplinks fail, or else vice-versa. In the first case, a network deployment that uses ENERGY STAR certified equipment that meets a minimum set level will use more energy for unnecessarily high speed uplinks. In the second case, a network deployment that uses ENERGY STAR certified equipment will have to reduce the number of edge ports per uplink to achieve the necessary performance, thus using more energy per connection. The table below illustrates this problem in comparing similar switches with a different number of downlink and uplink ports and different uplink speeds. As products, these would be extremely difficult to separate, and some of the switches would qualify for ENERGY STAR and others not, which in many cases would result in overbuying.

Models	Uplink Module	Power at 0% traffic	Power at 10% traffic	Power at 100% traffic
WS-3850-12S	4x1Gig	85.84	85.89	86.75
WS-3850-12S	2x10Gig	87.95	88.3	90.04
WS-3850-24S	4x1Gig	104.48	104.25	105.12
WS-3850-24S	2x10Gig	106.24	106.58	109.75
WS-3850-48T	4x1Gig	117.74	116.62	117.59
WS-3850-48T	2x10Gig	117.56	116.74	120.40
WS-3850-48T	4x10Gig	120.56	120.28	127.24
WS-3850-48P	4x1Gig	125.35	124.15	125.15
WS-3850-48P	2x10Gig	123.78	122.9	126.75
WS-3850-48P	4x10Gig	129.59	129.64	135.96
WS-3850-48U	4x1Gig	114.8	114.7	115.6
WS-3850-48U	2x10Gig	116.8	116.9	119.9
WS-3850-48U	4x10Gig	119.9	121.2	127.7

2. For Version 1.0, the ENERGY STAR LNE test method should be aligned with the ATIS test procedure.

The LNE Draft 2 Test Method proposes departing from the ATIS test method in ways that are not practicable.¹³ The ATIS test method was carefully developed over several years to take into consideration real world uses of network equipment. Every departure from the ATIS test method has the potential to increase testing costs and possibly require unnecessary product redesign. TIA makes the following recommendations with regard to the LNE test method.

- **TIA recommends that the LNE test method should utilize the ATIS test method taxonomies and load profiles for routers and Ethernet switches.**

The LNE test method should utilize the same load profiles for routers and switches found in Tables 1 and 2 of the ATIS standard for LNE Test Method Sections 6.1 and 6.2.¹⁴ The

¹³ See ENERGY STAR Program Requirements Product Specification for LNE Draft 2 Test Method (LNE Draft 2 Test Method), available at www.energystar.gov/sites/default/files/specs//Draft%20%20V1.0%20LNE%20Test%20Method.pdf.

¹⁴ See ATIS 0600015.03.2013, Annex A, Tables 1 and 2.

ENERGY STAR LNE test method should harmonize with the ATIS standard to maintain consistency and avoid patchwork definitions.

- **The LNE Test Method should allow for cascaded/snaked traffic between ports on line cards for base power chassis measurements that are not throughput related.**

Draft 2 Version 1.0 of the LNE Test Method proposes:

For each data port present on the UUT, there shall be at least one corresponding data port on the Test Equipment capable of sending and receiving data to and from the UUT at the highest operable line-rate standard.¹⁵

This proposal would result in requiring full port testing. Full port testing is unnecessary for energy usage reporting purposes and would significantly increase test complexity and costs. TIA recommends that the LNE Test Method follow the ATIS note in Section 6.3 of ATIS-0600015.03.201 that states, “It is acceptable to use cascaded/snaked traffic between ports on line cards for base chassis power measurements that are not throughput related.”¹⁶

- **The Input Power Requirements for DC-powered products should be aligned with ATIS.**

The Voltage Tolerance in the LNE Test Method is currently listed at +/- 2.0 V.¹⁷ The voltage tolerance should be aligned with ATIS 0600015.2013, which requires +/-3 V.

- **The LNE Test Method should follow the ATIS test procedure for addressing ambient temperature. (Lines 66-69).**

The LNE Test Method proposes a new method to address ambient temperature.¹⁸ ATIS document 0600015.2013 describes how to handle variable speed fans during testing. The assumption that $\pm 1^{\circ}\text{C}$ requirement will ensure constant fan speed is not based on actual testing experience and will result in inaccurate power numbers for modular products. The ambient temperature requirement should be changed to align with ATIS-0600015.2013, which requires $\pm 3^{\circ}\text{C}$ ($77 \pm 5^{\circ}\text{F}$).

- **The As-shipped Condition requirement does not make sense for the type of network equipment covered under the LNE specification.**¹⁹
- **TIA seeks clarification and the technical justification for the test procedure for UUT with multiple PSUs. Does EPA have an error estimate for this requirement?**²⁰

¹⁵ See LNE Draft 2 Test Method, lines 106-108.

¹⁶ See ATIS-0600015.03.201 Section 6.3.

¹⁷ See LNE Draft 2 Test Method, line 58.

¹⁸ See *id.* lines 66-69.

¹⁹ See *id.* lines 133-134.

²⁰ See *id.* lines 159-162.

CONCLUSION

TIA appreciates the opportunity to provide additional input to the EPA regarding the LNE specification and test method and looks forward to continuing to work with the EPA and other stakeholders moving forward.

Respectfully submitted,

TELECOMMUNICATIONS INDUSTRY ASSOCIATION

/s/ DANIELLE COFFEY

Danielle Coffey
Vice President
Government Affairs

Joseph Andersen
Director, Technology & Innovation Policy
Telecommunications Industry Association
1320 Court House Road, Suite 200
Arlington, VA 22201
Tel: (703) 907-7700
jandersen@tiaonline.org