

Index #	Submitter	Topic	Subtopic	Stakeholder Comments	EPA Response
1	Summary	Definitions	General	A stakeholder suggested further classification of the devices and clarification that features and configurations, such as upload, download and core system communication, affect energy profiles.	EPA is proposing several new definitions to address variability in features and configurations in LNE products.
2	Summary	Definitions	LNE	A stakeholder noted that the Large Network Equipment definition is too constraining for certain types of equipment (e.g., firewalls and load balancers are devices that see all network traffic, but do not necessarily connect to lots of systems). These products typically have few high-bandwidth ports whose total aggregate bandwidth is greater than eleven wired physical ports.	EPA is proposing that firewalls and load balancers remain out of scope for Version 1.0, based on stakeholder feedback that these products are not appropriate to be covered using the ENERGY STAR LNE test methodology.
3	Summary	Definitions	Switches	A stakeholder stated that the distinction between classic switches and routers has become blurred, as switches (e.g., L3 switches) have added features previously only found in routers. Limited L3 functionality has been added to some switches and is referred to as "Light Layer 3 switches" (or LL3). This commenter suggested that there be some distinction between L2, LL3 and L3 switches for fair comparison in any Energy Star metric.	EPA is proposing to revise the Switch definition to clarify that some devices can perform both native data link layer switching and also encapsulate data frames in network packets for intra and extra network routing at multiple link layers (e.g. 2, 3 & 4). These devices are still considered switches in the specification.
4	Summary	Definitions	Routers	A stakeholder noted that the router definition mentions devices that route network traffic to non-Ethernet ports. This commenter stated that these products can be both consumer and data center equipment and the bridging interface of these routers can be a WAN interface, such as DSL, ADSL, Modems, Sonet and other telecommunication protocols, that are not specifically Ethernet and thus these routers require a separate classification.	EPA has made minor revisions to the Router definition, but welcomes additional stakeholder feedback on whether additional clarification may be needed.
5	Summary	Definitions	Product Type	A stakeholder requested clarification on how a hybrid product, that doesn't exactly fit as a Switch, Router, Security Appliance or Access Point, be classified. As an example, they stated that a load balancer sits in front of a large server farm and directs traffic based on high-level rules and policies like http sessions, applications, authentication, etc. and after a traffic flow decision is made the traffic is sent via layer-2 or layer-3 (switching or routing) header manipulation. They noted that this box may be classified as a router, but because of where it sits in a network, it is generally utilized as a security appliance also.	EPA has clarified that both load balancers and security appliances are proposed to be excluded from scope in Version 1.0. In all cases, the primary function of the device will determine how it is categorized for ENERGY STAR purposes.
6	Summary	Definitions	Managed vs. Unmanaged	A stakeholder recommended that EPA consider using terms other than "Managed" and "Unmanaged" to differentiate categories of network equipment because all network systems are managed in some way. They noted that many routers contain an embedded CPU processor and additional, supporting circuitry and the differentiator between different routers and switches, in terms of power use, is the presence of a processor to manage the switch or router. They also stated that management processors are primarily found in modular switches and their presence is expected to increase in fixed switches as technologies move forward. This commenter proposed that the differentiation be made between switches and routers which have CPU based management and those with network based management and the use of a different terminology to describe the two management approaches. They also did not think that the presence of redundant power supplies has any bearing on the categorization of systems because it is an operational choice offered across a range of products of differing complexity.	EPA is proposing revisions to address the separation between processor managed vs. network managed products and welcomes feedback on this proposal.

7	Summary	Definitions	Modular	<p>A stakeholder recommended dividing modular network equipment into three types:</p> <ol style="list-style-type: none"> 1) Systems with module sockets for interfaces that are fixed in number and speed (e.g. media adapters, SFP). 2) Systems with modules that change the number and/or speed of interfaces but do not change the functionality (e.g., adapter modules that support 8 x 1Gbps or 1 x 10 Gbps and chassis systems with interface blades sharing a fixed forwarding fabric). 3) Systems supporting modules that can change the functionality of the combined unit. 	<p>Due to a lack of data to support the suggested modularity types at this time, EPA is proposing to separate fixed and modular products by whichever port type is more prevalent in the product. EPA welcomes feedback on this proposal.</p>
8	Summary	Definitions	Operation Modes	<p>A stakeholder stated that in general, network routers and switches do not have an "off" switch and will be either fully operational, managing network traffic, or in an idle state where traffic is not present but the device needs to be in a ready mode to manage and route "new" traffic.</p> <p>Several stakeholders requested clarification on the operation mode definitions by providing more distinction between state 1 and state 2. As is written, one stakeholder stated that a piece of equipment is considered in idle mode due to lack of data flowing but this could be due to other equipment not sending. This commenter noted that equipment would be constantly transitioning between Active/Idle based on the definition whereas, idle should require a substantial power reduction, like the sleep state of modern computers. Another stakeholder noted that in active mode, LNE should have all functionality available and be actively transmitted user data. A stakeholder stated that a low power mode will be integrated with the idle mode, which maintains latency and responds to a standard 'wake-up call' and this low power mode is optional for the user based on operational constraints.</p> <p>Another stakeholder stated that the ability to handle sporadic traffic is equivalent to the equipment returned to full capacity instantly and the unit under test could transition to a state where all ports remain active.</p>	<p>EPA is proposing to simplify the operation power states section, focusing on active state and idle state. EPA is requesting additional information on the functionality of Low Power States and how prevalent they are in LNE products.</p>
9	Summary	Definitions	Physical Wired Ports	<p>A stakeholder requested clarification on if non-wired ports (e.g., fiber-optic ports) are out of scope and what a physical wired port is.</p>	<p>EPA has clarified that fiber-optic connections are not considered Physical Network Ports in this document.</p>
10	Summary	Scope	General	<p>A stakeholder believed that the scope was too broad and the greatest environmental benefit would be with increasing power supply efficiency. They noted that fixed switches, routers and configurations would be a good place to start if EPA wants to have a broader LNE specification, however due to the complexity of the products and need for data, comparing different products is not manageable currently. This commenters also recommended the use of existing product taxonomies, such as ATIS (e.g., for routers and Ethernet switches).</p>	<p>EPA thanks the stakeholder for this comment but does not agree that LNE criteria should be limited to power supply efficiency. EPA does welcome additional feedback on the use of existing taxonomies in places where it would help more clearly delineate products based on functionality.</p>
11	Summary	Scope	LNE vs. SNE	<p>A stakeholder suggested differentiating LNE and SNE with performance characteristics.</p>	<p>EPA welcomes additional stakeholder feedback on alternative means to delineate between SNE and LNE. The current approach of using port count was created during the development of the V1.0 SNE specification. Should an alternate approach that more effectively delineates be identified, EPA anticipates applying the approach to both product specifications.</p>
12	Summary	Scope	Wireless Enterprise Products	<p>A stakeholder recommended including equipment with wireless capability.</p>	<p>A product that meets the LNE definition and happens to also provide wireless connectivity may certify as an LNE product, but the wireless portion of the product will not be evaluated during testing. Products which provide wireless connectivity and do not meet the LNE definition either are either currently covered in the V1.0 SNE specification, or plan to be covered in the V2.0 SNE specification if EPA is provided the data to do so.</p>

13	Summary	Scope	Fixed vs. Modular	<p>One stakeholder agreed that the primary focus of V1.0 should be fixed routers and switches. Another stakeholder noted that there are no boundaries between 'modular' and 'fixed' products and recommended not using this distinction in the specification. This commenter requested clarification on how EPA would reflect variability of pluggable items and suggested requiring a vendor to list all installed components.</p>	See Index # 7
14	Summary	Scope	Exclusions	<p>Several stakeholders agreed that security appliances and access point controllers be excluded. One stakeholder requested that VPN servers be excluded as they can be considered security devices as well as network caching and load balancing devices. Another stakeholder recommended that network appliances be excluded from scope. A commenter suggested that Storage Area Networks and Embedded Blade Server switches be distinguished and excluded.</p>	EPA is proposing to exclude all of these product types from Version 1.0.
15	Summary	Scope	PoE	<p>A stakeholder recommended capturing products excluded from the SNE specification due to the PoE exclusion, regardless of the number of ports.</p>	See Index # 12
16	Summary	Energy Efficiency Criteria	General	<p>Several stakeholders recommended V1.0 require reporting of a standard representation of power usage compared to performance metric as well as mandating other energy efficiency features (e.g., energy efficient Ethernet, variable speed fans, etc.), while avoiding pass/fail limits. This commenter stated that this approach will benefit the LNE users to a greater extent. They also noted that in most cases the purchases of LNE already includes an evaluation process that details energy usage.</p>	<p>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.</p> <p>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.</p>
17	Summary	Energy Efficiency Criteria	General Categorization	<p>A stakeholder noted that there are hundreds of categories of networking equipment and recommended using ATIS TEER to identify differing characteristics. Another stakeholder suggested that EPA work with industry to categorize products noting that there are enterprise and data center class switches and routers that can be segmented into access, aggregation, and core layers. They stated that these categories may need separate test methods/metrics.</p> <p>A stakeholder noted that efficiency based on power levels will be problematic for devices that perform different levels of function or operate at different points in a network especially in data center networks. This commenter stated that the landscape for networking functions is changing. Also, they said meaningful comparisons would require hundreds of separate categories for LNE.</p>	<p>EPA acknowledges that LNE products are used in different environments and is proposing new definitions for edge and core products. In addition, DOE is proposing separate test methodology for products with higher utilization workloads vs. lower utilization workloads.</p>

18	Summary	Energy Efficiency Criteria	Categorization of Managed vs. Unmanaged	A stakeholder noted that a network switch can be fixed and unmanaged and a managed switch does not necessarily have redundant power supplies. This commenter suggested a definition specifying that a managed switch can be remotely accessed for configuration, monitoring and telemetry.	See Index # 6
19	Summary	Energy Efficiency Criteria	Categorization of Stacked Switches	A stakeholder stated that there is a possible categorization issue with a class of managed network switches that support a function called "stacking". Stacking is the ability for an L3 or LL3 switch to provide link aggregation across multiple switches and can aggregate multiple discrete switches into one autonomous L3 switch using more power. Compared to a non-stacking switch, a stacking switch would not be able to achieve the same performance per watt metric. They stated that the stacking category of switches is highly valued by customers because of its capability to scale and expand. This commenter recommended that stacked switches be allowed to be tested in the full aggregate configuration.	EPA is proposing to revise the Switch definition to make clear that some devices can perform both native data link layer switching and also encapsulate data frames in network packets for intra and extra network routing at multiple link layers (e.g. 2, 3 & 4). These devices are considered switches in Version 1.0.
20	Summary	Energy Efficiency Criteria	Qualification Metrics	A stakeholder believed that there may be sufficient TEER data or that sufficient TEER data can be generated for specific categories of fixed routers or switches to enable specifying qualification metrics but the data gathering effort will be important to assess which product categories have sufficient data for creating qualification limits. They noted that where data is insufficient, EPA should use V1.0 to collect TEER or other metric data. A stakeholder recommended that EPA maintain efficiency metrics for the Draft 1 Test Method.	EPA has collected much of the publicly available TEER data that was readily accessible on manufacturer websites as well as published LNE product comparison reports. This pool of data is relatively small, and the variables in testing often differ, making apples to apples comparisons difficult. EPA will continue to look for additional data as the specification development process moves forward and encourages stakeholders to submit any additional product data using the ENERGY STAR LNE test method.
21	Summary	Energy Efficiency Criteria	Data Call	A stakeholder recommended that EPA call for information on the market conditions for: 1. Power supply efficiency 2. Available energy efficiency features 3. Availability of power use and inlet temperature data to be transferred from the product to the network 4. Availability of remote port administration 5. Highest AHSRAE level that a product is warranted 6. Availability of TEER performance data	EPA has made progress in collecting information in several of these areas, but welcomes any additional stakeholder feedback that would help move the process forward in a more expedited manner.
22	Summary	Energy Efficiency Criteria	PSU	A stakeholder recommended that fixed products should be tested as a whole with no requirements for the internal or external power supply.	EPA thanks the stakeholder for this comment but will continue to include external power supply requirements to align with the approach taken in most other ENERGY STAR IT specifications (e.g. computers, servers, storage).
23	Summary	Energy Efficiency Criteria	PSU/PoE	Two stakeholders agreed that power supply efficiency should be considered especially for systems that support power over Ethernet and that efficiency should be assessed according to 80-PLUS. One of these commenters noted that power levels are higher when PoE is deployed which would make low load efficiency levels less significant, however improvements could be achieved if the source and load devices use intelligent power negotiation and implementation should be encouraged. Another stakeholder stated that a PoE capable device should not be compared to a device not capable of supporting PoE devices because the power is so much higher for PoE capable devices.	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 feedback, EPA feels that setting levels at 80Plus Gold for LNE products is appropriate and welcomes additional PSU test data from LNE manufacturers.

24	Summary	Energy Efficiency Criteria	Modular Products	<p>A stakeholder noted that a modular chassis allows for the insertion of a wide variety of cards or blades that can span a high range of functionality and features, including high port count, aggregate bandwidth, flexible media types and speeds, POE power sourcing, power redundancy, network redundancy, security policies and management. This commenter also stated that the power consumption of each individual card may not always be available or even measurable in some systems and the only practical solution is to fill the chassis with equivalent cards configured the same and then measure total aggregate performance and power across the entire loaded modular chassis, which would have to be done with each card type for that card to prove compliance. They asked at what hierarchical level should compliancy be applied - should a card be listed as independently compliant, just the chassis or an entire loaded chassis with cards? Some specific capabilities could physically reside in either the cards or the chassis hardware, blurring the distinction between the functionality of the chassis and cards. Therefore it seems the only fair approach is to consider an entire loaded chassis for compliancy.</p>	EPA and DOE are both seeking additional feedback from stakeholders on the most effective ways to configure modular systems for testing as well as reporting of power and performance data that is meaningful and useful to end-users. EPA welcomes further discussion on the above, as well as ideas on how to structure ENERGY STAR product families for modular system configurations.
25	Summary	Energy Efficiency Features	Powering Down Unused Ports	<p>A stakeholder pointed out that the proportion of unused ports in data center installations is low, even for edge networking systems. Edge equipment, with the use of structured cabling, allow operators to utilize all ports for a large proportion of networking systems and the edge equipment remains powered and connected to the network permanently. Aggregation and core devices are rarely installed with unused ports.</p>	EPA received verbal feedback that this requirement was reasonable and achievable and is proposing that it remain an energy efficiency features requirement.
26	Summary	Energy Efficiency Features	Remote Admin of Ports	<p>A stakeholder noted that most networking equipment supports remote administration of ports using standard network management tools so this requirement is not difficult.</p>	EPA thanks the stakeholder for this comment.
27	Summary	Energy Efficiency Features	Variable Speed Fans	<p>A stakeholder mentioned that variable speed fans are becoming common and this requirement could speed the market penetration of this technology but timing should be considered to show the impact to industry.</p>	EPA thanks the stakeholder for this comment.
28	Summary	Energy Efficiency Features	Dynamic Power Scaling with Level of Utilization	<p>A stakeholder stated that scalable networking should be the long term focus but these technologies are new and multiple generations of product development will be required but using a metric such as ATIS TEER will encourage it.</p>	EPA understands that these capabilities are not yet common in the market, but is interested in further discussion on how to potentially incentivize and accelerate the adoption of these features.
29	Summary	Energy Efficiency Features	EEE	<p>A stakeholder recommended an incentive for products implementing EEE to reflect the energy savings achieved.</p>	EPA is proposing that EEE functionality is a requirement for all physical network ports of products certified to Version 1.0.
30	Summary	Energy Efficiency Features	Operating at Higher Temperatures	<p>A stakeholder noted interest in environmental specifications to increase efficiency but the topic is still under study so it would be too early to add this criteria.</p>	EPA is interested in further exploring ways to recognize products that can operate at higher temperatures and subsequently lead to an IT system where cooling costs can be reduced. EPA welcomes additional feedback on proposed approaches to encourage development of this functionality.
31	Summary	Standard Reporting Requirements	General	<p>A stakeholder agreed that reporting energy use and performance is crucial. Another stakeholder recommended that EPA follow the reporting characteristics outlined in ATIS, stating that the most common characteristic is the power conversion and thermal conditions.</p> <p>A commenter noted that although products assess power use, they are not necessarily reporting this information to the network and software development would be required.</p>	EPA is proposing that all core LNE products shall be capable of measuring and reporting input power and inlet air temperature. Edge products will not be required to have this ability in Version 1.0.

32	Summary	Standard Reporting Requirements	Displaying of Test Results on Product Finder	A stakeholder pointed out a whitepaper, based on ATIS TEER, that represents a standard method of reporting product energy use and efficiency. Another stakeholder suggested that the reported data will need to be determined during the specification development process.	EPA is proposing an initial list of information that it intends to collect and display as part of the certification process for Version 1.0. EPA welcomes stakeholder feedback on additional information that should be displayed on the ENERGY STAR website.
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