Comment #	Topic	Summary	DOE Comments
1	Power Conditioning Requirements	A stakeholder commented that the LNE power conditioning requirements should match those used in the ENERGY STAR Servers and Storage test methods, since the testing will typically occur in the same labs.	The U.S. Department of Energy (DOE) agrees that the power requirements for these types of products should be harmonized. The alternating current (ac) power requirements included in Section 4.A) of the ENERGY STAR Version 1.0 Draft 1 Test Method (Draft 1 Test Method) for Large Network Equipment (LNE) are consistent with those included in Section 4.A) the ENERGY STAR Version 2.0 Computer Servers Test Method (servers test method). The servers test method does not include direct current (dc) power requirements, but the dc power requirements listed in Section 4.A) of the LNE Draft 1 Test Method are consistent with those included in Section 5.2.4 of Alliance for Telecommunications Industry Solutions (ATIS)-0600015.2009. The ac input power requirements included in Section 4.A) of the Draft 2 Test Method are the same as those included in Section 4.A) of the Draft 1 Test Method. The dc input power requirements listed in Section 4.A) of the Draft 2 Test Method are harmonized with Section 5.2.4.1 of ATIS-0600015.2013.
2	As-Shipped Condition	A stakeholder commented that most manufacturers ship a router or switch with a base configuration, which could be potentially set to maximize the efficiency of the UUT. However, this stakeholder noted that customers typically load a custom configuration for an LNE device when it is installed in the network, rather than using an "as shipped" configuration.	DOE understands that testing a product using an "as-shipped" configuration might not be representative of each customer's configuration used in its intended deployment. Due to the wide variety of features and functionality present in LNE products, DOE has not included additional constraints or requirements in the Draft 2 Test Method regarding a product's "as-shipped" configuration. DOE also recognizes that a product's "as-shipped" configuration could be set to maximize the reported efficiency. However, as long as the configuration allows the test to be run according to the requirements provided in the test method, testing a product in its "max efficiency" configuration should not be problematic.
3	LNE Requiring Initial Configuration	A stakeholder commented that most LNE require initial configuration in order to operate properly. This stakeholder stated that a configuration should be provided for testing, but it should not be permitted to be modified during testing (e.g., between utilization levels). Furthermore, the stakeholder opined that the configuration details should be included with the published results and that manufacturers should be allowed to test each product using multiple configurations in order to demonstrate its effect on the results.	Section 5.1.A)1)a) of the Draft 1 Test Method allows manufacturers to provide instructions and/or supporting materials if a product cannot be tested in its "as-shipped" condition. This section also requires manufacturers to provide a detailed description of the initial configuration material (files, instructions, etc.) if applicable. This section remains unchanged in the Draft 2 Test Method. The Draft 1 Test Method does not contain guidelines or requirements regarding "reconfiguration" during testing. DOE agrees that the manufacturer-specified configuration should not be modified once testing has commenced, and a requirement prohibiting "mid-test reconfiguration" is included in Section 5.1.A)1)b) of the Draft 2 Test Method.
4	Half-Port Testing and EEE Support	A stakeholder supports the proposal to test network equipment with half of the ports connected and with Energy Efficient Ethernet (EEE) enabled on switches where EEE is available.	DOE appreciates the comment. The Draft 2 test method provides guidance for testing EEE-compatible products and includes half-port testing.
5	Half Port Testing	A stakeholder commented that it may be common that to only have half of the DL ports connected, but all of the UL ports are typically connected in that scenario. Also, this stakeholder noted that the max non drop rate (NDR) throughput is more strongly related to the total UL bandwidth than that of the DL. Hence, the stakeholder opined that all UL ports should be connected during half-port testing.	DOE agrees with the comment. Section 5.1.A)5)a)iii. of the Draft 2 Test Method require that if the UUT has separate uplink and downlink ports, then all uplink ports and half of the downlink ports shall be connected during testing.
6	Half Port Testing	A stakeholder commented that testing Full and Half Port will double the required testing, and therefore double the test burden.	The Draft 1 Test Method requires that all products perform both full- and half-port testing. However, full-port testing may not be representative of the intended use for some products and half-port may not be representative for others. For this reason, Section 6 of the Draft 2 Test Method includes two distinct procedures: one intended to be representative of high-utilization scenarios and the other of low-utilization scenarios. The former requires full-port configuration, while the latter uses half-port.
7	Link-Idle Distribution	A stakeholder noted that the idle-period distribution can have a strong effect on the energy-saving potential of EEE. The stakeholder had modeled idle period length using a Poisson distribution during the development of the EEE standard, but most test equipment is incapable of doing this. Rather, they typically use a uniform distribution. The stakeholder opined that, although it might reduce the effectiveness of EEE, a uniform distribution should be used in order to create more comparable results amongst all tested products.	DOE recognizes that the idle-period distribution can affect the energy usage of products equipped with EEE, and agrees that this distribution should be the same across all tested products in order to ensure compatibility of the results. Furthermore, since most test equipment is limited to uniform distribution when modeling the idle period length, it might be impractical for the Draft 2 Test Method to use another distribution. For this reason, Section 5.1.A)5)d)iii. of the Draft 2 Test Method requires that the link-idle period be uniformly distributed during load testing.

8	Semi-Modular Products: Interfaces	A stakeholder commented that some LNE use interchangeable modules that change the port configuration (e.g., 8x1000BASE-T; 16x1000BASE-T; 8xgigabit SFP; 16xgigabit SFP; 2x10GBASE-T; or 2x10 gigabit SFP+). The stakeholder stated that although they often sell with modules or combinations of modules pre-installed, that these systems aren't modular since the modules don't change base functionality. The stakeholder questioned whether all module permutations would be tested, or would the manufacturer select an example configuration. The stakeholder proposed that all combinations of modules be tested for each base product, as long as they only change "the number, medium, or speed of interfaces".	Section 5.1.A)5)e) in the Draft 1 Test Method includes guidelines for determining which physical interfaces should be used if there are multiple pluggable module options available. However, these guidelines typically apply to the selection of a pluggable transceiver or cable for a given type of module. The Draft 2 Test Method does not provide include requirements or guidelines regarding port configuration when different port configuration options are available for a given "base product". The determination of how ports should be configured when interchangeable port modules are available will be addressed at a later date. However, Section 5.1.A)5)e)1. of the Draft 2 Test Method does require that interchangeable modules, if used, are installed homogenously (e.g., all downlink ports are the same, and all uplink ports are the same).
9	Physical Interface Requirements	A stakeholder commented that LNE usually don't ship with pluggable module interfaces, and that copper interfaces do not always represent the option with the highest power consumption (e.g, a 10GBASE-T XENPAK module may use 12W while a 10Gb/s direct attach copper SFP+ module may use less than 1W). The stakeholder opines that if the intention is to test the efficiency of just the UUT, then the effect of pluggable interfaces should be minimized. Furthermore, the stakeholder believes that the best approach may be to allow the manufacturer to choose the lowest-power option for a given speed since it is difficult to find an interface configuration that works for every system.	DOE recognizes that there are different types of pluggable modules available for LNE products, and that certain types of pluggable modules may be more appropriate for a given deployment scenario than others. Furthermore, certain products might not support copper-based modules at all. For this reason, the Draft 2 Test Method does not include requirements regarding the types of pluggable modules that must be used. DOE recognizes that the type of pluggable module used during testing affects a product's power consumption and performance. Therefore, the selection of pluggable modules is considered an issue of product configurability. Therefore, the determination of which pluggable modules are used will be handled by the specification document.
10	Semi-Modular Products: PSUs	A stakeholder commented that some LNE can have different PSU configurations, which are chosen based on the interface modules installed and redundancy requirements. The stakeholder noted that a system with an inappropriately configured PSU will operate inefficiently and unrepresentatively. This stakeholder opined that the manufacturer should select an appropriate PSU configuration according to the test performed.	DOE understands the concern, and the PSU selection and configuration will be addressed at a later date.
11	UUTs with Multiple PSUs	A stakeholder commented that some LNE with multiple PSUs support 2 AC inputs; others support 1 AC input and a separate DC input for backup power. This stakeholder opined that including PDU overhead power is inappropriate, since a system with one PSU should be measured the same way as a system with two. The stakeholder believes that a better option would be to measure all power supplies separately and then sum the resulting measurements. The stakeholder noted that manufacturers typically recommend a power supply based on interface module configuration, so this should be the basis of PSU selection during testing.	DOE agrees that including efficiency losses introduced by a power distribution unit (PDU) may not be representative of normal operation, and could unfairly penalize products with multiple PSUs. For this reason, section 5.1.A)4)b) of the Draft 2 Test Method prohibits the use of a PDU if there are multiple PSUs. Instead, the Draft 2 Test Method allows power meters with multiple channels and/or multiple power meters to be used simultaneously.
12	UUTs with Multiple PSUs	A stakeholder commented that UUTs supporting multiple PSUs should not necessarily have all PSUs installed and connected during testing. The stakeholder noted that an extra PSU could support redundancy or capacity, and each purpose will create a different efficiency scenario. The stakeholder opined that if extra power supplies are required for testing, the purpose of the extra PSU should be specified (redundancy or capacity).	Although redundancy is an attribute commonly found in LNE products, it is a concept that can be difficult to quantify consistently across different products and types of products. For this reason, the Draft 2 Test Method does not include redundancy requirements and allows manufacturers to determine the most appropriate PSU configuration. However, each tested product must have each installed PSU connected to an appropriate power source during testing.
13	Definitions: Payload	A stakeholder commented that "frame" or "packet" could be confused for payload, and that it may be clearer to if frame sizes were cited rather than payload sizes (e.g., in a new column to the table which describes IMIX).	DOE agrees that the inclusion of the terms, "frame", "packet", and "payload" could potentially cause confusion if the distinction between each is not defined. For this reason, the Draft 2 Test Method includes a definition for each of the aforementioned terms, as well as a diagram that visually demonstrates how each of the different concepts is related. Furthermore, the table that describes the Simple IMIX packet distribution in the Draft 2 Test Method includes a column providing frame sizes, as well as the packet sizes. DOE believes that providing both frame and packet size requirements clarifies the intended requirements.
14	References to IEEE Standards	A stakeholder commented that the amendment title of an IEEE document should not be used in a reference once the amendment has been included into a full revision of the base standard.	The Draft 2 Test Method includes updated IEEE references that adhere to the correct reference style for IEEE documents.
15	Nomenclature for Types of PoE	A stakeholder commented that the references to 802.3at and 802.3af should be replaced with Type 1 and Type 2, respectively.	See response to Comment #14.
16	PoE Load Testing	A stakeholder commented that the efficiency of PoE delivery is mostly driven by the efficiency of the PSU, and that the PoE efficiency can be linked to some kind of PSU efficiency criterion such as "80-Plus".	DOE agrees with the comment. Based on stakeholder feedback and internal investigations, DOE believes that most of the power loss occurring in PoE delivery can be attributed to PSU inefficiency. In order to reduce testing burden, the Draft 2 Test Method does not include PoE load testing.

17	PoE Maximum Supported Load	A stakeholder commented that IEEE 802.3 defines the max supported load per port, for each Type and Class advertised during the load-classification process. The stakeholder noted that some systems express further restrictions via LLDP or other proprietary methods. Additionally, many PSEs have a system-wide PoE limit that can restrict the powering of all ports, or all ports in a set, simultaneously. The stakeholder commented that PSEs can manage the system-wide power budget using device classes, LLDP, or proprietary methods. This stakeholder also noted that IEEE 802.3 also allows a system to ignore power management altogether. A stakeholder commented that due to variation in PSEs, it may be difficult to determine a generalized "max load" for all capable products, as well as applying that max load across all capable ports. The stakeholder also noted that spreading an equal load across all loads may not provide the maximum PoE capability of a PSE. A stakeholder commented that proper PoE testing will have a large burden, and may not provide more meaningful results than simply using PSU efficiency. The stakeholder also noted that if PoE testing is included in the test method, there are numerous practical methods which can be utilized to measure the "max homogenous load".	See response to Comment #16.
18	Highest PoE Load Point	The highest load point for PoE loading in the Draft 1 Test Method is 90% of max system PoE. A stakeholder opined that the 10% margin is unnecessary but not objectionable. This is because the PoE standard accounts for the worst case cable losses when defining the max power requirements for the PSE and PD. Furthermore, the stakeholder noted that a practical evaluation of the maximum power would make a cable-losses margin redundant. Another stakeholder also commented that the 10% is not necessary since the cable losses are minimal.	See response to Comment #16.
19	PoE Load Levels	A stakeholder commented that PSEs do not spend much time providing close to the max power capability of the system. The stakeholder opined that PSEs should be tested at load points more representative of normal operation, which is substantially below their maximum capabilities (i.e., <25% of the maximum tested capability). This stakeholder noted that intelligent power management reduces over-provisioning compared to domestic or enterprise AC power distribution, but typical usage stays below 50%. Another stakeholder believes that PoE load testing should be performed only at 100% of maximum available PoE, since that is how testing is typically performed in industry.	See response to Comment #16.
20	Existing Standards	A stakeholder opined that current existing standards should be used rather than creating new ones. The stakeholder believes that if updates to the current standard are needed, DOE/EPA should contact the standards bodies to let them address the issues.	DOE wishes to harmonize with industry standards where possible, and has used ATIS as the foundation for the Energy Star Test Method. However, there are aspects of the method of test and the product configuration that DOE felt may need to be further detailed to meet the Energy Star program goals. DOE has included those additions in this draft and seeks comment from industry parties on those additions.
21	Number of Ports Required on Test Equipment	A stakeholder commented that it may be burdensome to require test equipment to have a corresponding port for each port on the UUT, especially with larger modular products. ATIS states "It is acceptable to use cascaded/snaked traffic between ports on line cards for base chassis power measurements that are not throughput related". The stakeholder opined that the test method should harmonize with this requirement.	The ATIS test method states that "snaked traffic" is only acceptable for "base chassis power measurements that are not throughput related" during modular testing. Therefore, DOE believes that such a method would not be permitted for measurements that are throughput related. The requirement that all UUT ports be connected to a corresponding port on the test equipment remains unchanged in the Draft 2 Test Method. However, DOE seeks to determine a method that reduces test burden for larger products without diminishing the effectiveness of the test.
22	Harmonization with Existing Standards	A stakeholder commented that the load levels, class definitions, and efficiency metric should be harmonized with the ATIS procedure. Another stakeholder commented that the efficiency metric is important for comparing products fairly and should be included.	At this time, DOE is focusing on the Test Methodology and not the efficiency metric. The Draft 2 Test Method does not include an efficiency metric. No determination has been made yet regarding the inclusion of an efficiency metric. DOE and EPA will determine which, if any, metric is used at a later date.

23	Stacked Switches	A stakeholder commented that there are some switches that can be connected in groups via a proprietary connection on the backplane. This allows the multiple devices to functionally act as if they were a single unit. The stakeholder noted that each of these products may individually consume more power than an otherwise identical product due to the extra circuitry required to perform the stacking. However, when connected together, multiple devices may demonstrate equal or greater efficiency than otherwise identical devices. Additionally, the ability to effectively increase the number of available ports on a fixed-unit is desirable for many users who want the ability to expand capacity in the future without investing in a modular product. The stakeholder opined that stacked switches should be permitted to be tested in a fully "stacked" configuration.	DOE recognizes that some LNE products may be capable of demonstrating improved or expanded functionality when connected to a separate but identical product. The Draft 2 Test Method treats each stackable switch as a single product, and therefore requires each to be tested individually. However, DOE would like to understand the power usage and performance of stackable products better. For this reason, DOE may consider adding additional guidelines for testing stackable switches in a future draft of version of the test method.
24	Dual-Group Partial Mesh	A stakeholder commented that the dual-group partial mesh section needs to be refined, since many advanced LNE can have their ports arbitrarily partitioned. As it is written now, traffic cannot be shared between any of the "reconfigurable" ports. The stakeholder opined that the current language in the test method should be updated to provide clarity on how to configure and test these products.	DOE recognizes that some LNE products have ports that are capable of being arbitrarily partitioned. Furthermore, the concepts of "uplink" and "downlink" may not be as readily applicable to such products. For this reason, the Draft 2 Test Method requires that products be tested in the dual-group partial mesh configuration only if there are clear designations between downlink and uplink ports listed on the product. All other products, including those with ports that can be arbitrarily partitioned, shall be tested using the full mesh configuration.
25	Idle Definition	A stakeholder commented that in response to comment 5, "Definition – Idle", of the LNE Discussion Document & Proposed Testing Comment Responses, DOE requires the UUT to be able to handle sporadic traffic but simultaneously states that it does not need to be able to transition to full traffic immediately. The stakeholder notes that the ability to handle sporadic traffic is the same as being able to return to full capacity instantaneously, so this definition contradicts itself. The stakeholder stated that the definition is also inconsistent with EPA's response to comment 22, "Energy Efficiency – System Level", which states that EPA does not intend to encourage sleep mode functionality that degrades system performance. A stakeholder commented that if the UUT is not required to be capable of handling full traffic at all times, it could choose to transition from a real-time (RT) to a non-real time (non-RT) state in order to save energy. The stakeholder opined that this is not representative of normal use and may create inconstancies in testing from vendor to vendor. The stakeholder noted that ATIS separates out the testing for RT and non-RT so that the results from each are not compared.	The Draft 1 Test Method includes the requirement that a product must be capable of transitioning to full traffic while in idle. This requirement remains unchanged in the Draft 2 Test Method, and all throughput testing is performed on products in a "real time" scenario. The Draft 2 Test Method does not include "non-real time" testing. The Very Low Utilization (VLU) test, included in the Draft 2 Test Method, does not specifically demonstrate a device's capability to transition to sustained full traffic while in idle. However, DOE believes that the VLU test verifies that a product can properly process traffic in "real time" during the test.
26	Ambient Temperature Requirements	A stakeholder commented that there are tight requirements for voltage and frequency in the Draft 1 Test Method, but the requirement for ambient temperature is relatively loose (25°C +/-5°C). The stakeholder noted that this wide temperature range can make a substantial difference in the power consumption of the system since automatic fan speed controls are based on internal system temperature readings. The stakeholder recommended that tighter ambient temperature requirements be used in order to compare product results fairly.	DOE agrees with the comment and the Draft 2 Test Method includes an ambient temperature requirement with a total allowable range of 2°C. Furthermore, DOE believes that 25°C may not be representative of the ambient temperatures that LNE will experience in deployment based on current and future trends. Many LNE products include efficiency features that might not be able to demonstrate energy-savings at 25°. For this reason, the Draft 2 Test Method includes an ambient temperature centered at 27°C. This makes the allowable ambient temperature range 26°C to 28°C in the Draft 2 Test Method. This temperature shall be measured at a distance no greater than 50mm from the main airflow inlet of the tested product, which is consistent with Section 4.E)3) of the ENERGY STAR Computer Servers Test Method V. 2.0 (Rev. Apr-2013).