



ENERGY STAR®
Small Network Equipment
Draft 2 Specification
Final Draft Test Method


Stakeholder Webinar
December 6, 2012

U.S. Environmental Protection Agency
U.S. Department of Energy




Learn more at energystar.gov

Agenda




- 1 Introduction
- 2 Final Draft Test Method
- 3 Draft 2 Specification
- 4 Open Comment & Next Steps




2

Introduction




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- 2 Final Draft Test Method
- 3 Draft 2 Specification
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3

Webinar Details



- Audio provided via conference call in:
 - Call in: +1.877.423.6338 (in the US)
+1.571.281.2578 (international)
 - Code: 456-417
 - Please keep phone lines on mute unless speaking
 - Press *6 to mute and un-mute your line
- Webinar materials will be available online shortly
 - Go to: www.energystar.gov/NewSpecs
 - Click on: Small Network Equipment



4

Presenters



- **Una Song**
U.S. Environmental Protection Agency
Project Manager, Small Network Equipment
- **John Clinger**
ICF International
- **Tom Bolioli**
Terra Novum



5

Activities To Date



- Late 2009: Specification development launch
- 2010 - 2011: Test Method development and data assembly
- February 2012: Draft 1 specification released
- November 15, 2012: Draft 2 specification & Final Draft test method distributed to stakeholders
- **Today, December 6th: Overview of the clarifications to the test method and revisions to the specification**



6

Written Comments



- Thank you to everyone for your helpful feedback on the Draft 1 specification and test method.
- In addition to making verbal comments during today's call, stakeholders are encouraged to submit written comments to networking@energystar.gov

Comment Deadline

Friday, January 4, 2013



7

Webinar Objectives




1. Provide overview of clarifications to the test method and specification
2. Summarize improved dataset and proposed specification criteria
3. Obtain stakeholder feedback on proposed revisions to the specification in preparation for a Final Draft




8

Final Draft Test Method




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9

Required Tests



- EPA has clarified the required test procedures for each product type:

Product Type	Test Procedure Section			
	7.2.A) Idle State	7.2.B) Wired Network WAN	7.2.C) Wired Network LAN	7.2.D) Wireless Network LAN
Modem (DSL, Cable, ONT)	X	X		
Integrated Access Device	X	X	X	X
Switch/Router	X		X	Routers with Wireless
Access Point	X			X



10

Battery Operated Products



- EPA has clarified steps to ensure a **fully charged battery** prior to testing, aligning with other ENERGY STAR Test Methods for electronics:

Battery Operated Products: For products designed to operate using batteries either when not connected to the mains or during a power disruption, the battery shall be fully charged before the start of testing and shall be left in place for the test. To ensure the battery is fully charged, perform the following steps:

- For UUTs that have an indicator to show that the battery is fully charged, continue charging for at least an additional 5 hours after the indication is present.
- If there is no charge indicator, but the manufacturer's instructions provide a time estimate, continue charging for at least an additional 5 hours after the manufacturer's estimate.
- If there is no indicator and no time estimate in the instructions, but the charging current is stated on the UUT or in the instructions, terminate charging 1 hour after the calculated charge duration or, if none of the above applies, the duration shall be 24 hours.



11

Test Configuration



- To limit variation and be consistent with other ENERGY STAR test procedures, EPA requires the length of the Ethernet cable to be between 1 and 2 meters:

Ethernet Cabling: All Ethernet cables used for testing shall meet ANSI/EIA/TIA-568 Category 5e (Cat5e) specifications and shall be between **1 and 2 meters** in length.



12

Wireless Link Precedence



- EPA has revised the tables for wireless testing to clarify appropriate channel bandwidths and address the inclusion of IEEE 802.11ac:

Single instantaneous frequency band support: The first supported wireless standard and frequency band starting from the top of Table 4 shall be used for Access Point testing. Only one band shall be active during the test.

Table 5

Wireless Band	Frequency
IEEE 802.11ac	5 GHz (Maximum supported channel bandwidth)
IEEE 802.11n	5 GHz (Maximum supported channel bandwidth)
IEEE 802.11n	2.4 GHz (20MHz channel bandwidth)
IEEE 802.11g	2.4 GHz
IEEE 802.11b	2.4 GHz
IEEE 802.11a	5 GHz



13

Wireless Link Precedence



Simultaneous instantaneous frequency band support: The first supported pair of wireless standards and frequency bands starting from the top of Table 5 shall be used for access point testing.

Table 5

Wireless Band 1	Frequency 1	Wireless Band 2	Frequency 2
IEEE 802.11n	2.4 GHz (20 MHz channel bandwidth)	IEEE 802.11ac	5 GHz (Maximum supported channel bandwidth)
IEEE 802.11n	2.4 GHz (20 MHz channel bandwidth)	IEEE 802.11n	5 GHz (Maximum supported channel bandwidth)
IEEE 802.11g	2.4 GHz	IEEE 802.11n	5 GHz (Maximum supported channel bandwidth)
IEEE 802.11g	2.4 GHz	IEEE 802.11a	5 GHz
IEEE 802.11b	2.4 GHz	IEEE 802.11a	5GHz



14

WAN Link Precedence



- **MoCA, HPNA and WiMAX (802.16e)** connection types have been removed from Table 6, due to limited data and inability to test them in the current test method. These protocols should be turned off during testing. Products that act solely as bridges between an Ethernet network and one of the removed protocols are now out of scope.

Connection Type	Media Type
DOCSIS (Cable)	Coax
PON	Fiber
DSL	Copper (Twisted Pair)
Ethernet (IEEE 802.3)	Copper (Twisted Pair)



Draft 2 Specification



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Definitions



- Clarified the **Access Point** definition
- Harmonized **Operation Modes and States** with latest revisions to the test method
- Per stakeholder suggestion, replaced “maximum raw bit rate” with “maximum PHY bit rate”:

Link Rate: The *maximum PHY bit rate* possible on a particular link (e.g., 1000BASE-T Ethernet supports 1 Gb/s in each direction [2 Gb/s total]; IEEE 802.11g supports 54 Mb/s total).
- New definitions for **Full Network Connectivity** and **External Proxy Capability** relating to the proposed Section 3.3.3 External Proxy Allowance (to be discussed later on in the presentation).



17

Product Family



- For the purpose of reducing testing burden while ensuring representativeness, EPA has proposed the following Product Family structure:

Product Family: A group of product models that are (1) made by the same manufacturer, (2) subject to the same ENERGY STAR qualification criteria, and (3) of a common basic design. Product models within a family differ from each other according to one or more characteristics or features that either (1) have no impact on product performance with regard to ENERGY STAR qualification criteria, or (2) are specified herein as acceptable variations within a product family. **For Small Network Equipment, acceptable variations within a product family include:**

- 1) Color,
- 2) Housing, or
- 3) Any of the functional adders specified in Table 2.



18

Scope



- A stakeholder requested that EPA explicitly exclude from scope equipment that contains hardware circuits that support **Internet or Ethernet security or data security functions (e.g., Firewall, VPN, SSL, Encryption/decryption, etc.)**.



- EPA has not received data to support this suggestion.
- Non-rack mounted requirement in the SNE definition should provide sufficient separation from SNE and excluded products covered under the large network equipment (LNE) specification development process. To learn more about LNE, visit www.energystar.gov/newspecs.



19

Power Supply Requirements



- A stakeholder noted that the multi-output voltage external power supplies are not included.

External Power Supplies (EPSs): EPSs (single- and multiple-voltage) shall meet the level V performance requirements under the International Efficiency Marking Protocol and include the level V marking. Additional information on the Marking Protocol is available at www.energystar.gov/powersupplies.

- External Power Supplies shall meet level V requirements when tested using the *Test 315 Method for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac 316 Power Supplies, Aug. 11, 2004*.
- EPA is not aware of any multi-output voltage EPSs in use with SNE but welcomes stakeholder input regarding their inclusion.

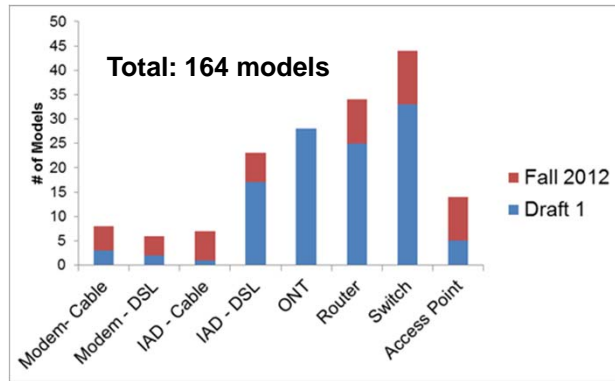


20

Data Assembly



- In Fall 2012, EPA received additional data tested with the draft ENERGY STAR test method
- Includes 50 new models currently available on the market from various manufacturers



Average Power Calculation



- EPA has maintained the average measured power calculation and maximum average power limit calculation from Draft 1

Equation 1: Average Power Calculation (P_{AVG})

$$P_{AVG} = Average[P_{WAN_TEST}, P_{LAN_TEST}, P_{WIRELESS_TEST}]$$

Where:

$Average[x_i]$ = Average of terms (x_i) applicable to the UUT;

P_{WAN_TEST} = WAN test, at 1.0 kb/s (W);

P_{LAN_TEST} = LAN test, half of available wired LAN ports populated, at 1.0 kb/s (W);

$P_{WIRELESS_TEST}$ = LAN test, at 1.0 kb/s (W).

Equation 2: Maximum Average Power (P_{AVG_MAX})

$$P_{AVG_MAX} = P_{BASE} + \sum_{i=1}^n P_{ADD_i}$$


Where:

P_{BASE} = Base Power Allowance

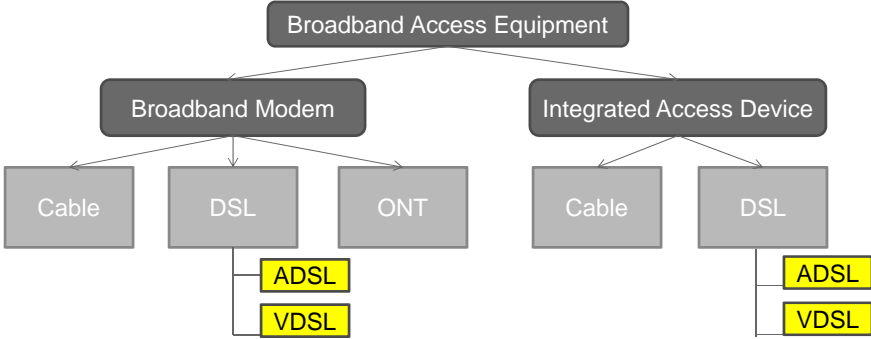
P_{ADD_i} = Additional Functional Adders



ADSL & VDSL Proposals




- New base allowances based on primary functionality tested: ADSL or VDSL
- Products with both ADSL & VDSL shall be tested using ADSL




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graph TD
    A[Broadband Access Equipment] --> B[Broadband Modem]
    A --> C[Integrated Access Device]
    B --> B1[Cable]
    B --> B2[DSL]
    B --> B3[ONT]
    C --> C1[Cable]
    C --> C2[DSL]
    B2 --- D[ADSL]
    B2 --- E[VDSL]
    C2 --- F[ADSL]
    C2 --- G[VDSL]
    
```



23

Proposed Base Allowances



- With the enhanced dataset, EPA proposes the following new and revised base power allowances:

Product Type	Draft 2 P_BASE (watts)	Draft 1 P_BASE (watts)
Broadband Modem – Cable	5.9	TBD
Broadband Modem – ADSL	4.0	TBD
Broadband Modem - VDSL	6.9	
Broadband Modem – ONT	5.5	5.5
IAD - Cable	6.0	8.0
IAD - ADSL	5.5	
IAD - VDSL	8.4	
Router	3.2	4.5
Switch	0.6	2.5
Access Point	2.0	TBD


24

Additional Functional Adders



- EPA maintained the Draft 1 proposed functional adders

Feature	Power Allowance (P_{ADD}) in watts	Notes
Fast Ethernet (100Base-T)	0.1	Allowance applied once per port present in the UUT.
Gigabit Ethernet (1000Base-T)	0.3	Allowance applied once per port present in the UUT.
Wi-Fi (802.11a/b/g/n)	0.7	Applied once for the UUT for availability of Wi-Fi connectivity.



25

Additional Functional Adders



- Some stakeholders suggested the following:
 - Additional adders for features such as MoCA, HPNA, integrated storage, and Voice over Internet Protocol
 - Wi-Fi adder applied for each Wi-Fi interface present in the product



- EPA has not received any product data that supports developing an adder for these technologies



26

EEE Allowance



- EPA is proposing an allowance to encourage the adoption of EEE

Energy Efficiency Ethernet (EEE) Allowance: Small Network Equipment products that ship with IEEE 802.3az compliant Gigabit Ethernet ports may **claim a 0.2 watt additional adder for each Gigabit port when calculating P_{ADD}** .

- If all the 4 port Gigabit Ethernet switches sold in 2012 had EEE functionality, **EPA estimates savings of close to \$3M annually** through reducing the power consumption between SNE and End Point Devices.

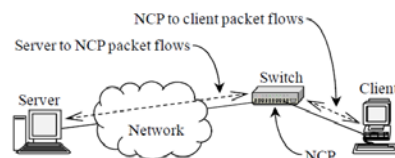


27

External Proxy Allowance



- EPA is proposing an allowance to encourage the adoption of external proxy capability
 - Provides the ability for End Point Devices to maintain Full Network Connectivity while entering a sleep state
 - If all the desktop computers that are left on could enter low power mode because of proxying, **EPA estimates savings of over \$180M annually in the U.S.**



Note: The NCP within the switch covers for the client host when it is sleeping to maintain full network presence.

Figure 1. System view of the NCP



28

Proxy Definitions



External Proxy Capability:

The ability of an SNE device to maintain Full Network Connectivity on behalf of an End Point Device. Must include an implementation of a standard protocol for communicating between the host and the SNE device. Note: A known such protocol is mDNS. Waking the sleeping host is typically accomplished by Wake-On-LAN or a wireless equivalent.

Full Network Connectivity:

The ability of an End Point Device to maintain network presence while in Sleep Mode or another low power mode (LPM) of equal or lower power consumption and intelligently wake when further processing is required (including occasional processing required to maintain network presence). Presence of the End Point Device, its network services and applications is maintained even though the End Point Device is in a LPM. From the vantage point of the network, an End Point Device with full network connectivity that is in LPM is functionally equivalent to an idle End Point Device with respect to common applications and usage models. Full network connectivity in LPM is not limited to a specific set of protocols but can cover applications installed after initial installation. Also referred to as "network proxy" functionality and as described in the Ecma-393 standard.



29

Proxy Allowance Values



- EPA proposes the following levels of proxy capability and associated allowances:
 - **Base Capability:** To maintain addresses and presence on the network while in LPM, the system handles IPv4 ARP and IPv6 NS/ND. **0.2 W**
 - **Remote Wake:** While in LPM, the system is capable of remotely waking upon request from outside the local network. Includes Base Capability. **0.5 W**
 - **Service Discovery/Name Services:** While in LPM, the system allows for advertising host services and network name. Includes Base Capability. **0.8 W**
 - **Full Capability:** While in LPM, the system supports Base Capability, Remote Wake, and Service Discovery/Name Services. **1.0 W**



30

PoE Management



- EPA received feedback that a Power over Ethernet (PoE) Supply management requirement is unnecessary because it does not provide any significant benefit to the energy efficiency performance of the product given the standards already in place



- Thus, EPA has removed the requirement included in Draft 1:

~~3.4.1 Power over Ethernet (PoE) Supply Management: All SNE capable of delivering PoE to end point devices shall be capable of disabling PoE functionality upon user request.~~



31

Optional Performance Reporting



- EPA has included the option to provide additional data to appear on the ENERGY STAR qualified product list that may help users evaluate products to meet specific needs and interpret energy efficiency data:
 - Ethernet Throughput
 - Max # of Wireless Clients
 - Max # of NAT Clients
 - # of EEE Gigabit Ethernet ports – **mandatory** for any products that claim the EEE Allowance in Section 3.3.2.
 - Maximum External Proxy Capability – **mandatory** for any products that claim the External Proxy Allowance in Section 3.3.3.



32

Toxicity Requirements



- EPA has included toxicity requirements in the ENERGY STAR Partner Commitments

Ensure that all of Partner's products that bear the ENERGY STAR certification mark meet the following standard:

Product material requirements as defined in restriction of hazardous substances (RoHS) regulations, as generally accepted. This includes exemptions in force at the date of product manufacture: where the maximum concentration values tolerated by weight in homogeneous materials are: lead (0.1%), mercury (0.1%), cadmium (0.01%), hexavalent chromium (0.1%), polybrominated biphenyls (PBB) (0.1%), or polybrominated diphenyl ethers (PBDE) (0.1%). Batteries are exempt.

Notes:

- The explicit intention is to harmonize with EU RoHS.
- For purposes of ENERGY STAR third-party certification, these requirements shall not be reviewed when products are initially qualified nor during subsequent verification testing. Rather, EPA reserves the right to request supporting documentation at any time.



33

Open Comment & Next Steps



34

Open Comment



- EPA would now like to open up the line for any general comments from stakeholders.



35

Timelines



- EPA proposed the following timeline:

Draft 2 Comment Deadline	January 4, 2013
Final Draft Specification Released	Late January 2013
Final Specification Published	February 2013
Specification Effective Date	March 2013



36

Written Comments



- Please send all comments to:
networking@energystar.gov

Comment Deadline

Friday, January 4, 2013



37

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38

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