ENERGY STAR Small Network Equipment Version 1.0 Draft 1 Webinar

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Agenda

Time (all EST)	Topic
12:00 PM	Introduction (5 minutes)
	Definitions (30 minutes)
	Test Method Changes and Overview (15 minutes)
	Qualification Criteria (45 minutes)
	Proposed Toxicity and Recyclability Requirements (10 minutes)
	Partner Commitments (10 minutes)
1:55 - 2:00 PM	Closing Topics

Specification Structure Overview

- Two components of the specification
  - Program Requirements
    - Partner Commitments
    - Definitions
    - Efficiency/Eligibility Criteria
  - Test Method
    - Conditions
    - Evaluation Steps
    - Data Template

Version 1.0

- EPA intends Version 1.0 to provide program coverage where immediately possible based on data availability

- Key Goals:
  - Establish test method
  - Establish a scope clear enough to delineate from product not covered in version 1.0 and with what will ultimately fall under a Large Network Equipment program

Definitions

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Definitions

- Definitions are included in Section 1
  - Cover testing and evaluation considerations

- When possible, EPA prefers to harmonize with definitions that are generally accepted by industry.

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Product Classifications and Types

| 120	2)	Small Network Equipment (SNE): Network Equipment that is intended to serve users in either
121		small networks or a subset of a large network. SNE includes a) all Network Equipment with
122		integral wireless capability and b) other Network Equipment meeting **all** of the following
123		criteria:
124	a)	Designed for stationary operation;
125	b)	Contains no more than eleven (11) wired Physical Network Ports;
126	c)	Primary configuration for operation outside of standard equipment racks;
127	d)	Meets the definition of one or more of the Product Types defined below.

- The definition for Small Network Equipment is intended to fully describe the <u>Version 1.0</u> scope
  - Emphasis is on program considerations – to create clear expectations about which products fit Version 1.0 and which are left for future versions of the program

- Large Network Equipment: EPA intends to commence efforts, likely in late 2012, on a companion program for other portions of the network equipment market

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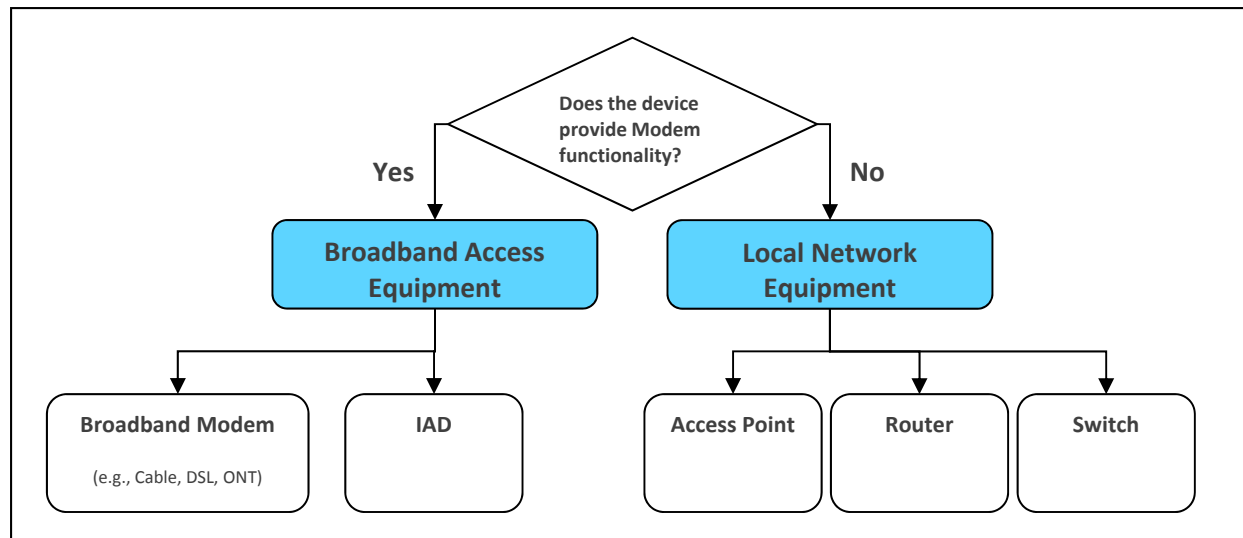
Product Types

- This graphic appeared in Draft 1 to describe product types covered by the program

- Highlighted: groupings based on testing considerations (interface with head end service provider equipment)

Product Types
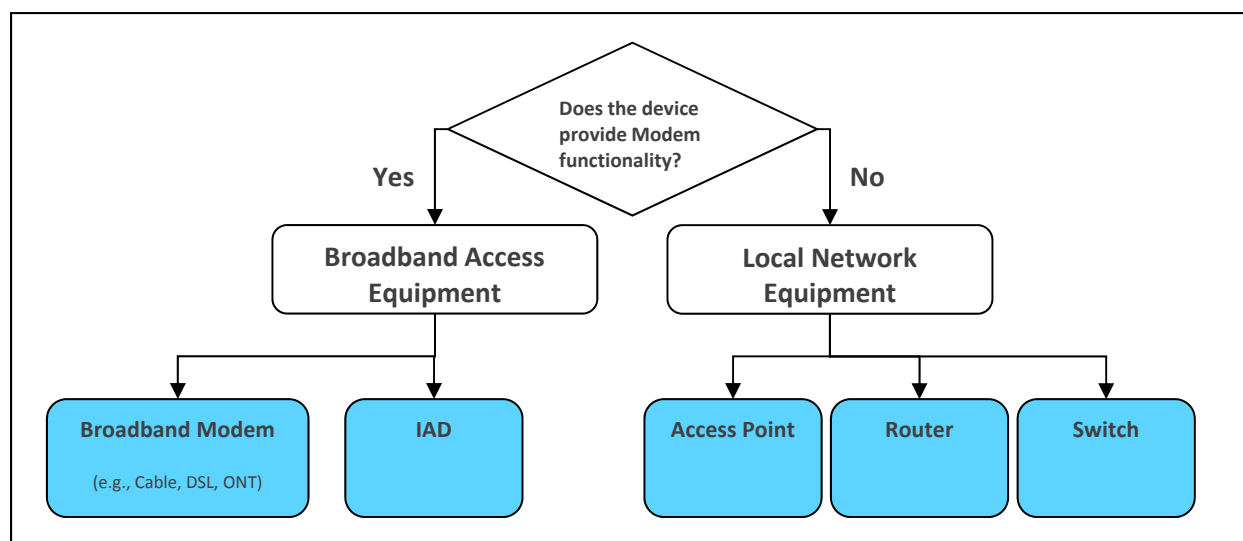
- Within these groupings, EPA identified five product classifications for coverage in Version 1.0

- Note: integration of features present in multiple product types discussed later in this presentation

Product Types
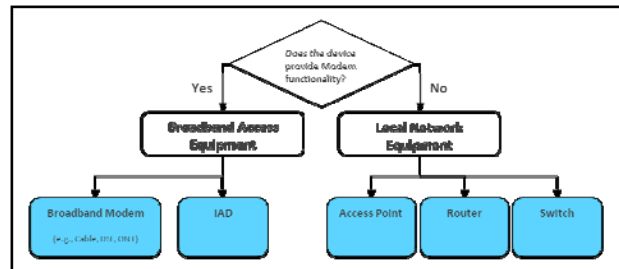
- **Broadband Modem**: A device that transmits and receives digitally-modulated analog signals over a wired or optical network as its primary function. The Broadband Modem category does not include devices with integrated Router, Switch, or Access Point functionality.

  – **Optical Network Termination Device (ONT)**: A type of Broadband Modem that converts signals between copper (wired) or wireless connections and an optical fiber connection. ONTs are available in either desktop or building-mounted versions with different connectivity options.

- **Integrated Access Device (IAD)**: A network device with a modem and one or more of the following functions: wired network routing, multi-port Ethernet switching and/or access point functionality

Product Types
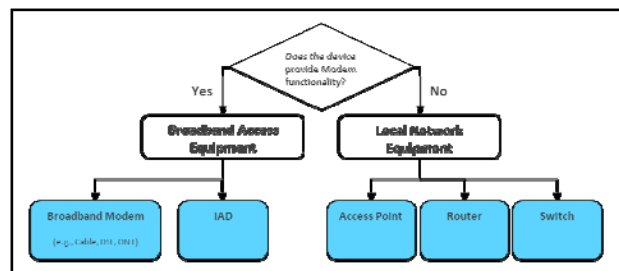
- **Access Point**: A device that provides IEEE 802.11 (Wi-Fi) connectivity to multiple clients as its primary function.

- **Router**: A network device that determines the optimal path along which network traffic should be forwarded as its primary function. Routers forward packets from one network to another based on network layer information. Devices fitting this definition may provide both Router functionality and wireless network capability.

- **Switch**: A network device that filters, forwards, and floods frames based on the destination address of each frame as its primary function. The switch operates at the data link layer of the OSI model.

Other Key Definitions

- Idle State
  - The definition in Draft 1 is intended to describe a small network device in such a condition for testing purposes, not a defined feature offered by units

- Product Family
  - As used by the ENERGY STAR program, product families are groups of product models that share key characteristics (e.g., made by the same manufacturer, same basic design) AND are subject to the same set of ENERGY STAR criteria
  - May differ from marketed product families
  - Used to structure representative testing during the qualification process
  - Left as TBD in Draft 1; EPA welcomes stakeholder proposals on appropriate provisions

Test Method Revision 5 Overview

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

Validation Testing Overview

- DOE completed validation testing on ENERGY STAR Revision 4 Test Method
- 15 products from various manufacturers
- Testing performed at internal DOE test lab
- Recommended changes for Revision 5 Test Method

Products Tested

- **3 Wired Routers**

- **2 Switches**

- **1 Wireless Access Point**

- **9 Integrated Access Devices (IAD)**
  - Tested both wired and wirelessly when applicable

- **Modems**: not tested

Test Setup and Measurements

- UUT (Unit Under Test) configured as-shipped
- Idle Mode Testing
  - Idle, no data transfer
- Wired Active Mode Testing
  - One-port test, 1 kbps and max data rate
  - Half-port test, 1 kbps and max data rate
- Wireless Active Mode Testing
  - One wired port (WAN), one wireless client, 1 kbps and max data rate

Summary of Proposed Changes and Clarifications

Topic	Revision 4 Test Method	Revision 5 Test Method
Wireless Testing	Remove the antennas (if possible) and connect the test unit to the client via coaxial cables	Perform all wireless UUT testing wirelessly
Determining Received Signal Strength	Primary method: use test client to determine received signal strength	Recommend, but not required, to use RF test equipment to determine received signal strength
Received Signal Strength Tolerance	Signal strength of -50 dBm $\pm$ 3 dB	Signal strength of -50 dBm $\pm$ 5 dB
RF Enclosure	Use RF "shielded" enclosure	Clarified that shielded enclosure should be lined with RF absorbing material
1 kb/s Data Rate		1 kb/s data rate defined as 30 second "moving average"

Requests for Feedback

- Low Data Rate
  - Feedback on 1 kb/s data rate and acceptable ranges
- Traffic Generation
  - Test Method proposes using IMIX traffic mix
  - Any issues with the proposed mix and/or setup?
  - Recommendations for alternative traffic generation methods?
- Wireless changes
  - removing the ability to use wired connections

Qualification Criteria

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Power Supplies and Power Management Techniques

- External Power Supplies
  - Efficiency and Power Factor requirements and structure set as described by Roman Numeral V of the International Marking Protocol
  - Equivalent to requirement in discontinued recognition program for End Use Products

- Network "power management"
  - Power Over Ethernet (PoE)
    - Requirement to offer user the ability to disable PoE when unnecessary
  - Energy Efficient Ethernet
    - EPA envisions EEE as a future requirement for the SNE program
    - Stakeholder proposals welcomed on ways to support and encourage adoption of EEE in current product offerings
  - Ecma-393 (*proxZzzy*)
    - EPA is aware of some SNE enabling Full Network Connectivity in low power modes and is seeking ways to encourage its adoption
    - Further information: http://www.ecma-international.org/publications/standards/Ecma-393.htm

Efficiency Requirements: Dataset

- EPA evaluated all data received in both data assembly efforts

- EPA believes that this ENERGY STAR dataset is relatively reflective of the current market for all products proposed for inclusion in this specification except non-ONT Broadband Modems and Access Points

- EPA is requesting additional data/information for these product types and, as such, is not proposing levels for those products in this Draft 1 specification

Product Type	Products in Dataset	Unique Manufacturers or Sources
Broadband Modem – ONT	25*	2
Broadband Modem – Cable or DSL	4	2
Integrated Access Device	17	5
Router	23	5
Switch	29*	3
Access Point	5	3

2 ONTs and 3 Switches tested but contained more than 11 wired network ports

Summary of Changes Between Data Assembly Efforts

	V2	V4
WAN Testing	• Measurements taken with traffic at 7 speeds, as applicable to the UUT	• Measurements taken with traffic at 2 speeds, 1 kb/s and a high traffic rate as specified in Table 8
Wired LAN	• Three scenarios: minimum-, half-, and full-ports connected • For each scenario, measurements taken with traffic at 4 speeds, as applicable to the UUT	• One scenario: half-ports connected • For the half-port scenario, measurements taken with traffic at 2 speeds, 1 kb/s and a high traffic rate as specified in Table 8
Wireless LAN	• Measurements taken with traffic at 4 speeds, as applicable to the UUT • Tests repeated for each available wireless protocol	• Measurements taken with traffic at 2 speeds, 1 kb/s and a high traffic rate as specified in Table 8 • Tests repeated for each available wireless protocol

Approach: Average Power Consumption

- Tests:
  - **WAN**: Measured power consumption in *Wired Network –WAN* test, at 1.0 kb/s (W)

  - **LAN**: Measured power consumption in *Wired Network –LAN* test, half of available wired LAN ports populated, at 1.0 kb/s (W)

  - **Wireless**: Measured power consumption in *Wireless Network – LAN* test, at 1.0 kb/s (W)

Approach: Average Power Consumption

Equation 2: Maximum Average Power ($\underline{P_{AVG\_MAX}}$) Calculation for Small Network Equipment

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

Where:
- P_{BASE} = Base power allowance (W) from Table 1;
- P_{ADDi} = The power allowance as specified in Table 2 for each feature present in the device, for a total of n such allowances.

- Average of power measured during a period of low traffic
  - Why: A small amount of persistent data flows over most small networking products in situ most of the time and this reflects that real world usage
  - As applicable to the Unit Under Test

Power Allowances

- Base values assigned for each product type

- Adders proposed for Ethernet ports and Wireless capability

- As noted, available data did not allow for creation of Base allowance proposals for Cable and DSL modems, Access Points

Table 1: Base Power Allowances

Product Type	P_{BASE} (watts) Version 1.0
Broadband Modem – Cable	*TBD*
Broadband Modem – DSL	*TBD*
Broadband Modem – ONT	**5.5**
IAD	**8.0**
Router	**4.5**
Switch	**2.5**
Access Point	*TBD*

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Adders

Table 2: Additional 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.

- EPA drew from the EU Code of Conduct for Broadband equipment as well as expected averages of connected and unconnected power consumption per port during low levels of activity

Feature Integration and Convergence

- SNE products commonly mix device functions from multiple product types (e.g., wireless routers)

- Draft 1 structure assigns a product a single base allowance

- Adders for wired ports and wireless functionality are intended to accommodate varying levels of functionality within the product types

Next Steps

- Stakeholder feedback

- Identify if additional data is available in the near term for product types underrepresented in the dataset

- Adjust Version 1.0 scope as necessary, establish targeted product types for further evaluation under future versions

<u>Stakeholder input crucial</u>

Proposed Toxicity Requirements

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Proposed Toxicity Requirements

- ENERGY STAR: differentiating products based on energy efficiency only

- In developing these requirements, EPA seeks to avoid associating the ENERGY STAR label with poor quality or otherwise undesirable products

- Many ENERGY STAR product specifications (e.g. lighting) incorporate non-energy requirements. Reflects longstanding practice of ensuring that ENERGY STAR products deliver on consumer expectation for quality

In making CE purchase decisions, factors such as price (95%) and product features (88%) are most vital in purchase decision making.

Surprisingly, environmental factors, including energy consumption (85%) and the ability to recycle a device (70%) were highly rated on the decision tree (above elements such as brand and size) – a possible indication that these considerations are weighing more heavily on consumers' minds.

- Source: *Consumer Electronics Association*, "Powering Intelligent Electricity Use," 2011.

Proposed Toxicity Requirements

- For SNE Draft 1, EPA drew from existing standards for toxicity (RoHS Directive)

  - RoHS Directive: SNE product manufacturers have extensive experience with designing products free from certain toxic materials in compliance with the RoHS Directive

    - EPA welcomes feedback from stakeholders to understand if any materials exempted for a given period of time under the RoHS Directive currently apply to components typically found in SNE

Proposed Toxicity Requirements

- Non-energy requirements are exempt from third party certification process

- Non-energy requirements are not intended for international adoption and that when products are sold in countries other than US, they are not subject to proposed non-energy requirements

- Included exemptions for toxicity harmonized with RoHS Directive where applicable to SNE. EPA seeks feedback on additional exemptions that may apply

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Recyclability Requirements

- Recyclability criteria remained to be determined in Draft 1

- EPA seeks feedback on recyclability standards applicable to SNE

Partner Commitments

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Partner Commitments

- This section of the specification provides guidance on participation in the ENERGY STAR program for a particular product category
- Language is largely standardized across the program
- Topics covered:
  - ENERGY STAR marking protocol and requirements for qualified products
  - Verification and information disclosure
  - Special Distinction (ENERGY STAR Awards)

Product Labeling

- Product labeling requirements are generally aligned across the program to provide consumers with an accurate, efficient way to identify qualified products

- Goal: promote differentiation based on ENERGY STAR qualification through all available sales channels

Product Labeling

25	5.1. Partner must use the ENERGY STAR mark in all of the following ways:
26	
27	5.1.1. On the top or front of the product. Labeling on the top or front of the product may be
28	permanent or temporary. All temporary labeling must be affixed to the top or front of the
29	product with an adhesive or cling-type application;
30	
31	5.1.2. In product literature (i.e. user manuals, spec sheets, etc.);
32	
33	5.1.3. On product packaging for products sold at retail; and
34	
35	5.1.4. On the Partner's Internet site where information about ENERGY STAR qualified models is
36	displayed:
37	
38	5.2. If additional information about the ENERGY STAR program(s) or other products provided by the
39	Partner on its Web site, Partner must comply with the *ENERGY STAR Web Linking Policy*, which
40	can be found at www.energystar.gov/partners.

- Current requirements closely follow standard program guidance

- EPA welcomes proposals from stakeholders on ways to tailor the requirements to opportunities specific to network equipment use or purchase

Closing

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Timeline

Topic	Timeframe
Draft 1	Distributed on February 28, 2012
Close of comment period on Draft 1	**March 30**
Draft 2	Mid-April
Stakeholder meeting/webinar	Late April
Close of comment period on Draft 2	Mid-May
Final Draft	Late May
Small Network Equipment Specification Finalized	Early June

References and Resources

- ENERGY STAR Small Network Equipment specification revision: www.energystar.gov/NewSpecs (click on Small Network Equipment)

- Questions, email list requests: networking@energystar.gov

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Thank you!

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