



ENERGY STAR[®]

Small Network Equipment Draft 3 Specification

Stakeholder Webinar
May 30, 2013

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



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Agenda



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

Introduction



- 1** Introduction
- 2 Draft 3 Specification
- 3 Final Test Method
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Webinar Details



- Audio provided via conference call in:
 - Call in:** +1.877.423.6338 (in the US)
+1.571.281.2578 (international)
 - Code:** 436598
 - 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

Presenters



- **Una Song**
U.S. Environmental Protection Agency
Project Manager, Small Network Equipment
- **John Clinger**
ICF International
- **Steven Lanzisera**
Lawrence Berkeley National Laboratory

Activities To Date



- Late 2009: Specification development launch
- 2010 - 2011: Test Method development and data assembly
- February 2012: Draft 1 Specification
- November 15, 2012: Draft 2 Specification & Final Draft Test Method
- March 2013: Final Data Assembly Effort
- **May 21, 2013: Draft 3 Specification released to stakeholders**
- **Today, May 30, 2013: Overview of the Draft 3 specification and clarifications in the Final Test Method**

Written Comments



In addition to making verbal comments during today's call, stakeholders are encouraged to submit written comments to networking@energystar.gov

Comment Deadline

Webinar Objectives



1. Summarize final dataset and proposed Draft 3 Specification criteria
2. Provide overview of clarifications to the Final Test Method
3. Obtain stakeholder feedback on proposed revisions to the specification in preparation for a Final Draft

Draft 3 Specification



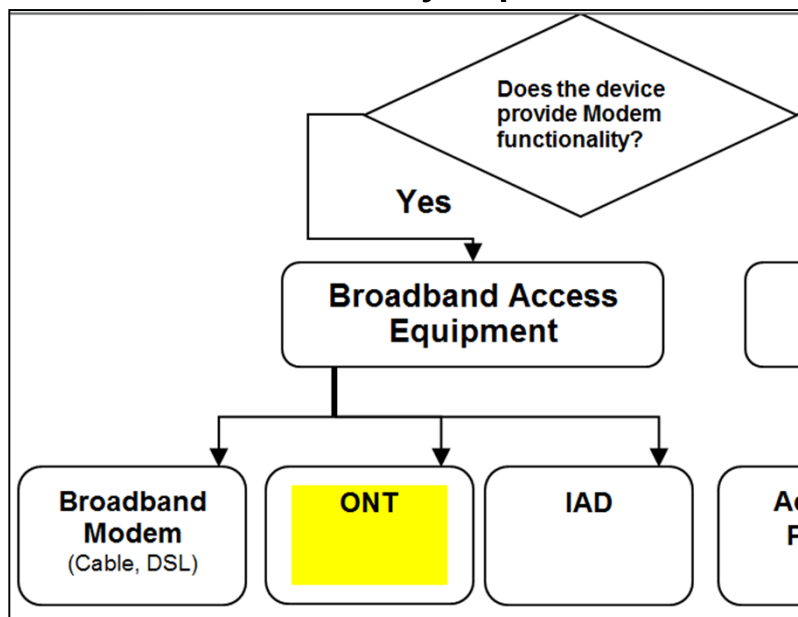
1	Introduction
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Definitions: ONTs

- One stakeholder noted that some Optical Network Termination Devices (ONTs) ranged from having only modem functionality to additional functionality such as data and phone signal routing



- EPA created a separate ONT product category which may have variable data connectivity options



Definitions: SOHO



- EPA removed the definition/acronym “SOHO: Small Office / Home Office” from the specification as it is not referenced elsewhere in the document



Scope: Excluded Products

- EPA received stakeholder feedback on the need to exclude “enterprise” level Access Points for the following reasons:
 - They offer features not addressed in the specification and consume more power
 - Lack of data for these products in the EPA dataset
- EPA has excluded enterprise products based on how they are marketed and the presence of one or more physical features

Scope: Excluded Products



- EPA proposes the following language to exclude enterprise Network Equipment:

Network Equipment that is marketed and sold as enterprise Network Equipment and meets one or more of the following additional criteria:

- 1) is shipped without a power supply;
- 2) requires a separate external access point controller for operation.



Dataset Summary

- During the most recent data assembly effort, EPA received 34 additional Access Point and Router models representing 13 different manufacturers

Data Assembly Period	Access Point	Broad-band Modem	IAD	ONT	Router	Switch	Total
Draft 1	5	3	20	28	25	33	114
Draft 2	8	9	14		8	11	50
Draft 3	7				27		34
Total	20	12	34	28	60	44	198



Average Power Calculation

- EPA has maintained the average measured power calculation and maximum average power limit calculation from Draft 2

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

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

Where:

$\text{Average}[x_i]$ = 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

DOCSIS Channels



- A couple of stakeholders commented on Draft 2 that the base allowances were not taking into account DOCSIS bonded configurations
- EPA analyzed the cable models dataset:
 - Several DOCSIS 1.0 and 2.0 products have a higher adjusted average power values than the DOCSIS 3.0 products
 - The only DOCSIS 3.0 8x4 modem is the second lowest power consuming cable modem
 - A DOCSIS 3.1 8x4 channel IAD has one of the lowest adjusted average power values in that category



- Without additional data, EPA cannot justify allowances for additional DOCSIS 3.0 downstream channels

Draft 2 Wi-Fi Comments



- Stakeholders commented that the Draft 2 0.7 W Wi-Fi allowance did not effectively capture high performance with multiple bands and chains
 - One stakeholder noted a 4 W difference in average power between dual-band and single-band routers whereas there is only a 0.1 W difference in average power between single-band routers and routers without Wi-Fi (normalized data)

Draft 3 Wi-Fi Analysis



- Analyzed all Wi-Fi routers in the EPA dataset
- Developed an adder structure based on the total number of receive chains in a product that is shipped with simultaneous dual band Wi-Fi enabled:
 - Results in acceptable qualification rates for the following router types:
 - 802.11n single band
 - 802.11n simultaneous dual band
 - 802.11ac simultaneous dual band

Draft 3 Wi-Fi Allowances



- EPA is proposing the following Wi-Fi allowances:

Feature	Power Allowance (P_{ADD}) in watts	Notes
Wi-Fi (802.11a/b/g/n)	0.7	Allowance applied once for the UUT for availability of Wi-Fi connectivity.
802.11n per Receive Chain	0.2	Allowance applied to total number of 2.4 GHz and 5.0 GHz 802.11n receive chains. Only applicable for products that ship with simultaneous dual band Wi-Fi enabled.
802.11ac per Receive Chain	1.3	Allowance applied to 5.0 GHz 802.11ac receive chains only. Only applicable for products that ship with simultaneous dual band Wi-Fi enabled.

Plain Old Telephone Service



- Stakeholders noted that Plain Old Telephone Service (POTS) ports require an allowance as the supporting base hardware cannot be shut off due to 911 availability regulations
- In analyzing the dataset EPA observed an increase in power consumption from 1 POTS port to 2 POTS ports but none for 4 POTS ports



- EPA has added the following telephony allowance:

Feature	Power Allowance (P_{ADD}) in watts	Notes
Plain Old Telephone Service (RJ11/RJ14)	0.5	Allowance applied once per port, up to a maximum of two ports.

Base Allowance Power Overview



- EPA removed the Broadband Modem – VDSL product category since the products in this category in Draft 3 were miscategorized and should have all been placed in the IAD – VDSL category. As a result, the IAD – VDSL allowance was lowered.
- Given that most ONT products contain one or two POTS ports and are eligible for the new allowance, EPA adjusted the base allowance to recognize the top performing models.
- The Broadband Modem – Cable, IAD – Cable, and Routers allowances were also adjusted based on changes in the EPA dataset.

Draft 3 Base Power Allowances



- EPA is proposing the following base allowances:

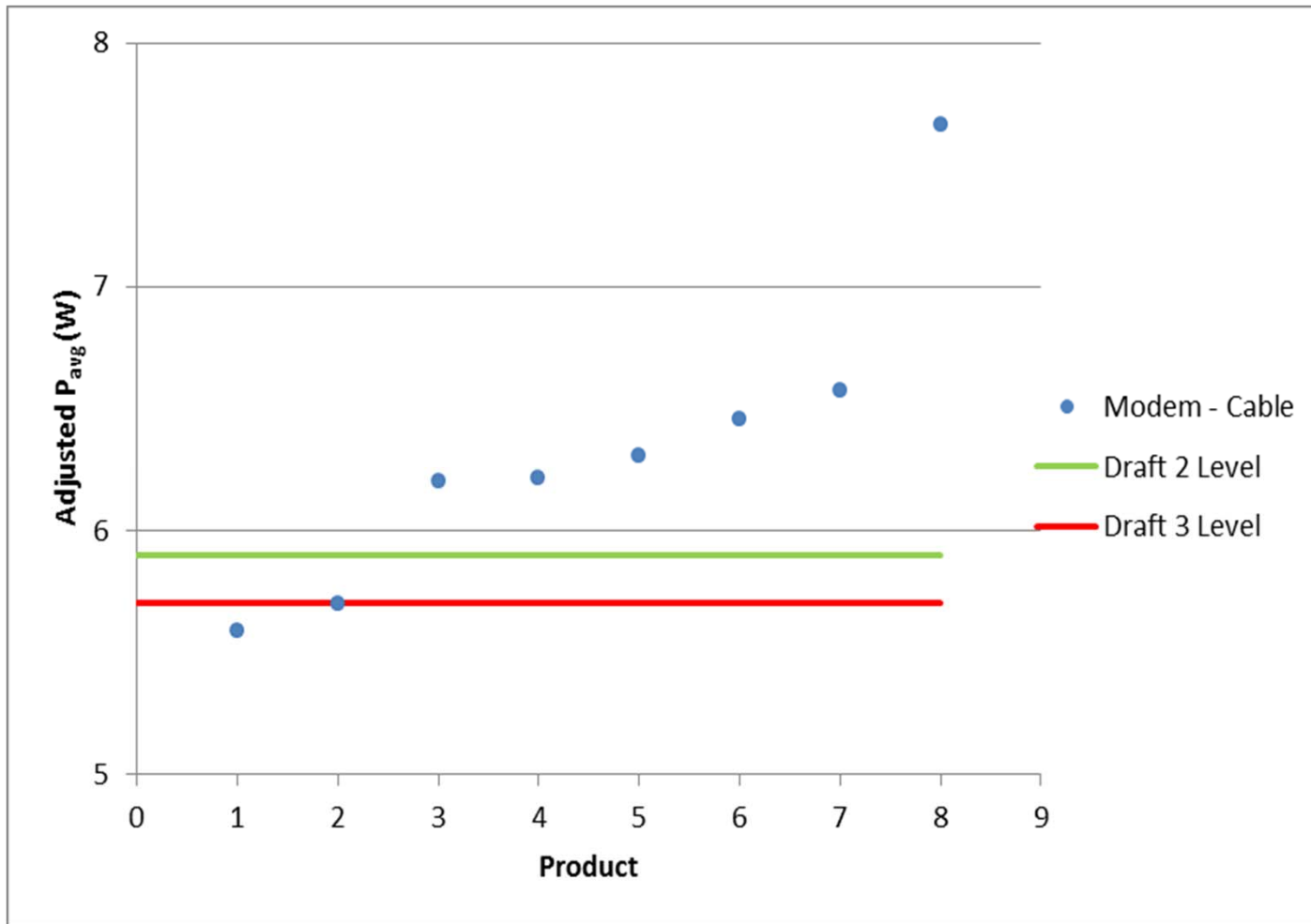
Product Type	P _{BASE} (watts)	P _{BASE} (watts)
	Draft 2	Draft 3
Broadband Modem – Cable	5.9	5.7
Broadband Modem – ADSL	4.0	4.0
Broadband Modem - VDSL	6.9	-
ONT	5.5	4.4
IAD - Cable	6.0	6.1
IAD - ADSL	5.5	5.5
IAD - VDSL	8.4	7.5
Router	3.2	3.1
Switch	0.6	0.6
Access Point	2.0	2.0

Changes In Efficiency Criteria

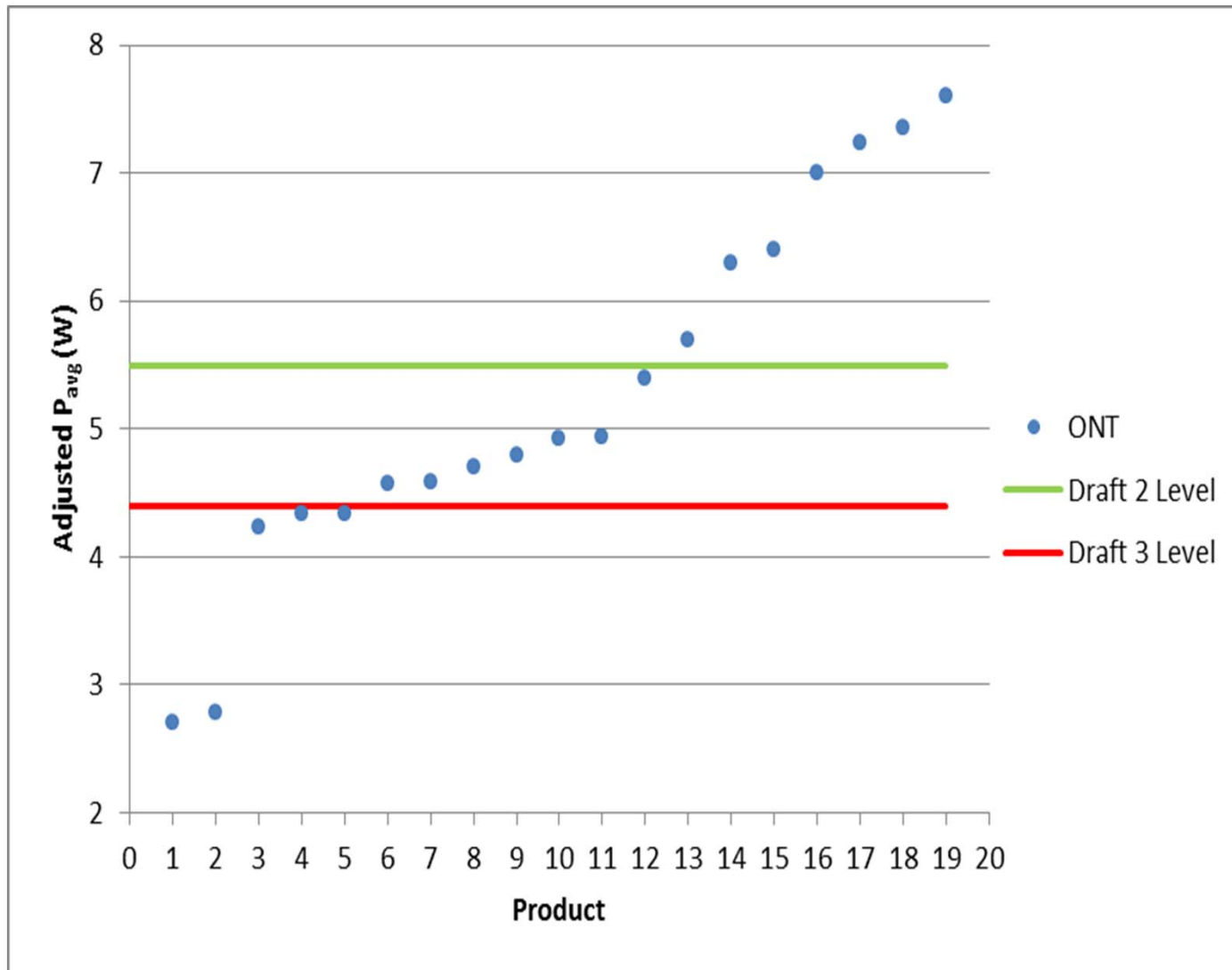


- The charts in the followings slides present data in each product category where modifications to the dataset led to revisions in base power allowances in the Draft 3 Specification. The vertical axis in each chart is the adjusted P_{AVG} (calculated P_{AVG} minus appropriate adder values); the horizontal axis represents products in the ENERGY STAR dataset file.

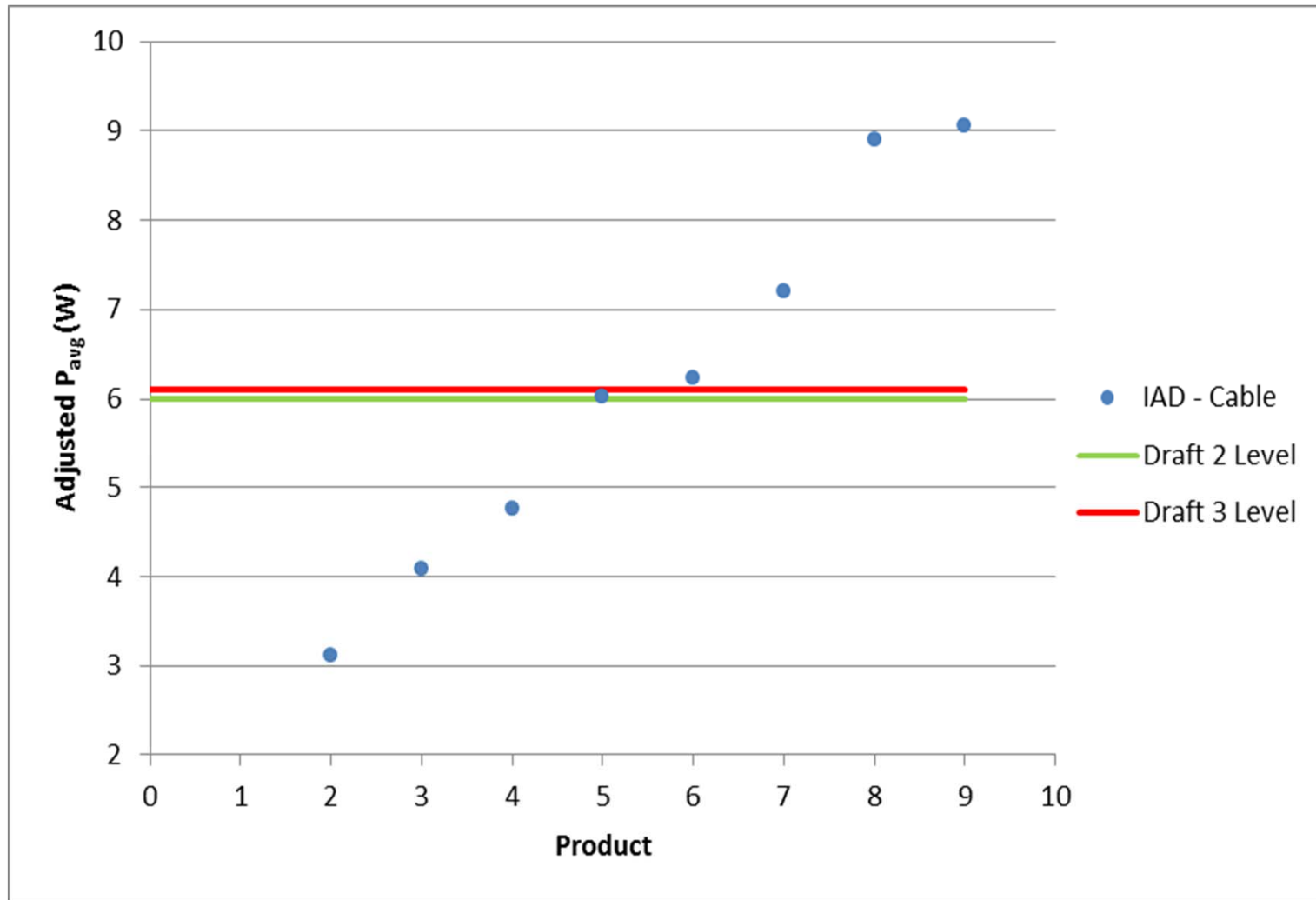
Cable Modems



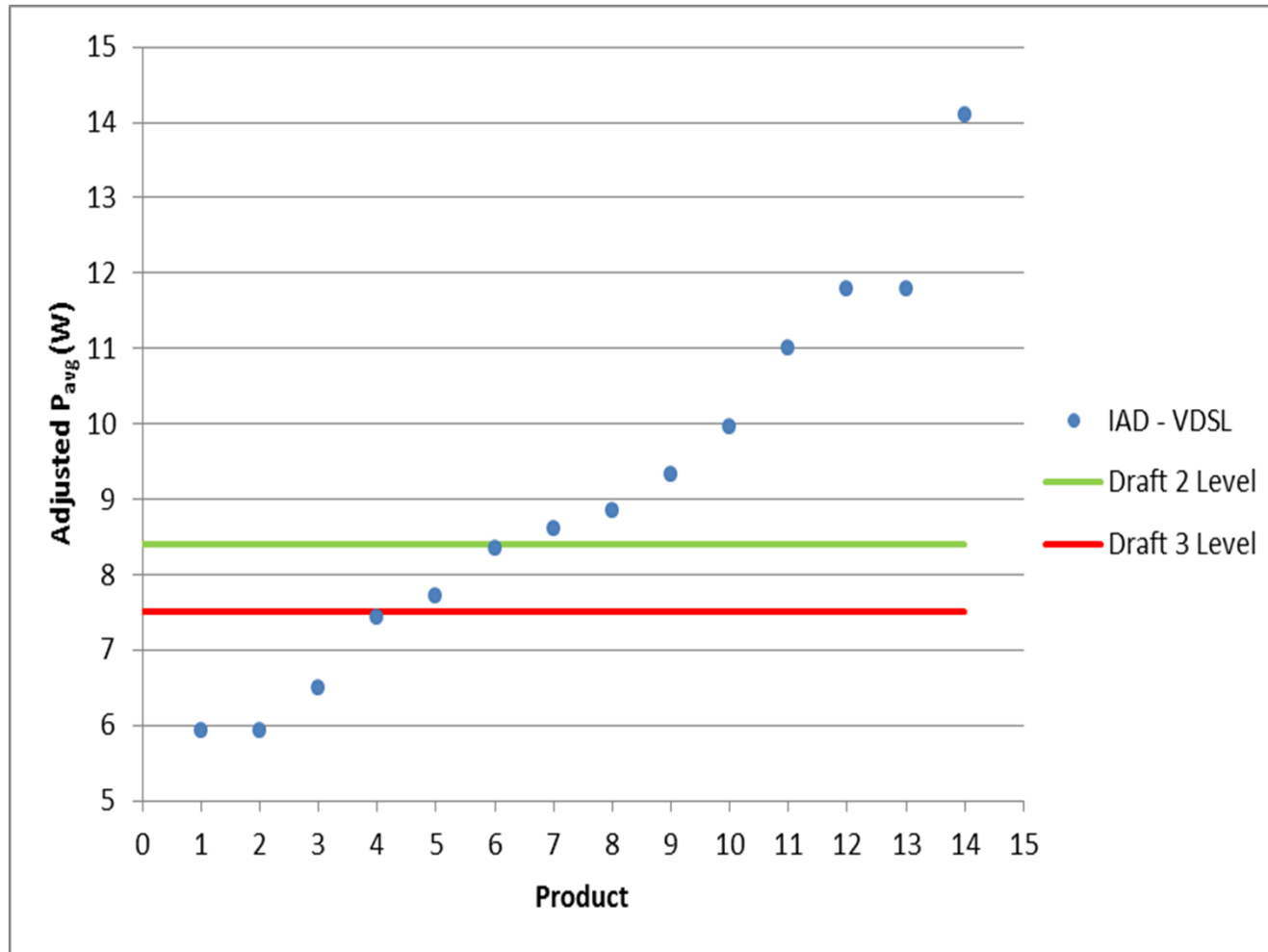
ONTs



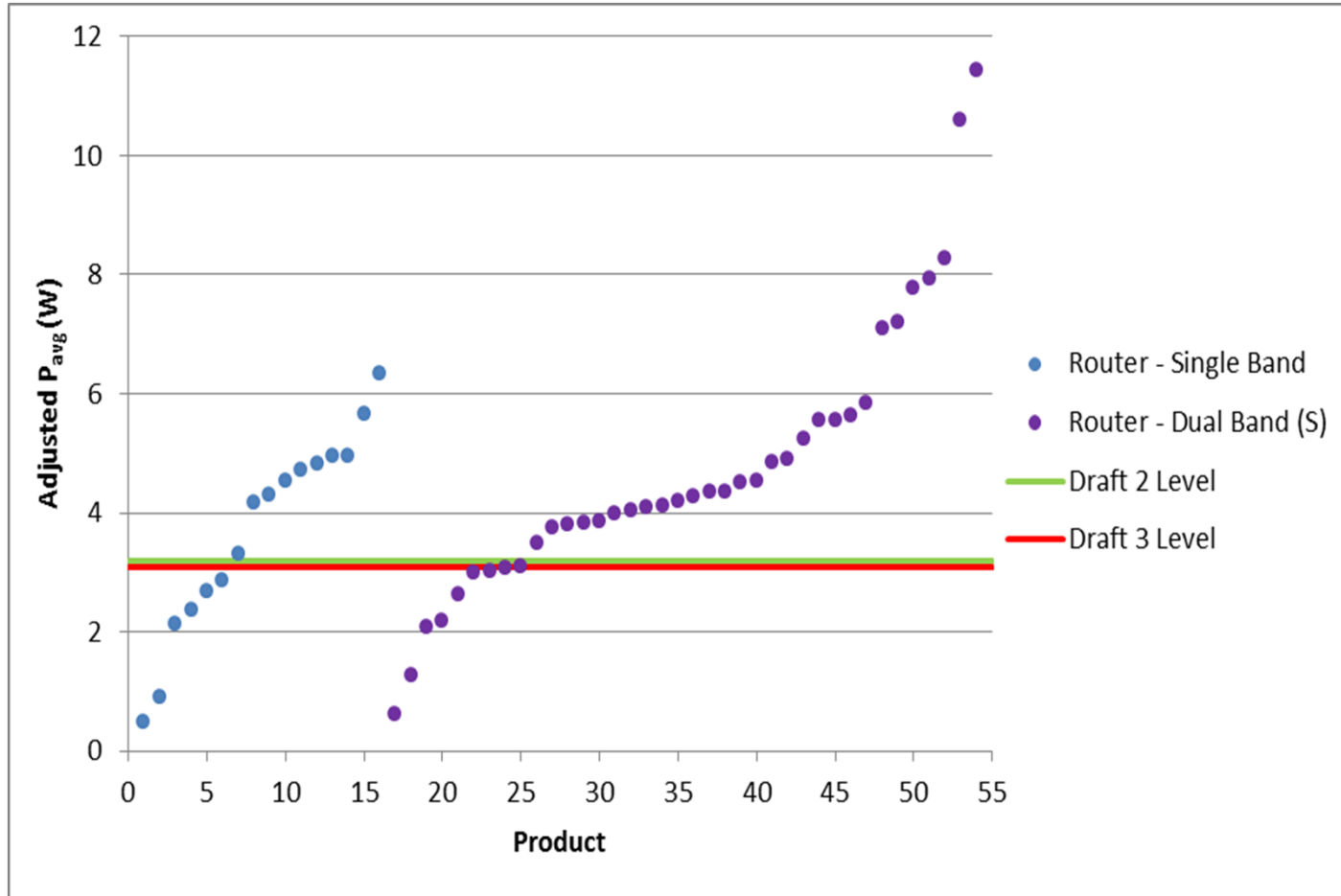
IADs - Cable



IADs - VDSL




Routers



VDSL Precedence



- In Draft 2, EPA proposed that products capable of both ADSL and VDSL shall be tested using only ADSL
 - However, stakeholders noted that many of these products have additional features commonly found in VDSL-only products
- 
- EPA will now require that these products be tested with their VDSL functionality and meet the VDSL base power allowance

Final Test Method



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Required Tests




- In line with revisions to the definitions in the specification, EPA separated Optical Network Termination Devices from Modems into a separate 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)	X	X		
Optical Network Termination Device (ONT)	X	X		
Integrated Access Device	X	X	X	X
Switch/Router	X		X	Routers with Wireless
Access Point	X			X

Traffic Generators



- Stakeholders expressed concern about the expense and availability of traffic generators
- 
- EPA has clarified that commercially available versions are not required

Section 5 C) Data Source/Transfer Requirements: **Commercially available traffic generators are not required to generate traffic, provided the chosen hardware and software used for testing meet the criteria below.** Traffic generators used for testing shall be configured for the correct traffic topology and traffic profile, and as follows:

- 1) All data transfers shall occur via User Datagram Protocol (UDP);
- 2) The “data rate” is the average number of bits per second passing over a link in one direction. Data rates are expressed as the average number of bits found in UDP data frames passing over a link in a one second period;
- 3) The traffic generator shall be able to support the maximum theoretical data rate of the unit under test (UUT) with UDP traffic.
- 4) Test traffic shall contain random data in a variety of datagram (or frame) sizes based on an Internet traffic mix (IMIX) sent at random intervals. See references in Table 3 for more information;
- 5) Data shall be evenly split between both directions (transmission and reception) for a given link unless otherwise specified in this test procedure;
- 6) Port numbers for data traffic shall be randomly selected in advance of each test from the available pool of valid UDP ports. Once selected, port numbers shall not be changed for the duration of testing. If the selected port results in blocked traffic by a UUT firewall, select a different port at random before proceeding with the test.

Example Software Script



- Stakeholders can use either hardware or software to generate traffic as long as the traffic used for testing meets the requirements in Section 5.C of the test method
- Lawrence Berkeley National Laboratory is developing an example script for potential use in the Version 1.0 ENERGY STAR Small Network Equipment Test Method
- A publicly available link will be provided in the Final Test Method sent to stakeholders and posted on the ENERGY STAR website



Data Rate Variability

- Stakeholders indicated challenges in achieving an exact moving average of 1kb/s for the required 1kb/s data rate



- EPA will allow defined ranges of variability in the moving averages of the 1kb/s and high data rates used during testing to reduce burden

Section 7.1 A) Tests are performed at two data rates, 1 kb/s (0.5 kb/s in each direction), and the highest rate supported by the link shown in Table 8. **The 1 kb/s rate shall be achieved as a moving average, where the data rate averages 1 kb/s, +/- 50%, in any 30 second window...The high data rate shall be achieved as a moving average, where the data rate averages the rate as determined above, +/- 10%, in any 30 second window.**

Final Test Method Recap



- Once the example software development is complete, it will be linked on the ENERGY STAR website.
- Once the Final Test Method is published, laboratories and certification bodies may begin the accreditation process.

Open Comment & Next Steps



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Open Comment



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

Timeline



- EPA proposed the following timeline:

Draft 3 Comment Deadline	June 7, 2013
Final Test Method Released	Early – Mid June 2013
Final Draft Specification Released	Mid- Late June 2013
Final Specification Published	Mid-Late July 2013
Certification Body Training	TBD
Specification Effective Date	August 2013

Written Comments



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

Comment Deadline

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Thank you!

