



ENERGY STAR® Program Requirements Product Specification for Telephony

Draft 1 Test Method Rev. May-2012

1 OVERVIEW

The following test method shall be used for determining product compliance with requirements in the ENERGY STAR Eligibility Criteria for Telephony.

2 APPLICABILITY

ENERGY STAR test requirements are dependent upon the features of the product under evaluation. The following guidelines shall be used to determine the applicability of each section of this document:

- The test procedures in Section 6.2 shall be performed on all products.
- The test procedures in Section 6.3 shall be performed on all products but Wireless IP Telephones and Additional Handsets.
- The test procedures in Section 7 shall be performed on Voice over Internet Protocol (VoIP) and Hybrid Telephones with Data Switch Ports.

3 DEFINITIONS

Unless otherwise specified, all terms used in this document are consistent with the definitions in the ENERGY STAR Eligibility Criteria for Telephony.

Note: For initial discussion, the acronyms and definitions below have been included in the test method. Some definitions are based on those in the current eligibility criteria for telephony, while others are new and have been included to permit testing of VoIP phones. All definitions and acronyms will eventually be moved to the specification.

A) Product Types:

- 1) Telephone: A commercially available electronic product whose primary purpose is to transmit and receive sound over a distance using a voice or data network.

a. Sound Transmission Mechanism:

- i. Analog Telephone: A Telephone or component of a Telephone system that ultimately converts sound into analog waveforms for transmission through an RJ11 connection.
- ii. Voice over Internet Protocol (VoIP) Telephone: A Telephone or component of a Telephone system that ultimately converts sound into Internet Protocol data packets for transmission through an Ethernet connection.
- iii. Hybrid Telephone: A Telephone or component of a Telephone system that ultimately converts sound into either analog waveforms for transmission through an RJ11 connection or Internet Protocol data packets for transmission through an Ethernet connection.

Note: Per stakeholder comment, DOE and EPA have included a definition for Hybrid Telephones. DOE and EPA propose that these Telephones are only tested using VoIP capability since this feature is likely of most interest to the consumer and more energy consumptive. DOE and EPA welcome stakeholder comment on this approach.

- 33 iv. Cellular Telephone: A Telephone that converts sound into multiple-access (e.g.,
 34 Code-Division Multiple Access (CDMA)) packets for transmission to a cellular.
- 35 b. Configuration:
- 36 i. Cordless Telephone: A Telephone with a base station and a handset. The
 37 charging base of a Cordless Telephone or its External Power Supply is designed
 38 to plug into a wall outlet, and although the Cordless Telephone base has a
 39 permanent physical connection to the network, there is no physical connection
 40 between the portable handset and the network.
- 41 ii. Corded Telephone: A Telephone with a permanent physical connection between
 42 the handset and the network.
- 43 iii. Conference Telephone: A Telephone without a handset that utilizes a
 44 speakerphone for all communications and is primarily used for conference calls.
- 45 iv. Additional Handset: A Telephone consisting of a handset, charger and battery,
 46 designed for use with a multi-handset Telephone system.

Note: DOE and EPA have refined the Product Type definitions so that Telephones may be categorized by two non-mutually exclusive characteristics: sound transmission mechanism and configuration. EPA proposes that the following products be under consideration for inclusion in the Version 3.0 specification. DOE and EPA welcome further stakeholder comment on the applicability of the test method to these proposed covered product types.

		Sound Transmission			
		Analog	VoIP/Hybrid	Cellular	
Configuration	Additional Handset	Currently Covered under V2.1	Under Consideration: - Power over Ethernet(PoE) and ac-powered - Ethernet, WiFi, access point	Not Under Consideration (Proposed for inclusion under ENERGY STAR Battery Charging Systems Program)	
	Cordless			Not Under Consideration (No Products in this space)	
	Corded	w/ External Power Supply			Under Consideration
		w/o External Power Supply			Not Under Consideration
	Conference	Under Consideration			

Note: One stakeholder commented that the definition of Cordless Telephone as stated in the Preliminary Draft Test Method could be inclusive of Cellular Telephones. Under the definitional structure proposed here, the traditional “Cordless Telephone” can be seen as a combination of the Cordless Telephone configuration and the Analog Telephone sound transmission mechanism, making it clear that Cellular Telephones are not included.

47 Operational Modes:

- 48 1) Partial On (Sleep) Mode: A mode that may persist for an indefinite time when a Telephone is
 49 connected to a power source and is capable of receiving a call. The Telephone is not receiving or
 50 transmitting sound or charging a battery, and the handset is “on the hook”.

Note: This mode was formerly defined as Standby Mode in the ENERGY STAR Telephony Specification Version 2.2. In response to the Preliminary Draft Test Method, a stakeholder suggested that the Partial On (Sleep) Mode definition indicate which telephony functions are under consideration during the test. The stakeholder suggested the following clarification, “the Telephone is not performing or displaying auxiliary functions; upgrading firmware; etc., the buttons and/or display are not illuminated and the handset is “on the hook”. EPA and DOE welcome further stakeholder comment regarding the types of functions that should be considered in Partial On (Standby) Mode.

- 51 2) On Mode: Comprises the Idle, Operation, and Charging Modes.
- 52 a. Idle (Off-hook) Mode: The mode in which the Telephone is connected to a power source
- 53 and is “off the hook”. Though not necessarily transmitting and receiving data, a dial tone
- 54 is present.
- 55 b. Operation Mode: The mode in which the Telephone is connected to a power source and
- 56 is receiving and/or transmitting sound and/or playing/recording a message.
- 57 c. Charging Mode: The mode in which the Telephone is connected to a power source and is
- 58 charging a battery.
- 59 3) Off Mode: The mode in which the Telephone is connected to a power source but is not
- 60 performing any Partial On or On Mode functions.

61 B) Functionalities:

- 62 1) Digital Answering Technology: The capability to receive a call, play an outgoing message, and
- 63 record an incoming message.

Note: In the Version 2.1 specification, Answering Machines and Combination Cordless Telephone/Answering Machines are product categories. EPA proposes eliminating these product categories in Version 3.0 and instead defining Digital Answering Technology as a function. While there is currently only one ENERGY STAR qualified Answering Machine product, Cordless Telephones with Digital Answering Technology represent the majority of models on the ENERGY STAR Qualified Products List. Since Digital Answering Technology is almost a ubiquitous function of Telephones, EPA does not see the need for a separate product category. EPA and DOE welcome further comment on the presence of Digital Answering Technology in the market, and whether this function of a Telephone should be tested or considered in the specification.

- 64 2) Data Switch Port: The capability to provide data connectivity to a computer Ethernet network
- 65 interface controller (NIC).
- 66 3) High Resolution Display: A function by which a device converts a video signal into a visual output
- 67 (e.g., LCD panel, plasma display panel). This definition does not include Status Displays.
- 68 4) Status Display: A function by which a product provides a visual display of less than 480x234 pixel
- 69 resolution or 5 inches diagonal screen size, including a back-lit alphanumeric clock or channel
- 70 indicator. This definition does not include single indicator lamps.

Note: EPA proposes the above definitions for categorizing Telephone display types and welcomes comments on their applicability to all Telephone products.

- 71 5) Multi-Handset Technology: The capability of supporting multiple additional handsets.
- 72 6) Spread Spectrum Technology (SST): A communication technique whereby the carrier frequency
- 73 of a signal is automatically and rapidly changed to provide enhanced transmission range,
- 74 extendable portable numbers, and additional security. This definition includes direct sequence
- 75 (e.g., digital spread spectrum or DSS) and frequency hopping.

76 C) Telecommunications and Test Equipment:

- 77 1) Router: A network device that determines the optimal path along which network traffic should be
78 forwarded as its primary function. Routers forward packets from one network to another based on
79 network layer information. Devices fitting this definition may provide both Router functionality and
80 wireless network capability.
- 81 2) Switch: A network device that filters, forwards, and floods frames based on the destination
82 address of each frame as its primary function. The Switch operates at the data link layer of the
83 Open Systems Interconnection (OSI) model.
- 84 3) Power Sourcing Equipment (PSE): An electronic device, such as a Switch or a Midspan that
85 sources (supplies) the power on the Ethernet cable for PoE devices. PoE Switches supply power
86 and terminate the data link. PoE Midspans inject power and are placed between a non-PoE
87 switch and the device being powered but provide no additional network functionality.
- 88 4) Ringdown Simulator: A piece of testing equipment which simulates a two-way telephone line.

89 D) Additional Terms:

- 90 7) External Power Supply (EPS): A component contained in a separate physical enclosure external
91 to the Telephone product casing and designed to convert line voltage ac input from the mains to
92 lower ac or dc voltage(s) for the purpose of powering the Telephone. An External Power Supply
93 shall connect to the Telephone product via a removable or hard-wired male/female electrical
94 connection, cable, cord or other wiring.

Note: Per stakeholder comment, EPA and DOE have clarified the definition of External Power Supply to include the conversion to lower ac output voltage.

- 95 8) Internet Protocol (IP): The communications protocol used for the transmission of data packets
96 across multiple networks (e.g., the Internet) as defined by the Internet Engineering Task Force¹
97 (IETF).
- 98 9) Voice over Internet Protocol (VoIP): The transmission of voice and other sound over a network
99 using the Internet Protocol where sound is converted into IP data packets by the device for
100 transmission over a network that uses IP. This network may be local or the Internet. Devices
101 using VoIP do not plug into a traditional telephone jack but connect to a network through an
102 access point, Ethernet or WiFi.
- 103 10) Energy Efficient Ethernet (EEE): A technology which enables reduced power consumption of
104 Ethernet interfaces during times of low data throughput. Specified by *IEEE 802.3az*.
- 105 11) Power over Ethernet (PoE): A technology which enables transfer of electrical power, along with
106 data, to network end point devices through an Ethernet cable. Currently specified by *IEEE*
107 *802.3af* and *IEEE 802.3at*.
- 108 12) Unit Under Test (UUT): The specific sample of a representative model undergoing measurement
109 which includes the base product (the Telephone) and any accessories packaged with it.
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¹ IETF, *RFC 791: Internet Protocol – Defense Advanced Research Projects Agency (DARPA) Internet Program Protocol Specification* <<http://tools.ietf.org/html/rfc791>>

- 111 E) Product Family: A group of product models that are (1) made by the same manufacturer, (2) subject
112 to the same ENERGY STAR qualification criteria, and (3) of a common basic design. Product models
113 within a family differ from each other according to one or more characteristics or features that either
114 (1) have no impact on product performance with regard to ENERGY STAR qualification criteria, or (2)
115 are specified herein as acceptable variations within a product family. For Telephones, acceptable
116 variations within a product family include:
- 117 1) Color,
 - 118 2) Housing,
 - 119 3) Number of Additional Handsets.

120 **Note:** EPA and DOE have modified the Product Family definition to include multi-handset systems. EPA
121 plans to propose that these systems be tested in their highest energy-consuming configuration (i.e., with
122 the highest number of Additional Handsets), and if this configuration qualifies, any configurations that ship
123 with a smaller number of Additional Handsets will also qualify.

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125 F) Acronyms:

- 126 1) ac: Alternating Current
- 127 2) C: Celsius
- 128 3) CAT 5/6: Category 5 or 6 cable, the standard cables used for Ethernet connections
- 129 4) dc: Direct Current
- 130 5) EPS: External Power Supply
- 131 6) Hz: Hertz
- 132 7) kHz: Kilohertz
- 133 8) IEC: International Electrotechnical Commission
- 134 9) IP: Internet Protocol
- 135 10) PoE: Power over Ethernet
- 136 11) PSE: Power Sourcing Equipment
- 137 12) SST: Spread Spectrum Technology
- 138 13) UUT: Unit Under Test
- 139 14) V: Volts
- 140 15) VoIP: Voice over Internet Protocol
- 141 16) W: Watts

142 4 TEST SETUP

143 A) Test Setup and Instrumentation: Test setup and instrumentation for all portions of this method shall
144 be in accordance with the requirements of IEC 62301, Ed. 2.0, "Household Electrical Appliances –
145 Measurement of Standby Power," Section 4, "General Conditions for Measurements", unless
146 otherwise noted in this document. In the event of conflicting requirements, the ENERGY STAR Test
147 Method shall take precedence.

148 B) Input Power:

- 149 1) Products intended to be powered from a PoE source shall be connected to a PSE voltage source
150 of 48 ± 2 volts.

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Note: The input power for dc-powered devices has been set to 48 ± 2 volts. DOE believes this value provides stringent power requirements while also allowing for flexibility in the developing market of PoE measurement equipment. Stakeholders are encouraged to comment on this value. DOE is also interested in stakeholder feedback regarding whether any dc powered products would not operate within the provided voltage range.

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- 2) Products intended to be powered from ac mains shall be connected to a voltage source appropriate for the intended market, as specified in Table 1.

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Table 1: Input Power Requirements for Ac-Powered Products

Market	Voltage	Voltage Tolerance	Maximum Total Harmonic Distortion	Frequency	Frequency Tolerance
North America, Taiwan	115 V ac	+/- 1.0 %	2.0 %	60 Hz	+/- 1.0 %
Europe, Australia, New Zealand	230 V ac	+/- 1.0 %	2.0 %	50 Hz	+/- 1.0 %
Japan	100 V ac	+/- 1.0 %	2.0 %	50 Hz/ 60 Hz	+/- 1.0 %

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- C) Ambient Temperature: Ambient temperature shall remain between 18° C and 28° C, inclusive, for the duration of the test.

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- D) Relative Humidity: Relative humidity shall remain between 10% and 80%, inclusive, for the duration of the test.

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- E) Ac Power Meter: When measuring ac power, power meters shall possess the following attributes:

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- 1) Crest Factor:

- i) An available current crest factor of 3 or more at its rated range value; and
- ii) Lower bound on the current range of 10 mA or less.

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- 2) Minimum Frequency Response: 3.0 kHz

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- 3) Minimum Resolution:

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- i) 0.01 W for measurement values less than 10 W;

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- ii) 0.1 W for measurement values from 10 W to 100 W; and

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- iii) 1.0 W for measurement values greater than 100 W.

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- 4) Measurement Accuracy:

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- i) Power measurements with a value greater than or equal to 0.5 W shall be made with an uncertainty of less than or equal to 2% at the 95% confidence level.

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Note: The Test Method (Rev. Sep-2011) proposed an uncertainty variation of 5%. DOE is proposing an allowed uncertainty variation of 2% in this draft to align with IEC 62301 Ed. 2.0 and to eliminate the discontinuity between the requirements for measurements larger and smaller than 0.5 W.

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- ii) Power measurements with a value of less than 0.5 W shall be made with an uncertainty of less than or equal to 0.01 W at the 95% confidence level.

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- 181 F) PoE Power Meter: When measuring PoE, power meters shall possess the following attributes:
- 182 1) Cable Compatibility: Capable of measuring Power over Ethernet connections directly from the
- 183 Category 5 or 6 (CAT5/6) cable, regardless of the PoE method used (i.e., Mode A, Mode B, or
- 184 Gigabit PoE).
- 185 2) Minimum Resolution:
- 186 i) 0.01 W for measurement values less than 10 W;
- 187 ii) 0.1 W for measurement values from 10 W to 100 W; and
- 188 iii) 1.0 W for measurement values greater than 100 W.
- 189 3) Measurement Accuracy:
- 190 i) Power measurements shall have an accuracy of less than or equal to $\pm (2\% + 0.1 \text{ W})$.

191 **Note:** DOE is aware that there are few PoE meters that meet the proposed requirements. DOE is

192 interested in stakeholder feedback on the feasibility and/or burden related to obtaining a PoE meter

193 capable of meeting these requirements

- 194 4) Cable Length: A one meter CAT 5/6 cable shall be used between the power meter and the Unit
- 195 Under Test (UUT) for all testing.

196 **Note:** DOE testing showed that large discrepancies in cable length (on the order of tens of meters) affect

197 the UUTs' power consumption. Stakeholders also noted that the length of cable between the power meter

198 and UUT can affect the power consumption of the UUT and suggested a length of one meter for testing.

199 Based on testing and stakeholder comment, DOE has therefore included a cable length requirement to

200 increase test repeatability and ensure all PoE phones are tested in the same manner. Stakeholders are

201 encouraged to comment on the proposed cable length.

202 5 TEST CONDUCT

- 203 A) As-shipped Condition: The UUT shall be in new condition and shall be tested in its "as-shipped"
- 204 condition including, but not limited to, display brightness settings.

205 **Note:** DOE requests comment on using default brightness settings for testing. Though only applicable to

206 units that include backlights, testing demonstrated that display brightness significantly affected power

207 consumption. DOE is considering measuring applicable units at both minimum and maximum brightness

208 levels and averaging to determine an aggregate value.

209 Additionally, DOE requests comment on other settings that might affect power consumption under normal

210 operating conditions, as well as any other settings that may need to be specified in the test method.

- 211 B) Battery-powered Products: If the UUT contains rechargeable batteries, or can be integrated with
- 212 another device that contains rechargeable batteries, all batteries shall be fully charged prior to the
- 213 start of testing and shall remain in place for the duration of testing.

- 214 C) Additional Handsets and Accessories: All UUTs shall be tested in two configurations:

- 215 1) If shipped with the UUT, all Additional Handsets and accessories connected and set up in their
- 216 default configuration, and

- 217 2) With only the base unit and no Additional Handsets or accessories connected or set up.

218 The model name and number of all Additional Handsets and accessories used during testing shall be

219 reported.

220 **Note:** DOE believes that Additional Handsets and accessories would be set up under normal operation.
221 DOE and EPA are interested in how Additional Handsets and accessories might affect the power
222 consumption of the UUT during testing. As such, DOE has included testing units both with and without all
223 Additional Handsets and accessories connected or set up. DOE and EPA are also interested in
224 stakeholder feedback regarding what types of accessories are normally shipped with Telephony products
225 and what kind of functionality they provide.

226 D) VoIP Server: Any standard configuration and/or equipment for creating a VoIP network is permitted.
227 The UUT shall have a dial tone and be capable of receiving and making a phone call within the local
228 VoIP network. A valid VoIP route to outside the local VoIP server is not required.

229 1) The VoIP Server and all other network equipment shall be able to support the highest network
230 speed at which the UUT is capable of operating.

231 **Note:** DOE has revised the test method language to remove any mention of the Session Initiation
232 Protocol (SIP), making it inclusive of all VoIP protocols.

233 DOE received comments stating that the network speed at which the Telephone operates can affect
234 energy consumption. As such, DOE has included the requirement that all network equipment be capable
235 of supporting the unit's highest network speed.

236 E) Hybrid Telephones: Hybrid Telephones shall be tested as VoIP Telephones.

237 1) If a Hybrid Telephone ships with an EPS or connects directly to the mains, it shall be tested as an
238 ac powered unit.

239 2) Otherwise, it shall be tested as a PoE unit.

240 **6 TEST PROCEDURES FOR ALL PRODUCTS**

241 **6.1 UUT Preparation**

242 1. Set up the UUT in accordance with its instructions for use, except where these conflict with the
243 requirements of this test method. If no instructions for use are available, then factory or "default"
244 settings shall be used.

245 2. PoE Powered Units:

246 A. Connect the UUT to the PoE power meter and connect the PoE power meter to a PoE port
247 on a suitable Switch. There shall be no Midspans between the power meter and UUT. A
248 suitable Switch is defined as a Switch that:

249 i) Supports all modes of PoE that the Telephone can support.

250 ii) Supports the maximum network speed of the UUT's network connection.

251 B. Units that can utilize an alternate power source, as well as PoE, shall be tested using the
252 PoE connection.

253 C. Set up the Switch according to manufacturer instructions and connect it to the VoIP Server.

254 D. Connect a second PoE Telephone that is compatible with the network to the Switch (for
255 Operation Mode testing).

256 E. Configure the VoIP Server and both Telephones to prepare for making and receiving calls
257 locally to the VoIP Server and the VoIP system the server implements.

258 i) Record the manufacturer and model number of the VoIP Server.

259 ii) Set the network speed to the UUT's highest supported speed.

260 iii) In the event that a VoIP Server setting does not have a default and is not specified in this
261 test method, the setting shall be set according to the tester's discretion and recorded.

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Note: DOE has amended the VoIP Server setup requirements to require any departures from default settings be recorded for testing repeatability.

- 3. Ac Powered Units:
 - A. Set up the UUT in its standard configuration, utilizing any included EPSs, if applicable. Connect an approved power meter to an ac line set to the appropriate voltage and frequency as specified in Table 1.
 - B. Plug the UUT into the measurement outlet on the power meter. No power strips or uninterruptible power supply units shall be connected between the UUT and the meter.
 - C. Connect the UUT to a suitable external telephone jack for Analog Telephones or a suitable VoIP Server for Hybrid and Wireless VoIP Telephones.
 - i) Additional Handsets shall be connected to a multi-handset Telephone system and be capable of making calls.
 - ii) In the case that a working telephone line is not available, a Ringdown Simulator may be used as a replacement. Another Telephone must be connected to the Ringdown Simulator.
 - iii) For Wireless VoIP Telephones, set up a wireless network according to manufacturer instructions and connect the UUT to the wireless network. The wireless network shall be connected to a VoIP Server.

Note: For Operation Mode testing, DOE is interested in measuring only the power consumption increase from the connection between two phones and not the effects of sound/data transfer. DOE testing did not see any increase in power consumption when sound/data transfer occurred. DOE is interested in feedback regarding whether testing should include sound/data transfer.

- D. The UUT shall be capable of making a call across either the public switched telephone network or the Ringdown Simulator or the VoIP network, for Wireless IP Telephones and Hybrid Telephones.

6.2 Partial On Mode Measurement

- 1. Ensure the UUT is in the Partial On Mode.
- 2. Verify that there is a dial tone then return the Telephone to the “on the hook” configuration. For Wireless IP Telephones, the hand-set shall be placed on the battery charger during testing.
- 3. Measure and record the ac input voltage and frequency.
- 4. Wait 5 minutes, then set the meter to begin accumulating true power values at an interval greater than or equal to 1 reading per second. Accumulate power values for 5 minutes and record the average (arithmetic mean) value.

Note: The current Version 2.2 of the Telephony Test Method requires a minimum measurement period of 2 hours that accounts for both manually selected and automatically cycled multiple Partial On Modes. This provision was inadvertently removed from the Version 3.0 Preliminary Draft Test Method. DOE and EPA welcome stakeholder feedback regarding the presence and functionality of multiple Partial On (Sleep) Modes such as deep sleep capability, low power variants of Digital Enhanced Cordless Telecommunications (DECT), and missing call notification (flashing LED). DOE and EPA also request feedback on whether the 5 minute test above is sufficiently representative or whether a longer test or separate tests are necessary.

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304 **6.3 Operation Mode Measurement**

- 305 1. Ensure the UUT is in the Partial On Mode.
- 306 2. Disable any features that would cause the UUT to disconnect or time out during the Operation
307 Mode test. If such a feature cannot be disabled, shorten the stabilization time to permit a five
308 minute measurement period.
- 309 3. Verify that there is a dial tone.
- 310 4. Sound Volume and Muting: For Operation Mode testing, the UUT shall be set up such that:
 - 311 A. The UUT sound volume shall be silenced, or on the lowest possible setting, and
 - 312 B. The UUT microphone shall be muted, or on the lowest possible setting, if possible.
- 313 5. Make a voice-only call using the UUT.
 - 314 A. Calls made using the public switched telephone network shall be made to another
315 Telephone set up at the testing facility.
 - 316 B. Calls made using VoIP or a Ringdown Simulator shall be made to the other Telephone
317 connected to the VoIP Server or Ringdown Simulator, respectively.
- 318 6. Answer the call on the receiving Telephone.
- 319 7. Wait 5 minutes after the call is connected, then set the meter to begin accumulating true power
320 values at an interval greater than or equal to 1 reading per second. Accumulate power values for
321 5 minutes and record the average (arithmetic mean) value.

322 **Note:** DOE and EPA believe that Idle Mode does not represent an appreciable portion of the normal
323 usage profile for phones; therefore, DOE has not included Idle Mode testing in this draft of the test
324 method. Nevertheless, taking the handset off the hook could illuminate the screen or enable other
325 persistent functionality. DOE and EPA welcome further stakeholder comment on the presence of unique
326 functionalities to Idle Mode and whether or not these should be taken into consideration in a separate Idle
327 Mode test, or perhaps in combination with the Operation Mode test. Moreover, DOE and EPA are
328 interested in receiving data regarding the normal usage profile for all types of phones to determine the
329 contribution of Operation Mode to total energy consumption.

330 **7 ADDITIONAL TEST PROCEDURES FOR VOIP AND HYBRID** 331 **TELEPHONES WITH A DATA SWITCH PORT**

332 **7.1 Measuring Data Switch Port Connectivity**

- 333 1. Set up the UUT according to Section 6.1.
- 334 2. Ensure the UUT is in the Partial On Mode.
- 335 3. Connect a personal computer to the Data Switch Port of the UUT. Ensure that the computer is on
336 and that this is the computer's only network connection. Ensure that the computer recognizes this
337 connection.
- 338 4. Wait 5 minutes, then set the meter to begin accumulating true power values at an interval greater
339 than or equal to 1 reading per second. Accumulate power values for 5 minutes and record the
340 average (arithmetic mean) value.

341 **Note:** DOE is interested in stakeholder feedback regarding how often computers are connected to switch
342 ports and use this as the only network connection. Investigative testing showed that connecting through
343 the switch port added a significant amount of energy.

344 **8 REFERENCES**

345 A) IEC 62301:2011. Household Electrical Appliances – Measurement of Standby Power. Ed. 2.0.