ENERGY STAR® Program Requirements for Telephony

Partner Commitments

Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR certified products. The ENERGY STAR Partner must adhere to the following partner commitments:

Certified Products

1. **Comply with current ENERGY STAR Eligibility Criteria**, which define performance requirements and test procedures for Telephony. A list of eligible products and their corresponding Eligibility Criteria can be found at www.energystar.gov/specifications.
2. **Prior to associating the ENERGY STAR name or mark with any product**, obtain written certification of ENERGY STAR qualification from a Certification Body recognized by EPA for Telephony. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform Telephony testing. A list of EPA-recognized laboratories and certification bodies can be found at www.energystar.gov/testingandverification.
3. **Ensure that any model associated with the ENERGY STAR name or mark** meets the following standards:

    3.1. 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.

    3.2. The generally accepted attributes of a recyclable product at the date of product manufacture: where products shall be designed for ease of disassembly and recyclability where external enclosures, sub-enclosures, chassis and electronic subassemblies are easily removable with commonly available tools, by hand, or by a recycler's automated processes.

    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.

Using the ENERGY STAR Name and Marks

4. Comply with current ENERGY STAR Identity Guidelines, which define how the ENERGY STAR name and marks may be used. Partner is responsible for adhering to these guidelines and ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance. The ENERGY STAR Identity Guidelines are available at www.energystar.gov/logouse.
5. Use the ENERGY STAR name and marks only in association with certified products. Partner may not refer to itself as an ENERGY STAR Partner unless at least one product is certified and offered for sale in the U.S. and/or ENERGY STAR partner countries.

6. Provide clear and consistent labeling of ENERGY STAR certified Telephony products.

   6.1. The ENERGY STAR mark must be clearly displayed in all of the following ways:

      1) On top/front of the product;

      2) In product literature specific to the certified model (i.e., user manuals, specification sheets, etc.); and

      3) On the brand owner's website.

   6.2. The ENERGY STAR mark may only be applied to product packaging if all of the individual Telephony models included in the package are ENERGY STAR certified. Models that must be ENERGY STAR certified include base station Telephones, any Additional Handsets, and any other products covered under the scope of the ENERGY STAR Telephony Product Specification.

Verifying Ongoing Product Qualification

7. Participate in third-party verification testing through a Certification Body recognized by EPA for Program Name, providing full cooperation and timely responses, EPA/DOE may also, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at the government's request.

Providing Information to EPA

8. Provide unit shipment data or other market indicators to EPA annually to assist with creation of ENERGY STAR market penetration estimates, as follows:

   8.1. Partner must submit the total number of ENERGY STAR qualified Program Name shipped in the calendar year or an equivalent measurement as agreed to in advance by EPA and Partner. Partner shall exclude shipments to organizations that rebrand and resell the shipments (unaffiliated private labelers).

   8.2. Partner must provide unit shipment data segmented by meaningful product characteristics (e.g., type, capacity, presence of additional functions) as prescribed by EPA.

   8.3. Partner must submit unit shipment data for each calendar year to EPA or an EPA-authorized third party, preferably in electronic format, no later than March 1 of the following year.

   Submitted unit shipment data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner.

9. Report to EPA any attempts by recognized laboratories or Certification Bodies (CBs) to influence testing or certification results or to engage in discriminatory practices.

10. Notify EPA of a change in the designated responsible party or contacts within 30 days using the My ENERGY STAR Account tool (MESA) available at www.energystar.gov/mesa.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures, and should keep EPA informed on the progress of these efforts:

- Provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.

- Consider energy efficiency improvements in company facilities and pursue benchmarking buildings through the ENERGY STAR Buildings program.
- Purchase ENERGY STAR qualified products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR qualified product information to employees for use when purchasing products for their homes.
- Feature the ENERGY STAR mark(s) on Partner website and other promotional materials. If information concerning ENERGY STAR is provided on the Partner website as specified by the ENERGY STAR Web Linking Policy (available in the Partner Resources section of the ENERGY STAR website), EPA may provide links where appropriate to the Partner website.
- Ensure the power management feature is enabled on all ENERGY STAR qualified displays and computers in use in company facilities, particularly upon installation and after service is performed.
- Provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR qualified products.
- Provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, and communicate Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR website, etc. The plan may be as simple as providing a list of planned activities or milestones of which Partner would like EPA to be aware. For example, activities may include: (1) increasing the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrating the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) providing information to users (via the website and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products; and (4) building awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event.
- Join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. The SmartWay Transport Partnership works with freight carriers, shippers, and other stakeholders in the goods movement industry to reduce fuel consumption, greenhouse gases, and air pollution. For more information on SmartWay, visit www.epa.gov/smartway.
- Join EPA's Green Power Partnership. EPA's Green Power Partnership encourages organizations to buy green power as a way to reduce the environmental impacts associated with traditional fossil fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune 500 companies, small and medium businesses, government institutions as well as a growing number of colleges and universities. For more information on Green Power, visit www.epa.gov/greenpower.

ENERGY STAR® Product Specification for Telephony

Eligibility Criteria
Version 3.0
Rev. Oct-2014

Following is the Version 3.0 ENERGY STAR product specification for Telephony. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

DEFINITIONS

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 the Public Switched Telephone Network (PSTN).

ii. Voice over Internet Protocol (VoIP) Telephone: A Telephone or component of a Telephone system that 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 has the ability to ultimately convert sound into both analog waveforms for transmission through the PSTN and Internet Protocol data packets for transmission through an Ethernet connection.

iv. Cellular Telephone: A Telephone that converts sound into multiple-access (e.g., Code-Division Multiple Access (CDMA), Global System for Mobile Communications (GSM), and fourth generation long term evolution (4G LTE)) packets for transmission through a cellular network.

b. Configuration:

i. Cordless Telephone: A Telephone with a base station and a handset. The cradle of a Cordless Telephone or its External Power Supply is designed to plug into a wall outlet. Although the Cordless Telephone base has a permanent physical connection to the network, there is no physical connection between the portable handset and the network.

ii. Corded Telephone: A Telephone with a permanent physical connection between the handset and the network.

iii. Conference Telephone: A Telephone without a handset that utilizes a speakerphone for all communications and is primarily used for conference calls.

iv. Additional Handset: A Telephone consisting of a handset, cradle, and battery, designed for use with a multi-handset Telephone system.

v. Wireless (Wi-Fi) Telephone: A Telephone consisting of a handset, cradle, and battery that connects to a network via an Institute of Electrical and Electronic Engineers Standard 802.11-2012 (IEEE 802.11-2012) (Wi-Fi) connection.

B) Operational Modes:

1) Partial On (Sleep) Mode: A mode that may persist for an indefinite time when a Telephone is connected to a power source and a telephone line or other physical or wireless network connection and is capable of receiving a call. The Telephone is not receiving or transmitting sound, and the handset is "on the hook" and the speakerphone is not engaged.

2) On Mode: Comprises the Call Origination and Active Modes.

   a. Call Origination Mode: The mode in which the Telephone is connected to a power source and the handset is "off the hook" or the speakerphone is engaged. Though not necessarily transmitting and receiving data, a dial tone is present.

   b. Active Mode: The mode in which the Telephone is connected to a power source and a telephone line or other physical or wireless network connection and is receiving and/or transmitting sound and/or playing/recording a message and the handset is "off the hook" or the speakerphone is engaged.

3) Off Mode: A mode that may persist for an indefinite time when a Telephone is connected to both a power source and a telephone line or other physical or wireless network connection and is NOT capable of receiving a call.

C) Functionalities:

1) Video Calling: The capability of a Telephone to convert both full-motion video and sound into Internet Protocol data packets for transmission through an Ethernet connection.

2) Data Switch Port: A secondary Ethernet port on a telephone that provides the capability to pass data connectivity to an external device (e.g., a computer's Ethernet network interface controller (NIC)).

D) Telecommunications and Test Equipment:

1) 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 Open Systems Interconnection (OSI) model.

2) Power Sourcing Equipment (PSE): An electronic device, such as a Switch or a Midspan that sources (supplies) the power on the Ethernet cable for Power over Ethernet (PoE) devices. PoE Switches supply power and terminate the data link. PoE Midspans inject power and are placed between a non-PoE switch and the device being powered but provide no additional network functionality.

3) Ringdown Simulator: A piece of testing equipment which simulates a two-way telephone line.

E) Additional Terms:

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

2) Internet Protocol (IP): The communications protocol used for the transmission of data packets across multiple networks (e.g., the Internet) as defined by the Internet Engineering Task Force[1] (IETF).

3) Voice over Internet Protocol (VoIP): The transmission of voice and other sound and/or full-motion video over a network using the Internet Protocol where sound is converted into IP data packets by the device for transmission over a network that uses IP. This network may be local or the

[1] IETF, *RFC 791: Internet Protocol – Defense Advanced Research Projects Agency (DARPA) Internet Program Protocol Specification* <http://tools.ietf.org/html/rfc791>

Internet. Devices using VoIP do not plug into a traditional telephone jack but connect to a network through an access point, Ethernet or Wi-Fi.

4) Energy Efficient Ethernet (EEE): A technology which enables reduced power consumption of Ethernet interfaces during times of low data throughput. Specified by *IEEE 802.3az*.

5) Power over Ethernet (PoE): A technology which enables transfer of electrical power, along with data, to network end point devices through an Ethernet cable. Currently specified by *IEEE 802.3-2012.*

6) Full Network Connectivity: The ability of an End Point Device to maintain network presence while in a 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.

    a. Network Proxy - Base Capability: To maintain addresses and presence on the network while in LPM, the system handles IPv4 ARP and IPv6 NS/ND.

    b. Network Proxy - Remote Wake: While in LPM, the system is capable of remotely waking upon request from outside the local network. Includes Base Capability.

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

8) Unit Under Test (UUT): The specific sample of a representative model undergoing measurement which includes only the base product (the Telephone) and not any Additional Handsets and accessories packaged with it, or an Additional Handset, not including any accessories packaged with it, depending on the product type being tested for certification.

9) Product Family: A group of product models that are (1) made by the same manufacturer, (2) subject to the same ENERGY STAR certification 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 certification criteria, or (2) are specified herein as acceptable variations within a Product Family. For Telephones, acceptable variations within a Product Family include:
    1) Color,
    2) Housing, and
    3) Number of Additional Handsets.

F) Acronyms:

1) ac: Alternating Current

2) C: Celsius

3) CAT 5e/6: Category 5 (enhanced) or 6 cable, the standard cables used for Ethernet connections

4) dc: Direct Current

5) EPS: External Power Supply

6) Hz: Hertz

7) kHz: Kilohertz

8) IEC: International Electrotechnical Commission

9) IP: Internet Protocol

10) PoE: Power over Ethernet

11) PSE: Power Sourcing Equipment

12) PSTN: Public Switched Telephone Network

13) SST: Spread Spectrum Technology

14) UUT: Unit Under Test

15) V: Volts

16) VoIP: Voice over Internet Protocol

17) W: Watts

SCOPE

2.1 Included Products

2.1.1 Telephony products are categorized by two independent characteristics: Sound Transmission Mechanism and Configuration. Products that meet the definition of Telephone as specified herein and transmit sound via Analog, VoIP, or a Hybrid of Analog and VoIP are eligible for ENERGY STAR certification, with the exception of products listed in Section 2.2.

2.2 Excluded Products

2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for certification under this specification. The list of specifications currently in effect can be found at www.energystar.gov/specifications.

2.2.2 The following products are not eligible for certification under this specification as illustrated in Figure 1:

i. Cellular Telephones;

ii. Telephones that transmit both sound and video;

iii. Corded Analog Telephones without External Power Supplies; and

iv. Stand alone answering machines.

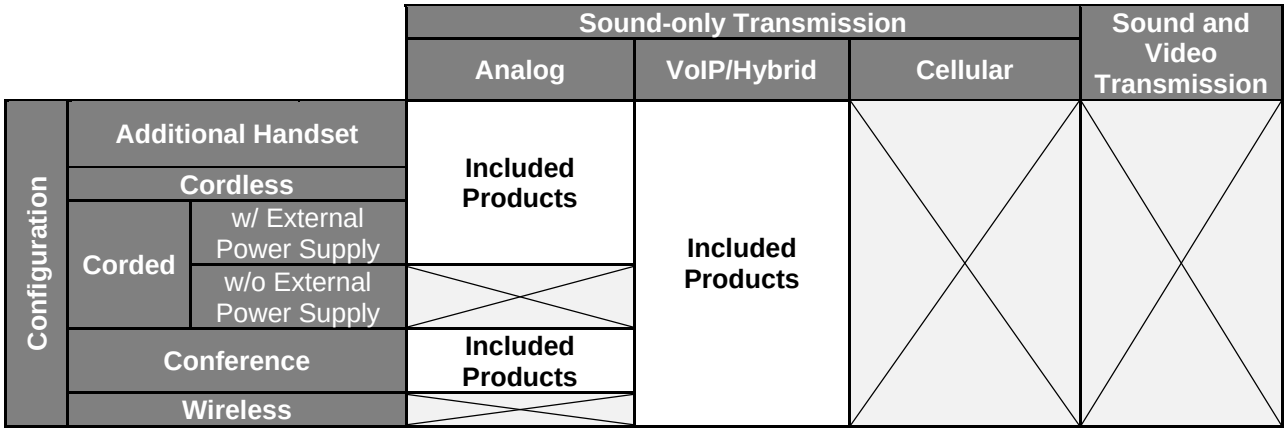

Figure 1: Telephony Product Type Assignment

CERTIFICATION CRITERIA

3.1 Significant Digits and Rounding

3.1.1 All calculations shall be carried out with directly measured (unrounded) values.

3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using directly measured or calculated values without any benefit from rounding.

3.1.3 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

3.2 Power Supply Requirements

3.2.1 Power supply test data and test reports from testing entities recognized by EPA to perform power supply testing shall be accepted for the purpose of certifying the ENERGY STAR product.

3.2.2 External Power Supply (EPS): Single- and Multiple-voltage EPSs shall meet the Level V or higher performance requirements under the International Efficiency Marking Protocol when tested according to the Uniform Test Method for Measuring the Energy Consumption of External Power Supplies, Appendix Z to 10 CFR Part 430.

i. Single-voltage EPSs shall include the Level V or higher marking.

ii. Multiple-voltage EPSs meeting Level VI or higher shall include the Level VI or higher marking.

iii. Additional information on the Marking Protocol is available at http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0005-0218

3.3 Power Requirements

3.3.1 Measured Partial On Mode power, P_{P_ON}, as tested per the Section 6.2 of the Test Method minus the calculated Off Mode Incentive, $P_{Off\_Incentive}$, in Section 3.3.4 as applicable, shall be less than or equal to the Maximum Average Power, P_{MAX}, as stated in Equation 1.

Equation 1: Power Requirement

$$(P_{P\_ON} - P_{OFF\_INCENTIVE}) \leq P_{MAX}$$

3.3.2 Maximum Average Power , P_{MAX}, shall be calculated as stated in Equation 2.

Equation 2: Maximum Average Power

$$P_{MAX} = P_{BASE} + \sum_{i=1}^{n} P_{ADDi} + P_{PROXY}$$

Where:

- P_{BASE} *is the base power allowance (W) from Table 1;*
- P_{ADDi} *is the power allowance (W) as specified in Table 2 for each feature present in the device, for a total of n such allowances; and*
- P_{PROXY} *is an additional proxy incentive (W) as specified in Table 3.*

Table 1: Base Power Allowances, P_{BASE} (W)

		Sound Transmission Mechanism	
		Analog	VoIP or Hybrid
Configuration	Additional Handset	0.3	0.3
	Cordless	1.3	2.0
	Corded	1.1	2.0
	Conference	1.3	2.5
	Wireless		2.0

Table 2: Additional Functional Adders

Feature	Power Allowance P_{ADD} (W)	Notes
Gigabit Ethernet (1000Base-T)	1.0	Applies if the Telephone has one or more Gigabit Ethernet ports.
IEEE 802.3az compliant Gigabit Ethernet	0.2	Telephony products that ship with all of the Gigabit Ethernet ports compliant with IEEE 802.3az compliant may claim a 0.2 watt additional incentive. The 0.2 watt incentive applies only once regardless of the number of ports present.

3.3.3 External Proxy Incentive: VoIP or Hybrid Corded and Cordless Telephones that ship with External Proxy Capability in Partial On mode may claim one of the following adders in Table 3 when calculating P_{ADD} based on the level of Proxy functionality in the product, as defined in Section 1.E.6. All Analog Telephones and Additional Handsets for VoIP and Analog systems cannot receive this incentive.

Table 3: External Proxy Incentives

Capability	P_{PROXY} (W)
Base Capability	0.3
Remote Wake	0.5

3.3.4 Off Mode Incentive: VoIP or Hybrid Corded and Cordless Telephones that ship with an Off Mode that meets the requirements in 3.4.1.1 may calculate the Off Mode Incentive, $P_{Off\_Incentive}$, by using Equation 3. All Analog Telephones and Additional Handsets for VoIP and Analog systems cannot receive this incentive.

Equation 3: Off Mode Incentive

$$P_{OFF\_INCENTIVE} = 0.25 \times (P_{P\_ON} - P_{OFF})$$

Where:

- $P_{OFF\_INCENTIVE}$ *is the value subtracted from measured Partial On Mode power in Equation 1;*
- P_{P_ON} *is the measured Partial On Mode power (W); and*
- P_{OFF} *is the measured Off Mode power (W).*

3.4 Power Management Requirements

3.4.1 To receive the Off Mode Incentive in Section 3.3.4, Cordless, Corded, and Conference VoIP and Hybrid Telephones shall be capable of three or more of the following actions:

i. Device initiated automatic power down to Off Mode after a scheduled time or predetermined period of timing has elapsed following the cessation of primary and secondary functions, user input, or connected device activity.

ii. Network activated automatic power down of the device to Off Mode per programmable or default settings.

iii. Manual activation of Off Mode from Partial On Mode by the end-user via a clearly marked button or electronic menu option on the Telephone.

iv. Manual activation of Partial On Mode from Off Mode by the end-user via a clearly marked button, electronic menu option, or lifting the receiver on the Telephone.

3.4.2 Color and backlit displays shall power down to the default as-shipped Partial On Mode test state in a time period less than or equal to 20 minutes after the cessation of user input.

3.4.3 Products shall be shipped with informational materials to notify customers and operators of the following:

i. A description of default power management settings.

ii. Guidance for enabling available power management features at the network and device level including but not limited to Off Mode, External Network Proxy, and automatic and timed power down of backlit displays and other functions.

iii. Information about ENERGY STAR and the benefits of power management, to be located at or near the beginning of the hard copy or electronic user manual, or in a package or box insert.

Note: Products intended for sale in the U.S. market are subject to minimum toxicity and recyclability requirements. Please see ENERGY STAR® Program Requirements for Telephony: Partner Commitments for details.

TESTING

4.1 Test Methods

4.1.1 Test methods identified in Table 4 shall be used to determine certification for ENERGY STAR.

Table 4: Test Methods for ENERGY STAR Certification

Product Type	Test Method
All Telephony Products	ENERGY STAR Test Method for Telephony Rev. November-2013

4.2 Number of Units Required for Testing

4.2.1 Representative Models shall be selected for testing per the following requirements:

i. For certification of an individual product model, the Representative Model shall be equivalent to that which is intended to be marketed and labeled as ENERGY STAR.

ii. For certification of a Product Family where models vary by the number of Additional Handsets shipped with the base station, the base station and two Additional Handsets of the same model number shall be tested where the base station is UUT 1 and one of the Additional Handsets is UUT 2. (The other Additional Handset is used in the test but its power is not measured). If the Representative Models UUT 1 and UUT 2 each meet all applicable requirements and are individually ENERGY STAR certified, then all other configurations consisting of the base station with any number of Additional Handsets of the same model number may be ENERGY STAR certified as a Product Family.

iii. For certification of a Product Family that varies by characteristics other than the number of Additional Handsets, the highest energy using configuration within that Product Family shall be tested and serve as the Representative Model. Any subsequent testing failures (e.g., as part of verification testing) of any model in the family will have implications for all models in the Product Family.

4.2.2 A single unit of each Representative Model shall be selected for testing.

4.3 International Market Certification

4.3.1 Products shall be tested for certification at the relevant input voltage/frequency combination for each market in which they will be sold and promoted as ENERGY STAR.

EFFECTIVE DATE

5.1.1 Effective Date: The Version 3.0 ENERGY STAR Telephony specification shall take effect on **October 1, 2014.** To be ENERGY STAR certified, a product model shall meet the ENERGY STAR specification in effect on the model's date of manufacture. The date of manufacture is specific to each unit and is the date on which a unit is considered to be completely assembled.

5.1.2 Future Specification Revisions: EPA reserves the right to change this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through stakeholder discussions. In the event of a specification revision, please note that the ENERGY STAR certification is not automatically granted for the life of a product model.

ENERGY STAR® Program Requirements Product Specification for Telephony

Final Test Method Rev. Nov-2013

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 that are capable of entering Off Mode.

Table 1. Test Procedure Applicability

Product Configuration	Test Procedure Section	
	6.2 Partial On Mode	6.3 Off Mode*
Corded Telephone	X	* Off Mode shall be tested when available.
Cordless Telephone	X	
Conference Telephone	X	
Additional Handset	X	
WiFi Telephone	X	

3 DEFINITIONS

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

4 TEST SETUP

4.1 Test Setup for All Products

A) Test Setup and Instrumentation: Test setup and instrumentation for all portions of this method shall be in accordance with the requirements of International Electrotechnical Commission (IEC) 62301, Ed. 2.0, "Household Electrical Appliances – Measurement of Standby Power," Section 4, "General Conditions for Measurements" (IEC 62301, Ed. 2.0, 2011), unless otherwise noted in this document. In the event of conflicting requirements, the ENERGY STAR Test Method shall take precedence.

B) Input Power:

1) When testing with a Power over Ethernet (PoE) source, the UUT shall be connected to a Power Sourcing Equipment (PSE) voltage source of 53 ± 2 volts during testing. The PSE voltage source must be IEEE 802.3-2012 compliant.

   a. Lower voltages required for detection and classification of Powered Devices (PD) may be used prior to testing.

2) When testing with power from ac mains, the UUT shall be connected to a voltage source appropriate for the intended market, as specified in Table 2.

Table 2: 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 or 60 Hz	+/- 1.0 %

C) Ambient Temperature: Ambient temperature shall remain at 23° C ± 5° C, for the duration of the test.

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

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

1) Crest Factor:

   a. An available current crest factor of 3 or more at its rated range value; and

   b. Lower bound on the current range of 10 mA or less.

2) Minimum Frequency Response: 3.0 kHz

3) Minimum Resolution:

   a. 0.01 W for measurement values less than 10 W;

   b. 0.1 W for measurement values from 10 W to 100 W; and

   c. 1.0 W for measurement values greater than 100 W.

4) Measurement Accuracy:

   a. 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.

   b. 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.

F) PoE Power Meter: When measuring a PoE PD, power meters shall possess the following attributes:

1) Cable Compatibility: Capable of measuring Power over Ethernet connections directly from the Category 5 (enhanced) or 6 (CAT 5e/6) cable, regardless of the PoE method (PD operating modes) as specified by IEEE 802.3-2012.

2) Enables Ethernet link and packet traffic flow to the Unit Under Test (UUT) from a link partner at all network speeds at which the UUT is capable.

3) Acts as a PSE or allows another PSE to source power to the UUT.

4) Minimum Resolution:

   a. 0.01 W for measurement values less than 10 W;

   b. 0.1 W for measurement values from 10 W to 100 W; and

   c. 1.0 W for measurement values greater than 100 W.

5) Measurement Accuracy:

   a. Power measurements shall have an accuracy of less than or equal to ± (2% + 0.1 W).

6) Cable Length: A one meter CAT 5e/6 cable shall be used between the power meter and the UUT for all testing.

5 TEST CONDUCT

5.1 Test Conduct for All Products

A) As-shipped Condition: The UUT shall be tested in its "as-shipped" condition including, but not limited to, display brightness settings, unless otherwise specified by this test method.

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

C) Accessories: All UUTs shipped with accessories shall be tested with all accessories set up as specified in the manufacturer instructions.

D) UUTs sold with Additional Handsets: UUTs sold with Additional Handsets as part of a multi-handset system shall be tested with two Additional Handsets connected and set up in their default configuration.

   1) Additional Handsets and the UUT shall be placed at least 1.2 meters above the floor. Additional Handsets shall be placed 3 ± 0.1 meters from the UUT with a direct line of sight between the Additional Handset and UUT.

   2) Additional Handsets set up for testing shall remain in Partial On Mode for the duration of testing.

   3) The model name and number of all Additional Handsets and accessories used during testing shall be reported.

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

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

F) Energy Efficient Networking Protocols:

   1) If the UUT supports IEEE 802.3az protocol, all connected devices must support IEEE 802.3az.

   2) If the UUT supports Link Layer Discovery Protocol (LLDP)[1] for 802.3az, all connected devices must support LLDP for 802.3az.

[1] LLDP as defined in IEEE 802.1ab.

G) Hybrid Telephones: Hybrid Telephones shall be tested as VoIP Telephones.

H) PoE Telephones: All Telephones that can be powered using PoE shall be tested as PoE powered units.

6 TEST PROCEDURES FOR ALL PRODUCTS

6.1 UUT Preparation

A) Set up the UUT in accordance with the manufacturer instructions, except where these conflict with the requirements of this test method. If no instructions for use are available, then the as-shipped settings shall be used.

B) PoE Powered Units:

1) Connect the UUT to the PoE power meter and connect the PoE power meter to a port on a suitable Switch. A suitable Switch is defined as a Switch that:

a. Supports the maximum network speed of the UUT's network connection.

b. Supports all PoE modes that the Telephone can support, unless PoE power is supplied by the PoE power meter.

2) Units that can utilize an alternate power source, as well as PoE, shall be tested using the PoE connection.

3) Set up the Switch according to manufacturer instructions and connect it to the VoIP Server.

4) Configure the VoIP Server and Telephone to prepare for making and receiving calls locally to the VoIP Server and the VoIP system the server implements.

a. Record the manufacturer and model number of the VoIP Server.

b. Set the network speed to the UUT's highest supported speed.

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

C) Ac Powered Units:

1) 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 2.

2) Plug the UUT into the measurement outlet on the power meter. No power strips or uninterruptible power supply (UPS) units shall be connected between the UUT and the meter.

3) Connect the UUT to a suitable external telephone jack for Analog Telephones or a suitable VoIP Server for Hybrid and WiFi Telephones.

a. When testing Additional Handsets, the UUT shall be connected to a multi-handset Telephone system and be capable of making calls.

b. 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.

c. For WiFi Telephones, set up a WiFi network according to manufacturer instructions and connect the UUT to the WiFi network. The WiFi network shall be connected to a VoIP Server.

4) The UUT shall be capable of making a call across either the Public Switched Telephone Network (PSTN), a Ringdown Simulator, or a VoIP network, for WiFi Telephones and Hybrid Telephones.

D) For VoIP and Hybrid Telephones with Data Switch Ports:

1) Connect a personal computer to the UUT Data Switch Port. Ensure that the computer is on and that this is the computer's only network connection. Ensure that the computer recognizes this connection.

6.2 Partial On Mode Measurement

A) For UUTs with Cordless Telephones, Additional Handsets, and WiFi Telephones:

1) Place the handset with a fully charged battery in the cradle at least 2 hours prior to the beginning of testing.

2) Ensure the UUT is in the Partial On Mode.

3) If the UUT can be placed in Call Origination Mode while the handset is in the cradle:

a. Place the UUT in Call Origination Mode for less than 1 minute.

b. Confirm the presence of a dial tone.

c. Return the UUT to Partial On Mode.

4) If the UUT cannot be placed in Call Origination Mode while the handset is in the cradle:

a. Remove the handset from the cradle.

b. Confirm the presence of a dial tone.

c. Place the handset back into the cradle, within one minute of removing it, and return the UUT to Partial On Mode.

d. Wait 10 minutes.

5) Measure and record the ac input voltage and frequency.

6) Set the meter to begin accumulating true power values at a rate greater than or equal to 1 reading per second. Accumulate power values for 2 hours and record the average (arithmetic mean) value.

B) For all other UUTs:

1) Ensure that 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.

3) Wait 10 minutes.

4) Measure and record the ac input voltage and frequency.

5) Set the meter to begin accumulating true power values at a rate greater than or equal to 1 reading per second. Accumulate power values for 10 minutes and record the average (arithmetic mean) value.

6.3 Off Mode Measurement

A) Perform the following test on any Telephone capable of entering Off Mode:

1) Place the UUT in Partial On Mode.

2) Place the UUT in Off Mode, as instructed in the product's user manual. All physical connections (e.g., data or power cabling) required for Partial On Mode must remain connected during Off Mode testing.

a. The method used to place the UUT in Off Mode shall be reported.

3) Wait 10 minutes.

4) Measure and record the ac input voltage and frequency.

5) Set the meter to begin accumulating true power values at a rate greater than or equal to 1 reading per second. Accumulate power values for 10 minutes and record the average (arithmetic mean) value.

7 REFERENCES

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

B) IEEE 802.3-2012. IEEE Standard for Ethernet.

C) IEEE 802.11-2012. IEEE Standard for Information Technology --Telecommunications and information exchange between systems Local and metropolitan area networks--Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications.