



ENERGY STAR[®] Product Specification for Telephony

Eligibility Criteria Final Draft Version 3.0

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

3 **1 DEFINITIONS**

4 A) Product Types:

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

7 a. Sound Transmission Mechanism:

8 i. Analog Telephone: A Telephone or component of a Telephone system that
9 ultimately converts sound into analog waveforms for transmission through the
10 Public Switched Telephone Network (PSTN).

11 ii. Voice over Internet Protocol (VoIP) Telephone: A Telephone or component of a
12 Telephone system that converts sound into Internet Protocol data packets for
13 transmission through an Ethernet connection.

14 iii. Hybrid Telephone: A Telephone or component of a Telephone system that has
15 the ability to ultimately convert sound into both analog waveforms for
16 transmission through the PSTN and Internet Protocol data packets for
17 transmission through an Ethernet connection.

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

22 b. Configuration:

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

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

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

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

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

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- 38 B) Operational Modes:
- 39 1) Partial On (Sleep) Mode: A mode that may persist for an indefinite time when a Telephone is
40 connected to a power source and a telephone line or other physical or wireless network
41 connection and is capable of receiving a call. The Telephone is not receiving or transmitting
42 sound, and the handset is “on the hook” and the speakerphone is not engaged.
- 43 2) On Mode: Comprises the Call Origination and Active Modes.
- 44 a. Call Origination Mode: The mode in which the Telephone is connected to a power source
45 and the handset is “off the hook” or the speakerphone is engaged. Though not
46 necessarily transmitting and receiving data, a dial tone is present.
- 47 b. Active Mode: The mode in which the Telephone is connected to a power source and a
48 telephone line or other physical or wireless network connection and is receiving and/or
49 transmitting sound and/or playing/recording a message and the handset is “off the hook”
50 or the speakerphone is engaged.
- 51 3) Off Mode: A mode that may persist for an indefinite time when a Telephone is connected to both
52 a power source and a telephone line or other physical or wireless network connection and is NOT
53 capable of receiving a call.
- 54 C) Functionalities:
- 55 1) Video Calling: The capability of a Telephone to convert both full-motion video and sound into
56 Internet Protocol data packets for transmission through an Ethernet connection.
- 57 2) Data Switch Port: A secondary Ethernet port on a telephone that provides the capability to pass
58 data connectivity to an external device (e.g., a computer’s Ethernet network interface controller
59 (NIC)).
- 60 D) Telecommunications and Test Equipment:
- 61 1) Switch: A network device that filters, forwards, and floods frames based on the destination
62 address of each frame as its primary function. The Switch operates at the data link layer of the
63 Open Systems Interconnection (OSI) model.
- 64 2) Power Sourcing Equipment (PSE): An electronic device, such as a Switch or a Midspan that
65 sources (supplies) the power on the Ethernet cable for Power over Ethernet (PoE) devices. PoE
66 Switches supply power and terminate the data link. PoE Midspans inject power and are placed
67 between a non-PoE switch and the device being powered but provide no additional network
68 functionality.
- 69 3) Ringdown Simulator: A piece of testing equipment which simulates a two-way telephone line.
- 70 E) Additional Terms:
- 71 1) External Power Supply (EPS): A component contained in a separate physical enclosure external
72 to the Telephone product casing and designed to convert line voltage ac input from the mains to
73 lower ac or dc voltage(s) for the purpose of powering the Telephone. An External Power Supply
74 shall connect to the Telephone product via a removable or hard-wired male/female electrical
75 connection, cable, cord or other wiring.
- 76 2) Internet Protocol (IP): The communications protocol used for the transmission of data packets
77 across multiple networks (e.g., the Internet) as defined by the Internet Engineering Task Force¹
78 (IETF).

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

79 3) Voice over Internet Protocol (VoIP): The transmission of voice and other sound and/or full-motion
80 video over a network using the Internet Protocol where sound is converted into IP data packets
81 by the device for transmission over a network that uses IP. This network may be local or the
82 Internet. Devices using VoIP do not plug into a traditional telephone jack but connect to a network
83 through an access point, Ethernet or Wi-Fi.

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

86 5) Power over Ethernet (PoE): A technology which enables transfer of electrical power, along with
87 data, to network end point devices through an Ethernet cable. Currently specified by *IEEE 802.3-*
88 *2012*.

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

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

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

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

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

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

121 F) Acronyms:

122 1) ac: Alternating Current

123 2) C: Celsius

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

- 125 4) dc: Direct Current
- 126 5) EPS: External Power Supply
- 127 6) Hz: Hertz
- 128 7) kHz: Kilohertz
- 129 8) IEC: International Electrotechnical Commission
- 130 9) IP: Internet Protocol
- 131 10) PoE: Power over Ethernet
- 132 11) PSE: Power Sourcing Equipment
- 133 12) PSTN: Public Switched Telephone Network
- 134 13) SST: Spread Spectrum Technology
- 135 14) UUT: Unit Under Test
- 136 15) V: Volts
- 137 16) VoIP: Voice over Internet Protocol
- 138 17) W: Watts

139 **2 SCOPE**

140 **2.1 Included Products**

141 2.1.1 Telephony products are categorized by two independent characteristics: Sound Transmission
142 Mechanism and Configuration. Products that meet the definition of Telephone as specified
143 herein and transmit sound via Analog, VoIP, or a Hybrid of Analog and VoIP are eligible for
144 ENERGY STAR certification, with the exception of products listed in Section 2.2.

145 **2.2 Excluded Products**

146 2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible
147 for certification under this specification. The list of specifications currently in effect can be found
148 at www.energystar.gov/specifications.

149 2.2.2 The following products are not eligible for certification under this specification as illustrated in
150 Figure 1:

- 151 i. Cellular Telephones;
- 152 ii. Telephones that transmit both sound and video;
- 153 iii. Corded Analog Telephones without External Power Supplies; and
- 154 iv. Stand alone answering machines.

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		Sound-only Transmission			Sound and Video Transmission
		Analog	VoIP/Hybrid	Cellular	
Configuration	Additional Handset		Included Products	Included Products	X
	Cordless				
	Corded	w/ External Power Supply	X		
		w/o External Power Supply			
	Conference		Included Products		
	Wireless		X		

156 **Figure 1: Telephony Product Type Assignment**

157 **3 CERTIFICATION CRITERIA**

158 **3.1 Significant Digits and Rounding**

- 159 3.1.1 All calculations shall be carried out with directly measured (unrounded) values.
- 160 3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using directly
161 measured or calculated values without any benefit from rounding.
- 162 3.1.3 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR
163 website shall be rounded to the nearest significant digit as expressed in the corresponding
164 specification limit.

165 **3.2 Power Supply Requirements**

- 166 3.2.1 Power supply test data and test reports from testing entities recognized by EPA to perform
167 power supply testing shall be accepted for the purpose of certifying the ENERGY STAR
168 product.
- 169 3.2.2 External Power Supplies (EPSs): Single- and Multiple-voltage EPSs shall meet the level V
170 performance requirements under the International Efficiency Marking Protocol when tested
171 according to the Uniform Test Method for Measuring the Energy Consumption of External
172 Power Supplies, Appendix Z to 10 CFR Part 430.
- 173 i. Single-voltage EPSs shall include the level V marking.
- 174 ii. Additional information on the Marking Protocol is available
175 at www.energystar.gov/powersupplies.

176 **3.3 Power Requirements**

- 177 3.3.1 Measured Partial On Mode power, PP_ON, as tested per the Section 6.2 of the Test Method
178 minus the calculated Off Mode incentive, POff_Incentive, in Section 3.3.4 as applicable, shall
179 be less than or equal to the Maximum Average Power, P_{MAX}, as stated in Equation 1.

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Equation 1: Power Requirement

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$$(P_{P_ON} - P_{OFF_INCENTIVE}) \leq P_{MAX}$$

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

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Equation 2: Maximum Average Power

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

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Where:

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▪ P_{BASE} is the base power allowance (W) from Table 1;

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▪ 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

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▪ P_{PROXY} is an additional proxy incentive (W) as specified in Table 3.

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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	X	2.0

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Note: EPA has maintained the Draft 2 Specification Base Power Product Types and Allowances. To clarify the application of the criteria, EPA has modified the table so that the Base Allowance values are categorized in a grid format by Sound Transmission Mechanism (columns) and Configuration (rows).

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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 IEEE 802.3az compliant Gigabit Ethernet ports may claim a 0.2 watt additional incentive

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3.3.3 External Proxy Incentive: VoIP and Hybrid Telephones that ship with External Proxy Capability in Partial On mode may claim one of the following adders in Table 3 when calculating PADD based on the level of Proxy functionality in the product, as defined in Section 1.E.6.

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Note: EPA has specified that Telephones may receive the External Proxy Incentive if the capability is present in Partial On mode. It is not required that the Telephone provide External Proxy Capability in Off Mode.

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Table 3: External Proxy Incentives

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

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3.3.4 Off Mode Incentive: VoIP and Hybrid Telephones that ship with an Off Mode that meets the requirements in 3.4.1 may calculate the Off Mode Incentive, POff_Incentive, by using Equation 3.

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Equation 3: Off Mode Incentive

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$$P_{OFF_INCENTIVE} = 0.25 \times (P_{P_ON} - P_{OFF})$$

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Where:

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- $P_{OFF_INCENTIVE}$ 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).

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3.4 Power Management Requirements

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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:

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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.

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

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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.

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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.

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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.

231 **Note:** Following the release of the Draft 2 specification, one stakeholder commented that the proposal
232 requiring the Telephone’s display to power down to the default Partial On Mode state in less than 5
233 minutes might negatively impact the experience of heavy users. Upon further consideration, EPA is
234 proposing to revise this requirement to less than 20 minutes, harmonizing with the Draft European
235 Commission ErP Ecodesign Directive Lot 26 for Networked Standby, in which “the period of time after
236 which the power management function, or a similar function, switches the equipment automatically into a
237 condition providing networked standby shall not exceed 20 minutes.”

238 While EPA continues to encourage manufacturers to power down the display quickly, extending the
239 power-down time limit from 5 to 20 minutes should not impact the overall product’s energy consumption,
240 even in business settings where the phones may be used in On Mode more frequently than in consumer
241 settings, since the display should remain powered down during non-business hours; the majority of the
242 savings (achieved during nights and weekends) should remain unchanged. Raising the upper bound of
243 the display power down time limit provides manufacturers flexibility in designing their products for a
244 variety of use cases.

245 3.4.3 Products shall be shipped with informational materials to notify customers and operators of the
246 following:

- 247 i. A description of default power management settings.
- 248 ii. Guidance for enabling available power management features at the network and device level
249 including but not limited to Off Mode, External Network Proxy, and automatic and timed
250 power down of backlit displays and other functions.

251 **Note:** EPA encourages manufacturers to provide options and instructions for users (and network
252 operators where feasible) to program the Telephone to power down the backlight and other functions in
253 less time than the default settings when possible.

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

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

260 4 TESTING

261 4.1 Test Methods

262 4.1.1 Test methods identified in Table 4 shall be used to determine certification for ENERGY STAR.
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264 **Table 4: Test Methods for ENERGY STAR Certification**

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

265 **4.2 Number of Units Required for Testing**

266 4.2.1 Representative Models shall be selected for testing per the following requirements:

- 267 i. For certification of an individual product model, the Representative Model shall be equivalent
268 to that which is intended to be marketed and labeled as ENERGY STAR.
- 269 ii. For certification of a Product Family where models vary by the number of Additional Handsets
270 shipped with the base station, the base station and two Additional Handsets of the same
271 model number shall be tested where the base station is UUT 1 and one of the Additional
272 Handsets is UUT 2. (The other Additional Handset is used in the test but its power is not
273 measured). If the Representative Models UUT 1 and UUT 2 each meet all applicable
274 ENERGY STAR certification criteria, then all other configurations consisting of the base
275 station with any number of Additional Handsets of the same model number may be ENERGY
276 STAR certified.
- 277 iii. For certification of a Product Family that varies by characteristics other than the number of
278 Additional Handsets, the highest energy using configuration within that Product Family shall
279 be tested and serve as the Representative Model. Any subsequent testing failures (e.g., as
280 part of verification testing) of any model in the family will have implications for all models in
281 the Product Family.

282 4.2.2 A single unit of each Representative Model shall be selected for testing.

283 **4.3 International Market Certification**

284 4.3.1 Products shall be tested for certification at the relevant input voltage/frequency combination for
285 each market in which they will be sold and promoted as ENERGY STAR.

286 **5 EFFECTIVE DATE**

287 5.1.1 Effective Date: The Version 3.0 ENERGY STAR Telephony specification shall take effect on
288 **October 1, 2014**. To be ENERGY STAR certified, a product model shall meet the ENERGY
289 STAR specification in effect on the model's date of manufacture. The date of manufacture is
290 specific to each unit and is the date on which a unit is considered to be completely assembled.

291 5.1.2 Future Specification Revisions: EPA reserves the right to change this specification should
292 technological and/or market changes affect its usefulness to consumers, industry, or the
293 environment. In keeping with current policy, revisions to the specification are arrived at through
294 stakeholder discussions. In the event of a specification revision, please note that the ENERGY
295 STAR certification is not automatically granted for the life of a product model.