



ENERGY STAR[®] Product Specification for Telephony

Eligibility Criteria Draft 2 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.

37 B) Operational Modes:

- 38 1) Partial On (Sleep) Mode: A mode that may persist for an indefinite time when a Telephone is
39 connected to a power source and a telephone line or other physical or wireless network
40 connection and is capable of receiving a call. The Telephone is not receiving or transmitting
41 sound, and the handset is “on the hook” and the speakerphone is not engaged.
- 42 2) On Mode: Comprises the Call Origination and Active Modes.
- 43 a. Call Origination Mode: The mode in which the Telephone is connected to a power source
44 and the handset is “off the hook” or the speakerphone is engaged. Though not
45 necessarily transmitting and receiving data, a dial tone is present.
- 46 b. Active Mode: The mode in which the Telephone is connected to a power source and a
47 telephone line or other physical or wireless network connection and is receiving and/or
48 transmitting sound and/or playing/recording a message and the handset is “off the hook”
49 or the speakerphone is engaged.
- 50 3) Off Mode: A mode that may persist for an indefinite time when a Telephone is connected to both
51 a power source and a telephone line or other physical or wireless network connection and is NOT
52 capable of receiving a call.

53 **Note:** EPA has revised the definition of Off Mode removing the language “absent external stimulus
54 such as network initiation, physical interaction with the receiver or other part of the Telephone” to
55 simplify the definition based on stakeholder comment. One stakeholder also stated that PoE-powered
56 VoIP Telephones cannot receive calls at power levels of less than 1 W targeted by this mode
57 confirming that this characteristic alone is appropriate for defining Off Mode. Whereas a Telephone
58 would typically operate in Off Mode during non-peak hours and not need to receive a call, EPA
59 encourages Telephones to also implement power saving features such as EEE and proxying in the
60 Partial On Mode where the phone is capable of receiving a call and may need to use additional power
61 beyond 1 W for normal operating functions. EPA welcomes further stakeholder feedback on the
62 distinction between Off Mode and Partial On Mode.

63 C) Functionalities:

- 64 1) Video Calling: The capability of a Telephone to convert both full-motion video and sound into
65 Internet Protocol data packets for transmission through an Ethernet connection.
- 66 2) Data Switch Port: A secondary Ethernet port on a telephone that provides the capability to pass
67 data connectivity to an external device (e.g., a computer’s Ethernet network interface controller
68 (NIC)).

69 **Note:** During the webinar held on July 9, stakeholders expressed confusion regarding what types of
70 ports qualified as Data Switch Ports when performing testing according to the ENERGY STAR
71 Version 3.0 Telephony Test Method. As such, a refined definition for Data Switch Port has been
72 proposed to provide clarification for testing. EPA & DOE welcome stakeholder feedback on the
73 proposed definition for Data Switch Port.

74 D) Telecommunications and Test Equipment:

- 75 1) Switch: A network device that filters, forwards, and floods frames based on the destination
76 address of each frame as its primary function. The Switch operates at the data link layer of the
77 Open Systems Interconnection (OSI) model.
- 78 2) Power Sourcing Equipment (PSE): An electronic device, such as a Switch or a Midspan that
79 sources (supplies) the power on the Ethernet cable for Power over Ethernet (PoE) devices. PoE
80 Switches supply power and terminate the data link. PoE Midspans inject power and are placed
81 between a non-PoE switch and the device being powered but provide no additional network
82 functionality.

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

84 E) Additional Terms:

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

90 2) Internet Protocol (IP): The communications protocol used for the transmission of data packets
91 across multiple networks (e.g., the Internet) as defined by the Internet Engineering Task Force¹
92 (IETF).

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

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

100 5) Power over Ethernet (PoE): A technology which enables transfer of electrical power, along with
101 data, to network end point devices through an Ethernet cable. Currently specified by *IEEE 802.3-*
102 *2012*.

103 6) Full Network Connectivity: The ability of an End Point Device to maintain network presence while
104 in a low power mode (LPM) of equal or lower power consumption and intelligently wake when
105 further processing is required (including occasional processing required to maintain network
106 presence). Presence of the End Point Device, its network services and applications is maintained
107 even though the End Point Device is in a LPM. From the vantage point of the network, an End
108 Point Device with full network connectivity that is in LPM is functionally equivalent to an idle End
109 Point Device with respect to common applications and usage models. Full network connectivity in
110 LPM is not limited to a specific set of protocols but can cover applications installed after initial
111 installation. Also referred to as “network proxy” functionality and as described in the Ecma-393
112 standard.

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

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

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

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

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

126 9) Product Family: A group of product models that are (1) made by the same manufacturer, (2)
127 subject to the same ENERGY STAR certification criteria, and (3) of a common basic design.
128 Product models within a family differ from each other according to one or more characteristics or
129 features that either (1) have no impact on product performance with regard to ENERGY STAR
130 certification criteria, or (2) are specified herein as acceptable variations within a Product Family.
131 For Telephones, acceptable variations within a Product Family include:

- 132 1) Color,
- 133 2) Housing,
- 134 3) Number of Additional Handsets.

135 F) Acronyms:

- 136 1) ac: Alternating Current
- 137 2) C: Celsius
- 138 3) CAT 5e/6: Category 5 (enhanced) or 6 cable, the standard cables used for Ethernet connections
- 139 4) dc: Direct Current
- 140 5) EPS: External Power Supply
- 141 6) Hz: Hertz
- 142 7) kHz: Kilohertz
- 143 8) IEC: International Electrotechnical Commission
- 144 9) IP: Internet Protocol
- 145 10) PoE: Power over Ethernet
- 146 11) PSE: Power Sourcing Equipment
- 147 12) PSTN: Public Switched Telephone Network
- 148 13) SST: Spread Spectrum Technology
- 149 14) UUT: Unit Under Test
- 150 15) V: Volts
- 151 16) VoIP: Voice over Internet Protocol
- 152 17) W: Watts

153

154 **2 SCOPE**

155 **2.1 Included Products**

156 2.1.1 Telephony products are categorized by two non-mutually exclusive characteristics: Sound
157 Transmission Mechanism and Configuration. Products that meet the definition of Telephone
158 as specified herein and transmit sound via Analog, VoIP, or a Hybrid of Analog and VoIP are
159 eligible for ENERGY STAR certification, with the exception of products listed in Section 2.2.

160 **2.2 Excluded Products**

161 2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible
 162 for certification under this specification. The list of specifications currently in effect can be
 163 found at www.energystar.gov/specifications.

164 2.2.2 The following products are not eligible for certification under this specification as illustrated in
 165 Figure 1:

- 166 i. Cellular Telephones;
- 167 ii. Telephones that transmit both sound and video;
- 168 iii. Corded Analog Telephones without External Power Supplies; and
- 169 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	X	
		w/o External Power Supply			
	Conference		Included Products	X	
	Wireless		X		

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

172 **3 CERTIFICATION CRITERIA**

173 **3.1 Significant Digits and Rounding**

174 3.1.1 All calculations shall be carried out with directly measured (unrounded) values.

175 3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using
 176 directly measured or calculated values without any benefit from rounding.

177 3.1.3 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR
 178 website shall be rounded to the nearest significant digit as expressed in the corresponding
 179 specification limit.

180 **3.2 Power Supply Requirements**

181 3.2.1 Power supply test data and test reports from testing entities recognized by EPA to perform
182 power supply testing shall be accepted for the purpose of certifying the ENERGY STAR
183 product.

184 3.2.2 External Power Supplies (EPSs): Single- and Multiple-voltage EPSs shall meet the level V
185 performance requirements under the International Efficiency Marking Protocol when tested
186 according to the Uniform Test Method for Measuring the Energy Consumption of External
187 Power Supplies, Appendix Z to 10 CFR Part 430.

188 i. Single-voltage EPSs shall include the level V marking.

189 ii. Additional information on the Marking Protocol is available
190 at www.energystar.gov/powersupplies.

191 **3.3 Power Requirements**

192 3.3.1 Measured Partial On Mode power, P_{P_ON} , as tested per the Section 6.2 of the Test Method
193 minus the calculated Off Mode incentive, $P_{OFF_INCENTIVE}$, in Section 3.3.4 as applicable, shall be
194 less than or equal to the Maximum Average Power, P_{MAX} , as stated in Equation 1.

195 **Equation 1: Power Requirement**

196
$$(P_{P_ON} - P_{OFF_INCENTIVE}) \leq P_{MAX}$$

197 3.3.2 Maximum Average Power, P_{MAX} , shall be calculated as stated in Equation 2.

198 **Equation 2: Maximum Average Power**

199
$$P_{MAX} = P_{BASE} + \sum_{i=1}^n P_{ADDi} + P_{PROXY}$$

200 *Where:*

- 201 ▪ P_{BASE} is the base power allowance (W) from Table 1;
- 202 ▪ P_{ADDi} is the power allowance (W) as specified in Table 2 for each feature
203 present in the device, for a total of n such allowances; and
- 204 ▪ P_{PROXY} is an additional proxy incentive (W) as specified in Table 3.
- 205

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Table 1: Base Power Allowances

Product Type	P _{BASE} (W)
Tested VoIP and Hybrid Cordless, Wireless, and Corded Telephones	2.0
Tested VoIP and Hybrid Conference Telephones	2.5
Analog Corded Telephones	1.1
Analog Cordless and Conference Telephones	1.3
Additional Handsets Analog and VoIP	0.3

207

208 **Note: Cordless Analog Telephones:** EPA has revised the proposed Base Power Allowances for
 209 Cordless Analog Telephones in response to stakeholder feedback that the Draft 1 levels did not take into
 210 account that the base station and Additional Handsets maintain an active connection under the Draft
 211 Version 3.0 ENERGY STAR Test Method. To account for a connection between a base station and two
 212 Additional Handsets (the configuration specified in Section 4.2.1), EPA has increased the base allowance
 213 by 0.4 W from the 0.9 W proposed in Draft 1 to 1.3 W in Draft 2. The amount is based on data provided
 214 by the stakeholder and is expected to capture the top performing models currently certified to the Version
 215 2.2 specification.

216 EPA further notes that the Version 3.0 ENERGY STAR Test Method requires that Additional Handsets
 217 and base stations be placed 3 meters apart. EPA would like to recognize models that are capable of
 218 reducing transmission power at this short range relative to the maximum achievable range. For instance,
 219 EPA is aware of models that are capable of reducing transmission power between the highest and lowest
 220 level by roughly a factor of three. EPA welcomes comments on the above Analog Cordless Telephone
 221 1.3 W base allowance proposal and any additional data regarding the power associated with a base
 222 station tested within 3 meters of two Additional Handsets in Partial On Mode.

223 **Cordless Analog Telephones:** EPA is proposing a new separate category for Base Allowance for Corded
 224 Analog Telephones since they do not provide a battery charging function. Based on limited Version 3.0
 225 and other data, EPA proposes that the new Base Power Allowance for Corded Analog Telephones be 1.1
 226 W. Effectively this value indicates that an efficient Cordless Analog Telephone may use 0.2 W-0.3 W
 227 more power on average than a Corded Analog Telephone for charging the handset which is in line with
 228 the proposed Additional Handset allowance of 0.3 W. EPA welcomes further data and feedback on
 229 Corded products.

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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

233 3.3.3 External Proxy Incentive: VoIP and Hybrid Telephones that ship with External Proxy Capability may
 234 claim one of the following adders in Table 3 when calculating P_{ADD} based on the level of Proxy
 235 functionality in the product, as defined in Section 1.E.6.

236

Table 3: External Proxy Incentives

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

237

238 3.3.4 Off Mode Incentive: VoIP and Hybrid Telephones that ship with an Off Mode that meets the
 239 requirements in 3.4.1 may calculate the Off Mode Incentive, P_{Off_Incentive}, by using Equation 3.

240

Equation 3: Off Mode Incentive

241

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

242

Where:

243

- P_{OFF_INCENTIVE} is the value subtracted from measured Partial On Mode power in Equation 1;

244

- P_{P_ON} is the measured Partial On Mode power (W); and

245

- P_{OFF} is the measured Off Mode power (W).

246

247 3.4 Power Management Requirements

248 3.4.1 To receive the Off Mode Incentive in Section 3.3.4, Cordless, Corded, and Conference VoIP and
 249 Hybrid Telephones shall be capable of three or more of the following actions:

- 250 i. Device initiated automatic power down to Off Mode after a scheduled time or predetermined
251 period of timing has elapsed following the cessation of primary and secondary functions, user
252 input, or connected device activity.
- 253 ii. Network activated automatic power down of the device to Off Mode per programmable or
254 default settings.
- 255 iii. Manual activation of Off Mode from Partial On mode by the end-user via a clearly marked
256 button or electronic menu option on the Telephone.
- 257 iv. Manual activation of Partial On Mode from Off Mode by the end-user via a clearly marked
258 button, electronic menu option, or lifting the receiver on the Telephone.

259 **Note:** EPA has revised the language of 3.4.1 from necessitating two or more actions out of three total to
260 necessitating three or more actions out of four total. Section 3.4.1.iii and section 3.4.1.iv have both been
261 included to promote the user activation of both Off Mode or Partial On Mode from the prior state. EPA is
262 also proposing that Off Mode may be suspended by lifting the receiver on the Telephone. EPA intends for
263 the Off Mode to save power while providing both utility to end users and network administrators.
264 Stakeholders are encouraged to comment on the implementation feasibility of these features.

265 3.4.2 Color and backlit displays shall power down to the default Partial On Mode test state in less than 5
266 minutes after the cessation of user input.

267 3.4.3 Products shall be shipped with informational materials to notify customers and operators of the
268 following:

- 269 i. A description of default power management settings.
- 270 ii. Guidance for enabling available power management features at the network and device level
271 including but not limited to Off Mode, External Network Proxy, and automatic and timed
272 power down.
- 273 iii. Information about ENERGY STAR and the benefits of power management, to be located at
274 or near the beginning of the hard copy or electronic user manual, or in a package or box
275 insert.

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

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281 4 TESTING

282 4.1 Test Methods

283 4.1.1 Test methods identified in Table 4 shall be used to determine certification for ENERGY STAR.

284 **Table 4: Test Methods for ENERGY STAR Certification**

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

285 4.2 Number of Units Required for Testing

286 4.2.1 Representative Models shall be selected for testing per the following requirements:

- 287 i. For certification of an individual product model, the Representative Model shall be equivalent
288 to that which is intended to be marketed and labeled as ENERGY STAR.
- 289 ii. For certification of a Product Family where models vary by the number of Additional Handsets
290 shipped with the base station, the base station and two Additional Handsets of the same
291 model number shall be tested where the base station is UUT 1 and the Additional Handset is
292 UUT 2 . If the Representative Models UUT 1 and UUT 2 each meet all applicable ENERGY
293 STAR certification criteria, then all other configurations consisting of the base station with *n*
294 Additional Handsets of the same model number may be ENERGY STAR certified.
- 295 iii. For certification of a Product Family that varies by characteristics other than the number of
296 Additional Handsets, the highest energy using configuration within that Product Family shall
297 be tested and serve as the Representative Model. Any subsequent testing failures (e.g., as
298 part of verification testing) of any model in the family will have implications for all models in
299 the Product Family.

300 **Note:** In Draft 1, EPA proposed that the maximum configuration of *n* Additional Handsets be tested with
301 the base station for the certification of a Product Family consisting of any number of fewer than *n*
302 Additional Handsets of the same model number. However, the maximum configuration of Analog
303 Telephones sold at retail (base station plus 1-5 Additional Handsets) varies from the maximum feasible
304 configuration (8-12 Additional Handsets). The maximum configuration is therefore ambiguous and could
305 lead to test configurations not commonly seen in a residential home or small office.

306
307 To reduce this ambiguity and provide more representative results, Draft 2 specifies that only two
308 Additional Handsets be tested with the base station, which is the configuration used in Germany's Blue
309 Angel award for Corded VoIP Telephones (RAL-UZ 150). EPA welcomes stakeholder comment on the
310 feasibility of this configuration for all Corded and Cordless Analog Telephones operating as base stations.
311 For instance, are there Corded or Cordless Analog Telephones that are incapable of operating with two
312 Additional Handsets? Is a base station plus two Additional Handsets a reasonable configuration for
313 representing the entire Product Family and energy savings features present in the models?

314 4.2.2 A single unit of each Representative Model shall be selected for testing.

315 **4.3 International Market Certification**

316 4.3.1 Products shall be tested for certification at the relevant input voltage/frequency combination for
317 each market in which they will be sold and promoted as ENERGY STAR.

318 **5 EFFECTIVE DATE**

319 5.1.1 Effective Date: The Version 3.0 ENERGY STAR Telephony specification shall take effect on
320 **TBD**. To be ENERGY STAR certified, a product model shall meet the ENERGY STAR
321 specification in effect on the model's date of manufacture. The date of manufacture is specific
322 to each unit and is the date on which a unit is considered to be completely assembled.

323 5.1.2 Future Specification Revisions: EPA reserves the right to change this specification should
324 technological and/or market changes affect its usefulness to consumers, industry, or the
325 environment. In keeping with current policy, revisions to the specification are arrived at
326 through stakeholder discussions. In the event of a specification revision, please note that the
327 ENERGY STAR certification is not automatically granted for the life of a product model.