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.

1 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.

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

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)).

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

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 (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 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,
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

2 **SCOPE**

2.1 **Included Products**

2.1.1 Telephony products are categorized by two non-mutually exclusive 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

3 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 Supplies (EPSs): Single- and Multiple-voltage EPSs shall meet the level V 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 marking.

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

3.3 Power Requirements

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

\[
\text{Equation 1: Power Requirement}
\]

\[
(P_{\text{P,ON}} - P_{\text{Off,Incentive}}) \leq P_{\text{MAX}}
\]

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

\[
\text{Equation 2: Maximum Average Power}
\]

\[
P_{\text{MAX}} = P_{\text{BASE}} + \sum_{i=1}^{n} P_{\text{ADD}} + P_{\text{PROXY}}
\]

Where:

- \( P_{\text{BASE}} \) is the base power allowance (W) from Table 1;
- \( P_{\text{ADD}} \) 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
- \( P_{\text{PROXY}} \) is an additional proxy incentive (W) as specified in Table 3.
### Table 1: Base Power Allowances

<table>
<thead>
<tr>
<th>Product Type</th>
<th>$P_{BASE}$ (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested VoIP and Hybrid Cordless, Wireless, and Corded Telephones</td>
<td>2.0</td>
</tr>
<tr>
<td>Tested VoIP and Hybrid Conference Telephones</td>
<td>2.5</td>
</tr>
<tr>
<td>Analog Corded Telephones</td>
<td>1.1</td>
</tr>
<tr>
<td>Analog Cordless and Conference Telephones</td>
<td>1.3</td>
</tr>
<tr>
<td>Additional Handsets Analog and VoIP</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Note: Cordless Analog Telephones: EPA has revised the proposed Base Power Allowances for Cordless Analog Telephones in response to stakeholder feedback that the Draft 1 levels did not take into account that the base station and Additional Handsets maintain an active connection under the Draft Version 3.0 ENERGY STAR Test Method. To account for a connection between a base station and two Additional Handsets (the configuration specified in Section 4.2.1), EPA has increased the base allowance 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 by the stakeholder and is expected to capture the top performing models currently certified to the Version 2.2 specification.

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

Corded Analog Telephones: EPA is proposing a new separate category for Base Allowance for Corded Analog Telephones since they do not provide a battery charging function. Based on limited Version 3.0 and other data, EPA proposes that the new Base Power Allowance for Corded Analog Telephones be 1.1 W. Effectively this value indicates that an efficient Cordless Analog Telephone may use 0.2 W-0.3 W more power on average than a Corded Analog Telephone for charging the handset which is in line with the proposed Additional Handset allowance of 0.3 W. EPA welcomes further data and feedback on Corded products.
Table 2: Additional Functional Adders

<table>
<thead>
<tr>
<th>Feature</th>
<th>Power Allowance P_{ADD} (W)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gigabit Ethernet (1000Base-T)</td>
<td>1.0</td>
<td>Applies if the Telephone has one or more Gigabit Ethernet ports.</td>
</tr>
<tr>
<td>IEEE 802.3az compliant Gigabit Ethernet</td>
<td>0.2</td>
<td>Telephony products that ship with IEEE 802.3az compliant Gigabit Ethernet ports may claim a 0.2 watt additional incentive</td>
</tr>
</tbody>
</table>

3.3.3 External Proxy Incentive: VoIP and Hybrid Telephones that ship with External Proxy Capability 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.

Table 3: External Proxy Incentives

<table>
<thead>
<tr>
<th>Capability</th>
<th>P_{PROXY} (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Capability</td>
<td>0.3</td>
</tr>
<tr>
<td>Remote Wake</td>
<td>0.5</td>
</tr>
</tbody>
</table>

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, P_{Off_Incentive}, by using Equation 3.

Equation 3: Off Mode Incentive

\[ P_{OFF\_INCENTIVE} = 0.25 \cdot (P_{P\_ON} - P_{OFF}) \]

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.

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

3.4.2 Color and backlit displays shall power down to the default Partial On Mode test state in less than 5 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.

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.
4 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

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Telephony Products</td>
<td>ENERGY STAR Test Method for Telephony Rev. XXX-2013.</td>
</tr>
</tbody>
</table>

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 the Additional Handset is UUT 2. If the Representative Models UUT 1 and UUT 2 each meet all applicable ENERGY STAR certification criteria, then all other configurations consisting of the base station with \( n \) Additional Handsets of the same model number may be ENERGY STAR certified.

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.

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

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

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.

5 EFFECTIVE DATE

5.1.1 Effective Date: The Version 3.0 ENERGY STAR Telephony specification shall take effect on TBD. 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.