Following is the Version 7.0 ENERGY STAR Product Specification for Televisions. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

1 DEFINITIONS

A) Product Types:

1) Television (TV): A product designed to produce dynamic video, contains an internal TV tuner encased within the product housing, and that is capable of receiving dynamic visual information from wired or wireless sources including but not limited to:

a) Broadcast and similar services for terrestrial, cable, satellite, and/or broadband transmission of analog and/or digital signals;

b) Display-specific data connections, such as HDMI, Component video, S-video, Composite video;

c) Media storage devices such as a USB flash drive, a memory card, or a DVD; or

d) Network connections, usually using Internet Protocol, typically carried over Ethernet or Wi-Fi.

2) Hospitality Television: A TV product which includes the following features:

a) A control port for bi-directional communication (DB-9, RJ11, RJ12, RJ45, coaxial cable, or HDMI-CEC); and

b) Activated hospitality protocol software (e.g., SmartPort, Meeting Professionals International (MPI), Multiple Television Interface (MTI), Serial Protocol) to provide direct access to Video-On-Demand (VOD) systems or a digital media player designed for hospitality-specific applications.

B) Operational Modes:

1) On Mode: The power mode in which the product is connected to a mains power source, has been activated, and is providing one or more of its principal functions.

Note: Based on stakeholder feedback, EPA is removing the definition and power requirements for Power Overhang State because EPA understands that the functions previously delivered in this state, including quick start, are now delivered in one of the Standby modes as defined in this specification.

2) Standby-Passive Mode: The mode in which the TV is connected to a power source, produces neither sound nor picture, but can be switched into another mode with the remote control unit or an internal signal.

1 10 CFR 430.2
2 10 CFR 430, Subpart B, Appendix H, Section 2.14
3 10 CFR 430, Subpart B, Appendix H, Section 2.18
3) **Standby-Active, Low Mode**: The mode in which the TV is connected to a power source, produces neither sound nor picture, but can be switched into another mode with the remote control unit or an internal signal, and with an external signal, and is not exchanging/receiving data with/from an external source.

4) **Standby-Active, High Mode**: The mode in which the TV is connected to a power source, produces neither sound nor picture, but can be switched into another mode with the remote control unit or an internal signal, and with an external signal, and is exchanging/receiving data with/from an external source.

   a) **Download Acquisition Mode**: The power mode in which the product is connected to a mains power source, produces neither sound nor picture, and is actively downloading data. Data downloads may include channel listing information for use by an Electronic Program Guide, TV setup data, channel map updates, firmware updates, monitoring for emergency messaging/communications or other network communications.

   **Note**: EPA has retained the definition for Download Acquisition Mode (DAM), having heard from stakeholders that Hospitality TVs continue to make use of this mode.

5) **Off Mode**: The mode where the TV is connected to a power source, produces neither sound nor picture, and cannot be switched into any other mode with the remote control unit, an internal signal, or an external signal.

C) **Additional Functions**: Functions that are not required for the basic operation of the device. Additional functions include, but are not limited to, a VCR unit, a DVD unit, an HDD unit, a FM-radio unit, a memory card-reader unit, or an ambient lighting unit.

   1) **Thin Client Capability**: The ability of the TV to receive, decrypt, and display encrypted content provided by a Multichannel Video Programming Distributor (MVPD) over the Local Area Network via a server device co-located on the customer premises without the need for a client device at the TV.

   2) **Full Network Connectivity**: The ability of the TV to maintain network presence while in Standby-Active, Low mode. Presence of the TV, its network services, and its applications, is maintained even if some components of the Television are powered down. The TV can elect to change power states based on receipt of network data from remote network devices, but should otherwise stay in Standby-Active, Low mode absent a demand for services from a remote network device. Full network connectivity is not limited to a specific set of protocols. Also referred to as “network proxy” functionality and described in the Ecma-393 standard.

   **Note**: EPA received no comments on this new Full Network Connectivity definition and thus has retained it with no modifications in Draft 2. Under Draft 2, EPA has removed the following ‘Additional Function’ definitions included in Draft 1:

   **Point of Deployment (POD) Module**: In response to Draft 1, stakeholders commented that the presence of PODs or CableCARDs in TVs is rapidly declining such that these functions will likely be nonexistent when this specification takes effect. Stakeholders relayed that conditional access will be provided through software downloads in the future. Therefore EPA is proposing to drop the reporting requirement for POD and to remove this definition.
High Efficiency Video Processing: Stakeholders commented that High Efficiency Video Processing does not consume significantly more power than other TV decoder technologies. EPA also anticipates that UHD TVs with Thin Client Capability will already include this technology, and therefore does not propose highlighting the availability of this functionality on the ENERGY STAR Certified Products List. Thus, EPA is removing the definition.

Wake-on-LAN (WoL): EPA is proposing to remove Wake-on-LAN and Wake-on-Wireless definitions because these functionalities fall under Full Network Connectivity when applying the Standby-Active, Low power requirements to a TV. EPA did not receive feedback that Wake-on-LAN or WoWLAN require additional power, so for simplicity EPA will also exclude them from the Definitions section.

D) Special Functions: Functions that are related to, but not required for, the basic operation of the device. Special functions include, but are not limited to, special sound processing, power saving functions (e.g., Automatic Brightness Control).

1) Automatic Brightness Control (ABC): The self-acting mechanism that controls the brightness of a display as a function of ambient light.

2) Gesture Recognition: Ability to recognize non-verbal communication through a movement of the body, head, or limbs to express or emphasize an idea, sentiment, or command.

3) Voice Recognition: Ability to recognize spoken words or phrases and to convert said communication into text or commands to which meaning has been assigned.

Note: EPA proposes to include the above human interface capability definitions for Gesture and Voice Recognition so that Partners are able communicate these features to consumers. Partners would self-report these features to certification bodies. EPA will continue to monitor the prevalence of these features in the market and seek information regarding their energy consumption to determine if they should be further addressed under future specification revisions. Based on discussions with stakeholders and review of available information, it does not appear that gesture and voice recognition features require significant additional power in On or Standby Modes. As a result, EPA does not propose testing or providing additional allowances for these features under the Version 7.0 specification.

E) Television Settings and Menus:

1) Preset Picture Setting: A preprogrammed factory setting obtained from the TV menu with predetermined picture parameters such as brightness, contrast, color, sharpness, etc. Preset picture settings can be selected within the Home or Retail Configurations.

2) Default Picture Setting: The Preset Picture Setting that the TV enters into immediately after making a selection from the Forced Menu. If the TV does not have a Forced Menu, this is the as-shipped preset picture setting.

3) Brightest Selectable Preset Picture Setting: The Preset Picture Setting in which the TV produces the highest screen luminance within either the Home or Retail Configuration.

4) Home Configuration: The TV configuration selected from the Forced Menu which is designed for typical consumer viewing and is recommended by the manufacturer for home environments.
5) **Retail Configuration** \(^{13}\): The TV configuration selected from the Forced Menu which is designed to highlight the TV's features in a retail environment. This configuration may display demos, disable configurable settings, or increase screen brightness in a manner which is not desirable for typical consumer viewing.

6) **Forced Menu** \(^{14}\): A series of menus which require the selection of initial settings before allowing the user to utilize primary functions. Within these menus contains an option to choose the viewing environment between Retail and Home Configurations.

7) **Electronic Program Guide (EPG)**: An interactive on-screen menu of TV program information downloaded from an external source or embedded interstitially in broadcast video streams (e.g., program time, date, and descriptions).

**Figure 1: Illustration of Picture Settings for TVs with a Forced Menu** \(^{15}\)

![Diagram of Forced Menu](image)

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12 10 CFR 430, Subpart B, Appendix H, Section 2.6  
13 10 CFR 430, Subpart B, Appendix H, Section 2.16  
14 10 CFR 430, Subpart B, Appendix H, Section 2.5  
F) Power Devices:

1) **External Power Supply (EPS):** Also referred to as External Power Adapter. A component contained in a separate physical enclosure external to the TV casing, designed to convert line voltage ac input from the mains to lower dc voltage(s) in order to provide power to the TV. An EPS connects to the TV via a removable or hard-wired male/female electrical connection, cable, cord or other wiring.

2) **Main Battery:** A battery capable of powering the TV to produce dynamic video without the support of mains power.

G) Product Characteristics:

1) **Luminance:** The photometric measure of the luminous intensity per unit area of light traveling in a given direction, expressed in units of candelas per square meter (cd/m²).

2) **Screen Area:** The viewable screen area of the product, calculated by multiplying the viewable image width by the viewable image height. For curved screens, the measurements shall be made along the curvature on the face of the screen rather than along a straight line/chord.

3) **Native Vertical Resolution:** The number of visible physical pixels along the vertical axis of the TV (e.g., a TV with a screen resolution of 1920 x 1080 (horizontal x vertical) would have a Native Vertical Resolution of 1080).

**Note:** In Draft 2, EPA has made minor edits to the definition of Native Vertical Resolution to specify that the number of physical pixels counted should be visible and not obscured by the bezel or other components. EPA welcomes stakeholder feedback on the clarity and applicability of this change to the definition.

**Effective Vertical Resolution:** In Draft 1, EPA proposed the inclusion of a device-independent definition of resolution, “Effective Vertical Resolution,” and referenced the Society for Information Displays (SID) Information Displays Measurement Standard Version 1.03 Section 7.8. This standard provides a means for determining effective resolution that does not rely on physical structure, and instead focuses on objective measurements of performance which relate to human visual perception. This approach uses an alternating high contrast band (>50% Michelson contrast (“contrast modulation”) in both vertical and horizontal axes). [http://www.sid.org/Publications.aspx](http://www.sid.org/Publications.aspx)

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17 10 CFR 430, Subpart B, Appendix H, Section 2.12
In response, EPA received mixed feedback about the use of Native versus Effective Vertical Resolution to categorize higher resolution TVs. As a result, EPA proposes to maintain Native Resolution to characterize higher resolution TVs, since physical pixel count provides an established basis on which to compare the energy performance of these TVs. EPA welcomes feedback on this approach.

H) Basic Model: All units of a given type of product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional characteristics that affect energy consumption and energy efficiency.

I) Multichannel Video Programming Distributor (MVPD): A person such as, but not limited to, a cable operator, a multichannel multipoint distribution service, a direct broadcast satellite service, or a TV receive-only satellite program distributor, who makes available for purchase, by subscribers or customers, multiple channels of video programming.

J) Unit Under Test (UUT): The unit currently undergoing testing.

2 SCOPE

2.1 Included Products

Products that are: (1) marketed to the consumer as a TV (i.e., TV is the primary function); (2) capable of being powered from a wall outlet with an external power supply; and (3) meet one of the following product type definitions, are eligible for ENERGY STAR certification, with the exception of products listed in Section 2.2:

i. TVs

ii. Hospitality TVs

2.2 Excluded Products

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.

Products that satisfy one or more of the following conditions are not eligible for ENERGY STAR certification under this specification:

i. Televisions with a Main Battery that enables operation without connected mains power.

Note: In Draft 1, EPA proposed to remove Televisions with a Main Battery from the scope of the specification. Given that EPA received no stakeholder feedback opposing this change, that there are no ENERGY STAR-certified battery operated-TVs currently, and the inherent incentive for battery-operated TVs to save energy, EPA retains the proposal to exclude TVs with Main Batteries in line with the scope of the DOE Appendix H to Subpart B of 10 CFR Part 430.

ii. Products with a computer input port (e.g., VGA), that are marketed and sold primarily as computer monitors or other displays, and that do not contain an integrated TV tuner encased within the product housing.

18 10 CFR 430.2
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 exact values without any benefit from further 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 General Requirements

3.2.1 External Power Supplies (EPSs): Single- and Multiple-voltage EPSs shall meet the level VI 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 Subpart B of 10 CFR Part 430.

i. Single- and Multiple-voltage EPSs shall include the level VI marking.


Note: EPA has updated the EPS requirements to reflect the energy conservation standards adopted by DOE earlier this year, and which cover both single- and multiple-voltage. EPSs will take effect on February 10, 2016.

3.2.2 General User Information: The product shall ship with consumer informational materials located in either (1) the hard copy or electronic user manual, or (2) a package or box insert. These materials shall include:

i. Information about the ENERGY STAR program,

ii. Information on the energy consumption implications of changes to default as-shipped Television configuration and settings, and

iii. Notification that enabling certain optional features and functionalities (e.g., instant-on), may increase energy consumption beyond the limits required for ENERGY STAR certification, as applicable.

3.2.3 Forced Menu: Any product that includes a Forced Menu upon initial start-up shall:

i. Provide users with a choice of Home Configuration or Retail Configuration. Partners may use alternative terminology if approved by EPA.

ii. Upon selection of Retail Configuration at initial start-up, either (1) display a second prompt requiring the user to confirm the choice of Retail Configuration, or (2) display information on the start-up menu that the Home Configuration is the setting in which the product qualifies for ENERGY STAR. If option (2) is selected, additional detail about ENERGY STAR certification and energy consumption expectations shall be included in printed product literature and on the product information page on the Partner’s website.

3.2.4 Preset Picture Setting Menu: For any product where consumers have the option of selecting different picture settings from a preset menu at any time:
i. The product shall display on-screen information that the Default Picture Setting (the Default Picture Setting in Home Configuration for TVs with a Forced Menu) reflects the settings under which the product qualifies for the ENERGY STAR. For example, such information may be indicated by including the ENERGY STAR mark in the name or description of that picture setting or in the form of a message displayed each time any setting other than the Default Picture Setting is selected; and

ii. The product may optionally display on-screen information indicating that factory-configured picture settings other than the Default Picture Setting meet ENERGY STAR if a TV in those settings could also meet the Section 3.3 On Mode Requirements. For purposes of ENERGY STAR certification, Partners shall report the presence of these settings to the EPA-recognized certification body and maintain internal documentation. EPA reserves the right to request this documentation at any time. The settings shall not be third-party tested or reviewed during certification and verification processes.

Note: EPA received new stakeholder feedback that some picture settings other than the Default Picture Setting can also qualify to the ENERGY STAR requirements and that some Partners may wish to communicate this to consumers. As a result, EPA is proposing to allow Partners the option to indicate that additional picture settings also meet ENERGY STAR requirements. For purposes of third-party certification, additional picture settings that meet ENERGY STAR requirements shall be reported by the partner to the certification body, however, documentation shall not be reviewed when products are certified or during verification testing. EPA reserves the right to request this documentation at any time. EPA welcomes stakeholder comment on this new provision.

3.2.5 Standby-Passive Mode and Standby-Active, Low Mode Settings: If users can select and enable Standby-Passive Mode or Standby-Active, Low Mode functions from a display prompt in On Mode or a settings menu other than a Forced Menu, and if these functions may alter power consumption from the default, as-tested Home Configuration, the product shall:

i. Display on-screen information that enabling certain optional features and functionalities (e.g., instant-on) in Standby-Active, Low Mode other than those included in the Home Configuration default as-tested settings may alter the ENERGY STAR certified configuration, or

ii. Display on-screen information that enabling the optional features and functionalities may change the energy consumption of the product.

Note: In Draft 1, EPA proposed on-screen informational requirements for Standby-Passive Mode and Standby-Active, Low Mode settings that may be altered by the consumer via a menu. Stakeholders shared that settings in Standby Mode may include a wide variety of features (human interfaces, applications, timers, network connections, etc.) that may be made available to users in a variety of ways other than the traditional menu used for features like Picture Settings. Therefore, to allow for flexibility, EPA is proposing that Partners may meet Standby Mode on-screen informational requirements by including ENERGY STAR messaging next to the default as-shipped configuration or a more general message such as "this selection may change the energy consumption of your product."

EPA received feedback on its Draft 1 proposal to require that consumers be prompted to select a discrete time period within a 24-hr cycle for a particular setting, such as quick start, to be enabled. Stakeholders identified difficulties in implementing such a feature across products since many TVs may not have an internal clock. As a result of such challenges, EPA has reconsidered this approach. With more network enabled and feature-rich TVs entering the market in the next couple of years, EPA expects that many TV features such as quick start will be enabled by default or prompted in a Forced Menu and thus captured under Standby-Active, Low and Standby-Passive Modes tests, ensuring that TVs with these features are evaluated against ENERGY STAR requirements. For those features that are not enabled in the as-tested configuration, EPA believes the above proposed on-screen requirements enable the consumer to optimally use the TV in a way that reduces unnecessary energy waste.
3.2.6 **Thin Client Capability and MVPD-ready Information**: Products that meet with Thin Client Capability or are otherwise MVPD-ready shall:

i. Report the presence of Thin Client Capability and supporting information including, but not limited to, interoperability protocols, decryption, and decoding functions for display on the ENERGY STAR certified products list; and

ii. Inform the consumer in the user manual and/or on-screen prompt that the TV may be capable of operating without a set-top box from a MVPD.

**Note**: In response to stakeholder feedback in Draft 1, EPA is retaining the above Draft 1 proposal to provide consumers, retailers, and energy efficiency program sponsors with basic information regarding Thin Client Capability to increase awareness of its potential benefits. To assist stakeholders in seeing how this proposed reporting requirement would be implemented, EPA has included with this Draft 2 specification a Draft Version 7.0 Qualified Product Exchange (QPX) template for stakeholder review.

3.2.7 **Standby-Active, High Mode Capability**: TVs with Standby-Active, High Mode shall automatically return to the default as-tested Standby-Active, Low Mode or Standby-Passive Mode following a manufacturer firmware update or other maintenance operation in Standby Active, High Mode within a period less than or equal to 15 minutes from the completion of said update/maintenance operation.

**Note**: EPA seeks to ensure that TVs return to a Standby-Active, Low or Standby-Passive Mode rather than remaining in a higher power Standby-Active, High Mode following a firmware update or delivering other functionality historically delivered during Power Overhang State, such as quick start. For purposes of third-party certification, the time within which the TV returns to the default as-tested Standby Active, Low mode shall be reported by the Partner to the EPA-recognized certification body however documentation shall not be reviewed when products are certified or during verification testing. EPA reserves the right to request this documentation at any time.

### 3.3 On Mode Requirements

3.3.1 For all TVs, On Mode power, as tested per Section 7.1.2 *On Mode Test for TVs without ABC Enabled by Default* or Section 7.1.3.2 *On Mode Power Calculation* (for TVs with ABC Enabled by Default) in Appendix H shall be less than or equal to the Maximum On Mode Power Requirement \(P_{ON,\text{MAX}}\) and high resolution allowance, as shown in Equation 1.

**Equation 1: On Mode Power Requirement for All TVs**

\[
P_{ON} \leq P_{ON,\text{MAX}} + P_{HR}
\]

Where:

- \(P_{ON}\) is On Mode Power in watts;
- \(P_{ON,\text{MAX}}\) is the Maximum On Mode Power requirement in watts calculated in Equation 2; and
- \(P_{HR}\) is a high resolution allowance in watts, as applicable, calculated in Equation 2.

3.3.2 The Maximum On Mode Power Requirement \(P_{ON,\text{MAX}}\) in watts shall be calculated per Equation 2.

**Equation 2: Maximum On Mode Power Requirement**

\[
P_{ON,\text{MAX}} = 71 \times \tanh(0.0005 \times (A - 140) + 0.045) + 14
\]

Where:

- \(P_{ON,\text{MAX}}\) is the maximum allowable On Mode Power consumption in watts;
- \(A\) is the viewable Screen Area of the product in square inches; and
- \(\tanh\) is the hyperbolic tangent function.
3.3.3 TVs with Native Vertical Resolution greater than or equal to 2160 pixels and certified to ENERGY STAR before May 1, 2017, are eligible for a high resolution On Mode Power Allowance ($P_{HR}$) as calculated per Equation 3.

**Equation 3: Calculation of On Mode Power Allowance for TVs with Native Vertical Resolution Greater than or Equal to 2160 pixels (Expires May 1, 2017)**

$$P_{HR} = 0.55 \times P_{ON,MAX}$$

*Where:*
- $P_{HR}$ is the high resolution On Mode Power Allowance in watts; and
- $P_{ON,MAX}$ is the maximum allowable On Mode Power consumption in watts.

**Note:** In response to the On Mode Power levels for HD TVs in EPA’s Draft 1 proposal, a few stakeholders stated, with supporting data, that EPA's estimated On Mode power of Version 6.0 ABC models, calculated through linear interpolation of power measurements at the NOPR illuminance test points (0, 10, 50, 100, and 300 lux) to approximate power at the Final Rule illuminance test points (3, 12, 35, and 100 lux), was too low. Thus, for Draft 2, EPA conducted new analyses of its dataset removing the interpolated ABC models. The revised dataset represents 764 unique models and includes 112 ABC models certified to Version 6.1 and tested to the Final Rule DOE Test Procedure with the remainder non-ABC models certified to both Version 6.0 and 6.1, since the reported power values of non-ABC models were not affected by the Final Rule DOE Test Procedure.

Sixteen percent of TVs in EPA’s revised dataset meet the revised On Mode requirements. At least 10 major manufacturers have one or more models meeting the new proposed criteria. Based on the market response to past revisions of the TV specification and how rapidly the television market evolves, EPA anticipates a more than adequate selection of ENERGY STAR certified models by the time the specification takes effect in 2015.

**Ultra High Definition (UHD)**

In response to questions posed in Draft 1, EPA obtained data on 63 current and forthcoming UHD models from a few stakeholders and the California Energy Commission database. Data indicate that while most UHD models consume considerably more energy than HD models, a few stand out as being significantly more efficient than their counterparts. EPA seeks to recognize only top performing UHD models, aiming to incentivize improvements in efficiency across other models in the near future. The data further indicate that UHD TV On Mode Power increases with screen size in a similar manner as for HD TVs. Therefore to capture the most efficient UHD TVs, EPA proposes an adder of 55% of the maximum On Mode Power requirement. EPA proposes this adder be proportional to On Mode power as calculated based on screen area, recognizing that the UHD impact on energy use will be experienced across the total screen area.

With this adder, three manufacturers have products that would be eligible for the ENERGY STAR. Recognizing that UHD is new to the market, and TV partners have an impressive record of dialing back the power use of new features, EPA proposes that the adder expire on May 1, 2017. Existing Version 7.0 products certified with the adder would remain on the ENERGY STAR Certified Products List until Version 8.0 is effective. Any product certified to Version 7.0 on or after the date would not be eligible to receive the adder to meet the On Mode Requirements.

In response to stakeholder feedback during the Draft 1 webinar on the energy use of UHD models, EPA and DOE are still interested in understanding differences in power consumption due to the processing power needed to upscale 2K content to 4K content. EPA and DOE encourage stakeholders to provide additional data as they become available.
3.4 Standby-Passive Mode Requirements

3.4.1 Standby-Passive mode ($P_{STANDBY-PASSIVE}$), as measured per Section 7.3.3 Standby-Passive Mode of Appendix H, shall be less than or equal to 0.5 W.

3.5 Standby-Active, Low Mode Requirements

3.5.1 Standby-Active, Low Mode, as measured per Section 7.3.3 Standby-Active, Low Mode of Appendix H, shall be less than or equal to 3.0 W.

Note: Based on stakeholder comments, EPA has removed the distinction proposed in Draft 1 for TVs with Full Network Connectivity since EPA has confirmed that the definition of Standby-Active, Low Mode inherently implies the TV can provide the functions defined under Full Network Connectivity.

In Draft 1, EPA proposed a maximum Standby-Active, Low Mode power requirement of 1.0 W after examining the energy consumption of other electronics products in network connected low power states to understand the possibilities that could carry over into TVs. In response, stakeholders suggested that a range of 3.0 to 6.0 W more accurately reflects projected TV efficiencies in Standby-Active Low Mode, though existing product data are not yet widely available.

Given the lack of TVs currently tested with Full Network Connectivity, EPA reviewed other consumer products with Wi-Fi, including printers with Wi-Fi connections that had measured Standby around 2.5 to 3.5 W in 2011. EPA believes also there have been significant improvements in Standby network power given the need to save battery power in mobile network devices such as tablets and cell phones. In September 2013, the International Energy Agency 4E Standby Power Annex released a report titled “Power Requirements for Functions” which includes data on the power consumption of the latest Ethernet controllers, Ethernet ports, and Wi-Fi transceivers, as well as information such as ac-dc power supply and dc-dc component conversion efficiency assumptions. The report states, for example, that an idle Ethernet link without Energy Efficient Ethernet enabled requires 0.373 to 0.583 W of ac power, while an Idle Wi-Fi transceiver requires 0.036 to 0.250 W of ac power. The latest Institute of Electrical and Electronics Engineers (IEEE) 802.11 standard for Wi-Fi includes power management features that can be integrated into products to deliver significant power savings. Finally, in 2011 the European Union set mandatory standards for Network Standby targeting a level of 3.0 W for TVs by 2017. Given already existing drivers, EPA is now proposing a limit of 3.0 W in Draft 2.

EPA will continue to monitor the market, looking for products that deliver greater efficiency for less. Recognizing that network functions of TVs are ever-evolving, EPA continues to welcome both component and product power data in Standby-Active, Low Mode.

3.6 Luminance Requirements

3.6.1 For products with a luminance in the Brightest Selectable Preset Picture Setting (the greater value of $L_{DEFAULT_RETAL}$ or $L_{BRIGHTEST_HOME}$) less than 450 cd/m², luminance in the Default Picture Setting ($L_{DEFAULT_HOME}$) shall be greater than or equal to 65% of the luminance in the Brightest Selectable Preset Picture Setting.

3.6.2 For products with a luminance in the Brightest Selectable Preset Picture Setting greater than or equal to 450 cd/m², luminance in the Default Picture Setting shall be greater than or equal to 293 cd/m².

Note: EPA received mixed feedback on whether the 65% luminance requirement is still representative of how products are shipped and used by consumers in the home. Some stakeholders noted that the existing luminance requirements limit the Partners’ ability to deliver a more optimal viewing experience for consumers at home, whereas others support them if they continue to meet consumer expectations and guard against shipping dim products in order to meet the ENERGY STAR criteria.
While most TVs have Brightest Selectable Preset Picture Setting luminance between 200 and 400 cd/m², there are some that are brighter. According to some stakeholders, a Default Picture Setting luminance that is 65% of the Brightest Selectable Preset Picture Setting luminance would be too bright for user comfort in these very bright TVs. EPA is therefore proposing that for products with Brightest Selectable Preset Picture Setting luminance of at least 450 cd/m², the luminance in the Default Picture Setting can be no more than 293 cd/m² (which is 65% of 450 cd/m²).

Approximately 95% of EPA’s dataset has Brightest Selectable Preset Picture Setting luminance below 450 cd/m², and therefore this new proposal would only apply to a small subset of currently certified models. This proposal is intended to still guard against TVs being shipped too dim, while permitting products with brighter maximum screen luminance to be optimized for home use. EPA seeks feedback on this proposal.

3.7 Download Acquisition Mode (DAM) Requirements for Hospitality TVs

3.7.1 A product may automatically exit Standby-Passive Mode or Standby-Active, Low Mode and enter Download Acquisition Mode according to a predefined schedule, in order to:

i. Download channel listing information for use by an electronic programming guide,

ii. Monitor for emergency messaging/communications, or

iii. Communicate via a network protocol.

3.7.2 DAM energy consumption for all DAM states \(E_{\text{DAM}}\), as measured per the CEA Procedure for DAM Testing, shall be less than or equal to 40 watt-hours per day (0.04 kWh/day).

Note: Since EPA proposes retaining the definition of Hospitality TVs, EPA also proposes retaining the Download Acquisition Mode (DAM) test. Under Version 7.0, EPA seeks to ensure that all TVs meeting the definition for Hospitality TVs be tested in DAM for certification if they are capable of doing so. EPA found that under Version 6.0/6.1, many Hospitality TVs were tested as consumer models instead. Some Hospitality TVs do resemble consumer models in that they contain Ethernet capability. To ensure that the specification captures the full functions of Hospitality TVs, EPA and DOE propose that, where applicable, Hospitality TVs that have Ethernet capability test for Full Network Connectivity, according to the test method in Section 4.2.2 in addition to the Download Acquisition Mode test. EPA seeks additional stakeholder feedback on this proposed approach.

The Version 6 specification currently has the following standby requirement applicable to Hospitality TVs:

For Hospitality Televisions that feature an always-on DAM, measured DAM power \(P_{\text{DAM}}\) shall be less than or equal to 1.0 W when tested per the Standby-Passive Mode test procedure.

EPA proposes to replace this above requirement with the Section 3.5 Standby Active, Low Mode requirements for all TVs because it includes Full Network Connectivity which serves similar functionality to always-on DAM. EPA requests comment on this approach.

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

4 TESTING
4.1 Test Methods

4.1.1 Test methods identified in Table 1 shall be used for certification as applicable.

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Ac Mains-powered TVs</td>
<td>Uniform Test Method for Measuring the Energy Consumption of Television Sets incorporated in Appendix H to Subpart B of 10 CFR Part 430.</td>
</tr>
</tbody>
</table>

4.2 Additional Required Test for TVs with Standby-Active, Low Mode

4.2.1 The following method in Table 2 shall be used for TVs with a Standby-Active, Low mode:

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVs with Standby-Active, Low Mode</td>
<td>CEA-2037-A, Determination of Television Set Power Consumption</td>
</tr>
</tbody>
</table>

4.2.2 If the TV is network enabled and tested in Standby-Active, Low per Appendix H, the following additional test is required for ENERGY STAR certification:

i. Perform all procedures specified in Section 6.7.5 Standby-active, Low of CEA-2037-A with the additional preconditions:
   1) Place the UUT in the On Mode as tested per Appendix H and momentarily press the power button on the remote control; and
   2) Wait 5 minutes after pressing the power button before beginning the Section 6.7.5 procedures in CEA-2037-A.

ii. TVs, for which availability can be confirmed with one of the methods in Section 6.7.5.2 Availability of CEA-2037-A, shall be reported as having Full Network Connectivity.

Note: EPA and DOE received stakeholder support for including the above additional test would only be used to confirm the presence of Full Network Capability in Standby-Active, Low Mode. EPA and DOE have made one minor edit: in Draft 1 the test referred to Section 6.6.5 of CEA-2037-A. This was incorrect and has been updated to Section 6.7.5.

4.3 Additional Required Test for Hospitality TVs

4.3.1 DAM energy consumption of Hospitality TVs shall be measured using the following method in Table 3:

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitality TVs</td>
<td>CEA Procedure for DAM Testing: For TVs, Rev. 0.3, Sept. 2010</td>
</tr>
</tbody>
</table>
4.4 Number of Units Required for Testing

4.4.1 One of the following sampling plans shall be used to test for ENERGY STAR certification:

i. A representative unit shall be selected for testing the Basic Model;

ii. Units shall be selected for testing per the sampling requirements defined in 10 CFR 429.25, which references 10 CFR 429.11.

4.5 International Market Certification

4.5.1 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 USER INTERFACE

5.1.1 Partners are encouraged to design products in accordance with the user interface standard IEEE 1621: Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments. For details, see http://eetd.lbl.gov/Controls.

6 EFFECTIVE DATE

6.1.1 Effective Date: The Version 7.0 ENERGY STAR Televisions specification shall take effect on XX XX, 2015. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on its 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.

Note: EPA anticipates finalizing this specification revision in late 2014, where the specification would take effect in late Summer 2015.

6.1.2 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.

7 CONSIDERATIONS FOR FUTURE REVISIONS

7.1.1 Standby-Active, High Mode: EPA and DOE are interested in learning more about Standby-Active, High Mode. EPA anticipates exploring this issue and potential power limits and duty cycle requirements in the next specification revision.

Note: EPA anticipates reviewing and addressing Standby-Active, High Mode during a future revision to the specification, for reasons mentioned in Section 3.2.7.

7.1.2 Trends and Improvements in Energy Efficiency: EPA anticipates continued gains in energy efficiency to be achieved in the next few years with advances in technology such as LED efficacy, the addition of reflective polarizing film, power supply improvements, lower screen reflectance, improved backplanes (Low Temperature Polysilicon and Indium Gallium Zinc Oxide), quantum dot technology, and next generation Organic Light Emitting Diodes (OLED). As such, EPA anticipates an opportunity for proposing further limits on power consumption in future revisions.