



**ENERGY STAR® Program Requirements  
for Set-top Boxes  
DRAFT 3 – Version 2.0  
January 14, 2008**

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**Table of Contents**

<b>Partner Commitments</b>	2
<i>Commitments</i>	2
<i>Performance for Special Distinction</i>	3
<b>Eligibility Criteria</b>	5
<i>Section 1: Definitions</i>	5
<i>Section 2: Qualifying Products</i>	8
<i>Section 3: Energy Efficiency and Power Management Criteria</i>	8
<i>Section 4: Testing Products for ENERGY STAR</i>	11
<i>Section 5: User Interface</i>	14
<i>Section 6: Effective Date</i>	14
<i>Section 7: Future Specification Revisions</i>	15



# ENERGY STAR® Program Requirements for Set-top Boxes

## Partner Commitments DRAFT 3 – Version 2.0 January 14, 2008

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### Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified set-top boxes (STBs). The ENERGY STAR Partner must adhere to the following program requirements:

- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on set-top boxes and specifying the testing criteria for set-top boxes. EPA may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at EPA's request;
- comply with current ENERGY STAR Identity Guidelines, describing how the ENERGY STAR marks and name may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;
- qualify at least one ENERGY STAR set-top box model within 30 days of activating the set-top box portion of the agreement. When the manufacturing Partner qualifies the product, it must meet the specification (e.g., Version 2.0, Tier 1) in effect at that time;
- for all qualified STBs sold at retail or directly to the consumer, provide clear and consistent labeling of ENERGY STAR qualified set-top boxes. The ENERGY STAR mark must be clearly displayed on the product, or via electronic notification.
  1. via electronic notification:
    - The ENERGY STAR mark must appear in cyan, black, or white (as described in the ENERGY STAR Identity Guidelines);
    - The ENERGY STAR mark must be at least 10% of the screen by area, may not be smaller than 76 pixels x 78 pixels, and must be legible;
    - The ENERGY STAR mark must appear for a duration not less than five seconds at power up, or at another event/location proposed by partner and approved by EPA in advance of distribution to consumers; and
    - The ENERGY STAR mark must be displayed as part of the auto power down notification, or at another event/location proposed by partner and approved by EPA in advance of distribution to consumers.

*Note: EPA welcomes feedback on the above proposal, which allows flexibility in displaying the ENERGY STAR mark at power up and power down.*

2. via a permanent or temporary label on product:

- 98           – Label must follow guidance for certification marks provided in the ENERGY STAR Identity  
99           Guidelines ([https://www.energystar.gov/index.cfm?c=logos.pt\\_guidelines](https://www.energystar.gov/index.cfm?c=logos.pt_guidelines)).

100  
101 For all qualified STBs sold to service providers, Partner may, but is not required to, provide labeling. If  
102 labeling is provided, then it must meet the requirements above for electronic notification or physical  
103 labeling. Appropriate labeling of boxes provided to subscribers is the responsibility of the service  
104 provider. However, Partner may provide this labeling for service providers. Partner must clearly  
105 communicate the requirements for configuration and installation that are necessary for the STB to  
106 maintain ENERGY STAR qualification and receive labeling.  
107

108 *Note: Based on stakeholder comments, the above labeling requirements have been clarified. In*  
109 *the case where a STB is sold to a service provider, the service provider is responsible for ensuring*  
110 *that the STB is appropriately labeled. However, Partner may provide labeling for service provider.*

- 111
- 112 • for all qualified products, clearly display the ENERGY STAR mark:
    - 113       1. In product literature (i.e., user manuals, spec sheets, etc.);
    - 114       2. On product packaging for products sold at retail; and
    - 115       3. On the manufacturer’s Internet site where information about ENERGY STAR qualified models  
116       is displayed;
  - 117
  - 118 • explain the conditions under which the model is able to earn the ENERGY STAR in product guide and  
119 specification sheets for each qualified product. For STBs sold at retail, include information on how  
120 using the product in conjunction with a Service Provider subscription (cable, satellite, IP) can impact  
121 the product’s energy use, and what steps the consumer must take to assure that the product still  
122 meets ENERGY STAR criteria. In addition, these materials shall notify service providers that they  
123 must complete an ENERGY STAR Partnership Agreement before labeling any STB, or claiming to  
124 provide ENERGY STAR qualified STBs in advertising or promotions.  
125
  - 126 • provide to EPA, on an annual basis, an updated list of ENERGY STAR qualified set-top box models.  
127 Once the Partner submits its first list of ENERGY STAR qualified set-top box models, the Partner will  
128 be listed on the ENERGY STAR Web site. Partner must provide annual updates in order to remain on  
129 the list of participating product manufacturers;  
130
  - 131 • provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in  
132 determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total  
133 number of ENERGY STAR qualified set-top boxes shipped (in units by model) or an equivalent  
134 measurement as agreed to in advance by EPA and Partner. Partner is also encouraged to provide  
135 ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g.,  
136 type, presence of additional functions, or other as relevant), total unit shipments for each model in its  
137 product line, and percent of total unit shipments that qualify as ENERGY STAR. The data for each  
138 calendar year should be submitted to EPA, preferably in electronic format, no later than the following  
139 March and may be provided directly from the Partner or through a third party. The data will be used  
140 by EPA only for program evaluation purposes and will be closely controlled. Any information used will  
141 be masked by EPA so as to protect the confidentiality of the Partner;  
142
  - 143 • notify EPA of a change in the designated responsible party or contacts for set-top boxes within 30  
144 days.  
145  
146

## 147 **Performance for Special Distinction**

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

- 151
- 152 • consider energy efficiency improvements in company facilities and pursue the ENERGY STAR mark
- 153 for buildings;
- 154
- 155 • purchase ENERGY STAR qualified products. Revise the company purchasing or procurement
- 156 specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA
- 157 for periodic updates and coordination. Circulate general ENERGY STAR qualified product information
- 158 to employees for use when purchasing products for their homes;
- 159
- 160 • feature the ENERGY STAR mark(s) on Partner Web site and in other promotional materials. If
- 161 information concerning ENERGY STAR is provided on the Partner Web site as specified by the
- 162 ENERGY STAR Web Linking Policy (this document can be found in the Partner Resources section on
- 163 the ENERGY STAR Web site at [www.energystar.gov](http://www.energystar.gov)), EPA may provide links where appropriate to
- 164 the Partner Web site;
- 165
- 166 • ensure the power management feature is enabled on all ENERGY STAR qualified monitors and
- 167 computers in use in company facilities, particularly upon installation and after service is performed;
- 168
- 169 • provide general information about the ENERGY STAR program to employees whose jobs are relevant
- 170 to the development, marketing, sales, and service of current ENERGY STAR qualified product
- 171 models;
- 172
- 173 • provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the
- 174 program requirements listed above. By doing so, EPA may be able to coordinate, communicate,
- 175 and/or promote Partner's activities, provide an EPA representative, or include news about the event in
- 176 the ENERGY STAR newsletter, on the ENERGY STAR Web pages, etc. The plan may be as simple
- 177 as providing a list of planned activities or planned milestones that Partner would like EPA to be aware
- 178 of. For example, activities may include: (1) increase the availability of ENERGY STAR qualified
- 179 products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2)
- 180 demonstrate the economic and environmental benefits of energy efficiency through special in-store
- 181 displays twice a year; (3) provide information to users (via the Web site and user's manual) about
- 182 energy-saving features and operating characteristics of ENERGY STAR qualified products: and (4)
- 183 build awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on
- 184 one print advertorial and one live press event;
- 185
- 186 • provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase
- 187 availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and
- 188 its message.



## ENERGY STAR® Program Requirements for Set-top-Boxes

### Eligibility Criteria DRAFT 3 – Version 2.0 January 14, 2008

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199 **1) Definitions:** Below are the definitions of the relevant terms in this document.

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#### STB Types

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All STB types can come as stand-alone tuners or as part of a larger device with other tuners and/or secondary functions such as, but not limited to, DVR and DVD playback/recording.

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A. Cable STB: A STB whose principal function is to receive television signals from a broadband, hybrid/[fiber] coaxial, community cable distribution system and deliver them to a consumer display and/or recording device. Source: CSA C380-06 modified.

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B. Internet Protocol (IP) STB: A STB whose principal function is to receive television/video signals encapsulated in IP packets and deliver them to a consumer display and/or recording device. Source: CSA C380-06.

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C. Satellite STB: A STB whose principal function is to receive television signals from satellites and deliver them to a consumer display and/or recording device. Source: CSA C380-06.

215

216

217

D. Terrestrial STB: Any STB whose principal function is to receive television signals over the air (OTA) and deliver them to a consumer display and/or recording device. Source: CSA C380-06.

218

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E. Thin-Client/Remote: A STB that is designed to interface between a Gateway STB and a TV (or other output) that has no ability to interface with the service provider directly and relies solely on a Gateway box for content. Any STB that meets the definition of Cable, Satellite, IP or Terrestrial STB is not a Thin-Client/Remote STB.

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#### Components

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F. Conditional Access: The encryption, decryption, and authorization techniques employed to protect content from unauthorized viewing. CableCARD and Downloadable Conditional Access (DCAS) are examples of this technology.

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233

G. Data Over Cable Service Interface Specification (DOCSIS): An international suite of standards that define interface requirements for cable modems involved in high-speed data and video/audio content distribution over cable television systems.

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#### Functionalities

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H. Base Functionality: For purposes of this specification, the primary functionality that defines the

241 criteria that apply to a STB. The Base Functionality is one of the following: Cable, Satellite, IP,  
242 Terrestrial or Thin-Client/Remote. (See Section 3 below.)  
243

- 244 I. Additional Functionalities: Additional Functionalities consist of one or more of the following:  
245 Additional Tuners, Additional Tuners – OTA/IP, Advanced Video Processing, DVR, High Definition  
246 Resolution (does not apply to terrestrial), Removable Media Player, Removable Media  
247 Player/Recorder, Gateway, and Cable Card.  
248  
249

### 250 **Additional Functionalities**

- 251  
252 J. Additional Tuners: An additional tuner provides a second source of media content either from a  
253 physically separate A/V input or from the primary input (used concurrently); they need not be for  
254 the same source media type. Out-Of-Band tuners built in compliance with standards ANSI/SCTE  
255 55-1 2002 and ANSI/SCTE 55-2 2002 and other similar types of technologies are not considered  
256 additional tuners for the purposes of this specification. For example, a device with additional  
257 tuners has the ability to tune into two or more separate streams of video simultaneously and place  
258 those on separate outputs (outputs being either physical outputs, picture-in-picture, or recording  
259 mechanisms). Note that network-based outputs are not covered under the additional tuners  
260 definition but are covered in the definition of a gateway device.  
261

- 262 K. Additional Tuners – Terrestrial / IP: An Additional Tuner of Terrestrial or IP type.  
263

- 264 L. Advanced Video Processing/Codecs: Advanced methods for video encoding, transcoding and  
265 decoding. Examples include, but are not limited to, H.264/MPEG 4 and SMPTE 421M.  
266

- 267 M. Digital Versatile Disk (DVD): An optical disc storage media format that can be used for data  
268 storage, including movies, with high video and sound quality.  
269

- 270 N. Digital Video Recorder (DVR): A device that records video in a digital format to a rewritable disk  
271 drive or other non-volatile storage media local to the unit. The term covers DVR functions  
272 integrated in a STB; it does not include software for personal computers that enables video  
273 capture and playback to and from the computer's data storage nor does it include server based  
274 DVR capabilities.  
275

- 276 O. High Definition Resolution: Video with resolutions greater than 480i/p.  
277

- 278 P. Out-Of-Band Tuners: Tuners compliant with standards ANSI/SCTE 55-1 2002 and ANSI/SCTE  
279 55-2 2002 and other similar types of technologies used to gain access to data channels outside of  
280 the audio/video source signal. These may facilitate two-way communication and allow the box to  
281 send diagnostic information back to the Service Provider as well as enabling Pay-Per-View  
282 content and other rich media interactive content.  
283

- 284 Q. Removable Media Player: A device, such as a DVD player, whose primary purpose is the  
285 decoding of digitized video signals on a DVD.  
286

- 287 R. Removable Media Player/Recorder: A device, such as a DVD recorder, whose primary purpose is  
288 the production or recording of digitized video/audio signals on a DVD.  
289

- 290 S. Gateway STB: A STB that meets the definition for Cable, Satellite, IP or Terrestrial STB above  
291 and is capable of providing independent content to multiple TVs.  
292

- 293 T. CableCARD<sup>(TM)</sup>: A plug-in card that complies with the ANSI/SCTE 28 interface that is inserted  
294 into a Digital Cable Ready device to enable the decryption of premium services and provide other  
295 network control functions. Also know as a "Card" or a "Point of Deployment" (POD module).  
296 CableCARD<sup>(TM)</sup> is a registered trademark of CableLabs<sup>®</sup>. Source: CSA C380-06 modified.

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### Operational Modes and Power States

- U. On/Active: An operational state in which the STB is actively delivering one or more of its principal functions and some or all of its applicable secondary functions.
- V. Sleep: A state in which the STB has less power consumption, capability, and responsiveness than in the On/Active state. The STB may enter a Sleep state from the On/Active state after:
  - a. the user pushes a power/standby button on the remote or on the unit; or
  - b. the STB auto power downs to a Sleep state. The energy consumption after auto power down to Sleep and after a user initiated power down to Sleep may, or may not be, equivalent.

*Note: Based in part on stakeholder feedback, EPA has decided to use the term "Sleep" rather than "Standby" to avoid confusion with other EPA specifications and international standards.*

### Miscellaneous

- W. Auto Power Down: The capability to automatically switch from the On state to a Sleep state after a period of time without user input, generally based on the amount of time the unit has remained "idle" from last active use, i.e., user input such as channel change, volume change, menu access, etc.
- X. Cable, Satellite, and Telecom Service Provider: An entity that provides video (and possibly other) content to subscribers with whom it has an ongoing financial relationship. A service provider in the context of ENERGY STAR is one that distributes to end users STBs covered by this specification under an agreement such as a lease or rental arrangement.
- Y. CSA: The Canadian Standards Association is a not-for-profit, membership-based association that works in Canada as well as globally to develop standards that affect areas such as public safety and health, quality of life, the environment, and trade.
- Z. C380-06: CSA's test procedure for the measurement of energy consumption of STBs.
- AA. Digital Television Adapter (DTA): Receives terrestrial (over the air), digital signals and converts them to an analog output suitable for analog TVs. DTAs do not provide digital signal output. For the purposes of this specification, the DTA category does not include converters that work with satellite or cable digital signals, nor does it cover devices with multi-functionality such as DVD players with digital to analog conversion capability. Source: ENERGY STAR Digital-to-Analog Converter Box specification.

DTAs are addressed under the Version 1.1 ENERGY STAR specification for Digital-to-Analog Converter Boxes, and are not included in this Set-top box specification.
- BB. Game Console: A stand-alone device whose primary use is to play video games. The primary inputs for game consoles are special hand held controllers rather than a mouse and keyboard used by conventional computers. Game consoles are also equipped with audio-visual outputs for use with televisions as the primary display, rather than an external monitor or integrated display. These devices typically do not use a conventional operating system, but often perform a variety of multimedia functions such as: DVD/CD playback, digital picture viewing, and digital music playback. Source: ENERGY STAR Version 4.0 Computers specification.

Game consoles are addressed by the ENERGY STAR Version 4.0 Computers specification, and are not included in this Set-top Box specification.

353 CC. TEC: Total Energy Consumption. TEC is an assessment tool used in this specification that  
354 provides flexibility to approach the issue of energy efficiency while retaining a comparable metric  
355 to assess performance. In this specification, efficiency criteria are noted in terms of calculated  
356 energy use over a year for a typical user (kWh/yr) rather than power (Watts) for On and Sleep  
357 states.  
358

359 DD. UUT: Unit Under Test (UUT) refers to the product being tested. Source: CSA C380-06 modified.  
360  
361  
362

363 **2) Qualifying Products:** In order to qualify as ENERGY STAR under Tier 1 of this specification,  
364 STBs must meet the definition for these products in Section 1 and meet the technical requirements in  
365 Section 3. The following devices that fall within the definition of a STB, or provide functions similar to  
366 STBs, do not qualify under this Tier 1 specification. EPA envisions that the below excluded products list  
367 will likely be modified for the Tier 2 phase of this specification:  
368

369 **Tier 1 Excluded Products:**

- 370 • Game Consoles (See definition above)
- 371 • DTAs (See definition above)
- 372 • IP set-top boxes sold or provided outside of a dedicated service or service contract
- 373 • Products that qualify under the ENERGY STAR® Program Requirements for Consumer  
374 Audio and DVD Products  
375

376 *Note: Following the proposal sent out to stakeholders and discussed during the October 31<sup>st</sup> call,*  
377 *this draft excludes for Tier 1 products that qualify under the ENERGY STAR Audio and DVD*  
378 *specification. Terrestrial tuners in DVD products may be addressed in any future revision of the*  
379 *Audio and DVD specification, or integrated into Tier 2 of the STB specification.*  
380  
381

382 **3) Energy Efficiency and Power Management Criteria:** Only those products addressed by  
383 the Qualifying Products definition in Section 2 that meet the following criteria may qualify for ENERGY  
384 STAR.  
385

386 **A) Calculated TEC Criteria**

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388 The criterion for ENERGY STAR qualified STBs is a calculated TEC (in annual kWh). The criterion  
389 (herein called an “allowance”) is an allowance for Base Functionality, plus allowances for specific,  
390 additional functionalities present across a duty cycle. This duty cycle is further explained in Section 4.  
391

392 **B) Base Functionality Allowance**

393 The Base Function shall be established as detailed below.  
394

- 395 a. If the STB meets the definition of Cable STB above, regardless of whether the cable  
396 reception is considered the “principal function” by the manufacturer or service provider,  
397 and/or the STB is capable of receiving cable service after installation of a CableCARD™  
398 or other type of conditional access (CA) system, the Base Functionality is CABLE.  
399
- 400 b. If the STB Base Function is not CABLE, and the STB meets the definition of Satellite STB  
401 above, regardless of whether the satellite reception is considered the “principal function”  
402 by the manufacturer or service provider, the Base Functionality is SATELLITE.  
403
- 404 c. If the STB Base Function is not CABLE or SATELLITE, and the STB meets the definition  
405 of IP STB above, regardless of whether the IP reception is considered the “principal  
406 function” by the manufacturer or service provider, the Base Functionality is IP.  
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- d. If the STB Base Function is not CABLE, SATELLITE, or IP, and the STB meets the definition of Terrestrial STB above, regardless of whether the terrestrial reception is considered the “principal function” by the manufacturer or service provider, the Base Functionality is TERRESTRIAL.
- e. If the STB Base Function is not CABLE, SATELLITE, IP or TERRESTRIAL, and the STB otherwise meets the definition of Thin-Client/Remote, the Base Function is THIN-CLIENT/REMOTE.

**Table 1: Base Functionality Annual Energy Allowance**

Base Functionality	Tier 1 Annual Energy Allowance (kWh/year)	Tier 2 Annual Energy Allowance (kWh/year)
Cable	70	50
Satellite	88	56
IP	45	36
Terrestrial	27	22
Thin-Client/Remote	27	22

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*Note: EPA relied heavily on power measurements reported in Roth, Kurt & Kurtis McKenney, TIAX, "Energy Consumption by Consumer Electronics in U.S Residences," January 2007 to establish allowances for Tier 1. Results were compared against the data set provided by the NRDC of currently installed STBs. This also applies to Additional Functionalities as shown in Table 2.*

*EPA believes establishing criteria for Tier 2 is important to provide a target for energy savings within the next few years. The basis for the proposed Tier 2 allowances involved two scenarios with approaches that manufacturers and service providers could use to meet the criteria. The 3-Watt Sleep was assumed for a scenario in which a STB was designed to allow for a substantial amount of time in the Sleep mode. An Excel Workbook detailing the assumptions was shared with stakeholders after the San Diego meeting and is available on the ENERGY STAR Web site. EPA will review, with stakeholder engagement, the proposed Tier 2 levels, well in advance of the Tier 2 effective date to ensure that these levels remain appropriate.*

**C) Additional Functionalities Allowance**

The Additional Functionalities Allowance, if applicable, shall be determined using values from Table 2.

**Table 2: Additional Functionalities Annual Energy Allowance**

Additional Functionalities	Tier 1 Annual Energy Allowance (kWh/year)	Tier 2 Annual Energy Allowance (kWh/year)
Additional Tuners	53	16
Additional Tuners – Terrestrial /IP	14	8
Adv. Video Processing	18	12
DVR	60	32
High Definition <sup>1</sup>	35	12
Removable Media Player	12	8
Removable Media Player/Recorder	23	10
Gateway	44	25
Cable Card	15	TBD

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<sup>1</sup> Credit for High Definition applies to all STBs except those with Base Functionality of TERRESTRIAL.

Note: Changes made to Tables 1 and 2 above in this Draft 3 specification are based on feedback from stakeholders and additional EPA investigation. Specific changes are listed below.

Table 1: Base Functionality Annual Energy Allowance

- A base functionality for Thin-Client/Remote has been added as part of a solution to incorporate Home Networking.
- Allowances for the IP Base Functionality have been added to the table.
- Tier 2 allowances for Cable and Satellite have been increased in response to stakeholder concerns that meeting the Draft 2 Tier 2 values was not feasible given the time frame.

Table 2: Additional Functionalities Annual Energy Allowance

- Tier 1 DVR allowance has been reduced based on stakeholder feedback.
- Clarification has been made regarding the allowance that Additional IP Tuners receive.
- Tier 2 allowances for Additional Tuners, Advanced Video Processing, Removable Media Player, and Removable Media Player/Recorder have been raised from Draft 2, in response to stakeholder concerns that meeting the Draft 2 values is not feasible in the given time frame.
- Allowances for Cable Card and Gateway Functionalities have been added. (See special requirements for Gateway in section 4(F) below.) A Tier 2 criterion for Cable Card is TBD as EPA plans to revisit the need for a Cable Card allowance as the Tier 2 effective date approaches.

#### **D) Calculating Device Allowances**

To calculate the ENERGY STAR allowance for a given device, take the sum of the base functionality allowance and all applicable additional functionalities allowances. (Note there may not be any additional functions in devices such as standard cable or satellite STBs.) This sum is the calculated annual kWh limit, or TEC value. This sum equals the maximum amount of energy the box can use in a given year as calculated following the ENERGY STAR test procedure.

Annual Energy Allowance (kWh/year) = Base Functionality Allowance + Additional Functionalities Allowance

#### **Examples:**

(A) Under Tier 1, the energy allowance for a high-definition, Cable STB with DVR to qualify for ENERGY STAR would be 165 kWh/y (70 kWh/y for the base function, 35 kWh/y for the high definition and 60 kWh/y for the DVR).

(B) Under Tier 2, the energy allowance for the same product would drop to 94 kWh/y.

#### **E) STBs Using an External Power Supply**

To qualify, the external power supply must be ENERGY STAR qualified or meet the no-load and active mode efficiency levels provided in the ENERGY STAR Program Requirements for Single Voltage Ac-Ac and Ac-Dc External Power Supplies. The ENERGY STAR specification and qualified product list can be found at: [www.energystar.gov/powersupplies](http://www.energystar.gov/powersupplies).

Note: To clarify the above paragraph, manufacturers have two options to meet this requirement: (1) use an ENERGY STAR qualified EPS (see link in text above to the qualified products list), or (2) test the power supply they intend to use following the ENERGY STAR test procedure to determine it meets the ENERGY STAR specification. STB manufacturers may also request that EPS manufacturer test EPS product and certify that it meets ENERGY STAR requirements.

#### F) Gateway STBs

When using the Gateway Additional Functionalities energy allowance to establish the criteria for a STB, the following procedure should be followed. This allowance should only be used for STBs that can provide independent content to more than one TV. Specific requirements for Gateway STBs are also included.

- First, test the multi-room STB and compare the results to the specification criteria assuming the STB will deliver content to only one TV, i.e., do not include the Gateway allowance. If the STB passes, then it qualifies as an ENERGY STAR qualified STB under any installation configuration, i.e., it can be used for one or more TVs.
- If the STB does not pass the single TV STB test, then determine if it qualifies as a Gateway STB.
  - Add the Gateway additional annual energy allowance listed in Table 2 to the criteria established for the STB. Compare the test results to the more lenient Gateway criteria to see if the STB qualifies for ENERGY STAR.
  - If the STB qualifies as a Gateway STB, manufacturer must clearly indicate in product literature that product only qualifies for ENERGY STAR when providing content to more than one TV.

### 4) Testing Products for ENERGY STAR:

#### A) Product Testing Set-up, Procedures, and Documentation:

The test results produced by the ENERGY STAR test procedure (AKA; modified CSA 380-06) shall be used as the primary basis for determining ENERGY STAR qualification. Manufacturers are required to perform tests and self-certify those models that meet the ENERGY STAR requirements.

#### B) TEC Assessment

In this specification, the power consumed in the On and Sleep states will be multiplied by the number of hours a defined typical device spends in On and Sleep. The result will be a single energy value representing the energy usage of the device over the course of an entire year.

To determine if a STB meets the ENERGY STAR specification criteria (Annual Energy Allowance), the TEC of the STB shall be calculated as follows. If the TEC assessed for the product is less than the Annual Energy Allowance calculated from Section 3D, the product meets the criteria and has earned the ENERGY STAR.

#### C) Equation 1: Base Assessment

*Applies To All Products*

Calculate the Base energy consumption by multiplying the measured power consumption as specified in this test procedure by the hours per day values in the equations below. If the UUT (Unit Under Test) does not include the capability for auto power down, then use the first equation (a). If the product does include

545 auto power down capability, and it meets the requirements in section (F) below then use the second  
546 equation (b).

547  
548  $P_{TV}$ ,  $P_{Sleep}$  and  $P_{Auto PD}$  are power levels in Watts as measured according to the ENERGY STAR test  
549 procedure.

550 a) Annual energy (kWh/yr) for a product with no auto power down

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552 
$$kWh_{Base} = 0.365 \times (14 \times P_{TV} + 10 \times P_{Sleep})$$

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554 b) Annual energy (kWh/yr) for a product with auto power down capability

555  
556 
$$kWh_{Base} = 0.365 \times ((7 \times P_{TV}) + (10 \times P_{Sleep}) + (7 \times P_{Auto PD}))$$

557  
558 Examples:

559  
560 (C) The UUT (HD DVR cable STB, Tier 1) does not have auto power down capability, and the  
561 measurement during the test procedure are as follows:  $P_{TV} = 24.0$  Watts and  $P_{Sleep} = 18.0$  Watts. The  
562 annual energy consumption is then:

563  
564 
$$kWh_{Base} = 0.365 * ( 14 * 24.0 + 10 * 18.0 ) = 188.3 \text{ kWh/yr}$$

565  
566 (D) The UUT (HD DVR cable STB, Tier 1) does have auto power down capability, and the measurements  
567 during the test procedure are similar to example A:  $P_{TV} = 24.0$  Watts,  $P_{Sleep} = 18.0$  Watts and  $P_{AutoPD} =$   
568 18 Watts. The annual energy consumption is then:

569  
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$$kWh_{Base} = 0.365 * ( 7 * 24.0 + 10 * 18.0 + 7 * 18.0 ) = 173 \text{ kWh/yr}$$

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573 *Note: EPA used an analysis of available Nielson data to develop the above user models. The above is*  
574 *based on the statistical probability that a user is watching TV at any given time (segregated into 1/2 hour*  
575 *segments) with assumptions regarding which segments viewers were most likely to be watching. This*  
576 *yielded three distinct viewing periods – morning, afternoon, and evening.*

577  
578 *EPA understands that for most products, the power levels for  $P_{Sleep}$  and  $P_{Auto PD}$  will be the same. However,*  
579 *it is important for EPA to provide the flexibility for cases where these levels differ; therefore, two equations*  
580 *have been provided in this specification.*

### 583 **D) Equation 2: Playback And Record Assessment**

584 The table and equation below illustrate how to calculate from the values measured in the test procedure  
585 the annual energy consumption for the added functionalities such as playback and record. These apply  
586 only to products with a DVR, Removable Media Playback, or Removable Media Playback with Record  
587 capabilities. Sum the results for all functionalities applicable to the UUT.

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589  
590  $P_{TV}$ ,  $P_{Playback}$  and  $P_{Record}$  are power levels in Watts as measured according to the ENERGY STAR test  
591 procedure.

592  
593 
$$kWh_{Play/Record} = 0.365 \times \sum_1^2 (P_{mode} - P_{TV}) \times H_{mode}$$

594  
595 **Table 3: Duty Cycle**

Mode	DVR (Hours/Day)	Removable Media Playback (Hours/Day)	Removable Media Playback w/ Record capability (Hours/Day)	Additional Tuner Usage
Hours On-Playback (H <sub>Playback</sub> )	2	2	2	1
Hours On-Record (H <sub>Record</sub> )	3	0	1	2

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Example:

(E) Consider the Cable STB with DVR product in example (C) above with a P<sub>TV</sub> of 24.0 Watts. Following the test procedure, it is found that P<sub>Playback</sub> is 30.0 Watts and P<sub>record</sub> is 32.0 Watts

$$\text{kWh}_{\text{Play/Record}} = 0.365 * ((30.0 - 24.0) * 2 + (32.0 - 24.0) * 3) = 13.1 \text{ kWh/yr}$$

Note: EPA arrived at the preceding Duty Cycle figures in Table 3 based on conversations with industry, recent press reports, Neilson data, and professional judgment.

### E) Total Energy Consumption

If the STB includes a DVR, Removable Media Playback, or Removable Media Playback with Record capability, add the results of Equation 1 and Equation 2. If the STB does not include DVR, Removable Media Playback, or Removable Media Playback w/ Record capability, the TEC is equal to Equation 1.

Example:

(F) In the case of a STB with a DVR, Removable Media Playback, Removable Media Playback with Record capability, the TEC would be the sum of Equation 1, and Equation 2 (188.3 + 13.1) for a total of 201.4 kWh/yr for this STB. This product would not meet the ENERGY STAR requirements. If, however, the product had auto power down capability, the TEC would be 186.1 kWh/yr (173 + 13.1) and the product would qualify for ENERGY STAR.

Note: Draft 2 Section 4(E) *Electronic Program Guide and System Update Requirements* has been removed. The maximum allowable time for exiting Sleep is intended to apply only in a case where a manufacturer claims an auto power down capability and uses equation "b" for the base assessment in section 4 (C)(b). Note: the term "Standby" has been replaced with "Sleep" throughout this draft of the specification.

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### F) Auto Power Down

Auto power down capability is not a requirement under this specification. However, credit for anticipated energy savings for STBs that include auto power down capability is provided in Section C: Equation 1: Base Assessment - if the requirements in this subsection (F) are met.

When claiming the presence of Auto Power Down functionality for purposes of using equation 1b (Section

638 C: Equation 1: Base Assessment) and calculating the TEC, the following requirements must be met:  
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640

- 641 1. The STB must be shipped from the manufacturer with the auto power down setting engaging at  
642 four hours or less of inactivity. It is acceptable for the current program to complete before  
643 switching to the Sleep state. The energy-related settings shipped as the default by the  
644 manufacturer shall persist unless the user chooses at a later date to manually: a) disable the auto  
power down, or b) adjust the default time period from four hours or less to some other value.

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*Note: Based on stakeholder comment, the requirement that default energy-related settings “shall not be capable of being altered during the initial user set-up process and...” has been removed. EPA recognizes that in many, if not the majority of cases, the STB will be configured to meet a subscriber’s needs at the time of installation of the STB by an installer working for the service provider.*

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2. The STB may exit an automatically-initiated Sleep mode in order to scan for program and system information, scheduling information, or any other maintenance activity. If this occurs, the STB may exit the Sleep mode for no longer than two hours in a twenty-four (24) hour period that the device would otherwise remain in Sleep mode.

#### 656 **G) Submittal of Qualified Product Data to EPA**

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Partners are required to report data on those models that meet the ENERGY STAR guidelines to EPA. The test results must be reported to EPA using the Set-top Box Version 2.0 Qualifying Product Information (QPI) Form or Online Product Submittal Tool (OPS).

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**5) User Interface:** Although not mandatory, manufacturers are strongly recommended to design products in accordance with the Power Control User Interface Standard — IEEE 1621 (formally known as “Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments”). Compliance with IEEE 1621 will make power controls more consistent and intuitive across all electronic devices. For more information on the standard, see <http://eetd.LBL.gov/Controls>.

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**6) Effective Date:** The date that manufacturers may begin to qualify products as ENERGY STAR under this Version 2.0 specification will be defined as the *effective date* of the agreement. The ENERGY STAR specification for STBs (Version 2.0) Tier 1 is effective December 15, 2008. Tier 2 will become effective on December 15, 2010. Any previously executed agreement on the subject of ENERGY STAR qualified set-top boxes terminated effective February 2, 2005.

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1. Qualifying and Marking products under the Tier 1 Version 2.0 specification: All products, including models originally qualified under Version 1.0, with a date of manufacture on or after December 15, 2008, must meet the new (Version 2.0) requirements in order to qualify for ENERGY STAR. The date of manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is considered to be completely assembled.
  2. Qualifying and Marking products under the Tier 2 Version 2.0 specification: All products, including models originally qualified under Tier 1 Version 2.0, with a date of manufacture on or after December 15, 2010, must meet the Tier 2 requirements in order to qualify for ENERGY STAR.
  3. Elimination of Grandfathering: EPA will not allow grandfathering under this Version 2.0 ENERGY STAR specification. **ENERGY STAR qualification under previous Versions is not automatically granted for the life of the product model.** Therefore, any product sold, marketed, or identified by the manufacturing partner as ENERGY STAR must meet the current specification in effect at the time of manufacture of the product.

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**7) Future Specification Revisions:** EPA reserves the right to revise the specification should technological and/or market changes affect its usefulness to consumers or industry or its impact on the environment. In keeping with current policy, revisions to the specification will be discussed with stakeholders. In the event of a specification revision, please note that ENERGY STAR qualification is not

698 automatically granted for the life of a product model. To qualify as ENERGY STAR, a product model must  
699 meet the ENERGY STAR specification in effect on the model's date of manufacture.  
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