



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

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ENERGY STAR® Program Requirements for Set-top Boxes

Partner Commitments FINAL DRAFT– Version 2.0 March 14, 2008

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Commitment

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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:

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- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on STBs and specifying the testing criteria for STBs. 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;

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- 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;

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- qualify at least one ENERGY STAR STB model within six months of activating the STB 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;

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- for all qualified STBs sold at retail or directly to the consumer, provide clear and consistent labeling of ENERGY STAR qualified STBs. The ENERGY STAR mark must be clearly displayed on the product or via electronic notification.

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1. via electronic notification:

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- 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 on average at least once per day for a duration of not less than five seconds.

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Note: EPA has provided additional flexibility to the above labeling proposal by removing the specific requirements that the ENERGY STAR mark appear at resumption from Sleep and at initiation of APD. Manufacturers may display the ENERGY STAR mark on qualified boxes at a location or event that they feel would most benefit subscribers, the Service Provider, and the manufacturer.

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2. via a permanent or temporary label on product:

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- Label must follow guidance for certification marks provided in the ENERGY STAR Identity Guidelines (https://www.energystar.gov/index.cfm?c=logos.pt_guidelines).

- 98
99 For all qualified STBs sold to Service Providers, Partner may, but is not required to, provide labeling. If
100 labeling is provided, then it must meet the requirements above for electronic notification or physical
101 labeling. Appropriate labeling of boxes provided to subscribers is the responsibility of the Service
102 Provider. However, Partner may provide this labeling for Service Providers. Partner must clearly
103 communicate the requirements for configuration and installation that are necessary for the STB to
104 maintain ENERGY STAR qualification and receive labeling;
105
- 106 • for all qualified products, clearly display the ENERGY STAR mark:
107
 - 108 1. In product literature (i.e., user manuals, spec sheets, etc.);
 - 109 2. On product packaging for products sold at retail; and
 - 110 3. On the manufacturer's Internet site where information about ENERGY STAR qualified models
111 is displayed;
 - 112 • explain the conditions under which the model is able to earn the ENERGY STAR in product guide and
113 specification sheets for each qualified product. For STBs sold at retail, include information on how
114 using the product in conjunction with a Service Provider subscription (cable, satellite, IP) can impact
115 the product's energy use, and what steps the consumer must take to assure that the product still
116 meets ENERGY STAR criteria. In addition, these materials shall notify Service Providers that they
117 must complete an ENERGY STAR Partnership Agreement before labeling any STB, or claiming to
118 provide ENERGY STAR qualified STBs in advertising or promotions;
119
 - 120 • provide to EPA, on an annual basis, an updated list of ENERGY STAR qualified STB models. Once
121 the Partner submits its first list of ENERGY STAR qualified STB models, the Partner will be listed on
122 the ENERGY STAR Web site. Partner must provide annual updates in order to remain on the list of
123 participating product manufacturers;
124
 - 125 • provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in
126 determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total
127 number of ENERGY STAR qualified STBs shipped (in units by model) or an equivalent measurement
128 as agreed to in advance by EPA and Partner. Partner is also encouraged to provide ENERGY STAR
129 qualified unit shipment data segmented by meaningful product characteristics (e.g., type, presence of
130 additional functions, or other as relevant), total unit shipments for each model in its product line, and
131 percent of total unit shipments that qualify as ENERGY STAR. The data for each calendar year
132 should be submitted to EPA, preferably in electronic format, no later than the following March and may
133 be provided directly from the Partner or through a third party. The data will be used by EPA only for
134 program evaluation purposes and will be closely controlled. Any information used will be masked by
135 EPA so as to protect the confidentiality of the Partner;
136
 - 137 • notify EPA of a change in the designated responsible party or contacts for STBs within 30 days.
138

139 **Performance for Special Distinction**

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141 In order to receive additional recognition and/or support from EPA for its efforts within the
142 Partnership, the ENERGY STAR Partner may consider the following voluntary measures and should keep
143 EPA informed on the progress of these efforts:
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- 145
146 • provide quarterly, written updates to EPA as to the efforts undertaken by PARTNER to increase
147 availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and
148 its message;
149
- 150 • consider energy efficiency improvements in company facilities and pursue benchmarking buildings

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



ENERGY STAR® Program Requirements for Set-top-Boxes

Eligibility Criteria FINAL DRAFT– Version 2.0 March 14, 2008

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

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STB Types

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.

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

Components

- 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.
- 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.

Functionalities

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

236 criteria that apply to a STB. The Base Functionality is one of the following: Cable, Satellite, IP,
237 Terrestrial or Thin-Client/Remote. (See Section 3 below.)
238

239 I. Additional Functionalities: Additional Functionalities consist of one or more of the following:
240 Additional Tuners, Additional Tuners – OTA/IP, Advanced Video Processing, DVR, High Definition
241 Resolution (does not apply to terrestrial), Removable Media Player, Removable Media
242 Player/Recorder, Multi-Room, and CableCARD.
243
244

245 **Additional Functionalities**

246
247 J. Additional Tuners: An additional tuner provides a second source of media content either from a
248 physically separate A/V input or from the primary input (used concurrently); they need not be for
249 the same source media type. Out-Of-Band tuners built in compliance with standards ANSI/SCTE
250 55-1 2002 and ANSI/SCTE 55-2 2002 and other similar types of technologies are not considered
251 additional tuners for the purposes of this specification. For example, a device with additional
252 tuners has the ability to tune into two or more separate streams of video simultaneously and place
253 those on separate outputs (outputs being either physical outputs, picture-in-picture, or recording
254 mechanisms). Note that network-based outputs are not covered under the additional tuners
255 definition but are covered in the definition of a Multi-Room device.
256

257 K. Additional Tuners – Terrestrial/IP: An Additional Tuner of Terrestrial or IP type.
258

259 L. Advanced Video Processing/Codecs: Advanced methods for video encoding, transcoding and
260 decoding. Examples include, but are not limited to, H.264/MPEG 4 and SMPTE 421M.
261

262 M. CableCARD^(TM): A plug-in card that complies with the ANSI/SCTE 28 interface that is inserted
263 into a Digital Cable Ready device to enable the decryption of premium services and provide other
264 network control functions. Also known as a “Card” or a “Point of Deployment” (POD module).
265 CableCARD^(TM) is a registered trademark of CableLabs[®]. Source: CSA C380-06 modified.
266

267 N. 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 O. Digital Video Recorder (DVR): A device that stores 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 P. High Definition Resolution: Video output with resolutions greater than 480i/p.
277

278 Q. Home Network Interface: A network interface such as WiFi, MOCA, DNLA, etc. that allows a STB
279 to interface with external devices through a network. This allowance can be applied only to
280 devices that are NOT Multi-Room or thin client devices (as the network capability of those devices
281 is already accounted for in their allowances).
282

283 R. Multi-Room STB: A STB that meets the definition for Cable, Satellite, IP or Terrestrial STB above
284 and is capable of providing independent content to multiple TVs within a single family dwelling.
285 Products handling gateway services to multi-subscriber scenarios are not covered under this
286 specification.
287

288 S. Removable Media Player: A device, such as a DVD player, whose primary purpose is the
289 decoding of digitized video signals on a DVD.
290

291 T. Removable Media Player/Recorder: A device, such as a DVD recorder, whose primary purpose is

292 the production or recording of digitized video/audio signals on a DVD.
293
294

295 **Operational Modes and Power States**

- 296
297 U. On/Active: An operational state in which the STB is actively delivering one or more of its principal
298 functions and some or all of its applicable secondary functions.
299
300 V. Sleep: A state in which the STB has less power consumption, capability, and responsiveness than
301 in the On/Active state. The STB may enter a Sleep state from the On/Active state after:
302 a. the user pushes a power/standby button on the remote or on the unit; or
303 b. the STB auto powers down to a Sleep state. The energy consumption after auto power
304 down to Sleep and after a user initiated power down to Sleep may, or may not be,
305 equivalent.
306

307 **Miscellaneous**

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310 W. Auto Power Down: The capability to automatically switch from the On state to a Sleep state after
311 a period of time without user input, generally based on the amount of time the unit has remained
312 "idle" from last active use, i.e., user input such as channel change, volume change, menu access,
313 etc.
314
315 X. Cable, Satellite, and Telecom Service Provider: An entity that provides video (and possibly other)
316 content to subscribers with whom it has an ongoing financial relationship. A Service Provider in
317 the context of ENERGY STAR is one that distributes to end users STBs covered by this
318 specification under an agreement such as a lease or rental arrangement.
319
320 Y. CSA: The Canadian Standards Association is a not-for-profit, membership-based association that
321 works in Canada as well as globally to develop standards that affect areas such as public safety
322 and health, quality of life, the environment, and trade.
323
324 Z. C380-06: CSA's test procedure for the measurement of energy consumption of STBs.
325
326 AA. Digital Television Adapter (DTA): Receives terrestrial (over the air) digital signals and converts
327 them to an analog output suitable for analog TVs. DTAs do not provide digital signal output. For
328 the purposes of this specification, the DTA category does not include converters that work with
329 satellite or cable digital signals, nor does it cover devices with multi-functionality such as DVD
330 players with digital to analog conversion capability. Source: ENERGY STAR Digital-to-Analog
331 Converter Box specification.
332
333 DTAs are addressed under the Version 1.1 ENERGY STAR specification for Digital-to-Analog
334 Converter Boxes, and are not included in this STB specification.
335
336 BB. Game Console: A stand-alone device whose primary use is to play video games. The primary
337 inputs for game consoles are special hand held controllers rather than a mouse and keyboard
338 used by conventional computers. Game consoles are also equipped with audio-visual outputs for
339 use with televisions as the primary display, rather than an external monitor or integrated display.
340 These devices typically do not use a conventional operating system, but often perform a variety of
341 multimedia functions such as: DVD/CD playback, digital picture viewing, and digital music
342 playback. Source: ENERGY STAR Version 4.0 Computers specification.
343

344 Game consoles are addressed by the ENERGY STAR Version 4.0 Computers specification, and
345 are not included in this STB specification.
346

- 347 CC. Out-Of-Band Tuners: Tuners compliant with standards ANSI/SCTE 55-1 2002 and ANSI/SCTE

348 55-2 2002 and other similar types of technologies used to gain access to data channels outside of
349 the audio/video source signal. These may facilitate two-way communication and allow the box to
350 send diagnostic information back to the Service Provider as well as enabling Pay-Per-View
351 content and other rich media interactive content.

352
353 DD. 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 EE. UUT: Unit Under Test (UUT) refers to the product being tested. Source: CSA C380-06 modified.
360
361

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

368 **Tier 1 Excluded Products:**

- 369 • Game Consoles (See definition above)
- 370 • DTAs (See definition above)
- 371 • IP STBs sold or provided outside of a dedicated service or service contract
- 372 • Products that meet the definitions in the ENERGY STAR® Program Requirements for
373 Consumer Audio and DVD Products

374
375
376 **3) Energy Efficiency and Power Management Criteria:** Only those products addressed by
377 the Qualifying Products definition in Section 2 that meet the following criteria may qualify for ENERGY
378 STAR.
379

380 **A) Calculated TEC Criteria**

381
382 The criterion for ENERGY STAR qualified STBs is a calculated TEC (in annual kWh). The criterion
383 (herein called an “allowance”) is an allowance for Base Functionality, plus allowances for specific,
384 additional functionalities present across a duty cycle. This duty cycle is further explained in Section 4.
385

386 **B) Base Functionality Allowance**

387 The Base Function shall be established as detailed below.
388

- 389
390 a. If the STB meets the definition of Cable STB above, regardless of whether the cable
391 reception is considered the “principal function” by the manufacturer or Service Provider,
392 and/or the STB is capable of receiving cable service after installation of a CableCARD™
393 or other type of conditional access (CA) system, the Base Functionality is CABLE.
394
- 395 b. If the STB Base Function is not CABLE, and the STB meets the definition of Satellite STB
396 above, regardless of whether the satellite reception is considered the “principal function”
397 by the manufacturer or Service Provider, the Base Functionality is SATELLITE.
398
- 399 c. If the STB Base Function is not CABLE or SATELLITE, and the STB meets the definition
400 of IP STB above, regardless of whether the IP reception is considered the “principal
401 function” by the manufacturer or Service Provider, the Base Functionality is IP.
402

- 403 d. If the STB Base Function is not CABLE, SATELLITE, or IP, and the STB meets the
 404 definition of Terrestrial STB above, regardless of whether the terrestrial reception is
 405 considered the “principal function” by the manufacturer or Service Provider, the Base
 406 Functionality is TERRESTRIAL.
 407
 408 e. If the STB Base Function is not CABLE, SATELLITE, IP or TERRESTRIAL, and the STB
 409 otherwise meets the definition of Thin-Client/Remote, the Base Function is THIN-
 410 CLIENT/REMOTE.
 411
 412

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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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 ¹	35	12
Removable Media Player	12	8
Removable Media Player/Recorder	23	10
Multi-Room	44	25
CableCARD	15	TBD
DOCSIS ²	20	TBD
Home Network Interface	20	10

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

² OEMs must test with DOCSIS enabled if DOCSIS is present. Service providers can test with it and take the allowance only if they use it.

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

Table 1: Base Functionality Annual Energy Allowance

- *No changes from Draft 3.*

Table 2: Additional Functionalities Annual Energy Allowance

- *Gateway STB has been redefined as “Multi-Room” for clarification.*
- *An allowance for DOCSIS has been added to Tier 1, a TBD has been noted for Tier 2. Manufacturers must test with DOCSIS enabled if it is available in the STB.*
- *An allowance for Home Network Interface has been added. This is for a network interface such as WiFi, MOCA, DNLA, etc; that allows an STB interface with external devices through a network. This allowance can be applied only to devices that are NOT Multi-Room or thin client devices (as the network capability of those devices is already accounted for in their allowances)*

D) Calculating Device Allowance

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.

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E) STBs Using an External Power Supply

To qualify, the external power supply (EPS) used with newly-qualified STBs 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, Version 2.0. The ENERGY STAR specification and qualified product list can be found at: www.energystar.gov/powersupplies. Refurbished or reconfigured STBs that can meet the energy-efficiency performance requirements in the ENERGY STAR STB specification do **not** need to use an ENERGY STAR qualified (or equivalent) EPS.

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Note: Above, EPA has clarified that refurbished or reconfigured boxes that can meet the definitions in Section 1 and the technical requirements in Section 3 may earn the ENERGY STAR regardless of the EPS they use, and the ability of that EPS to meet ENERGY STAR criteria. This was modified in order to encourage Service Providers to upgrade their existing stock of STBs to ENERGY STAR, while avoiding the negative environmental impact associated with ensuring those refurbished or reconfigured, and in many cases deployed, boxes made use of an ENERGY STAR or equivalent EPS.

F) Multi-Room STBs

When using the Multi-Room Additional Functionalities energy allowance to establish the criteria for a STB, the following procedure must be followed. This allowance may only be used for STBs that can provide independent content to more than one TV. Specific requirements for Multi-Room 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 Multi-Room 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 Multi-Room STB.
 - Add the Multi-Room additional annual energy allowance listed in Table 2 to the criteria established for the STB. Compare the test results to the Multi-Room criteria to see if the STB qualifies for ENERGY STAR. For units that can support a second TV without the need for a thin client, and do this via widely used N/ATSC (unencrypted) via RF, the manufacturer can add in half of the relevant thin client adder.
 - If the STB qualifies as a Multi-Room STB, manufacturer must clearly indicate in product literature that product only qualifies for ENERGY STAR when providing content to more than one TV.

Note: By allowing devices that transmit via commonly-supported RF to secondary TVs to receive an additional energy allowance, EPA is avoiding a scenario where Multi-Room products that use multiple boxes would be favored from an ENERGY STAR perspective over boxes that deliver a similar service with a single box. This does not apply to devices that require additional hardware in either the TV or on the network (routers, switches), because once an additional piece of hardware is required, there is additional power required externally of the primary unit to make the “no client” scenario functional. In the case of RF-transmitted secondary output, most, if not all, TVs have some form of RF receiver.

G) Speculative Recording

Devices that provide for speculative recording must have an easy to reach menu option allowing the user to disable this feature at will.

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. This is confirmed by testing for ENERGY STAR qualification while the product is connected to the system, either on a live system or at a representative system in a laboratory.

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521 When qualifying and reporting STBs for ENERGY STAR, the following procedure can be used to
522 determine that an appropriate representative sample size has been tested.
523
- 524 1) Select on a random basis five units of the STB model to be tested. If the units have been
525 refurbished, all units must have undergone the same refurbishment or reconfiguration, and must
526 have received the same new hardware components or new or updated software.
527
 - 528 2) Test three units drawn at random from the pool of five units following the test procedure specified
529 in the ENERGY STAR Program Requirements for Set-top Boxes – Version 2.0.
530
 - 531 a) If all three units meet the applicable ENERGY STAR criteria, and are not within 10% of
532 the allowance in the specification, then the STB model meets ENERGY STAR requirements and
533 no more testing is needed.
534
 - 535 b) If all three units meet the applicable ENERGY STAR criteria, but any are within 10% of
536 the allowance in the specification, go to step 3.
537
 - 538 c) If any of the three units do not meet the ENERGY STAR criteria, then the STB model
539 does not meet ENERGY STAR requirements and cannot be referred to as ENERGY STAR
540 qualified.
541
 - 542 3) Test the additional two units in the pool. If both units meet the applicable ENERGY STAR criteria,
543 then the STB model meets ENERGY STAR requirements and no more testing is needed. If either
544 of the two units does not meet the applicable ENERGY STAR criteria, then the STB model does
545 not meet ENERGY STAR requirements and cannot be referred to as ENERGY STAR qualified.
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549 **B) TEC Assessment**

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551 In this specification, the power consumed in the On and Sleep states will be multiplied by the number of
552 hours a defined typical device spends in On and Sleep. The result will be a single energy value
553 representing the energy usage of the device over the course of an entire year.
554

555 To determine if a STB meets the ENERGY STAR specification criteria (Annual Energy Allowance), the
556 TEC of the STB shall be calculated as follows. If the TEC assessed for the product is less than the Annual
557 Energy Allowance calculated from Section 3D, the product meets the criteria and has earned the
558 ENERGY STAR.
559

560 **C) Equation 1: Base Assessment**

561 *Applies To All Products*
562

563
564 Calculate the Base energy consumption by multiplying the measured power consumption as specified in
565 this test procedure by the hours per day values in the equations below. If the UUT (Unit Under Test) does
566 not include the capability for auto power down, then use the first equation (a). If the product does include
567 auto power down capability, and it meets the requirements in section (F) below then use the second
568 equation (b).
569

570 P_{TV} , P_{Sleep} and $P_{Auto PD}$ are power levels in Watts as measured according to the ENERGY STAR test
571 procedure.
572

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

$$574 \quad kWh_{Base} = 0.365 \times (14 \times P_{TV} + 10 \times P_{Sleep})$$

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

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

Examples:

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

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

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

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

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

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

D) Equation 2: Playback and Record Assessment

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

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

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

Table 3: Duty Cycle

	DVR (Hours/Day)	Removable Media Playback (Hours/Day)	Removable Media Playback w/ Record capability (Hours/Day)
Mode			
Hours On-Playback ($H_{Playback}$)	2	2	2

Hours On-Record (H _{Record})	3	0	1
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Example:

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

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

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E) Total Energy Consumption

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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.

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Example:

(F) In the case of a HD STB with a DVR as used above, 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.

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F) Auto Power Down

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

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When claiming the presence of APD functionality for purposes of using equation 1b (Section C: Equation 1: Base Assessment) and calculating the TEC, the following requirements must be met:

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The STB must be shipped from the manufacturer with the APD setting engaging at four hours or less of inactivity. It is acceptable for the current program to complete before switching to the Sleep state. The energy-related settings shipped as the default by the manufacturer shall persist unless the user chooses at a later date to manually: a) disable the APD, or b) adjust the default time period from four hours or less to some other value. Partner may choose to not allow user the option of changing the power down settings.

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The STB may exit an automatically-initiated Sleep mode in order to download content and scan for program and system information, scheduling information, or any other maintenance activity. After activity is complete, STB must return to Sleep mode within no more than 15 minutes. If this occurs, the STB may exit the Sleep mode for no longer than an average of two hours in a twenty-four (24) hour period. This requirement of two hours per day does not include activities that an end user schedules (e.g. video recording of a daily show). Video downloads that are **not** user-scheduled (e.g. "speculative recording", or "push") **are** to be counted against the two hour average per day requirement.

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Note: Based on stakeholder feedback, the APD section above has been edited to clarify that the two-hour-per-day-limit is intended as a yearly average. The language has also been clarified to include non-user scheduled video downloads.

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G) Submittal of Qualified Product Data to EPA

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).

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>.

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 January 1, 2009. Tier 2 will become effective on January 1 2011. Any previously executed agreement on the subject of ENERGY STAR qualified set-top boxes terminated effective February 2, 2005.

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 January 1, 2009, 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 January 1, 2011, 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.

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 particular, EPA will finalize Tier 2 elements identified as TBD and reevaluate the appropriateness of other Tier 2 criteria at least nine months prior to the Tier 2 effective date. 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 automatically granted for the life of a product model. To qualify as ENERGY STAR, a product model must meet the ENERGY STAR specification in effect on the model’s date of manufacture.