

ENERGY STAR® for Set-top Boxes Specification Revision

May 15, 2007 Stakeholder Meeting
Discussion Guide

Introduction

To assist stakeholders in preparing for the May 15 set-top box (STB) specification revision kickoff meeting, EPA has developed this guide, which outlines the topics we hope to discuss. EPA hopes that presenting background and questions related to topics of interest to the ENERGY STAR program will ensure that the May 15 meeting will be more fruitful. To this end, EPA asks that those who will participate in the May meeting review this document in advance and come to the meeting prepared to contribute to the discussion on the following subjects. If, after reading this document, you would like to suggest other high-priority topics for discussion on May 15, please e-mail dmartinez@icfi.com. EPA invites those unable to participate in the May meeting in person to contact Katharine Kaplan at Kaplan.katharine@epa.gov or Darcy Martinez at dmartinez@icfi.com to offer responses to the following questions.

EPA hopes that this will be a productive meeting where stakeholders share information to contribute to the specification development process. EPA would like to make substantial progress toward the following outcomes:

- Definition of an STB in the context of ENERGY STAR;
- Test procedure(s) to measure power or energy consumption;
- Viable options for structuring an ENERGY STAR STB program that achieves the maximum energy savings in a reasonable amount of time;
- Plan for the collection of test data and commitment from stakeholders;
- Understanding of the varied parties in the STB universe and the role each can play to contribute to a successful STB program; and
- Timeline for next steps.

Defining an STB

An important first step in creating an ENERGY STAR program is deciding which products will be addressed and how they will be defined. For STBs, EPA examined existing test procedures and energy efficiency programs in search of a clear and comprehensive STB definition that could be used as a starting point for ENERGY STAR. It is EPA's understanding that annual energy use and potential energy savings in STBs are strongly linked to the video signal transmission system architecture. As such, it may be best to categorize set top boxes by the type of tuner they use. CEA-2022¹ provides such a categorization scheme and definitions for Digital STBs, including

¹ CEA-2022, Digital STB Active Power Consumption Measurement, December 2006, Consumer Electronics Association

Cable, Satellite, IP and Terrestrial STBs. EPA suggests that CEA-2022 could be used to establish the initial universe of digital STBs under consideration for ENERGY STAR as well as the categorization of STB functionalities.

CEA-2022 Definitions:

- Digital STB – A general term to cover a consumer electronic device that receives and decodes digital video signals from one or any combination of satellite, cable, terrestrial and/or internet protocol (IP) service, and presents the decoded video to a display and/or recording device via one or more analog and/or digital interfaces for consumption by an end user.
- Cable STB – Any 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 receiving or display device, where the service provider is providing cable service, as defined in the Communications Act of 1934, as amended.
- Satellite STB – Any STB whose principal function is to receive television signals from satellites and deliver them to a consumer display and/or recording device.
- IP (Internet Protocol) STB – Any 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.
- 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.

Note that on January 31, 2006, EPA launched a specification for Digital-to-Analog Converter Boxes (DTAs). Therefore, DTAs are not under consideration for the STB program at this time. Gaming consoles are covered under the Version 4.0 ENERGY STAR specification for computers, which becomes effective on July 20, 2007.

Discussion Questions

Which current STB products are important to consider for energy use, potential energy savings, and market growth? What new STB products are expected to be on the market in the next few years and what are the implications for energy use and potential energy savings? Are any product types omitted from the above definitions that warrant interest for potential energy savings opportunities and should be considered under an ENERGY STAR STB program? For example, should analog cable STBs be included in ENERGY STAR STB? Are these definitions problematic for products with multiple primary functions? Are there other definitions that should be considered? Which are the most important differences among products that may warrant separate treatment in a specification? Where are their similarities?

Test Procedures

EPA typically identifies or creates a test procedure to measure energy or power consumption, then establishes energy efficiency criteria based on measurements

following the procedure. Whenever possible, EPA strives to harmonize with existing test procedures for simplicity and to reduce the burden on stakeholders; however, modifications to existing test procedures or the creation of entirely new methods may be necessary. In the past, ENERGY STAR has referenced a range of test procedures – from those that take a simple measurement of modal power consumption, to those that outline a typical product duty cycle and measure accumulated energy over time.

Given EPA's goal to develop a meaningful ENERGY STAR STB program in a short timeframe, it is suggested that CEA-2022 and CEA-2013² could be used with certain modifications to obtain active and sleep mode power consumption for a robust data set. For example, ENERGY STAR might require boxes to be measured as deployed from a content provider, whereas CEA-2022 and -2013 do not provide specific guidance on this topic. As the shape of an ENERGY STAR STB program becomes better defined, EPA and stakeholders could discuss applying usage pattern information to the modal data generated by these test procedures to evaluate energy used during specific duty cycles.

Discussion Questions

Are CEA-2022 and 2013 reasonable starting points to test the power consumption of STBs? Where can you see need for improvement? How burdensome would it be to test a product to these methods? Are there other test procedures that should be considered, domestic or international? Are there other data points that should be captured during modal testing?

Possible Specification Structure and Program Approach

Establishing a specification and energy efficiency criteria for STBs requires addressing the fact that many STBs do not perform a simple single function, but rather incorporate multiple functions and features that impact annual energy use. Additionally, unlike many other CE products, STBs may be owned by and altered in the field by a service provider. EPA is interested in stakeholders' ideas to address these, and other STB-related, challenges. These challenges include the role the service providers take in remotely setting and enforcing policies on deployed STBs that directly effect the power consumption of the device.

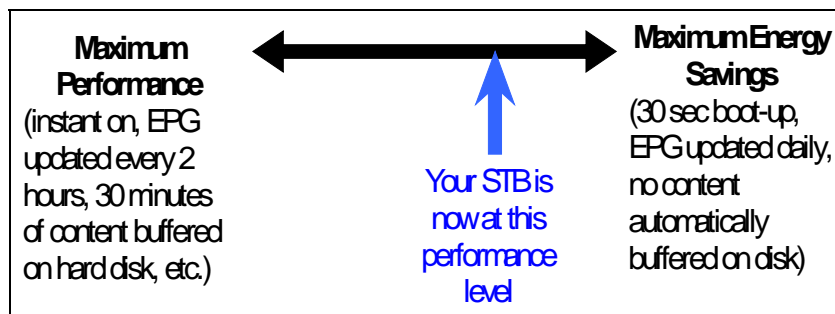
To help facilitate discussion on possible approaches to energy efficiency in STBs, the following matrix lists four ENERGY STAR specification criteria types that have been employed in the past.

² CEA-2013, Digital STB Background Power Consumption, July 2006, Consumer Electronics Association

Criteria Type	Examples / Precedents
<p>Power Down</p> <p>Reduce power during times when device not in use, or when less power is required in an idle state.</p> <ul style="list-style-type: none"> • Auto-power down • Manual Sleep/Power button to put unit into a low-power mode 	<ul style="list-style-type: none"> • ENERGY STAR requirement for auto-power down after 4 hours for DTAs • ENERGY STAR qualified PVR model (defunct) and DTAs.
<p>Standby / Off Power</p>	<ul style="list-style-type: none"> • Current ENERGY STAR DVD, TV and Audio product specifications among others.
<p>Active / Idle Power</p>	<ul style="list-style-type: none"> • ENERGY STAR DTA specification. • ENERGY STAR Computer Specification V4.0 (Tier 1: Idle, Tier 2: Active / Idle)
<p>Component Specifications</p>	<ul style="list-style-type: none"> • Power supply requirements in ENERGY STAR computer specification

Discussion Questions

What energy saving approaches are effective in terms of reducing energy use in STBs and cost effective for manufacturers and consumers? Should ENERGY STAR address downstream energy aspects, such as whether or not an STB can power down certain linked products? Which products will be sold at retail, and which will be provided as part of a service agreement? Will those provided by service providers require an alternative ENERGY STAR marketing approach as opposed to the typical retail strategies? Because box software can often determine whether energy-saving power management features are enabled for a given STB and since content providers determine the policies set in STB software, do STBs need to be qualified for ENERGY STAR labels as shipped from their manufacturers or from the end content provider? Could STB manufacturers collaborate with service providers to design interfaces to allow consumers more control over energy consumption and performance, as illustrated in the following diagram?



Current and Future Energy Use

According to a January 2007 report sponsored by the Consumer Electronics Association (CEA), set top boxes currently installed in the U.S. consume 20 TWh per year.³ This represents 13% of the total electricity consumed by consumer electronic devices (not including digital TVs), which collectively account for 11% of U.S. residential electricity consumption. The report finds that per unit power draw for basic STBs has generally decreased, while power draw has increased for models with additional features such as High Definition and Digital Video Recorders. Table 5-46 of the report lists estimates for current energy use of various categories of STBs. Digital cable and satellite boxes comprise more than half of the total energy consumption. Regular and high-definition DVRs make up approximately 20% of the total, with analog cable boxes also comprising roughly 20% of the total.

Annual Energy Consumption of Set-Top Boxes (TWh/yr) [Table 5-46, TIAX Report]				
	Cable	Satellite	Stand Alone	Total
Analog STB	4	n/a	n/a	4
Digital STB	5	7	n/a	12
HD Digital STB	0	0	n/a	0.4
PVR Digital STB	1	1	0.4	3
HD DVR Digital STB	0	1	n/a	1
Total	10	9	0.4	20

Discussion Questions

Will energy use, as reflected in the above table, likely grow, and if so, under which categories will the growth be seen? EPA understands that DVR-enabled boxes will represent the vast majority of STB deployments in a few years, which would in turn have significant energy impacts. How quickly do hardware manufacturers and content providers expect the overall stock of STBs to turn over to DVR-enabled products? What other estimates of current STB energy use in the US exist and do these estimates generally agree or disagree with those above? What projections are there for STB energy use in the next five years? What are the industry best-practice energy saving features that, if broadly adopted, could result in a significant deviation from the current energy usage growth in this product area?

³ Roth, Kurt W., and Kurtis McKenney, TIAX, LLC., *Energy Consumption by Consumer Electronics in U.S. Residences*, TIAX. Here in after referred to as "TIAX Report." See Table 5-46: Annual Energy Consumption of Set-Top Boxes (TWh/yr).

When considering future energy use, EPA understands that the overall energy use of two additional devices may grow substantially.

- Over The Air (OTA) Tuners
Before and during the transition to all digital over the air (OTA) transmission scheduled for early 2009, demand for products such as DVRs and DVD players and recorders that integrate an OTA digital tuner could increase substantially. EPA has recently released a specification for stand-alone simple Digital Television Adapters (DTAs) that can receive digital input, but only output analog signals for TV viewing.
- Internet Protocol TV (IPTV)
 - Current: 4.3 Million worldwide, likely less than a million in the US
 - Projection: 19 Million units worldwide in 2010
(Source: *IP Set Top Box Market Spurs New Players and Some Consolidation*, *ehomeupgrade.com*, 2/7/07, citing *In-stat.*)

Discussion Questions

What projections for sales and energy use for devices with OTA tuners and IPTV boxes can be shared? Additionally, can projections be broken down to reflect devices that are download-based and those that are streaming-based (including devices that buffer or record streamed live video to disk)?

Data

Access to empirical data on current products' energy and power consumption is critical to helping EPA determine which should earn the ENERGY STAR. EPA plans to conduct some testing, but will rely on industry for access to the newest models, particularly POD-enabled and IPTV boxes that have been less extensively researched by the energy efficiency community.

Discussion Questions

Would you be willing to test products and provide power/energy consumption data to EPA or a third party? Do you have access to test products in situ? Could you test soon-to-be-released products or prototypes with a specification focusing on the near term generation of products? Would you be willing to allow a third party to test your products?

Roles

EPA recognizes that this product category may call for a non-traditional approach for ENERGY STAR. The ubiquity, growing demand for more feature-rich products, and the range of stakeholders that affect the power profile of STBs make this product category ripe for creative solutions. It is EPA's understanding that for some types of STBs, how

the product is deployed in the field can impact its energy use. For example, a cable box model installed by one cable provider may use more energy than when installed by a different cable provider. Also, energy use could be changed by service provider choices in system operation and in firmware upgrades to the boxes. This may raise concern about the energy savings that can be delivered by an ENERGY STAR qualified STB.

EPA has the following understanding of the needs of varied STB stakeholders:

- STB manufacturers need to keep their costs low and deliver on customers' needs for reliable, easy-to-operate, feature-rich products;
- Cable and satellite providers need easy-to-understand products and service options, the ability to deliver on consumers' desires for programming and features, low cost options for efficiency, and the ability to maintain security; and
- End users need the programs and features they seek, savings on energy bills, and affordable products and services.

Discussion Questions

A diverse set of stakeholders usually assists EPA in creating ENERGY STAR criteria for a particular category, although it is usually product manufacturers that ultimately design and build efficient equipment that meets the ENERGY STAR specifications. Should additional stakeholders be invited to participate in this specification setting process? How do we assure that a STB tested by a manufacturer and shown to meet ENERGY STAR criteria actually save the end user energy when deployed? Should additional testing of a representative sample of STBs after deployment within the jurisdiction of a specific service provider be required to assure delivery of energy savings?

Next Steps and Timeline

The following list of milestones outlines the process EPA will follow to create an ENERGY STAR program for STBs. It is hoped that this illuminates the steps that will be taken and the future opportunities for collaboration with industry and other stakeholders.

Key Milestone	Date
Publicly launch spec. development process by distributing announcement letter.	March 15
Meetings in Denver with cable and satellite providers.	April 25 - 27
Distribute an update document with a list of key questions for stakeholders.	Early May
Stakeholder meeting in Washington, DC	May 15
Deadline for stakeholders to offer response to questions distributed in early May and share thoughts post May 15 stakeholder meeting.	May 23
Data collection	Early May - Late May
Release First Draft Specification.	Early June
Deadline for stakeholder comments on First Draft Specification.	Late June
International STB meeting at the IEA in Paris	July 4 - 6
Release Second Draft Specification	July 19
Stakeholder meeting	Aug. 7
Deadline for stakeholder comments on Second Draft Specification and Paris Meeting.	August 16
Release Draft Final Specification	Early Sept.
Deadline for stakeholder comments on Final Draft Specification (expected to be minor).	Late September
Publication of Final Specification.	Mid Oct.
Specification effective date.	June 2008

Discussion Questions

How well-placed are the proposed industry meetings? Have any important steps been omitted? Is this timeframe reasonable?