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OFFICE OF  
AIR AND RADIATION

**Summary of Rationale for Suspension of the ENERGY STAR<sup>®</sup> Specification for Set-top Boxes**  
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**I. Introduction**

The ENERGY STAR specification for set-top boxes was officially suspended on February 2, 2005. As of this date, existing partners were no longer able to submit set-top box models through the Online Product Submittal (OPS) tool for ENERGY STAR qualification and no new manufacturers were allowed to join as set-top box partners. An additional four months transition time was given, until May 31, 2005, for manufacturers to discontinue (i) use of the ENERGY STAR mark on their previously qualified set-top box products and related collateral materials, and (ii) any references to themselves as ENERGY STAR partners for set-top boxes.

When current market conditions change and become more conducive to having an ENERGY STAR specification for set-top boxes, EPA will revisit the program and consider developing a new specification for these products.

This memorandum provides a summary of EPA's rationale in suspending the ENERGY STAR specification for set-top boxes. It contains the following information:

- Background on existing ENERGY STAR specification
- Goals of specification revision
- Key milestones leading to the suspension of the specification
- EPA's research findings
- EPA's rationale for suspending the current specification

**II. Background on Existing ENERGY STAR Specification**

- In 2001, EPA launched its ENERGY STAR specification for set-top boxes. Products covered under this specification included: analog cable TV set-top boxes; advanced analog cable TV set-top boxes; digital TV converter set-top boxes; Internet access devices; video game consoles; videophone set-top boxes; set-top boxes with cable modems; digital cable TV set-top boxes; satellite TV set-top boxes; wireless TV set-top boxes (e.g., MMDS and LMDS); personal video recorders (e.g., TiVo and Replay TV); and multifunction devices. (For the

purposes of ENERGY STAR, a multifunction device is defined as a physically integrated device that has the core function of a satellite TV set-top box, digital cable TV set-top box, wireless TV set-top box, or personal video recorder plus one or more additional functionalities, such as an Internet access device or video game console.)

- Tier 1 of the Version 1.0 specification took effect on January 1, 2001 and Tier 2 was scheduled to take effect three years later, on January 1, 2004. (See Table 1 for Tier 1 and Tier 2 proposed criteria for ENERGY STAR qualified set-top boxes.)
  - A memorandum was distributed to industry in June 2003 informing them that the Tier 1 requirements were being extended while the Tier 2 requirements were revised. The reasons for this delay were two-fold. First, due to shifts in the economy and other factors, the set-top box technology and marketplace had not progressed as quickly as originally envisioned when the specification was developed in 2000. Second, EPA realized that it was necessary to review the Tier 2 specification and make adjustments to ensure the specification would be relevant (i.e., accurately reflect the most energy-efficient models on the market) when it took effect.
- As of November 2004, almost four years after the set-top box specification took effect, there were six manufacturing partners and a total of twenty-five qualifying products in the marketplace. (See Table 2 for a breakdown of the product-types.)

**Table 1: Energy-Efficiency Criteria for ENERGY STAR Qualified Set-top Boxes**

<b>Product Category</b>	<b>Tier 1: Standby/Low-power Mode</b>	<b>Tier 2: Standby/Low-power Mode</b>	
<b>Category 1</b> <ul style="list-style-type: none"> <li>• Analog Cable TV Set-top Box</li> <li>• Advanced Analog Cable TV Set-top Box</li> <li>• Digital TV Converter Set-top Box</li> <li>• Internet Access Device</li> <li>• Video Game Console</li> <li>• Videophone Set-top Box</li> <li>• Set-top Box (e.g., Internet access device) with Cable Modem for enhanced communications in Standby/Low-power Mode</li> </ul>	≤ 3 Watts	One specification for all set-top boxes:	
<b>Category 2</b> <ul style="list-style-type: none"> <li>• Digital Cable TV Set-top Box</li> <li>• Satellite TV Set-top Box*</li> <li>• Wireless TV Set-top Box</li> <li>• Personal Video Recorder</li> </ul>	≤ 15 Watts (for satellite systems, add ≤ 5 Watts for each LNB)		≤ 7 Watts (for satellite systems, add ≤ 5 Watts for each LNB)
<b>Category 3</b> <ul style="list-style-type: none"> <li>• Multifunction Device (i.e., a physically integrated device that has the core function of a satellite TV set-top box, digital cable TV set-top box, wireless TV set-top box, or personal video recorder plus one or more additional functionalities, such as an Internet access device or video game console)</li> </ul>	≤ 20 Watts (for satellite systems, add ≤ 5 Watts for each LNB)		

\*NOTE: The ENERGY STAR Tier 1 specification for each stand-alone satellite receiver is 15 Watts or less; manufacturers may add an additional 5 Watts or less to the specification for each LNB sold with a receiver. For example, a model sold with one receiver and a single LNB must consume 20 Watts or less to earn the ENERGY STAR. Similarly, a model sold with one receiver and a dual LNB must consume 25 Watts or less, and a model with two receivers and a dual LNB must consume 40 Watts or less. Please note that LNBs sold separately may *not* earn the ENERGY STAR.

**Table 2: ENERGY STAR Qualified Set-top Box Products as of November 2004**

<b>Manufacturer Company Name</b>	<b>Product Category</b>	<b>Number Qualified</b>
Funai Corporation, Inc.	Digital TV Converter Set-top Box	3
Hughes Network Systems	Satellite TV Set-top Box	3
LG Electronics, Inc.	Satellite TV Set-top Box	1
LG Electronics, Inc.	Digital TV Converter Set-top Box	2
LG Electronics, Inc.	Personal Video Recorder	1
Motorola - Broadband Communications Sector	Satellite TV Set-top Box	2
Pace Micro Technology plc	Multifunction Device	3
Pace Micro Technology plc	Digital Cable TV Set-top Box	9
Sony Electronics Inc.	Satellite TV Set-top Box	1

### **III. Goals of the Set-top Box Specification Revision**

EPA developed several goals for the revision of the Tier 2 set-top box specification. These were shared with stakeholders at various meetings, as outlined in greater detail in Section IV below. The goals for the specification revision included:

- Development of a more robust specification, which would incorporate a sound test procedure to measure the power consumption of set-top boxes and allow a large number of product-types to earn the ENERGY STAR, while being both technically feasible and cost-effective for manufacturers.
- Introduction of a Sleep Mode for set-top boxes.
- Greater manufacturer participation in the program.
- Increased energy, carbon, and monetary savings from ENERGY STAR qualified set-top boxes.
- An increased retail presence for set-top boxes.

### **IV. Key Milestones Leading to the Suspension of the Specification**

Key milestones leading to the specification suspension are:

- Attended The Cable TV National Show in May, 2004.
  - Met informally with several set-top box partners and researched products/technologies being highlighted by manufacturers for 2005.
- Attended the International Energy Agency's (IEA) set-top box workshop in May, 2004.
  - While there, discussed the goals of the Tier 2 specification revision with stakeholders.
- Met with the Electronic Industry Alliance's (EIA) set-top box working group in June, 2004.
  - EIA provided a proposal for the revised Tier 2 specification, which was somewhat based on the European Code of Conduct for Digital TV Service Systems in that it focused on set-top boxes that deliver either satellite, cable or terrestrial video signals

as their primary function. The set-top boxes had to meet a certain base power consumption level in Background Mode and then received incremental allowances for additional devices or technologies. Unlike the European Code of Conduct, there was no ceiling on the incremental allowances that could be gained with additional devices or technologies. Additionally, the base power levels proposed were higher than the existing Tier 1 specification for set-top boxes.

- Met with the National Cable and Telecommunications Association (NCTA) in June, 2004 to solicit their support for a revised Tier 2 specification for set-top boxes and their assistance in working with Multiple Systems Operators (MSOs).
- Attended the European Code of Conduct Meeting on the Energy Efficiency of Digital TV Service Systems on November 9, 2004.
- Conducted research into the set-top box market throughout 2004, including: discussions with manufacturers and MSOs; analysis of preliminary product-testing; and review of other voluntary specifications/guidelines set internationally for these products.
- Issued a memorandum on December 12, 2005 soliciting industry feedback on a proposed suspension of the current ENERGY STAR specification for set-top boxes.
  - No comments were received. Through discussions with EIA, it was determined that industry was largely in favor of this proposal.
- Issued a memorandum on February 2, 2005 officially suspending the current ENERGY STAR specification for set-top boxes.
- As of May 31, 2005, manufacturers had to discontinue (i) use of the ENERGY STAR mark on their previously qualified set-top box products and related collateral materials, and (ii) any references to themselves as ENERGY STAR partners for set-top boxes.

## **V. EPA's Research Findings**

- EPA's research showed that set-top boxes currently have very little variation in power consumption, both between different manufacturers and also across existing operating modes.
  - For example, several digital cable boxes metered by EPA had a minimum measured power consumption ranging from 16.7 – 22.7 watts across the boxes; the maximum measured power consumption ranged from 19.2 – 26.8 watts. (The differential between minimum and maximum measured power consumption ranged from 2.5 – 4.1 watts.)
- Introducing a Sleep Mode for set-top boxes would be an important way to garner additional energy and carbon savings.
  - This would likely necessitate a redesign of the current service provider networks, since the existing system requires set-top boxes to always be 'on' so they can receive updated channel maps and security keys from the MSOs. Electronic program guides must also be continuously updated as information is received from the MSOs. This redesign would likely be a resource intensive endeavor and require significant support from all set-top box stakeholders, including the MSOs.

- Setting a robust and effective specification for set-top boxes would require (1) a strategy to engage MSOs in discussions and (2) technological advances to allow set-top boxes to enter Sleep Mode without losing any functionality.
- Taking advantage of the energy savings potential associated with stand-alone digital TV adapters (DTAs) may be more straightforward. EPA has been investigating the possible development of an ENERGY STAR specification for these products only. Several states have passed legislation mandating maximum allowable power consumption levels for these products while other states are currently reviewing legislation that covers DTAs. EPA is continuing to track state-level and international activities on DTAs.

## **VI. EPA Rationale for Suspending the Current Specification**

EPA uses a consistent set of criteria in the development *and* revision of specifications for ENERGY STAR qualified products. These criteria guide EPA in its decision making and help EPA ensure that the ENERGY STAR will continue to be a trustworthy symbol for consumers to rely upon as they purchase products for the home or business and so that their purchases will deliver substantial environmental protection. These criteria include:

- Significant energy savings and environmental protection potential on a national basis;
- Product performance is maintained or enhanced;
- Qualified products will be cost-effective to the buyer;
- Efficiency can be achieved with several technology options, at least one of which is non-proprietary (i.e., not exclusive to proprietary technology);
- Product differentiation and testing are feasible; and
- Labeling would be effective and recognizable in the market.

Below EPA addresses the revision of the Tier 2 set-top box specification relative to each of these criteria.

- *Significant Energy Savings and Environmental Benefits.*
  - The potential for significant savings does not exist in the absence of a Sleep Mode for set-top boxes that is compatible within the current network environment.
  - Carbon savings for the set-top box program through the end of 2004 were projected to be very modest – 0.0012 MtC.
- *Product Performance is Maintained or Enhanced.*
  - Introducing a Sleep Mode within the current service provider network for set-top boxes would adversely affect product performance, as they could miss channel map updates and other data downloads from MSOs and may not be able to respond quickly enough when consumers turn them back on.
- *Cost-effectiveness.*
  - Set-top boxes are a classic example of a ‘split-incentive’ product. MSOs are the primary purchasers of these products, but they would not benefit directly from any energy savings or any investment in making subscriber networks capable of supporting a Sleep Mode.
- *Several Technology Options, including some with Non-proprietary Technology.*
  - Testing has identified few variations in energy use across set-top box models.

- No technology currently exists on the market to effectively incorporate Sleep Mode into set-top boxes while maintaining the necessary network connectivity.
- *Product Differentiation and Testing Procedure.*
  - Any new specification approaches would have required a new test procedure (e.g., to measure component or Sleep Mode energy consumption). EPA was willing to make the investment in developing this test procedure, but the current environment (e.g., the set-up of subscriber networks and set-top box technology) does not allow for the necessary stakeholder buy-in to move forward with it at this time.
- *Labeling.*
  - There is little variation in the power consumption of set-top box models currently available in the market. As such, EPA determined that there was not a current role for the ENERGY STAR mark in the marketplace. If technologies and markets progress, EPA hopes to reintroduce the mark to recognize approximately the top 25% of products in terms of energy-efficiency.