



**NRDC Comments on ENERGY STAR Draft 1 Version 4.1 Specification for Set  
Top Boxes**

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On behalf of the Natural Resource Defense Council (NRDC) and its 1.3 million members and electronic activists we respectfully submit these comments on EPA's Draft 1 Version 4.1 specification for Set-top Boxes (STBs). NRDC has a long standing interest in reducing the energy consumed by STBs and has published in-depth [reports](#) on national energy use of STBs which showed that in 2010 STBs consumed \$3 billion worth of electricity annually, with much of that occurring when the user is neither watching nor recording a show. NRDC strongly supports EPA's efforts to increase the efficiency of these devices and we provide comments on the topics listed below.

- Scope
- Treatment of new features
- Stringency of energy levels for thin clients
- Deep Sleep incentive in Version 4.1
- Deep Sleep requirements for Version 5
- Inclusion of DTAs

***Scope - NRDC supports inclusion of displayless video gateways in the ESTAR specification. We also recommend EPA update the scope and relevant sections of the specification to make it clearer that STBs that offer one or more additional functions beyond receiving and delivering video content such as VOIP telephony, hi speed internet, and/or router.***

The draft test method published by the Department of Energy limited the scope of covered STBs to those that provide video output via direct video connection. Several stakeholders, at the recent DOE test method workshop, including NRDC, stated that multiple STBs are expected to enter the market that do not provide video directly from the STB to the TV via a traditional direct video connection. These devices without direct video connection are often referred to as "headless" gateway STBs. Per ESTAR's latest draft, headless gateways are called displayless video gateways and are covered by its specification provided delivery of the video content is through quadrature

amplitude modulation (QAM), multimedia over coaxial alliance (MoCA) video with a Digital Living Network Alliance (DLNA) or similar security layer.

NRDC supports inclusion of displayless video gateways in ENERGY STAR's STB specification but recommends against limiting the type of output streams (QAM, MoCA with DLNA or similar security layer) in the specification as new techniques for distribution may emerge. We believe all STBs whose primary function is to receive and deliver pay TV service should be included in the ENERGY STAR specification. *The fact that the content reaches the TV or supplemental STB in the home via a direct video output or other technique should not be a factor as to inclusion in the scope and coverage by the ENERGY STAR specification.*

At the March 29, 2013 ENERGY STAR stakeholder meeting, representatives from Pace Electronics, the world's largest manufacturer of STBs indicated that multi-function set top boxes that could provide hi speed internet, digital telephony and/or router services in addition to traditional video/pay TV service are soon to enter the European market. NRDC expects these multifunction devices to also become available in the US market during the effective dates of ENERGY STAR Version 4.1.

NRDC recommends EPA update its draft specification to explicitly cover multifunction STBs. Functional adders for features such as VOIP, hi speed data modems, and routers should be included to account for additional power these features may require. Our specific advice on these points includes:

- a) Modify the scope and definitions to include these additional functions
- b) Add language to the test method that requires these additional functions to be hooked up to live systems (e.g. hook up multifunction device to Ethernet or wireless connection; connect one VOIP telephone receiver to the STB) prior to testing.
- c) Testing for these functions should focus on recording the "idle" or "ready" state power of these functions. In other words have the phone ready to receive a call but do NOT make or receive a call during the test, similarly do not send or download files over the internet connection. This simplifies the testing and provides an adequate simulation of these features whereby these devices spend the majority of their time NOT in active use.
- d) In setting the functional adders, EPA should refer to the data it has collected as part of its small network equipment specification setting process. For boxes with multiple additional functions, the functional adder should be some fraction of what the sum of each of these stand-alone devices would consume.
- e) If the schedule required to develop these functional adders is prolonged, we encourage ENERGY STAR complete this task in two steps. First, issue Version 4.1 without delay and include advisory language that Version 4.2 will be issued soon and it will include functional adders for multifunction STBs. Upon finalizing the functional adders and related test method language, EPA would

issue an updated version of its specification called Version 4.2. This two-step process allows EPA to initially issue its specification for all but multi-function STBs without further delay. As the multi-function STBs are not yet on the market in the US, a few month delay will not negatively impact the market and will provide the industry with energy targets to consider as they bring these products to the US market.

***Treatment of new features – NRDC recommends EPA establish reasonable functional adders to account for the incremental power new functionality such as ultra-HD or 3D images might require.***

At the ENERGY STAR stakeholder meeting a few manufacturers expressed concern that new STBs may include the ability to process content that is ultra HD or 3D and that these signals require additional processing power due to the larger amounts of data the files will contain, and that they may require additional “overhead” power even when this feature is not in use. This request seems reasonable provided the annual energy adders are appropriately set. If they are overly generous it could result in wasted energy and possibly the unintended consequence of manufacturers adding these features as a means to receive a large energy adder and qualify for ESTAR.

In developing this list of new features, EPA should try to limit the list of features that would receive new adders to those that are most likely to enter the market over the next 30 months and receive non trivial market share. Otherwise the specification and test method becomes overly complicated and provides a long laundry list of stand-alone adders that could greatly increase the energy use of new STBs.

***Thin Client Annual Energy Limits and Duty Cycle – We encourage EPA and DOE to establish unique duty cycles for thin clients and to reduce the proposed annual energy consumption levels for thin clients so that they align with the much lower levels of sleep mode power these devices are capable of. In addition, we recommend EPA remove thin clients from eligibility for the 20% deep sleep energy incentive.***

There is broad consensus that having one large “whole home” multi-room STB receive video content and for the second and third TVs in a home to have a “thin client” that receives its content from the whole home box, will result in lower household energy use. In the satellite business, the service providers have largely discontinued hooking up a DVR or basic STB to each TV and now deploy a thin client on the secondary TVs. Besides saving energy, this makes good business sense for the service providers as they no longer need to purchase and maintain as many DVRs. This translates to lower capital expenditures and increased reliability as the thin clients are much less expensive and do not have a solid state drive, which is often the source of failure and expensive service calls.

Today’s thin client STBs do not employ energy efficient designs as they consume near full power after the user turns them off ( sleep mode). While much of today’s power use for STBs in sleep mode is to maintain the connection to the service provider’s “head

end”, this requirement does not exist for thin clients. Thin clients should have power levels that are similar to Apple TV and Roku’s HD boxes which stream video from the internet. Their power levels are approximately 2 Watts in active mode and 1 Watt or less in standby mode.

In its current draft, EPA provides an allowance of 42 kWh/yr for thin clients ( base allowance – 10; advanced video processing 8; high definition 16; home network interface 8). We think the annual allowance for these devices should be based on power levels of 5W on and 1W sleep, or perhaps 5W and 2W sleep. The 2W sleep level provides sufficient power to account for satellite’s MOCA 2 distribution system which Echostar reported in the stakeholder meeting to require 0.5 to 1W in sleep mode.

As thin clients are deployed on a user’s 2<sup>nd</sup> and 3<sup>rd</sup> TV in a home, a duty cycle of 4 hours active and 20 watts sleep seems more appropriate. NRDC will recommend this in our comments to DOE as well. Employing this type of duty cycle to calculate the allowable energy levels for this specification will provide greater incentives for the industry to reduce the currently high sleep power levels found in their current thin clients.

If appropriate, EPA might consider establishing two different energy allowances for thin clients that utilize MoCA. Thin clients that use the newer MoCA 2 would receive a lower overall energy allowance than those that use the older MoCA 1 which does not support low power sleep states.

***Deep Sleep Incentive and Scheduler – We think the current EPA proposal for deep sleep incentives needs to be revisited. The new proposal should have a lower incentive level, remove potential areas for “double dipping”, and include requirements for basic functionality such as ability to wake to record prescheduled recordings in order to be eligible for the incentive. In addition, EPA should require inclusion of a user selectable deep sleep “scheduler” in its deep sleep incentive eligibility criteria.***

ENERGY has proposed a deep sleep incentive for eligible boxes that translates into a 20% adder<sup>1</sup> to the allowable annual energy levels provided in the specification. If the deep sleep savings are unlikely to happen in user’s homes, this results in giving back much of the incremental savings that would be achieved by moving from ENERGY STAR 3 to 4. Below we explain why we are concerned that the assumed deep sleep savings may not occur.

Today’s STBs consume roughly the same amount of power when on and when in sleep mode. The best boxes have a 5 to 7W difference between active and sleep. To help bring down the sleep mode power levels, EPA has added a deep sleep incentive. Unlike sleep, boxes in deep sleep mode will take 30 or more seconds to wake and provide consumers with fully functioning boxes. Some boxes may take several minutes to go

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<sup>1</sup> The credit of 17% translates to 1- .17 or .83; when you multiple by the reciprocal of 0.83 in equation 1, this translates to a 20% additional annual energy allowance.

from deep sleep to being able to view the program guide, access recorded content, etc. A deep sleep function that frustrates consumers will be disabled by all but the most conscientious consumers.

The current EPA proposal for deep sleep incentive eligibility requires the presence of a deep sleep button on the remote or front of the STB. The mere presence of a button will likely not result in incremental energy savings. During the meeting some manufacturers claimed that some of today's STBs cannot wake to record a prescheduled show when in deep sleep mode. (A simple design change should fix this problem. After all, a 20 year old DVD player was able to wake to record a show and then go back to sleep.) This would be very frustrating for DVR owners who highly value the ease of recording shows when they are not home. In addition, as most STBs are underneath a TV and are not easily accessed, simply requiring the button on the front of the STB will further reduce the probability that those users will push the deep sleep button.

NRDC offers the following recommendations to increase the probability of achieving real energy savings from deep sleep:

1. Require a deep sleep button on the remote control. The STB should begin to enter deep sleep after a button press of 2 seconds or less. This will prevent implementations like those initially seen in other countries which required the user to push the button in some abnormal way, such as holding the button for 15 seconds or via a series of button presses.
2. Add an eligibility requirement that devices in deep sleep must be able to wake to record a pre scheduled show and then go back to deep sleep shortly after completion of the recording. Language needs to be added to the test method to verify this capability.
3. Add a requirement that STBs receiving the deep sleep incentive have a built in deep sleep scheduler whereby the consumer can select from a user interface specific times each day whereby the device enters and exits deep sleep. The STB must have full wake capability, similar to sleep state (e.g. within 30 seconds) at the completion of the deep sleep period.
4. Boxes shall be shipped and deployed with deep sleep scheduler set to be in deep sleep between 1 and 5 am, when almost all users are unlikely to be watching TV.
5. The service provider may not include prompts for the user to disable this setting. Further discussion with stakeholders will likely be needed to find an appropriate middle ground here shy of specifying exact language for the user interface.

Other recommendations regarding deep sleep incentive:

1. Those devices that have a sleep state that delivers low power levels as the "normal" sleep state, meaning when the device is normally turned off by the user or via APD, do not need or warrant the deep sleep incentive

2. The magnitude of the deep sleep incentive needs to be reevaluated. As we have no way to predict how many users will take advantage of deep sleep, we recommend EPA reduce the size of the currently very generous incentive. A much lower incentive value around 9% (translates into 10% additional energy allowance) seems warranted given the uncertainty of the savings.
3. Thin clients should not be eligible for the deep sleep incentive as they do not connect to the head end and should already be able to achieve very low power levels when not in use.

***Deep Sleep in Version 5 – NRDC fully supports ENERGY STAR’s stated intention to require new STBs to achieve power levels of 3W or less when not in use in ENERGY STAR Version 5, effective roughly 4 years from today.***

Per NRDC’s 2010 report, STBs cost consumers \$2 billion per year to operate when they are NOT in use and this translates to 6 power plants worth of electricity consumption. This remains the biggest source of potential energy savings for these devices. As such, we completely support EPA’s intent to require much lower sleep levels in the future. With appropriate lead times and industry innovation these low power states would be achieved without any user inconvenience (e.g. wake times within 30 seconds). Such performance appears increasingly attainable as Robert Turner from Pace stated at the stakeholder meeting that Sky Italia is close to launching a satellite STB that only uses 0.5W in sleep mode and wakes within 15 seconds.

***Retain DTAs Within ENERGY STAR – NRDC recommends EPA reinsert digital transport adapters into its final specification.***

In its most recent draft specification proposal, EPA removed the category of products called digital transport adapters (DTAs). During the 3/29/13 ENERGY STAR stakeholder meeting, representatives from the cable industry stated that DTAs are still commonly used and deployed within their system, in particular on the second and third TVs in the home. These devices are essentially a basic cable box without the cable card slot. They are “one way” devices meaning they receive signal directly from the service provider (unlike a thin client which receives its content from a whole home STB) but do not allow for two way communication such as ordering and receiving on demand movies. These boxes differ from devices with the same name, DTAs- digital to analog convertor boxes, that were purchased to allow owners of analog TVs to continue to use their existing TV for free (over the air or terrestrial) broadcasts after the national switch to digital only signals. While these devices are being discontinued, DTAs used by the cable industry are not.

There are currently two DTAs on Energy Star’s Qualified Products List (QPL) and they use 3 to 4 Watts of power or a reported annual energy consumption of 29 to 35 kWh/hr. Given their low annual energy use, these devices should remain part of the program and service providers should be incented to deploy these devices instead of higher energy using devices. By keeping them in the program, service providers who install new

DTAs can receive credit towards their target to become an ENERGY STAR STB partner.