ENTROPIC
transforming the connected home

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Katharine Kaplan
EPA Team Lead
ENERGY STAR Product Development
US Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
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Re: ENERGY STAR® Specification for Set-top Boxes Version 4.1, Draft 2

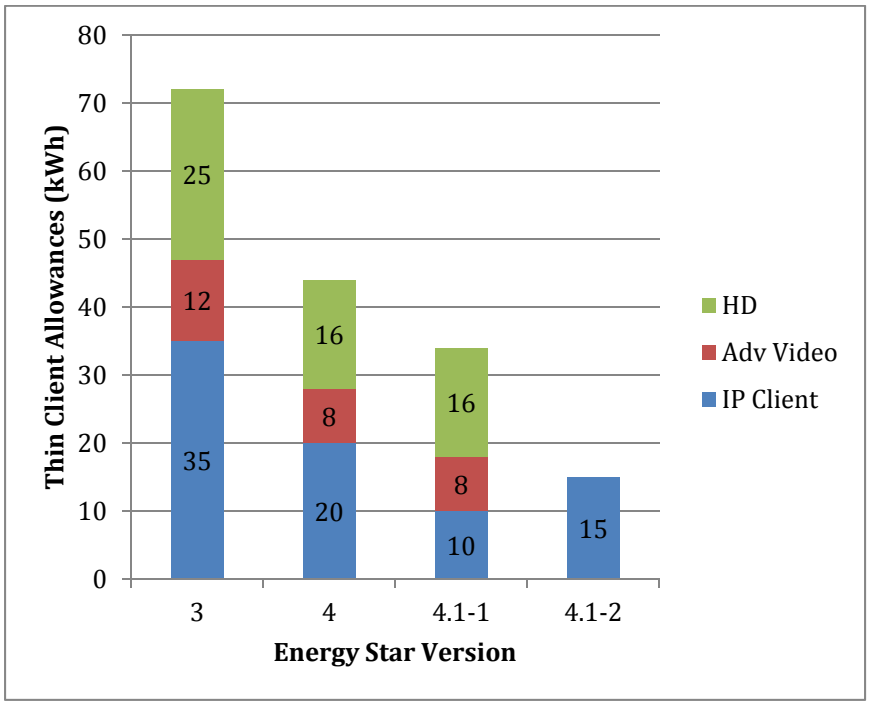
Dear Ms. Kaplan:

On behalf of Entropic Communications, Inc., I am offering comments on the Environmental Protection Agency's Draft 2 ENERGY STAR® Specification for Set-top Boxes Version 4.1 released May 30, 2013.

Entropic created the Multimedia over Coax Alliance (MoCA) networking technology, and is the leading supplier of MoCA HNI chips. In addition, Entropic is one of the primary providers of IP Thin Client and HD DTA SOCs to the North American service provider industry.

Thin Client Allowance

EPA has proposed to dramatically reduce Thin Client allowances to levels similar to "over the top" devices. The chart below shows the adopted and proposed AEC allowances for this product type from ENERGY STAR 3.0 to the latest 4.1 draft.



The latest proposed allowances do not properly account for Thin Client functional requirements. In the first place, EPA appears to have premised its analysis on the mistaken assumption that Thin Clients are functionally equivalent to over-the-top devices. In fact, over-the-top devices, such as Roku, typically operate with more compressed or lower resolution video. Service Providers require Thin Clients to operate at the highest rate of resolution (19-20 Mbps) and to have advanced applications processors capable of running complex video and graphics software stacks. Any Service Provider device also needs to support specific quality-of-service and diagnostic/manageability requirements, and contain conditional access level security features. The next generation Thin Client devices have multiple CPUs and operate at up to 5000 DMIPS of processing power to support modern and future Service Provider user interfaces and applications. To meet those performance requirements, both Service Provider IP set-top boxes and IP Thin Clients use equivalent silicon. This typically consists of a home networking / IP interface (like MoCA), an advanced video/graphics decoder engine and a high-speed applications processor. An IP Thin Client can talk to any/all of: a DVR, a gateway or the cloud. Client devices also typically include a broader variety of video outputs than HDMI or composite in order to handle the wide variety of TVs used by service providers' subscribers. Overly limiting the allowances for Thin Clients will actually create disincentives for whole home architectures.

Second, EPA has assumed that thin clients can operate at 6 W in On Mode for 7 hours and 1.5 W in Sleep Mode for 17 hours. The On mode for MoCA requires approximately 3.8 W. As a result, the proposed allowance leaves less than 2 W for all remaining functions. External components like DRAM, LEDs, flash memory and

RF4CE alone consume close to 2 W at the wall socket (this includes DC regulator efficiency and external power supply efficiency). The video / applications processing SOC component, while potentially as low as 5 W at the chip brings the total On Mode power of all non-MoCA components to around 10 W at the wall. In Sleep Mode, the external components mentioned above consume close to 1 W at the wall, with the SoC contributing slightly more than 1W. Taking all of the above into account, and allowing minimal production margin leads to an AEC of more than **40 kWh/yr**, not including MoCA.

Clearly the current Draft 2 allowances are unachievable in next generation Service Provider qualified IP Client SOCs. EPA has worsened the problem by eliminating the 24 kWh combined allowances provided for High Definition and Advanced Video Processing. The explanation offered was that these features are not a "differentiator," but standard features still consume power.

The low power mode assumptions for MoCA are also in error. EPA has assumed 0.5 W for MoCA 2.0 in Sleep Mode. EPA has also failed to account for power efficiency to the wall socket. The 10 kWh HNI adder level is unachievable in upcoming MoCA 2.0 chips, which are expected to consume 1.2 W at the wall in Sleep Mode. EPA's own numbers calculate the minimum required is 12 kWh, yet it has capped the client HNI adder at 10 kWh. Table 1 below shows estimated nominal power consumption for an upcoming next-gen MoCA 2.0 chip. The estimated AEC is clearly far above the current 10 kWh HNI assumption.

Table 1: Power Consumption for an Upcoming Next-Gen MoCA 2.0 Chip

	Active Mode	M2 Sleep Mode
Upcoming MoCA 2.0 Chip Power (Watts)	2.6	0.8
DC Regulator Efficiency	0.85	0.85
Level V External Power Supply Efficiency	0.803	0.803
AC Power from Wall Receptacle (Watts)	**3.81**	**1.17**
AEC (kWh/yr) for 7:17 hours	**17.0**	

Finally, there will continue to be a mix of MoCA 1 and MoCA 2 shipments for many years. EPA has assumed savings in mixed MoCA 1 and 2 households, but a MoCA 2 client cannot remotely wake up a MoCA 1 gateway.

To rectify these problems, MoCA and Thin Client allowances must be raised to match the performance required by Service Providers. Although there are many ways to raise the allowances to better match service provider IP set-tops, we recommend that the allowances (in kWh/yr) be set as shown in Table 2:

Table 2: Recommended Allowances for MoCA Thin Client

Base Thin Client	15
HD	16
AVP	8
HNI Base	10
MoCA adder	10
AEC (kWh/yr):	**59**

Definition of Thin Client

EPA's proposed definition of Thin Client is "a STB that can receive content over an HNI from another STB, but is unable to interface directly to the Service Provider network." As noted above, a Service Provider IP set-top box and an IP Thin Client use the equivalent silicon, and an IP Thin Client can talk to any/all of: a DVR, an IP gateway or the cloud. We recommend that the definition be amended to focus on the device's ability to receive content from another STB, and to remove the prohibition on capability to communicate with the network: "Thin Client /Remote: a STB that can receive content over an HNI from another STB~~, but is unable to interface directly to the Service Provider network~~."

HD DTAs

EPA's proposed elimination of the allowances for High Definition and Advanced Video Processing also has an adverse effect on HD DTAs, which are energy efficient methods for delivering linear cable programming. From the data made available, EPA appears to be relying upon only one model of Motorola HD DTA shown on the QPL at 35 kWh as the basis for its proposed allowance of 35 kWh. Drawing a conclusion from one model in a very small sample is prone to error. In this case, the EPA has erred in assuming that this allowance covers all energy efficient use cases for DTAs. DTAs are continuing to evolve to offer 1080p resolution. Some DTAs include a QPSK receiver to receive DAVIC out-of-band messages, support for IR remotes, and/or RF4CE. Newer HD DTAs have four tuners for faster channel change, a separate secure micro for conditional access functionality, and support for more DRAM / Flash. This all requires more power than provided by an allowance of 35 kWh. Entropic is already seeing feature sets that could push HD DTAs to around 60 kWh/yr or more. An artificially low DTA allowance will limit the use of DTAs to a narrow set of older features, and create incentives to deploy fully featured set-top boxes that use more energy. The EPA should restore the allowances for HD and AVP and make them available for DTAs.

MoCA Allowance on Server

EPA proposes a MoCA allowance on a server assuming that the server is in ON mode for 5 hours. EPA's client allowance is based on the assumption that the client is in ON mode for 7 hours. The server needs to act as MoCA network controller to manage the MoCA nodes for at least as long as the client is operating. Our understanding from the webinar is that this incorrect formula was proposed by DOE in a draft test procedure. EPA should not adopt this erroneous 5 hour duty cycle. If EPA's client allowance is based on 7 hours on, then the server needs to be on for at least 7 hours per day.

In addition, EPA's figures have not been properly scaled for both AC and DC converter efficiencies from the wall socket.

Conclusion

We request that EPA revise the allowances in accordance with these comments and publish a new draft for further industry study.

Respectfully submitted,

/s/ Dr. Anton Monk

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