May 9, 2013

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 12-AAER-2A
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: Invitation to Participate – Set-Top Boxes and Network Equipment

Cisco Systems, Inc. appreciates the opportunity to submit these comments in response to the California Energy Commission's (CECs) "Invitation to Participate" in a stakeholder dialogue on development of future energy efficiency standards for Set-Top Boxes (STBs). Cisco is the worldwide leader in networking that transforms how people connect, communicate, and collaborate.[1] The company builds environmental sustainability into business functions and processes, and it helps its customers and partners to do the same. Based on a deep commitment to environmental stewardship and energy efficiency, Cisco has developed an innovative corporate green strategy and has been a strong collaborator and partner with the ENERGY STAR® program.

Cisco encourages the Commission to carefully consider the implications of regulating the devices at issue in this proceeding. The STB landscape is shifting rapidly and toward greater functionality and energy efficiency in the absence of regulation. These developments,

[1] Cisco's network-centric platform is changing the nature of work and the way we live. Founded in 1984, Cisco pioneered the development of Internet Protocol ("IP")-based networking technologies. This tradition continues with the development of routing, switching, and other networking-based technologies, such as application networking services, collaboration, home networking, security, storage area networking, Cisco TelePresence® systems, unified communications, unified computing, video systems, and wireless. All of these technologies are made possible by the evolution of the network. As an innovator in the communications and information technology industry, Cisco and our valued partners sell Cisco hardware, software, and services to businesses of all sizes, governments, service providers, and consumers.

described in greater detail below, are consistent with the dual goals articulated by CEC staff during the recent stakeholder meetings on the Phase 1 appliance categories.

Cisco appreciates the Commission's decision to allow this additional opportunity for stakeholder input at the front end of the regulatory process. We are hopeful that CEC will avail itself of the latest information on the energy consumption of devices that will be deployed in the near future as a result of existing industry commitments. This is the baseline against which potential incremental energy efficiency benefits from a future regulation should be measured.

Networking Equipment Should be Excluded from the Scope of this Proceeding.

Materials released by CEC for this Invitation to Participate (ITP), including the staff slides presented during the April 4 Web-Ex meeting, indicate that the Commission intends to include Network Equipment within the scope of this proceeding. Subsequent conversations between industry representatives and CEC staff suggest that the Commission does not intend to expand the scope of this proceeding beyond STBs, but rather is interested in gathering information on network equipment to identify potential opportunities for future energy efficiency gains.

While this action is consistent with the three-phase regulatory proceeding outlined in the Commission's Order Instituting Rulemaking on Appliance Efficiency Regulations, adopted March 14, 2012 (Order 12-0314-16, the OIR does not include network equipment in any of the three proposed regulatory phases. The scope of the March 2012 OIR is more limited in scope than the ITP, and consistent with the reality that networking devices, system architectures and consumer markets are rapidly evolving and are ill-suited to broad categorization and regulation. The consequences of regulatory action at this time would be to inhibit device and network functionality, increase costs for consumers in excess of the benefits delivered by regulation, and to sacrifice opportunities to achieve greater energy efficiency gains through use of multifunction devices and software designed to optimize energy use on a broader scale. These outcomes would be at odds with the Commission's statutory mandates for appliance efficiency regulations.

STBs and network equipment are not a single product class. Rather, they are comprised of several wide-ranging types of dissimilar products. These different product classes should not be aggregated together in the same regulatory proceeding for a number of reasons, not the least of which is that the regulations and testing procedures themselves would vary significantly for each product class. Given the differences in functionality and power consumption of the product classes at issue, it makes little sense to lump such a broad range of devices into a single class for the purpose of a future regulatory proceeding.

For these important reasons, Cisco supports excluding networking equipment from the Commission's STB regulatory proceeding.

Set-Top Boxes Present Unique Regulatory Challenges that May Frustrate Achievement of CEC's Energy Efficiency Objectives.

Cisco appreciates that this solicitation represents a new effort by the Commission to better understand the STB product category before launching a formal rulemaking process. We applaud this effort. However, as we discuss in more detail below, and in the documents we incorporate by reference, the term "set-top box" encompasses an incredibly complex, highly-variable and rapidly-evolving universe of devices and software that can be customized to meet the needs of the individual consumer. As noted in the comments submitted jointly by the California Cable & Telecommunications Association and the National Cable & Telecommunications Association:

> "Set-top boxes are not standalone, static products. They are integrated components of distribution networks that differ significantly in network architectures, transmission protocols, software stacks, conditional access security systems, out-of-band communications channels used for command and control of the set-top box, operating system and processor instruction sets, network control architectures in support of interactivity, and electronic program guide applications and guide metadata formats, among other variables."[2]

The questions posed by CEC staff understandably reflect the Commission's experience from prior appliance efficiency regulatory proceedings, which involved more homogenous product categories designed to perform one function over the life of the product. Cisco agrees with the above-noted commenters that "the Commission's energy efficiency approaches were simply not designed for dynamic and fast moving video networks, where set-top boxes operate as part of constantly changing networks, get new downloads in the field, and change functions as services evolve."

[2] Comments of the California Cable & Telecommunications Association and the National Cable & Telecommunications Association to the California Energy Commission in response to the "Invitation to Participate in the Development of Appliance Energy Efficiency Measures", page 4.

At a minimum, the Commission should consider the following issues which present unique challenges for a regulatory proceeding on STBs:

1. **Set-Top Boxes cannot be grouped into a single product classification.** Any attempt to classify STB products for purposes of new CEC regulations necessarily would be either overly broad (including devices that are functionally equivalent to STBs, but are not traditional or exclusively hardware STBs) or under-inclusive (failing to cover a substantial and growing portion of the video device market). For instance, a broad definition designed to encompass all means by which a consumer could receive video signals from a multichannel video programming distributor (MVPD) device could inadvertently bring tablet computers, computers, gaming consoles, and smartphones under the umbrella of the regulation. By contrast, a narrow definition could distort the marketplace by arbitrarily subjecting some video distribution business structures to the regulation, thus inflating the costs of implicated products, while holding others harmless.

2. **Unlike traditional consumer electronic products, an STB's features and energy consumption evolve over the lifespan of the device.** Service providers can, for example, enable and disable core functionality remotely via software upgrades. STBs also include software configuration options that can be exercised by the end user. These devices can be easily transitioned from a cable to an internet protocol (IP) STB post-shipment. Thus, a single STB could shift from a cable STB to an IP digital video recorder (DVR) based on changes made after shipment, often by an entity other than the manufacturer. Even if CEC develops different efficiency standards reflecting variable device functionality, a previously-compliant device could still become non-compliant without any physical change to the device. In some cases, a software upgrade could substantially increase device functionality, moving a device out of a particular class without clarity as to how it should be classified.

3. **Regulating energy consumption of STBs could simply shift consumption to other devices.** Imposing conservation standards on STBs would require substantial redesigns of the video distribution network and could lead providers to shift functionality to other endpoints within the home or elsewhere in the network. Regulating a small piece of a network would have the same effect as pressing on a balloon – the functionality and corresponding energy consumption may simply shift to another part of the network or to a non-regulated device.

4. **Mandating "deep sleep" is neither economically justified nor technologically feasible.** Service providers need to maintain network connectivity to ensure network and content security, and to update program guides and on-demand offerings. The more functionality integrated into a device, the greater the need for that device to maintain constant connectivity with the network. "Deep sleep" requires reengineering and innovation at multiple levels including at the chipset, middleware, STB manufacturer and service provider levels. As we discuss in the next section, the STB industry has made material commitments to explore this possibility, but there are many moving pieces that need to be addressed and each of these will undergo technological changes over the course of the industry's examination of this issue.

5. **CEC's evaluation of potential energy efficiency benefits must include the benefits of multi-function devices.** Just one of today's high-end STBs can provide the same functionality that previously required multiple devices, thereby increasing energy efficiency on a larger scale. STBs and network equipment are also being used to deliver energy saving services to consumers, such as home energy management. The functionality of STBs is also displacing energy consumption outside the home, as consumers increasingly order video content on-demand instead of driving to a retail store to acquire the same content. Conventional regulatory constraints, such as rigid test procedures, present significant barriers to market entry for new technologies that promise much greater potential for energy efficiency gains than the traditional approach of regulating individual devices.

6. **CEC must account for the significant variations that exist among cable, satellite and IP MVPDs when developing test procedures.** Cable, satellite and IP MVPD providers rely on vastly different technologies, architectures and STBs to deliver video content to their consumers. These devices have evolved along different paths based on the technological realities each medium creates. For example, satellite providers must deal with the physical constraints of one-way spectrum and having to maintain constant communication with the satellite, while cable STBs must accommodate DOCSIS and CableCARD standards[3]. Even within a single device class, such as a cable MVPD, different devices will utilize different architectures, software applications, update practices and service offerings. Customer subscription plans

[3] **Data Over Cable Service Interface Specification** (**DOCSIS**) is an international telecommunications standard that permits the addition of high-speed data transfer to an existing cable TV system. **CableCARD** is a special-use card that allows consumers in the United States to view and record digital cable television channels on digital video recorders, personal computers and television sets without the use of other equipment such as a set top box.

can affect energy consumption. Other variables such as geographic location, frame rate, and video format will also impact the energy profile of a STB. And, as noted above, STB functionality and energy consumption can evolve over time through remote software device upgrades and enabling of new functionality.

7. **CEC should avoid reliance on outdated information that does not reflect the energy consumption of devices currently being deployed.** Cisco's high-end STBs have advanced from consuming 215 kWh per year in 2009 to 183 kWh per year in 2011, while continuing to support consumer-demanded functions and adding multi-room capability. This improved performance, which is not unique to Cisco products, may not be reflected in information submitted to CEC in support of STB regulation. It is imperative that CEC utilize the best available information in establishing the energy consumption baseline against which potential incremental efficiency benefits will be evaluated.

CEC should also consider Cisco's March 15, 2012 response to the U.S. Department of Energy's Request for Information concerning its proposed regulation of STBs[4]. This document identifies a number of additional technical and practical challenges to regulation of a very fluid technology in a very dynamic market. It is likely that the conventional STB the Commission seeks to regulate will be obsolete by the time any new regulations take effect.

Cisco would welcome the opportunity to meet with CEC staff to discuss this information request.

The Set-Top Box Energy Efficiency Landscape has Changed Dramatically Since the OIR was Adopted in Early 2012.

Significant industry-wide developments in STB efficiency during the past year have demonstrated that regulation of STBs is unnecessary at this time. Cisco joined 14 other industry partners in developing and adopting the Set-Top Box Energy Conservation Agreement ("Agreement")[5]. The Agreement includes meaningful commitments with specific deadlines

[4] Comments of Cisco Systems, Inc., Dept. of Energy Docket No. EERE-2011-BT-NOA-0067, at 6-9 (Mar. 15, 2012) ("Cisco RFI Comments").

[5] Voluntary Agreement For Ongoing Improvement to the Energy Efficiency of Set-Top Boxes, Dec. 6, 2012 ("Voluntary Agreement" or "Agreement"), *available at* http://i.ncta.com/VoluntaryAgreement-EnergyEfficiencyofSetTopBoxes.pdf. Participants include Comcast, DIRECTV, DISH Network, Time Warner Cable, Cox, Verizon, Charter, AT&T, Cablevision, Bright House Networks and CenturyLink, and manufacturers Cisco, Motorola, EchoStar Technologies and ARRIS.

designed to ensure that at least 90% of all STBs purchased and deployed after 2013 will meet the ENERGY STAR® 3.0 rating. These actions will increase STB energy efficiency by an average of 45% and will generate residential electricity savings of $1.5 billion annually. The Agreement includes the following components:

- At least 90 percent of all new STBs purchased and deployed after December 31, 2013 will meet ENERGY STAR® 3.0 efficiency levels.

- For immediate electricity cost savings, more than 10 million already-deployed STBs with digital video recording ("DVR") capabilities will be updated by cable providers to include "light sleep" capabilities. Telecommunications providers committed to offering similar light sleep capabilities this year, and satellite providers committed to including an "automatic power down" feature in 90 percent of STBs purchased and deployed.

- Energy efficient whole-home DVR solutions will be available as an alternative to multiple in-home DVRs for subscribers of satellite and some telecommunications providers beginning in 2013.

- "Deep sleep" functionality in next generation cable STBs will be field tested and deployed if successful.

Importantly, the Agreement also provides sufficient flexibility to promote continued innovation in this dynamic technology. Restrictive standards for STBs, such as those currently contemplated by DOE, would discourage incorporation of innovative features in new STBs. Manufacturers would be reluctant to introduce such features unless they could be sure that the new features either would not increase the energy consumption of the device or would be popular enough in the market to overcome the cost of preemptively seeking a change in the regulatory standard. This kind of pre-authorization approach would greatly retard innovation in the STB market.

The Agreement includes strict audit, verification, and enforcement measures to ensure continued participation, as well as governance structures and procedures to evaluate progress and adjust the Agreement accordingly. It is now in force and is already delivering savings to consumers on their electric bills.

Cisco's Recommendation for CEC Action on Set-Top Boxes

The market for video distribution service is rapidly evolving as the industry strives to provide services that meet consumer expectations. Through innovation and voluntary efforts, the industry has made great strides in making STBs and network equipment more efficient without compromising functionality. Imposing standards either in California or at the federal level is arguably unwarranted and could, in fact, hinder innovation.

Rather than pursuing a time consuming regulatory path that will offer, at best, marginal benefits many years from now, CEC should work with the industry participants on implementation of the Voluntary Agreement. CEC should allow a reasonable period of time to monitor progress on reducing energy consumption and set a future date by which it would determine whether meaningful additional energy efficiency gains can be achieved through regulation of STBs. This approach would allow CEC to make a more informed decision on the need to regulate STBs in the first instance. Importantly, it would also reduce the near-term burden on CEC to complete the broad spectrum of rulemakings contemplated in Phase 1 of the Commission's OIR.

Cisco appreciates CEC's consideration of our perspective on this matter.

Sincerely,

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