

**AMENDMENT NO. 1  
TO THE  
VOLUNTARY AGREEMENT  
FOR ONGOING IMPROVEMENT TO THE ENERGY EFFICIENCY OF SET-TOP BOXES**

Effective January 1, 2014

This document sets out a Voluntary Agreement between the undersigned Signatories to continue improvements in the energy efficiency of Set-Top Boxes used in the distribution of digital video signals.

**1. Purpose**

- 1.1. The Voluntary Agreement for Ongoing Improvements in the Energy Efficiency of Set-Top Boxes dated December 6, 2012 was adopted to continue improvements in the energy efficiency of Set-Top Boxes used in the delivery of services by Service Providers, thereby further reducing potential environmental impact and increasing benefits to consumers. Fostering device and service functionality while encouraging innovation and competition by Service Providers and Manufacturers are equally important objectives of this Voluntary Agreement.
- 1.2. The purpose of this Amendment No. 1 to the Voluntary Agreement is to continue such improvements by adopting Tier 2 requirements for Set-Top Boxes; by expanding the scope of devices included in Tier 2 requirements; and by including Energy Advocates as Signatories and voting Members of the Steering Committee that serves as the coordinating and governing body of this Voluntary Agreement.
- 1.3. The Voluntary Agreement as amended is attached hereto as Attachment A.
- 1.4. The Voluntary Agreement as amended is intended to be a complete and adequate substitute for all Federal and State legislative and regulatory solutions pertaining to the energy efficiency of set-top boxes. The Signatories agree that the Voluntary Agreement is the preferred means for addressing the energy consumption of complex, networked, digital video service set-top boxes that are generally owned by the Service Provider and integrated with distribution networks, but deployed within the premises of customers.

**2. Energy Advocate Signatories to the Voluntary Agreement**

- 2.1. The undersigned Energy Advocates agree to become Signatories to the Voluntary Agreement as amended.
- 2.2. In addition, the Signatories are commencing joint efforts to develop energy efficiency measures for application to small networking equipment (e.g., residential modems, routers, etc.).

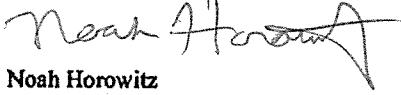
**3. Conditions to Effectiveness of Tier 2 and Amendment No. 1**

- 3.1. All commitments of Signatories are contingent on the continued absence of all U.S. Federal and State proceedings and legislative efforts considering mandatory test procedures or energy efficiency regulation of Set-Top Boxes and Multi-Service Gateway Set-Top Boxes used by Service Providers, unless otherwise mutually agreed by the Signatories.
- 3.2. Each Signatory will use its best efforts to discourage initiation of any new mandatory test procedures or energy efficiency regulation or legislation directed at Set-Top Boxes and Multi-Service Gateway Set-Top Boxes used by Service Providers.
- 3.3. The effective date of this Amendment No. 1 is January 1, 2014.

The undersigned Signatories agree to the Voluntary Agreement as amended.

Natural Resources Defense Council

Signature:



Name: Noah Horowitz

Title: Senior Scientist and Director - NRDC Center for Energy Efficiency Standards

Date: 12/19/2013

American Council for an Energy-Efficient Economy and the Appliance Standards Awareness Project

Signature:



Name: Naomi Baum

Title: Chief Operating Officer, ACEEE

Date: 12/19/2013

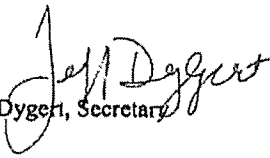
On behalf of all Signatories to the Voluntary Agreement, this will certify that this Amendment No. 1 has been duly adopted in accordance with the terms of the Voluntary Agreement.

Signature:



Mark Hess, Chairman

Signature:



Jeffrey H. Dyger, Secretary

Attachment A

**VOLUNTARY AGREEMENT  
FOR ONGOING IMPROVEMENT TO THE ENERGY EFFICIENCY OF SET-TOP BOXES**

Amended and Restated: January 1, 2014

This document sets out a Voluntary Agreement between the undersigned Signatories to continue improvements in the energy efficiency of Set-Top Boxes used in the distribution of digital video signals. The Annexes 1-13 attached hereto form part of the Voluntary Agreement.

**1. Purpose**

- 1.1. The purpose of this Voluntary Agreement is to continue improvements in the energy efficiency of Set-Top Boxes used in the delivery of services by Service Providers, thereby further reducing potential environmental impact and increasing benefits to consumers. Fostering device and service functionality while encouraging innovation and competition by Service Providers and Manufacturers are equally important objectives of this Voluntary Agreement.
- 1.2. Energy efficiency improvements will be pursued provided that such improvements do not jeopardize the intended uses and functionalities of Set-Top Boxes; that they preserve or enhance the customer experience; and that they are sufficiently flexible to adapt to technological options and market competition, to improve functionality, to offer service enhancements, and to foster rapid innovation.
- 1.3. The Voluntary Agreement is intended to be a complete and adequate substitute for all Federal and State legislative and regulatory solutions. The Signatories agree that this agreement is the preferred means for addressing the energy consumption of complex, networked, digital video service set-top boxes that are generally owned by the Service Provider and integrated with distribution networks, but deployed within the premises of customers.
- 1.4. The Signatories agree that energy efficiency measures should not create undue burdens or competitive disadvantages for Service Providers compared with other means of distributing video programming and other programming services.
- 1.5. Nothing in this Voluntary Agreement shall preclude any party from implementing energy efficiency measures that exceed the requirements of this Agreement.

**2. Equipment Covered**

- 2.1. This Voluntary Agreement initially covers only new Set-Top Boxes, as defined in Annex 1, ordered and placed into service in the United States by a Service Provider after the Effective Date. Except as specifically set forth in the Annexes 3-5 applicable to specific industry groups of Service Providers, there is no retroactive effect on equipment that is deployed or in inventory prior to the Effective Date, nor is there any requirement to retire or change existing equipment or to change existing equipment that is returned to the Service Provider and refurbished, repaired, and/or upgraded, and then redeployed.
- 2.2. Pursuant to the procedures of Section 11, during calendar year 2013 the Steering Committee will discuss amendments to this Voluntary Agreement that might be adopted to apply to future devices used by Service Providers for the delivery of commercial video services to consumers.
- 2.3. In addition, the Signatories are commencing joint efforts to develop energy efficiency measures for application to small networking equipment (e.g., residential modems, routers, etc.).

### **3. Service Provider Signatory Commitments for Set-Top Boxes**

#### 3.1. From the Effective Date:

- 3.1.1. Service Providers, through their purchasing, will support and encourage the development of new Set-Top Boxes designed to minimize energy consumption as specified below while achieving the operational specifications, preserving their intended uses and functionalities, permitting ongoing innovation, preserving and enhancing the customer experience, and complying with existing applicable regulation.
- 3.1.2. Ninety percent (90%) of all new Set-Top Boxes that a Service Provider Purchases after December 31, 2013 shall meet the efficiency standards established for ENERGY STAR Version 3.0 devices as of the Effective Date (“Tier 1”).
- 3.1.3. A Service Provider shall also comply with such specific energy efficiency provisions as are set forth in the Annex specifically accepted by the Service Provider when it becomes a Signatory.

#### 3.2. From the effective date of Amendment No. 1:

- 3.2.1. Ninety percent (90%) of all new Set-Top Boxes (including Multi-Service Gateway Set-Top Boxes) that a Service Provider Purchases after December 31, 2016 shall meet the efficiency standards established for Tier 2 devices.

#### 3.3. Service Providers will support:

- 3.3.1. reasonable steps to monitor the effectiveness of this Voluntary Agreement through the procedure described in Section 10;
- 3.3.2. periodic review of the Voluntary Agreement to consider amendment to the Voluntary Agreement through the procedure described in Section 11; and
- 3.3.3. reasonable steps to inform consumers about the general energy consumption characteristics and performance of Set-Top Boxes, as described in Section 7.5.

### **4. Signatories to the Voluntary Agreement**

- 4.1. Service Providers may become Signatories by signing Annex 7, Part A.
- 4.2. Equipment Manufacturers, Component Manufacturers, Software Providers, and Conditional Access Providers may become Vendor Signatories to the Voluntary Agreement by signing Annex 7, Part B. Each such Vendor Signatory endorses the purposes of the Voluntary Agreement and agrees to its commitments set out herein.
- 4.3. Each Signatory commits only to the areas which are under its individual control and responsibility.
- 4.4. After the Effective Date, qualified additional parties may become Signatories upon the approval of the Steering Committee, which shall not be unreasonably withheld.

### **5. Vendor Signatory Commitments for Set-Top Boxes**

- 5.1. Component Manufacturers will use reasonable efforts to design Set-Top Box components which improve functionality and enable component sub-systems to be controlled and operated in an energy efficient manner.
- 5.2. Conditional Access Providers will use reasonable efforts to design and develop conditional access systems which enable improved Set-Top Box energy efficiency while meeting the functional and operational specifications of Service Providers.

- 5.3. Equipment Manufacturers will use reasonable efforts to design and manufacture equipment to enable improved Set-Top Box energy efficiency while meeting the Service Providers' functional and operational specifications.
- 5.4. Software Providers will use reasonable efforts to develop software power management applications that are consistent with the commitments made by Service Providers for Set-Top Boxes and that enable Service Providers to utilize and integrate hardware power management features offered by Equipment Manufacturers and to do so without negatively impacting other Set-Top Box features and functionality or adversely affecting the End User customer experience.

## **6. Test Method**

- 6.1. The applicable test methodologies and procedures are fully described within this document or incorporated by reference to external methodologies and/or procedures. Clarification of referenced methodologies or procedures is provided in Annex 6 to avoid ambiguity.
- 6.2. Compliance with the Tier 1 energy consumption targets shall be demonstrated using tests defined in or reasonably consistent with the EPA ENERGY STAR Version 3.0 STB Testing Program.
  - 6.2.1. The energy efficiency of Set-Top Boxes will be tested as normally installed for the End User as is specified in the ENERGY STAR Version 3.0 STB Program. Tests must be conducted using an EPA-Recognized Laboratory listed at the ENERGY STAR web site [http://www.energystar.gov/index.cfm?c=third\\_party\\_certification.tpc\\_index](http://www.energystar.gov/index.cfm?c=third_party_certification.tpc_index) or new test facilities which are pre-approved as test facilities for specific technologies as set forth in Annexes 3-5. Set-Top Boxes that have already been tested and appear on the ENERGY STAR Qualified Product List as meeting the efficiency standards for ENERGY STAR Version 3.0 (or later) devices need not be re-tested under this Voluntary Agreement for Tier 1 compliance as long as the ENERGY STAR test was conducted on the Service Provider's live network or simulated environment in the Service Provider's as-deployed configuration; but such Set-Top Boxes shall be included in annual reports required by Section 7.1.
  - 6.2.2. The Signatories agree that Equipment Manufacturers, Service Providers, Software Providers, Conditional Access Providers and Component Manufacturers are constantly innovating their products in response to developments in service concepts and technologies, competition, and consumer demand. In order to foster the benefits of such innovative and competitive markets, when testing for compliance with the Tier 1 energy consumption targets, new features/functions which consume significant power and functions not covered by the ENERGY STAR Version 3.0 STB Program should be deactivated (if possible) during the testing process and are not to be counted against reported efficiency targets. The test results will explicitly list any functions that were deactivated during testing. If it is not possible to deactivate such functions for testing, the Signatory may provide written documentation indicating the incremental power consumption of the function to be excluded from the reported test result. Such deactivated/excluded functions may be accounted for in updated applicable energy consumption targets. Set-Top Boxes that utilize this method shall also report the TEC of the Set-Top Boxes tested as configured in their as-deployed configuration, without deactivation of as-deployed features not covered by ENERGY STAR Version 3.0.
  - 6.2.3. A Service Provider has the option to demonstrate compliance with the Tier 1 energy consumption targets by using the test methodologies and procedures for Tier 2

Commitments as described in Annex 6 (Test Method), Annex 10 (Tier 2 Commitments) and Annex 11 (New Features Process).

- 6.3. The applicable test methodologies and procedures for Tier 2 Commitments are fully described in Annex 6 (Test Method), Annex 10 (Tier 2 Commitments) and Annex 11 (New Features Process). Tests must be conducted using qualified vendor test facilities on laboratories plants, Service Provider laboratories plants, or test facilities which are pre-approved as test facilities for specific technologies as set forth in Annexes 3-5.

## **7. Reporting**

- 7.1. Each Service Provider shall prepare a confidential annual report by April 1 of each year commencing in 2014 containing the data for the prior Reporting Period during which it was a Signatory and submit the report to the Independent Administrator or to an aggregating entity as set forth in Section 7.4 below.
  - 7.1.1. The information in the annual report shall include:
    - 7.1.1.1. For each Set-Top Box model Purchased during the Reporting Period, all information necessary to calculate maximum allowed or reported TEC, including:
      - 7.1.1.1.1. Modal power use (e.g., on, sleep, deep sleep) and annual energy use (TEC);
      - 7.1.1.1.2. Features similar to those reported to ENERGY STAR (e.g., HD, DVR, whole home, HNI, auto power down enabled, etc.); and
      - 7.1.1.1.3. Details on calculating TEC and implementation of sleep states, including the number of hours deep sleep was set for at deployment.
    - 7.1.1.2. Different configurations of a model should be reported separately if energy use varies by configuration.
    - 7.1.1.3. Procurement information (total units Purchased by category and units Purchased compliant with Tier 1 and with Tier 2 requirements by category) with an attestation that the volumes reported reflect units Purchased during the reporting period.
  - 7.1.2. For reporting purposes from 2014-2016, Service Providers shall also provide the same information with respect to Digital Transport Adapters and Multi-Service Gateway Set-Top Boxes in commercial deployment.
  - 7.1.3. Service Providers are encouraged towards early adoption of Tier 2 commitments. To that end, annual reports for the 2014, 2015, and 2016 reporting periods (report years 2015, 2016, 2017) will include the percentage of Set-Top Boxes that test at Tier 2 levels. A Service Provider has the option to report this percentage by using the test method defined in Section 6.1 through 6.3 to approximate Tier 2 qualification, or to use the test method described in Annex 10 (Tier 2 Commitments) and Annex 11 (New Features Process). Clarification of referenced methodologies or procedures is provided in Annex 6.
  - 7.1.4. The information in the annual report shall include the number of residential multichannel video subscribers served during the reporting period, with an indication of the “as of” date.
  - 7.1.5. Service Providers are invited to report information to the Independent Administrator that can help to describe trends and progress. For example: (1) the number of consumers who upgraded from SD non-DVR to HD DVR service, which upgrade consumed less energy than an upgrade under the 2012 Base Case; (2) the number of thin clients in lieu of fully-featured Set-Top Boxes under the 2012 Base Case; and (3) the number of hours of tablet viewing. It is understood that accounting and reporting systems vary, and that the

Independent Administrator will be expected to aggregate data in order to protect the confidentiality of individual Service Provider information.

- 7.1.6. Service Providers shall provide an annual report for the 2017 Reporting Period by April 1, 2018, notwithstanding any expiration of the initial Term of the Voluntary Agreement.
- 7.1.7. A recommended reporting template is shown in Annex 2.
- 7.2. By April 1 of each year commencing in 2014, the National Cable & Telecommunications Association (NCTA) and the Consumer Electronics Association (CEA) shall provide the Independent Administrator with the estimated total number of U.S. residential multichannel video subscribers served by all Service Providers (including those outside of the Voluntary Agreement) during the reporting period. NCTA and CEA shall provide this estimate for the 2017 Reporting Period, notwithstanding any expiration of the initial Term of the Voluntary Agreement. By May 1 of each year commencing in 2014, NCTA and CEA shall provide information on progress with respect to non-procurement commitments in Annexes 3, 4A, 4B and 5 for inclusion in the annual report.
- 7.3. A Reporting Period covers a single calendar year. When a Service Provider is making its first report, it may provide data either for the entire prior calendar year (effectively backdating its commitment to the January 1 preceding its signature) or provide a report covering only the period beginning with its signature.
- 7.4. Service Providers may elect to submit reports to a recognized industry consortium or industry association for aggregation and anonymization prior to forwarding to the Independent Administrator for final aggregation and reporting, provided that individual records are retained for purposes of audit. In the case of Set-Top Box purchases, the aggregating entity shall provide the Independent Administrator with: (1) the total number of compliant Set-Top Boxes Purchased by company; (2) the total number of Set-Top Boxes Purchased by company; (3) TEC by model; and (4) the total number by category of Set-Top Box (e.g., Cable DVR, Non-DVR, Thin Client, Digital Transport Adapters and Multi-Service Gateway Set-Top Boxes) aggregated and anonymized so as not to reveal the mix of products by company.
- 7.5. All reporting arrangements shall protect the confidentiality of commercially sensitive information. The Independent Administrator must sign a confidentiality agreement in relation to any confidential information supplied by the Signatories.
- 7.6. Service Providers shall provide their subscribers and potential customers with reasonable access to energy efficiency information about the Set-Top Boxes subject to this Voluntary Agreement no later than January 1, 2014 (or six months after signature, if later). The energy efficiency information that the Service Provider shall make available under this section shall include:
  - 7.6.1. For each model of Set-Top Box Purchased after January 1, 2014:
    - 7.6.1.1. Modal power use (e.g., on, sleep, deep sleep) and annual energy use (TEC); and
    - 7.6.1.2. Features similar to those reported to ENERGY STAR (e.g., HD, DVR, whole home, HNI, auto power down enabled, etc.). The feature set description will be sufficient to calculate the applicable allowance.
    - 7.6.1.3. Set-Top Boxes that meet the Tier 1 energy consumption targets by deactivating or accounting for new features and functionalities shall report both the qualifying TEC and the TEC of the Set-Top Boxes as configured in their as-deployed configuration, without deactivation of as-deployed features not covered by ENERGY STAR Version 3.0. The latter TEC shall be provided to subscribers and potential

customers pursuant to this Section 7.6 and published in the annual report required by Section 7.8.

- 7.6.2. For reporting purposes from 2014-2016, Service Providers shall also provide the same information with respect to Digital Transport Adapters and Multi-Service Gateway Set-Top Boxes in commercial deployment.
  - 7.6.3. Different configurations of a model should be reported separately if energy use varies by configuration.
  - 7.6.4. This information need not be updated for software and/or configuration changes unless changes significantly affect energy use.
  - 7.6.5. This information shall be made publicly available for each such model as such models are made available to the Service Provider's subscribers.
  - 7.6.6. The information need not include confidential or commercially sensitive information, such as features that have not been publicly announced.
- 7.7. The Independent Administrator will aggregate and compile the confidential data submitted by Signatories and submit a report to the Steering Committee for each Reporting Period by May 31 of the following year. To preserve confidentiality, except as set forth below for early adoption of Tier 2, any such official report produced by the Independent Administrator in connection with the information supplied by any individual Signatory shall not refer to the performance of individual Signatories.
- 7.7.1. The Independent Administrator will aggregate Service Provider reports of models/units/annual energy use and report aggregated TEC on a purchases weighted basis in categories such as DVR/Non-DVR/Thin Client/DTA/Multi-Service Gateway Set-Top Box. Aggregation must be sufficient so that no individual company's results can be deduced or reasonably approximated. Data may be averaged in the Independent Administrator report to the Steering Committee.
  - 7.7.2. Model-specific data may be made available to the Steering Committee, unless the model is specific to or predominantly used by a single Service Provider and has not been made available publicly.
  - 7.7.3. The information shall not include confidential or commercially sensitive information, such as shipping and volume reports and features that have not been publicly announced.
  - 7.7.4. The percentage of Set-Top Boxes that test at Tier 2 levels early shall be provided on a Service Provider-specific basis to the Steering Committee.
  - 7.7.5. The Independent Administrator may report trends useful for power load planning, such as overall rate of change in plug load.
  - 7.7.6. The Report shall report efficiency gains under the Voluntary Agreement, compared with the 2012 Base Case.
  - 7.7.7. The Independent Administrator report should put data in context. For example: (1) the number of consumers who upgraded from SD non-DVR to HD DVR service, which upgrade consumed less energy than an upgrade under the 2012 Base Case; (2) the number of Thin Clients in lieu of fully-featured Set-Top Boxes under the 2012 Base Case; (3) examples of implementations that permit viewing without a Set-Top Box; and (4) that such Multi-Service Gateway Set-Top Boxes as may be reported during the 2014-2016 period are nascent products that are under development.



- 7.7.8. If the Independent Administrator finds substantial non-compliance in a Service Provider report, it shall provide notice to the Service Provider by May 1 and to the committee of Signatories designated pursuant to Section 12.5.
- 7.7.9. The Independent Administrator shall provide a report to the Steering Committee for the 2017 Reporting Period by May 31, 2018, notwithstanding any expiration of the initial Term of the Voluntary Agreement.
- 7.8. The Independent Administrator and Steering Committee shall publish a public annual report that will:
  - 7.8.1. Identify participating members during the reporting period.
  - 7.8.2. Identify the aggregate number of video customers served by Service Provider Signatories compared with the number of U.S. residential multichannel video subscribers served by all Service Providers (including those outside of the Voluntary Agreement) during the reporting period.
  - 7.8.3. Report efficiency gains under the Voluntary Agreement, compared with the 2012 Base Case. The percentage of Set-Top Boxes that test at Tier 2 levels early shall be provided only on an aggregate basis in the annual report.
  - 7.8.4. Indicate information that has been corroborated through field verification.
  - 7.8.5. Include a narrative of trends, such as overall progress under the Voluntary Agreement, overall rate of change in plug load, and contextual comments such as those identified in Section 7.7.7.
  - 7.8.6. Include an Appendix of Set-Top Boxes which Service Providers have Purchased during the Reporting Period including their model number, features, modal power use (e.g., on, sleep, deep sleep) and annual energy use (TEC). The information shall not include confidential or commercially sensitive information, such as shipping and volume reports and features that have not been publicly announced.
- 7.9. To preserve confidentiality, any such annual report produced by the Independent Administrator in connection with the information supplied by any individual Signatory shall not refer to the performance of individual Signatories or provide information from which an individual company's results can be deduced or reasonably approximated.
- 7.10. The Steering Committee shall make arrangements for the publication of an annual report for the 2017 Reporting Period by July 30, 2018, notwithstanding any expiration of the initial Term of the Voluntary Agreement.

## **8. Audit and Verification**

- 8.1. Either the Independent Administrator or an independent auditor approved by the Steering Committee will conduct an audit of procurement figures reported by one Service Provider selected at random each year. The same Service Provider shall not be randomly selected two years in a row.
- 8.2. In addition, on request of the Steering Committee, the Independent Administrator shall instruct an independent auditor approved by the Steering Committee to conduct an audit of the information and test results supplied by any Service Provider's Annex 2 annual report, provided that information and test results which is also submitted to ENERGY STAR may not be subject to an audit other than one initiated by ENERGY STAR if the ENERGY STAR test was conducted on the Service Provider's live network or simulated environment in the Service Provider's as-deployed configuration. Commercially sensitive information with respect to an individual Signatory, as designated by that Signatory, shall remain confidential both during and

after the audit. Signatories agree to provide reasonable assistance to the auditor. The independent auditor must sign a confidentiality agreement in a form reasonably satisfactory to the Signatory. The Steering Committee shall bear the cost of such audit.

- 8.3. The Independent Administrator shall arrange for field verification of Set-Top Box energy consumption as follows.
  - 8.3.1. Verification will test only Set-Top Boxes on various Service Provider networks in no fewer than 80 and no more than 100 homes annually, at least 12% of which shall be in California. Set-Top Boxes that have been qualified through the ENERGY STAR program are not excluded from field verification. The Steering Committee shall determine the scope and sampling methodology (including limitations on the frequency with which any particular Service Provider is subject to field verification), verification protocols, verification dispute resolution procedures and reporting format, and the means for protecting the confidentiality of data collected during verification. Such procedures shall include recording whether the end-user has disabled or modified as-deployed energy-related settings. The verification process shall not inconvenience customers.
  - 8.3.2. Field verification reports to the Steering Committee shall include the information set forth in Annex 13.
  - 8.3.3. The cost of field verification shall be assessed equitably by the Steering Committee among the Signatories other than the Energy Advocates, separate from the dues established under Section 9. Costs of field verification shall not be imposed entirely upon the Vendor Signatories.
  - 8.3.4. Service Providers or their designees will identify candidate homes/customers utilizing the Set-Top Boxes subject to field verification. The field verification will not be identified as being sponsored or endorsed by the Service Provider without the consent of the Service Provider.
  - 8.3.5. Issues identified during field verification shall be submitted for discussion with the relevant Service Provider and/or by the Steering Committee. Substantial non-compliance identified from field verification shall be submitted as a claim for resolution under Section 12.3 through 12.5.
  - 8.3.6. Field verification shall take place annually from 2014 through 2017. Field verification conducted in 2017 shall consist primarily of Set-Top Boxes covered by Tier 2 Commitments described in Annex 10 (Tier 2 Commitments).

## **9. Steering Committee**

- 9.1. A Steering Committee is established as the coordinating and governing body of this Voluntary Agreement.
- 9.2. Each Service Provider with more than two million U.S. residential multichannel video subscribers as of its date of execution of this Voluntary Agreement, or which is one of the three largest telephone providers of U.S. residential multichannel video services, may nominate one person to represent it as a Member on the Steering Committee. Initial Service Provider Signatories shall maintain their Member seats on the Steering Committee notwithstanding any merger or consolidation of particular Service Provider Members.
- 9.3. The Vendor Signatories in Annex 7, Part B together may nominate no more than three persons to serve as Members of the Steering Committee. A representative of the Consumer Electronics Association shall serve as one such Member. No Signatory may be represented twice.

- 9.4. A representative of the National Cable & Telecommunications Association shall serve as a Member.
- 9.5. The Energy Advocates together may nominate no more than two persons to serve as voting Members of the Steering Committee. The Energy Advocates may also nominate a third person as a non-voting participant of the Steering Committee representing an Energy Advocate who has not nominated a voting Member, with full rights to receive information, participate, and attend meetings as do Members but with no voting rights.
- 9.6. Signatories entitled to nominate a Member may appoint an alternate representative that may attend meetings and vote in the absence of that Member. Signatories may replace a Member or alternative representative on notice.
- 9.7. The Steering Committee will elect a Chair from among its Members.
- 9.8. The Chair will be responsible for convening the Steering Committee meetings at least once each calendar year, and for running meetings of the Steering Committee.
- 9.9. At the request of any Signatory, the Chair may authorize any person to attend meetings of the Steering Committee as a non-voting observer.
- 9.10. Attendees at Steering Committee meetings shall sign a confidentiality agreement as a condition of attendance.
- 9.11. The Steering Committee may adopt rules of procedure and administration. At a minimum, such rules will provide that all Members will be provided with at least fifteen (15) days' prior written notice of meetings of the Steering Committee or any sub-committee or any other groups acting in accordance with this Voluntary Agreement, that an agenda will be circulated sufficiently before the meeting to be reviewed by counsel, that no substantive vote will occur unless the subject of the vote was included in such prior notice, and that written minutes as to all topics of discussion be recorded, approved by all committee Members, and retained.
- 9.12. The Steering Committee may adopt rules for reporting, verification, and audit, which may be informed by existing ENERGY STAR procedures. For purposes of reporting compliance with the Tier 1 energy consumption targets, these rules may include specific procedures for Service Providers to use in documenting deactivated functions or excluding the power consumed by functions not covered by the ENERGY STAR Version 3.0 STB Program, as set forth in Section 6.2.2.
- 9.13. The Steering Committee may delegate any of its powers under the Voluntary Agreement to specific individuals or to sub-committees established by the Steering Committee.
- 9.14. The Steering Committee shall designate an Independent Administrator to be responsible for the collection and processing of information supplied directly or indirectly by Signatories and determining a Signatory's compliance with the Voluntary Agreement.
- 9.15. The costs of attending Steering Committee meetings will be borne by each attendee.
- 9.16. The costs of operating the Steering Committee shall be allocated in cost-recovery only annual dues set by the Steering Committee and assessed equally on each Signatory. The initial amount shall not exceed \$10,000 per Signatory annually. Annual dues for non-profit Energy Advocates shall be 25% of dues for commercial Signatories, with no financial responsibility for field verification costs.
- 9.17. The Steering Committee will seek regular consultation and engagement with the official representatives of the Department of Energy, the Environmental Protection Agency, appropriate state regulatory authorities, and other stakeholders to provide updates regarding the implementation of this Agreement.

## **10. Review of the Voluntary Agreement**

### 10.1. Annual Review

10.1.1. At least once each calendar year the Steering Committee will meet to review the Voluntary Agreement in order to:

10.1.1.1. evaluate the effectiveness of the Voluntary Agreement in achieving its purposes as identified in Section 1 above;

10.1.1.2. create an annual report consistent with Section 7.8;

10.1.1.3. evaluate current and future developments that may influence energy consumption with a view to agreeing upon a course of action and/or revising the Voluntary Agreement; and

10.1.1.4. set future targets to increase energy efficiencies in accordance with the usual product development cycles.

10.1.2. Such discussions shall take place on a confidential basis.

### 10.2. Interim Consultations

10.2.1. During the first year of operation under this Voluntary Agreement, the Steering Committee shall meet at least quarterly at a mutually agreed upon time and place to review progress towards applicable targets and any significant issues discovered which are likely to affect meeting such targets.

10.2.2. During the second year of operation under this Voluntary Agreement, the Steering Committee shall meet at least quarterly at a mutually agreed upon time and place. Some of these meetings may be held by conference call.

10.2.3. During subsequent years of operation under this Voluntary Agreement, the Steering Committee may hold periodic meetings on a mutually agreeable timetable.

10.2.4. The Signatories agree to review the energy use of Set-Top Boxes that incorporate DOCSIS 3.0 8x4 mode and greater by October 2015 and to modify the Additional Functionality TEC Allowance as appropriate.

## **11. Amendment of the Voluntary Agreement**

11.1. The Voluntary Agreement may be amended in accordance with Section 10 and in accordance with the procedure set out in this Section 11. The Steering Committee will consult on proposed amendments to the Voluntary Agreement prior to any vote on an amendment.

11.2. The Members of the Steering Committee will negotiate in good faith when considering amendments to the Voluntary Agreement.

11.3. The Chair of the Steering Committee will call for a vote to be made by a subsequent meeting of the Steering Committee. All Members will be notified of the details of the next meeting, the proposed amendment(s) and the calling of a vote in accordance with the notice provisions of Section 9.10.

11.4. At the next meeting of the Steering Committee, each proposed amendment will be adopted if (1) there is at least agreement of two-thirds of the Service Provider Members; (2) the two-thirds includes at least one Member of each of the three industry groups of Service Providers (cable, satellite, and telephone) covered by the Voluntary Agreement; and (3) there is agreement by a majority of all voting Members. The telephone companies that sign either Annex 4A or 4B are together deemed to be one industry group for purposes of voting requirements in this Section 11.4.

- 11.5. An industry-specific Annex may only be amended by agreement of two-thirds of the Service Provider Members covered by that specific Annex, after consultation with such Vendor Member(s) as is appropriate for that industry-specific Annex. Service Providers not covered by a particular industry-specific Annex may not prevent amendment of that Annex.
- 11.6. Any Member may raise with the Steering Committee any concerns that an amendment to an industry-specific annex is inconsistent with the purpose of this Voluntary Agreement and may require further amendments to the Voluntary Agreement.
- 11.7. Once an amendment to the Voluntary Agreement has been adopted by the Steering Committee, the Voluntary Agreement will be amended with the newly adopted amendment taking effect on the next anniversary of the Effective Date or such other date as may be adopted with the amendment.

## **12. Non-Compliance and Dispute Resolution**

- 12.1. Substantial compliance with the Voluntary Agreement shall be assessed by the Independent Administrator based upon data for the most recently completed Reporting Period on the basis of the information provided by each Signatory and data collected under the field verification program.
- 12.2. In mitigation of any claims or concerns raised with respect to any Reporting Period and in evaluating substantial compliance with the Voluntary Agreement, a Service Provider shall be credited for alternative energy efficiency steps which the Service Provider demonstrates will provide net energy efficiency gains in the delivery of content that are superior to those required by the Voluntary Agreement. The Steering Committee shall adopt procedures for evaluating such alternative energy efficiency steps. The Steering Committee may authorize a committee of Signatories to approve an alternative efficiency credit, but only if such committee includes at least one Energy Advocate Signatory that approves the request.
- 12.3. The Steering Committee may raise a claim against a Signatory concerning compliance with the Voluntary Agreement.
- 12.4. The Steering Committee will establish dispute and compliance resolution procedures that provide notice of a claim to the Signatory, and shall endeavor in good faith to resolve the issue within three (3) months through consultation.
- 12.5. A Signatory that is found by the Independent Administrator not in substantial compliance with the Voluntary Agreement after being credited for alternative energy efficiency steps, if any, shall be provided a period of three (3) months from the date of its receipt of the notice described in Section 12.4 to provide a satisfactory remedial plan to the Steering Committee. The Steering Committee shall authorize a committee of Signatories to approve a remedial plan, but only if such committee includes at least one Energy Advocate Signatory that approves the plan. A Signatory that fails to do so and to fulfill its remedial plan may have its Signatory status terminated by the Steering Committee and its termination reported to such persons as the Chair may deem appropriate.
- 12.6. Involuntary termination pursuant to this Section constitutes the sole and complete remedy available to the Steering Committee, Signatories, Independent Administrator, auditor or any third party or other individuals or entities with respect to any alleged noncompliance with any term, provision or obligation of the Voluntary Agreement by a Signatory.

## **13. Termination**

- 13.1. Any Service Provider, Equipment Manufacturer, Component Manufacturer, Software Provider, and Conditional Access Provider may elect to terminate its Signatory status by giving twenty-

eight days' written notice to the Chair of the Steering Committee. Such termination shall immediately terminate all of that Signatory's rights and obligations under the Voluntary Agreement except that all confidentiality obligations arising from this Voluntary Agreement shall survive such termination.

- 13.2. The Chair will notify all Members of the Steering Committee and such other persons as the Chair may deem appropriate of the termination.
- 13.3. If Service Providers depart from the Voluntary Agreement and the remaining Service Provider Signatories serve fewer than 85% of the U.S. residential multichannel video subscribers served by Service Providers, then the Energy Advocates may, after no less than ninety days during which the Energy Advocates shall engage in good faith discussions with the Steering Committee to address their concerns, jointly terminate the Signatory status of all of the Energy Advocates and advocate for regulatory solutions; provided that their advocacy will include their best efforts to assure that Signatories still operating under the Voluntary Agreement may continue to operate under its terms in lieu of new energy efficiency regulations. Examples of such advocacy would include urging regulators to (1) narrowly define the class of any regulated covered products to cover only equipment of Service Providers who are not Signatories to the Voluntary Agreement (including those who were Signatories but have terminated their Signatory status); or (2) create a safe harbor for those operating under the Voluntary Agreement. Such termination shall be indicated by giving twenty eight days' written notice, signed by all Energy Advocates, to the Chair of the Steering Committee. Such termination shall immediately terminate all of the Energy Advocates' rights and obligations under the Voluntary Agreement except that all confidentiality obligations and these advocacy terms arising from the Voluntary Agreement shall survive such termination.
- 13.4. The Energy Advocates may also jointly terminate their Signatory status if industry commitments in the Voluntary Agreement are not being performed in good faith, or changes in the Voluntary Agreement are not faithful to the purposes of the Voluntary Agreement and consistent with the justified expectations of all Signatories. The Energy Advocates may terminate under this provision, after no less than ninety days during which the Energy Advocates shall engage in good faith discussions with the Steering Committee to address their concerns. Such termination shall be indicated by giving written notice, signed by all Energy Advocates, to the Chair of the Steering Committee. Such termination shall immediately terminate all of the Energy Advocates' rights and obligations under the Voluntary Agreement except that all confidentiality obligations arising from this Voluntary Agreement shall survive such termination.

#### **14. Termination of Regulatory Approaches**

- 14.1. Each Signatory will use its best efforts to have all U.S. Federal and State proceedings considering mandatory test procedures or energy efficiency regulation of Set-Top Boxes and Multi-Service Gateway Set-Top Boxes used by Service Providers terminated and to discourage initiation of any new regulation directed at that equipment.
- 14.2. All commitments of Signatories are contingent on the termination and continued absence of all such proceedings unless otherwise mutually agreed by the Signatories.

## **15. Term**

- 15.1. The term of this Voluntary Agreement shall begin on January 1, 2013 and shall continue for five (5) years; provided that the reporting commitments shall continue until the 2018 publication of the annual report for 2017.
- 15.2. The Voluntary Agreement may be renewed by mutual agreement.

## **16. Miscellaneous**

- 16.1. Press. A Signatory may make public statements or issue press releases in relation to the Voluntary Agreement generally and its own compliance and/or engagement with the Voluntary Agreement. Except as expressly provided in this Voluntary Agreement, neither the Steering Committee nor any Signatory may make public statements or issue press releases making reference to another Signatory's compliance and/or engagement with the Voluntary Agreement (directly or by inference), except for: (1) statements made with prior approval of that other Signatory; and (2) comparative product information; provided that no statements may make use of or reveal confidential information. A Signatory may make public statements or issue press releases in relation to the Voluntary Agreement provided that no public statement or press releases: (1) may reveal confidential information; (2) provide information from which the operations of an individual Signatory may be inferred; or (3) be used as a tool for negotiations or advocacy for Federal or State legislative and regulatory solutions, it being agreed that concerns with operations under the Voluntary Agreement or opportunities for change shall be directed to Steering Committee discussions. A Signatory may engage in press activities concerning Set-Top Box energy efficiency that do not provide information about or refer to the Voluntary Agreement.
- 16.2. Force Majeure. If a Signatory is prevented or delayed in performance of its commitments hereunder as a result of circumstances beyond such Signatory's reasonable control, including, without limitation, Acts of God, war, terrorism, acts of the government, or failure of suppliers, subcontractors, or carriers, such failure or delay will not be deemed to constitute substantial noncompliance with this Voluntary Agreement, but such commitments will remain in full force and effect, and will be performed or satisfied as soon as reasonably practicable after the termination of the relevant circumstances causing such failure or delay.
- 16.3. Counterparts. This Voluntary Agreement may be executed in one or more counterparts, each of which when so executed and delivered shall be an original and all of which together shall constitute one and the same instrument. Signatures to this Voluntary Agreement may be delivered by facsimile, which, upon delivery, shall be deemed to be originals.
- 16.4. Legal Effect. The Voluntary Agreement sets out a course of action for the Signatories to improve the energy efficiency of Set-Top Boxes. The Voluntary Agreement is not a commercial agreement and does not in itself create any contractual relationship, partnership, joint venture or other agency relationship among the Signatories. Nothing in this Voluntary Agreement shall be deemed to create a third-party beneficiary relationship.
- 16.5. Notice. All communications to Signatories in relation to the Voluntary Agreement should be addressed and sent to the relevant contact point specified in Annex 9.

## **SCHEDULE OF ANNEXES**

ANNEX 1 – GENERAL DEFINITIONS

ANNEX 2 – REPORTING PRO-FORMA

ANNEX 3 – CABLE INDUSTRY PROVISIONS

ANNEX 4A – IPTV PLATFORM PROVISIONS (AT&T and CenturyLink)

ANNEX 4B – VERIZON PLATFORM PROVISIONS (Verizon)

ANNEX 5 – SATELLITE INDUSTRY PROVISIONS

ANNEX 6 – TEST METHOD

ANNEX 7, Part A – SERVICE PROVIDER SIGNING FORMS

ANNEX 7, Part B – EQUIPMENT MANUFACTURERS, SOFTWARE PROVIDERS,  
CONDITIONAL ACCESS PROVIDERS, COMPONENT MANUFACTURERS  
SIGNING FORMS

ANNEX 8 – ANNUAL REPORT

ANNEX 9 – CONTACT INFORMATION

ANNEX 10 – TIER 2 COMMITMENTS

ANNEX 11 – NEW FEATURE PROCESS

ANNEX 12 – 2012 BASE CASE

ANNEX 13 – INFORMATION INCLUDED IN FIELD VERIFICATION REPORTS



## ANNEX 1 – GENERAL DEFINITIONS

1. “Component Manufacturer” means a company or other legal entity that is responsible for designing and manufacturing components that will be used by a second company to build a product.
2. “Conditional Access” means the encryption, decryption, and authorization techniques employed to make access to content conditional upon authorization using a key that is dynamically allocated using a conditional access (CA) or Digital Rights Management (DRM) system.
3. “Conditional Access Provider” means a company that supplies the Conditional Access techniques employed to protect content from unauthorized viewing.
4. “Effective Date” means January 1, 2013, except that as applied to a Signatory that signs the Voluntary Agreement after that date, it shall mean the date on which that party signs the Voluntary Agreement.
5. “End User” means a subscriber to content services provided by a Service Provider who uses a Set-Top Box provided by the Service Provider as part of the subscription.
6. “Energy Advocates” are the Natural Resources Defense Council and the American Council for an Energy-Efficient Economy/Appliance Standards Awareness Project.
7. “Equipment Manufacturer” means the company or other legal entity that is responsible for designing, developing and/or manufacturing a Set-Top Box for Purchase and deployment in the United States by a Service Provider.
8. “Federal” includes any part of the government of United States and any department, agency or instrument thereof.
9. “Independent Administrator” means the party designated by the Steering Committee who is tasked with, and responsible for, the collection and processing of information supplied directly or indirectly by Signatories pursuant to Section 7 and Annex 2, and determining a Signatory’s compliance with the Voluntary Agreement in accordance with Section 12. The Steering Committee shall engage the services of an Independent Administrator upon terms and conditions that shall require undertakings of confidentiality from the Independent Administrator, and which shall also set out any requirements or applicable mechanisms for a process of appeal, should this ever be necessary.
10. “Members” means the Members of the Steering Committee.
11. “Purchase” means to accept delivery of a Set-Top Box for commercial deployment in the United States.
12. “Reporting Period” means the period within which the required information is to be submitted by a Signatory (which is generally a calendar year).
13. “Service Provider” means an entity that provides video (and possibly other) content to subscribers with whom it has an ongoing contractual relationship through a cable, satellite, or other managed distribution network provided by that entity. A Service Provider in the context of the Voluntary Agreement is one that supplies Set-Top Boxes to a residential End User.
14. “Set-Top Box” means a device which is capable of receiving digital television services from a coaxial, hybrid fiber coaxial, or fiber-to-the-home distribution system, from satellites, or encapsulated in IP packets from managed IP distribution networks; to decrypt or descramble these signals; and to decode/decompress for delivery to residential consumer displays and/or recording devices, and/or one or more other Set-Top Boxes or Thin Clients in a residential multi-room architecture; and that is Purchased and placed into service in the United States by a Service

Provider for the first time on or after the Effective Date. The Set-Top Boxes subject to this Voluntary Agreement are limited to the following Set-Top Boxes supplied by Service Providers to residential End Users:

- a. DVR. A Set-Top Box that has the capability of storing digital video signals received from the network to a rewritable disk drive or other non-volatile storage media local to the unit.
- b. Non-DVR. A Set-Top Box that does not have the capability of storing digital video signals received from the network.
- c. Thin Client. A Set-Top Box that is designed to interface between another Set-Top Box and a TV (or other display device) over a home network and relies solely on the other Set-Top Box for access to digital video signals received from the network. Any Set-Top Box that meets the definition of DVR or Non-DVR is not a Thin Client.

Except as provided below for Tier 2 Commitments and as specifically set forth in Section 2.1 of Annex 3, Set-Top Boxes subject to this Voluntary Agreement do not include:

- d. Any Set-Top Box that is Purchased for the first time before the Effective Date, including any such Set-Top Box that is returned to the Service Provider and refurbished, repaired, and/or upgraded, and then redeployed, or that is used in a “swap-for-failure” scenario after the Effective Date.
- e. Any Multi-Service Gateway Set-Top Box, which for purposes of this Voluntary Agreement is a device that is capable of joining multiple Service Provider delivery protocols that provisions video and at least one of voice or broadband services from a Service Provider.

For Tier 2 Commitments, Set-Top Boxes subject to this Voluntary Agreement also include:

- f. Any Multi-Service Gateway Set-Top Box, which for purposes of this Voluntary Agreement is a device that is capable of joining multiple Service Provider delivery protocols that provisions video and at least one of voice or broadband services from a Service Provider.
- g. Any Cable Digital Transport Adapter (DTA), which for purposes of this Voluntary Agreement is a minimally-configured unidirectional Set-Top Box without recording functionality that can receive and decode video content as delivered from a coaxial or hybrid fiber coaxial system.

15. “Signatory” and “Signatories” mean those companies or organizations that sign this Voluntary Agreement as Service Providers, Vendor Signatories or Energy Advocates.
16. “Software Provider” means a company or other legal entity that is responsible for producing the middleware and/or the operational software for the Set-Top Box.
17. “State” includes the governments of the District of Columbia and any State, territory and insular possession of the United States and their political subdivisions; and any agency or instrument thereof.
18. “Steering Committee” means the coordinating and governing body of this Voluntary Agreement.
19. “Tier 1” means the energy consumption targets designated in Section 3.1.2.
20. “Tier 2” means the energy consumption targets designated in Section 3.2.1.
21. “Vendor Signatory” means the Equipment Manufacturers, Software Providers, Conditional Access Providers, Component Manufacturers that are Signatories pursuant to ANNEX 7, Part B –

Equipment Manufacturers, Software Providers, Conditional Access Providers, Component Manufacturers Signing Forms.

22. “2012 Base Case” means the report of Set-Top Box energy consumption applicable to devices prior to the Voluntary Agreement, as identified in Annex 12.

## ANNEX 2 – REPORTING PRO-FORMA

### Information to be provided by Service Providers

Name of the Service Provider	
Reporting Period to which the information relates	
Number of residential multichannel video subscribers served during the reporting period, with an indication of the “as of” date	
Total number of Set-Top Box units Purchased by the Service Provider during the Reporting Period	
Total number of Set-Top Box units Purchased Box by the Service Provider during the Reporting Period that meet the requirements of § 3	
Percentage of all Set-Top Boxes Purchased that test at Tier 2 requirements early (identify test method utilized)	
Energy consumption figures for each model, as detailed in Figure 1	
A description of new features being reported pursuant to § 6 or Annex 11 (New Features Process) and proposed allowance (documentation must be attached)	
Optional: information concerning alternative energy efficiency steps which the Service Provider wishes to be considered under § 12.2	

All Section (§) references above are to the Voluntary Agreement.

**Figure 1**

						Modal Power			Annual Energy (Compliance)	Annual Energy (as deployed)	Number Procured
Service Provider	Model Type (Primary Deployed Function)	Brand	Model Name	Model Number	Features	On (W)	Sleep (W)	Deep Sleep (W)	TEC (kWh)	TEC (kWh)	New Units

Include details on calculating TEC and implementation of sleep states.

Set-top Boxes that meet the Tier 1 energy consumption targets by deactivating or accounting for new features and functionalities shall report both the qualifying TEC and the TEC of the Set-Top Boxes as configured in their “as-deployed” configuration.

The report shall identify which models meet applicable energy consumption targets.

Category of Set-Top Box means, for the purposes of reporting under this Annex, a DVR, Non-DVR, Thin Client, Multi-Service Gateway Set-Top Box and Cable Digital Transport Adapter (DTA).

Where the data such as TEC reported for compliance differs from the data reported for public reporting, the report shall indicate which data applies for which purpose and which test method(s) were used.

Reporting format may be conformed to the format required by ENERGY STAR.

Features shall be referred to by the following descriptors:

**Tier 1 (ENERGY STAR Version 3.0)**

<b>Base Type</b>	<b>Descriptor</b>
Cable	CBL
Satellite	SAT
Cable Digital Transport Adapter (DTA)	DTA
Internet Protocol (IP)	IP
Thin Client	TC
<b>Allowance</b>	<b>Descriptor</b>
Advanced Video Processing	AVP
CableCARD	CC
Digital Video Recorder (DVR)	DVR
DOCSIS	DOC
High Definition (HD) Resolution	HD
Home Network Interface	HNI
Multi-Room	MR
Multi-Stream - Cable/Satellite	MS-C/S
Multi-Stream – Terrestrial/IP	MS-T/I

**Tier 2**

<b>Base Type</b>	<b>Descriptor</b>
Cable	CBL
Cable Digital Transport Adapter (DTA)	DTA
Satellite	SAT
Internet Protocol	IP
Thin Client	TC
<b>Allowance</b>	<b>Descriptor</b>
Advanced Video Processing	AVP(n) (n = number of active decoders)
High Definition	HD
Multi-Stream (1 < received streams ≤ 2)	MS
Multi-Stream Additional (2 < received streams ≤ 8)	MS-A
Transcoding (XCD)	XCD
Transcoding Additional (per tested stream transcoded)	XCD-A(n) (n = number of tested streams transcoded)
CableCARD (per CC, max 2)	CC(n) (n = number of CableCARDs)
DOCSIS 2.0	D2
DOCSIS 3.0 (up to and including 8X4 mode)	D3
Digital Video Recorder	DVR
Shared DVR	S-DVR
Multi-Room	MR
Home Network Interface	HNI
MoCA HNI	M-HNI
WiFi HNI	W-HNI
MIMO WiFi HNI	MIMO
Routing	RTG

## ANNEX 3 - CABLE INDUSTRY PROVISIONS

### 1. Signatories

- 1.1. The detailed commitments set forth in this Cable Industry Annex have been subscribed to by Comcast Cable Communications, LLC, Time Warner Cable, Inc., Cox Communications, Inc., Charter Communications, Inc., Cablevision Systems Corp., and Bright House Networks, LLC (“Cable Operators”). The Cable Operators are the largest Service Provider member companies of the National Cable & Telecommunications Association (NCTA) who serve approximately 85% of cable subscribers. Key vendors to the cable industry, identified in ANNEX 7, Part B, are also Signatories in support of the Voluntary Agreement.

### 2. Phase 1: Sleep

- 2.1. The Voluntary Agreement does not have any effect on previously deployed equipment. The Cable Operators nonetheless specifically commit to go beyond this general principle. The Cable Operators will continue the deployment which commenced in September 2012 of new Set-Top Boxes with “light sleep” capabilities while still preserving their functionality and of software updates enabling “light sleep” to certain models of deployed DVRs that have been placed in service prior to the Effective Date and are capable with commercially reasonable efforts of implementing “light sleep.”
- 2.2. “Light Sleep” means the capability of reducing energy consumption by the Set-Top Box during extended periods of inactivity or at specific times. Normative settings should put the Set-Top Box into sleep mode after no more than 4 hours of inactivity (i.e., no user input or programmed event in process), and to place the Set-Top Box back into sleep mode no more than 15 minutes after concluding an automatic function that does not require user input (e.g., download, programmed recording). The Cable Operators may vary these settings in order to provide a good customer experience. The Cable Operators may also provide customers with tools to vary or opt-out from these settings.

### 3. Phase 2: Procurement

- 3.1. Each Cable Operator will ensure that 90% of all new Set-Top Boxes it Purchases after December 31, 2013 shall meet the efficiency standards for ENERGY STAR Version 3.0 devices, with “Light Sleep” enabled in capable DVR models.
- 3.2. The Cable Operators will provide reports of 2013 procurements pursuant to the Annual Report provided for in the Voluntary Agreement.

### 4. Phase 3: Power Scaling

- 4.1. Development. The Cable Operators will work with their suppliers to develop next generation semiconductors and specifications for new model Set-Top Boxes allowing parts of the device to operate in a reduced power consumption mode while still functioning with cable system architectures and meeting consumer expectations for quick start-up time and the ability for the Set-Top Box to wake for periodic updates or record pre-scheduled shows.
- 4.2. Field Testing. The Cable Operators will commence field tests of Set-Top Boxes that include next generation power management (herein referred to as Next Generation Set-Top Boxes) by December 31, 2014.
- 4.3. Deployment. If a Next Generation Set-Top Box has been field tested and it successfully performs on a Cable Operator’s network, the embedded next generation System-on-a-Chip supports all of a Cable Operator’s services, and utilization of that Next Generation Set-Top Box is economically feasible, then the Cable Operator will begin deployment of that Next Generation

Set-Top Box in its ordinary set-top box replacement cycle. The parties anticipate deployment of such successfully tested Next Generation Set-Top Boxes during 2016.

**5. Testing**

- 5.1. Testing methods to determine energy use and compliance beyond ENERGY STAR Version 3.0 shall be performed as provided in Annex 6.
- 5.2. Cable Television Laboratories, Inc. (CableLabs) and the Cable Operators' test facilities operating under CableLabs' guidance are specifically approved as test facilities for these purposes.
- 5.3. Cable Operators may utilize qualified vendor test facilities for testing purposes.

## ANNEX 4A - IPTV PLATFORM PROVISIONS

### 1. Signatories

- 1.1. The detailed commitments set forth in this IPTV platform Annex have been subscribed to by AT&T Services, Inc., and CenturyTel Broadband Services, LLC d/b/a CenturyLink.

### 2. Accommodation of New Features Not Addressed by Energy Star Version 3

- 2.1. Because of the rapid pace of innovation, Energy Star Version 3 functionality allowances and/or testing methodology may not address all features present in Set-Top Boxes covered by the Voluntary Agreement. To the extent newly introduced features cannot be disabled for testing, as contemplated in paragraph 6.3 of the Voluntary Agreement, the Service Provider, after consultation with the appropriate manufacturer, will specify an energy consumption allowance to account for the new feature. The Service Provider will document and disclose the process used to quantify this allowance, subject to appropriate protections for proprietary and competitively sensitive information.
- 2.2. The Service Provider will use reasonable diligence to establish an energy consumption allowance for Set-Top Box features not addressed by Energy Star Version 3. However, consistent with this agreement's emphasis on rapid innovation and protecting the customer experience, the absence of such an allowance will not delay the deployment of devices carrying the new feature. Nor will a reasonable delay in establishing such an allowance count against a Service Provider in determining compliance with its deployment commitments under this Voluntary Agreement.

### 3. Light Sleep and Whole-Home Features in DVR Set-Top Boxes

- 3.1. When deploying DVR Set-Top Boxes, the Service Providers adopting this annex commit to provide units incorporating software instructions that automatically direct the disk drive to stop spinning during periods of disk inactivity, consistent with preserving the customer experience and disk life. The Service Providers covered by this annex agree to continue to provide this light sleep feature on all DVR Set-Top Boxes newly purchased and deployed after the date of adoption of this voluntary agreement.
- 3.2. To the extent DVR Set-Top Boxes are deployed, the Service Providers adopting this annex commit to deploying whole-home DVR Set-Top Boxes, rather than multiple in-home DVR Set-Top Boxes. Whole-home DVR Set-Top Boxes can effectively and efficiently serve content to multiple remote or client devices within a consumer's home. Having a single, whole-home DVR Set-Top Box serving video content in this manner typically consumes significantly less energy than do configurations involving multiple DVR Set-Top Boxes throughout the home.

### 4. Reduction of Inactive State Energy Consumption

- 4.1. The Service Providers adopting this annex are committed to pursuing innovative and commercially reasonable strategies (including deep sleep) to further reduce the energy consumption of their Set-Top Boxes, particularly when those boxes are not active. In pursuing these strategies, the Service Providers must weigh the potential for energy savings against the potential for adverse customer experience.
  - 4.1.1. The Service Providers covered by this annex commit to evaluate the options for further reducing inactive-state energy consumption while not degrading the customer experience.
  - 4.1.2. The Service Providers commit to providing periodic updates to government and energy-advocate stakeholders on: (1) the steps considered to further reduce their Set-Top Boxes' energy consumption and (2) the technological and customer-experience issues that must be addressed to enable achievement of this goal.



#### **ANNEX 4B - VERIZON PLATFORM PROVISIONS**

1. The detailed commitments set forth in this annex have been subscribed to by Verizon and relate to its FiOS TV service.
2. Verizon intends to achieve the commitments with respect to Set-Top Box purchases and deployment after December 31, 2013 consistent with Section 3 of the Voluntary Agreement. Consistent with Section 6.3 of the Voluntary Agreement, new features or functions which consume significant power and are not covered by Energy Star Version 3.0 will not to be counted against the initial efficiency targets.
3. Verizon will enable “light sleep” capabilities in certain models of Set-Top Boxes that are newly purchased and deployed after January 1, 2013, while not degrading the customer experience.
4. Verizon will set a default value of four hours of inactivity, although it may vary particular settings as needed to provide a good customer experience and/or to program sleep at a specific time.
5. Verizon commits to pursuing innovative and commercially reasonable strategies (including deep sleep) to continually reduce the energy consumption of its Set-Top Boxes, particularly when those boxes are not active. In pursuing these strategies, Verizon will weigh the potential for energy savings against the potential for adverse customer experience while not degrading the customer experience.
6. Verizon commits to offering and deploying Whole Home servers and clients, as appropriate, for its customers’ residential configurations, in 2013.

## **ANNEX 5 - SATELLITE INDUSTRY PROVISIONS**

In addition to the energy efficiency commitments outlined in Section 3 (Service Provider Commitments for Set-Top Boxes), Satellite Service Provider signatories commit to:

1. Effective January 1, 2013, (the calendar year 2013 reporting period), at least 90% of new Set-Top Boxes Purchased will include an “Automatic Power Down” (APD) feature with a default value of 4 hours or less.
2. Effective January 1, 2013 (the calendar year 2013 reporting period), energy efficient Whole-Home Servers and Clients will be available to all new and existing subscribers.
3. By the end of 2013 (for the calendar year 2014 reporting period), at least 90% of all new Set-Top Boxes Purchased, including Whole-Home DVR Set-Top Boxes, will meet ENERGY STAR Version 3.0.

## ANNEX 6 – TEST METHOD

The Signatories plan to follow test methodologies and procedures described in the *CEA-2043: Set-top Box (STB) Power Measurement* standard developed under the auspices of the Consumer Electronics Association (CEA) R4 Video Systems Committee, ANSI 2043-2013.

The Steering Committee may amend and update this Annex under the procedures of Section 11.

### Operational Guidance for Testing and Reporting

The Voluntary Agreement describes which test method is to be used when, and how the data is to be applied (e.g., to determine compliance with a specific procurement requirement and/or for public reporting). This operational guidance is intended as an aid in applying those provisions and providing a cross reference to the applicable portions of the Voluntary Agreement.

The energy efficiency of Set-Top Boxes will be tested as normally installed for the End User, unless otherwise stated below. (6.2.1.; Annex 10, §5A)

#### 1. Determining Voluntary Agreement Compliance with Tier 1

Testing to determine whether a specific Set-Top Box model meets the allowable Tier 1 TEC limits shall be performed as follows:

- Service Providers may use either tests defined in or reasonably consistent with the EPA ENERGY STAR Version 3.0 STB Testing Program (6.2) (Tier 1 Tests) or applicable test methodologies and procedures for Tier 2 Commitments as described in Annex 6 (Test Method), Annex 10 (Tier 2 Commitments) and Annex 11 (New Features Process) (6.3) (Tier 2 Tests). (6.2.3)
- New features not covered by the ENERGY STAR Version 3 program may be deactivated or activated and accounted for prior to testing. (6.2.2)
- If using the ENERGY STAR Version 3 test method and the Set-Top Box meets the MR definition, then, as documented in the ENERGY STAR Version 3 test method, the MR STB may be tested and evaluated in a single-room configuration without taking the MR allowance or may be tested and evaluated in a multi-room configuration taking the MR allowance. (6.2.1)

#### 2. Determining Early Adoption of Voluntary Agreement Tier 2

Service Providers that include the percentage of Set-Top Boxes that test at Tier 2 levels in reports for the 2014, 2015, and 2016 reporting periods (report years 2015, 2016, and 2017) have the option to report this percentage by using Tier 1 Tests or Tier 2 Tests. (7.1.2) However, if a Service Provider reports TEC for Voluntary Agreement compliance purposes with a new feature deactivated, but the feature is activated as deployed, then it should utilize Tier 1 testing with the Set-Top Boxes configured in their as-deployed configuration to determine whether that Set-Top tests at Tier 2 levels. (6.2.2)

#### 3. Determining Compliance with Tier 2

Testing to determine whether a specific Set-Top Box model meets Tier 2 shall use the Tier 2 Tests. (6.3)

#### 4. Public Reporting for Voluntary Agreement Tier 1 and Tier 2

All Set-Top Boxes covered by the Voluntary Agreement shall be tested and the data included in the annual reports submitted by the Service Providers to the Independent Administrator. (7.1) The model-

specific power levels and Typical Energy Consumption (TEC) values are to be made publicly available by the Service Providers to their subscribers and prospective customers, and in the Voluntary Agreement published annual report. (7.6; 7.8.6)

For public reporting purposes, testing shall be performed as follows:

- Prior to 2017, Service Providers may use either Tier 1 Tests or Tier 2 Tests. (7.1.2)
- Beginning 1/1/2017, only the Tier 2 Tests shall be used. (3.2.1; 6.3)
- New features may be disabled or deactivated prior to testing only if they are deactivated in their as-deployed configuration by the Service Provider. (6.2.2)
- If a new test method and allowance has been developed and approved by the Steering Committee for a new feature used by a sector, then it shall be used by a service provider in that sector. (6.3; Annex 11)
- MR STBs that are tested using Tier 1 Tests may be tested in a single-room configuration or in a multi-room configuration, as is currently documented in the ENERGY STAR Version 3 test method. (6.2.1) However, the Service Provider must also report the expected TEC of an MR STB, as-installed, when operating in a multi-room configuration, either by retesting the MR STB in a multi-room configuration or by adding the ESv3 allowance differences to the single-room reported TEC. (For example, a Service Provider could add 30 kWh/year (the MR allowance minus the HNI allowance) to the measured single-room TEC value to avoid retesting a MR STB). (6.2.2)

NOTE: In some cases, the publicly-reported TEC values may be higher than the TEC values reported by the Service Provider to determine compliance with the Tier 1 requirements. This is due to the fact that new features may be turned off during the testing to determine compliance with Tier 1 but may be turned on as-installed by the Service Provider. (6.2.2) Publicly-reported TEC should report values that End Users would experience if using the device with the pre-specified TEC equation duty cycles. (6.2.2; 7.6.1.3)

**ANNEX 7, Part A – SERVICE PROVIDER SIGNING FORMS**

The undersigned Signatories agree to the Voluntary Agreement and ANNEX 3 – CABLE INDUSTRY PROVISIONS.

**Bright House Networks, LLC**

Signature: /s/ Jeff Chen  
Name: Jeff Chen  
Title: SVP, Advanced Technology  
Date: November 30, 2012

**Cablevision Systems Corp.**

Signature: /s/ Yvette Kanouff  
Name: Yvette Kanouff  
Title: EVP – Corporate Engineering & Technology  
Date: November 30, 2012

**Charter Communications, Inc.**

Signature: /s/ Jay Rolls  
Name: Jay Rolls  
Title: SVP & CTO  
Date: November 29, 2012

**Comcast Cable Communications, LLC**

Signature: /s/ Tony Werner  
Name: Tony Werner  
Title: EVP & CTO  
Date: November 30, 2012

**Cox Communications, Inc.**

Signature: /s/ Kevin T. Hart

Name: Kevin T. Hart

Title: Executive Vice President & Chief Technology Officer

Date: November 29, 2012

**Time Warner Cable Inc.**

Signature: /s/ Mike LaJoie

Name: Mike LaJoie

Title: Chief Technology Officer

Date: November 28, 2012

The undersigned Signatories agree to the Voluntary Agreement and ANNEX 4A – IPTV PLATFORM PROVISIONS.

**AT&T Services, Inc.**

Signature: /s/ Nolan Daines  
Name: Nolan Daines  
Title: SVP  
Date: November 30, 2012

**CenturyTel Broadband Services, LLC d/b/a CenturyLink**

Signature: /s/ Matt Beal  
Name: Matt Beal  
Title: SVP Corporate Strategy/Product Development & CTO  
Date: November 30, 2012

The undersigned Signatories agree to the Voluntary Agreement and ANNEX 4B – VERIZON PLATFORM PROVISIONS (Verizon).

**Verizon Communications, Inc.**

Signature: /s/ James J Gowen

Name: James J Gowen

Title: Vice President Supply Chain Operations / Chief Sustainability Officer

Date: 11/30/2012



The undersigned Signatories agree to the Voluntary Agreement and ANNEX 5 – SATELLITE INDUSTRY PROVISIONS.

**DirecTV, LLC**

Signature: /s/ Rômulo Pontual  
Name: Rômulo Pontual  
Title: EVP and CTO  
Date: November 30, 2012

**DISH Network LLC**

Signature: /s/ Stanton Dodge  
Name: Stanton Dodge  
Title: EVP & General Counsel  
Date: November 30, 2012

**ANNEX 7, Part B – EQUIPMENT MANUFACTURERS, SOFTWARE PROVIDERS,  
CONDITIONAL ACCESS PROVIDERS, COMPONENT MANUFACTURERS SIGNING  
FORMS**

The undersigned Signatories agree to the Voluntary Agreement.

**Cisco Systems, Inc.**

Signature: /s/ Joe Chow  
Name: Joe Chow  
Title: VP/GM, Connected Devices  
Service Provider Video Technology Group  
Date: November 29, 2012

**Motorola Mobility LLC**

Signature: /s/ Marwan Fawaz  
Name: Marwan Fawaz  
Title: Executive Vice President  
Date: November 28, 2012

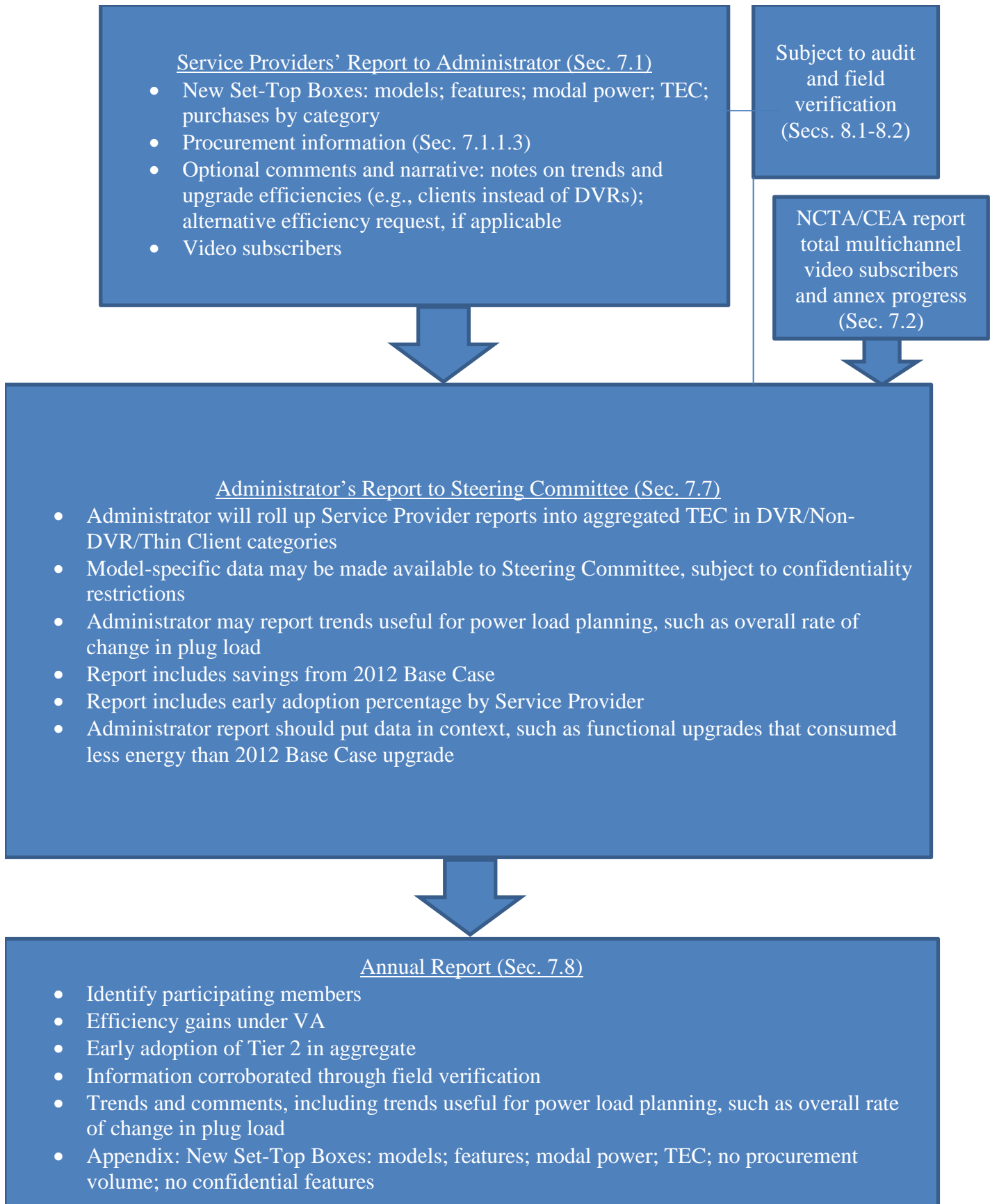
**ARRIS Group, Inc.**

Signature: /s/ Lawrence A. Margolis  
Name: Lawrence A. Margolis  
Title: EVP and Chief Counsel  
Date: November 28, 2012

**EchoStar Technologies LLC**

Signature: /s/ Mark Jackson  
Name: Mark Jackson  
Title: President  
Date: November 29, 2012

## ANNEX 8 – ANNUAL REPORT



**ANNEX 9 – CONTACT INFORMATION**  
**REDACTED**

**ANNEX 10 – TIER 2 COMMITMENTS**  
**VOLUNTARY AGREEMENT**  
**FOR ONGOING IMPROVEMENT TO THE ENERGY EFFICIENCY OF SET-  
TOP BOXES**

**Tier 2 Program Requirements**

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1 **1 INTRODUCTION**

2  
3 This document defines Maximum Typical Energy Consumption (TEC) base and additional feature energy  
4 allowances, allowance rules, and the Typical Energy Consumption (TEC) equation used to determine  
5 compliance with the VOLUNTARY AGREEMENT FOR ONGOING IMPROVEMENT TO THE ENERGY  
6 EFFICIENCY OF SET-TOP BOXES (the “VA”). This document is specific to the Tier 2 Program and is not  
7 applicable to the original VA dated December 6, 2012, which uses the EPA’s ENERGY STAR Version 3.0 STB  
8 Program.

9 **2 COMPLIANCE NOTATION**

10  
11 As used in this document “shall” and “must” denote mandatory provisions. “Should” denotes a provision that is  
12 recommended but not mandatory. “May” denotes an item whose presence does not preclude compliance, and  
13 implementation of which is optional. “Optional” denotes items that may or may not be present in a compliant  
14 device.

15 **3 DEFINITIONS**

16 A) Set-Top Box (STB): a device which is capable of receiving digital television services from a coaxial, hybrid  
17 fiber coaxial, or fiber-to-the-home distribution system, from satellites, or encapsulated in IP packets from  
18 managed IP distribution networks; to decrypt or descramble these signals; and to decode/decompress for  
19 delivery to residential consumer displays and/or recording devices, and/or one or more other Set-Top  
20 Boxes or Thin Clients in a residential multi-room architecture; and that is Purchased and placed into  
21 service in the United States by a Service Provider for the first time on or after the Tier 2 Effective Date.  
22 The Set-Top Boxes subject to this Voluntary Agreement are limited to the following Set-Top Boxes  
23 supplied by Service Providers to residential End Users:

- 24 1) STBs with a Digital Video Recorder (DVR) feature.  
25 2) STBs without a Digital Video Recorder (DVR) feature.  
26 3) Thin Client STBs.  
27 4) Cable Digital Transport Adapter (DTA) STBs.  
28 5) Multi-Service Gateway STBs.

29 Set-Top Boxes subject to this Voluntary Agreement do not include any Set-Top Box that is Purchased for  
30 the first time before the Tier 2 Effective Date, including any such Set-Top Box that is returned to the  
31 Service Provider and refurbished, repaired, and/or upgraded, and then redeployed, or that is used in a  
32 “swap-for-failure” scenario after the Tier 2 Effective Date.

- 33 B) STB Base Types:
- 34 1) Cable (CBL): A STB that can receive and decode video content as delivered from a Service Provider  
35 hybrid fiber coaxial distribution system using a Conditional Access System (CAS).
- 36 2) Satellite (SAT): A STB that can receive and decode video content as delivered from a Service Provider  
37 satellite network using a Conditional Access System (CAS).
- 38 3) Cable Digital Transport Adapter (DTA): A minimally-configured unidirectional Set-Top Box without  
39 recording functionality that can receive and decode video content as delivered from a coaxial or hybrid  
40 fiber coaxial system using a Conditional Access System (CAS).
- 41 4) Internet Protocol (IP): A STB that can receive and decode video content encapsulated in IP packets  
42 from a Service Provider managed distribution network.
- 43 5) Thin Client (TC): A STB that can receive and decode video content solely over a Home Network  
44 Interface from another STB and does not include a Service Provider network interface.
- 45 C) Client: A device (e.g., STB, Thin Client STB, Smart TV, Mobile Phone, Tablet, PC, etc.) that can receive  
46 video content over a Home Network Interface.
- 47 D) Multi-Service Gateway STB (MSG-STB): A STB that is capable of joining multiple Service Provider  
48 delivery protocols and/or that provisions a video service and at least one of voice or broadband services  
49 from a Service Provider.
- 50 E) Additional Functionality:
- 51 1) CableCARD (CC): The capability to decrypt premium video content and services and provide other  
52 network control functions via a plug-in Conditional Access module that complies with the ANSI/SCTE  
53 28 HOST-POD Interface Standard.<sup>1</sup>
- 54 2) Digital Video Recorder (DVR): A feature that enables recording and playback of video content from a  
55 hard disk drive (HDD) or other integrated non-volatile storage. A DVR often includes features such as:  
56 Play, Record, Pause, Fast Forward (FF), and Fast Rewind (FR). The presence of a DVR feature does  
57 not mean the device is defined to be a STB.
- 58 3) DOCSIS®: The capability to distribute data and video content over cable television infrastructure  
59 according to the following specifications:
- 60 i) DOCSIS 2.0 (D2): DOCSIS 2.0 interface as defined by CableLabs® Data Over Cable Service  
61 Interface Specification.<sup>2</sup>
- 62 ii) DOCSIS 3.0 (D3): DOCSIS 3.0 interface as defined by CableLabs® Data Over Cable Service  
63 Interface Specification.<sup>3</sup>
- 64 4) High Definition (HD): The capability to transmit or display video signals with a minimum output  
65 resolution of 1280×720 pixels in progressive scan mode at minimum frame rate of 59.94 fps  
66 (abbreviated 720p60) or a minimum output resolution of 1920×1080 pixels in interlaced scan mode at  
67 29.97 fps (abbreviated 1080i30).
- 68 5) Advanced Video Processing (AVP): The capability to decode video signals in accordance with  
69 standards H.264/MPEG 4 or SMPTE 421M.
- 70 6) Transcoding (XCD): Additional capability to translate (e.g., MPEG2 to H.264), transrate (e.g., HD  
71 bitrate to Mobile bitrate), transcale (e.g., HD resolution to Mobile resolution), transcrypt (e.g., CAS to  
72 DRM), or perform audio format conversions (e.g., AC-3 to AAC) in real-time.
- 73 7) Home Network Interface (HNI): the interface with external devices over a local area network (e.g.,  
74 MoCA, HPNA, IEEE 802.3, IEEE 802.11, HomePlug AV) capable of transmitting video content.

<sup>1</sup> <http://www.scte.org/standards>

<sup>2</sup> <http://www.cablelabs.com/specifications/specification-search/?cat=docsis&scat=docsis-2-0>

<sup>3</sup> <http://www.cablelabs.com/specifications/specification-search/?cat=docsis&scat=docsis-3-0>

- 75 8) WiFi HNI (WiFi HNI): A wireless HNI as specified by IEEE 802.11.
- 76 9) Multi-Input Multi-Output WiFi (MIMO WiFi): Functionality that supports more than one Spatial Stream<sup>4</sup>  
77 for both send and receive.
- 78 10) Shared DVR (S-DVR): The capability to provide independent DVR video content to more than one  
79 Display Device and/or Client in a single-subscriber configuration.
- 80 11) Multi-Room (MR): The capability to provide independent live video content to more than two Display  
81 Devices and/or Clients in a single-subscriber configuration.
- 82 12) Multi-Stream (MS): The capability to receive multiple independent streams of video content.
- 83 13) Routing (RTG): The capability to determine the path along which network traffic should be forwarded.
- 84 F) Auto Power Down (APD): A STB feature that monitors parameters correlated with user activity or viewing.  
85 If the parameters collectively indicate that no user activity or viewing is occurring, the APD feature enables  
86 the STB to transition to a sleep mode or OFF mode.
- 87 G) Principal STB Functions: Functions necessary for selecting (EPG), receiving, decoding, decompressing, or  
88 delivering live or recorded video content to a Display Device, local/remote recording device, or Client.  
89 Monitoring for user or network requests is not considered a Principal STB Function.
- 90 H) Operational Modes:
- 91 1) ON Mode: The STB is connected to a mains power source. At least one Principal STB Function is  
92 activated and all Principal STB Functions are provisioned for use. The power consumption in ON  
93 mode may vary based on specific use and configuration.
- 94 2) SLEEP Mode: A range of reduced power states where the STB is connected to a mains power source  
95 and is not providing any Principal STB Function. The STB may transition to ON, DEEP SLEEP, or  
96 OFF mode due to user action, internal signal, or external signal. The power consumed in this mode  
97 may vary based on specific use or configuration. If any Principal STB Function is activated while  
98 operating in this mode, the STB is assumed to transition to ON mode. Monitoring for user or network  
99 requests is not considered a Principal STB Function. The STB shall be able to transition from this  
100 mode to ON mode within 30 seconds.
- 101 3) DEEP SLEEP Mode: A range of reduced power states where the STB is connected to a mains power  
102 source and is not providing any Principal STB Function. DEEP SLEEP represents the lowest average  
103 power consumption state where Principal STB Functions can be re-activated without user action and  
104 without the transition time requirement of SLEEP Mode.
- 105 4) OFF Mode: The STB is connected to a mains power source, has been de-activated, and is not  
106 providing any function. The STB requires a user action to transition from this mode to ON or SLEEP  
107 mode.
- 108 I) Other Definitions
- 109 1) Display Device (DD): A device (e.g., TV, computer monitor, or portable TV) that receives its content  
110 directly from a STB through a video interface (example: High-Definition Multimedia Interface (HDMI),  
111 Component Video, Composite Video, or S-Video), not through a HNI, and displays it for viewing.
- 112 2) Service Provider (SP): An entity that provides video (and possibly other) content to subscribers with  
113 whom it has an ongoing contractual relationship through a cable, satellite, or other managed  
114 distribution network provided by that entity.

---

<sup>4</sup> Spatial Stream: Spatial multiplexing is a transmission technique in MIMO wireless communication used to transmit independent and separately-encoded data signals, so-called Spatial Streams, from each of the multiple transmit antennas. Therefore, the space dimension is reused, or multiplexed, more than one time. The number of receive antenna does not define the number of Spatial Streams. The common description "2 x N: 2" means 2 send streams x N antennas: 2 receive streams, where N will always be the same or larger as the largest number of streams.

- 115 3) Conditional Access System (CAS): The encryption, decryption, and authorization techniques employed  
116 to protect content from unauthorized viewing. CableCARD and Downloadable Conditional Access  
117 System (DCAS) are examples of Conditional Access technology.
- 118 4) Typical Energy Consumption (TEC): A means for evaluating energy efficiency through a calculation of  
119 expected energy consumption for a typical household over a one year period, expressed in units of  
120 kWh/year.

## 121 **4 QUALIFICATION CRITERIA**

122

### 123 A) Significant Digits and Rounding

#### 124 1) All measured and calculated power values shall be rounded as follows:

- 125 i) To the nearest 0.01 W for power measurements of 10 W or less.
- 126 ii) To the nearest 0.1 W for power measurements of greater than 10 W and up to 100 W.
- 127 iii) To the nearest 1 W for power measurements of greater than 100 W.

#### 128 2) All measured and calculated TEC values shall be rounded as follows:

- 129 i) To the nearest 0.01 kWh/year for values of 10 kWh/year or less.
- 130 ii) To the nearest 0.1 kWh/year for values of greater than 10 kWh/year and up to 100 kWh/year.
- 131 iii) To the nearest 1 kWh/year for values of greater than 100 kWh/year.
- 132

### 133 B) General Qualification Criteria

#### 134 1) Device Operation Requirements:

- 135 i) Products may automatically exit SLEEP mode and/or DEEP SLEEP mode on a regular schedule  
136 to perform maintenance activities. The total time spent performing maintenance activities shall not  
137 exceed an average of two hours in any 24-hour period. Maintenance activities may include, but  
138 are not limited to; software updates, electronic programming guide updates, HDD maintenance,  
139 and routine diagnostic operations.
- 140 ii) Products that automatically exit SLEEP mode or DEEP SLEEP mode and have completed  
141 maintenance or other user-requested activities (e.g., user pre-scheduled recording) shall  
142 automatically return to SLEEP mode or DEEP SLEEP mode in less than 15 minutes.
- 143 iii) Products that provide a default (no user opt-in) speculative recording function shall provide a user-  
144 accessible menu option to permit users to disable the functionality. Instructions for disabling  
145 speculative recording shall be made available to the user.
- 146 iv) Energy-related default settings shall persist until an end-user chooses to disable or modify the  
147 default settings.
- 148 v) Products represented as offering an APD feature shall meet the following requirements:
- 149 (1) Products shipped with software from the manufacturer shall ship with APD enabled by default,  
150 with APD timing set to engage after a period of inactivity less than or equal to 4 hours.
- 151 (2) Otherwise, at time of installation the Service Provider shall enable APD timing to engage after  
152 a period of inactivity less than or equal to 4 hours. The Service Provider may vary these  
153 settings in order to provide a good customer experience but the average APD timeout period  
154 must be less than or equal to 4 hours.
- 155 (3) Products that provide an APD feature should provide a user-accessible menu option to permit  
156 users to modify or disable the functionality.



- 157 vi) Products represented as offering a DEEP SLEEP mode shall meet the following criteria:
- 158 (1) Products shipped with software from the manufacturer shall ship with automatic DEEP SLEEP
- 159 mode enabled by default.
- 160 (2) Otherwise, at time of installation the Service Provider shall enable automatic DEEP SLEEP
- 161 mode.
- 162 (3) Products that provide a DEEP SLEEP mode should provide a user-accessible menu option to
- 163 permit users to modify or disable the functionality.

164

165 C) Maximum Typical Energy Consumption Requirement

- 166 1) Maximum TEC: The maximum allowed TEC is the sum of the specified STB Base type allowance and
- 167 the sum of all applicable Additional Functionality Allowances as defined in Equation 1.

168

169

**Equation 1: Maximum TEC**

$$TEC_{MAX} = TEC_{BASE} + \sum_1^i TEC_{ADDL_i}$$

170

Where:

171

$TEC_{BASE}$  is the Base Type Allowance (kWh); and

172

$TEC_{ADDL_i}$  is each applicable Additional Functionality Allowance (kWh).

173

- 174 2) Base Allowances shall be as specified in Table 1:

175

If a STB supports more than one base type definition then the topmost base type listed in Table 1 must be used to classify the device.

176

177

**Table 1: Base Type TEC Allowances**

Base Type (use Topmost if Multiple Apply)	Tier 2 Allowance (KWh/year)
Cable DTA (DTA)	25
Cable (CBL)	45
Satellite (SAT)	50
Internet Protocol (IP)	45
Thin Client (TC)	12

178

- 179 3) Additional Functionality Allowances shall be as specified in Table 2, subject to the following usage
- 180 rules:

181

- i) Each Additional Functionality Allowance shall be used at most **once per STB** unless otherwise specified.

182

183

- ii) **DTA** base type shall only use the **HD**, **AVP**, and **HNI** allowances if applicable.

184

- iii) **TC** base type shall only use the **HD**, **AVP**, **HNI**, **WiFi HNI**, **MoCA HNI**, and **MIMO WiFi** allowances if applicable.

185

186

- iv) **AVP** allowance shall be used for each decoder that is active during the ON mode test up to a maximum of two (2).

187

188

- v) **CableCARD** allowance shall be used for each CableCARD up to a maximum of two (2).

- 189 vi) **DVR** allowance shall not be used with STB types that support a Service Provider network-based  
190 “DVR” service and do not use a hard disk drive (HDD) or other integrated non-volatile storage.
- 191 vii) Either **DOCSIS 2.0 (D2)** allowance OR **DOCSIS 3.0 (D3)** allowance, but not both, shall be used if  
192 applicable.
- 193 viii) **DOCSIS 3.0 (D3)** allowance is applicable to all DOCSIS 3.0 configurations up to and including an  
194 eight downstream/four upstream configuration (8X4 mode).
- 195 ix) Either **Shared DVR (S-DVR)** allowance OR **Multi-Room (MR)** allowance, but not both, shall be  
196 used if applicable.
- 197 x) Either **Multi-Room (MR)** allowance OR **Home Network Interface (HNI)** allowance, but not both,  
198 shall be used if applicable.
- 199 xi) **MoCA HNI (M-HNI)** allowance and/or **WiFi HNI (W-HNI)** allowance are used in addition to the **MR**  
200 allowance or **HNI** allowance and shall only be used if the interface is providing video content  
201 during the qualification test (e.g., if a **MoCA HNI** and a **WiFi HNI** provide video content to Clients  
202 concurrently during the qualification test, then both allowances may be taken).
- 203 xii) **MIMO WiFi HNI (MIMO)** allowance is additive to the **WiFi HNI (W-HNI)** allowance.
- 204 xiii) **Multi-Stream (MS)** allowance shall be used for devices receiving two (2) video content streams  
205 during the qualification test.
- 206 xiv) **Multi-Stream Additional (MS-A)** allowance is used in addition to the **MS** allowance and shall be  
207 used for devices receiving greater than two (2) and, up to and including, eight (8) video streams if  
208 applicable.
- 209 xv) **Transcoding Base (XCD)** allowance shall be used if the device includes a transcoding feature in  
210 addition to the basic video decoding required for directly connected Display Devices.
- 211 xvi) **Transcoding Additional (XCD-A)** allowance is additive to **Transcoding Base (XCD)** and shall be  
212 used once for each actively transcoded video stream during the qualification test.
- 213 xvii) **Routing (RTG)** Routing allowance may be used if the device is providing IP routing functionality,  
214 forwarding IP data packets from one IP network to another as part of a high-speed data service.  
215 Routing of IP video packets that is not part of a high-speed data service is considered a new  
216 feature that does not have an energy allowance and is subject to the new feature allowance  
217 setting process set forth in Annex 11.

218

219

**Table 2: Additional Functionality TEC Allowance (TEC<sub>ADDL\_i</sub>)**

<b>Additional Functionality</b>	<b>Tier 2 Allowance (kWh/year)</b>
Advanced Video Processing (AVP) (per active decoder, max 2)	8*
High Definition (HD)	12
Multi-Stream (MS) (1 < received streams ≤ 2)	8
Multi-Stream Additional (MS-A) (2 < received streams ≤ 8)	8
Transcoding (XCD)	13
Transcoding Additional (XCD-A) (per tested stream transcoded)	5*
CableCARD (per CC, max 2)	15*
DOCSIS 2.0 (D2)	20
DOCSIS 3.0 (D3) (up to and including 8X4 mode)	50
Digital Video Recorder (DVR)	45

Additional Functionality	Tier 2 Allowance (kWh/year)
Shared DVR (S-DVR)	20
Multi-Room (MR)	40
Home Network Interface (HNI)	10
MoCA HNI (M-HNI)	12
WiFi HNI (W-HNI)	15
MIMO WiFi HNI (MIMO)	$[2 \times N_{2.4 \text{ GHz}} + 4 \times N_{5 \text{ GHz}}]$ Where $N$ is the number of spatial streams at each specified frequency <sup>5</sup>
Routing (RTG)	27
* Indicates allowance may be used more than once	

220

221

222

D) Measured Typical Energy Consumption Requirements: The measured values derived from Section 5 below are used in combination with the TEC equation to calculate the  $TEC_{MEASURED}$  value for the device.

223

224

1) Measured TEC ( $TEC_{MEASURED}$ ) shall be less than or equal to the Maximum TEC Requirement ( $TEC_{MAX}$ ), as determined in the above section.

225

2)  $TEC_{MEASURED}$  shall be calculated using Equation 2.

226

227

#### Equation 2: Measured TEC

$$TEC_{MEASURED} = 0.365[(T_{WATCH\ TV} \times P_{WATCH\ TV}) + (T_{SLEEP} \times P_{SLEEP}) + (T_{APD} \times P_{APD}) + (T_{DEEP\ SLEEP} \times P_{DEEP\ SLEEP})]$$

228

229

230

231

232

*Note: The maximum value for  $T_{DEEP\ SLEEP}$  is four (4) hours for the purposes of this program. To claim DEEP SLEEP the device must transition to and from DEEP SLEEP mode automatically when in the as-deployed configuration.*

233

Where:

234

•  $T_{WATCH\ TV}$  is the time coefficient for On Mode, as determined per Table 3;

235

•  $P_{WATCH\ TV}$  ( $= P_{WATCH\ TV_n}$ \*) is the measured power in On Mode (W);

236

•  $T_{SLEEP}$  is the time coefficient for Sleep Mode, as determined per Table 3;

237

•  $P_{SLEEP}$  is the measured power in Sleep Mode (W);

238

•  $T_{APD}$  is the time coefficient for APD, as determined per Table 3;

239

•  $P_{APD}$  ( $= P_{APD\_ON\_to\_SLEEP}$ \*) is the measured power after an APD timeout (W);

240

•  $T_{DEEP\ SLEEP}$  is the time operating in DEEP SLEEP Mode time (maximum of 4h); and

241

•  $P_{DEEP\ SLEEP}$  ( $= P_{SLEEP\_SP_n}$ \*) is the measured power in DEEP SLEEP Mode (W).

242

\*  $T_{APD\_ON\_to\_SLEEP}$ ,  $P_{APD\_ON\_to\_SLEEP}$ ,  $P_{SLEEP\_SP_n}$ , and  $P_{WATCH\ TV_n}$  are test result parameters from CEA-2043.

243

$T_{APD\_ON\_to\_SLEEP}$  is the STBs default APD timeout duration.

244

3) Operational Mode Durations for use with Equation 2 are specified in Table 3:

<sup>5</sup> To claim spatial streams at both  $N_{2.4\text{ GHz}}$  and  $N_{5.0\text{ GHz}}$ , the channels must operate concurrently. If concurrent channel operation is not supported then the channel/spatial stream combination yielding the higher allowance should be used.

**Table 3: Operational Mode Durations**

APD Enabled by Default	Automatic DEEP SLEEP	$T_{WATCH\ TV}$ ( $14 \geq T_{SLEEP} \geq 5$ )	$T_{SLEEP}$ ( $10 \geq T_{SLEEP} \geq 6$ )	$T_{APD}$ ( $9 \geq T_{APD} \geq 7$ )	$T_{DEEP\ SLEEP}$ ( $T_{DEEP\ SLEEP} \leq 4\ h$ )
NO	NO	14	10	0	0
NO	YES	14	$10 - T_{DEEP\ SLEEP}$	0	DEEP SLEEP as-deployed duration
YES	NO	$7 - ((4 - T_{APD\_ON\_to\_SLEEP})/2)$	10	$7 + ((4 - T_{APD\_ON\_to\_SLEEP})/2)$	0
YES	YES	$7 - ((4 - T_{APD\_ON\_to\_SLEEP})/2)$	$10 - T_{DEEP\ SLEEP}$	$7 + ((4 - T_{APD\_ON\_to\_SLEEP})/2)$	DEEP SLEEP as-deployed duration

246  
247  
248  
249  
250

Note: Default APD timeout durations of less than 4h are given a 50% credit toward reduction of the  $T_{WATCH\_TV}$  7h duration. The 7h is the sum of 5h, accounting for the national average TV watching time, and 2h, assuming 50% of users shut off the TV but leave the STB on which causes APD to trigger after the default 4h duration resulting in the addition of 2h to national TV watching time per day. The reduction of the APD timeout results in a reduction in  $T_{WATCH\_TV}$ .

251

## 5 TEST CRITERIA

252

### A) Test Method:

253  
254  
255

The VA Tier 2 Program requires the use of the CEA-2043: Set-top Box (STB) Power Measurement standard, as published in June 2013 by the Consumer Electronics Association, for all required power measurement values.

256

### B) Number of Units Required for Testing:

257  
258

1) A product configuration equivalent to that which is intended to be marketed is considered a Representative Model.

259  
260  
261

2) A single unit of each Representative Model shall be selected for testing. If the resulting  $TEC_{MEASURED}$  is within 5% of the  $TEC_{MAX}$  requirement, two (2) additional units of the same Representative Model with an identical configuration shall be tested.

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3) All tested units shall be less than or equal to the  $TEC_{MAX}$  for the device configuration to meet the requirements.

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### C) Configuration Testing Rules:

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1) STBs offering more than one integrated Service Provider (SP) network interface option at time of installation may either be tested with each combination of SP network interface and each result reported under a different STB sub-model or the STB may be tested using the SP interface priority as specified in Table 4 and reported once under the primary model number. This table may not apply to TC STB types.

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**Table 4: Service Provider Network Interface Priority**

Connection (Protocol)
1. Coax (QAM/DOCSIS)
2. Coax (SAT/MoCA)
3. Coax (QAM/MoCA)
4. Wi-Fi (802.11)
5. Coax (HPNA)
6. Ethernet (802.3)
7. Other

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- 2) STBs offering more than one integrated HNI option at time of installation, but operating with only one HNI after installation, may either be tested with each SP network interface and each result reported under a different STB sub-model or the STB may be tested using the HNI connection priority as specified in Table 5 and reported once under the primary model number.

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**Table 5: HNI Priority**

Connection (Protocol)
1. MIMO Wi-Fi HNI
2. Wi-Fi HNI
3. Coax (MoCA)
4. Coax (HPNA)
5. HomePlug AV
6. Ethernet (802.3)
7. Other

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- 3) STBs offering concurrent operation of integrated HNIs at time of installation must be tested with the HNIs providing video content.

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- 4) STBs offering more than one Display Device interface shall use the priority as specified in Table 6 for each Display Device.

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**Table 6: Display Device Interface Priority**

Connection (Protocol)
1. HDMI/DVI
2. Component
3. S-Video
4. Composite
5. Coax
6. Other

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- 5) STBs claiming the **Multi-Room (MR)** allowance must be tested with three (3) live video streams with at least one (1) Client (receiving live video) in addition to locally connected Display Devices, if supported. If three (3) live streams are not supported the MR allowance may not be used.

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- 6) STBs claiming the **Shared DVR (S-DVR)** allowance must be tested with two (2) independent DVR video streams serving one of the following configurations:

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- 286 i) One directly connected Display Device and one Client.  
 287 ii) Two directly connected Display Devices.  
 288 iii) Two Clients.  
 289 7) **Multi-Service Gateway STBs** must replace CEA-2043 Section 8.1.12 Non-STB Features with the  
 290 following new text:

291 **8.1.12 Non-STB Features**

292 *Product features such as voice or data services that are not covered by a specific CEA-2043 test*  
 293 *procedure or a configuration directive from 8.1.14 should be left in their default condition and must be*  
 294 *provisioned and made operational. The STB should be tested while these features are in their idle*  
 295 *state. Idle state for a data service is achieved by connecting to a Client with low (< 1 kbps) payload*  
 296 *data transmission. Idle state for a voice service is achieved by connecting a telephone, verifying a dial*  
 297 *tone is present, then disconnecting the telephone from the STB.*

298 D) Required Tests Results:

- 299 1) The minimum required CEA-2043 tests, test parameters, and reported results are specified in Table 7.  
 300 Parameters used in this section are defined in the CEA-2043 document.  
 301 2) Any deviations from Table 7 test parameters must be reported to the VA Independent Administrator  
 302 when annual STB TEC results are reported.  
 303 3) CEA-2043 SPECIAL SLEEP Mode test is not required if the STB does not support a DEEP SLEEP  
 304 mode.

305 **Table 7: CEA-2043 Required Tests and Test Parameters**

<b>CEA-2043</b> (Test Number: Test Name)	<b><u>Test Parameters</u></b>	<b><u>Reported Result</u></b>
<b>ON Mode</b>		
8.2.2.1 ON (Watch TV)*	$T_{ON} \geq 5m$	$P_{WATCH\_TV\_n}$ (n = DD + Clients)
<b>SLEEP Mode</b>		
8.3.4 SLEEP***	$T_{SLEEP} \geq 1h$ (Use CEA 2043 Section 8.3.2 (a) for SLEEP determination method**)	$P_{SLEEP}$
<b>SPECIAL SLEEP Mode</b>		
8.3.4 SLEEP (for DEEP SLEEP mode)	$T_{SLEEP} \geq 1h$	$P_{SLEEP\_SP\_1}$
<b>Power Mode Transitions</b>		
8.5.1 APD initiated ON to SLEEP	$T_{SLEEP\_MAX} = 4.25h$	$P_{APD\_ON\_to\_SLEEP}$ $T_{APD\_ON\_to\_SLEEP}$
8.5.3 Reenter SLEEP after RECORD	$T_{SLEEP\_MAX} = 20m$	TREC_to_SLEEP
8.5.4 Reenter SLEEP after MAINT	$T_{SLEEP\_MAX} = 20m$	TMAINT_to_SLEEP
8.5.5 SLEEP to ON	$T_{SLEEP\_to\_ON\_WAIT} = 1m$	$T_{SLEEP\_TO\_ON}$

306 \* CEA-2043 ON Mode test may be tested at the maximum configurations only and without the requirement to  
 307 measure and record incremental Display Device and Client configuration power consumption, as is required in

- 308 CEA-2043 Section 8.2.2.1. Only the maximum Display Device and Client configurations power consumption  
309 must be reported.
- 310 \*\* SLEEP determination method from CEA-2043 Section 8.3.2(a) is “No channel viewing or recording is  
311 supported on a UUT or Client.”
- 312 \*\*\* Assure no DEEP SLEEP mode is scheduled over the entire duration of the SLEEP test.

## **ANNEX 11 – NEW FEATURES PROCESS**

### **1.0 Purposes**

- 1.1 This new feature process is applicable to Tier 2 Commitments.
- 1.2 This new feature process is intended to encourage innovation and competition by Service Providers and Vendor Signatories and also to encourage energy efficiency by design.
- 1.3 This new feature process is intended to provide a path for Service Providers and Vendor Signatories to innovate and add new features, including features with no assigned allowances and features that are in the early stages of design, without being treated as in violation of Voluntary Agreement energy allowances or procurement commitments.
- 1.4 This new feature process is intended to assure that most Set-Top Boxes remain under the procurement commitments of the Voluntary Agreement, with sufficient transparency for appropriate allowances to be established for new features.

### **2.0 Testing**

- 2.1 If a Set-Top Box subject to the Voluntary Agreement includes one or more new energy consuming features that do not have energy allowances, the Set-Top Box should be tested as deployed under the current test method provided in the Voluntary Agreement. Examples of such new features are High Efficiency Video Processing, Full HD (1080p-60), Ultra HD, Non-Frame compatible 3DTV, DOCSIS 3 channels with more than 8x4 bonded channels, future SOCs that include more than two decoders, WiFi Access Point, and VOIP functionality included in a Set-Top Box.
- 2.2 The test method provided in the Voluntary Agreement includes instructions about what to test and measurement instructions will include instructions on which duty cycles to assume for determining compliance with the efficiency standards of the Voluntary Agreement, regardless of actual duty cycles. For example, for reporting purposes a test procedure for a Set-Top Box may assume that a particular ON mode reading for the Set-Top Box with the feature engaged is in use 7 hours a day, even if actual use is for a shorter or longer period for the device or feature at issue.

### **3.0 Allowances**

- 3.1 If a Service Provider deploys a Set-Top Box that includes a new feature with no allowance, and the presence of the feature causes the Set-Top Box to exceed the TEC, the Service Provider will set and report an appropriate initial allowance for the power consumption of that feature when it reports the device under the Voluntary Agreement.
- 3.2 The initial allowance will be reported within nine months of the initial deployment of such a Set-Top Box if the Service Provider expects that its percentage of procurement of such Set-Top Box will be sufficient to be reported in its next annual report.
- 3.3 The initial allowance will represent the Service Provider's best estimate of the amount of energy consumed by the new feature in that particular unit. All new features, associated initial allowances, and justifications for such allowance, will be submitted to the Independent Administrator together with other required testing data. The Independent Administrator shall



inform the Steering Committee of the Service Provider created allowance for the new feature, except as otherwise provided in Section 3.4.

- 3.4 If the new feature is confidential and the Service Provider seeks an allowance, the Service Provider shall confidentially report the initial allowance, the basis for the allowance, and a written justification for its confidentiality to the Independent Administrator. The new feature may remain confidential until the feature is marketed or otherwise made public. The Service Provider shall inform the Independent Administrator within thirty days of marketing or otherwise making public a previously confidential new feature. In no case may a new feature remain confidential for purposes of this agreement, for longer than eighteen months from initial deployment. Once a new feature is reported as public information or the eighteen month period has elapsed, the Independent Administrator shall inform the Steering Committee of the Service Provider created allowance for the new feature. Annual reports should include the total energy use of Set-Top Boxes that include confidential new features, but need not identify the new feature.
- 3.5 When the information is reported to the Steering Committee, the Steering Committee shall propose appropriate allowances and effective dates when the allowances would go into effect under the processes of Voluntary Agreement. Initial allowances set by the Steering Committee will reflect the Steering Committee's best estimates of the energy consumption required for systems incorporating the new feature to meet the Voluntary Agreement levels. Initial allowances shall be set within six months of submission, and become effective at such time as is prescribed by the Steering Committee.
- 3.6 If a Service Provider includes in its report to the Independent Administrator a Set-Top Box that it has Purchased but has not yet deployed that includes a new feature with no allowance, and the presence of the feature causes the Set-Top Box to exceed the TEC, the Service Provider may report a provisional Service Provider created allowance until an initial allowance is submitted after deployment.
- 3.7 Allowance setting would be designed to not prejudice a variety of implementations. If a new feature is specific to one particular sector and its energy consumption when applied to other sectors is undetermined, it may be adopted as a sector annex amendment. The process for adopting a level for that feature will apply to other sectors when one of its Service Provider members submits an allowance for that feature to the Independent Administrator.
- 3.8 Allowances established by the Steering Committee for a new feature would be publicly reported as are other such allowances under the Voluntary Agreement.

**ANNEX 12 – 2012 BASE CASE**

**2012 Base Case: estimated national energy consumption**

	On			Sleep			UEC	Units	TEC	Power Plants	
	Watts	Hours	kWh/yr	Watts	Hours	kWh/yr	kWh/yr	Millions	TWhr/yr	Rosenfelds	
Cable	DVRs	33	14	169	31	10	113	282	27	7.5	2.5
	Receivers	16	14	83	15	10	56	139	57	7.9	2.6
	Clients	11	14	57	9	10	33	90	2	0.1	0.0
	DTAs	5	14	23	4	10	16	39	33	1.3	0.4
Sat.	DVRs	33	14	169	31	10	114	283	21	5.9	2.0
	Receivers	13	14	66	12	10	44	110	58	6.4	2.1
Telco	DVRs	17	14	86	15	10	54	140	6	0.8	0.3
	Receivers	11	14	55	10	10	35	90	21	1.9	0.6
	<b>U.S. Total</b>			708			465		<b>224</b>	<b>32</b>	<b>10.6</b>

**2012 Base Case: estimated national energy consumption with proliferation of DVRs (multiple per home)**

	On			Sleep			UEC	Units	TEC	Power Plants	
	Watts	Hours	kWh/yr	Watts	Hours	kWh/yr	kWh/yr	Millions	TWhr/yr	Rosenfelds	
Cable	DVRs	33	14	169	31	10	113	282	57	16.1	5.4
	Receivers	16	14	83	15	10	56	139	27	3.7	1.2
	Clients	11	14	57	9	10	33	90	2	0.1	0.0
	DTAs	5	14	23	4	10	16	39	33	1.3	0.4
Sat.	DVRs	33	14	169	31	10	114	283	71	20.1	6.7
	Receivers	13	14	66	12	10	44	110	21	2.3	0.8
Telco	DVRs	17	14	86	15	10	54	140	21	2.9	1.0
	Receivers	11	14	55	10	10	35	90	6	0.5	0.2
	<b>U.S. Total</b>			708			465		<b>237</b>	<b>47</b>	<b>15.7</b>

### ANNEX 13 – INFORMATION INCLUDED IN FIELD VERIFICATION REPORTS

Field verification reports to the Steering Committee shall include the information illustrated below:

Service Provider	STB Manufacturer	STB Category	State Tested	Verified TEC exceed SP reported TEC? (Y or N)	Verified TEC meet Tier 1? [Y or N]	Verified TEC meet Tier 2? [Y or N in 2017]	Energy-related settings observed in the home that differed from SP as deployed settings
A	1	CBL DVR	CA	N	Y	N	-
A	1	TC	IL	N	Y	N	-
B	2	SAT DVR	IL	Y	N	N	Deep sleep disabled
C	3	SAT	WA	N	Y	Y	Deep sleep set M-F for 12 hours per day.
D	1	DTA	CA	Y	N	N	-
E	4	IP	NY	N	Y	Y	-