Canadian Pay-TV Set-top Box Energy Efficiency Voluntary Agreement (STB CEEVA)

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1 Introduction

This non-regulatory, Canadian Energy Efficiency Voluntary Agreement for Set-top Boxes (STB CEEVA) aims to complement the ENERGY STAR Set-top Box program in Canada by establishing feature-based maximum energy consumption allowance levels for new Set-top Boxes Received by Canadian pay-TV Service Providers. The overall objective of the STB CEEVA is to achieve the deployment of efficient Set-top Boxes without a) restricting the rapid pace of technological innovation characteristic of the pay-TV market sector, or b) adversely impacting the usability of Set-top Boxes.

The STB CEEVA seeks to minimize the additional effort required by Manufacturers, by adopting the USVA test method for example, while enabling Canadian Service Providers and other stakeholders to depart from the USVA where they see fit, for example in the Operating Procedures.

2 General Definitions

This section defines the general definitions used in the body of the STB CEEVA document. The STB CEEVA defines program requirements that span multiple Tiers staged over time. Because each of these Tiers is based on a different set of external policy documents (e.g. different versions of ENERGY STAR program requirements), definitions may vary between Tiers as do qualification criteria and test methods.

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 Provider” means a company that supplies the Conditional Access techniques employed to protect content from unauthorized viewing.
3. “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.
4. “Data Aggregator” means the party designated by the Steering Committee who is tasked with, and responsible for, the collection and processing of reporting information supplied by Signatories, and determining a Signatory’s compliance with the Agreement.
5. “Digital Video Gateway” means a Set-top Box without a direct video connection.
6. “Endorser” means a non-signatory Member who publicly endorses the agreement.
7. “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.
8. “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 Canada by a Service Provider.
9. “Members” mean the Members of the Steering Committee, which consist of Signatories and Non-Signatory Members.

10. “Manufacturer” in the context of this agreement means a Signatory organization that manufacturers and sells Set-top Boxes to Service Providers.
11. “Non-signatory Member(s)” means those companies or organizations that are Members of the Steering Committee but are not Service Providers or Manufacturers.
12. “Receive” means to take delivery of any new (not refurbished) Set-top Box for commercial deployment in Canada.
13. “Reporting Period” means the period for which the required information is to be submitted by a Signatory (which is generally January 1st to December 31st).
14. “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 Agreement is a Signatory that supplies Set-top Boxes to a residential End User.
15. “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 a single residential consumer display and/or recording device, and/or one or more other Set-top Boxes or Thin Clients in a residential multi-room architecture, and that is Received by a Canadian Service Provider for the first time on or after the Effective Date.
16. “Signatory” and “Signatories” mean those companies or organizations that sign this Agreement.
17. “Steering Committee” means the coordinating and governing body of this Agreement.
18. “Thin Client” means A STB that can receive and decode video content solely over a Home Network Interface from another STB and does not include a Service Provider network interface.
19. “Tier 1” means the efficiency standards established in ENERGY STAR version 3.0 Program Requirements.
20. "Tier 2” means the efficiency standards established in Annex B, Tier 2 Requirements and Test Method Tier 2 Requirements and Test Method.
21. “Tier 1 Effective Date” means Jan 1, 2017, except that as applied to a Signatory that signs the Agreement after that date, it shall mean the date on which that party signs the Agreement.
22. “Tier 2 Effective Date” means Jan 1, 2018, except that as applied to a Signatory that signs the Agreement after that date, it shall mean the date on which that party signs the Agreement.
23. “Unit Under Test” or “UUT” means the equipment being tested.
24. “US VA” means the industry-led Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Set-top Boxes, initially executed in December 2012 and amended in January 2014.

3 Equipment Covered

This STB CEEVA covers all newly manufactured Set-top Boxes Received by Canadian Service Providers after the Tier 1 Effective Date, January 1, 2017, except new models that have not been deployed or

publicly announce and that the Service Provider wishes to remain confidential. In this case, the Service Provider must make a note to the Data Aggregator that x-number of such boxes have been received and are not included in the reported model information or procurement data. The Service Provider must also report these Set-top Boxes in the Reporting Period in which they are deployed, the Reporting Period after the one in which they were Received. The Data Aggregator will supply Service Provider exception notes to the firm hired to audit procurement records so that the auditing firm knows to look for these units in the Reporting Period following the Reporting Period in which these boxes were received.

4 Commitments

From the Tier 1 Effective Date (January 1, 2017) Signatories agree that ninety percent (90%) of all new Set-top Boxes that a Service Provider Received in each calendar year shall meet the efficiency standards established in ENERGY STAR version 3.0 Program Requirements.

From the Tier 2 Effective Date (January 1, 2018) Signatories agree that ninety percent (90%) of all new Set-top Boxes that a Service Provider Received in each calendar year shall meet the efficiency standards established in Annex B, Tier 2 Requirements and Test Method Tier 2 Requirements and Test Method.

Signatory Service Providers will make best efforts to ensure that collective market share represents 85% of total Canadian pay-TV subscribers, in order to reduce Canadian greenhouse gas emissions resulting from the operation of pay-TV Set-top Boxes.

Signatories commit to review items listed in “STB CEEVA Steering Committee Initial Meeting Agenda Items” in the initial Steering Committee meeting and to maintain this as a working document used to track “parking lot” items. This commitment to review these items does not represent a commitment to take any specific action on any of the items listed in this document. The commitment is to discuss them and assess what, if any, actions are appropriate at that point in time. Proposed items may be tabled if discussion leaves them unresolved but shall remain in the list, with dated notes reflecting main discussion/decision points, for consideration at a later time, and within no more than a year of the latest discussion.

Signatory Service Providers will support:

- reasonable steps to inform consumers about the general energy consumption characteristics and performance of Set-top Boxes, as described in Section 6, and
- reasonable steps to monitor the effectiveness of this Agreement through the procedure described in Section 9 Review and Amendment of the Agreement

Equipment manufacturers will use reasonable efforts to design Set-top Boxes which improve functionality and enable Set-top Boxes to be controlled and operated in an energy efficient manner without compromising the user experience.

Service Providers will consider in an early Steering Committee meeting the possibility of developing Annex-specific goals or commitments including but not limited to efforts to reconfigure installed Digital Video Recorders (DVR) to auto-power-down (APD) their hard drives when consumers are neither watching nor recording shows in cases where the DVR is APD capable with a software update.

5 Test Method

The STB CEEVA test method was developed with the following goals in mind:

1. Provide repeatable results that approximate "real world" energy consumption (i.e., as actually operated in an end user setting)
2. Minimize test burden for Signatories by adopting USVA specifications with clarifications and examples
3. Align with ENERGY STAR to reduce test burden for Service Providers and Manufacturers who wish to participate in both STB CEEVA and ENERGY STAR programs.

The applicable test methodologies and procedures are fully described within this document or incorporated by reference to external methodologies and/or procedures.

5.1 Testing for Compliance Determination

5.1.1 Tier 1 test method

For determination of Tier 1 compliance with the STB CEEVA, 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 Requirements document.[1] 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 devices prior to the Effective Date a) need not be re-tested under this Agreement, as long as the ENERGY STAR test was conducted on the Service Provider's live network in the Service Provider's default configuration, and b) shall be included in annual reports and counted towards Service Provider commitments.

The Signatories agree that 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 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 function for testing, the Signatory may provide written documentation indicating the incremental power consumption of the function to be added to the applicable energy consumption targets, per the Annex E, New Feature Process.

A Service Provider has the option to demonstrate compliance with the Tier 1 maximum energy allowance levels by using the test methodologies and procedures for Tier 2 Commitments as described in Annex B, Tier 2 Requirements and Test Method and Annex E, New Feature Process.

[1] http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/settop_boxes/ENERGY_STAR_STB_Final_Version_3_Specification.pdf

5.1.2 Tier 2 test method

The applicable test methodologies and procedures for Tier 2 Commitments are fully described in Annex B, Tier 2 Requirements and Test Method and Annex E, New Feature Process. Tests must be conducted using an EPA-Recognized Laboratory, or tests may be conducted in other test facilities which are pre-approved by the Steering Committee on Set-top Boxes in their default configuration. Tests must be conducted on Service Provider headend equipment.

5.2 Testing for Public Reporting

All STBs covered by the STB CEEVA shall be tested and the data included in the annual reports submitted by the Service Providers to the Data Aggregator. 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 STB CEEVA published annual report.

For public reporting purposes, testing shall be performed according to the following:

- Prior to the Tier 2 Effective Date, Service Providers may use either ENERGY STAR Version 3 test method[2] or the test method set out in the Tier 2 Program Requirements and Test Method. Beginning with the Tier 2 Effective Date, only the test method set out in the Tier 2 Program Requirements and Test Method shall be used.
- New features may be disabled or deactivated prior to testing only if they are deactivated as-installed by the Service Provider. New features that default to on MAY NOT be deactivated for the purpose of reporting.
- If a new test method and allowance is subsequently developed and approved by the STB CEEVA Steering Committee for a new feature, then it shall be used.
- Multi-Room (MR) STBs that are tested using ENERGY STAR Version 3 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. 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 (e.g. A Service Provider could add 30, the MR allowance minus the HNI allowance, to the measured single room TEC value to avoid retesting a MR STB).

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 commitments. 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. Publicly reported TEC shall reflect values that a customer would experience if using the device with the pre-specified TEC equation duty cycles.

5.2.1 Determining Early Compliance to STB CEEVA Tier 2

Only publicly reported TEC values may be used to estimate early compliance for the STB CEEVA annual report. This is required since only publicly reported TEC values reflect the as-installed TEC. If a Service

[2] https://www.energystar.gov/sites/default/files/specs//private/ENERGY_STAR_STB_Test_Method_Rev._Jan-2011.pdf

Provider elects to publicly declare a device meets STB CEEVA Tier 2 they may use either the STB CEEVA Tier 1 (ESv3) or Tier 2 test method.

5.3 Quality Assurance

For all forms of testing described above—compliance, reporting, and determination of early Tier 2 compliance—the following quality assurance requirements apply. Test results must be certified by any certification body that:

a) is ISO 17065 accredited and/or is recognized by the Standards Council of Canada for Set-top Box testing and qualification of Supervised Manufacturer's Test Laboratories (SMTLs) (CableLabs, pending 17025 accreditation, is authorized to act as a certification body under this agreement to include audit functions.),

b) has Steering Committee approval, and

c) adheres to a quality assurance scheme that meets the following requirements:

    1) Tests shall be conducted in the certification body's lab by certification body staff, or by SMTL staff in a SMTL lab. A Manufacturer or Service Provider may act as a SMTL.

    2) Tests must be conducted on a live network with Set-top Boxes in default configuration, with the exception of cases under the ENERGY STAR 3.0 test method where it is acceptable under this agreement to turn off new features for which ENERGY STAR 3.0 does not provide an adder.

    3) Each Reporting Period the Data Aggregator will randomly select one Service Provider, never the same one twice in consecutive years whose test results shall be audited by a certification body selected by the Service Provider. The audit will occur in the last quarter of each Reporting Period. The test result audit shall consist of a retest of two Set-top Box models selected by the auditing certification body. The first of these tests may be skipped in the first reporting year if there were no compliance tests conducted early in the first reporting period. The second of these two tests may be skipped if the certification body was present for the initial certification test being audited.

        i) The first model must be one that had been tested and determined compliant relatively early in the Reporting Period or in a previous Reporting Period, that is still actively in use on the service provider network, and that the service provider believed to continue to be compliant. The purpose of this first test is to determine whether or not the service provider is meeting its commitment to maintain Set-top Box compliance over time during the reporting period.

        ii) The second model must be a compliant or non-compliant one that has been recently tested. The purpose of this test is to ensure that the certification body can reproduce the test results. The certification body selects a recently tested Set-top Box in order to reduce the number of software updates that may have occurred since the Set-top Box was first tested.

    Retest audits shall be conducted at the same location as the original test and may be conducted by certification body staff in the presence of SMTL staff or by SMTL staff in the presence of certification body staff. The scope of the audit shall include testing for both certification and reporting if different.

    4) The certification body shall qualify SMTLs using scheme criteria that include equipment calibration, staff training, and a document control.

    5) The scheme will NOT include a challenge test program.

    6) The scheme will NOT include annual retest audits of each service provider.

    7) The scheme will NOT include certification labeling.

    8) The scheme will include public listing of compliant and non-compliant Set-top Boxes by the certification body.

    9) The scheme will involve annual in-person audits of each SMTLs lab to include staff training records, document retention system procedures and documentation, and test equipment calibration records.

6 Reporting

STB CEEVA Members communicate with the public in two ways, a) by publishing a single STB CEEVA annual report, and b) by posting feature and energy consumption information about each of the new models they offer to their pay-TV service subscribers on an easy to find part of their respective websites.

6.1 Annual Report

Each Signatory Service Provider shall send to the Data Aggregator a confidential annual report by April 1 after each Reporting Period containing the data for the prior Reporting Period during which it was a Signatory. The Data Aggregator shall provide anonymized, aggregated Service Provider data to the Steering Committee by May 1. The Steering Committee shall then write and publish the public annual report for each Reporting Period by July 1.

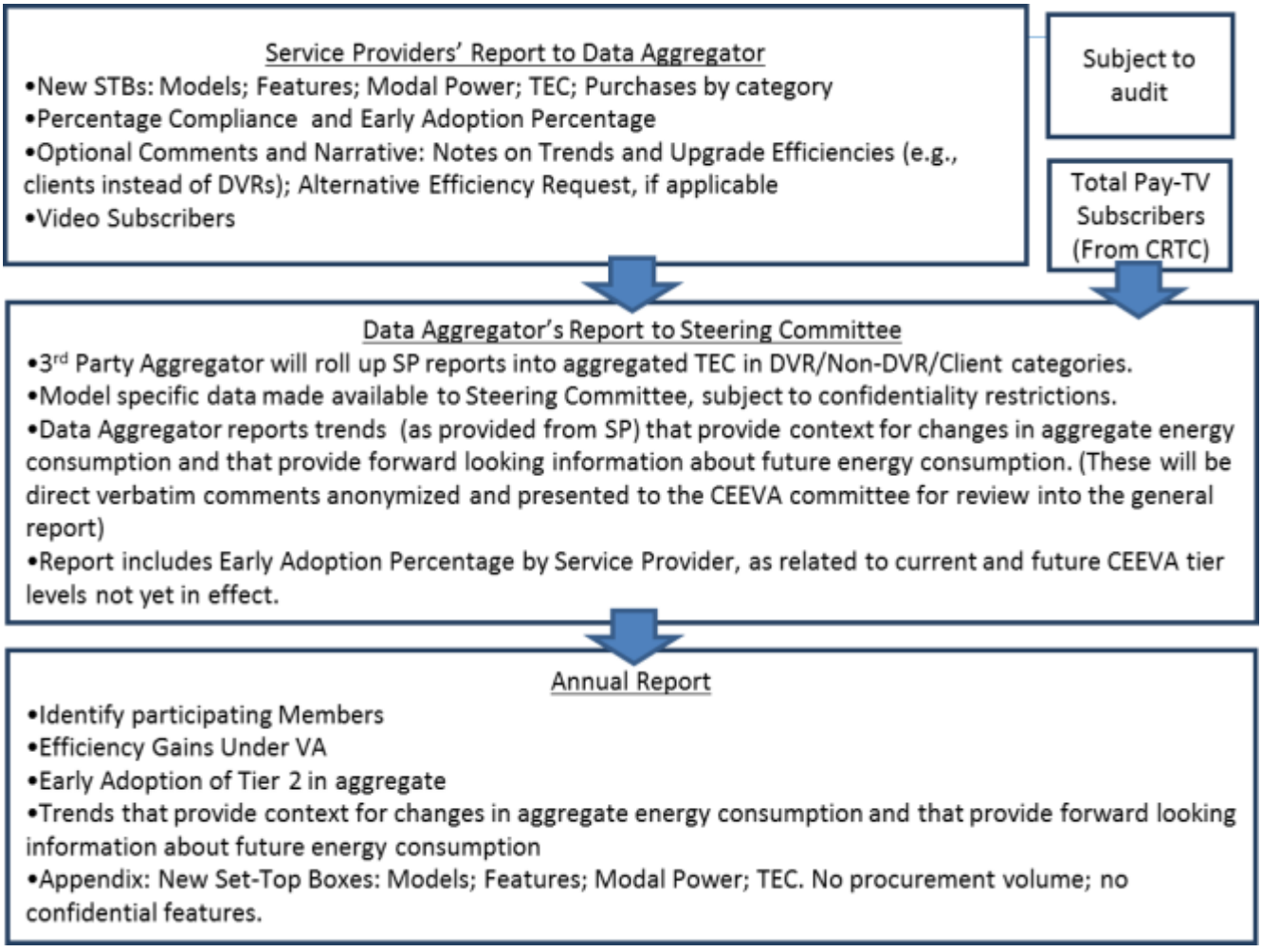

Figure 1: Report flow chart

The information in the annual report shall include:

- For each reported Set-top Box model, all information necessary to calculate maximum allowed or reported TEC, including:
    - Modal power use (e.g., on, sleep, deep sleep) and annual energy use (TEC);
    - Features similar to those reported to ENERGY STAR (e.g., HD, DVR, whole home, HNI, auto power down enabled, etc.); and
    - Details on calculating TEC and implementation of sleep states, including the number of hours deep sleep was set for at deployment.
- Deployment information (total units Deployed by category and units Deployed compliant with Tier 1 and with Tier 2 commitments by category) with an attestation that the volumes reported reflect units Deployed during the reporting period.

Models shall be distinguished if energy use varies by configuration.

Signatory Service Providers are encouraged towards early adoption of Tier 2 commitments. To that end, annual reports for all reporting periods before the Tier 2 Effective Date 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 Tier 1 test method to approximate Tier 2 qualification, or to use the test method described in Annex B, Tier 2 Requirements and Test Method and Annex E, New Feature Process .

Each Service Provider shall provide the number of residential multichannel video subscribers served. The last regularly published subscriber count during the year will be used for the STB CEEVA annual report. The total number of residential multichannel video subscribers served during the reporting period by both signatory and non-signatory Service Providers shall be determined by the CRTC.

Service Providers are encouraged to report information to the Data Aggregator that can help to describe energy consumption trends and energy efficiency progress. For example, reduced average energy consumption per subscriber is driven by continued shift to thin clients or additional energy required for a new capability.

When a Signatory Service Provider is making its first report, it may provide data either for the entire prior Reporting Period, Jan 1 – Dec 31 (effectively backdating its commitment to the Jan 1 preceding its signature) or provide a report covering only the period beginning with its signature.

All reporting arrangements shall protect the confidentiality of commercially sensitive information. The Data Aggregator must sign a confidentiality agreement in relation to any confidential information supplied by the Signatories.

The Data Aggregator shall aggregate Service Provider reports of models/units/annual energy use and report aggregated TEC in categories such as DVR/Non-DVR/Thin Client/DTA/Multi-service Gateway Set-top Box in the form set out in Annex A. Aggregation must be sufficient so that no individual company's results can be deduced or reasonably approximated. Data may be averaged in the Data Aggregator report to the Steering Committee.

- 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.
- The information shall not include confidential or commercially sensitive information, such as shipping and volume reports and features that have not been publicly announced.
- The percentage of Set-top Boxes that meet Tier 2 early shall be provided on a Service Provider-specific basis to the Steering Committee.
- The Data Aggregator may report trends useful for power load planning, such as overall rate of change in Set-top Box national energy consumption.

The Data Aggregator report should put data in context. For example: (1) the number of thin clients in lieu of fully-featured Set-top Boxes; and (2) the number of hours of tablet viewing. It is understood that accounting and reporting systems vary; and that the Data Aggregator will be expected to aggregate data in order to protect the confidentiality of individual Service Provider information.

If the Data Aggregator finds substantial non-compliance in the Service Provider report, it shall notify NRCan, who will provide notice to the Service Provider by May 1.

The Steering Committee shall publish a public annual report that will:

- Identify participating Members during the reporting period.
- Identify the aggregate number of video customers served by Service Provider Signatories compared with the number of Canadian residential multichannel video subscribers served by all Service Providers (including those outside of the Agreement) during the reporting period.
- Report efficiency gains under the Agreement using a method and baseline to be addressed in the CEEVA Steering Committee - Initial Meeting Agenda items. The percentage of Set-top Boxes that meet Tier 2 early shall be provided only on an aggregate basis in the annual report.
- Include a narrative of trends, such as overall progress under the Agreement, overall rate of change in total annual energy consumption, and underlying factors that drive that energy consumption up or down.
- Include an Appendix of Set-top Boxes which Service Providers have Received during the Reporting Period including their model numbers and 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.

6.2 Model Information on Service Provider Websites

Signatory Service Providers shall provide their subscribers and potential customers with reasonable access to energy efficiency information about their own Set-top Boxes subject to this Agreement no later than April 1, 2017 (or six months after signature, if it becomes a signatory after January 1, 2017) and shall update this information by April 1st of each subsequent year. The energy efficiency

information that the Service Provider shall make available under this section shall include for each model of Set-top Box Received after the Tier 1 Effective Date:

- Modal power use (e.g., on, sleep, deep sleep) and annual energy use (TEC); and
- 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.
- Set-top Boxes that meet the applicable energy consumption targets for Section 4 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.

Models shall be distinguished if energy use varies by configuration. This information need not be updated for software and/or configuration changes unless changes significantly affect energy use. This information shall be made publicly available for each model made available to the Service Provider's subscribers. The information will not include confidential or commercially sensitive information, such as features that have not been publicly announced.

7 Annual Procurement Audit

An accounting firm authorized to write a letter of assurance will conduct an audit of procurement figures for one Service Provider selected at random each year. The same Service Provider shall not be randomly selected two years in a row.

8 Steering Committee Operating Procedures

A Steering Committee is established as the coordinating and governing body of this Agreement. The operating procedures should:

- ensure a made in Canada agreement, standards and Steering Committee;
- create a simplified, transparent and accountable process;
- support a consensus approach to decision making, with the need for 'votes' to be used in very limited circumstances;
- not hamper innovation or unduly disrupt the Canadian market or Canadian consumers.

The Steering Committee serves as the STB CEEVA governing body. Steering Committee Members consist of Signatories, who are the participating Service Providers and Manufacturers, and Non-signatory Members, who are the government, non-governmental, utility, and trade association organizations who participate in Member meetings. Membership requires a commitment to fully support Steering Committee duties, which include reviewing amendments to the USVA and determining whether or not to adopt as is or in modified form. The Steering Committee selects and instructs a third party Data Aggregator, who annually submits aggregated data to NRCan and the Steering Committee, which in turn writes the annual report. All Members of the Steering Committee participate in generating the annual

report. The Steering Committee appoints and can remove Members if necessary. If a Member is removed, it can still attend public meetings.

There is a new Steering Committee chair each year. The first chair is chosen randomly from the pool of Service Provider Signatories. Subsequent chair assignments default to the Service Provider in good standing who completes the annual audit.

The Steering Committee shall meet quarterly in the first year and semi-annually in following years with an annual face-to-face meeting, which shall accommodate online attendance to include full participation including voting. Upon request from any signatory the Chair can call a special Steering Committee meeting to deal with emergent issues that are unable to be delayed until next scheduled meeting.

Steering Committee meetings must include a public meeting open to all interested parties and may include a Member meeting limited to Members and/or a Signatory meeting limited to Signatories. The committee shall work on a consensus model, resorting to a vote taken by voting Members only when full discussion has occurred and arguments and objections have been fully explored and recorded in minutes. If consensus of attendees in the public and/or Member meetings is not clear, then Signatories decide by vote (to be determined by a simple majority) in which each Service provider casts a single vote and for which Signatory Manufacturers and the Consumer Technology Association (CTA) (if a Signatory) cast two votes total. This Agreement does not define how CTA and Manufacturers would cast their two votes.

The Steering Committee's duties include:

- administering the new feature process,
- developing annual reports,
- reviewing and amending the agreement on annual basis, and
- managing Membership to include removal of Signatories after substantial efforts to achieve corrective action fail.

Non-Signatory Members are encouraged to endorse the Agreement. Each Non-Signatory Member may have its own approach to endorsing. NRCan may put-up a web page. Others may issue a press release.

The Chair must prepare the draft agenda of the Steering Committee meeting. The Chair must include in the draft agenda all points proposed by the members of the Steering Committee and, where relevant, all points that may be received from observers. Invitations to the Steering Committee meeting must be sent to all members of the Steering Committee. An announcement of the Steering Committee meeting, including the provisional agenda, must be posted on a website of the voluntary agreement not later than thirty days in advance of the meeting. Requests for participation to the Steering Committee are evaluated by the Chair taking into consideration the pertinence of the request.

Documents to be presented and discussed at the Steering Committee meeting must be sent to all members of the Steering Committee, and must be posted on online no later than 7 working days in advance of the meeting. Online access to draft documents may be restricted to STB CEEVA Members.

All members of and observers to the Steering Committee must have a right to take the floor at the Steering Committee meetings and to request the Chair to register their views in the minutes.

Chair shall prepare minutes from each Steering Committee meeting,, circulate them to all Steering Committee members and post them on the website of the voluntary agreement within thirty days of the meeting. The Chair must allow at least two weeks after circulation of minutes for members and observers to the Steering Committee to submit comments before further distribution and final publication on the website.

The Signatories must bear all expenses related to the operation of the Steering Committee.

The Steering Committee may decide to convene a working group to carry out specific tasks required under the voluntary agreement. In this case, the Steering Committee, with the agreement of the Commission, must decide on the composition of the group, its specific tasks and the time frame of its operation. The working group may consist of the members and the observers to the Steering Committee may include external experts and must be required to report to the Steering Committee on the results of its work within a deadline specified by the Steering Committee.

9 Review and Amendment of the Agreement

At least once each reporting year the Steering Committee will meet to review the Agreement in order to:

- evaluate the effectiveness of the Agreement in achieving its purposes as identified in Section 1 above;
- create an annual report consistent with Section 6;
- evaluate current and future developments that may influence energy consumption with a view to agreeing upon a course of action and/or revising the Agreement; and
- set future targets to increase energy efficiencies in accordance with the usual product development cycles.

10 Non-compliance and Dispute Resolution

Non-compliance with STB CEEVA commitments could take several forms, all related to the Service Provider commitments articulated in Section 4:

1. Failure to meet Tier 1 or Tier 2 procurement commitments (90% of new Set-top Boxes). This form of non-compliance may be self-reported or the result of an audit.
2. Failure to provide required information for annual report as described in Section 6 in a timely manner.
3. Failure to post easily accessible public information about new Set-top Box models on Service Provider website per Section 6 in a timely manner.
4. Failure to participate in review and amendment of the Agreement as described in Section 9.

The initial objective of the Steering Committee when dealing with a non-compliant Signatory is to be supportive and assistive of that entity moving into compliance. A signatory that is aware it is or will be non-compliant should advise the Data Aggregator and NRCan of the deficiency as soon as possible.

Once notified of non-compliance or anticipated non-compliance directly by a Service Provider or indirectly by the Data Aggregator, the following steps shall be taken:

1. The aggregator will provide, to NRCan's satisfaction, all necessary information, including all communication between the Service Provider and the Data Aggregator, to enable a complete understanding of the non-compliance problem.

2. NRCan will meet with the non-compliant Service Provider to discuss the non-compliance problem and to develop a corrective action plan, which should include measurable success metrics to include checkpoints, completion dates, and expectations for status reporting.

3. NRCan will follow up with the Service Provider by reviewing status reports and meeting with the Service Provider at key checkpoints and providing written feedback to the Service Provider.

If the corrective action plan involves a recovery plan such that no Service Provider commitments are missed at the end of the reporting period, then the matter shall be closed between NRCan and the non-compliant Service Provider without Steering Committee engagement. For example, NRCan works with a Service Provider who, mid-year, is concerned that they will not meet their STB CEEVA commitments, to develop a software patch that brings their affected Set-top Boxes into compliance by the end of the reporting period.

However, if the matter involves providing an enduring exception to Service Provider commitments, then NRCan would work with the non-compliant Service Provider to develop a corrective action that involves the exception, and then NRCan proposes this plan to the Steering Committee for approval. For example, a Service Provider is championing a new, more efficient approach to digital TV content distribution (e.g. network DVR) but their Set-top Boxes fall just out of compliance, and there is no way to recover without a redesign, which will not happen during this reporting period. NRCan may recommend to grant this Service Provider a time-limited exception. The Steering Committee would have the ability to approve or reject NRCan's recommendation.

In developing corrective action recommendations to the Steering Committee, NRCan should consider the balance of the Service Provider's commitment to save energy for its Canadian subscribers. For example, if 89% of a Service Provider's new Set-top Boxes meet STB CEEVA allowance levels by a large margin, and the non-compliant models narrowly miss, then NRCan might take this into consideration when developing corrective active recommendations for the Steering Committee. However, it should be noted that STB CEEVA allowance levels are not intended to represent fleet average efficiency levels. The intent is that 90% of Service Provider boxes comply by a large enough margin that even the units at the lower-efficiency end of the normal distribution curve comply.

Finally, if the non-compliant Service Provider fails to execute a predefined corrective action plan, then NRCan shall refer the matter to the Steering Committee, which shall develop next steps up to and including removal of the non-compliant signatory from the STB CEEVA. NRCan's role is consultative and does not involve enforcement activities. Only the Steering Committee has the authority to enforce compliance, primarily or exclusively by removing non-compliant Service Providers from the Agreement.

However, if NRCan or provincial regulators, after ineffective course correction actions, determine that on balance Signatories are not meeting the letter or the spirit of the Agreement including the commitment to maintain 85% Canadian market share, then NRCan or other regulators may terminate their Membership and develop federal or provincial regulatory approaches to increasing the energy efficiency of Set-top Boxes.

NRCan shall preserve the confidentiality of information exchanged between NRCan and non-compliant Service Providers via mechanisms outlined in the Access to Information Act. If NRCan refers the matter to the Steering Committee, then the non-compliant Service Provider shall not be required to share confidential information with other Members. Because the Steering Committee may have less information than NRCan about the source of non-compliance and progress towards completion of the corrective action plan—because some or all of this information would put the non-compliant Service Provider at risk in terms of its competitive position—the Steering Committee may rely heavily on NRCan's recommendation to continue working with the non-compliant Service Provider to correct its course or to remove it from STB CEEVA.

11 Termination

Any Service Provider or Equipment Manufacturer 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 Agreement except that all confidentiality obligations arising from this Agreement shall survive such termination. The Chair will notify all Members of the Steering Committee and such other persons as the Chair may deem appropriate of the termination. Any Non-signatory Member may elect to terminate its Member status by giving twenty-eight days' written notice to the Chair of the Steering Committee. Such termination shall immediately terminate that Member's access to Member-only meeting and other information shared by Members and not the general public.

12 Term

The term of this Agreement shall begin on Tier 1 Effective Date and shall continue through the 2021 reporting period to include the annual report for that reporting period. The Agreement may be renewed by mutual agreement.

Annex A Reporting Template

Service Providers will use Excel template to report information to the Data Aggregator in support of the annual reporting cycle: *Canadian STB VA Data Reporting Template DRAFT (2016-01-27).xlsx*.

Annex B Tier 2 Requirements and Test Method

B.1 Introduction

This annex defines Maximum Typical Energy Consumption (TEC) base and additional feature energy allowances, allowance rules, and the Typical Energy Consumption (TEC) equation used to determine compliance with the Canadian Energy Efficiency Voluntary Agreement (STB CEEVA) for Set-top Boxes. This annex is specific to the Tier 2 Program and does not apply to Tier 1. These requirements are identical to USVA requirements. Tier 2 testing must be conducted per the Quality Assurance requirements listed in Section 5 of this document.

B.2 Compliance Notation

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

B.3 Definitions

The definitions below are specific to this Annex only and shall supersede the General Definitions listed in Section 2 of this document where there are differences. ENERGY STAR definitions have evolved over time, given that this document references both ENERGY STAR 3.0 and later versions of ENERGY STAR on which the Tier 2 test method is based, it is and will continue to be difficult to maintain a single set of definitions throughout the document. If a Tier 3 is added to this document to include test method updates, it is likely that Tier 3 requirements will include definitions specific to Tier 3.

A) Set-top Box (STB): 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 Received by a Canadian Service Provider for the first time on or after the Tier 2 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:
   1) STBs with a Digital Video Recorder (DVR) feature.
   2) STBs without a Digital Video Recorder (DVR) feature.
   3) Thin Client STBs.
   4) Cable Digital Transport Adapter (DTA) STBs.
   5) Multi-Service Gateway STBs

Set-Top Boxes subject to this Voluntary Agreement do not include any Set-Top Box that is Received for the first time before the Tier 2 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 Tier 2 Effective Date.

B) STB Base Types:

1) Cable (CBL): A STB that can receive and decode video content as delivered from a Service Provider hybrid fiber/coaxial distribution system using a Conditional Access System (CAS).
2) Satellite (SAT): A STB that can receive and decode video content as delivered from a Service Provider satellite network using a Conditional Access System (CAS).
3) Cable Digital Transport Adapter (DTA): 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 using a Conditional Access System (CAS).
4) Internet Protocol (IP): A STB that can receive and decode video content encapsulated in IP packets from a Service Provider managed distribution network.
5) Thin Client (TC): A STB that can receive and decode video content solely over a Home Network Interface from another STB and does not include a Service Provider network interface.

C) Client: A device (e.g. STB, Thin-Client STB, Smart TV, Mobile Phone, Tablet, PC, etc.) that can receive video content over a Home Network Interface.

D) Multi-Service Gateway STB (MSG-STB): A STB that is capable of joining multiple Service Provider delivery protocols and/or that provisions a video service and at least one of voice or broadband services from a Service Provider.

E) Additional Functionality:
1) CableCARD (CC): The capability to decrypt premium video content and services and provide other network control functions via a plug-in Conditional Access module that complies with the ANSI/SCTE 28 HOST-POD Interface Standard.[3]
2) Digital Video Recorder (DVR): A feature that enables recording and playback of video content from a hard disk drive (HDD) or other integrated non-volatile storage. A DVR often includes features such as: Play, Record, Pause, Fast Forward (FF), and Fast Rewind (FR). The presence of a DVR feature does not mean the device is defined to be a STB.
3) DOCSIS®: The capability to distribute data and video content over cable television infrastructure according to the following specifications:
   i) DOCSIS 2.0 (D2): DOCSIS 2.0 interface as defined by CableLabs® Data Over Cable Service Interface Specification.[4]
   ii) DOCSIS 3.0 (D3): DOCSIS 3.0 interface as defined by CableLabs® Data Over Cable Service Interface Specification.[5]
4) High Definition (HD): The capability to transmit or display video signals with a minimum output resolution of 1280×720 pixels in progressive scan mode at minimum frame rate of 59.94 fps (abbreviated 720p60) or a minimum output resolution of 1920×1080 pixels in interlaced scan mode at 29.97 fps (abbreviated 1080i30).
5) Advanced Video Processing (AVP): The capability to decode video signals in accordance with standards H.264/MPEG 4 or SMPTE 421M.
6) Transcoding (XCD): Additional capability to translate (e.g. MPEG2 to H.264), transrate (e.g. HD bitrate to Mobile bitrate), transcale (e.g. HD resolution to Mobile resolution), transcrypt (e.g. CAS to DRM), or perform audio format conversions (e.g. AC-3 to AAC) in real-time.

[3] http://www.scte.org/standards/
[4] http://www.cablelabs.com/cablemodem/specifications/specifications20.html
[5] http://www.cablelabs.com/cablemodem/specifications/specifications30.html

7) Home Network Interface (HNI): the interface with external devices over a local area network (e.g. MoCA, HPNA, IEEE 802.3, IEEE 802.11, HomePlug AV) capable of transmitting video content.
8) WiFi HNI (WiFi HNI): A wireless HNI as specified by IEEE 802.11
9) Multi-Input Multi-Output WiFi (MIMO WiFi): functionality that supports more than one Spatial Stream[6] for both send and receive.
10) Shared DVR (S-DVR): The capability to provide independent DVR video content to more than one Display Devices and/or Clients in a single-subscriber configuration.
11) Multi-Room (MR): The capability to provide independent live video content to more than two Display Devices and/or Clients in a single-subscriber configuration.
12) Multi-Stream (MS): The capability to receive multiple independent streams of video content.
13) Routing (RTG): The capability to determine the path along which network traffic should be forwarded.

F) Auto Power Down (APD): A STB feature that monitors parameters correlated with user activity or viewing. If the parameters collectively indicate that no user activity or viewing is occurring, the APD feature enables the STB to transition to a sleep mode or OFF mode.

G) Principal STB Functions: Functions necessary for selecting (EPG), receiving, decoding, decompressing, or delivering live or recorded video content to a Display Device, local/remote recording device, or Client. Monitoring for user or network requests is not considered a Principal STB Function.

H) Operational Modes:
1) ON Mode: The STB is connected to a mains power source. At least one Principal STB Function is activated and all Principal STB Functions are provisioned for use. The power consumption in ON mode may vary based on specific use and configuration.
2) SLEEP Mode: A range of reduced power states where the STB is connected to a mains power source and is not providing any Principal STB Function. The STB may transition to ON, DEEP SLEEP, or OFF mode due to user action, internal signal, or external signal. The power consumed in this mode may vary based on specific use or configuration. If any Principal STB Function is activated while operating in this mode, the STB is assumed to transition to ON mode. Monitoring for user or network requests is not considered a Principal STB Function. The STB shall be able to transition from this mode to ON mode within 30 seconds.
3) DEEP SLEEP Mode: A range of reduced power states where the STB is connected to a mains power source and is not providing any Principal STB Function. DEEP SLEEP represents the lowest average power consumption state where Principal STB Functions can be re-activated without user action and without the transition time requirement of SLEEP Mode.
4) OFF Mode: The STB is connected to a mains power source, has been de-activated, and is not providing any function. The STB requires a user action to transition from this mode to ON or SLEEP mode.

[6] Spatial Stream: Spatial multiplexing is transmission techniques in MIMO wireless communication 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.

I) Other Definitions
   1) Display Device (DD): A device (e.g., TV, Computer Monitor, or Portable TV) that receives its content directly from a STB through a video interface (example: High-Definition Multimedia Interface (HDMI), Component Video, Composite Video, or S-Video), not through a HNI, and displays it for viewing.
   2) Service Provider (SP): 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.
   3) Conditional Access System (CAS): The encryption, decryption, and authorization techniques employed to protect content from unauthorized viewing. CableCARD and Downloadable Conditional Access System (DCAS) are examples of Conditional Access technology.
   4) Typical Energy Consumption (TEC): A means for evaluating energy efficiency through a calculation of expected energy consumption for a typical household STB over a one year period, expressed in units of kWh/year.

B.4 Qualification Criteria

B.4.1 Significant Digits and Rounding

1) All measured and calculated power values shall be rounded as follows:
   i) To the nearest 0.01 W for power measurements of 10 W or less
   ii) To the nearest 0.1 W for power measurements of greater than 10 W and up to 100 W
   iii) To the nearest 1 W for power measurements of greater than 100 W
2) All measured and calculated TEC values shall be rounded as follows:
   i) To the nearest 0.01 kWh/y for values of 10 kWh/y or less
   ii) To the nearest 0.1 kWh/y for values of greater than 10 kWh/y and up to 100 kWh/y
   iii) To the nearest 1 kWh/y for values of greater than 100 kWh/y

B.4.2 General Qualification Criteria

1) Device Operation Requirements:
   i) Products may automatically exit SLEEP mode and/or DEEP SLEEP mode on a regular schedule to perform maintenance activities. The total time spent performing maintenance activities shall not exceed an average of two hours in any 24-hour period. Maintenance activities may include, but are not limited to; software updates, electronic programming guide updates, HDD maintenance, and routine diagnostic operations.
   ii) Products that automatically exit SLEEP mode or DEEP SLEEP mode and have completed maintenance or other user-requested activities (e.g. user pre-scheduled recording) shall automatically return to SLEEP mode or DEEP SLEEP mode in less than 15 minutes.
   iii) Products that provide a default (no user opt-in) speculative recording function shall provide a user-accessible menu option to permit users to disable the functionality. Instructions for disabling speculative recording shall be made available to the user.
   iv) Energy-related default settings shall persist until an end-user chooses to disable or modify the default settings.
   v) Products represented as offering an APD feature shall meet the following requirements:
      (1) Products shipped with software from the manufacturer shall ship with APD enabled by default, with APD timing set to engage after a period of inactivity less than or equal to 4 hours.

(2) Otherwise, at time of installation the Service Provider shall enable APD timing to engage after a period of inactivity less than or equal to 4 hours. The Service Provider may vary these settings in order to provide a good customer experience but the average APD timeout period must be less than or equal to 4 hours.
(3) Products that provide an APD feature should provide a user-accessible menu option to permit users to modify or disable the functionality.

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

B.4.3 Maximum Typical Energy Consumption Requirement

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

Equation 1: Maximum TEC

$$TEC_{MAX} = TEC_{BASE} + \sum_{1}^{i} TEC_{ADDL\_i}$$

Where:
TEC_{BASE} is the Base Type Allowance (kWh); and
TEC_{ADDL_i} is each applicable Additional Functionality Allowance (kWh).

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

Table 1: Base Type TEC Allowances

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

3) Additional Functionality Allowances shall be as specified in Table 2, subject to the following usage rules:
   i) Each Additional Functionality Allowance shall be used at most **once per STB** unless otherwise specified.
   ii) **DTA** base type shall only use the **HD**, **AVP**, and **HNI** allowances if applicable.
   iii) **TC** base type shall only use the **HD**, **AVP**, **HNI**, **WiFi HNI**, **MoCA HNI,** and **MIMO WiFi** allowances if applicable.
   iv) **AVP** allowance shall be used for each decoder that is active during the ON mode test up to a maximum of two (2).
   v) **CableCARD** allowance shall be used for each CableCARD up to a maximum of two (2).
   vi) **DVR** allowance shall not be used with STB types that support a Service Provider network-based "DVR" service and do not use a hard disk drive (HDD) or other integrated non-volatile storage.
   vii) Either **DOCSIS 2.0 (D2)** allowance OR **DOCSIS 3.0 (D3)** allowance, but not both, shall be used if applicable.
   viii) **DOCSIS 3.0 (D3)** allowance is applicable to all DOCSIS 3.0 configurations up to and including an eight downstream/four upstream configuration (8X4 mode).
   ix) Either **Shared DVR (S-DVR)** allowance OR **Multi-Room (MR)** allowance, but not both, shall be used if applicable.
   x) Either **Multi-Room (MR)** allowance OR **Home Network Interface (HNI)** allowance, but not both, shall be used if applicable.
   xi) **MoCA HNI (M-HNI)** allowance and/or **WiFi HNI (W-HNI)** allowance are used in addition to the **MR** allowance or **HNI** allowance and shall only be used if the interface is providing video content during the qualification test (e.g. If a **MoCA HNI** and a **WiFi HNI** provide video content to Clients concurrently during the qualification test then both allowances may be taken).
   xii) **MIMO WiFi HNI (MIMO)** allowance is additive to the **WiFi HNI (W-HNI)** allowance.
   xiii) **Multi-Stream (MS)** allowance shall be used for devices receiving two (2) video content streams during the qualification test.
   xiv) **Multi-Stream Additional (MS-A)** allowance is used in addition to the **MS** allowance and shall be used for devices receiving greater than two (2) and, up to and including, eight (8) video streams if applicable.
   xv) **Transcoding Base (XCD)** allowance shall be used if the device includes a transcoding feature in addition to the basic video decoding required for directly connected Display Devices.
   xvi) **Transcoding Additional (XCD-A)** allowance is additive to **Transcoding Base (XCD)** and shall be used once for each actively transcoded video stream during the qualification test.
   xvii) **Routing (RTG)** Routing allowance may be used if the device is providing IP routing functionality, forwarding IP data packets from one IP network to another as part of a high-speed data service. Routing of IP video packets as part of a pay-TV video distribution service should be considered a new feature if it involves incremental energy consumption and subject to the new feature allowance setting process.

Table 2: Additional Functionality TEC Allowance (TEC_{ADDL_i})

Additional Functionality	Tier 2 Allowance (kWh/year)
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
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)	$[2\times N_{2.4\ \mathrm{GHz}} + 4\times N_{5\ \mathrm{GHz}}]$ Where *N* is the number of spatial streams at each specified frequency[7]
Routing (RTG)	27
* Indicates allowance may be used more than once	

B.4.4 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.

1) Measured TEC ($TEC_{MEASURED}$) shall be less than or equal to the Maximum TEC Requirement (TEC_{MAX}), as calculated using Equation 1.
2) $TEC_{MEASURED}$ shall be calculated using Equation 2.

Equation 2: Measured TEC

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

[7] To claim spatial streams at both $N_{2.4\ GHz}$ and $N_{5.0\ GHz}$ 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.

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.

Where:

- *$T_{WATCH\ TV}$ is the time coefficient for On Mode, as determined per Table 3;*
- *$P_{WATCH\ TV}$ (= $P_{WATCH\ TV\_n}$*) is the measured power in On Mode (W);*
- *T_{SLEEP} is the time coefficient for Sleep Mode, as determined per Table 3;*
- *P_{SLEEP} is the measured power in Sleep Mode (W);*
- *T_{APD} is the time coefficient for APD, as determined per Table 3;*
- *P_{APD} (= $P_{APD\_ON\_to\_SLEEP}$*) is the measured power after an APD timeout (W);*
- *$T_{DEEP\ SLEEP}$ is the time operating in DEEP SLEEP Mode time (maximum of 4h); and*
- *$P_{DEEP\ SLEEP}$ (= $P_{SLEEP\_SP\_n}$*) is the measured power in DEEP SLEEP Mode (W).*

** $T_{APD\_ON\_to\_SLEEP}$, $P_{APD\_ON\_to\_SLEEP}$, $P_{SLEEP\_SP\_n}$, and $P_{WATCH\ TV\_n}$ are test result parameters from CEA-2043. $T_{APD\_ON\_to\_SLEEP}$ is the STBs default APD timeout duration.*

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

Table 3: Operational Mode Durations

APD Enabled by Default	Automatic DEEP SLEEP	T_{WATCH_TV} ($14 \geq T_{WATCH\_TV} \geq 5$)	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	$10 - T_{DEEP\ SLEEP}$		DEEP SLEEP default 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 default duration

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}.

B.5 **Test Criteria**

A) Test Method:

The CEEVA 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.

B) Number of Units Required for Testing:

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

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

C) Configuration Testing Rules

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 Service Provider network interface and each result reported under a different STB sub-model or the STB may be tested using the Service Provider interface priority as specified in Table 4 and reported once under the primary model number. This table may not apply to TC STB types.

Table 4: Service Provider Network Interface Priority

Connection (Protocol)
Coax (QAM/DOCSIS)
Coax (SAT/MoCA)
Coax (QAM/MoCA)
Wi-Fi (802.11)
Coax (HPNA)
Ethernet (802.3)
Other

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 Service Provider 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.

Table 5: HNI Priority

Connection (Protocol)
MIMO Wi-Fi HNI
Wi-Fi HNI
Coax (MoCA)
Coax (HPNA)
HomePlug AV
Ethernet (802.3)
Other

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

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

Table 6: Display Device Interface Priority

Connection (Protocol)
HDMI/DVI
Component
S-Video
Composite
Coax
Other

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

8.1.12 Non-STB Features

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

D) Required Tests Results:
1) The minimum required CEA-2043 tests, test parameters, and reported results are specified in Table 7. Parameters used in this section are defined in the CEA-2043 document.
2) Any deviations from Table 7 test parameters must be reported to the CEEVA Data Aggregator when annual STB TEC results are reported.
3) CEA-2043 SPECIAL SLEEP Mode test is not required if the STB does not support a DEEP SLEEP mode.

Table 7: CEA-2043 Required Tests and Test Parameters

CEA-2043 (Test Number: Test Name)	Test Parameters	Reported Result
ON Mode		
8.2.2.1 ON (Watch TV)*	TON ≥ 5m	PWATCH TV_n (n = DD + Clients)
SLEEP Mode		
8.3.4 SLEEP***	TSLEEP ≥ 1h (Use CEA 2043 Section 8.3.2 (a) for SLEEP determination method**)	PSLEEP
SPECIAL SLEEP Mode		
8.3.4 SLEEP (for DEEP SLEEP mode)	TSLEEP ≥ 1h	PSLEEP_SP_1
Power Mode Transitions		
8.5.1 APD initiated ON to SLEEP	TSLEEP_MAX = 4.25h	PAPD_ON_to_SLEEP TAPD_ON_to_SLEEP
8.5.3 Reenter SLEEP after RECORD	TSLEEP_MAX = 20m	TREC_to_SLEEP
8.5.4 Reenter SLEEP after MAINT	TSLEEP_MAX = 20m	TMAINT_to_SLEEP
8.5.5 SLEEP to ON	TSLEEP_to_ON_WAIT = 1m	TSLEEP_TO_ON

* CEA-2043 ON Mode test may be tested at the maximum configurations only and without the requirement to measure and record incremental Display Device and Client configuration power consumption, as is required in CEA-2043 Section 8.2.2.1. Only the maximum Display Device and Client configurations power consumption must be reported.

** SLEEP determination method from CEA-2043 Section 8.3.2 (a) is “No channel viewing or recording is supported on a UUT or Client”.

*** Assure no DEEP SLEEP mode is scheduled over the

Annex C Clarification of Multi-room Testing

This annex is intended to clarify the Tier 2 test method. If this clarification inadvertently conflicts with part of the Tier 2 test method, then the Tier 2 test method, included in Tier 2 Requirements and Test Method, supersedes these clarifications.

C.1 Implementation of CEA-2043 for Multi-room Testing

C.1.1 Multi-room Test Configuration

Multi-room STBs may be set up per Figure 2. Alternatively, the MR test set-up could involve two connected display devices and one client Set-top box; no figure or tables are provided for this allowable configuration, but the general approach is the same as are the test conduct requirements each display and client Set-top Box in the test configuration.

1. The Clients connected to the Multi-room STB or Shared DVR shall be configured per CEA-2043.
2. STBs claiming the Multi-Room (MR) allowance must be tested with three (3) live video streams. If three live streams are not supported the MR allowance may not be used.
3. All other testing conditions shall be taken from the sections above.

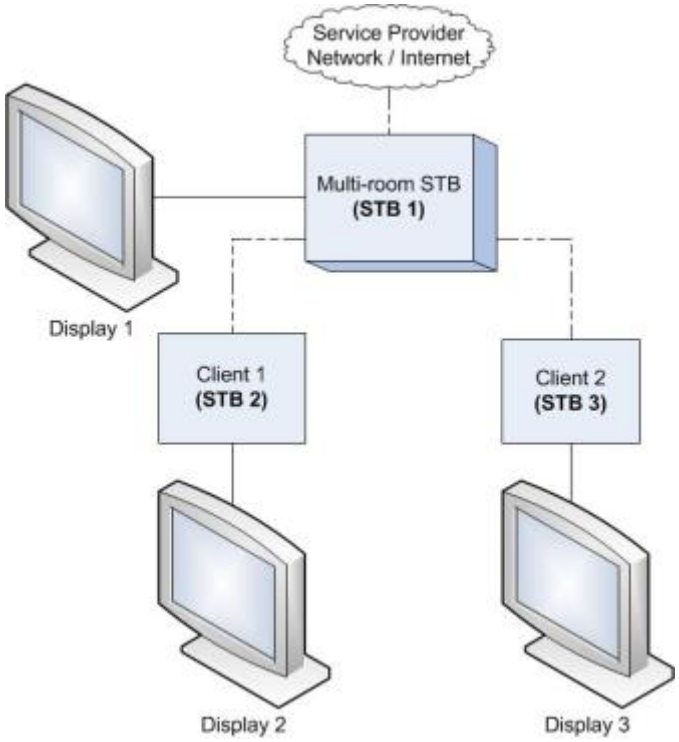

Figure 2: Multi-room Configuration with a Single Display (2 Displays and 1 Client is also allowed)

C.1.2 Multi-room STB Sleep Mode Test Conduct

The following instructions describe the measurement of Sleep Mode for Multi-room and Shared DVR STB for the purposes of calculating TEC.

1. The devices in the configuration shall concurrently run all of the applicable CEA-2043 tests specified in CEA-2043 section listed in Table 8, with the Thin Client/Remote STBs serving as a background condition for the testing of the Multi-room or Shared DVR STB (UUT).
2. It is allowable to test with two displays and one client, in which case two displays are connected to STB 1 (in Sleep mode) and only STB 2 (also in Sleep mode) is connected by HNI.

Table 8: Multi-room or Shared DVR STB Sleep Mode Test Conduct with One Display

STB in Figure 2	CEA-2043 Test	Result	Notes
STB 1 (UUT)	8.3: SLEEP	P_{SLEEP}	Multi-room STB not being used locally for viewing or recording
STB 2	8.3: SLEEP	Not Measured	Thin Client in Sleep Mode
STB 3	8.3: SLEEP	Not Measured	Thin Client in Sleep Mode

C.1.3 Multi-room STB ON Mode Test Conduct

The following instructions describe the measurement of ON Mode for Multi-room STB for the purposes of calculating TEC.

1. The devices in the configuration shall concurrently run all of the applicable CEA-2043 tests specified in CEA-2043 section listed in Table 9, with the Thin Client/Remote STBs serving as a background condition for the testing of the Multi-room STB (UUT).
2. When testing On Mode for MR STBs, live video traffic shall be sent to all connected Clients.
3. It is allowable to test with two displays and one client, in which case two displays are connected to STB 1, and STB 2 but not STB 3 is connected to STB 1 by HNI.

Table 9: Multi-room STB Test Conduct with One Display

STB in Figure 2	CEA-2043 Test	Result	Notes
STB 1 (UUT)	8.2.2.1 ON (Watch TV)	P_{WATCH_TV}	Multi-room STB in On Mode
STB 2	8.2.2.1 ON (Watch TV)	Not Measured	Thin Client in On Mode over a home network
STB 3	8.2.2.1 ON (Watch TV)	Not Measured	Thin Client in On Mode over a home network

C.2 Implementation of CEA-2043 for Displayless Video Gateway (DVG) Testing

DVGs are not defined in the USVA. In this document they are considered STBs without display output.

C.2.1 Displayless Video Gateway (DVG) STB Test Configuration

Displayless Video Gateways shall be set up per Figure 2, using the connections specified in Section 5C) Configuration Testing Rules, and subject to the requirements below.

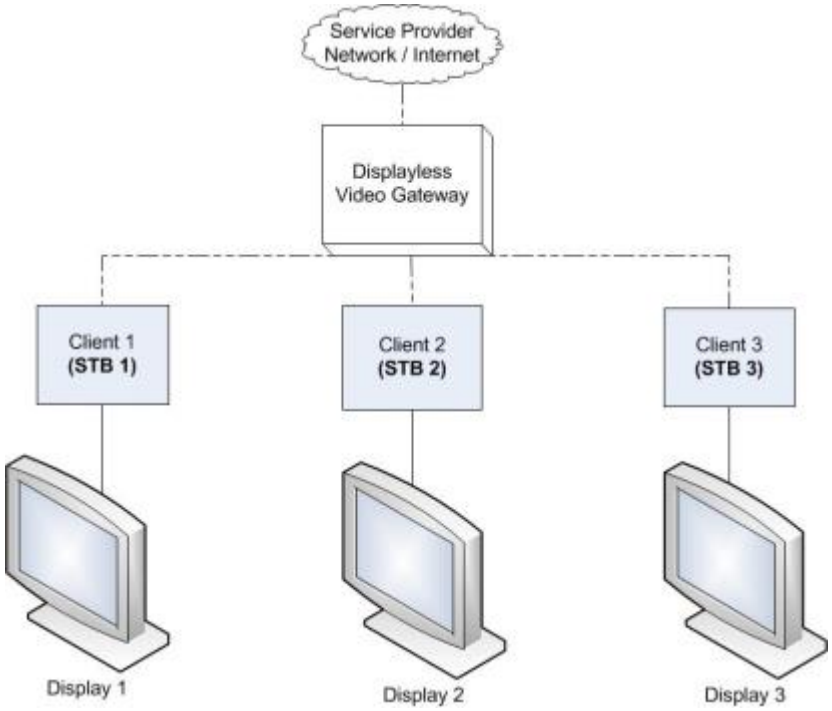

Figure 3: Displayless Video Gateway (DVG) Configuration

1. DVGs shall be configured per the setup in CEA-2043 for multi-room devices.
2. The Clients connected to the DVG shall be configured per CEA-2043.

C.2.2 Displayless Video Gateway (DVG) Sleep Mode Test Conduct

The following instructions describe the measurement of Sleep Mode for DVGs for the purposes of calculating TEC.

1. The DVG under test and the connected Clients shall be running the CEA-2043 tests specified in Table 10 concurrently, with the Thin-client/Remote STBs serving as a background condition for the testing of the DVG.
2. When testing Sleep Mode for DVGs, no video traffic shall be sent to the Clients. Regardless of the internal state of the DVG, this configuration shall be considered the Sleep Mode for the DVG.

Table 10: DVG Sleep Mode Test Conduct

Device in Figure 2	CEA-2043 Test	Result	Notes
Displayless Video Gateway (UUT)	8.3.4 SLEEP	PSLEEP	All Clients in SLEEP mode
STB 1	8.3.4 SLEEP	Not Measured	Thin Client/Remote STB in SLEEP mode over a home network
STB 2	8.3.4 SLEEP	Not Measured	Thin Client/Remote STB in SLEEP mode over a home network
STB 3	8.3.4 SLEEP	Not Measured	Thin Client/Remote STB in SLEEP mode over a home network

C.2.3 Displayless Video Gateway (DVG) On Mode Test Conduct

The following instructions describe the measurement of On Mode for DVGs for the purposes of calculating TEC.

1. The DVG under test and the connected Clients shall be running the CEA-2043 tests specified in Table 1 concurrently, with the Thin Client/Remote STBs serving as a background condition for the testing of the DVG.
2. When testing On Mode for DVGs, video traffic shall be sent to all connected Clients. Regardless of the internal state of the DVG, this configuration shall be considered the On Mode for the DVG.

Table 11: DVG On Mode Test Conduct

Device in Figure 2	CEA-2043 Test	Result	Notes
Displayless Video Gateway (UUT)	8.2.2.1: ON (Watch TV)	P_{WATCH_TV}	All Clients in On Mode
STB 1	8.2.2.1: ON (Watch TV)	Not Measured	Watching TV on a Display Device connected to Thin Client/Remote STB over a home network
STB 2	8.2.2.1: ON (Watch TV)	Not Measured	Watching TV on a Display Device connected to Thin Client/Remote STB over a home network
STB 3	8.2.2.1: ON (Watch TV)	Not Measured	Watching TV on a Display Device connected to Thin Client/Remote STB over a home network

C.3 Implementation of CEA-2043 for STBs and DVGs with a Deep Sleep State

C.3.1 Deep Sleep State Test Setup

Units for test shall be set up per the following requirements.

1. All devices shall be configured per CEA-2043.
2. The number of Clients, Display Devices, or Recording Devices connected to the UUT is unspecified; however, all devices shall be in Sleep Mode.

C.3.2 User-enabled Deep Sleep State Test Conduct

Test per Section 8.3 of CEA-2043, following the additional instructions in Section 8.3.3 of CEA-2043 and per the following requirements.

1. The tester shall enable Deep Sleep State per manufacturer instructions and report the process for enabling Deep Sleep State.
2. Record the average power drawn as $P_{SLEEP\_SP\_1}$ over the time period $T_{SLEEP.}$

C.3.3 Scheduled Deep Sleep State Test Conduct

1. All requirements in section 8.3.1 of CEA-2043 shall be followed.
2. The time period for the test, T_{SLEEP}, shall be equal to the duration of the default sleep schedule or 6 hours, whichever is smaller. If there is no default scheduled sleep time, then input the start and end time such that the total scheduled sleep duration (T_{SLEEP}) is exactly 4 hours (e.g. scheduled sleep hours are set to be 1:00 am to 5:00 am).
3. 30 minutes before the beginning of the scheduled sleep time, place the STB or DVG in the On (Watch TV) configuration.
4. Do not use (or move) the STB or DVG remote control.
5. Place all connected client devices into Sleep Mode.
6. Ensure the STB or DVG is in On Mode before scheduled sleep time begins.
7. Begin power draw measurement at the start of the scheduled sleep time and record the average power drawn as $P_{SLEEP\_SP\_2}$ and the duration of the test as T_{DEEP_SLEEP}.

C.4 Verifying No Network Initiated Actions

According to section 8.3.1(c) of CEA-2043, no network initiated actions shall occur during the Sleep Mode or Deep Sleep State tests. If a network initiated action cannot be prevented, or if it is unclear whether network initiated actions are occurring during the tests, then use the following steps:

1. Repeat the Sleep Mode test 2 more times on the same unit, and
2. Use the median value of all 3 tests as the Sleep Mode power measurement.

Annex D Test Method Examples (Informative)

D.1 Using CEA-2043 Set-top Box (STB) Power Measurement Standard with CEEVA Tier2 STB Programs

This annex provides an example that may be helpful to the reader when calculating CEEVA total energy consumption equations using test results based on the CEA-2043 Set-top Box (STB) Power Measurement standard.

For the following the example UUT is define by:

CBL, AVP (x2), HD, MS, MS-A (8), CC(x1), D3, DVR, S-DVR, HNI, M-HNI with APD

Base Type (Use Topmost if Multiple Apply)	Tier 2 Allowance (kWh/yr)
Cable (CBL)	45

Per Table 1: Base Type TEC Allowances

$\mathbf{TEC_{Base}}$ = 45

Additional Functionality	Tier 2 Allowance (kWh/yr)	UUT
Advanced Video Processing (AVP) (per active decoder, max 2)	8	16
High Definition (HD)	12	12
Multi-Stream (MS) (1 < received streams ≤ 2)	8	8
Multi-Stream Additional (MS-A) (2 < received streams ≤ 8)	8	8
CableCARD (per CC, max 2)	15	15
DOCSIS 3.0 (D3) (up to and including 8X4 mode)	50	50
Digital Video Recorder (DVR)	45	45
Shared DVR (S-DVR)	20	20
Home Network Interface (HNI)	10	10
MoCA HNI (M-HNI)	12	12
Total		196

Per Table 2: Additional Functionality TEC Allowance ($TECADDL_i$)

CBL, AVP (x2), HD, MS, MS-A (8), CC(x1), D3, DVR, S-DVR, HNI, M-HNI

TEC_{ADD} = 196

1) The TECMAX should be calculated using the STB the base and additional functionalities:

$$TEC_{MAX} = TEC_{BASE} + \sum_{1}^{i} TEC_{ADDL\_i}$$

Add the base allowance to the additional allowance total:
TEC_{MAX} = 241

The laboratory has tested the device in accordance with the requirements of CEA-2043 and has provided the following test results:

CEA-2043Parameter	Measured Value
$P_{WATCH\ TV}$	34 W
P_{SLEEP}	15 W
$P_{APD\_ON\_to\_SLEEP}$	15 W
$T_{APD\_ON\_to\_SLEEP}$	2 Hours

Per Equation 2: Measured TEC definition

2)

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

3) APD is enabled as default and automatically enters SLEEP mode in 2 hours. Deep Sleep is not supported. Therefore, the following operational mode durations apply:

APD Enabled by Default	Automatic DEEP SLEEP	TWATCH_TV (14 ≥ TWATCH_TV ≥ 5)	TSLEEP (10 ≥ TSLEEP ≥ 6)	TAPD (9 ≥ TAPD ≥ 7)	TDEEP SLEEP (TDEEP SLEEP ≤ 4 h)
YES	NO	$7 - ((4-T_{APD\_ON\_to\_SLEEP})/2)$	10	$7+ ((4-T_{APD\_ON\_to\_SLEEP})/2)$	0

Per Table 3: Operational Mode Durations

Applying the equations of table 3 results in:

T_{WATCH_TV} = 6
T_{APD} = 8
T_{SLEEP} = 10

Finally the $TEC_{MEASURED}$ can be calculated with all the required values.

$P_{WATCH\ TV}$ = 34
P_{SLEEP} = 15
$P_{APD}=P_{APD\_ON\_to\_SLEEP}$ = 15
T_{WATCH_TV} = 6
T_{APD}= 8
T_{SLEEP}= 10

$$\boldsymbol{TEC_{MEASURED} = 0.365[(T_{WATCH\ TV} \times P_{WATCH\ TV}) + (T_{SLEEP} \times P_{SLEEP}) + (T_{APD} \times P_{APD}) + (T_{DEEP\ SLEEP} \times P_{DEEP\ SLEEP})]}$$ **= 173.01 kWh/yr**

Measured TEC ($TEC_{MEASURED}$) shall be less than or equal to the Maximum TEC Requirement (TEC_{MAX}):

$TEC_{MEASURED}$= **173.01 kWh/yr < 241 kWh/yr** (TEC_{MAX}) : **the UUT is CEEVA compliant**.

Annex E New Feature Process

E.1 Purposes

E.1.1 This new feature process is applicable to Tier 2 Commitments.

E.1.2 This new feature process is intended to encourage innovation and competition by Service Providers and equipment manufacturers and also to encourage energy efficiency by design.

E.1.3 This new feature process is intended to provide a path for Service Providers equipment manufacturers 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 STB CEEVA energy allowances or procurement commitments.

E.1.4 This new feature process is intended to assure that most Set-Top Boxes remain under the procurement commitments of the STB CEEVA, with sufficient transparency for appropriate allowances to be established for new features.

E.1.5 All new products or features will be reviewed and approved by the Steering Committee, regardless of whether they have already have been approved by the USVA to ensure that made-in-Canada standards prevail.

E.2 Testing

E.2.1 If a Set-Top Box subject to the STB CEEVA 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 STB CEEVA.

E.3 Allowances

E.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 existing levels, 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 STB CEEVA.

E.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.

E.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 Third Party Data Aggregator together with other required testing data.

E.3.4 The Third Party Data Aggregator shall inform the Steering Committee of the Service Provider created allowance for the new feature, except as it affects confidentiality and competitiveness.

E.3.5 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 Third Party Data Aggregator. The new feature may remain confidential until the feature is marketed or otherwise made public. The Service Provider shall inform the Third Party Data Aggregator 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 Third Party Data Aggregator 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.

E.3.6 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 STB CEEVA. 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 STB CEEVA levels. Initial allowances shall be set within six months of submission, and become effective at such time as is prescribed by the Steering Committee.

E.3.7 If a Service Provider includes in its report to the Third Party Data Aggregator a Set-Top Box that it has Received 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.

E.3.8 Allowance setting would be designed to not prejudice a variety of implementations. If a new feature is specific to one particular sub-sector of the TV Pay Market 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 Third Party Data Aggregator.

E.3.9 Allowances established by the Steering Committee for a new feature would be publicly reported as are other such allowances under the STB CEEVA.

Annex F SIGNATURES

The undersigned Signatories agree to the Voluntary Agreement.

Bell Canada

Signature: /s/ Karen Atkinson
Name: Karen Atkinson
Title: Director of Supply Chain
Date: September 9, 2016

COGECO Connexion

Signature: /s/ Michel Blais
Name: Michel Blais
Title: Vice President, Engineering and Operations
Date: August 4, 2016

Rogers Communications

Signature: /s/ Eric J. Dino
Name: Eric J. Dino
Title: Senior Vice President, Residential Product Management
Date: December 7, 2016

Shaw Communications

Signature: /s/ Janice Davis
Name: Janice Davis
Title: Senior Vice President, Supply Chain
Date: August 22, 2016

Shaw Communications

Signature: /s/ Zoran Stakic
Name: Zoran Stakic
Title: EVP & CTO
Date: August 31, 2016

Videotron G.P.

Signature: /s/ Daniel Proulx
Name: Daniel Proulx
Title: Chief Technological Officer

Date:

Videotron G.P.

Signature: /s/ Pierre Roy Porretta
Name: Pierre Roy Porretta
Title: Vice President, Engineering, Research and Development
Date: September 22, 2016

Arris

Signature: /s/ Keith Jones
Name: Keith Jones
Title: SVP & CPO
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Date: September 8, 2016