

**Voluntary Industry Agreement to improve the energy consumption  
of Complex Set Top Boxes within the EU**

**Proposal from the industry group, Version 3.0  
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## 1 INTRODUCTION

This industry Voluntary Agreement seeks to contribute to the achievement of the EU Action Plan on Energy Efficiency and in particular of the Ecodesign Directive<sup>1</sup> by reducing the potential environmental impact of Complex Set-top-Boxes (CSTBs), which will ultimately be beneficial to consumers and other end users.

Service Providers, Equipment Manufacturers, Software Providers, Conditional Access Providers and Component Manufacturers representing a large majority of the CSTB industry have been invited to sign this Voluntary Agreement.

While continual improvements have reduced the environmental impact of CSTBs, the CSTB industry recognises that further improvements must be pursued. It is recognised that the energy consumption of CSTBs is influenced by the services offered, the number of features provided and by the components used.

This Voluntary Agreement provides a complete and adequate alternative to an implementing measure in the context of the Ecodesign Directive, which provides that priority should be given to alternative courses of action such as self-regulation by the industry.

The Signatories shall ensure that this Voluntary Agreement is implemented in full compliance with all the provisions of the Treaty on the Functioning of the European Union (in particular internal market and competition rules) as well as with the international engagements of the EU, including multilateral trade rules, and accept that it shall be assessed against the indicative criteria set out in Annex VIII of the Ecodesign Directive and in the light of the European Commission Guide to the Implementation of Directives based on the New Approach and the Global Approach ("Blue Guide")<sup>2</sup>.

In line with the European Commission "Communication on Environmental Agreements at Community level within the Framework of the Action Plan on the Simplification and Improvement of the Regulatory Environment"<sup>3</sup>, this Voluntary Agreement may be acknowledged by the European Commission through an exchange of letters with the Signatories.

## 2 EQUIPMENT COVERED BY THE VOLUNTARY AGREEMENT

This Voluntary Agreement is effective from the 1st July 2010 (the "Effective Date") and covers CSTBs, as described and defined in Annex B and Annex F. This Voluntary Agreement does not have retroactive effect: only individual CSTBs that are placed on the Internal Market for the first time on or after the Effective Date or which are put into service on the market for the first time on or after the Effective Date, in accordance with the Blue Guide, are subject to this Voluntary Agreement. The scope of the Voluntary Agreement as described in this Section 2 also applies to CSTBs that are manufactured outside the EU on or after the Effective Date and which are placed on the market within the EU.

## 3 OVERALL OBJECTIVE

The overall objective of the Voluntary Agreement is to reduce the energy consumption of CSTBs in accordance with the energy consumption targets and time frame established in Annex D (*Maximum Energy Consumption Targets and Time Schedule*), with a view to maximising the environmental

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<sup>1</sup> Directive 2009/125/EC.

<sup>2</sup> [http://ec.europa.eu/enterprise/newapproach/legislation/guide/document/1999\\_1282\\_en.pdf](http://ec.europa.eu/enterprise/newapproach/legislation/guide/document/1999_1282_en.pdf)

<sup>3</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52002DC0412:EN:NOT>

benefits from improved design. Ecodesign requirements and energy consumption targets should be set bearing in mind the intended use of CSTBs, and should not have a negative impact on their functionality. In particular a detrimental impact on CSTBs (which would include slower start-up times, the ability to schedule recordings, the ability to record remotely, hinder the availability of push VOD content to customers, etc.) would seriously impede the intended use of the vast majority of CSTBs, and in so doing, would fundamentally undermine the EU Action Plan on Energy Efficiency for this product group.

In direct contrast to this, the Voluntary Agreement delivers an industry-wide commitment to reducing the potential environmental impact of CSTBs. It goes beyond a “business as usual” scenario and provides for quick progress by means of rapid and cost-effective implementation, while allowing for flexible and appropriate adaptation to technological options and market sensitivities. This Voluntary Agreement sets out the means by which the Signatories, which are drawn from across the spectrum of the CSTB industry, will commit to achieving such rapid and effective implementation while continuing to invest in and develop sustainable and appropriate “best of class” CSTB products.

## 4 COMMITMENTS

From the Effective Date or Signature Date, Signatories individually and collectively agree to be responsible to the European Commission and will each make their reasonable efforts to:

- 4.1 Abide by the general principles of CSTB hardware and software design set out in Annex A (*General Principles of CSTB Design*);
- 4.2 Reduce the energy consumption of CSTBs to the minimum necessary to meet their operational specification while not limiting Service Providers’ ongoing ability to improve functionality and offer service enhancements;
- 4.3 Not exceed the maximum energy consumption targets set out in Annex D (*Maximum Energy Consumption Targets and Time Schedule*). In particular:
  - 4.3.1 Each Signatory<sup>4</sup> shall ensure that 90%<sup>5</sup> of its CSTBs comply with the applicable energy consumption targets of the Voluntary Agreement as set out in Annex D (*Maximum Energy Consumption Targets and Time Schedule*). For the avoidance of doubt, only CSTBs placed on the market during an applicable Reporting Period shall count towards this target of 90%. This principle also applies to CSTBs that are manufactured outside of the EU, but which are supplied, distributed or used within the EU;
  - 4.3.2 Should a Signatory achieve compliance with Section 4.3.1 above, then that Signatory is entitled to make that achievement public;
  - 4.3.3 Should 25% or more of a Signatory’s CSTBs comply with any subsequent energy consumption targets of the Voluntary Agreement as set out in Annex D (*Maximum Energy Consumption Targets and Time Schedule*) before the entry into force of those targets then that Signatory is entitled to make that achievement public. In the event that any Signatory does (or did before it became a Signatory) acquire any company not being a signatory which places CSTBs on the market in the EU then any CSTBs placed on the market by that acquired company need not (although they may) be included for the purposes of calculating compliance with section 4.3.1 above for a period of three years after their acquisition.

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<sup>4</sup> if they are an Equipment Manufacturer or Service Provider

<sup>5</sup> Units

- 4.4 Develop an appropriate commitment to ensure the active involvement of potential signatories;
- 4.5 Work with the European Commission, Member States' representatives and other interested parties involved in CSTBs to agree common working agendas to improve the environmental performance of CSTBs;
- 4.6 Co-operate with the European Commission and Member States to monitor the effectiveness of this Voluntary Agreement through the procedure described in Section 5 (*Reporting, Monitoring and Compliance*);
- 4.7 Co-operate with other Signatories, with the European Commission and with Member States to review the Voluntary Agreement and the Tier 1 and Tier 2 energy consumption targets through the procedure described in Section 7 (*Review, Revision and Termination of the Voluntary Agreement*);
- 4.8 Inform consumers about the environmental characteristics and performance of CSTBs, and facilitate and encourage consumers to adopt energy efficient practices in connection with the use of CSTBs. In particular, Signatories shall provide consumers with detailed information about energy consumption levels. Such information shall be made available at the point of sale or where relevant and possible, it may be published online. Note that this clause is applicable to the signatory in charge of the distribution of equipment to the end user
- 4.9 Ensure that procurement specifications for CSTBs are compliant with this Voluntary Agreement;
- 4.10 Signatories commit only to the areas which are under their individual control and responsibility.

Specifically Signatories who are:

- a) Component Manufacturers, in order to support Equipment Manufacturers in meeting and where possible improving upon the energy consumption targets contained within this Voluntary Agreement, commit to designing CSTB components which improve functionality and enable component sub-systems to be controlled and operated in the most energy efficient manner;
- b) Conditional Access Providers commit, in order to support Service Providers in meeting and where possible improving upon the energy consumption targets contained within this Voluntary Agreement, to designing and developing conditional access systems which enable improved CSTB energy efficiency without negatively impacting functional and operational requirements of Service Providers;
- c) Equipment Manufacturers commit to designing and manufacturing CSTBs to Service Providers functional and operational specifications that meet the energy limits contained within this Voluntary Agreement and where possible improve upon them;
- d) Service Providers commit to working with all other Signatories in order that the Service Provider's supply of CSTBs to end-users is compliant with this Voluntary Agreement; and
- e) Software Providers, in order to support Service Providers in meeting and where possible improving upon the energy consumption targets contained within this Voluntary Agreement, commit to developing and supplying software power management applications which enable Service Providers to fully utilise and integrate hardware power management features provided by Equipment Manufacturers and to do so without negatively impacting other CSTB features and functionality.

## 5 REPORTING, MONITORING, REVISION & COMPLIANCE

The European Commission in partnership with the Steering Committee shall be invited to monitor the achievements of the objectives set out in the Voluntary Agreement. The plan for monitoring and reporting shall be detailed, transparent and objective. It shall remain for the European Commission assisted by the Steering Committee to consider whether the objectives of the Voluntary Agreement have been met.

### 5.1 Reporting

Each Signatory shall provide information to the Independent Inspector detailing the energy consumption of each type of CSTB it places on the market in the EU in compliance with this Voluntary Agreement, as applicable, and taking into account the relevant provisions of Annex C (*Measurement Method and Conditions*). For the avoidance of doubt, such reporting also applies to CSTBs manufactured outside of the EU, but placed on the market in the EU, in compliance with this Voluntary Agreement.

Each Signatory shall provide the required information for the relevant Reporting Period (see table specifying Reporting Periods below) in the format specified in Annex G. Information supplied by a Signatory will be determined by its Main Activity (as categorised in Annex G). Each Signatory may not perform more than one Main Activity under this Voluntary Agreement.

	Tier 1	Tier 2
1st Reporting Period	1 <sup>st</sup> July 2010 – 30 <sup>th</sup> June 2011	1 <sup>st</sup> July 2013 – 30 <sup>th</sup> June 2014
2 <sup>nd</sup> Reporting Period	1 <sup>st</sup> July 2011 – 30 <sup>th</sup> June 2012	1 <sup>st</sup> July 2014 – 30 <sup>th</sup> June 2015
3 <sup>rd</sup> Reporting Period	1 <sup>st</sup> July 2012 – 30 <sup>th</sup> June 2013	1 <sup>st</sup> July 2015 – 30 <sup>th</sup> June 2016

**Figure 1: Reporting Periods for Tiers 1 and 2**

Where a Signature Date is not the start of a Reporting Period then a Signatory may choose one of the following:

1. For its first Reporting Period to run in line with the current Reporting Period and so to backdate its commitment
2. For its first Reporting Period to run from the date of signature until the end of that Reporting Period and so be shortened in the first year
3. For its first Reporting Period to commence at the start of the next Reporting Period and so to postdate its commitment

The Signatories note that some elements of reporting compliance under this Voluntary Agreement are likely to require the provision of commercially sensitive information. Requirements relating to the supply of information by the Signatory shall be proportionate and shall take into account the legitimate confidentiality of commercially sensitive information. These requirements shall provide for the secure supply and provision of all information (including commercially sensitive information). The receipt of information supplied by a Signatory shall always be subject to obligations of confidentiality. This will include maintaining confidentiality of information from other Signatories, while ensuring confidence in the compliance of individual Signatories with this Voluntary Agreement.

### 5.2 Monitoring

The Commission, in partnership with the Signatories shall be invited to monitor the achievement of the objectives of the Voluntary Agreement, in accordance with Annex VIII of the Ecodesign Directive. The Independent Inspector (who, for the avoidance of doubt, shall be bound by the same obligations of confidence as set out in Section 5.1) may be instructed to conduct an audit of the information supplied by any individual Signatory. The Commission, assisted by the Steering Committee, shall consider whether the objectives of the Voluntary Agreement have been met, taking into account the results of

audits produced by the Independent Inspector. To preserve business secrets and commercial confidences, any official report produced by the Commission in connection with the information supplied by any individual Signatory shall not refer to the performance of individual companies.

The Chair of the Steering Committee will ensure that at least twice during each Reporting Period the Signatories and the Commission shall meet to discuss the Voluntary Agreement in order to:

- Evaluate the effectiveness of this Voluntary Agreement in achieving its objectives as set out in Section 3;
- Evaluate current and future developments that may influence energy consumption (for example, integrated circuit development, conditional access systems) with a view to agreeing a course of action and/or revising the Voluntary Agreement;
- Set future targets to increase energy savings.

Such discussions shall take place on a confidential basis.

### **5.3 Revision**

#### **5.3.1 Decisions to amend the Voluntary Agreement**

Once the monitoring process set out in Section 5.2 of the Voluntary Agreement has been completed, the Steering Committee may agree to implement any necessary amendments to the Voluntary Agreement. All reasonable efforts shall be taken to ensure that the decisions of the Steering Committee to amend the Voluntary Agreement are taken on the basis of a consensus.

However, where consensus on an amendment to the Voluntary Agreement cannot be achieved in the course of a meeting of the Steering Committee, a call for an indicative vote may be made by the Steering Committee Chair or by a Quorum.

If the indicative vote indicates a favourable outcome (which shall be determined by achieving a minimum of a two-thirds majority) but a consensus is nonetheless not achieved, a call for a deciding vote may be made by a Quorum to be held at the following meeting of the Steering Committee. At such second meeting, the adoption of a decision shall require:

- a. a Quorum (as defined in Annex F);
- b. compliance with the Voting Procedures;
- c. the agreement of a two thirds majority (66%) of the Quorum; and
- d. appropriate agreement from the European Commission. The Signatories will work together with the European Commission to agree how it will be involved in this process and shall amend the Voluntary Agreement accordingly.

Representatives from Member States and interested parties involved with CSTBs shall be invited to participate in discussions concerning amendments to the Voluntary Agreement, but shall not be entitled to vote on any proposed revision.

#### **5.3.2 Any other decisions**

All reasonable efforts shall be taken to ensure that the decisions of the Steering Committee are taken on the basis of a consensus.

However, where consensus on an issue cannot be achieved in the course of a meeting of the Steering Committee, a call for an indicative vote may be made by the Steering Committee Chair or by a Quorum.

If the indicative vote indicates a favourable outcome (in accordance with a requirement for a two-thirds majority) but a consensus is nonetheless not achieved, a call for a deciding vote may be made by a

Quorum to be held at the following meeting of the Steering Committee. At such second meeting, the adoption of a decision shall be made in accordance with the Voting Procedures. At such second meeting, the adoption of a decision shall require:

- a. a Quorum (as defined in Annex F);
- b. compliance with the Voting Procedures;
- c. the agreement of at least a two thirds majority (66%) of the Quorum.

#### **5.4 Compliance**

Compliance with the Voluntary Agreement by individual Signatories, including with the commitments set out in Section 4, shall be assessed by the Independent Inspector at the end of each Reporting Period on the basis of the information provided by each Signatory in accordance with Section 5.1, above.

A Defaulting Signatory shall forfeit its Signatory status. A mechanism shall be developed to remove the Signatory status of a Defaulting Signatory. The Signatories will work together to agree this mechanism and amend the Voluntary Agreement. A Defaulting Signatory may however, engage in discussions with the European Commission, Member States and other Signatories with the intention of meeting its commitments under this Voluntary Agreement.

In addition, it may be appropriate for a mechanism to be developed to allow a Defaulting Signatory, who is striving to meet the Voluntary Agreement and expects to do so within a short period, to continue as a Signatory. The Signatories will work together with other stakeholders to agree if this is appropriate and, if so, to develop a mechanism for assessing and reporting such cases and amend the Voluntary Agreement, taking into account the requirement of equal treatment described in Section 6.1 below.

## **6 NATURE AND ORGANISATION OF VOLUNTARY AGREEMENT**

### **6.1 Nature of Voluntary Agreement**

The Signatory signs and enters into this Voluntary Agreement for and on behalf of itself and makes its commitment under the Voluntary Agreement to the Legal Entity.

This Voluntary Agreement shall not amount to a commercial agreement and shall not give rise to any commercial expectations or liabilities as between the Signatories in respect of the fulfilment of their individual commitments under the Voluntary Agreement.

All Signatories will be treated equally and there shall be no special arrangements for individual Signatories.

### **6.2 Organisation of Voluntary Agreement**

Each Signatory to the Voluntary Agreement as well as the European Commission shall have the right to nominate one person to represent it at the Steering Committee.

The Steering Committee shall elect, from amongst its members, a Chair. The Chair shall be responsible for convening the Steering Committee at regular intervals (and at least twice every Reporting Period) and for running such meetings of the Steering Committee. The Chair shall, however, have no executive or representative function unless this is delegated to them by the Steering Committee.

Meetings of the Steering Committee shall be open to named members and any person representing a Signatory or potential signatory to the Voluntary Agreement, as well as to any representatives of the



European Commission or Member States, as well as member states of the EEA or EFTA, and any other person who wishes to attend and who the Steering Committee believes represents a legitimate stakeholder. The Steering Committee will seek to achieve agreement by consensus at all times. If consensus cannot be achieved, the Steering Committee may reach a decision in accordance with the Voting Procedures.

The Steering Committee may decide to develop and adopt further rules of procedure where it deems it necessary and may decide to delegate powers where it deems it to be necessary to specific individuals or to sub-committees.

## **7 TERMINATION OF THE VOLUNTARY AGREEMENT**

Signatories remain bound by the Voluntary Agreement until they elect to terminate their Signatory status. A Signatory shall be entitled to terminate its Signatory status by giving twenty eight days' written notice to the Chair of the Steering Committee. The Chair shall inform all members of the Steering Committee, the European Commission and such other persons as the Chair may deem appropriate.

## ANNEX A – GENERAL PRINCIPLES OF CSTB DESIGN

A Signatory of this Voluntary Agreement agrees to use its reasonable efforts to ensure:

- A.1 CSTB's are designed so as to reduce energy consumption within the constraints of their operational specification;
- A.2 Operational and control systems are specified on the presumption that hardware has energy management built in, i.e. depending on the functionality required from the unit, the hardware could switch to a mode with a lower energy consumption;
- A.3 For Tier 1, an Auto Power Down (APD) feature is encouraged under this Voluntary Agreement and credit for anticipated energy savings for CSTBs that have APD capability is provided in Annex C Section C.7.2 (Equation 1: Base Assessment). For Tier 2, an APD feature shall be provided. Where APD is available its defaulted mode shall be "on" or "enabled". In claiming the APD credit, the software versions running on the box should be noted to enable verification.
- A.4 If the APD feature is present it is required that the CSTB automatically switches itself into the lowest standby mode which the Service Provider deems to be appropriate, after a period of time in the On mode following the last user interaction. This period of time shall be set at a default of no more than 4 hours by the Equipment Manufacturer or Service Provider and may be user adjustable but shall not be able to be set to a period of more than 8 hours. The CSTB should allow the viewer to continue watching beyond the set period by prompting the viewer to confirm that the CSTB is still in use. The Auto Power Down feature may however be able to be overridden by a user through a special menu option.
- A.5 The CSTB may exit a standby mode in order to download content and scan for program and system information, scheduling information, or any other maintenance activity. After activity is complete, the CSTB must return to a standby mode within no more than 15 minutes.
- A.6 Whilst adhering to the general principle of designing products to reduce energy consumption, Service Providers, Equipment Manufacturers, Software Providers, Conditional Access Providers and Component Manufacturers are constantly innovating their products as new service concepts and technologies develop. To avoid stifling such innovation, any unanticipated additional functionality which consumes significant energy but which is not listed in Table 4 in Annex D (Additional Functionalities Annual Energy Allowance) shall be deactivated during the measurement process. However, in the event that such deactivation is either inappropriate or unnecessary, then this requirement shall not be compulsory. The test results shall explicitly list any functions that were deactivated during the measurement process. Signatories shall ensure that, when the Voluntary Agreement is revised in accordance with Section 5.3, the list of additional functionalities in Table 4 in Annex D is updated to take into account the incremental energy consumption of any additional functionality not known or implemented at the time the Voluntary Agreement first entered into force or was last revised.
- A.7 Software Downloads to CSTB's shall not increase the power consumption requirements above the initial TEC allowance unless they provide additional functionality. Such additional functionality shall not increase the TEC allowance if listed in Table 4 Annex D, otherwise it should be deactivated for measurement purposes as described in Section A.6.
- A.8 Direct to retail devices, that is, CSTBs not supplied to an end user via a Service Provider (as defined in Annex F of this Voluntary Agreement), that provide for speculative recording (typically push video-on-demand content) must have a user-accessible menu option allowing the user to disable this feature at will. Manufacturers must also include instructions for disabling speculative recording in product materials. CSTBs supplied by a Service Provider that provide for speculative recording must have a user-accessible menu option allowing the user to disable this feature at will, or alternatively a disable function that can be applied upon

user request, for example via the Service Provider call centre. The Service Provider must also include instructions for disabling speculative recording in product materials.

- A.9 For Tier 2, CSTBs under this Voluntary Agreement should support a Standby operational mode of less than 1 Watt or contain an off button.

## ANNEX B – CSTB FUNCTIONALITY AND OPERATIONAL MODES

### B.1 CSTB

A CSTB is a device equipped to allow conditional access by descrambling using dynamically allocated keys, where the primary function of the device is the reception, descrambling and processing of data from digital broadcasting streams and related services. It may also have audio and video decoding and output capability and/or the ability to provide content to one or more dedicated Thin-Client/Remote CSTBs via a home network.

For the purposes of the Voluntary Agreement a device shall not be considered to be a CSTB unless it can fulfil the functions of a CSTB when activated by the operator of the network.

A Simple STB, as defined in Annex F, is outside the scope of this Voluntary Agreement. For avoidance of doubt, the use of fixed key descrambling or the inclusion of an HDMI interface and/or Huffman coding does not make a STB that would otherwise be classified as a Simple STB into a Complex STB. Also excluded from the scope of this Voluntary Agreement are devices whose primary function is something other than the reception of television signals, such as, but not limited to:

- Computers fitted with digital TV tuners or TV add-in cards;
- Games consoles with digital TV tuners
- Digital receivers with recording function based on removable media in a standard library format (VHS tape, DVD, Blu-ray disc and similar)
- Digital TVs with integrated receiver decoder
- External plug in digital receivers for computers (e.g. USB)

### B.2 TEC Base Functionality Allowances of CSTBs

The TEC base functionality allowances of all CSTBs includes conditional access to allow the descrambling of standard definition digital video and audio signals. The base functionality of all CSTBs includes the reception of digital TV signals from Cable, Satellite, IP or Terrestrial distribution systems, or else Thin-Client functionality, as further specified below.

The classification of each CSTB (as set out below) is distinct and each classification is mutually exclusive. In the event that a particular CSTB might fall into more than one of the categories below then it shall be treated as falling solely into the first such category.

- Cable CSTB is a CSTB which is capable of receiving digital television signals from a coaxial or hybrid fibre/coaxial distribution system and delivering them to a consumer display and/or external rendering/recording device. If the CSTB meets the definition of a Cable CSTB and the CSTB is capable of receiving a cable service protected by conditional access, the base functionality is defined to be cable, regardless of whether the cable reception is considered the “principal functionality” by the Manufacturer or Service Provider.
- Satellite CSTB is a CSTB which is capable of receiving digital television signals from a satellite transmission system and delivering them to a consumer display and/or external rendering/recording device. If the CSTB base functionality is not cable and the CSTB meets the definition of a Satellite CSTB and the CSTB is capable of receiving a satellite service protected by conditional access, the base functionality is defined to be satellite, regardless of whether the satellite reception is considered the “principal functionality” by the Manufacturer or Service Provider.
- Internet Protocol (IP) CSTB is a CSTB which is capable of receiving digital television/video signals encapsulated in IP packets and delivering them to a consumer display and/or external rendering/recording device. If the CSTB base functionality is not cable or satellite and the CSTB meets the definition of an IP CSTB and the CSTB is capable of receiving an IP service protected by conditional access, the base functionality is defined to be IP, regardless of whether the IP reception is considered the “principal functionality” by the Manufacturer or Service Provider.

- D. Terrestrial CSTB is a CSTB which is capable of receiving digital television signals from a terrestrial transmission system and delivering them to a consumer display and/or external rendering/recording device. If the CSTB base functionality is not cable, satellite or IP and the CSTB meets the definition of a Terrestrial CSTB and the CSTB is capable of receiving a terrestrial service protected by conditional access, the base functionality is defined to be terrestrial, regardless of whether the terrestrial reception is considered the “principal functionality” by the Manufacturer or Service Provider.
- E. Thin-Client/Remote CSTB: A CSTB that is designed to interface between a CSTB and a TV (or other output device) that has no ability to interface with the Service Provider directly and relies solely on a Cable, Satellite, IP or Terrestrial CSTB for content. Any CSTB that meets the definition of Cable, Satellite, IP or Terrestrial CSTB is not a Thin-Client/Remote CSTB. If the CSTB base functionality is not cable, satellite, terrestrial or IP, and the CSTB otherwise meets the definition of Thin-Client/Remote, the base functionality is defined to be thin-client/remote.

### **B.3 Additional TEC Functionality Allowances of CSTBs**

- F. Access to Additional RF Channels: Access to additional RF channels may be achieved either by adding additional RF tuners or else by providing a wideband tuner capable of accessing multiple channels simultaneously either from the primary network or else from a physically separate network. For example, the CSTB may allow access to multiple RF channels and have the ability to tune into two or more separate streams of video, audio, interactive media, service information or EPG data simultaneously and process these stream separately. This allowance does not apply to additional network-based IP inputs such as an additional Ethernet interface. The allowance given is per additional RF channel.
- G. Advanced Video Processing: Advanced methods for video decoding, giving compression efficiency significantly beyond MPEG-2. Examples include, but are not limited to, H.264/AVC and SMPTE 421M.
- H. High Efficiency Video Processing: High Efficiency methods for video decoding, giving compression efficiency significantly beyond H.264/AVC. This includes, but is not limited to, the example of HEVC.
- I. High Definition (“HD”) Resolution: Video output with resolutions greater or equal to 720p (1280 pixels x 720 lines at 50 frames/s progressive) or 1080i (1920 pixels x 1080 lines at 25 frames/s interlaced).
- J. Full High Definition Resolution: Video output with resolutions greater or equal to 1080p (1920 pixels x 1080 lines at 50 frames/s progressive). This relates to chipsets which are capable of decoding and displaying such resolutions.
- K. Ultra High Definition Resolution: Video output with resolutions greater or equal to 4Kx2K (3840 pixels x 2160 lines at 50 frames/s progressive).
- L. 3DTV Processing: Producing a 3D output by using a method that requires the processing of some form of difference signal. This includes, but is not limited to, MPEG MVC. It excludes frame compatible representation of 3D.
- M. Advanced Graphics Processing: advanced graphics capabilities for providing 3D graphics acceleration giving support for OpenGL ES 2.0 or higher.
- N. Digital Video Recorder (DVR): A device that stores video in a digital format to a rewritable disk drive or other non-volatile storage media local to the unit. The term covers DVR functions integrated in a CSTB; it does not include server based DVR capabilities. DVR capability may also provide ‘live pause’ functionality. For the DVR energy allowance to be claimed the recording capability must be greater than 15 minutes.

- O. Multi-decode: A CSTB with a functionality allowance that meets the definition for Cable, Satellite, IP or Terrestrial CSTB above and is capable of decoding more than one content stream. Picture in Picture (PIP) is one example of Multi-decode functionality.
- P. Multi-display: A CSTB with a functionality allowance that meets the definition for Cable, Satellite, IP or Terrestrial CSTB above and is capable of providing independent content streams to multiple end points external to the CSTB, e.g. TVs, within a single family dwelling.
- Q. In-home Networking: The capability to interface with external devices over a high bandwidth network (e.g., IEEE 802.11 (WiFi), MoCA, HPNA). The allowance is per network interface type implemented for home networks. For purposes of this Voluntary Agreement, IEEE 802.3 wired Ethernet is not considered to be an In-home Networking Interface.
- R. Return Path Functionality: This is an indicator of an enhanced functionality CSTB. Return Path functionality may be provided by any common means of connecting to a telecommunications network and used for the purpose of two-way data communications between the CSTB and the service provider (e.g. Ethernet, Wi-Fi, cable modem or telecommunications modem).
- S. Return Path Technical Interface: In addition to the Return Path Functionality allowance, a further allowance applies for CSTBs which include a broadband cable modem or broadband telecommunications modem. The value of this allowance is dependent on the broadband technology used (see table in Annex D, section D.3). No Technical Interface allowance applies to the lower power consuming return path technologies (e.g. Ethernet or Wi-Fi), which are assumed to be covered by the Return Path Functionality Allowance.

#### **B.4 Operational modes**

- T. **On**: Operational mode in which the CSTB is at least actively performing its base functionality. Note that the power consumption targets related to “On” mode might be variable over the time and dependent on the real functionality requested from the CSTB.
- U. **Standby**: Operational mode in which the CSTB has less energy consumption, capability, and responsiveness than in the “On” mode. The power consumption targets related to “Standby” mode might be variable and dependent on the real functionality requested from the CSTB.
- V. The CSTB may enter a Standby mode from the On mode after:
  - a. the CSTB receives a notification from the user to enter a standby mode via a power button press on a remote control or front panel of the unit, or through an electronic signal or data packet received via a digital interface on the CSTB; or
  - b. where APD is supported, the CSTB auto-powers down to a standby mode. The power consumption after auto-power down to standby and after a user initiated power down to standby may or may not be equivalent.

## ANNEX C – CALCULATION OF TOTAL ENERGY CONSUMPTION

The energy consumption shall be calculated and declared taking into account the relevant provisions of this Annex. In this measurement process, the energy consumed in the On and standby modes will be multiplied by the number of hours a defined typical device spends in On and Standby. The result will be a single energy value representing the energy usage of the device over the course of an entire year: its Total Energy Consumption.

Standby mode measurement should be taken at least 30 minutes after the device enters such a mode.

The *Total Energy Consumption* of a CSTB is compared to its *Total Energy Allowance* to determine its compliance with this Voluntary Agreement. The following parts describe the way for determining CSTB yearly energy allowances as well as calculating their Total Energy Consumption.

### C.1 General

The CSTB should be tested as shipped and as normally installed for the end-user. Where the same CSTB has been shipped with more than one software version during the course a reporting period then a single representative unit may be tested. Where the CSTB is capable of supporting a wired or wireless local area network this should be disabled unless an allowance is available in respect of this network in accordance with Annex D. If it cannot be disabled, the CSTB should be operated in the most basic mode required to produce picture and sound from the specified broadcast stream, for one local monitoring point working to the standard of that broadcast stream

One appropriate digital (test) HD broadcast stream shall be fed into the equipment. If the equipment does not accept HD inputs a standard (SD) stream shall be used.

No peripherals shall be attached except when necessary for feeding the broadcast stream into the equipment and delivering the function(s) as described in this Annex. Where such a peripheral requires power from the CSTB (e.g. a powered antenna for a Terrestrial CSTB or a Low Noise Block (LNB) for a Satellite CSTB), is not of a unique design specific to the CSTB but it is essential to make the CSTB function, then the energy required for the peripheral shall not be included in the test measurement.

The duration of measurement should be evaluated according to IEC62301.

### C.2 Calculated Total Energy Consumption criteria

The criterion used in order to assess compliance of CSTBs with this Voluntary Agreement is its calculated total energy consumption (TEC – in annual kWh). The criterion is an allowance for base functionality, plus allowances for specific, additional functionalities present across a duty cycle. This duty cycle is further explained in Sub-Section C.7.1.

### C.3 Base Functionality Allowance

The appropriate base functionalities are defined in Annex B.2. The corresponding allowances values are given in the Table 3 of Annex D (*Maximum Energy Consumption Targets and Time Schedule*).

### C.4 Additional Functionality Allowance

The appropriate additional functionalities are defined in Annex B.3. If applicable, these shall be determined using values from Table 4 of Annex D.

### C.5 Calculating Annual Energy Allowance

To calculate the Voluntary Agreement allowance for a given CSTB, take the sum of the base functionality allowance and all applicable additional functionalities allowances (note that there may not be any additional functionality in devices such as standard cable or satellite CSTBs). This sum is the

calculated annual kWh limit, or Total Energy Consumption (TEC) value. This sum equals the maximum amount of energy the box can use in a given year as calculated following the measurement procedure described in this Annex C.

Annual Energy Allowance = Base Functionality Allowance + Additional Functionalities Allowance

## C.6 Multi-decode and Multi-display Functionality Allowances

Additional allowances are applicable to products providing one or both of the following functionalities:

- **Multi-decode:** providing two or more different decoded videos. This functionality is commonly implemented in a single display as Picture in Picture (PIP).
- **Multi-display:** providing independent content to more than one display. When claiming the allowance for a second display, the content provided to the second display must be different to the content provided to the primary display.

Specific requirements for testing CSTBs with Multi-decode and/or Multi-display are described below.

### a. Multi-decode

When using the Multi-decode additional functionality energy allowance to establish the criteria for a CSTB, the following procedure shall be followed:

- First, test the CSTB operating with single-decode and compare the results to the energy allowance assuming the CSTB will deliver one decoded video, i.e. do not include the Multi-decode allowance. If the CSTB meets the target, no further measurement is required.
- If the CSTB does not pass the single decode device CSTB test, then determine if it qualifies by including the Multi-decode allowance when it provides multi-decode functionality (e.g. with independent content on main picture and PIP using the same display):
  - Add the Multi-decode additional energy allowance listed in Table 3 of Annex D to the allowances established for the CSTB.
  - Compare the test results to the total allowance to see if the CSTB is compliant with the Voluntary Agreement when providing multi-decode functionality.

### b. Multi-display

When using the Multi-display additional functionality energy allowance to establish the criteria for a CSTB, the following procedure shall be followed:

- First, test the CSTB operating with single-display and compare the results to the energy allowance assuming the CSTB will deliver content to only one display device, i.e. do not include the Multi-display allowance. If the CSTB meets the target, no further measurement is required.
- If the CSTB does not pass the single display device CSTB test, then determine if it qualifies by including the Multi-display allowance when it provides multi-display functionality (e.g. providing different encoded video content to another display device, which performs the decoding):
  - Add the Multi-display additional energy allowance listed in Table 3 of Annex D to the allowances established for the CSTB.
  - Compare the test results to the total allowance to see if the CSTB is compliant with the Voluntary Agreement when providing multi-display functionality.

### c. Multi-decode and Multi-display

When using both the Multi-decode and Multi-display additional functionality energy allowances to establish the criteria for a CSTB, the following procedure shall be followed:

- First, test the CSTB operating with single-decode and single-display and compare the results to the energy allowance assuming the CSTB will deliver one decoded video to one display device, i.e. do not include either the Multi-decode or Multi-display allowance. If the CSTB meets the target, no further measurement is required.
- Secondly, if the CSTB does not pass the single decode and display test and if appropriate for the CSTB implementation, determine if it qualifies by including the Multi-decode allowance when it provides multi-decode functionality, as described in section a. above. If the CSTB meets the target, no further measurement is required.
- Thirdly, if the CSTB does not pass the multi-decode test and if appropriate for the CSTB implementation, determine if it qualifies by including the Multi-display allowance when it provides multi-display functionality, as described in section b. above. If the CSTB meets the target, no further measurement is required.
- Finally, if the CSTB does not pass the multi-display test, determine if it qualifies by including both



the Multi-decode and Multi-display allowances when it provides both multi-decode and multi-display functionality (e.g. providing different decoded content to another display device):

- Add the Multi-decode and Multi-display additional energy allowances listed in Table 3 of Annex D to the allowances established for the CSTB.
- Compare the test results to the total allowance to see if the CSTB is compliant with the Voluntary Agreement when providing both multi-decode and multi-display functionality.

## C.7 Device Total Energy Consumption (TEC) Assessment

In this specification, the power consumed in the On and Standby modes will be multiplied by the number of hours a defined typical device spends in On and Standby. The result will be single energy value representing the energy usage of the device over the course of an entire year.

### C.7.1 Duty cycle

The Base Duty Cycle defines the number of hours during which a CSTB is considered to be working in “On”( =>  $T_{On}$ ) and “Standby modes” (=>  $T_{Standby}$  OR  $T_{APD}$ ).

The duty cycle is dependent on the (optional) availability of the Auto Power Down feature.

**Table 1: Base Duty Cycle**

CSTB with <b><u>NO</u></b> APD	<b>On</b>	<b>Standby</b>	
Daily time duration in this mode	$T_{On}= 9h$	$T_{Standby}=15h$	
CSTB <b><u>with</u></b> APD	<b>On</b>	<b>Standby</b>	<b>Standby from APD</b>
Daily time duration in this mode	$T_{On}= 4.5h$	$T_{Standby}=15h$	$T_{APD} =4.5h$

### C.7.2 TEC Assessment

Calculate the base energy consumption by multiplying the measured power consumption as specified in this test procedure by the hours per day values in the equations below. If the EUT does not include the capability for Auto Power Down, then use the first equation (a). If the product does include Auto Power Down capability, and it meets the requirements in Annex A (A.3; A.4), then use the second equation (b).

$P_{On}$ ,  $P_{Standby}$  and  $P_{APD}$  are power levels in watts as measured according to the measurement procedure set out in this Annex C.

- (a) Annual energy (kWh/yr) for a product with no Auto Power Down

$$kWh_{Base} = 0.365 \times (T_{On} \times P_{On} + T_{Standby} \times P_{Standby})$$

- (b) Annual energy (kWh/yr) for a product with Auto Power Down capability

$$kWh_{Base} = 0.365 \times (T_{On} \times P_{On} + T_{Standby} \times P_{Standby} + T_{APD} \times P_{APD})$$

Example A: The EUT does not have Auto Power Down capability, and the measurements during the measurement procedure are as follows:  $P_{On} = 24.0$  watts and  $P_{Standby} = 15.0$  watts. Using equation (a), the total energy consumption is then assessed to be:

$$kWh_{Base} = 0.365 * ( 9 * 24.0 + 15 * 15.0 ) = \mathbf{161 \text{ kWh/year}}$$

Example B: The EUT does have Auto Power Down capability, and the measurements during the measurement procedure are similar to example A:  $P_{On} = 24.0$  watts,  $P_{Standby} = 15.0$  watts and  $P_{APD} = 3$  watts. Using equation (b), the total energy consumption is then assessed to be:

$$kWh_{Base} = 0.365 * ( 4.5 * 24.0 + 15 * 15.0 + 4.5 * 3.0 ) = \mathbf{126.5 \text{ kWh/year}}$$

If the annual TEC assessed for the product is less than the annual Energy Allowance calculated from Annex D below, then the product is compliant with the energy consumption targets of this Voluntary Agreement.

## ANNEX D – MAXIMUM ENERGY CONSUMPTION TARGETS AND TIME SCHEDULE

**D.1 Effective Date:** This Voluntary Agreement is effective from July 1, 2010.

Tier 1 energy consumption targets shall be effective from the Effective Date or Signature Date until June 30, 2013.

Tier 2 energy consumption targets will become effective on July 1, 2013.

### **D.2 Base Functionality Allowance**

The base functionality allowance, if applicable, shall be determined using values from Table 3. See also Annex B.2, above.

**Table 3: Base Functionality Annual Energy Allowance**

<b>Base Functionality</b>	<b>Tier1 Annual Energy Allowance (kWh/year)</b>
Cable	45
Satellite	45
IP	40
Terrestrial	40
Thin-Client/Remote	40

<b>Base Functionality</b>	<b>Tier2<sup>6</sup> Annual Energy Allowance (kWh/year)</b>
Cable	40
Satellite	40
IP	35
Terrestrial	35
Thin-Client/Remote	35

### **D.3 Additional Functionalities Allowance**

The Additional Functionalities Allowances, if applicable, shall be determined using values from Table 4.

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<sup>6</sup> Tier 2 limits have been provided throughout this specification as preliminary targets that will be re-evaluated and finalized at least nine months prior to the Tier 2 effective date.

**Table 4: Additional Functionalities Annual Energy Allowance for Tier 1**

<b>Additional Functionalities</b>	<b>Tier 1 Annual Energy Allowance (kWh/year)</b>
Advanced Video Processing	20
High Definition	20
Access to additional RF Channels <sup>7</sup>	20
DVR	20
Return Path Functionality	60
Return Path Technical Interfaces:	
ADSL or DOCSIS 2.0	0
VDSL or DOCSIS 3.0 <sup>8</sup>	70
Multi-decode and Multi-display	38

**Additional Functionalities Annual Energy Allowance for Tier 2**

<b>Additional Functionalities</b>	<b>Tier 2 Annual Energy Allowance (kWh/year)</b>
Advanced Video Processing	0
High Efficiency Video Processing	20
High Definition	0
Full High Definition	20
Ultra High Definition	30
3DTV	20
Advanced Graphics Processing	5
Access to Additional RF Channels <sup>9</sup>	15
DVR	20
Return Path Functionality	25
Return Path Technical Interfaces:	
ADSL or DOCSIS 2.0	30
VDSL or DOCSIS 3.0 <sup>10</sup>	50
Multi-decode	25
Multi-display	6
In-home Network <sup>11</sup>	12

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<sup>7</sup> Allowance per RF channel

<sup>8</sup> Allowance per 4 bonded RF channels

<sup>9</sup> Allowance per RF channel

<sup>10</sup> Allowance per 4 bonded RF channels

<sup>11</sup> Allowance per network interface type implemented for Home Networks

## ANNEX E – TEST PROCEDURE

### E.1 Overview Of Test Procedure

- E.1.1 The intention of this Annex is to define an independent test process to determine the energy consumption of a CSTB under various standardised operating conditions, these are designed to emulate 'real world' viewing habits.
- E.1.2 All testing shall be carried out in controlled repeatable conditions, as specified below.
- E.1.3 Unless otherwise specified, all commands to the Equipment Under Test (EUT) shall be via the supplied remote control.
- E.1.4 Except for a smart card or Conditional Access module there shall be no external loads connected to the EUT, unless these are required for the EUT to function, if other external loads are required these shall not measurably increase the load on the EUT e.g. for satellite the LNB supply shall be via a DC block (i.e. powered independently).
- E.1.5 All compliance testing shall be carried out on products representative of production units. To provide results that will give an accurate representation of actual deployed usage the software used in the EUT shall be the same as the software used by the product when deployed by the Service Provider. Where the same CSTB has been shipped with more than one software version during the course a Reporting Period then a single representative unit may be tested.
- E.1.6 The compliance testing shall be carried out on one (1) random sample product. If the results show that the product has passed by a margin of greater than 10% then the product is deemed to be compliant and no further testing is required. If the product passes with a margin of less than 10% then two (2) further random samples shall be taken. If both of these pass then the product shall be deemed to have complied. If either one of these two samples fails to pass then the product does not comply with the Voluntary Agreement.
- E.1.7 When testing standard definition operations the audio/video content shall be encoded using a qualifying technology (e.g. MPEG-2 with scrambling) and typically a sports or film channel.
- E.1.8 When an allowance for high definition is taken the audio/video content shall be encoded using a qualifying technology (MPEG-2 with scrambling) and typically an HD sports or film channel.
- E.1.9 Where an allowance for the Return Path is claimed then the EUT must be operated to the highest version of the Return Path technology with which it is compatible.
- E.1.10 Where the allowance for advanced video processing is taken, then at least 1 test stream shall be encoded using a qualifying technology (e.g. H.264/AVC with scrambling).
- E.1.11 Where the energy savings can be influenced by the end user then all measurements shall be made using the factory default settings.
- E.1.12 Where the allowance for Multi-decode is claimed, then and the EUT shall decode at least two different encoded audio/video streams for the duration of the test.
- E.1.13 Where the allowance for Multi-display is claimed, then at least one additional display device rendering content different from the primary display device shall be connected to the EUT for the duration of the test.
- E.1.14 Where the allowance for in-home networking is claimed then each in-home network link shall be established, but the transfer of video over the link is not required

## E.2 General Test Conditions

E.2.1 The general conditions of test are described in IEC 62301 (Household electrical appliances – Measurement of standby power). The main requirements are summarised briefly below.

Test Conditions	Value
Ambient temperature	$23 \pm 5 \text{ }^{\circ}\text{C}$
Air speed close to the unit	$\leq 0.5 \text{ m/s}$
Supply voltage	$230\text{V} \pm 1\%$ $50 \text{ Hz} \pm 1\%$
Supply voltage waveform	Total harmonic content $\leq 2\%$ Crest factor between 1.34 and 1.49
Power level $\geq 0.5\text{W}$	Uncertainty $\leq 2\%$ at the 95% confidence level
Power level $\leq 0.5\text{W}$	Uncertainty $\leq 0.01 \text{ W}$ at the 95% confidence level
Power $\leq 10 \text{ W}$	Resolution $\geq 0.01 \text{ W}$
Power $10 \leq 100 \text{ W}$	Resolution $\geq 0.1 \text{ W}$

E.2.2 Test instruments shall be calibrated annually to traceable national standards to maintain the levels of accuracy above.

## E.3 Test Method for Standby (user initiated)

E.3.1 The EUT shall be put into its on mode.

E.3.2 If the EUT is capable of scheduling a recording then a recording shall be scheduled two (2) hours in the future.

E.3.3 After five (5) minutes in this mode, the standby or off button on the remote control shall be pressed.

E.3.4 The EUT shall then be left for a maximum of thirty (30) minutes for any housekeeping activities to complete.

E.3.5 At the end of the thirty (30) minutes or housekeeping activities the average energy in watt/hours shall be measured for a period of ten (10) minutes. Based on this ten (10) minute measurement the standby part of the TEC shall be calculated.

E.3.6 If the EUT has a variable power usage in standby the test cycle duration, over which the average power is to be measured, shall be amended to one (1) complete power usage cycle which shall be taken to be the cycle from minimum to maximum usage so that the standby part of the TEC shall be calculated based on one (1) complete cycle.

E.3.7 If the EUT is fitted with a front panel switch which initiates a different level of energy saving, then the test shall be repeated using the front panel switch to initiate the standby mode, with the test cycle being repeated in accordance with Sections E.3.1 – E.3.6 inclusive. If the results are different then the higher value shall be used

#### **E.4 Test Method for Auto- Power Down (APD)**

- E.4.1 If the EUT is capable of scheduling a recording then a recording shall be scheduled 6 hours in the future.
- E.4.2 The EUT shall be connected either to a live stream or a pre-recorded stream and left until the auto-standby is initiated.
- E.4.3 The EUT shall then be left for a maximum of 30 minutes for any housekeeping activities to complete. At the end of the 30 minutes or housekeeping activities the average energy in watt hours shall be measured in accordance with Section E.3 above. Based on this measurement the auto-standby part of the TEC shall be calculated.

#### **E.5 Test method for On Mode of Standard Definition (SD) non-PVR**

- E.5.1 The EUT shall be connected either to a live stream or a pre-recorded stream.
- E.5.2 The EUT shall then be left for a maximum of thirty (30) minutes or until the EUT has stabilised.
- E.5.3 The average energy in watt hours shall then be measured for a period of ten (10) minutes.
- E.5.4 Based on this ten (10) minute measurement the on-mode part of the TEC shall be calculated.

#### **E.6 Test method for On Mode of HD, Full HD, UHD and 3D non-PVR**

##### *Tier1*

- E.6.1 The EUT shall be connected to, and display, a stream of high definition (HD) content.
- E.6.2 The EUT shall then be left for a maximum of thirty (30) minutes or until the EUT has stabilised.
- E.6.3 The average energy in watt hours shall then be measured for a period of five (5) minutes (P<sub>HD-NPVR</sub>).
- E.6.4 Using the standard remote control the EUT shall then be re-tuned to a standard definition channel and the average consumption measured for a further fifteen (15) minutes (P<sub>SD-NPVR</sub>).
- E.6.5 The average HD non PVR watt/hours =  $\frac{1}{4} P_{HD-NPVR} + \frac{3}{4} P_{SD-NPVR}$ .
- E.6.6 Based on this twenty (20) minute measurement the on-mode part of the TEC shall be calculated.

##### *Tier2*

- E.6.7 The EUT shall be connected to, and displaying of the highest resolution it is able to support and 3DTV if applicable.
- E.6.8 The EUT shall then be left for a maximum of thirty (30) minutes or until the EUT has stabilised.
- E.6.9 The average energy in watt hours shall then be measured for a period of five (5) minutes (P<sub>High-NPVR</sub>).
- E.6.10 Using the standard remote control the EUT shall then be re-tuned to a 2D high definition channel and the average consumption measured for a further fifteen (15) minutes (P<sub>Low-NPVR</sub>).

E.6.11 The average HD non PVR watt/hours =  $\frac{1}{4}$  P\_high-NPVR +  $\frac{3}{4}$  P\_low-NPVR.

E.6.12 Based on this twenty (20) minute measurement the on-mode part of the TEC shall be calculated.

### E.7 Test method for On Mode of Standard Definition (SD) PVR

E.7.1 The EUT shall be connected either to a live stream or a pre-recorded stream.

E.7.2 The EUT shall then be left for a maximum of thirty (30) minutes or until the EUT has stabilised.

E.7.3 The EUT shall then be operated in accordance with Table 1. For typical 2 tuner EUT this means 1 channel will be viewed whilst a second is recorded. For a 6 tuner EUT 1 channel will be viewed and 5 recorded.

E.7.4 For the purposes of this test where there is more than 1 tuner the viewed channel shall be different to the recorded channels

Viewing	Recording	Duration
1	0	10
1	1	10

Table 1a – normal operation duty cycle – single tuner

Active Tuners	Viewing	Recording	Duration
1	1	0	10
2	1	1	10

Table 1b – normal operation duty cycle – dual tuners

Active Tuners	Viewing	Recording	Duration
1	1	0	5
2	1	1	10
3+	1	All -1	5

Table 1c – normal operation duty cycle – multi-tuners

E7.5 The average energy in watt/hours shall then be measured for each period. Based on this 20 minute measurement the on-mode part of the TEC shall be calculated.

### E.8 Test method for On Mode of HD, Full HD, UHD and 3D PVR

E.8.1 The EUT shall be connected either to a live stream or a pre-recorded stream.

E.8.2 The EUT shall then be left for a maximum of 30 minutes or until the EUT has stabilised.



- E.8.3 The EUT shall then be operated in accordance with Table 2. For typical 2 Tuner EUT this means 1 channel will be viewed whilst a second is recorded, for a 6 tuner EUT 1 channel will be viewed and 5 recorded.
- E.8.4 For the purposes of this test where there is more than 1 tuner the viewed channel shall be different to the recorded channels
- E.8.5 For the allocated energy for Advanced Graphics Processing, the EUT must be actively rendering 3D graphics for that allowance to be taken.

*Tier 1*

Viewing HD	Viewing SD	Recording HD	Recording SD	Duration
1	0	0	0	5
0	1	0	0	5
1	0	1	0	5
0	1	0	1	5

Table 2a – normal operation duty cycle – single tuner

Active Tuners	Viewing HD	Viewing SD	Recording HD	Recording SD	Duration
1	1	0	0	0	5
2	0	1	0	1	5
2	1	0	0	1	5
2	0	1	1	0	5

Table 2b – normal operation duty cycle – dual tuner

Active tuners	Viewing HD	Viewing SD	Recording HD	Recording SD	Duration
1	1	0	0	0	5
2	0	1	1	0	5
3	1	0	2	0	5
n > 3	0	1	2	All remaining	5

Table 2c – normal operation duty cycle – multi tuner

For example if 5 tuners are fitted then the final test shall be view one SD channel, record two HD channels and record two SD channels.

*Tier 2*

In the Tier2 period, new allowances related to higher definition (Full HD, UHD) as well as 3D functionalities are introduced. In order to simplify the measurement method, the EUT is to be operated with streams carrying the highest resolutions corresponding to the most demanding additional functionalities that EUT is claiming allowances for: the highest supported resolution in 2D mode and the highest supported resolution in 3D mode.

Viewing (highest claimed resolution)		Recording (highest claimed resolution)		Duration
2D-TV	3D-TV	2T-TV	3D-TV	
1	0	0	0	5
0	1	0	0	5
1	0	1	0	5
0	1	0	1	5

Table 2a – normal operation duty cycle – single tuner

Active Tuners	Viewing (highest claimed resolution)		Recording (highest claimed resolution)		Duration
	2D-TV	3D-TV	2D-TV	3D-TV	
1	1	0	0	0	5
2	0	1	0	1	5
2	1	0	0	1	5
2	0	1	1	0	5

Table 2b – normal operation duty cycle – dual tuner

Active tuners	Viewing (highest claimed resolution)		Recording (highest claimed resolution)		Duration
	2DTV	3DTV	2DTV	3DTV	
1	1	0	0	0	5
2	0	1	1	0	5
3	1	0	2	0	5
n > 3	0	1	2	All remaining	5

Table 2c – normal operation duty cycle – multi tuner

For example if 5 tuners are fitted then the final test shall be: view one 3DTV channel, record two 2DTV channels and record two 3DTV channels.

E.8.6 The average energy in watt/hours shall then be measured for each period. Based on this 20 minute measurement the on-mode part of the TEC shall be calculated.

## ANNEX F – GENERAL DEFINITIONS

- F.1 “Auto-Power-Down” or “APD” means the capability to automatically switch from the On mode to a standby mode after a period of time without user input, generally based on the amount of time the unit has remained “idle” from last active use, i.e. user input such as channel change, volume change, menu access, etc.
- F.2 “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.
- F.3 “Conditional access” means the encryption, decryption and authorization techniques employed to make access to content conditional upon authorisation using a key that is dynamically allocated using a Conditional Access (CA) or Digital Rights Management (DRM) system.
- F.4 “Conditional Access Provider” means a company that supplies the encryption, decryption, and authorization techniques employed to protect content from unauthorized viewing.
- F.5 “CSTB” means a complex set top box, the functionality, components and operational modes and power modes of which is more particularly defined within Annex B and which is placed on the Internal Market for the first time on or after the Effective Date or put into service in the Internal Market for the first time on or after the Effective Date. For the avoidance of doubt, any CSTB that is placed on the Internal Market for the first time before the Effective Date or put into service in the Internal Market for the first time before the Effective Date (a “pre-2010 box”) is expressly excluded from the scope of this Voluntary Agreement. This includes any pre-2010 box that is repaired, upgraded or refurbished and returned into the Internal Market, or that is used in a “swap-for-failure” scenario after the Effective Date.
- F.6 “Data Over Cable Service Interface Specification” (DOCSIS/EuroDOCSIS) means a suite of standards that define interface requirements for cable modems involved in high-speed data and video/audio content distribution over cable television systems. Successive versions of the standard have been developed, including:
- DOCSIS/EuroDOCSIS 2.0: Second generation DOCSIS standard
  - DOCSIS/EuroDOCSIS 3.0: Third generation DOCSIS standard, which provides higher bit rates by use of channel bonding
- F.7 “Defaulting Signatory” means a Signatory that has failed to comply with its commitments under the Voluntary Agreement.
- F.8 “Digital Subscriber Line” (DSL) means a suite of standards that define interface requirements for modems involved in high-speed data and video/audio content distribution over telephone subscriber lines. The DSL family consists of several individual standards, including:
- ADSL: Asymmetric Digital Subscriber Line
  - ADSL2plus: Second generation ADSL with extended bandwidth
  - VDSL: Very High Speed Digital Subscriber
  - VDSL2: Very High Speed Digital Subscriber Line second generation
- F.9 “Effective Date” means the 1<sup>st</sup> of July 2010.
- F.10 “Equipment Manufacturer” means the company who uses a component or components made by the Component Manufacturer, and is responsible for designing, developing and/or manufacturing a CSTB with a view to placing it on the Internal Market on its own behalf.
- F.11 “Equipment Under Test” or “EUT” means the equipment being tested.
- F.12 “IEC” means the International Electro technical Commission.
- F.13 “IEC 62301” means the document entitled “Household electrical appliances – Measurement of standby power”.
- F.14 “Independent Inspector” means the independent third party designated by the Steering Committee (on behalf of all Signatories) and who is tasked with, and responsible for, the collection and processing of information supplied by Signatories pursuant to Section 5.1 and Annex G, and determining a Signatory’s compliance with the Voluntary Agreement in accordance with Section 5.4. The Steering Committee shall engage the services of the

Independent Inspector upon terms and conditions that shall require undertakings of confidentiality from the Independent Inspector, and which shall also set out any requirements or applicable mechanisms for a process of appeal, should this ever be necessary.

- F.15 "Internal Market" means the internal market as defined in the Treaty on the Functioning of the European Union.
- F.16 "Main Activity" means the principal commercial activity of a Signatory. For the avoidance of doubt, a Signatory is not precluded from undertaking more than one activity (as set out in Section 5.1 of the Voluntary Agreement), but it may only declare itself to have one Main Activity for the purposes of this Voluntary Agreement.
- F.17 "Member States" means the member states of the EU.
- F.18 "Quorum" means two thirds of the Signatories being present at a meeting.
- F.19 "Reporting Period" means the period within which the required information is to be submitted by a Signatory within 3 months after the end of that period.
- F.20 "Service Provider" means an entity that, whether by cable, satellite, terrestrial or telecommunications, provides video (and possibly other) content to subscribers with whom it has an ongoing contractual relationship. A Service Provider in the context of the Voluntary Agreement is one that supplies CSTBs to end users.
- F.21 "Signatories" means those companies or industry participants who sign this Voluntary Agreement, which shall include (but not be limited to) Equipment Manufacturers, Software Providers, Conditional Access Providers, Component Manufacturers and Service Providers.
- F.22 "Signature Date" means the date on which a company makes its commitment to this Voluntary Agreement and becomes a Signatory of this Voluntary Agreement.
- F.23 "Simple STB" means a standalone device which, irrespective of the interfaces used, has the primary function of converting standard-definition (SD) or high-definition (HD), free-to-air digital broadcast signals to analogue broadcast signals suitable for analogue television or radio, and has no 'conditional access' function. For example, a STB that has an unpopulated Common Interface socket is a Simple STB. A STB that has a Common Interface socket which is populated with an active Common Interface Module is a Complex STB.
- F.24 "Software Provider" means a company who is responsible for producing the middleware and/or the operational software for the CSTB.
- F.25 "Steering Committee" means the co-ordinating and governing body of this Voluntary Agreement, appointed in accordance with the principles set out in Section 6.
- F.26 "Total Energy Consumption" or "TEC" means an assessment tool used in this specification that provides flexibility to approach the issue of energy efficiency while retaining a comparable metric to assess performance. In this specification, efficiency criteria are noted in terms of calculated total energy used over a year for a typical user (kWh/year) rather than energy (watts) for On and standby modes.
- F.27 "Tuner" means a tuner in the conventional sense, i.e. a tuner is a device or component that has the capability to demodulate physical transmissions from the DTV network at the electrical and mechanical level, corresponding to the OSI Physical Layer 1. Examples include DVB-S, DVB-T, DVB-C, DVB-H, ITU G.992.x (G.DMT etc), IEEE 802.16 (WiMAX). A tuner may also incorporate functionality from higher OSI layers (for example Ethernet), but to be classified as a "Tuner" for the purposes of this Voluntary Agreement it must provide OSI Layer 1 functionality and be used for the purpose of reception of digital media (DTV) content. A "Return Path" and an "Out-of-Band Tuner" is not considered a Tuner for the purposes of this Voluntary Agreement – see separate definitions. For the avoidance of doubt an Ethernet connector is not a Tuner as it does not provide OSI layer 1 functionality.
- F.28 "Voting Procedures" means the process for casting votes at the Steering Committee. A Signatory which reports under the Voluntary Agreement shall be entitled to cast a single vote for the Main Activity that it performs (in accordance with Section 5.1). The Voting Procedures will be carried out in a manner which ensures that a balanced representation of views between the various Signatories to this Voluntary Agreement is achieved at all times.

ANNEX G – REPORTING PRO-FORMA

**Information to be provided by Equipment Manufacturers:**

Name of the Signatory	
Company registration No. of Signatory	
Main Activity of Signatory	
Reporting Period to which the information relates	
Model type(s) and number of each model of CSTB manufactured, supplied and/or distributed by Equipment Manufacturer at wholesale and/or retail level (whether by sale, rental or free of charge), as applicable	
Energy consumption in the Reporting Period per CSTB model manufactured, supplied and/or distributed by Equipment Manufacturer at wholesale and/or retail level (whether by sale, rental or free of charge), as applicable, measured in TEC (according to the test procedure set out in Annex E)	

**Information to be provided by Service Providers:**

Name of the Signatory	
Company registration No. of Signatory	
Main Activity of Signatory	
Reporting Period to which the information relates	
Model type(s) and number of each model of CSTB supplied and/or distributed by the Service Provider at wholesale and/or retail level (whether by sale, rental or free of charge), as applicable	
Energy consumption in the Reporting Period per CSTB model supplied and/or distributed by the Service Provider at wholesale and/or retail level (whether by sale, rental or free of charge), as applicable, measured in TEC (according to the test procedure set out in Annex E)	
Standby and On mode figures in the Reporting Period per CSTB model supplied and/or distributed by the Service Provider at wholesale and/or retail level (whether by sale, rental or free of charge).	

**Information to be provided by Signatories which are neither Equipment Manufacturers nor Service Providers:**

Name of the Signatory	
Company registration No. of Signatory	
Main Activity of Signatory	
Reporting Period to which the information relates	
Provide specific model and/or version numbers for products shipped during the Reporting Period together with their relevant energy saving features	

ANNEX H – SIGNING FORM

**Voluntary Industry Agreement to improve the energy consumption  
of Complex Set Top Boxes within the EU**

Name of Signatory: .....

Main Activity of Signatory .....

Signs this Voluntary Industry Agreement and commits to the overall objective of reducing the energy consumption of CSTBs within the EU as set out herein.

For each Reporting Period, the Signatory will provide information to the Independent Inspector detailing the energy consumption of each type of CSTB it manufactures, supplies, distributes or uses within the EU, as applicable, in accordance with Section 5.1 and Annex G of this Voluntary Industry Agreement.

Signatory agrees to this Signing Form being shared with Member States' representatives involved with regulation under the Ecodesign Directive 2005/32/EC.

**For the Signatory:**

Date: .....

Name of Authorised Representative: .....

Function of Authorised Representative: .....

Address of Signatory: .....

Company Registration No of Signatory: .....

Email: .....

Signature: .....

Please send a duly signed and completed Signing Form to:

The VA Steering Committee,  
Technology Sectoral Governance INPO,  
Herestraat 5,  
B-3000 Leuven,  
Belgium

And/ or return electronically to:

david.daniels@bskyb.com