

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

Proposal from the industry group, Version 6.3

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INTRODUCTION

Equipment for the reception, decoding and interactive processing of digital broadcasting and related services have contributed and will continue to contribute substantially to the electricity consumption of households in the European Union. This Voluntary Agreement (VA) aims at reducing the potential electrical load represented by this equipment and at ensuring that the electrical efficiency of equipment required to support digital TV and related services is maximised.

This Voluntary Agreement lays down energy consumption requirements for Complex Set Top Boxes (CSTBs). It is complemented by a Code of Conduct on Digital TV which should be endorsed by any Signatory to this Voluntary Agreement aspiring to the best possible outcomes in the area of energy consumption.

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 constitutes a valid 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 2009/125/EC, the EU Guidelines on self-regulation measures concluded by industry under the Ecodesign Directive and the European Commission Guide to the Implementation of Directives based on the New Approach and the Global Approach (“Blue Guide”).

1 Overall Objective

The overall objective of this 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 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, such as slower start-up times, degradation of the ability to schedule recordings or to record remotely, hinder the availability of push VOD content to customers, etc.) Any such impact that would 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, 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 how 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.

2 Signatories and Market Coverage

The list of companies that are Signatories to this Voluntary Agreement can be found on the CSTB.EU website under ‘Signatories’. This list represents those manufacturers and supporting technical industries (silicon vendors and STB software vendors) that are the major suppliers to the EU pay TV industry as well as a number of pay TV Service Providers within the EU.

Market coverage is ensured by this combination, with the equipment vendors manufacturing compliant equipment for both Signatory Service Providers and non-Signatory Service Providers, and Signatory Service Providers specifying compliance to this Voluntary Agreement when purchasing from either

Signatory or non-Signatory vendors. This combination provides the market coverage required for a voluntary measure.

To comply with the VA guidelines the market coverage shall be verified by an independent body at least 2 yearly intervals or when a Signatory leaves or when it is drawn to the attention of the Chair of the Steering Committee that the market composition has changed.

Any change in composition that triggers a market coverage survey shall report the results of the survey to the Commission within 45 days of the survey being requested.

All Signatories shall complete the signing form in Annex J of this document. The Signatory shall indicate one Main Activity (CSTB Manufacturer, Service Provider, Component Manufacturer, Conditional Access Provider, Software Provider) in its signing form that corresponds to the commitments undertaken by becoming a Signatory to the Voluntary Agreement. The Steering Committee Chair shall send the originals of the completed signing forms to the Commission.

3 Scope

This Voluntary Agreement is effective from the 1st July 2016 (the "Effective Date") and covers CSTBs, as described and defined in the Annexes. 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 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.

This agreement covers all Complex set top boxes primarily deployed for, and through pay TV providers as described in the Annexes to this document, products outside the scope of the Annexes are specifically excluded from this voluntary agreement.

It is recognised that 100% compliance with these commitments is desirable, however this Voluntary Agreement recognises that in certain circumstances, through design delays, excessive costs of small-scale deployments etc., that there will be occasions where non-compliant product is placed on the market for a period. An allowance of 10% will be made for such product. The non-compliance should be reported to the Independent Inspector and a target date for when these products will no longer be placed on the market should be made known. This information may be made known anonymously in the Independent Inspector's report. For the avoidance of doubt, only CSTBs placed on the market during the current 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 Requirements

4.1 All Signatories

Signatories individually and collectively agree to be responsible to the European Commission and will each make their reasonable efforts to:

- abide by the general principles of CSTB hardware and software design set out in Annex A (*General Principles of CSTB Design*), as applicable to their market segment;
- work with the European Commission, Member States' representatives and other interested parties involved in CSTBs to agree to common working agendas to improve the environmental performance of CSTBs;
- co-operate with the European Commission and Member States to monitor the effectiveness of this Voluntary Agreement;
- co-operate with other Signatories, with the European Commission and with Member States to review the Voluntary Agreement, the Tier 4 energy consumption targets and the non-energy targets as shown in the Annexes to this document; and
- participate, as applicable, in the review process of this document as defined in section 14.

4.2 CSTB Manufacturers

Each CSTB Manufacturer Signatory shall commit to design and manufacture CSTBs to the Service Providers functional and operational specifications that meet, and where possible exceed, the commitments contained within this Voluntary Agreement. CSTB Manufacturers ensure that at least 90% of all CSTBs sold into the European Union in a given Reporting Period shall comply with the applicable energy consumption targets of the Voluntary Agreement as set out in Annex D (*Maximum Energy Consumption Targets and Time Schedule*) and that at least 90% of all CSTBs sold into the European Union in a given reporting period shall comply with the non-energy requirements in Annex F. Note: manufacturers shall target 100% compliance, but it is recognised that a maximum of 10% of products sold may be non-compliant with either the energy or non-energy aspects of this agreement.

4.3 Service Providers

Each Service Provider Signatory shall commit to working with the CSTB Manufacturer Signatories in order that the Service Provider's supply of CSTBs to end users is compliant with this Voluntary Agreement and shall ensure that at least 90% of all the products procured for deployment in the European union in a given Reporting Period shall comply with the applicable energy consumption targets of the Voluntary Agreement as set out in Annex D (*Maximum Energy Consumption Targets and Time Schedule*) and that at least 90% of all CSTBs procured for deployment into the European Union in a given reporting period shall comply with the non-energy requirements in Annex F. Note: Service Providers shall target 100% compliance, but it is recognised that a maximum of 10% of products purchased may be non-compliant with either the energy or non-energy aspects of this agreement

4.4 Others

Component Manufacturers commit to support CSTB Manufacturers in meeting and where possible improving upon the energy consumption targets contained within this Voluntary Agreement, to design CSTB components which improve functionality and enable component sub-systems to be controlled and operated in the most energy efficient manner.

Conditional Access Providers commit to support Service Providers in meeting and where possible improving upon the energy consumption targets contained within this Voluntary Agreement, to design and develop conditional access systems which enable improved CSTB energy efficiency without negatively impacting functional and operational requirements of Service Providers.

Software Providers commit to support Service Providers in meeting and where possible improving upon the energy consumption targets contained within this Voluntary Agreement, to develop and supply software power management applications which enable Service Providers to fully utilise and integrate hardware power management features provided by CSTB Manufacturers, and to do so without negatively impacting other CSTB features and functionality.

5 Independent Inspector

The Steering Committee shall, with the agreement of the Commission, appoint an Independent Inspector.

The Signatories of this agreement will bear all the reasonable costs of the Independent Inspector.

The appointment of the Independent Inspector will be published on the CSTB.EU website within 30 days of appointment.

The Independent Inspector will be responsible for:

- checking and reporting on the compliance of the Signatories to the requirements of this Voluntary Agreement;
- selecting which products and companies shall be audited in accordance with this Agreement;
- carrying out the product and company audits and reporting the results to the Steering Committee and the Commission;
- collecting the sales, purchasing and compliance data of all applicable Signatories.
- preparing the annual compliance report; and
- testing or overseeing testing of products selected for auditing.

Furthermore, the Independent Inspector will:

- protect the confidentiality of commercially secret or sensitive information;
- be impartial in all its actions and base its opinions on facts;
- interpret applicable rules in a truthful and sincere manner;
- be free of conflicts of interest and not have any business or other relationship with any Signatory; and
- perform all tasks with due care and supervise adequately all performed tasks for which it is responsible.

6 Compliance Verification

The Independent Inspector shall be responsible for verifying the compliance of the Signatories with this agreement.

This verification may be performed by

- Document checking
- Product testing
- Inspections in a Signatory's premises

The Independent Inspector is authorised to determine an appropriate mix of the above activities.

6.1 Document Checking

Manufacturer and Service Provider Signatories are responsible for providing the information on the spreadsheet published on the CSTB.EU website to the Independent Inspector annually at IndependentInspector@Navigant.com taking into account the relevant provisions of Annex C (*Calculation of Total Energy Consumption*). 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.

The Reporting Periods shall cover a 12-month period from 1st July to 30th June each year.

Reports are to be submitted to the Independent Inspector by 31st August each year. Additional requests by the Independent Inspector shall be answered promptly.

All products (compliant or otherwise), excluding prototypes and engineering samples not intended for commercial deployment, shall be included in the report.

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

Signatories that are neither CSTB Manufacturers nor Service Providers shall submit an annual statement to the Independent Inspector detailing their activities that support the objectives of this agreement.

Any Signatory that fails to submit the required information to the Independent Inspector shall be considered to be a 'non-compliant Signatory'.

6.2 Product Testing

The Independent Inspector shall select up to two random products from those reported by the Signatories to verify compliance with this Voluntary Agreement. For samples selected at CSTB Manufacturers or Service Providers' sites, the CSTB Manufacturer or Service Provider shall not participate in the selection of the samples to assure random selection.

To ensure the relevance of the audit testing, products shall, where possible be selected from those manufactured or deployed in high volume and from recently reported models. Products that are no longer actively produced or deployed should not normally be selected for audit.

The Independent Inspector may require the Signatories to provide specific documentation or information to support the verification testing.

The Independent Inspector must inform the Commission of the products selected for testing.

The summary results of verification testing are to be made public including the list of tested products and their conclusion (compliant/non-compliant).

6.3 Inspections

In addition to the scheduled inspections above, the Independent Inspector may perform a special inspection of any Signatory if he concludes that specific information received from any reputable source justifies an inspection. The reason for the special inspection must be disclosed to the Signatory and the Commission. The Signatory shall support the Independent Inspector during a special inspection.

The Independent Inspector shall send to the inspected Signatory a draft of the inspection report for comment within 30 days of the inspection.

The Signatory must respond to the draft report within 3 weeks. The final special inspection report must be issued within 5 weeks of the special inspection.

A Signatory, which according to the special inspection report, does not comply with this Voluntary Agreement or has not provided all the required information shall be considered to be a 'non-compliant Signatory'. The Signatory may be given up to 6 months additional time to be compliant.

The number of inspections carried out each year shall be agreed with the Steering Committee, taking into account Commission guidance.

7 Compliance Reporting

The Independent Inspector shall prepare an annual compliance report which shall be circulated to members of the Steering Committee by 31st March of the year following the Reporting Period.

Members of the Steering Committee may submit comments on the annual report within 15 days.

The final version of the annual compliance report must be submitted to members of the Steering Committee by 30th April of the year following the Reporting Period.

The content of the Annual report shall include, as a minimum:

- The contact details of the Independent Inspector
- The report authors
- The date of the report and Reporting Period
- The summary of the results presented
- The list of Signatories and their obligations (manufacturer, Service Provider or other)
- List of commitments and requirements on which Signatories had to report.
- Information on the data collection and processing method
- Information on the (non)compliance of each Signatory
- Information about any reasons for non-compliance
- Summary (including results) of any tests and audits performed in the Reporting Period
- Any challenges in preparing the report, in particular in collecting or processing data from Signatories
- Recommendations for the next Reporting Periods
- List of compliant and non-compliant Signatories
- List of compliant models covered by this Voluntary Agreement

Information in the annual report must be presented in both aggregated form summarising results for all Signatories, which is made publicly available, and detailed for each individual Signatory for the respective Signatory and the Commission only.

8 Monitoring the Effectiveness of this Voluntary Agreement.

The Commission shall monitor this Voluntary Agreement to ensure that it conforms to the general principals of Directive 2009/125/EC including Annex VIII, the Guidelines and the appropriateness of the requirements.

The Commission may consult with Signatories, the Independent Inspector and other stakeholders to ensure that this Voluntary agreement complies with the essential requirements of the Directive and that the controls are sufficient to enable future compliance.

The Commission may hold meetings with the Consultation Forum to discuss with stakeholders the application of this voluntary agreement.

9 Access to Background Data

The Commission, National Authorities and non-governmental organisations may request information via the Chair from Signatories or in an aggregated form from the Independent Inspector on the environmental aspects of products covered by this agreement. Any non-commercially sensitive information shall be provided to requesting stakeholders in a timely manner (usually within 30 days). A record of requests and responses shall be maintained and recorded in the minutes of Steering Committee meetings (including requests declined due to commercial sensitivity).

10 Management of this Agreement

This agreement shall be managed by the Steering Committee.

Each Signatory is entitled to nominate one representative member to the Steering Committee.

The Commission is entitled to nominate one representative member to the Steering Committee.

Each Signatory member of the Steering Committee shall have one equal vote.

Non-governmental observers, members of national authorities and invited guests shall be entitled to attend Steering Committee meetings but shall not have any voting rights.

The Steering Committee shall elect a Chair from the members.

The Chair shall serve for an initial period of 2 years and may be re-elected for further periods of 2 years.

The Chair is responsible for representing this agreement, convening and running Steering Committee meetings and for ensuring minutes are taken of meetings and published.

The Steering Committee shall hold a minimum of one meeting per calendar year, which shall be in Brussels. Further meetings may be held as required, either in Brussels, elsewhere or by an audio or video conferencing service.

Steering Committee meetings shall be convened by the Chair, any member of the Steering Committee may request the Chair to convene a meeting.

If this Voluntary Agreement fails to fulfil the essential requirements of a voluntary agreement as set out in the Directive or the Commission guidance notes the Chair shall convene a meeting within 30 days.

The Chair is responsible for preparing the Agenda of Steering Committee meetings, which shall include all items raised by Steering Committee members and where appropriate, those raised by observers. Draft agendas shall be circulated to all members of the consultation forum, the Steering Committee and shall be published on the CSTB.EU website at least 30 days before a meeting. Agendas must specifically include whether a new Chair or an amendment to the Voluntary Agreement is to be voted on.

Documents to be presented or discussed at the Steering Committee meeting shall be distributed and published on the CSTB.EU website at least 7 days before meetings.

All members and observers shall have the right to speak at meetings and to request their views are registered in the minutes.

Minutes of Steering Committee meetings shall be drafted and circulated to all attendees within 30 days. Attendees shall have 14 days to submit comments before the minutes are finalised and published.

Signatories shall bear all expenses related to the running of the Steering Committee, including testing and inspection activities, excluding costs of the representatives of the Commission and observers.

The Steering Committee may, if required, form working groups to carry out specific tasks, these working groups shall report back to the Steering Committee. Working groups may consist of Signatories, observers and outside experts.

Signatories may contract external companies to provide administrative support as required.

Wherever possible decisions taken by the Steering Committee shall be unanimous. If a vote is required, it shall be by at least a 2/3rd majority of votes cast with a quorum of 2/3rd of the membership being present and a simple majority of both Service Providers and CSTB Manufacturers.

11 Transparency

Meetings of the Steering Committee shall be open to Member States, EFTA/EEA countries, the Independent Inspector, NGOs and other interested stakeholders, including non-Signatory companies. Non-Signatories shall have observer status and shall not be entitled to vote.

Requests to participate as an observer shall be directed through the Chair.

The Steering Committee shall establish and maintain the CSTB.EU website.

The website shall contain the following:

- The most recent version of the Voluntary Agreement.
- Previous versions of the Voluntary Agreement.
- An up to date list of Signatories.
- A summarised report of market coverage.
- Meeting agendas and minutes for each meeting.
- The reports published by the Independent Inspector.
- Lists of compliant and non-compliant Signatories for each Reporting Period.
- List of compliant products.
- Information about the Independent Inspector (including contact details).
- Provision for visitors to submit questions about this Voluntary Agreement to the Signatories and the Independent Inspector.

12 Voluntary Withdrawal of a Signatory

A Signatory may withdraw from this agreement after giving 30 days written notice to the Chair.

Once a Signatory has withdrawn from this agreement all the agreements obligations on the Signatory shall cease except for the obligations on confidentiality of data.

The Chair shall inform Signatories of withdrawal of a Signatory within 7 days of receiving written notification.

Information on withdrawal of a Signatory shall be recorded in the minutes of the next Steering Committee meeting and shall be published on the CSTB.EU website.

If the withdrawal of a Signatory may reduce market coverage to less than 80%, the Steering Committee shall produce an updated market coverage report to establish the market coverage. If the market coverage does not meet the Commission's requirements, the Commission may withdraw its recognition and will consider adopting an Ecodesign implementing measure.

13 Exclusion of a Non-compliant Signatory

A Signatory is considered to be non-compliant if it has not complied with the requirements of this Agreement as reported by the Independent Inspector or has not responded to requests for information required by the Independent Inspector to prepare the compliance report, or has failed to provide the required information with the agreed deadlines.

A non-compliant Signatory may be audited by the Independent inspector in the following year.

A Signatory that is non-compliant for two consecutive years may be excluded from this Agreement, subject to the agreement of the Steering Committee. The Chair shall inform the Steering Committee within 7 days following the exclusion of a Signatory.

The exclusion of a Signatory shall be recorded in the minutes of the next Steering Committee meeting.

If the exclusion of a Signatory may reduce market coverage to less than 80%, the Steering Committee shall produce an updated market coverage report to establish the market coverage. If the market

coverage does not meet the Commission's requirements, the Commission may withdraw its recognition and will consider adopting an Ecodesign implementing measure.

14 Revision of this Voluntary Agreement

This Agreement shall be reviewed annually.

All revisions shall be discussed by the Steering Committee. Minor revisions may be adopted by the Steering Committee Signatories, and significant revisions shall, following discussion, be presented to the Consultation Forum by the Chair. Comments from the Consultation Forum shall be considered before a major revision is adopted.

Observers may suggest revisions to this Agreement, however only Signatories are entitled to vote on any proposal.

15 Withdrawal of the Recognition of this Voluntary Agreement by the Commission.

The Commission may withdraw its recognition of this Agreement when one of the following situations occurs:

- The Signatories have taken the decision to terminate the Agreement;
- The market coverage of this Agreement is below 80% for a period exceeding 6 months; or
- The Agreement no longer meets the objectives and general principals of the Ecodesign Directive.

The Commission will inform the Chair of its decision to withdraw recognition of this Agreement, and will provide the reasons. If Commission recognition is withdrawn, the Commission may consider mandatory ecodesign and energy labelling regulations.

ANNEX A – General Principles of CSTB Design

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

- A.1 CSTBs are designed to improve energy efficiency 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 An Auto Power Down (APD) feature shall be provided. The APD feature requires that the CSTB automatically switches itself into the lowest standby mode which the Service Provider deems to be appropriate, after a period in the on mode following the last user interaction. The APD feature shall be defaulted to “on” or “enabled” when installed by a Service Provider or shipped from a CSTB Manufacturer.
- A.4 The APD time shall be set at a default of no more than 4 hours by the CSTB 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. Where a CSTB may be deployed in a non-residential application the APD feature may be able to be overridden by a user through a menu option. For the 2019/20 Reporting Period onwards, to prevent accidental disabling of APD a second confirmation screen is required before APD is disabled.
- A.5 The CSTB may exit a standby mode 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 improve energy efficiency, Service Providers, CSTB 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 2 or in Annex D (Base and Additional Functionalities Annual Energy Limit) shall be deactivated during the measurement process. However, if 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 14, the list of additional functionalities in Table 2 in Annex D is updated to consider 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 CSTBs shall not increase the power consumption requirements above the initial TEC limit unless they provide additional functionality. Such additional functionality shall not increase the TEC limit if listed in Table 2 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 CSTBs that are supplied by CSTB Manufacturers without operational software or where the Service Provider adds their own software shall be measured and reported with the CSTB Manufacturers test software, and these CSTBs shall be reported on the annual report as ‘incomplete’. Where possible CSTB Manufacturers supplying non-Signatory Service Providers with CSTBs that have incomplete software shall make reasonable efforts to encourage the non-Signatory Service Provider to abide with the principles of this agreement, including auto power down or comparable solutions.

- A.10 The company responsible for the distribution of CSTBs to the end user shall inform consumers about the environmental characteristics and performance of their CSTBs and facilitate and encourage consumers to adopt energy efficient practices about the use of CSTBs. Service Provider Signatories shall provide consumers with detailed information about the energy consumption levels. Such information shall be made available at the point of sale and it shall be published online. If the energy consumption changes after CSTBs are shipped (e.g. due to software changes), online information shall be updated.

ANNEX B – CSTB Functionality and Operational Modes

B.1 Definition of Complex Set Top Box (CSTB)

A Complex Set Top Box (CSTB) is a device equipped to allow conditional access or digital rights protection 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 including protecting the content in transport and on the platform. It may also include additional functions including 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, and/or gateway and routing functions.

For the purposes of this Voluntary Agreement, a device shall not be considered to be a CSTB unless it fulfils the functions of a CSTB when activated by the Service Provider and is supplied to a Service Provider as defined in this Agreement.

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 decoders
- External plug in digital receivers for computers (e.g. USB) unless device could be powered from the AC mains.

B.2 TEC Base Functionality Limits of CSTBs

The TEC base functionality limits 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. If 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 in the order listed below: -

- A. 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 can receive 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.
- B. 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 can receive 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.
- C. 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 can receive 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 can receive 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 Limits of CSTBs

- A. Additional RF Channels Cable or Satellite: Access to additional RF channels may be achieved either by adding additional RF narrowband tuners (each with its corresponding demod) or else by providing a wideband (or full band capture) tuner capable of accessing multiple channels simultaneously (via multiple demods) 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 and demodulate two or more separate streams of video, audio, interactive media, service information or EPG data simultaneously and process these stream separately. This limit does not apply to additional network-based IP inputs such as an additional Ethernet interface. The limit given is per additional RF channel; please note that this limit refers to the capability of accessing additional frequencies simultaneously (via multiple demods) and the allowance is restricted to a maximum of 11 additional channels (12 including initial base). The allowance can be claimed for each additional channel that can be displayed or recorded simultaneously
- B. Additional RF Channels IP or Terrestrial: Access to additional video channels. For example, the CSTB may allow access to multiple video channels and have the ability to tune and decode two or more separate streams of video and process these stream separately. The limit given is per additional channel capable of being decoded and the allowance is restricted to a maximum of 11 additional channels (12 including initial base) The allowance can be claimed for each additional channel that can be displayed or recorded simultaneously.
- C. 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 HEVC H.265.
- D. 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.
- E. Ultra-High Definition Resolution: Video output with resolutions greater or equal to 4Kx2K (3840 pixels x 2160 lines at 50 frames/s progressive).
- F. 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.
- G. Advanced Graphics Processing: advanced graphics capabilities for providing 3D graphics acceleration giving support for OpenGL ES 2.0 or higher.
- H. 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 limit to be claimed the recording capability must be greater than 30 minutes.
- I. Multi-decode: A CSTB with a functionality limit 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.

- J. Multi-display: A CSTB with a functionality limit that meets the definition for Cable, Satellite, IP or Terrestrial CSTB above and is capable of providing independent content streams to at least 3 display devices external to the CSTB, e.g. TVs, within a single family dwelling. Note this may be one local display and 2 remote thin clients or any other combination of 3 or more outputs to displays
- K. Multi-encoding: A Cable, Satellite, IP or Terrestrial CSTB that is also capable of audio-video encoding from the highest claimed decoding resolution of the device to a different encoding format e.g. HEVC to MPEG4 to output content to a different device.
- L. In-home Networking: The capability to interface with external devices over a high bandwidth network (e.g., IEEE 802.11 (Wi-Fi), MoCA, HPNA, HomePlug). The limit is once per CSTB. For purposes of this Voluntary Agreement, IEEE 802.3 wired Ethernet is not considered to be an In-home Networking Interface.
- M. In-home Networking Access point -Router: The capability to determine the optimal path along which IP traffic should be routed IP between different home networks (e.g. IEEE802.11g and IEEE802.11ac), based on layer information
- N. 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).
- O. Return Path Technical Interface: In addition to the Return Path Functionality limit, a further limit applies for CSTBs which include a broadband cable modem or broadband telecommunications modem. The value of this limit is dependent on the broadband technology used (see table in Annex D, section D.3). No Technical Interface limit applies to the lower power consuming return path technologies (e.g. Ethernet or PSTN), which are assumed to be covered by the Return Path Functionality Limit.
- P. Speculative Recording: Automated recording based on customer profiling.
- Q. Telephony: the ability to connect to analog home telephone systems including but not limited to VOIP (Voice Over IP) and POTS (plain old telephone system). DECT (Digital Enhanced Cordless Telecommunications) is excluded as a separate transmitter is required
- R. Smart Home services / Ultra high processing capability: High-end services requiring ultra-high-end CPU and memory concept providing:
 - high (DMIPS) processing capability
 - capability to run securely and independently concurrent applications
 This is a non-exhaustive list of possible “Smart Home” services:
 - Support to “Smart Grids” concept
 - Home security, monitoring and automation
 - E-Health
 - Connected Home usage learning and users profiling etc.
- S. MIMO Wi-Fi 2.4GHz: In addition to the In-home networking or In-home Networking Access Point–Router a limit may be claimed for each spatial stream in the 2.4GHz band that the device supports. If a device supports both 2.4 and 5GHz bands the limit may be claimed for both bands is both can be used concurrently. If the bands are switchable then the limit can only be claimed for one band
- T. MIMO Wi-Fi 5GHz: In addition to the In-home networking or In-home Networking Access Point–Router a limit may be claimed for each spatial stream in the 5GHz band that the device supports. If a device supports both 2.4 and 5GHz bands the limit may be claimed for both bands is both can be used concurrently. If the bands are switchable then the limit can only be claimed for one band
- U. Powerline: The ability to network between clients and servers using signaling via the mains domestic wiring examples of include power line, G.hn.
- V. Community Wi-Fi: allows Service Providers to leverage unused capacity on existing Wi-Fi infrastructure to offer Wi-Fi network access to visitors and passers on an ad-hoc basis

B.4 Operational Modes

- A. **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.
- B. **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.
- C. 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. 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 considering 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 the on and standby modes. 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 (TEC).

The *Total Energy Consumption* of a CSTB is compared to its *Total Energy Limit* to determine its compliance with this Voluntary Agreement. The following parts describe the way for determining CSTB yearly energy limits 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 a Reporting Period, then a single representative unit may be tested. Where the CSTB can support a wired or wireless local area network this should be disabled unless a limit 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 broadcast stream shall be fed into the equipment at the highest resolution for which an allowance is claimed

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.

C.2 Calculated Total Energy Consumption Criteria

The criterion used to assess compliance of CSTBs with this Voluntary Agreement is its calculated total energy consumption (TEC – in annual kWh). The criterion is a limit for base functionality, plus limits 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 Limit

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

C.4 Additional Functionality Limit

The appropriate additional functionalities are defined in Annex B.3. If applicable, these shall be determined using values from Table 2 of Annex D.

C.5 Calculating Annual Energy Limit

To calculate the Voluntary Agreement limit for a given CSTB, take the sum of the base functionality limit and all applicable additional functionalities limits (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 E.

Annual Energy Limit = Base Functionality Limit + Additional Functionalities Limit

C.6 Multi-decode and Multi-Display Functionality Limits

Additional limits 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). If claiming the Multi-decode limit the CSTB must be tested with a minimum of two signals being decoded and displayed (e.g. PIP)
- **Multi-display:** providing independent content to a minimum of 3 displays or thin clients. When claiming the limit for-Multi-display each output must provide different content.

C.7 Device Total Energy Consumption (TEC) Assessment

In this Voluntary Agreement, 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 a 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 Auto Power Down feature.

Table 1: Base Duty Cycle

CSTB <u>with</u> APD	On	Standby	Standby from APD
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 equation below. P_{On}, P_{Standby} and P_{APD} are power levels in watts as measured according to the measurement procedure set out in this Annex E.

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

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

Example: The EUT measurement procedure shows P_{On} = 24.0 watts, P_{Standby} = 15.0 watts and P_{APD} = 3 watts. Using the equation, the total energy consumption is then assessed to be:

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

If the annual TEC assessed for the product is less than the annual Energy Limit calculated from Annex ED, 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, 2016

Tier 3 energy consumption targets will become effective on July 1, 2016

Tier 4 energy consumption targets will become effective on July 1, 2018

D.2 **Base Functionality and Additional Functionality Limits**

The base and additional functionality limits, if applicable, shall be determined using values from Table 2. See also Annex B.2 and B3.

Table 2: Base Functionality and Additional Functionality Limits

	Tier 3 kWh/year	Tier 4 kWh/year	Notes
Base functionality			
Cable	40	50	For tier 4 the return path allowance is included
Satellite	40	45	For tier 4 the return path allowance is included
IP	35	30	For tier 4 the return path allowance is included
Terrestrial	35	25	For tier 4 the return path allowance is included
Thin-Client/Remote	30	7	For tier 4 the return path allowance is included
Additional functionality			
High Efficiency Video Coding ¹	20	12	Once per decoder

¹ The limit only applies when decoded video is available in analog or digital form and /or when the CSTB provides transcoding capability from content encoded with advanced video coder.

Full High Definition ²	20	8	Once per CSTB
Ultra High Definition (DVB Phase 1) ³	30	20	Once per CSTB
3DTV none stereoscopic broadcast	20	8	Once per CSTB
Advanced Graphic Processing	5	0	Once per CSTB
Additional RF Channels Cable or Satellite	15	7	Per channel
Additional Channels IP or Terrestrial	8	4	Per channel
DVR ⁴	20	15	
Return path functionality	20	0	Once per CSTB
Return path technology ADSL	30	18	Once per CSTB
Return path technology DOCSIS 2.0	30	18	Once per CSTB
Return path technology VDSL	40	40	Once per CSTB
Return path technology DOCSIS 3.0 (first 4 channel)	50	25	Once per CSTB
Return path technology DOCSIS 3.0 (for each 4 additional channels)	10	5	Per 4 bonded channels
Multi-decode	25	0	Once per CSTB
Multi-encoding ⁵	10	0	Per encoder
Multi-display ⁶	6	0	Once per CSTB
In-home Network	15	12	
In-home Networking access point-router	30	15	Once per CSTB
Telephony / VOIP	5	4	Once per CSTB
Smart home services		TBD	

² 1080p50 or above

³ Mutually exclusive with Full High Definition

⁴ For this limit to be claimed, the recording capability must be greater than 30 minutes.

⁵ This limit may only be used for Equipment that can provide independent content. e.g. to more than one display device such as TV, portable media player in a different encoding format to the incoming information.

⁶ This limit may only be used for Equipment that can provide independent content to 3 or more display devices, e.g. TV, portable media player.

MIMO Wi-Fi: 2.4 GHz ⁷	3	3	per spatial stream
MIMO Wi-Fi: 5 GHz ⁸	10	8	per spatial stream
Powerline	10	10	Once per equipment
Community Wi-Fi ⁹	3	3	per spatial stream
Blu-Ray or DVD player		TBD	

⁷ This limit applies in addition to the In-home Networking limit. It can be taken in addition to the MIMO 5GHz limit for concurrent solutions only. Switchable 2.4 or 5GHz solutions can only claim either the 2.4 or the 5GHz limit.

⁸ This limit applies in addition to the In-home Networking limit and can be taken in addition to the MIMO 2.4GHz limit for concurrent solutions only. Switchable 2.4 or 5GHz solutions can only claim either the 2.4 or the 5GHz limit.

⁹ This limit is in addition to the In-home Networking limit and the MIMO limits and recognises the additional power consumed, as the CSTB cannot fully enter standby when providing Community Wi-Fi services.

ANNEX E - Test Procedure

E.1 Overview

All CSTB Manufacturer, Service Provider and audit testing shall be carried out as specified below.

- a) This section defines an independent test process to determine the power consumption of a CSTB under various standardised operating conditions designed to emulate average 'real world' viewing habits. All testing shall be carried out in controlled repeatable conditions, as specified below. The general conditions of test are described in IEC 62301 (Household electrical appliances – Measurement of standby power).
- b) 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).
- c) 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, where possible, 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.
- d) The compliance testing shall be carried out on one random sample product. If the product exceeds the limits, then that model does not comply with this Voluntary Agreement. If the product passes with a margin of less than 10% then 2 further random samples shall be taken, if both of these pass then the product complies, if any one exceeds the limits then the product does not comply.
- e) Where the energy consumption can be influenced by the end user, then all measurements shall be made using the default (as shipped) settings from the manufacturer or the default settings at first install in a consumer's premises.
- f) When testing, the audio/video content shall have a high bit rate, typically a sports or film channel.
- g) Where the limit for Full High Definition, Ultra High Definition or 3DTV processing is claimed then the EUT shall input, decode and output at the highest resolution claimed.
- h) Where a limit for the Return Path is claimed then the EUT must be operated to the highest version of the Return Path technology for which a limit is claimed.
- i) Where the limit for High Efficiency Video Processing is taken, then at least 1 test stream shall be encoded with that technology.
- j) Where the limit for Advanced Graphics Processing is taken then one channel shall display an image utilising AGP.
- k) Where the limit for multi-Decode is claimed then the EUT shall output at least 2 different streams either to two display devices or as Picture in Picture.
- l) Where the limit for multi-encode is claimed then the EUT shall output at least one stream to an external device encoded in a different format to the incoming stream, e.g. HEVC in AVC out.
- m) Where the limit for Multi-Display is claimed then at least-two additional display devices shall be connected to the EUT when performing the test methods set out at Sections E3-E8 of this Annex E and the secondary display devices shall render different content than the primary display device being used for the test. The EUT shall provide content to the additional display devices for the duration of the test.

- n) Where a product can schedule a recording in any mode then for all tests a recording shall be scheduled for at least 2 hours after that test will be completed.
- o) Where the limit for In-Home Networking is claimed, then the network interface shall be used to transfer audio and video to or from a single Client or Host. The in-home network interface shall be selected in the following order

Connection Protocol
Wi-Fi 5GHz
Wi-Fi 2.4GHz
MoCA
HPNA
Powerline
Ethernet
Other

- p) Where the limit for In-Home Networking Access Point Router is claimed, Router functionality shall be enabled, and a minimum of one link established, it is not necessary to transfer data over the link.
- q) Where the Telephony allowance is claimed the EUT shall have at least 1 telephone connected to each port type (VOIP, POTS). The phones shall be on-hook and shall not make or receive calls for the duration of the tests.
- r) The results of the testing shall be documented, including the model tested, the serial number of the EUT and the software version numbers.

E.2 Basic test requirements

The general conditions of test are described below.

Test Conditions	Value
Ambient temperature	23 ± 5 °C
Air speed close to the unit	≤ 0.5 m/s
Supply voltage	230V ± 1% 50 Hz ± 1%
Supply voltage waveform	Total harmonic content ≤ 2% Crest factor between 1.34 and 1.49
Power measurement accuracy:	
Power level ≥ 0.5W	Uncertainty ≤ 2% at the 95% confidence level
Power level ≤ 0.5W	Uncertainty ≤ 0.01 W at the 95% confidence level
Instrument resolution:	
Power ≤ 10 W	Resolution ≥ 0.01 W
Power 10 ≤ 100 W	Resolution ≥ 0.1 W

Table 3 - Main requirements

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

E.3 Test Method for Standby (P_{Standby} , user initiated)

- a) The EUT shall be put into its "on" mode.
- b) After 5 minutes in this mode, the standby or off button on the remote control shall be pressed.
- c) The EUT shall then be left for a maximum of 30 minutes for any housekeeping activities to complete.
- d) At the end of the 30 minutes or completion of housekeeping activities (whichever is shorter) the average energy shall be measured for a period of 5 minutes. Based on this 5-minute measurement the standby part of the TEC shall be calculated.
- e) If the EUT has an automatic standby cycle where automatic wake up from a low power mode is used periodically to receive updates then the test cycle duration shall be amended to 1 complete cycle (e.g. 30 minutes passive standby and 5 minutes active standby, test cycle 35 minutes total) the standby part of the TEC shall be calculated based on 1 complete cycle.
- f) If the EUT has a variable power usage of another type during standby, the average energy shall be measured (and calculated if appropriate) over the "Daily time duration in this mode" specified in table 1. Periods of active content download (e.g. nightly maintenance wake up) that may take place during this time shall not be considered. E.g. if the EUT has both light sleep and deep sleep, then the power shall be measured in both modes and the total standby consumption measured or calculated from the time in standby, until automatically switching to deep sleep and the remaining time in deep sleep.
- g) 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 as sections E3a-f. If the results are different then the higher value shall be used.
- h) If the EUT is fitted with a manual switch on a rear face, then that switch shall be disregarded.
- i) Based on this measurement the User initiated standby part of the TEC shall be calculated.

E.4 Test Method for Auto Power Down (P_{APD} , EUT initiated)

- a) The EUT shall be connected to, and displaying a Standard Definition stream.
- b) The EUT shall be left until the auto power down takes place.
- c) The EUT shall then be left for a maximum of 30 minutes or for any housekeeping activities (whichever is shorter) to complete. At the end of the 30 minutes or housekeeping activities the average energy shall be measured in accordance with section E3 above. If the EUT has a variable power usage of another type during standby, the average energy shall be measured (and calculated if appropriate) over the "Daily time duration in this mode" specified in table 1. Periods of active content download (e.g. nightly maintenance wake up) that may take place during this time shall not be considered. E.g. if the EUT has both light sleep and deep sleep, then the power shall be measured in both modes and the total standby consumption measured or calculated from the time in standby, until automatically switching to deep sleep and the remaining time in deep sleep.
- d) Based on this measurement the APD part of the TEC shall be calculated.

E.5 Test method for “on” mode for non-DVR

- a) The EUT shall be connected to, and displaying a stream of the highest resolution for which a limit is claimed, using HEVC (if claimed) and 3DTV if applicable.
- b) The EUT shall then be left for a maximum of 30 minutes or until the EUT has stabilised.
- c) The average energy shall then be measured for a period of 5 minutes.
- d) Based on this 5-minute measurement the “on” mode part of the TEC shall be calculated.

E.6 Test method for “on” mode DVR

- a) The EUT shall be connected to and displaying a stream of the highest resolution for which a limit is claimed.
- b) The EUT shall then be left for a maximum of 30 minutes or until the EUT has stabilised.
- c) The EUT shall then be set to view 1 channel at the highest resolution for which a limit is claimed, whilst a second channel is recorded. For the purposes of this test where there is more than 1 tuner, the displayed channel and the recorded channel shall have different content.
- d) The average energy shall then be measured for a period of 5 minutes.
- e) Based on this 5-minute measurement the “on” mode part of the TEC shall be calculated.

E.7 Test method for “on” mode for In-Home Networking Access Point - Router

- a) The EUT shall be connected to and displaying a stream of the highest resolution for which a limit is claimed.
- b) The EUT shall then be left for a maximum of 30 minutes or until the EUT has stabilised.
- c) A second channel shall be outputted to a display device or Client via an In-home Networking Interface, selected in the priority order specified below. Where the Multi-display allowance is claimed the In-home Network shall output independent content to each connected device

Connection Protocol
Wi-Fi
MoCA
HPNA
Powerline
Ethernet
Other

ANNEX F – Non-Energy Requirements

The following annex defines the non-energy environmental requirements and the respective verification that Signatories' CSTBs shall comply with in addition to the legal obligations in the applicable EU Directives and regulations and to the energy limits in ANNEX D. These requirements are based on a sub-set of the requirements in IEEE1680.6.

Suitable evidence of compliance shall be presented to the Independent Inspector on request.

When a Signatory company is selected for audit of non-energy requirements in this section the Independent Inspector may select up to 2 different models for verification. Notification of the models selected shall be given to the Signatory which then shall provide the specified evidence within 2 weeks (for manufacturers) or 3 weeks (for Service Providers, which may need to refer back to a manufacturer for data.)

Note unless specifically detailed in the sections below the requirements in this Annex apply only to the CSTB, they do not apply to external cables or remote controls

Note it is not expected that all the data for every model is held by Signatories 'just in case' it is requested by the auditor, it is acceptable for a Signatory to collect data only when requested, providing it can be obtained within the specified timescale.

Signatories are expected to have sufficient design or purchasing controls in place to ensure that products will comply even if evidence is not requested.

F.1 Short Chain Chlorinated Paraffins

CSTBs shall not contain any intentionally added Short Chain Chlorinated Paraffins in paints, coatings, plastics, rubbers and seals (limit 0.1% by weight of affected part) SCCPs are defined as 10-13 carbon atoms minimum 48% chlorine by weight, unless it can be shown that the SCCP above the limit is due to the use of recycled material content.

Verification criteria – Analytical test data indicating compliance OR documentation from the component manufacturer showing compliance.

F.2 Flame retardants.

Plastic parts greater than 25g, shall be free from flame retardants that are classified as dangerous substances under EC1272/2008, dangerous substances are typically identified in parts where the material safety data sheet has an 'R' category (includes a dangerous substance).

Verification criteria –Documentation from the component or material manufacturer showing compliance, copy of MSDS data sheet for the material or analytical test data.

F.3 Brominated and chlorinated flame retardants

External plastic casings of greater than 25g shall contain no more than 0.1% by weight of bromine and 0.1% by weight of chlorine attributable to brominated flame retardants and chlorinated flame retardants excluding parts containing 25% or more post-consumer recycled content, also excluding plastic casings of external power supplies, also excluding brominated or chlorinated substances that are not classified as BFRs or CFRs, but the use of these substances shall be documented if they exceed the threshold level. This requirement does not apply to external Power Supplies

Verification criteria –Documentation from the component or material manufacturer showing compliance or analytical test data.

F.4 PVC

PVC shall not be intentionally added to plastic parts in CSTBs. This requirement excludes PVC insulation in cables.

Verification criteria –Documentation from the component or material manufacturer showing compliance.

F.5 **Post-consumer recycled plastic content**

Manufacturer declares minimum percentage of postconsumer recycled plastic content, calculated as a percentage of total plastic (by weight) in each product.

The following may be excluded from the calculation of percentage: printed circuit boards, labels, cables, connectors, electronic components, optical components, electrostatic discharge (ESD) components, electromagnetic interference (EMI) components, and bio based plastic material.

Verification criteria –Declaration from the manufacturer showing the post-consumer recycled plastic content as a percentage of the total applicable plastic weight.

F.6 **Bio-based plastic content**

Manufacturer declares minimum percentage of bio-based plastic content, calculated as a percentage of total plastic (by weight) in each product.

The following may be excluded from the calculation of percentage: printed circuit boards, labels, cables, connectors, electronic components, optical components, electrostatic discharge (ESD) components, electromagnetic interference (EMI) components, and post-consumer recycled plastic material.

Verification criteria – Declaration from the manufacturer showing the bio-plastic content as a percentage of the total applicable plastic weight.

F.7 **Ease of disassembly**

Products shall be designed so that authorised service centres and recyclers can easily access: (a) materials with special handling needs at end of life; (b) material, components and subassemblies that could potentially be reused; and (c) components and subassemblies that may need removal for repair or replacement. Ease of access shall include the following:

- External enclosures, chassis, and electronic subassemblies shall be removable with commonly available tools or by hand unless in contradiction with safety standards.
- Product shall utilize commonly used fasteners for joining components, subassemblies, chassis and enclosures; an exception shall be provided for special fasteners needed for safety and/or anti-theft reasons.
- The variety of types of fastener shall be kept to a minimum so only a single tool or limited number of tools are needed for disassembly.
- Non-separable connections (e.g., glued, welded) between different materials shall be avoided unless they are compatible for recycling or technically or legally required or utilized for safety purposes or in an anti-theft application.
- Whole external power supplies shall be removable with commonly available tools or by hand but are not required to be further able to be disassembled.
- Parts requiring special handling at the end of life (e.g. batteries) shall be designed to be easily removable with commonly available tools before mechanical processing.

Verification criteria – Declaration from the manufacturer including details of any parts requiring pre-treatment and justification for any non-separable connections and special fasteners. A video demonstrating the disassembly process or a calculation in accordance with EN45554 may be provided.

F.8 **Plastics compatible with recycling**

Each plastic part of greater than 25g shall consist of only one recyclable plastic type or types that are compatible for recycling.

- Printed circuit boards, labels, cables, connectors, electronic components and optical

components are excluded from this requirement.

- In addition, these plastic parts shall not contain adhesives, coatings paints, finishes or pigments associated with surface coatings that are not compatible with reuse or recycling.
- Plastic parts above 25g shall be marked with the universal recycling symbol and the resin identification code in accordance with 94/62/EC.

Verification criteria – Declaration from the manufacturer including details of any parts and justification for any parts not compatible with this section.

F.9 **Product upgradeability**

Products shall include means by which their functionality may be extended, this may include software upgrades or hardware interfaces, e.g. USB, eSATA, etc., for the connection of ancillary devices, e.g. HDDs, WLAN, WPAN, etc. In the case of software upgrades, this would usually be done remotely by the Service Provider or, if the conditional access system permits, locally by means of a USB port or similar.

Manufacturers shall make available to service organisations authorised by the CSTB Manufacturer and Service Provider, information to enable products to be upgraded to prolong the product's useful life

Note: An internal hardware change to products, e.g. expansion of internal storage or any change made because a component(s) have reached their EOL, is often sufficient cause for the product variation to be declared a new product. If the nature of the hardware changes to the product that require it to undergo new regulatory compliance certification, then the product would either be declared a new product or identified as a version of an existing product.

Verification criteria – Declaration from the Signatory detailing the means a product can be upgraded and the upgrade process (e.g. over air software download, modular hardware replacement).

F.10 **Elimination of chlorine in packaging**

Elemental chlorine shall not be used as a bleaching agent in packaging material, unless specified by the customer.

Verification criteria – Declaration from the Signatory confirming chlorine is not used as a bleaching agent.

F.11 **Separable packaging materials.**

Unless there is a technical, legal or contractual requirement, dissimilar packaging materials shall not be bonded together (e.g. plastic to cardboard).

Verification criteria – Visual inspection of the packaging with Declaration from the Signatory if an exemption is claimed.

F.12 **Plastics in packaging**

All plastic parts weighing more than 10g or with a surface area of less than 25cm² shall be identified by the universal recycling symbol and the resin identification code in accordance with ISO11469, unless it is not technically feasible to apply the mark.

Verification criteria – Visual inspection of the packaging with Declaration from the Signatory if an exemption is claimed.

ANNEX G – General Definitions

- G.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.
- G.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.
- G.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.
- G.4 “Conditional Access Provider” means a company that supplies the encryption, decryption, and authorization techniques employed to protect content from unauthorized viewing.
- G.5 “Complex Set Top Box” (CSTB) means a device defined as a CSTB within Annex B and which is placed on the Internal Market to a Service Provider for the first time on or after the Effective Date or purchased by a Service Provider in the Internal Market for the first time on or after the Effective Date.
- G.6 “CSTB Manufacturer” means the company that uses a component or components made by a 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.
- G.7 “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
- G.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
- G.9 “Effective Date” means the 1st of July 2016.
- G.10 “Equipment Under Test” or “EUT” means the equipment being tested.
- G.11 “IEC” means the International Electrotechnical Commission.
- G.12 “Independent Inspector” means the independent third party designated by the Steering Committee (on behalf of all Signatories) that is tasked with, and responsible for, the collection and processing of information supplied by Signatories and determining a Signatory’s compliance with the Voluntary Agreement. 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.
- G.13 “Internal Market” means the internal market as defined in the Treaty on the Functioning of the European Union.
- G.14 “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 2 of the Voluntary Agreement), but it may only declare itself to have one Main Activity for the purposes of this Voluntary Agreement.
- G.15 “Member States” means the member states of the EU.

- G.16 “Quorum” means two thirds of the Signatories being present at a meeting.
- G.17 “Reporting Period” means the period within which the required information is to be submitted by a Signatory.
- G.18 “Service Provider” means an entity that provides video (and possibly other) content to subscribers with whom it has an ongoing contractual relationship including control of billing that is delivered through a cable, satellite, terrestrial or telecommunications network owned and managed by that entity. A Service Provider in the context of the Voluntary Agreement is one that supplies its own or uses other OEM CSTBs and has a managed relationship with the subscriber.
- G.19 “Set Top Box” refers to a Simple Set Top Box or a Complex Set Top Box as defined herein.
- G.20 “Signatories” means those companies or industry participants that sign this Voluntary Agreement, which shall include (but not be limited to) CSTB Manufacturers, Software Providers, Conditional Access Providers, Component Manufacturers and Service Providers.
- G.21 “Signature Date” means the date on which a company makes its commitment to this Voluntary Agreement and becomes a Signatory of this Voluntary Agreement.
- G.22 “Simple Set Top Box” 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.¹⁰ 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.
- G.23 “Software Provider” means a company that is responsible for producing the middleware and/or the operational software for the CSTB.
- G.24 “Steering Committee” means the co-ordinating and governing body of this Voluntary Agreement, appointed in accordance with the principles set out in Section 10.
- G.25 “Total Energy Consumption” or “TEC” means an assessment tool that provides flexibility to approach the issue of energy efficiency while retaining a comparable metric to assess performance. 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.
- G.26 “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” are 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.

¹⁰ See <http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32009R0107&from=en> for Simple STB regulation.

ANNEX H – Reporting Pro-Forma

See cstb.eu for the current reporting template.

ANNEX J – 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
(CSTB Manufacturer, Service Provider, Component Manufacturer,
Conditional Access Provider, or Software Provider)

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

For each Reporting Period, each CSTB Manufacturer Signatory will provide information to the Independent Inspector for each type of CSTB sold, and each Service Provider Signatory will provide information to the Independent Inspector for each type of CSTB purchased within the EU, in accordance with this Voluntary Industry Agreement.

Signatory agrees to this Signing Form being shared with Member States' representatives involved with regulation under the Ecodesign Directive 2009/125/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:
william.skeates@sky.uk