



Report of the Independent Inspector

to the VA on CSTBs – 8th Reporting Period 2017-2018

Prepared for:

Technology Sectoral Governance INPO

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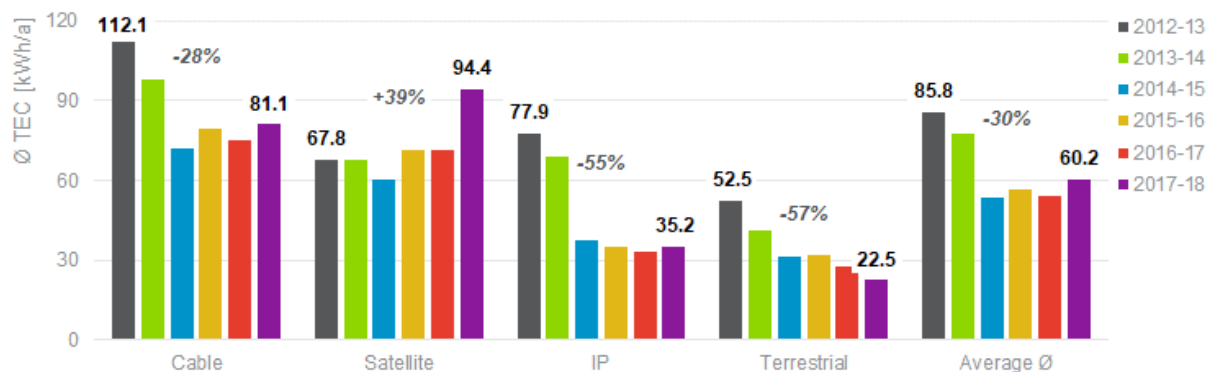
EXECUTIVE SUMMARY

Since 2010, the signatories to the *Voluntary Industry Agreement (VA) to improve the energy consumption of Complex Set Top Boxes (CSTBs) within the EU* continuously decreased the total energy consumption (TEC) of their distributed CSTBs despite the implementation of additional innovative but energy consuming features. In this eighth reporting period 2017-2018 (P8), however, this trend of further TEC reductions was broken for the first time. This report examines the historic development of the fragmented yet dynamic CSTB market in light of the VA. The following paragraphs provide details on how the signatories and their CSTBs perform today against the requirements of VA version 6.0 (VA 6).¹

In P8, one manufacturer and two ‘other signatories’ left the VA. Negotiations with non-signatories led to Sagemcom re-joining the VA after leaving in P7. Further talks with other companies continue at the closing date of this report. The 14 manufacturers and service providers participating in the VA reported sales and procurements (transactions) of 25.6 million CSTBs in P8. The potential double count of products ranges from 1.3 million to 3.5 million devices. Thus, the signatories’ market share among the approximately 300 companies servicing the EU CSTB market ranged from approximately 78% to 92%.

Despite the implementation of new functionalities that potentially require additional energy, signatories managed to reduce the average TEC by up to 57% (Terrestrial), see Figure 1. Satellite CSTBs showed a different trend, with an increased consumption of +39%, however starting from a below average level.

Figure 1. Historic Development of Average TEC per Base Functionality (Scope 2)



Source: Navigant

Overall, nine signatories complied completely with VA 6, Tier 3 requirements in P8. Four signatories reported transactions that did not comply with the VA. One signatory did not meet the compliance margin of at least 90% and therefore is non-compliant to VA 6. With 99.6% compliant transactions in total, the signatories achieved the highest rate since the 2012-2013 period.

Table 1. Compliance to VA 6 (Scope 1; N = 14 Signatories)

Main Obligation	Number of Signatories with Products Non-Compliant	Compliance Rate
Articles 4.2, 4.3 (TEC limitations)	4	99.6%
Articles A.3, A.4 (APD requirement)	0	100.0%
Overall	1	99.6%

Source: Navigant

¹ Technology Sectoral Governance INPO, 2018

The inspector selected two model types from Telekom Deutschland for testing compliance testing (Media Receiver 201, Media Receiver 401 Typ B). Despite the samples have been tested with less favourable stand-by modes than applied for the signatories' own testing, the resulting TEC remained 57% - 66% below the products' respective allowances. The default APD-time is 4 hours and cannot be changed by the user. Both model types are found compliant as the result of the compliance testing.

CSTBs spend most of their service time in standby-mode. Since non-compliant products show minor reductions of the energy consumption in standby-mode than compliant models, the inspector recommends for signatories to decrease standby-power and so improve the overall energy efficiency of their CSTBs.

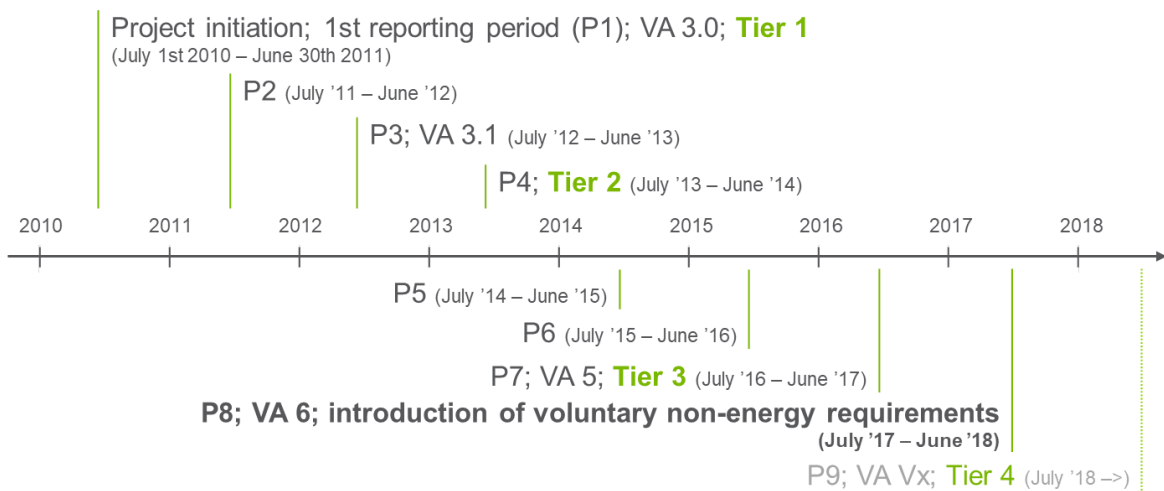
1. INTRODUCTION

1.1 Background

The *Voluntary Industry Agreement to improve the energy consumption of Complex Set Top Boxes within the EU* became first effective on July 1, 2010 with *version 3.0 (VA 3.0)*. Since then, the VA has gone through several amendments. It 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.”² National eco-labels like the German Blauer Engel³ reference their award criteria directly to the VA.

An Independent Inspector (the inspector) is assigned annually to inspect and report on the compliance to the VA’s requirements. Ecofys, which became part of Navigant in 2016, was selected for this role for the first reporting period and has been reselected thereafter. The historic development since project initiation, i.e., the introduction of new VA versions and the coming-to-force of advanced requirements ever since, is outlined in Figure 1-1.

Figure 1-1. Timeline from Project Initiation to Current Reporting Period Including Coming-Into-Force of New VA Versions and Advanced Requirements



Source: Navigant

The *Report of the Independent Inspector to the Voluntary Agreement on Complex Set Top Boxes* is commissioned by the VA steering committee and will be made available to the European Commission and Ecodesign stakeholders, e.g. members of the Consultation Forum established under Article 18 of the Ecodesign Directive.⁴ All reports are available for download at <http://cstb.eu>. Each report covers CSTB sales and purchases in a period of 12 months between July 1 and June 30 of the next year.

The findings of the inspector are based on:

1. Confidential data received by the signatories in their reports
2. Queries to selected signatories and the chair
3. Compliance testing of one signatory’s products by an independent testing laboratory

² Technology Sectoral Governance INPO, 2018, Introduction

³ RAL gGmbH, 2017, section 3.2

⁴ European Parliament and the Council of the European Union 2009

The contents of this report are as follows:

- Section 1 provides an update on the historic background of the VA and changes with VA 6.
- Section 2 explains the process of monitoring and inspection and outlines the data collection and processing methodology.
- Section 3 presents the findings and draws recommendations for the further development of the VA.
- The Appendices provide the data that was requested and received from the signatories.

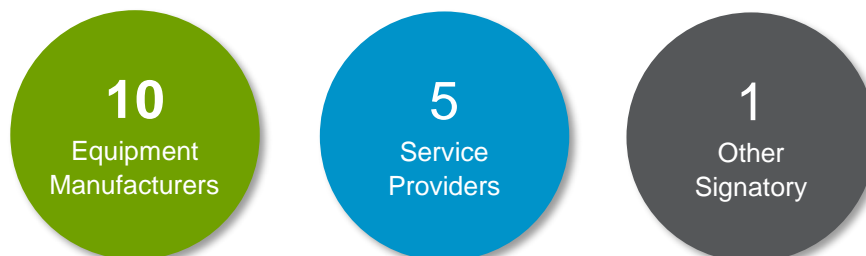
1.2 8th Reporting Period 2017-2018

For this eighth report, the inspector oversees compliance to version 6.0 of the VA (VA 6).⁵ This version became public on April 2, 2018. In the 8th reporting period (P8), Tier 3 requirements were effective. VA 6 introduced voluntary non-energy requirements which are to become mandatory in the 10th reporting period 2019-2020.⁶

Within P8, 16 signatories participated in the VA, see Table 1-1. *Sagemcom* rejoined while *Proximus*, *Intel* and *ST Microelectronics* left.

Table 1-1. Table of Signatories

#	Company	Main Activity
1	Advanced Digital Broadcast S.A.	Equipment manufacturer
2	Amino Communications Ltd	Equipment manufacturer
3	ARRIS	Equipment manufacturer
4	Humax Digital	Equipment manufacturer
5	Kaon Media	Equipment manufacturer
6	Sagemcom	Equipment manufacturer
7	Samsung	Equipment manufacturer
8	Sky Deutschland Fernsehen GmbH & Co.	Service provider
9	Sky Italia Srl	Service provider
10	Sky UK	Service provider
11	SmarDTV	Equipment manufacturer
12	Tatung Technology Inc	Equipment manufacturer
13	Technicolor	Equipment manufacturer
14	Telekom Deutschland GmbH	Service provider
15	Texas Instruments	Component manufacturer
16	Viasat Satellite Services AB	Service provider



Source: Chair of the VA

⁵ Technology Sectoral Governance INPO, 2018

⁶ Email communication with Chair of the VA, January 2019.

VA 6 includes further amendments for Tier 4 allowances which became effective in July 2018 (P9). Compared to VA 5, VA 6 brought increased base functionality allowances for cable, satellite, and terrestrial Complex Set Top Boxes (CSTBs). However, allowances for 14 additional functionalities were reduced or totally dismissed. The rationale was to diminish the oversized stacked allowances for CSTBs that have numerous additional functionalities. The inspector conducted an exploratory analysis using P8 sales, which revealed that the average sales weighted total allowance per CSTB decreased by 40% from 152 kWh/year to 90 kWh/year due to the amended Tier 4 allowances. This confirms the effect intended by the amendment. Appendix B includes a table that displays Tier 3 allowances, Tier 4 allowances as updated with VA 6, and the difference between both Tiers.

With VA 6 article A.10, obligations to provide customers with environmental information were re-implemented. Furthermore, VA 6 introduced 12 preliminarily non-binding non-energy requirements and respective verification criteria. These requirements cover production and packaging materials, and the application of sustainable design principles.

Table 1-2. VA6: Non-Energy Requirements

Article	Targeted Aspects
F.01	Short chain chlorinated paraffins
F.02	Flame retardants
F.03	Brominated and chlorinated flame retardants
F.04	PVC
F.05	Post-consumer recycled content percentage
F.06	Bio-based plastic content percentage
F.07	Ease of disassembly
F.08	Plastics compatible with recycling
F.09	Product upgradability
F.10	Chlorine in packaging
F.11	Separable packing materials
F.12	Plastics in packaging

Source: VA 6, Annex F

2. METHODOLOGY

2.1 Data Collection and Processing

Equipment manufacturers (manufacturers) and service providers were asked to fill a table-based reporting template that for P8 was adapted to aid the market coverage analysis. An additional sheet has been added to allow the voluntary assessment of non-energy requirements. Instructions on how to fill the reporting template were added to reduce clarification efforts. The target date for submitting these signatory reports to the inspector was set to September 30, 2018. This was one more month than usual to give more time for voluntarily compiling non-energy information. The queried information is provided in Appendix A of this report.

The signatory who is neither manufacturer nor service provider was asked to provide a statement that elaborates on two questions, as required by VA 6, article 6.1:⁷

- Which activities did your company carry out in the period July 2017-June 2018 to support the objectives of the VA?
- Which activities does your company plan to support the objectives of the VA?

The inspector confirmed the receipt of signatory reports or statements and requested clarification where required:

- Missing, incomplete or unclear information
- Confirmation on assumptions of the inspector
- Sales of non-compliant products

Reports of two signatories were seriously delayed as their known contact data were outdated, which only came to light when they did not respond to reminders for report submission. Once all signatories with reporting obligations, i.e., manufacturers and service providers, submitted their reports and all questions were clarified, the analysis began.

Excursus: Article 4.3

During the meeting of the steering committee (SC) on November 21, 2018, the attendees discussed the implications of article 4.3 on the service providers' reporting obligations. Article 4.3 states:

"Each Service provider signatory shall 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 shall ensure that at least 90% of all the products procured 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 the non-energy requirements in Annex F. Note: service providers shall target 100% compliance, but it is recognised in section 4 above that a maximum of 10% of products purchased may be non-compliant."

Source: VA 6, article 4.3

At least two interpretations of this article exist on what service providers shall report to the inspector:

- a) The number of CSTBs procured by service providers
- b) The number of CSTBs distributed (sold or loaned) by service providers to end-users.

The chair declared that VA 6 intends option a). Therefore, the inspector subsequently contacted the service providers for them to confirm they reported on procured CSTBs or else to submit a revised

⁷ VA 6, article 6.1: "Signatories who are neither Manufactures nor Service Providers shall submit an annual statement to the inspector detailing their activities that support the objectives of this agreement."

report. Following a constructive exchange on the exact meaning, four out of five service providers revised their reports.

Until the SC meeting, the inspector interpreted article 4.3 according to option b). Figures from previous periods may comprise of a mix of both options.

2.2 Compliance Testing

Two products of Telekom Deutschland were selected for the annual compliance testing.

- Media Receiver 201
- Media Receiver 401 Typ B

Telekom Deutschland and their products were randomly selected for compliance testing. At no time did the inspector have reason to doubt the statements or intentions of the signatory. All provisions taken by the inspector have the sole objective of getting a holistic understanding and maintaining impartiality.

Since the beginning of compliance testing, the inspector travelled to warehouses to take random samples directly from a local stock. This procedure becomes more and more complicated for all involved parties as signatories either produce products on demand or keep stock in external warehouses. External non-signatory parties expressed strong concerns against e.g. the inspector entering their premises and refer to security matters and problems with their automated processes. For the P8 testing, the inspector decided to follow a common order process but required a signed confirmation from the warehouse that the products submitted to the inspector for compliance testing were a) randomly selected, packed and shipped, b) without participation of employees of Telekom Deutschland, and c) had not been manipulated by any other person.

The inspector assigned the test laboratory Eurofins Digital testing (Eurofins) to conduct the compliance measurements following the provisions given in VA 6, Annex E. Thereafter, the inspector shared the test results with the signatory for commenting. The testing results are outlined in Section 3.6.

2.3 Reporting

VA 6, article 7 states which contents shall be included in the annual report as a minimum:

- The contact details of the 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

In addition to publishing this report with aggregated information, the inspector informed each signatory on their individual outcomes. All statistics in this report are based on signatories' data, if no other source is explicitly named.

3. RESULTS

3.1 Adjustments

The signatories reported total sales and procurements of 25.6 million devices in P8. Some products have been reported as sold by signatory manufacturers to signatory service providers which in turn reported these products as procured. This report accounts for the fact of potential double counts and considers three scopes.

- **Scope 1:** Sales and procurements are considered as reported by signatories (N = 25.6 million CSTBs).
- **Scope 2:** Where different signatories reported the sales of identical model types, manufacturer’s sales have been reduced by the amount of service providers’ procurements of the same model types (N = 24.2 million CSTBs).
- **Scope 3:** Where signatories reported products “*Supplied by [manufacturers] to signatory service provider or purchased from signatory [manufacturers],*” the larger total amount of all signatories per the two signatory types has been deducted from the total sales (N = 20.7 million CSTBs).

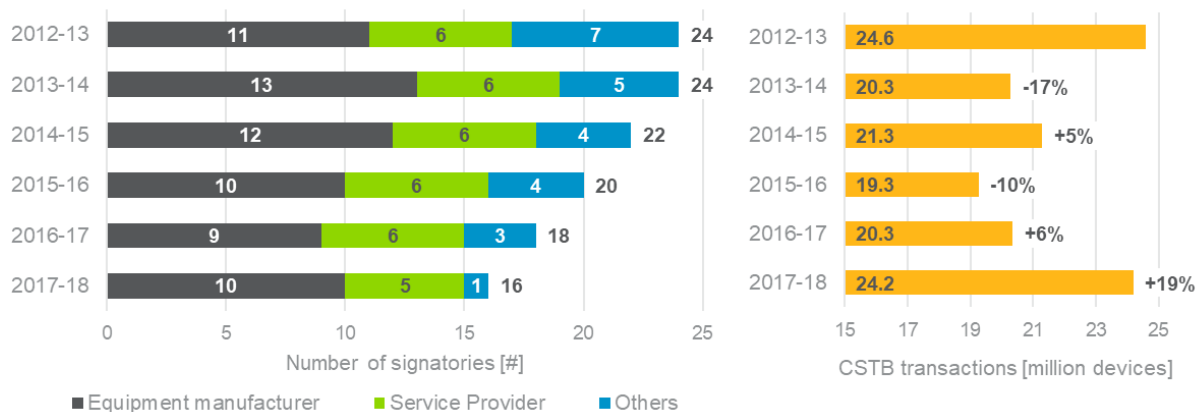
To improve the readability of this reports, the following text summarizes sales and procurements as transactions.

3.2 General Statistics

In this reporting period, 14 signatories with reporting obligations submitted reports including their transaction data. One signatory informed the inspector that they did not deploy any CSTBs in the EU during P8. Despite the extended due date and sending reminders, the inspector had received only six out of 14 signatory reports in time.

Figure 3-1 shows that the number of CSTBs covered by the VA grew in recent years by about 25% though the number of its signatories decreased from 20 to 16. Since there were hardly any means to identify double counts in the past, transaction figures from previous years probably are higher than real market placements. Therefore, the actual relative increase in the last 2 years is potentially higher than displayed.

Figure 3-1. Number of Signatories per Type (left) and Number of CSTBs Placed on the Internal Market (right, Scope 2) from 2012 to 2018

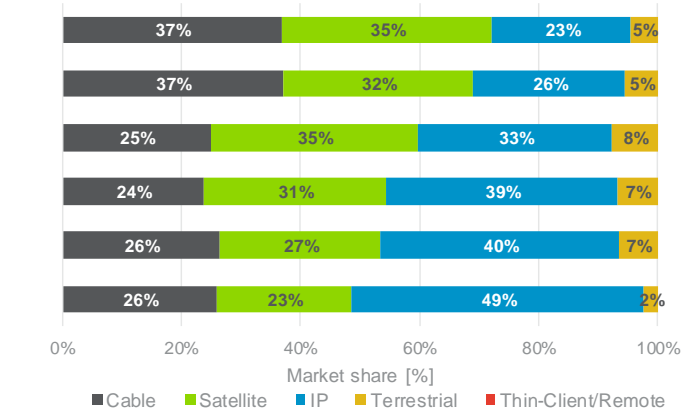


Source: Navigant

The CSTB market is dynamic, with new players emerging and companies merging or selling their CSTB departments. In its market coverage study, IHS Markit estimated over 50 manufacturers shipped into the EU market and over 250 significant service providers serviced it in 2017.⁸ This underlines the high level of fragmentation of the EU CSTB market. For the 15 signatories to the VA with reporting obligations,⁹ the study estimated transactions of 16 million CSTBs. These transactions accounted for an overall market share of 59% in 2017. For the period 2017-2018, the study projected an average overall market size of 26.4 million CSTBs.¹⁰ With the current transaction data, the inspector estimates that signatories achieved a market share between 78% (scope 3) and 92% (scope 2) in P8.

At the beginning of the VA, most sold CSTBs were cable-based (37%). Their share decreased over time whereas IP-devices currently make up for half of the CSTBs sold by signatories (49%, scope 2), see Figure 3-2. Sales of thin-client or remote-devices have been below 1% in P1 and ceased in the past 3 years.

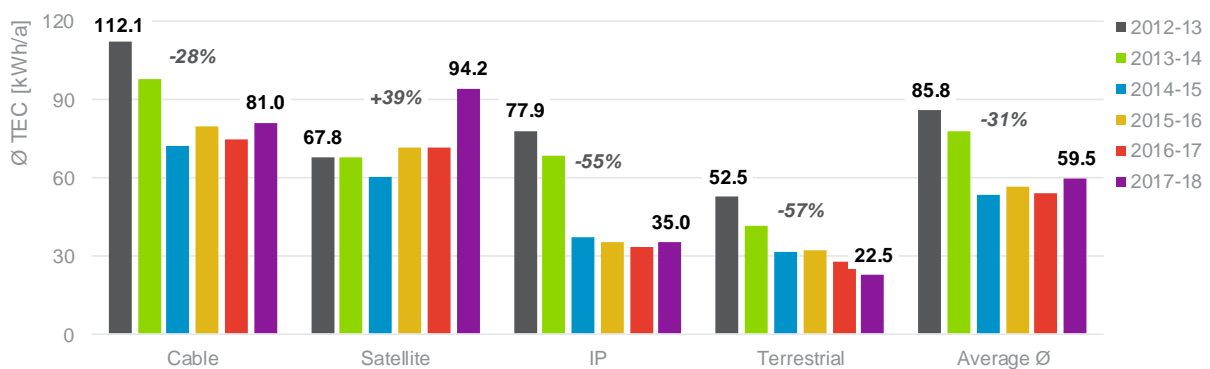
Figure 3-2. Market Shares per Base Functionality (2012-2018; Scope 2)



Source: Navigant

Over the course of the VA, signatories managed to reduce the total energy consumption (TEC)¹¹ of most of their products (see Figure 3-3). However, the TEC for cable, satellite, and IP-based CSTBs grew in P8. Only the energy efficiency of terrestrial CSTBs improved continuously. Whereas IP and terrestrial CSTBs still need less than 50% of their initial TEC, satellite devices consume 39% more energy today than in the past, although starting at a below-average level. This is partially due to a high number of additional functionalities, as Figure 3-4 indicates. A CSTB's total allowance is a good

Figure 3-3. Historic Development of Average TEC per Base Functionality (Scope 2)



Source: Navigant

indicator for its complexity as additional allowances for additional features stack. This effect is not

⁸ IHS Markit, 2017

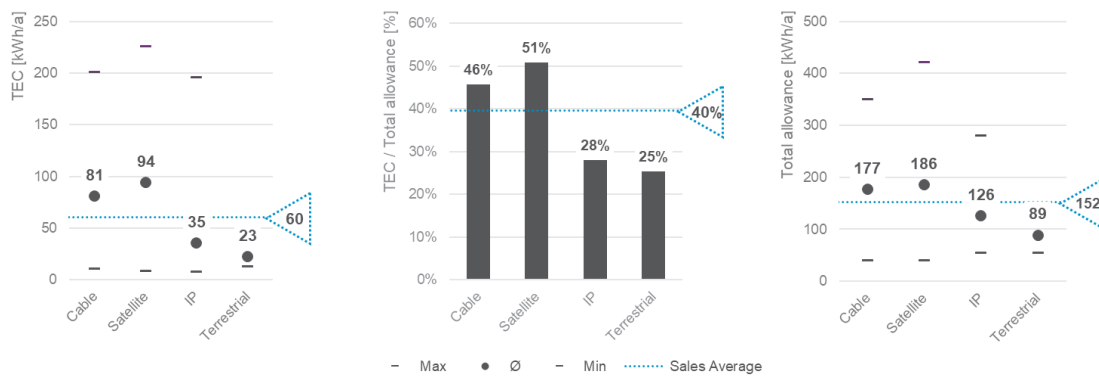
⁹ HIS Markit counted 20 signatories as of 10 November 2017. However, in fact 18 companies were member of the VA at this date.

¹⁰ IHS Markit projected total sales of 27.1 million CSTBs in full year 2017 and 25.8 million CSTBs in 2018. Since the VA defines periods from July 1 to June 30, the inspector considers the average of 26.4 million CSTBs.

¹¹ TEC calculation: $TEC [kWh/a] = 0.365 [1/a] * (4.5h * On-Power [W] + 15h * Standby-Power [W] + 4.5h * APD-Power [W])$; see VA 6, Annex C.

linear since different allowances per functionality apply as displayed in Table B-1. However, the effect works similarly for the different base functionalities as most allowances apply equally for all base functionalities. For most cases it is reasonable to say the lower the TEC-to-allowance ratio, the more energy efficient the product. Figure 3-4 shows that satellite-based CSTBs achieve the highest total allowances on average, the highest TEC and highest TEC-to-allowance ratio. IP-based CSTBs achieve by 32% lower allowances than satellite-based ones but require only one-third of their TEC, resulting in about half of the TEC-to-allowance ratio. The comparison indicates that there is large potential to improve the energy efficiency of satellite CSTBs which is the more important in the light of their increasing average TEC. This also applies for cable CSTBs.

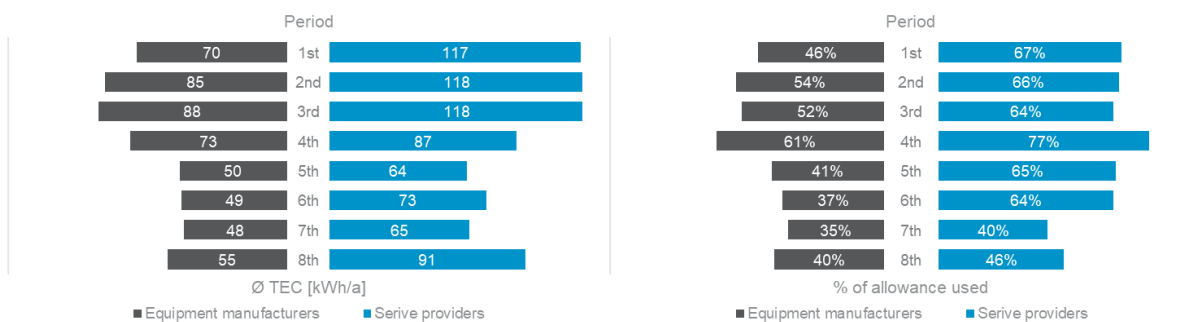
Figure 3-4. Average, Minimal and Maximal TEC (left), Total Allowance (right) and TEC to Allowance Ratio (middle) per Base Functionality in Period 2017-2018 (Scope 2)



Source: Navigant

Despite stricter limitations with each VA revision, both, CSTBs reported by manufacturers and service providers, require less than half of their eligible allowances today (see Figure 3-5). The figure reveals that manufacturers' CSTBs require 39% less energy than service providers' products.

Figure 3-5. Average TEC (left) and Total Allowance (right) per Signatory Type and Period (Scope 2)

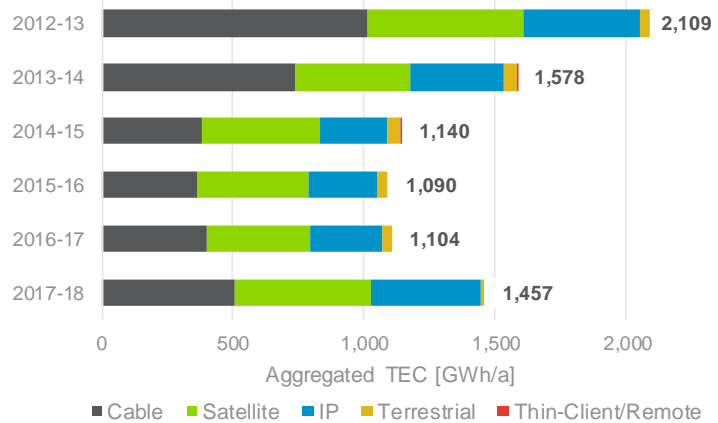


Source: Navigant

Note: 6.3 million products that have not been tested with final software were excluded from this chart.

The increased average TEC (+11%) and the rising CSTB transactions inherit a total TEC of 1,457 GWh/a (+32%) for the reported CSTBs of P8. This applies under the assumption that all reported CSTBs are also deployed in P8, which probably was not the case as not all products procured by service providers were shipped from their suppliers or distributed to end consumers in the same period.

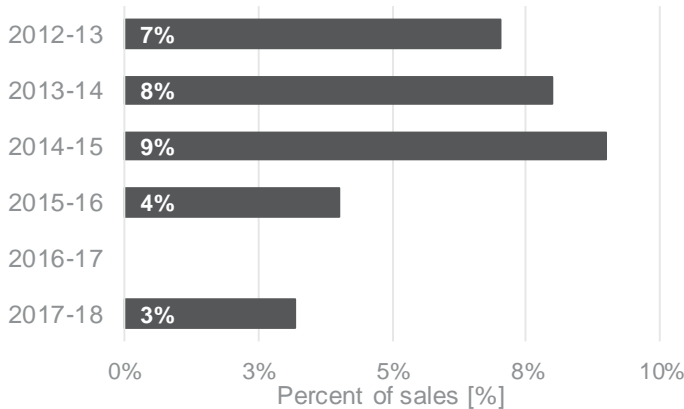
Figure 3-6. Theoretical Aggregated TEC of All CSTB transactions by Signatories per Period [GWh/a] (Scope 2)



Source: Navigant

VA 6, article A.6 allows signatories to disable new innovative functionalities during testing, for which no allowances are listed in the VA’s Annex D. No functionalities had been disabled according to the period 2016-2017 reporting. In the reports for P8, however, 3% of transactions were flagged (see Figure 3-6). The disabled feature was “Wake on Cast.”

Figure 3-7. Transaction Shares of Units with New Innovative Functionality Disabled during Testing [%] (Scope 1)



Innovative functionality disabled during testing in 2017-2018:

“Wake on Cast” support on android TV STB

Source: Navigant

3.3 Compliance

Manufacturers' and service providers' compliance to VA 6 during P8 was analysed with respect to two obligations:

- Articles 4.2, 4.3 (TEC limitations)¹²
- Articles A.3¹³, A.4¹⁴ (APD requirements)

As Table 3-1 summarizes, five signatories reported products for P8, which saw TECs exceed their allowances, and thus were non-compliant. One of these signatories did not reach the margin of 90%¹⁵ compliant products and is counted overall non-compliant to VA 6. This case has been reported to the chair. For the first time, all reported models provided an auto power down (APD) feature which runs after of no more than 4 hours by default.

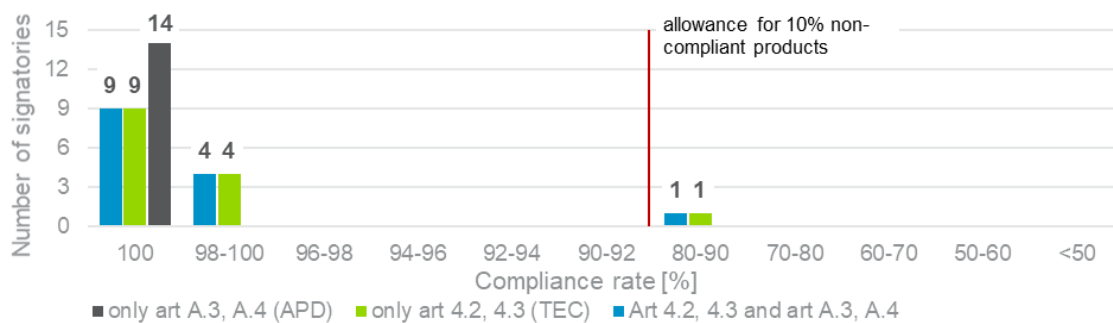
Table 3-1. Compliance to VA 6 (Scope 1; N = 14 Signatories)

Main Obligation	Number of Signatories with Products Non-Compliant	Compliance Rate
Articles 4.2, 4.3 (TEC limitations)	5	99.6%
Articles A.3, A.4 (APD requirement)	0	100.0%
Overall	1	99.6%

Source: Navigant

Figure 3-8 further depicts the shares of compliant sales per signatory. As already mentioned, five signatories sold non-compliant products. However, only one missed the 90% compliance margin since over 10% of their products exceeded the eligible TEC allowances. The remaining four signatories achieved compliance rates of above 98%. Nine signatories and their products complied 100% to VA 6.

Figure 3-8. Number of Signatories per Compliance Rate (Scope 1, N = 14 Signatories)



Source: Navigant

¹² VA 6, articles 4.2, 4.3: Equipment manufacturers and service providers shall “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”

¹³ VA 6, article A.3: “An Auto Power Down (APD) feature shall be provided and this shall be defaulted to “on” or “enabled” when installed by a service provider or shipped from a manufacturer.”

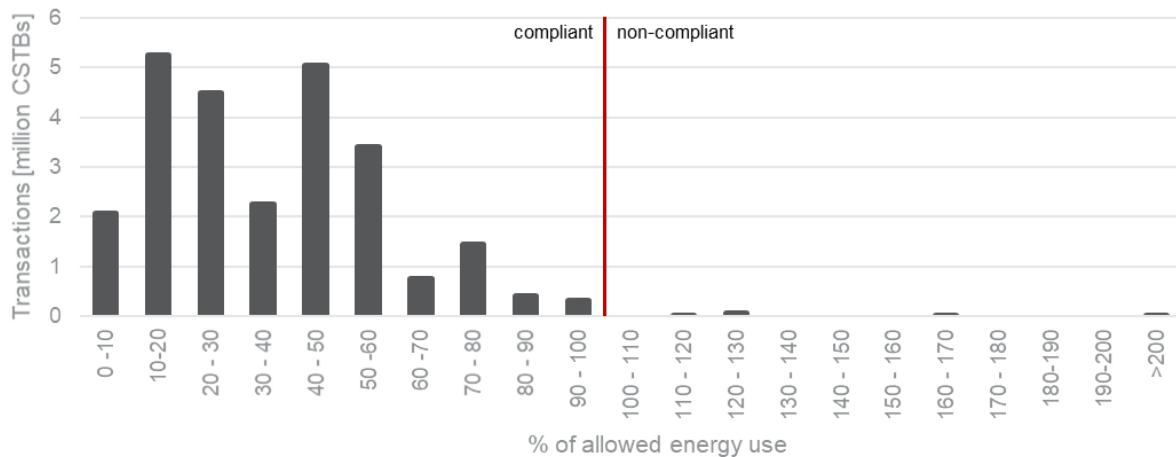
¹⁴ VA 6, article A.4: “The APD feature requires that the CSTB automatically switches itself into the lowest standby mode which the Service Provider deems to be appropriate, after a period of time in the On mode following the last user interaction. This period of time shall be set at a default of no more than 4 hours.”

¹⁵ VA 6, article 3: “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 of time. An allowance of 10% will be made for such product.”

The degree of how much energy CSTBs consume versus their allowance differed broadly in P8. Some products required less than 10% of the allowed energy, others required more than 200% of their allowance, as Figure 3-9 shows. On average today's CSTBs use 39% of their allowance. It was 30% in the previous period. This rise occurred despite the same Tier 3 allowances applied. Overall, 99.6% of the products remained within their limits which is the best compliance rate since 2012-2013. The reasons for transactions of non-compliant products were:

- Sell-out of legacy products from stock
- Decrease in functionality decreased TEC less than expected while allowance dropped
- Desire of customer for CSTBs to stay permanently in active standby

Figure 3-9. Transactions in Period 2017-2018 per Percentage of Allowed Energy Consumption (Scope 1)



Source: Navigant

Table 3-2 lists the compliance status per signatory. The overall compliance improved compared to P7. The non-compliant signatory achieved 86% compliance, which has been a significant improvement on the previous period but is below the 90% compliance margin. Therefore, they were overall non-compliant for the second period in a row but express strong commitment to the VA and expect to be compliant in the next reporting period.

Table 3-2. Compliance Status per Signatory

Company	Main activity	Compliance
Advanced Digital Broadcast S.A.	Equipment manufacturer	Compliant
Amino Communications Ltd	Equipment manufacturer	Compliant
ARRIS	Equipment manufacturer	Compliant
Humax Digital	Equipment manufacturer	Compliant
Kaon Media	Equipment manufacturer	Compliant
Sagemcom	Equipment manufacturer	Compliant
Samsung	Equipment manufacturer	Compliant >= 90% to article 4.2 Compliant to A.3
Sky Deutschland Fernsehen GmbH & Co.	Service provider	Compliant >= 90% to article 4.3 Compliant to A.4
Sky Italia Srl	Service provider	Compliant
Sky UK	Service provider	Compliant >= 90% to article 4.3 Compliant to A.4
SmarDTV	Equipment manufacturer	Compliant
Tatung Technology Inc	Equipment manufacturer	Compliant
Technicolor	Equipment manufacturer	Compliant >= 90% to article 4.2 Compliant to A.3
Telekom Deutschland GmbH	Service provider	Compliant

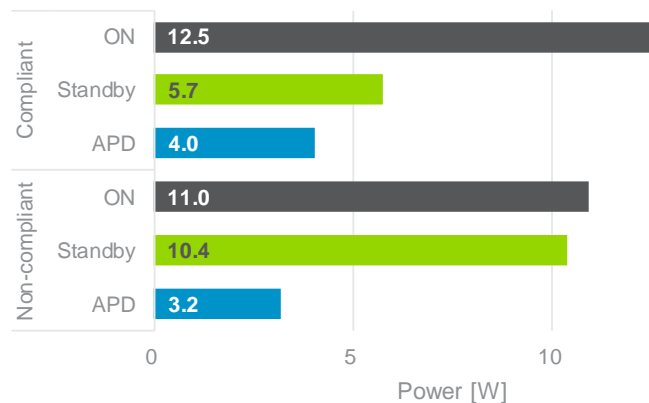
Company	Main activity	Compliance
Texas Instruments	Component manufacturer	No reporting obligation
Viasat Satellite Services AB	Service provider	Non-compliant to article 4.3 Compliant to A.4

- **Compliant:** 100% of products comply with VA 6, Tier 3 requirements
- **Compliant >=90%:** At least 90% of products comply with VA 6, Tier 3 requirements
- **Non-compliant:** Less than 90% of products comply with VA 6, Tier 3 requirements
- **No reporting obligation:** Signatory type other than equipment manufacturer or service provider

Source: Navigant

Figure 3-10 illustrates how compliant and non-compliant CSTBs differ in terms of the average energy consumption. ON-power and APD-power differ only by about 1 W (12.5 W vs. 11.0 W). However, non-compliant products require almost twice the energy (5.7 W vs. 10.4 W) of compliant models in standby. While compliant CSTBs on average reduce their energy consumption by half when switching to standby, non-compliant CSTBs only reduce their energy consumption by less than 1 W.

Figure 3-10. Average Power Consumption per Mode and Compliance Status (Scope 1)



Source: Navigant

3.4 Findings on Other Articles

3.4.1 Speculative Recording (Annex A.8)

Where no information on speculative recording was provided on the cover sheet of the signatory report, the inspector asked: “Did [signatory] sell any direct to retail devices with speculative recording in the reporting period (Annex A.8 of VA v.6)? If yes, please provide an answer for following questions:

- Is there a user-accessible menu option allowing the user to disable this feature at will?
- Are instructions provided for disabling speculative recording?”

Overall,

- Eleven signatories did not sell direct to retail devices.
- One manufacturer and one service provider responded that their respective devices provide a user-accessible menu option allowing the user to disable this feature at will. Instructions are described in the manual.
- One service provider responded that respective devices provide a user-accessible menu option allowing the user to disable this feature at will. However, the user has to call a service centre as the settings are accessible in a hidden service menu, which is not mentioned in the user manual.
- One service provider responded that respective devices do not provide a user-accessible menu option but disabling this feature is possible via the operator’s website or by calling a service centre.

3.4.2 Environmental Characteristics (Annex A.10)

VA 6 reintroduced requirements for the reporting of environmental information to end users. As in the past, the reporting template queried service providers for a “URL where environmental characteristics and performance of CSTB-types are reported.” If not available online, they were asked to state where the information for consumers can be found. All five service providers provided URLs.

- For three signatories, a search for the reported model types on the stated websites did not produce any results.
- For one signatory, the stated web-address was not available. A search on the signatory's website quickly delivered product-pages for the reported models but neither the pages themselves nor the content (e.g. manuals) downloadable from these sites included environmental metrics.
- One signatory referenced a website that displays some of the reported products and their energy consumption.

3.4.3 Non-Energy Aspects (Annex F)

The reporting upon non-energy requirements was optional in P8. Only one signatory reported such information and they complied 100% to VA 6, Annex F requirements.

3.5 Statement from Other Signatories (6.1)

VA 6, article 6.1 requires “Signatories who are neither Manufactures nor Service Providers [to] submit an annual statement to the inspector detailing their activities that support the objectives of this agreement.”

In P8, the remaining ‘other signatory’ continued releasing components with lower to ultra-low Iq and eco-mode operation. Such components enable higher efficiency of the power tree in these modes and potentially support progressing energy savings with newly introduced CSTBs. The signatory emphasized continuing to release more efficient products and their engagement in the VA group.

3.6 Compliance Testing

Two model types sold by Telekom Deutschland have been tested for compliance to VA 6:

- Media Receiver 201
- Media Receiver 401 Typ B

Two samples per model type have been tested. One additional device per model was shipped for the case of irregularities with the tested boxes but it was not necessary to test them, too.

The CSTBs provide three Stand-by modes. The user has to select one of them upon first initiation of stand-by: “Herunterfahren” (deep stand-by); “Stand-by” (active stand-by); “Ruhezustand” (networked Standby). The independent inspector chose to deploy the active stand-by during the recent measurements. According to the product manual,¹⁶ this is the most energy-intensive stand-by mode. Compliance in this mode also indicates compliance in the remaining stand-by modes. It also is the stand-by mode recommended by the device's context menu. In April 2018, the model MR 401 Typ B has been tested by TÜV Rheinland and based on these testings awarded with the German eco-label “Blauer Engel”. The testings of TÜV Rheinland deployed the device in deep stand-by.

¹⁶ Telekom Deutschland, 2018a, Telekom Deutschland, 2018b

Media Receiver 201

The compliance testing confirmed ($\pm 1\%$) the ON-power demand as reported by Telekom Deutschland in their signatory report. The measured stand-by power was as reported in the product manual ($\pm 1\%$). It was – as expected – significantly higher than in the signatory’s report, probably due to testing in the less-beneficial active stand-by. APD-power almost equalled stand-by power.

- The resulting TEC remains 66% below the allowance.
- Default APD-time is 4 hours and cannot be changed by the user

Therefore, the Media Receiver 201 complies with VA 6.

Media Receiver 401 Typ B

The compliance testing confirmed ($\pm 1\%$) the ON-power demand as reported by Telekom Deutschland in their signatory report. The measured stand-by power was as reported in the product manual ($\pm 1\%$). It was – as expected – significantly higher than in the signatory’s report, probably due to testing in the less-beneficial active stand-by. APD-power almost equalled stand-by power.

- The resulting TEC remains 58% below the allowance.
- Default APD-time is 4 hours and cannot be changed by the user

Therefore, the Media Receiver 401 Typ B complies with VA 6.

For both models, the ON-Power measured during the compliance testing and reported in the signatory reports was ~1W higher (10-14%) than claimed in the product manuals.¹⁶ Telekom Deutschland explained the initial measurement was taken with a so called *TestApp* and they “will improve the manual as soon as possible”. The measured stand-by power was as reported in the product manuals ($\pm 1\%$).

3.7 Outlook Tier 4

Tier 4 requirements became effective on July 1, 2018 and will be subject of next year’s report of the inspector. Table 3-3 displays the results of a BAU-scenario analysis where the 2017-2018 transactions were rated against VA 6, Tier 4 requirements. Whereas eight signatories are unlikely to have compliance issues or at least stay within the 90% compliance margin, four signatories may fail to reach this target with their current product characteristics.

Table 3-3. Compliance Outlook Based on 2017-2018 Transactions vs. VA 6, Tier 4 Requirements

Compliance/non-compliance	Number of signatories [#]	Transaction share [%]
Compliant $\geq 90\%$: at least 90% of products comply with VA6, Tier 4 requirements	8	66%
Non-compliant: Less than 90% of products comply with VA6, Tier 4 requirements	6	34%

3.8 Recommendations

The inspector recommends that the Steering Committee discusses and decides on follow-up actions regarding the following topics

- **Consider reviewing the TEC calculation formula.** Since all CSTBs now support APD, which by default will be active after 4 hours at the latest, it is questionable that the current formula considers 15 hours of standby before APD becomes active. However, reviewing this approach will also require the revision of allowances.

- **Decrease CSTBs power consumption in standby-mode.** Since CSTBs spend most time per day in stand-by or deep stand-by, decreasing their stand-by power consumption can lower their TEC over-proportionately compared to reductions of the ON-power.
- **Amend article 4.3 so service providers report on their CSTBs distributed to end consumers or implement further means to ensure TEC improvements of such products when deployed with service providers' software.** Different interpretations of article 4.3 exist, as outlined in Section 2.1. A clearer phrasing is required to ensure the VA's effectiveness on products distributed by service providers as the energy consumption of a CSTB as procured by a service provider may differ from its energy consumption as distributed to an end user. Only the latter materializes real in-use energy consumption. Thus, the inspector strongly recommends rephrasing article 4.3 as follows:

"Each Service provider signatory shall 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 shall ensure that at least 90% of all the products distributed (sold, loaned, etc.) 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 the non-energy requirements in Annex F. Note: service providers shall target 100% compliance, but it is recognised in section 4 above that a maximum of 10% of products distributed may be non-compliant."

To fact-base this recommendation, the inspector analysed the subset which was deducted in the beginning to determine scope 2, as noted in Section 3.1. These 1.5 million CSTBs relate to five model types which have been reported by manufacturers and service providers alike. All products reported by service providers achieve higher TEC values than the respective products reported by manufacturers. The surplus compared to manufacturer's models of the same type ranged from +2% to +339% (median: +235%).

3.9 Amendment to the Report of the Independent Inspector to the VA on CSTBs: 2016–2017

The previous *Report of the Independent Inspector*¹⁷ mistakenly listed Entropic Communications as a member to the VA, when they did not participate in period 2016-2017.

¹⁷ Surmeli-Anac and Kretschmer, 2018

4. REFERENCES

- 1 European Parliament and the Council of the European Union (2009): *Directive 2009/125/EC of the European parliament and of the council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (recast)*. In: Official Journal of the European Union, vol. 2009, no. L 285, pp. 10–35.
- 2 IHS Markit (2017): *Complex STB Market Penetration review: Voluntary Agreement on complex set-top box power consumption*.
- 3 RAL gGmbH (2017): *Blauer Engel. Das Umweltzeichen. Set-Top Boxen. DE-UZ 196*. Ausgabe Januar 2015. Version 3. Bonn.
- 4 Surmeli-Anac, Nesen; Kretschmer, David (2018): *Report of the Independent Inspector to the VA on CSTBs – 2016 - 2017*.
- 5 Technology Sectoral Governance INPO (2018): *Voluntary Industry Agreement to improve the energy consumption of Complex Set Top Boxes within the EU. Proposal from the industry group, Version 6.0*. Available online at <http://cstb.eu/>.
- 6 Telekom Deutschland (2018a): *Bedienungsanleitung. Media Receiver 201*. Bonn. Available online at <https://www.telekom.de/hilfe/downloads/bda-media-receiver-201.pdf>, accessed 1/21/2019.
- 7 Telekom Deutschland (2018b): *Bedienungsanleitung. Media Receiver 401*. Bonn. Available online at <https://www.telekom.de/hilfe/geraete-zubehoer/media-receiver/media-receiver-401/bedienungsanleitung-media-receiver-401-b>, accessed 1/21/2019.

APPENDIX A. SIGNATORY REPORTING

A.1 Manufacturers and Service Providers

Manufacturers and service providers received a table-based reporting template that queried the following information:

Table A-1. General Information Queried from Signatories

General information
Name of Signatory
Company registration number
Main activity
4.8:*
URL where environmental characteristics and performance of CSTB-types are reported:
If this is not available online, please state where information can be found:
A.8, for devices with speculative recording functionality:*
Is there a user-accessible menu option allowing the user to disable this feature at will?
Is there a disable function that can be applied upon user request (for example via the service provider call centre)?
Are instructions provided for disabling speculative recording?

Source: *VIA-reporting_template_v18.2.xlsx*

* *Service providers only*

The inspector investigated on article A.8 further via email, since the reporting template only requested this information from service providers while VA 6 states requirements for both service providers and manufacturers:

Did [Signatory] sell any Direct to retail devices with speculative recording in the reporting period (VA6, A.8)? If yes, please provide answer for following questions:

- a. Is there a user-accessible menu option allowing the user to disable this feature at will?*
- b. Are instructions provided for disabling speculative recording?*

Table A-2. Energy-Related Information Queried from Signatories

CSTB-Specific Information: Energy-Related Aspects	
Brand	Multi-Encode
Model Type	Multi-Display
Base Functionality	In-Home Network
Supplied by mfg to Signatory Service Provider or Purchased from Signatory mfg	Access Point Router
NEW Innovative Functionality Disabled?	Telephony VOIP
High Efficiency Video Processing	Smart Home Services
Full HD	MIMO Wi-Fi 2.4GHz
Ultra HD	MIMO Wi-Fi 5GHz
3D-TV	Powerline
Advanced Graphics Processing	Community Wi-Fi
Additional RF channels - Cable or Satellite	Blu-Ray DVD Player/Recorder
Additional Channels IP or Terrestrial	On Power (W)
DVR	Standby Power (W)

CSTB-Specific Information: Energy-Related Aspects

Return Path Functionality	Does Product Support APD?
DOCSIS 2.0 or ADSL	A.4: APD Support, What Is Default Time Period after which the CSTB Switches Itself into Standby (hours)?
VDSL	APD - What Is the Max APD Time That Can Be Selected, Maximum Permitted = 8 hours (Excluding Disabled - If Applicable)
DOCSIS 3.0	APD Power (W)
DOCSIS 3.0 Additional 4 Channels above 4	Mfg Only - Reported Using Test Software - Not Supplied with Final Software
Multi-Decode	Annual Sales Quantity Placed on the Internal Market During the Reporting Period?

Source: *VIA-reporting_template_v18.2.xlsx*

Table A-3. Non-Energy Information Queried from Signatories

CSTB-Specific Information: Non-Energy Requirements

Short Chain Chlorinated Paraffins	Ease of Disassembly
Flame Retardants	Plastics Compatible with Recycling
Brominated and Chlorinated Flame Retardants	Product Upgradability
PVC	Chlorine in Packaging
Post-Consumer Recycled Content %	Separable Packing Materials
Bio-Based Plastic Content %	Plastics in Packaging

Source: *VIA-reporting_template_v18.2.xlsx*

A.2 Other Signatories

Signatories who are neither manufactures nor service providers were asked to elaborate on two questions as requested by VA 6, article 6.1:

- Which activities did your company carry out in the period July 2017-June 2018 to support the objectives of the VA?
- Which activities does your company plan to support the objectives of the VA?

APPENDIX B. ALLOWANCES

Table B-1 displays Tier 3 allowances, Tier 4 allowances as updated with VA 6 and the difference between both Tiers. Compliance to Tier 3 requirements was mandatory in P8, which this report relates to.

Table B-1. Allowances as Defined in VA 6

Functionality	Annual Energy Allowance (kWh/Year)	
	Tier 3 (01JULY16-30JUNE18)	Tier 4 (01JULY18 onwards)
Base Functionality		
Cable	40	50 (+10)
Satellite	40	45 (+5)
IP	35	30 (-5)
Terrestrial	35	25 (-10)
Thin-Client/Remote	30	7 (-23)
Additional Functionalities	Tier 3 (01JULY16-30JUNE18)	Tier 4 (01JULY18 onwards)
High Efficiency Video Coding	20	12 (-8)
Full High Definition (1080p50 or above)	20	8 (-12)
Ultra High Definition (DVB Phase 1)	30	20 (-10)
3DTV None Stereoscopic Broadcast	20	8 (-12)
Advanced Graphic Processing	5	0 (-5)
Additional RF Channels Cable or Satellite	15	7 (-8)
Additional Channels IP or Terrestrial	8	4 (-4)
DVR	20	15 (-5)
Return Path Functionality	20	0 (-20)
Return Path Technology DOCSIS 2.0/ADSL	30	18 (-12)
Return Path Technology DOCSIS VDSL	40	40
Return Path Technology DOCSIS 3.0 (First 4 Channels)	50	25 (-25)
Return Path Technology DOCSIS 3.0 (per Additional 4 Channels)	10	5 (-5)
Multi-Decode	25	0 (-25)
Multi-Encode	10	0 (-10)
Multi-Display	6	0 (-6)
In-Home Network	15	12 (-3)
In-Home Networking Access Point-Router	30	15 (-15)
Telephony/VOIP	5	4 (-1)
Smart Home Services		TBD
MIMO Wi-Fi 2.4GHz	3	3

Functionality	Annual Energy Allowance (kWh/Year)	
MIMO Wi-Fi 5GHz	10	8 (-2)
PowerLine	10	10
Community Wi-Fi	3	3
Blu-Ray or DVD Player/Recorder		TBD

Source: VA 6

APPENDIX C. LIST OF COMPLIANT CSTB

Signatory	Model Type
Advanced Digital Broadcast	ADB-5743CDX
Advanced Digital Broadcast	TLN-5744CX
Advanced Digital Broadcast	TNR-2760ST
Advanced Digital Broadcast	TLA-1722W
Advanced Digital Broadcast	4000S
Advanced Digital Broadcast	3900S
Advanced Digital Broadcast	NCP-4740SF
Advanced Digital Broadcast	ADB-1750C
Advanced Digital Broadcast	VEC-4730CD
Advanced Digital Broadcast	BLZ-1721C
Advanced Digital Broadcast	HD6500
Advanced Digital Broadcast	HD4500
Advanced Digital Broadcast	ADB-1750CF(X)
Advanced Digital Broadcast	MEL-1750CF(X)
Advanced Digital Broadcast	ADB-1771CF(X)
Advanced Digital Broadcast	VEC-4730CDX
Advanced Digital Broadcast	4900T+
Advanced Digital Broadcast	5000T+
Amino Communications	A140
Amino Communications	H140
Amino Communications	A150
Amino Communications	H150
Amino Communications	A550
Amino Communications	Kamai 510
Amino Communications	Kamai 661
Amino Communications	Aria 610
Amino Communications	Aria 7
Amino Communications	Aria 6X
Amino Communications	Kamai 7X
Amino Communications	Kamai 7E

Signatory	Model Type
ARRIS	DCR7151/24
ARRIS	DCX960
ARRIS	DCX960 D/L
ARRIS	DMC7002KLG
ARRIS	DMC7002KLG2 D/L
ARRIS	DPS5002NS
ARRIS	DSR8151/24
ARRIS	DZC3000NGT
ARRIS	DZS3000NV
ARRIS	DZS3001IFN
ARRIS	DZS3001NS
ARRIS	HMC4120
ARRIS	MI7115NGT
ARRIS	VIP1002ESL
ARRIS	VIP1113
ARRIS	VIP1143
ARRIS	VIP1143W
ARRIS	VIP1853
ARRIS	VIP2262EV2
ARRIS	VIP2262V2
ARRIS	VIP2502EW
ARRIS	VIP2853
ARRIS	VIP2952 V2
ARRIS	VIP4302
ARRIS	VIP4302W
ARRIS	VIP5242
ARRIS	VIP5242W
ARRIS	VIP5305
ARRIS	VIP5305W
ARRIS	VIP5602EW
ARRIS	ZC4110OVE
ARRIS	ZD4500ZNO
ARRIS	ZH4110NS
Humax Digital	HDR-4000C/E
Humax Digital	HD-FOX C
Humax Digital	DTR-T2100
Humax Digital	DTR-T2110
Humax Digital	DTR-T2120
Humax Digital	IRHD-5300C
Humax Digital	iHDR-5200C/NL
Humax Digital	iHDR-5400C
Humax Digital	CDIG-1000C/SE
Humax Digital	CXHD-6000C/SE

Signatory	Model Type
Humax Digital	DTR-T4000
Humax Digital	DB-T2200
Humax Digital	HD NANO Connect/DE
Humax Digital	iCord Pro/500GB
Humax Digital	HMS-1000S/DE
Humax Digital	HD NANO ECO
Humax Digital	HDR-2000T/500G
Humax Digital	HDR-2000T/1TB
Humax Digital	HB-1000S
Humax Digital	HDR-1000S/1TB
Humax Digital	HDR-1000S/2TB
Humax Digital	HDR-1010S
Humax Digital	HDR-1001S
Humax Digital	HMS-1000S/IT
Humax Digital	HDR-1800T/GB/320GB
Humax Digital	DTR-T2000/GB/500GB
Humax Digital	DTR-T2000/GB/1TB
Humax Digital	H1/DE
Humax Digital	HD NANO FREE
Humax Digital	YSR-2000/DK
Humax Digital	CDIG-2000C/R/SE
Humax Digital	FVP-4000T/GB/BR/500G B
Humax Digital	FVP-4000T/GB/BR/1TB
Humax Digital	FVP-4000T/GB/DB/500G B/MC
Humax Digital	FVP-4000T/GB/DB/1TB
Humax Digital	FVP-4000T/GB/BL/2TB
Humax Digital	HDR-1100S/GB/WH/500G B
Humax Digital	HDR-1100S/GB/WH/1TB
Humax Digital	HDR-1100S/GB/WH/2TB
Humax Digital	HDR-1100S/GB/BL/500GB
Humax Digital	HDR-1100S/GB/BL/1TB
Humax Digital	HDR-1100S/GB/BL/2TB
Humax Digital	TN8000HD/Bundle

Signatory	Model Type
Humax Digital	HD NEO/DE
Humax Digital	HGS-1000S/DE
Humax Digital	HD-6400S
Humax Digital	HD-6600S
Humax Digital	HD-6800S
Humax Digital	ESi-160
Humax Digital	ESd-160s
Humax Digital	ESd-160c
Humax Digital	B1
Humax Digital	DIGI+C HD4
Humax Digital	HB-1100S
Humax Digital	YS-4000
Humax Digital	GNM-1000
Humax Digital	FVP-5000T/GB/BL/500GB
Humax Digital	FVP-5000T/GB/BL/1TB
Humax Digital	FVP-5000T/GB/BL/2TB
Kaon Media	CO3600
Kaon Media	KCF-SA900PCO
SAGEMCOM BROADBAND SAS	DEC DCIW344
SAGEMCOM BROADBAND SAS	DEC DCTI384 UHD VF SP
SAGEMCOM BROADBAND SAS	DEC DCTI384 UHD VF SP-NEBA
SAGEMCOM BROADBAND SAS	DEC DCTIW384 DNA
SAGEMCOM BROADBAND SAS	DEC DIW384 SUNRISE
SAGEMCOM BROADBAND SAS	DEC DTIW384 UHD SFR
SAGEMCOM BROADBAND SAS	DEC DTIW384 UHD VF IT-4L
SAGEMCOM BROADBAND SAS	DEC DTIW384 UHD VF SP-4L
SAGEMCOM BROADBAND SAS	DEC EGCI384 UHD MT
SAGEMCOM BROADBAND SAS	DEC EGCI384 UHD SFR
SAGEMCOM BROADBAND SAS	DEC ESI383-500 VF DE
SAGEMCOM BROADBAND SAS	DEC ITSAD88 HD NEWTV-3 (UHD90)
SAGEMCOM BROADBAND SAS	DEC RTIW383 Orange
SAGEMCOM BROADBAND SAS	DSIW79 HD TPSA

Signatory	Model Type
SAGEMCOM BROADBAND SAS	DTIW77 HD BOXER
SAGEMCOM BROADBAND SAS	RCI88-320 HD KDG V2
Samsung	GX-HT500EL/HT
Samsung	GX-HT501EL/HT
Samsung	GX-BT530SM/BT
Samsung	SMT-E6400/XEN
Samsung	SMT-G7401/XEN
Samsung	SMT-E7100W/NFR
Samsung	GX-DT500EL/ZG
Samsung	GX-DT502EL/ZG
Samsung	GX-MB540TL/ZG
Samsung	GX-SM530SL/ZG
Samsung	GX-SM660SM/ZG
Samsung	SMT-C5120A/XEG
Samsung	GX-ME530TK/ZT
Samsung	GX-M7550SK/SKL
Samsung	GX-VF670EM/VFI
Samsung	GX-VI680SJ/VIA
Samsung	SMT-S5140/VIA
Samsung	GX-PT730SH/PT
Samsung	GX-PL680EK/OPL
Samsung	GX-OR530SK/ORO
Samsung	GX-TR500EL/ZR
Samsung	GX-TR530CK/ZR
Samsung	GX-TR530SK/ZR
Samsung	GX-SP680EL/OSP
SKY ITALIA	DZS3001NS
SKY ITALIA	DPS5002NS
SKY ITALIA	ESi-160
SKY ITALIA	ESi240
SKY ITALIA	EM150IT
SKY ITALIA	4201TT
SKY ITALIA	3801TT
Sky UK	DRX890WL
Sky UK	ES130
Sky UK	ES140
Sky UK	EM150
Sky UK	ES240
Sky UK	4500SK
Sky UK	4201UK
Sky UK	4201IE
Sky Deutschland Fernsehen Gmbh & Co. KG	ESD-160S

Signatory	Model Type
Sky Deutschland Fernsehen Gmbh & Co. KG	ESD-160C
Tatung Technology Inc.	MR200
Tatung Technology Inc.	MR400
Tatung Technology Inc.	MR201
Tatung Technology Inc.	MR401B
Tatung Technology Inc.	MR601
Tatung Technology Inc.	STB-3112CDA
Tatung Technology Inc.	STB-3012CDA
Technicolor	8020DVB
Technicolor	DCI713EKT
Technicolor	DCI765EKT
Technicolor	DCI804RMU
Technicolor	DSI724DST
Technicolor	DWT765
Technicolor	HIE4008
Technicolor	IPV5001
Technicolor	ISB2201
Technicolor	USW4001
Technicolor	USX8001
Technicolor	UZW4010TIM
Technicolor	UZW4010TIM2
Technicolor	UZX8020CHM
Technicolor	VGW10-KD-K9-2
Technicolor	ISB2231
Technicolor	ISB8430
Technicolor	UZW4030
Telekom Deutschland GmbH	Media Receiver 201
Telekom Deutschland GmbH	Media Receiver 400
Telekom Deutschland GmbH	Media Receiver 401 Typ B
Telekom Deutschland GmbH	Media Receiver 500 Sat
Telekom Deutschland GmbH	Media Receiver 601 Sat
Telekom Deutschland GmbH	Media Receiver Entry
Viasat	VI-GX680SJ
Viasat	VI-GX680SJ
Viasat	DSZ3000NV
Viasat	DSZ3000NV

APPENDIX D. CSTB PROPERTIES

This table is included in the XLS-data set attached to this report.

Independent Inspector

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