

Memo on the EuP Preparatory Study on Simple Set Top Boxes (Lot 0)

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1. Introduction

A simple STB is an appliance for the **reception, decoding and processing of digital broadcasting** in order to view digital channels on old analogue TV sets. STB with recording capacity are included but not those with conditional access (pay TV...) which fall under EuP Lot 18 (Complex STB).

Although European manufacturers and importers of TVs will make the transition to IDTVs (TVs with integrated digital reception platforms), many millions of analogue TVs will still be added to household stocks until 2015 and will require STB at switchover. **The EU-25 stock of simple STBs is estimated to grow to an amount of about 177 million devices.**

Manufacturers and retailers predict that basic low feature simple STB will leave the European market from the end of the analogue switch off roadmap in 2015. The rapid penetration and dramatic fall in the retail price of aesthetically desirable flat panel TVs with integrated digital receiver/decoders may also prove to be a strong contributor to the demise of the simple STB. However **new feature trends may still extend the life of the product genre. STB with Personal Video Recorder (PVR) are set to become the mainstream product genre.** A wave of new product offerings is about to enter the market.

For some years power consumption of STB was not a main target for manufacturers. But a voluntary "Code of Conduct" has been implemented at EU level. Some regulatory and voluntary regimes have implemented, or planning to implement, "automatic power down" as part of the performance requirements (e.g. USA-EPA, Australia, EU CoC).

The study globally shows that with the implementation of ecodesign measures the total power consumption of STBs in the EU could be reduced in 2012 by 2.5 TWh, which is -75% compared to BAU.

The relevant international standards covering STB are EN/IEC 62301 "*Household Electrical Appliances, Measurement of Standby Power*"; IEC 62087 "*Methods of measurement for the power consumption of audio video and related equipment*"; CEA-2013 "*Digital STB Background Power Consumption*".

STB are actually covered by four EU directives: WEEE, RoHS, Low Voltage Directive (LVD) and Electromagnetic (EMC) Directive (amended by Directive 92/31/EC).

2. Consumer awareness

Very few European surveys are available concerning the impact of user behaviour on the energy footprint of TV peripherals such as STB, DVD players, Video recorders and home theatre systems.

To date all public campaigns to increase awareness of the energy consumption of TV associated products are limited. National campaigns designed to inform the Consumer about digital switchover tend to give energy efficiency criteria the lowest priority.

3. Most significant environmental impacts of a STB

The use phase of the Simple STB is the most energy consuming of all phases from production to recycling of the devices. These results are for a lifetime assumption for the devices of 5 years (the life could be extended if the box moves from the main TV to the children's room, party room or country house). The use phase has the most important environmental impact mainly depending on the On-mode (7300 hours for the whole expected product life of 5 years) and secondary to the Standby-mode (36500 hours for the whole expected product life of 5 years).

For Simple STB / PVR the energy consumption during the use phase is even more relevant compared with the production and distribution phase as it is for the simple STB without additional features.

On the basis of the VHK EcoReport tool's assessments reducing the power consumption would be the main adjusting screw for any reduction of the environmental impact of STB.

4. Other environmental aspects

- Production phase

Even if power demand in the manufacturing phase isn't a main issue in the Simple STB lifecycle, new PCB materials offer an opportunity to reduce the power demand in manufacturing phase. Their main advantage is their huge potential concerning the improvement of the product recycling at the end of lifetime of the devices.

- Impact of external power supply

For STBs using an external power supply, this will always be active and must have good efficiency characteristics. External power supplies are covered by EuP Lot 7.

- Impact of the remote control

For the power supply of the remote control two alkaline cells are common. Other power sources such as small manual generators, solar cells and fuel cells have been experimented with but have not proved acceptable to the user or commercially viable yet.

Using foamed boards, a significant ecological optimisation of remote controls is possible. Foamed HTT boards offer the avoidance of toxic additives as flame-retardants and a material recycling at the end of its lifetime makes the product advantageous concerning ecology and economy.

- Impact of packaging

Around 75% by weight can be recycled at the end of life. A STB does not need the cushioning properties of expanded polystyrene and the more eco friendly cardboard is a viable alternative. It seems likely that lighter cardboard would be suitable for most STB, which would reduce the transportation costs and associated environmental impacts.

- End of life and recyclability

It is unlikely that a basic STB costing up to 60 € will be repaired in its lifetime: diagnosing faults other than those associated with the power supply can be time consuming and repairs at chip level very complex.

- Chemicals and hazardous substances

The study gives very limited information and data on chemicals.

5. Solutions to cut energy consumption in the use phase

There are several solutions available to the market to provide an energy efficient power supply for Simple STBs.

- Better software design

The software used in the Simple STB has a critical influence on the power requirement both in standby and on-mode. Several examples of STBs with fastshot low-cost software are recognised by their high energy demand, particularly in standby.

Designers of “benchmark” energy efficient Simple STBs have shown that processor power can be reduced by more than 50% for a given decoding process by careful software design. A good software design provides not only low power use of the hardware resources in on-mode, it offers additional features as low power standby-mode due to software triggered switch-off of components not used during the standby operation of the STB.

Ideally adequate power management of each circuit block should be achieved by software control of the silicon. The choice of RISC (Reduced Instruction Set Computer) CPU over a CISC (Complex Instruction Set Computer) CPU can help reduce the overall power consumption.

- Automatic power down

The likelihood is that a STB will be left on when the TV is switched to standby. Careful design consideration should be given to this issue. An ideal solution in the early transition phase is to incorporate automatic standby in the STB.

Remote control solutions must be considered allowing the user to put the STB and TV into standby simultaneously. The introduction of new silicon functional blocks is the key tool for achieving STB efficiency. An auto electronic standby at low power requirement will be the best solution where, with low cost STBs, two remote controls are invariably required to put the TV and STB into standby.

- The hard off switch debate

A radical method to reduce the standby-consumption of simple STB could be the often-suggested hard-off switch.

Since former remote control based solutions used in TV sets (*Dangschat patent*) are not available any more due to the disappearance of the respective components because of RoHS problems, there is no remote control triggered solution for an electromechanical hard mains switch available.

With some current STB a switch is incorporated, but usually associated with the mains connector at the back panel. Most consumers won't use a switch located out of site. Where a front on/off-switch is fitted, it is usually only a standby-switch relaying the soft-off function of the remote control. The hard mains switch is not applicable for Simple STB / PVR since the PVR would lose its time shift feature.

It seems around 20% of consumers use do it yourself switch-able connection plug boards to switch off their TV equipment including STB after watching TV. More elegant solutions to solve the standby/switch-off problems associated with user habits are in the European Market. These usually consist of a mains supply panel with detection circuits, that can automatically sense the on-mode and standby state of the TV and switch power on or off to outlets for peripherals such as the STB. Using these solutions 0.3 W in standby is possible as well as wake up on demand using many forms of signalling.

6. Best available technologies on the market

The study considers a base-case and two BAT options:

- Base-Case: The power consumption is for STB without additional feature in On-mode: 7 W, Standby-mode: 6 W. The power consumption of the STB+PVR version is in On-mode: 26 W, Standby-mode: 6 W.

- BAT option 1: implementation of the DaVinci solution (a BAT software) and higher integration of silicon. The power consumption is for STB without additional feature in On-mode: 5 W, Standby-mode: 0.25 W. The power consumption of the STB+PVR version is in On-mode: 13 W, Standby-mode: 0.25 W.

- BAT option 2: implementation of dSID chip to reduce the Standby consumption to less than 0,3 Watts. All other features are taken unmodified. The consumption for STB without any further features is in On-mode: 7 W, Standby-mode: 0.3 W. The power consumption of the STB+PVR version is in On-mode: 26 W, Standby-mode: 0.3 W.

For the devices described in this report a further reduction of power consumption in the use phase seems to be not helpful.

7. Scenarios for EuP requirements on energy consumption

The study suggests the following EuP requirements:

	Deadline	Standby-mode	On-mode
Simple STB (SD)	2010	1 W	5 W
Simple STB (SD)	2012	0,5 W	5 W
PVR allowance for hard disk (HD)	2012	-	+ 7 W
Allowance for 2 nd tuner	2012	-	+ 1 W
Simple STB (HD)	2012	0,5 W	7 W *
PVR allowance for hard disk (HD)	2012	-	+ 7 W
Allowance for 2 nd tuner	2012	-	+ 1 W

*) incl. decoder and digital interface HDMI

Table 8.2: Power Consumption Limits for Simple STB and Deadlines

Note: the "2nd tuner" is a feature to record a program while watching another one.

The first deadline for an On-mode power limitation to 5 W and a Standby-mode power limit of 1 W is set for the year 2010. Designers of Simple STBs for Standard Definition already have access to low power components and software design that will allow the required 2010 targets to be met with conventional silicon. This is in line with the next step of expected higher integration of the STB electronics.

The consultants expect a transition period of 2 years for the implementation of the low standby (0.5 W). Since a complete re-design of PVR is needed for 2012 an additional new design for 2010 should not be expected. No Industry will make this manufacturing investment today without the coercion of mandatory implementation measures.

There are two reasons for the two steps approach: one is the option to keep the reduction deadline in line with the horizontal measures on Standby (Lot 6). The second is the expected availability of power efficient hard disk drives to the consumer electronics market in bulk quantities and at reduced price by 2012.

Existing, competitively marketed, Standard Definition STB products already meet the 2010 power requirement targets clearly demonstrating the viability of these targets.

8. Expected outcomes

With the implementation of the 2010 measures the total power consumption of simple STB (without PVR) could be cut by **736 GWh (i.e. 48% compared to BAU)**.

With the implementation of the 2012 measures the total power consumption of all simple STB could be reduced by **2.5 TWh (i.e. 75% compared to BAU)**.

9. Concerns for 2020

The conversion from analogue to digital broadcasting started in Western Europe with standard definition (SD) broadcasting. For Eastern European countries the shift to digital will be linked with the transformation of SD broadcasting to high definition (HD). **HD PVR devices are expected to consume significantly more power than SD.** But detailed data are not available since the DVB-T2 standard is not published yet.