



# THOMSON

## Streaming Set-Top-Box

Digital HAVi/IP Receiver & Controller for Home Networks

Within the framework of the HomeNet2Run project, Thomson has developed a Streaming Set-Top-Box, which is capable of performing both, full HAVi and Internet Protocol (IP) applications. The implementation of the two protocols in a single box is a first approach towards a heterogeneous Home Network architecture.



The emergence of digital home networks currently reveals that there won't be a unique and preferred home network infrastructure. Diversity is then one of the major challenges identified by the HomeNet2Run project to be dealt with in order to make home networking happen. In this context, heterogeneity is regarded as the co-existence of AV and PC networks, each of them using its specific physical infrastructure, a dedicated device control and its own operating system.

PC networks are usually based on Ethernet physical connections managed with a UPnP (Universal Plug and Play) network system. On the other side, AV applications will likely be supported through IEEE1394 networks with HAVi (Home Audio Video Interoperability) control software. Both systems show fundamental differences, preventing them from being used together.

In the research laboratory of Hannover, Thomson's subsidiary DTB has developed a solution for the heterogeneity issue, which is capable of performing both HAVi and IP functionality. With HAVi and IP applications running simultaneously, the consumer will be able to watch TV, while surfing on the Internet in a separate window and to control his home network from anywhere. Moreover, the DVB-IPI feature offers to the user the benefit of more broadcast content coming from the Internet.

The built-in bridge functionality between HAVi and UPnP will enable the user to control all his network devices from any equipment, regardless of the network they belong to. AV streaming between devices connected to different network segments is also possible in any direction. This enables to benefit from the most effective combination of devices in order to perform any user request, such as storing video information on a PC and playing it back on a HAVi display.

The Thomson Streaming Set-Top-Box features one of the first implementation of DVB-IPI disclosed to the public. It consists of parallel processing modules for the HAVi and IP functionalities. While the HAVi module is connected to the IEEE1394 interface, the IP section is fed via the Ethernet connector. Both modules share the same picture format decoder, e.g. MPEG-2.



The HAVi implementation enables the control of any generation of HAVi devices thanks to a Full Audio Video (FAV) device profile, i.e. full range of HAVi software elements and capability to run Havlets and the level-2 user interface. Even non-HAVi devices like DV camcorders can be supported.

The IP-stack module includes an extension module, which can detect and process an embedded MPEG-2 Transport Stream within the IP stream. This module will allow DVB-IPI compliant streams to be received via the IP network and decoded into the appropriate display format.

The HAVi-UPnP gateway module acts as a bridge between the two worlds. It converts commands from one network to the appropriate format of the other network, thus enabling the control and interaction of all devices belonging to both networks. Bi-directional audio-video streaming between both networks is now possible, provided that the streaming format is supported by the sending and receiving devices.

Key features and major benefits of the Streaming Set-Top-Box:

- IEEE1394 and Ethernet connections
- Full HAVi FAV software stack implementation
- Full IP software stack implementation
- DVB-IPI compliance
- HAVi-UPnP gateway module

The Streaming Set-Top-Box concept implements on a Wintel PC platform the latest engineering results of the HomeNet2Run research program. HomeNet2Run, a three-year duration project with participants from Belgium, France, Germany, Italy, Netherlands and Switzerland, was given the Eureka

label in 2001. The development work of DTB has been carried out within the BRAVISSIMO project (Broadband Audio/Video Interactive Services in Modern Environments), the German part of HomeNet2Run, financially supported by the German Ministry of Education and Research (BMBF - Bundesministerium für Bildung und Forschung).

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