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Fig. 1: Web Interface: recorder selection menu.

VIRTUAL PVR HOME NETWORK MEDIA STREAMING SOLUTION

Nowadays we are living in the “digital” era. Homes were invaded by digital content, such as images, video and music which can be recorded on digital cameras and mobile phones or downloaded from the Internet. It is also possible to record TV series, for later viewing, in digital format, however the existing Personal Video Recorder (PVR) solutions are restricted to the Set Top Box (STB) hard disk.

Consumers want more and more, so they ask why it is not possible to share all this content across the Home Network (HN) and play it when and where they want it, regardless from the source.

immediately share their digital library. All these innovations must be accessed by everyone regardless of their technical knowledge. It is only possible with an intuitive and friendly solution.

The *Virtual PVR* concept refers to a solution that 1) enables the distribution of functionality typically residing in a Set Top Box among other devices in the home (e.g. NAS), and 2) allows the user to seamlessly and remotely access his PVR system through well-established web interfaces.

The Home Network has UPnP AV devices and services that are announced and discovered automatically.

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The Concept

The keyword is interoperability. Consumers should easily connect all the devices and

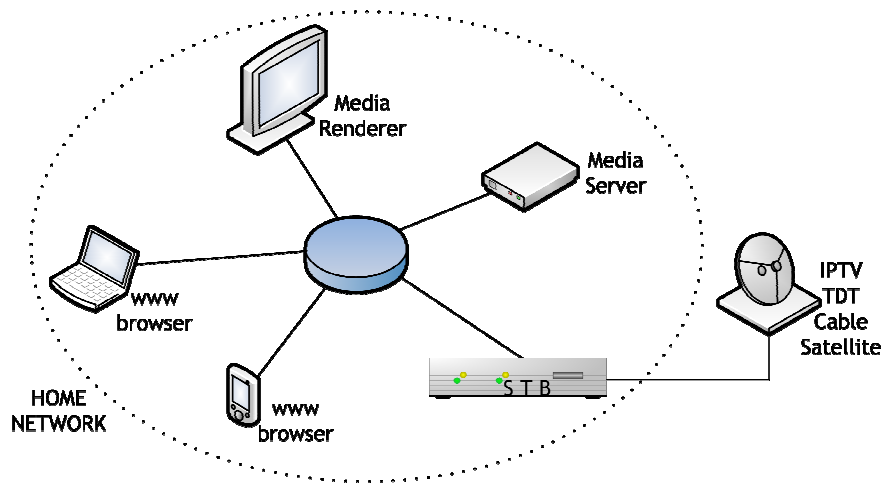


Fig. 2: Home Network architecture.

Project Details

March—July 2009
MSc Thesis Project

Technology

The *Platinum* library provided the necessary framework and tools to implement UPnP Media Servers and Control Points using C++ programming language. The Web Interface was built using PHP and JavaScript.

Requirements

Besides the STB prototype, all the CE devices only need to be UPnP/DLNA compliant in order to take part of the system. To interact with *Virtual PVR* users need a Web browser.

Abbreviations

CE-Consumer Electronics
DLNA-Digital Living Network Alliance
NAS- Network-Attached Storage
PVR-Personal Video Recorder
STB- Set Top Box
UPnP- Universal Plug and Play

The Interface

The *Virtual PVR* allows users to see the devices connected to his Home Network, like the NAS and the STB. The user choices are used to configure the devices in the Home Network, through the STB. It is also possible to render the contents in any UPnP display available in the Home Network.

The Web Interface has 5 major sections: Music, Video, Images, Live TV and Recorder. The Music section displays all the items with audio MIME type, available in the Home Network. The user is free to choose which item wants to play and the default media player starts the stream session. The Video section shows the video items available in the Home Network. Once again the user is free to choose which video wants to see and the stream session starts.

The Image section is quite different from the sections described before. As it is not necessary to use a media player to receive the stream the web interface creates a thumbnail for each image. If the user wants to see the image in a real size just needs to click on the image. The slideshow mode is also available. The Live TV section allows the user to see a TV channel in real time. The STB prototype has only one TV tuner which means that only one stream

session is available at each moment. The user can choose which channel to see and switch the channel.

The Recorder section displays the TV listings of the channels that support EPG. The user is able to choose which programmes want to record. Once recorded the programme becomes available to see on the Video section.

The Web Interface is also responsible to control where to reproduce a media item. It is possible because Media servers define a connection ID for each streaming session which means that an item being reproduced on a Media Renderer and on the browser's media player represent two different connections ID.

Advantages

The great advantage of the system is that it can be accessed seamlessly and remotely through well-established web interfaces which means, that the user only needs to access a terminal with a www browser to interact with the system. The system allows users to stream music, video and image items available in different devices without having to perform a specific configuration.

Users are able to access and interact with highly intuitive, rich content and a flexible interface.