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mobi
mobilizing the internet

INNOVATION REPORT

Home-to-Home UPnP

Transparent access to remote devices

Within the scope of the MOBILIZING THE INTERNET project, Philips Research has developed a solution that enables users to access content easily while on the move. In particular, users may remotely access content stored at home. The solution does not require modifications to either the UPnP standard or existing UPnP-based devices, such as UPnP streaming clients.

Introduction

Universal Plug and Play (UPnP) is the basis for easy access to devices and content in a home network. It has standardised the way devices in a network can discover each other. For instance, via UPnP a display can find a media server, present a movie overview and play back a selected movie. However, a device in one home network cannot discover devices in another network. More specifically, the TV in a friend's house cannot see the devices in your home.

Home-to-Home UPnP

Home networking and Internet connectivity in the domestic environment are emerging rapidly. A typical home network contains at least one PC and possibly a number of networked consumer electronics (CE) devices such as Philips Connected Planet products. Consumers can view holiday pictures, play music and watch video using a Philips Streamium device in the living room and a PC upstairs containing content. Figure 1 shows this scenario.

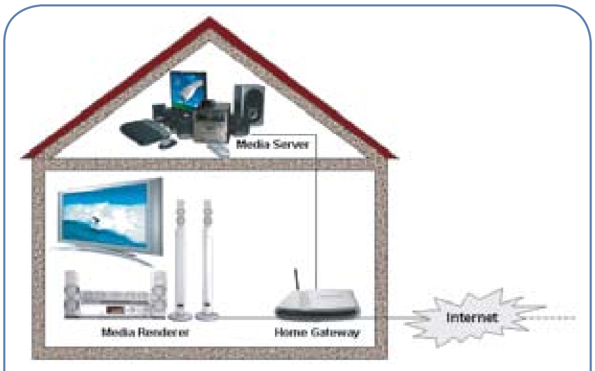

Figure 1: Rendering content within the home

At present, Connected Planet products can only give access to devices and content within the home. Considering the increasing Internet connectivity in households, it seems obvious to extend the scope of Connected Planet beyond the home. This enables the consumer, for instance, to show holiday pictures at a friend's house or to listen to his own music at a holiday home without the need to carry this content about. Figure 2 shows the extended scenario.

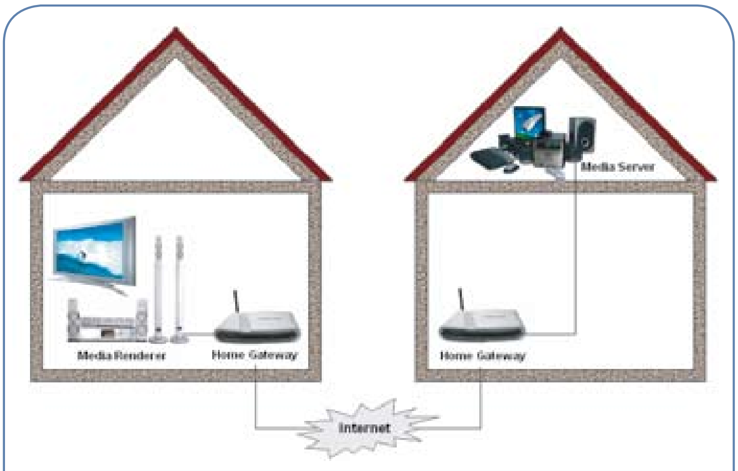

Figure 2: Rendering remote content

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Devices in home networks are based on UPnP. A limitation of UPnP is that the scope of the protocol is limited to the local home network. This makes connecting UPnP networks difficult. Philips Research has developed a solution – Home-to-Home (H2H) – that makes it possible to connect UPnP networks in a fully transparent way. The solution focuses on the home gateway devices and makes them take care of creating a virtually merged network. User security preferences are taken into account.

Thanks to the transparency of the Philips solution, no modifications to either the UPnP standard or existing UPnP-based devices are required. Only the software on the home gateways is extended. This means that any existing Connected Planet network containing off-the-shelf Streamium devices can be given H2H support using an H2H-enabled gateway.

An H2H-enabled gateway has a so-called 'buddy' list that contains homes of friends and relatives. Through a user interface that can be presented either on a PC or personal digital assistant (PDA) in the network, the user can manage the buddy list and take care of connections and access control. Once a buddy is in the list and a connection has been established, by default the situation is such that devices in both networks can see each other and co-operate remotely.

Additionally, from both sides the users can control which devices should and should not be visible in their friends' networks. This can be done individually for each device and for each friend in the buddy list. So, for instance, a user may choose to show his music server to his friend Bob but hide it from friend Alice. Similarly, he may choose to show his picture server to Alice and hide it from Bob. Full connectivity for all kinds of UPnP devices is provided, including out-of-band traffic such as video streaming, but it is done in such a way that the user has full control on what to share and what not to share with other people.

Connections between the networks made for sharing devices impose a security risk. Even though a user presumably trusts friends and relatives, this is not acceptable. Therefore H2H gateways manage firewalls between the connected UPnP networks in order to block traffic between those networks down to the IP level. The result of this approach is that a device that may not be shared with the friend's network is not visible or reachable from that network in any way. In this way, H2H realises fully transparent and safe connectivity, taking into account the privacy wishes of the user.

Philips intends to deploy the H2H solution in its Connected Planet products in 2006.