

Chapter 71

Home Media Access with Heterogeneous Devices

Tayeb Lemlouma

IRISA Laboratory and University of Rennes I, France

ABSTRACT

The intensive use of social content anywhere and from any device presents new challenges for current systems and networks particularly when they are used by novice users. One of the most places where social channels are used by non-expert users and with a wide range of devices is at home. Unfortunately, current digital home systems lack of intelligent components that help terminals and users to find, configure and connect devices for using media content (video, audio, etc.) in an intuitive, transparent and optimized way. In this paper, the author discusses how the user's experience is negatively affected in existing digital home systems. Particularly, in heterogeneous environments with terminals and networks having different capabilities. The author discusses the home media access using a real-world evaluation of existing home systems. The author compares these evaluations to a Web-based approach and show how the use of the home network resources can be significantly improved for sharing and browsing media items and folders.

INTRODUCTION

Digital home systems were designed to offer an interoperable network that ensures sharing media content in a seamless environment regardless: media sources, location, delivery methods and protocols, formats and existing terminals. With the success of different social networks and channels, digital home systems -used mainly by non-expert users- represent an important place where the home users can share and use different media and data coming from different sources. Unfortunately, actual digital home systems do not meet this objective yet (Socher, 2008). Furthermore, many users are still unaware about the existence of digital technologies. Let us consider, for instance, one representative example of a digital standard such as the Digital Living Network Alliance (DLNA). The Digital Living Network Alliance is already integrated in about 74% of existing CEs. This standard knows only 6% of real users that are aware about the existence of the digital functionalities and are able to use them intuitively (In-Sat, 2010). Many rea-

DOI: 10.4018/978-1-5225-3822-6.ch071

sons explain this situation. Mainly we cite the complexity of the proposed technologies inside the home network, the inter communication and cooperation between different industrial and standard norms, the heterogeneity of media formats and devices. Finally, the lack of intelligent components or services that help terminals and users to find, configure and connect their terminals in order to use the media content in the best possible and automatic way.

Many previous works have studied reducing the overhead traffic on services advertisements for example with the UPnP protocol. Digital homes represent an interesting challenging context especially for social applications and home residents that are usually novice. Services are mainly related to sharing, discovering and rendering items such as music, videos and pictures. Also, at home, the residents may use, in the same time, a wide variety of devices and access methods that are heterogeneous in terms of network and rendering capabilities. In order to qualify and quantify the *user's satisfaction* about the *use* of the different services (i.e. the *user experience*), we generally use the concept of *quality of experience*. This concept is widely used to describe how users experience the available services (e.g. the ability to find home media content, the available bandwidth for their applications, the rendering capabilities of their device, etc.). An efficient digital home system should enable the access to media content and services with heterogeneous terminals and without preliminary configurations and settings. Also, it should optimize the network traffic generated by digital homes components by using only necessary traffic when it is really needed by the user and its social applications. This paper shows how the home network resources and the user's experience are affected in existing digital home systems. Particularly, in a heterogeneous environment where users are usually connected through a wireless access using handheld devices.

Based on real-world evaluations, we identify useful lessons for optimizing the media access and network resources. We show and measure how a client-server based approach, like UNIVERSALLY (Lemlouma, 2013), can improve digital home systems by using the Web and the HTTP protocol for heterogeneous devices with limited capabilities. In a heterogeneous environment, many devices are still not compatible with the advanced digital home functionalities (Jovanovic et al., 2012; Ilkic et al., 2013) such as content discovery, multicast dialog, verbose XML parsing and heterogeneous media decoding. We believe that moving toward a client-server model guarantees that no home traffic will be generated if the user does not ask the network for something. This approach ensures that any transmitted data will be an answer of the user's request and avoids unnecessary traffic and bandwidth consumption.

The remainder of the paper is structured as follows. We review the related works and present an overview of a representative case of the current digital home systems. We then discuss the negative impact of current digital home systems. We discuss our measurements regarding the home network traffic used in background and while browsing media items. We identify a set of relevant guidelines in order to optimize the media access at home and evaluate the optimization in terms of bandwidth consumption and media access time after the presentation of a client-server web based approach.

RELATED WORK

The use and the improvement the home media access within heterogeneous mobile devices have been explored in research work over the past few years. Lai et al. (2010) propose a UPnP based content sharing system for supporting multimedia devices in a digital home network. The work uses a server to which devices must be directly plugged in order to be integrated in the sharing system. The approach simplifies the content discovery, reduces the overhead but limits the location of the content that should be

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