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TITLE OF THE INVENTION
(280 characters max)
Method and Sharing Media Libraries and playlists on data home networks

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ENCLOSED APPLICATION PARTS (check all that apply)

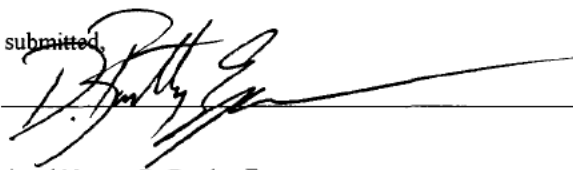
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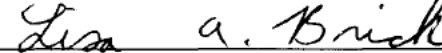
Respectfully submitted,

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Title of Invention: A method for sharing media libraries and playlists on data home networks

Inventors: Tarek Elabbady, Shannon Chan, Mukund Sankarayan, Sandeep Sahasrabudhe

The general plan for this design was shared under NDA with Compaq, Dell, and Broadcom

Introduction

This invention describes two software services: the media library service and the media catalogue service. The Media Library service exposes a list of metadata describing media content stored on a home network media stores and created by media jukeboxes living on PCs or digital AV devices. The Catalog Service is a centralized service hosted by one PC that discovers and aggregates the contents of all media libraries published on the home network and presents a unified list that could be accessed from interested devices on the network. Each item in the media library or the media catalog consists of metadata about a piece of digital media such as an audio track, video clip, or digital image.

New Role for the PC in the Entertainment Arena: These services provide excellent examples for why PCs should play more center role in the connected home entertainment scenarios. By hosting these services, the PC offers a content management on top of its present role as media storage and media gateway. The consumer electronics device companies have been rejecting such position for the PC.

Leadership Role: A new generation of digital audio and video players/recorders are appearing around us to support digital/internet media mania. These devices are primarily focused on extending the digital media and video beyond its storage location on the PCs or from the Internet servers directly. However, these devices are now being introduced following no standard design. Each manufacture for these devices is working on proprietary solutions for presenting, accessing, and controlling the digital media contents available on the home network. By implementing these services in the platforms, device companies will be encouraged to adopt our approach that can become the standard for such applications. The more standardized the designs become, the more successful it will be in the market place, and the less confused the consumer.

Motivation for the Invention:

The digital media is the fastest growing Ecommerce activity in this era. The PC is the number one gateway for media contents today, and is the most logical choice to store it. The consumer media experience in the home usually takes place in rooms away from the PC-room. Digital Media device companies saw the need for a device that can pull/receive the digital media from its store to play in traditional entertainment centers regardless of the PC location. However, until now, there is no standard mechanism that allows users to access their media collection from UIs presented on these devices. Therefore our invention is the first attempt to offer such standard method. The method utilizes the Universal Plug and Play networking protocols standards as well as standard data exchange languages (XML) and Standard scripting language (Jscript) to create, distribute media libraries and aggregate the libraries in one unified catalog the user can access from any of these devices. In addition, the Media Library Service is designed to meet three basic requirements: (1). Access Control: media devices on the home network typically do not logon to a domain controller. In a typical configuration, we will set the ACLs to allow access to anonymous users. This means that any UPNP control point on the home network can access the UPNP Media Library Service. The home network should be protected by an Internet firewall to prevent unauthorized access. (2). Network Firewalls: the home network should not be directly connected to the Internet. UPNP devices on the home network should connect to the Internet via Internet Connection Sharing. ICS acts as a firewall, preventing unauthorized users from accessing the IP addresses of UPNP devices on the home network. (3) Content

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unauthorized users from accessing the IP addresses of UPNP devices on the home network. (3) Content Protection: we will make an effort to protect copyrighted content from unauthorized duplication. Our content protection implementation consists of an ISAPI filter and the DRM Portable Media License Service.

Description of the Invention:

The main function of the service is to map existing media libraries created on a PC to XML-document using a standard XML-schema. The resulting XML document then is advertised to the Universal Plug and Play (UPnP) network. The user, using MediaLibrary UPnP control points on the home network, can discover the Media library service and invoke actions to the service (search, query, additem, ...).

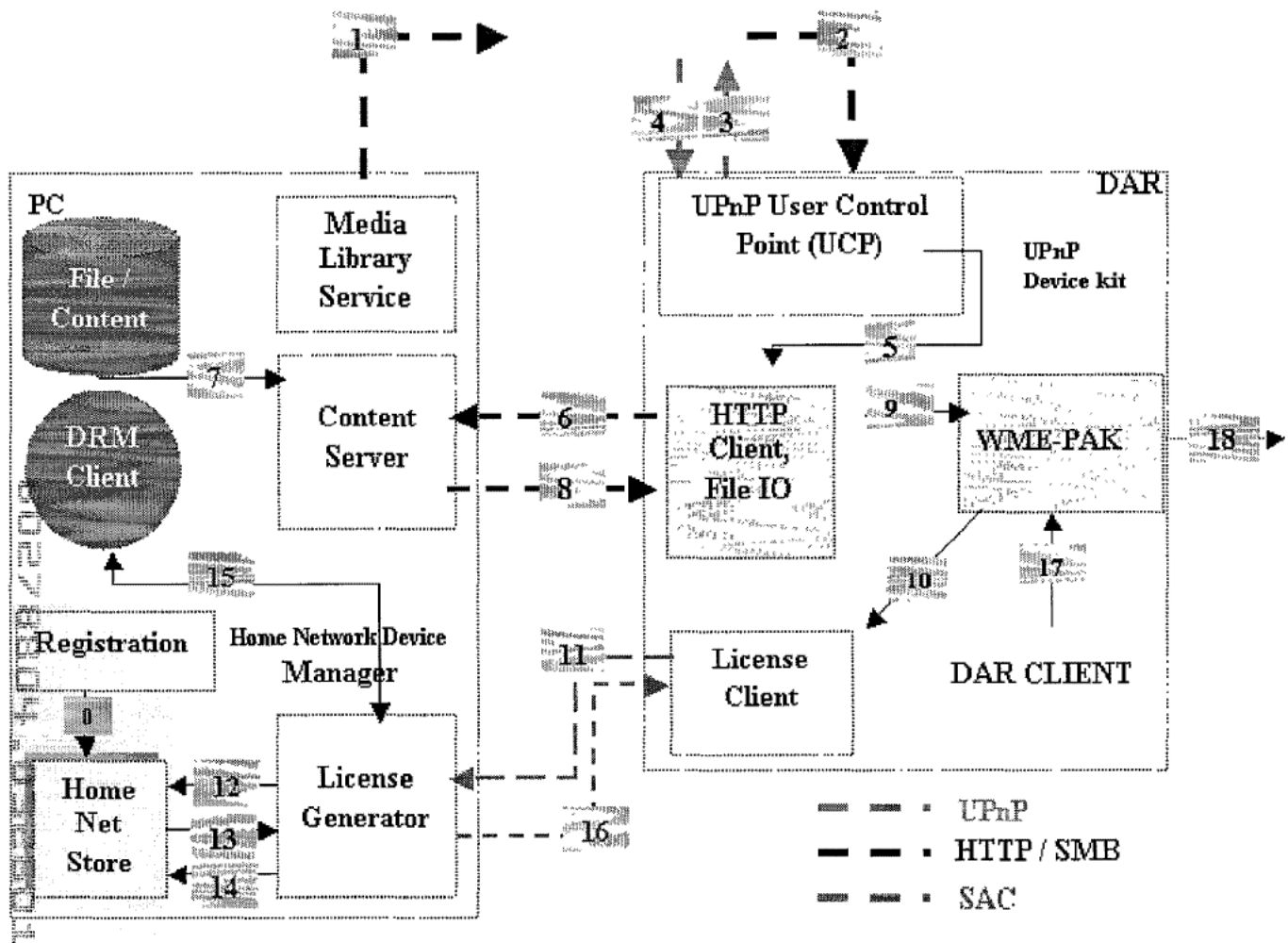
The following is a system flow highlights for the applicable scenario

- (1) At boot-up time, the UPnP "Media Catalog" service is created and hosted by a pre-configured server PC on the network (possibly the gateway machine). Using UPnP discovery message, the service then is advertised on the home network.
- (2) Following the catalog notification, each media library hosted by a network PC or Digital AV device advertises itself to the network, which then can be discovered by the catalog service. The catalog aggregates the contents of all media libraries on the network and forms a unified list of pointers (URLs) to digital media on the home net. The catalog then is re-advertised to the network.
- (3) The user on the UPnP-enabled device discovers the media catalog. The catalog control point on the device contains a catalog UI and a catalog manager. The user views the catalog content on the catalog's UI and select the media to play using the catalog's manager. At this point using a third party UPnP control point, such as a universal remote control, the user can also discover both the media catalog and DAR devices on the home net.
- (4) Once the users make their selection from the catalog, the DAR returns a URL (or UNC) of the selected media to the content server associated with the media store.
- (5) The content server establishes the connection with the requesting device opens and reads the selected media file and initiates the transmission of the file contents to the device.
- (6) The device decode and decompress the file content and initiate playback of the media

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Diagrams and Flow Charts:

Music Library



DAR: Digital Audio(Media) Receiver

- (0) Manually register the DAR
- (1) Advertise Library to the Network using UPnP
- (2) Discover the library by the DAR UPnP-control point
- (3) Conduct a search for music (query the library)
- (4) Results from the search (list of URLs)
- (5) Select music (URL)
- (6) Request the content of music file via HTTP GET (URL) or File IO (UNC)
- (7) Open & Read file using file server or HTTP server
- (8) Transmit file content to DAR
- (9) WME PAK attempts to decode, decompress the file to play
- (10) For protected files (all shared files on home networks will be DRM-protected), WME PAK asks DAR client for license.
- (11) DAR client requests Server to issue a portable media license. The following info is sent from BLT to PC in this call:

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- URL, Serial#, KID, Extended info from V7HeaderObject, Application security level
- (12) Open the PM license store based on the serial #. Note that store are kept on per device basis.
 - (13) Read the store into
 - (14) Request DRM client to give a PM license. memory (only if the DAR registration is confirmed by the license generator)
 - SetLicenseStore
 - SetV1KID or SetV2ContentHeader, based on license type.
 - CreatePMLicense
 - (15) Save the updated license store obtained from CreatePMLicense.
 - (16) Return the license store to the DAR client.
 - (17) DAR client forwards the store to WME PAK to proceed with decoding and decompressing the music content
 - (18) Play the song

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