Content and License Roaming for eHome DRM Applications

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A Digital Rights Management (DRM) system provides persistent protection and rights management for a digital asset from its creation to consumption. DRM becomes increasingly important for multimedia since more and more content is delivered in digital formats which can be easily duplicated and distributed without any loss of fidelity through Internet to reach a large group of audience. Developing effective DRM systems for multimedia applications has been actively pursued by both academia and the industry in recent years. A typical DRM system such as the Windows Media Rights Manager (WMRM) from Microsoft encrypts multimedia content into files and uploads the decryption key to a license server for users to download. When a DRM protected content is played for the first time, a right object called license which contains decryption key(s) and specifications on how the content can be used by the user is delivered to and stored for later usage in the playing device. A license is individualized, typically encrypted with a key that binds to the hardware of a user's player, to prevent unauthorized share with others. A secure, trusted, and tamper-proof DRM module is needed in a user's playing device in a DRM system.

In home applications, content may be played with devices with different characteristics such as PC, TV, pocket PC, portable media players, etc. In streaming applications, one receiver connected to outside may need to re-stream content to other devices through home networks to ensure the content to be simultaneously played at different places with different devices in a future's eHome. DRM protected content, while ensuring content properly consumed, should also facilitate these typical ways in consuming multimedia at eHome. Current multimedia DRM systems cannot efficiently deliver such a user experience. Protected content has to be decrypted, transcoded to a stream that fits characteristics of the targeted device, and then DRM protected. These operations have to be performed by a home device which is not trusted. Since DRM license is typically bound to a device, roaming of a license from one home device to another is troublesome. We need to design a new multimedia DRM system for future's eHome applications.

In this paper, we provide a status report on our ongoing research project to develop a multimedia DRM system which provides seamless content and license roaming among devices for eHome applications. Fine granularity scalable video and audio codecs are selected to compress multimedia content for our multimedia DRM system. A compressed scalable stream is encrypted by our DRM system in such a way that an encrypted stream preserves fine granularity scalability so that protected content can be transcoded directly without decryption to meet target device's characteristics. This fine granularity scalability of protected content is also very desired for eHome streaming applications when content is streamed from one device to other devices over a home wireless network since the bandwidth of a wireless network may fluctuate greatly, esp. when a device moves from one place to another. To facilitate easy license roaming among devices, a main home device such as PC is selected to act as a mini-license-server to issue restricted licenses to other devices according to the specified rights in the "main license" stored with the main device. Each "secondary device" has to be registered with the main device before a restricted license can be issued to it. There is a limit on maximum number of registered devices as well as on turnover rate. A restricted license is valid for a limited duration of time to allow a device to play protected content offline. Restricted license in a portable device has a longer duration than fixed devices to allow protected content to be played in a trip. Restricted licenses are synchronized periodically with the main license to ensure persistent rights management among allow all devices according to the specified rights in the main license.

license on to another device (7).
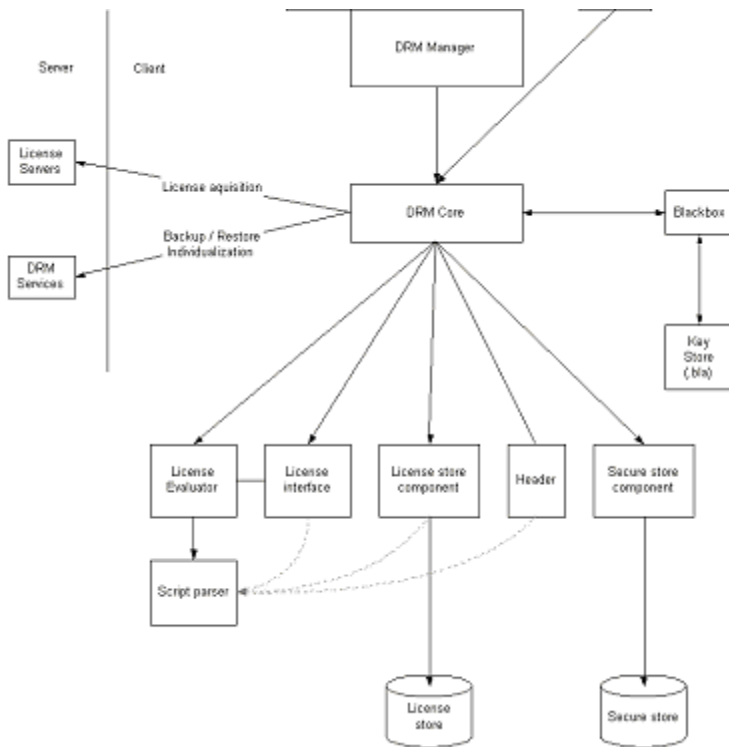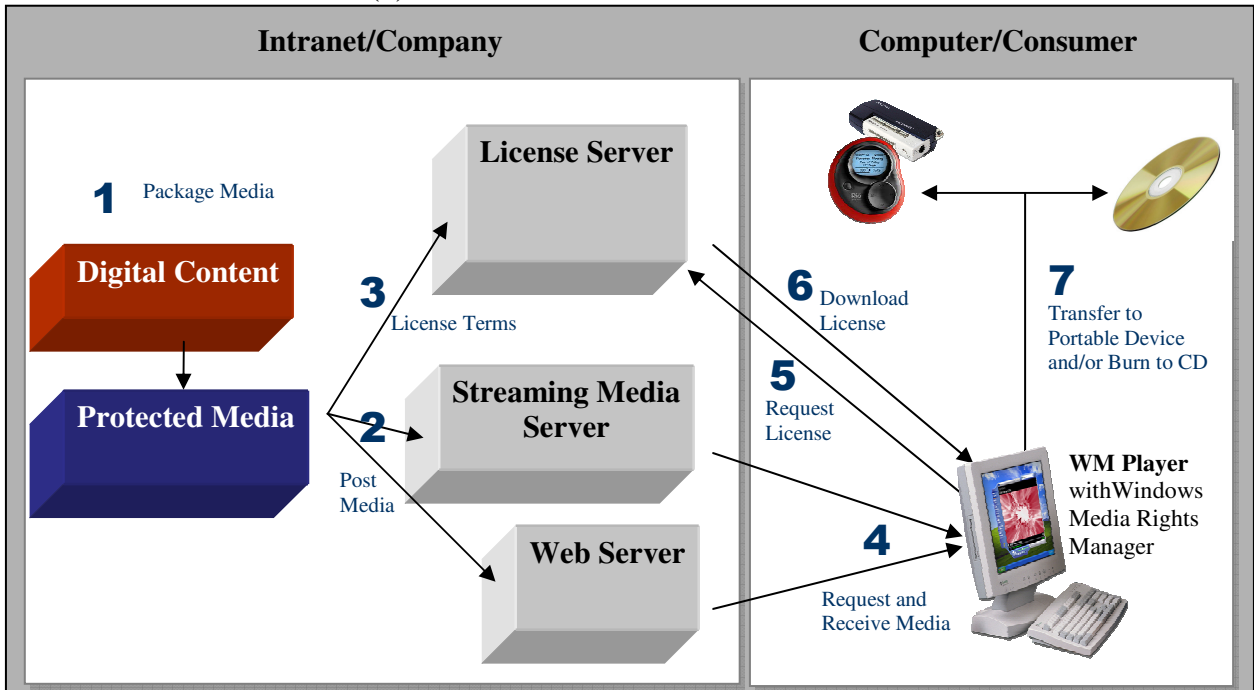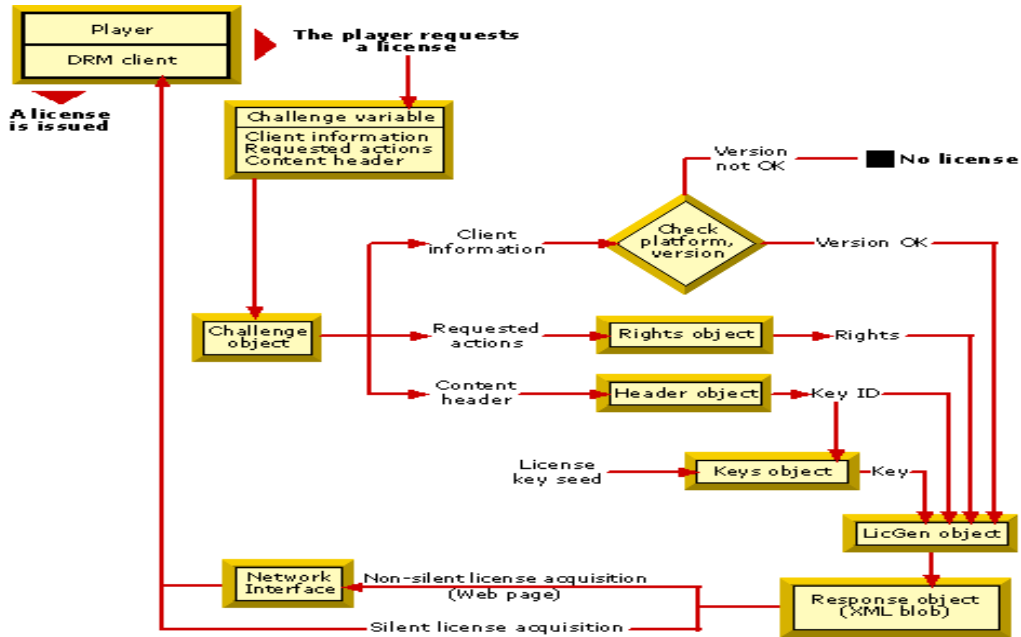
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