



# RealSystem Media Commerce Suite

## Technical White Paper

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## Introduction

Continuing improvements in Internet technology, like widespread broadband availability and advancement in multimedia development, enable the delivery of digital media over Internet Protocol (IP) networks. Digital distribution over IP networks is a exciting alternative to traditional entertainment broadcasting. It introduces a higher level of interactivity, on-demand services, and broader access to media traditionally unavailable to average consumers.

However, the new distribution paradigm also introduces risks of piracy and widespread distribution of unauthorized, stolen content. Content providers and media retailers are faced with the challenge of leveraging this technology to deliver high-value media to consumers, while simultaneously ensuring the protection of this content.

Media rights management provides an innovative solution for content providers, retailers, and consumers, through the application of cryptographic technology and computer security. It offers high-quality media to consumers while protecting media ownership rights. Consumers now have access to a wider array of material and content providers can dictate the access parameters.

RealNetworks believes that rights management technology is essential in enabling a business model centric marketplace for media commerce. With RealSystem® Media Commerce Suite, RealNetworks is introducing the leading digital rights management platform that enables the association of business rules with all valuable media content. By leveraging the end-to-end, robust rights management technologies of RealSystem Media Commerce Suite, rights owners can now develop successful business models to make their valuable assets available to large audiences over the Internet.

## RealNetworks Solution to Media Rights Management: RealSystem Media Commerce Suite

RealSystem Media Commerce Suite meets the following goals:

- Satisfies the needs of all content owners and corresponding rights holder.
- Enables a number of flexible business models including subscription, video on demand (VOD), and other innovative media commerce business models.
- Protects the content owner from piracy attempts or unauthorized access.

- Provides value to consumers by offering content that would otherwise be unavailable without the use of rights management technology.
- Offers secured digital media to the widest audience possible by making it available on desktops, portable devices, and set-top box deployments.
- Transparently delivers secured media to consumers and seamlessly enforces rights during playback, so users receive and play secured media in the same manner as other media files.

## **Understanding RealSystem Media Commerce Suite**

RealSystem Media Commerce Suite provides four components to protect, deliver, and enforce rights for media:

- RealSystem Packager—a utility software for content providers to securely package media files and products for digital distribution or broadcasting.
- RealSystem License Server—an HTTP server that accepts requests for and generates licenses that permit access to secured media.
- Media Commerce Upgrade for RealPlayer—a trusted client that recognizes secured RealMedia files (.rms). Secured RealMedia files are RealMedia files converted to secured data packets stored in an .rms format. The .rms format was specifically developed for secured media. Media Commerce Upgrade for RealPlayer enforces overall system integrity of the client-side media engine and ensures content can only be played back in a trusted, tamper-resistant environment.
- RealSystem RealServer secure file format plug-in—a RealSystem Server plug-in that enables RealSystem Server to seamlessly stream secured media packages.

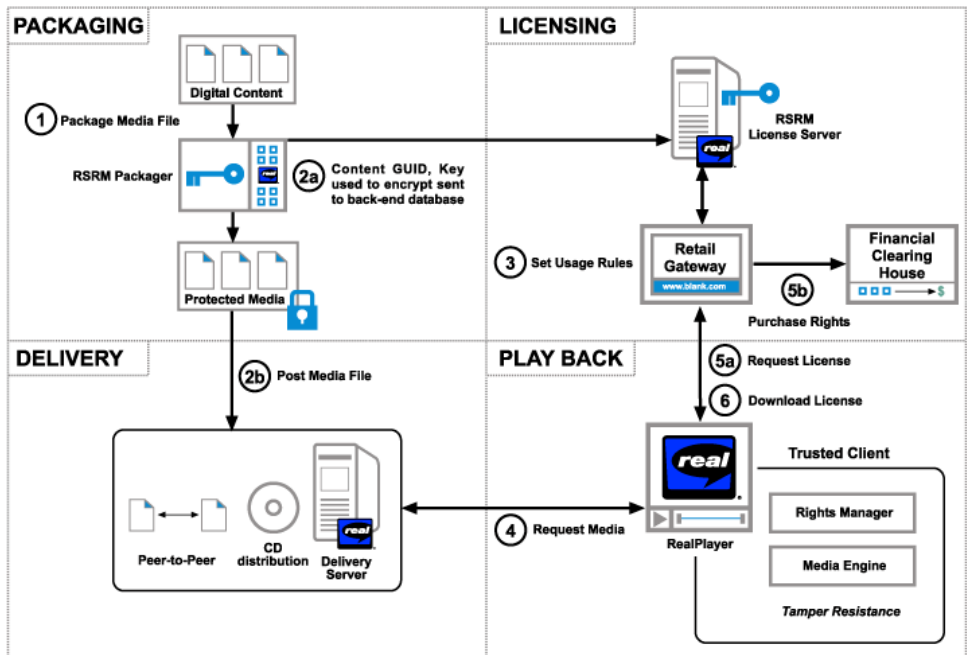
These components interact with existing content delivery mechanisms, a retail Web server and a back-end database. These three components consist of:

- Existing delivery mechanisms to deliver secured content. Secure RealMedia files can be delivered on virtually any delivery mechanism: traditional File Transfer Protocol (FTP) downloads, peer-to-peer networks, multicasting or even on traditional medium like CDs or DVDs.
- A content database, which stores identifying information for each content file: the secured content key and a globally unique identifier. It inputs this data from RealSystem Packager and makes it available to the retail Web server during content licensing.

- The retail Web server, an existing front-end Web site through which consumers request licenses to secured content. The retail Web server sends these requests to RealSystem License Server and returns the licenses generated by RealSystem License Server to the consumer.

## Understanding the Process Flow

The following diagram illustrates the generic process flow of rights management in RealSystem Media Commerce Suite.



RealSystem Media Commerce Suite protects, delivers, and enforces access rights for secured content using these steps:

1. RealSystem Packager converts an unsecured RealMedia file to a secured media file. It generates a globally unique identifier (GUID) and a secured key for the content file and saves them in a text file for import into the retailer's content database.
2. The content GUID and the secured key are imported into a back-end database and the secured media file is made available to consumers through some delivery mechanism, for example a RealServer, a download server, or offline distribution on CDs.

3. The retailer sets usage rules for licensing content.
4. A user contacts the retail Web server to obtain a license to play the secured RealMedia file.
5. The retail Web server requests rights from RealSystem License Server and processes financial transactions with a clearing house for the user's purchase of these rights:
  - a. The retail Web server sends an HTTP request to RealSystem License Server for a license to play the secured content.
  - b. RealSystem License Server parses the information received in the request, then generates and encrypts a license.
  - c. The retail Web server then returns the license to the trusted client, Media Commerce Upgrade for RealPlayer.
6. The trusted client retrieves the content file. It checks its secured license database to ensure that it has received the rights to play the file. Only then will the trusted client play the file.

## **Features and Benefits of RealSystem Media Commerce Suite**

RealSystem Media Commerce Suite is based on a modular, open, extensible, and scalable architecture. This architecture offers the following benefits:

- Ease of integration with existing systems
- Support for various implementation scenarios
- Flexible and variable rights
- Cross-platform compatibility for Windows and UNIX
- Scalable architecture to permit system growth
- Secured and securable components

### **Ease of Integration**

As the diagram in the “Understanding the Process Flow” shows, each step within RealSystem Media Commerce Suite is a unique and self-contained task. Although the components require data-sharing, they do not require single ownership. Different companies can own and operate appropriate pieces of the system. This allows content providers to set up RealSystem Media Commerce Suite in different ways. For example, a retail Web server



could use two RealSystem License Servers to generate licenses--one for European clients and another for American clients.

### Implementation Scenarios

RealSystem Media Commerce Suite can easily support multiple retail models, including:

- Direct sales models
- Multi-tiered retail models
- Hosted service providers

#### Direct Sales Models

Established retail brands, that already attract customers to their site, will probably use a direct sales model. These retailers run both the retail Web server and the components of RealSystem Media Commerce Suite. These companies gain additional profits using their direct customer relationships. A direct sales model implementation will look similar to the system diagram shown in “Understanding the Process Flow”.

#### Multi-tiered Retail Models

Other content owners, like a record label company, will probably choose a more traditional multi-tier retail model. For example, the record label company, Label A, may want to use three large retail chains, Music Retailer A, Music Retailer B, and Music Retailer C, to resell Band Z albums since most consumers know that these stores sell music, but do not know what label company Band Z uses. In this scenario, the record company, Label A, will operate RealSystem Packager, RealSystem License Server, and the content database and have a business-to-business relationship with the direct retailers to sell the media and make requests directly of RealSystem License Server for licenses. Either the retailers (Music Retailer A, Music Retailer B, and Music Retailer C) or the content owner (Label A) may provide the retail Web server for the purchase of licenses.

#### Hosted Service Providers

Unsigned bands or independent musicians may look for a hosting service to distribute their content for a percentage of the revenue. In this scenario, the hosting service will take protected files from the bands or musicians and make this content available through its retail Web server. Users will request licenses from the Web site, and these requests are sent to RealSystem License Server of the appropriate band or musician. RealSystem License Server returns the

license to the retail Web server and the retail Web server then sends the license to the requesting user.

## Securing Media

Securing content involves creating a secured content key that prevents unauthorized content access and protects the file contents, so it can be securely delivered to authorized consumers.

### Features and Benefits of RealSystem Packager

RealSystem Media Commerce Suite encrypts media using strong cryptographic algorithms. As we saw earlier, the content is secured at the beginning of the process by the encryption methods of RealSystem Packager; the secured content key for the protected media is stored separately in the content database. The secured media file cannot be accessed until RealSystem License Server generates a license with the key for this content.

RealSystem Media Commerce Suite's methods for securing media offers the following advantages:

- **Strong Cryptography**

The encryption algorithms used for media encryption use public algorithms that have passed cryptographic analysis and employ long key lengths.

- **Support for Metadata**

RealSystem Packager allows metadata input that content providers want to store with the file information. For example, a content provider may choose to store title, author, and copyright information for each content file and make this information available to consumers. However, it may also want to store the date of each content file's encryption for internal use. RealSystem Packager easily accommodates both of these requests.

- **Rights Are Stored Separately from the Content**

RealSystem Packager encrypts the content file, but rights are added separately. This allows content providers to define business rules and different scenarios for purchasing rights to a single piece of content. Because rights and content are not coupled until a single license is generated, content providers can license a single piece of content in a variety of ways. For instance, a content provider may choose to give a one-

month license to a user as part of her club membership, but only a three-day license to non-members.

- **Support for Secured Streaming and Download Delivery**

RealSystem Media Commerce Suite allows you to package your content once and distribute it with either streaming or download delivery methods. The system even supports other traditional delivery methods, such as CDs or DVDs. This is another reason rights are stored separately from the content file. Regardless of how the content is delivered, it can only be played with a valid license issued to the individual client.

- **Secured Distribution and Delivery of Content**

Since the secured content file is never stored with its content key, at no point are the means to view the content file in the same location as the file itself. Once the user obtains a license, she retrieves the content; simultaneously, Media Commerce Upgrade for RealPlayer retrieves the secured key in her license to play the content.

## Database Integration

Content providers can import the tab-delimited text file from RealSystem Packager into any database type. As stated earlier, they can customize the type of data they want stored with the content file and store it in an existing customer database or create a new database. The database is required to support only two columns: the content GUID and the content key.

## Licensing Media

RealSystem License Server licenses media by generating licenses that prescribe the type of access an individual is granted for a particular piece of content. It can offer different types of licenses to different users for the same piece of content.

## Features and Benefits

RealSystem License Server is built using RealSystem Server technology. Thus, it offers many of the same benefits afforded by the RealSystem Server:

- Cross-platform compatibility to run on Windows or UNIX platforms
- Efficient load balancing to handle peak volumes

- Ability to restrict access by IP address for added security

All licenses issued by RealSystem License Server meet the following criteria:

- Licenses are uniquely bound to a client machine.
- Licenses are authenticated and secured during delivery.
- Licenses support flexible business rules for assigning rights.
- Licenses can be used to revoke or restore licenses, if the content provider chooses to implement these capabilities.

RealSystem License Server accepts license requests from the retail Web server in a simple HTTP format. This facilitates integration and communication between the retail Web server and RealSystem License Server.

### Simple Communication Protocol

The retail Web server sends client-specific information, the content GUID and key retrieved from the content database, and adds the appropriate rights for this user and content. The retail Web server can use any method to retrieve this information from the trusted client and the content database. For example, to retrieve client information, the retail Web server can employ embedded player functionality or use JavaScript or other scripting languages. To retrieve information from the content database, the retail Web server can use any database language that is compatible with the content database format. The retail Web server needs only to comply with the HTTP request format when sending this information to RealSystem License Server.

### Restricted Access

RealSystem License Server communicates only with the retail Web server. The retail Web server, then, is the only authorized server to request licenses and receive the license requests. The retail Web server acts as a proxy between the trusted clients and RealSystem License Server. In this way, it prevents direct interaction between consumers and RealSystem License Server. This helps protect against invalid license requests or attempts to tamper with RealSystem License Server.

### Unique Licensing

Each license is unique to the computer on which the requesting trusted client resides. This prevents the transfer of the license to another client.

### Secured License Delivery

Because the license is uniquely bound to the individual client, only the requesting client can use it. Additionally, the content key is never in clear text; it is always encrypted.

### Flexible Business Rules

Content rights are the foundation with which content providers create their business rules. Because each piece of secured content is not coupled with rights until an individual license is generated, content providers can license one piece of content in a variety of ways, such as:

- A subscription service based on a time period or number of playbacks
- A rental service based on the same criteria

### Revocation Capabilities

RealSystem License Server has the capacity to act as a revocation agent. Content providers can use revocation to do any of the following:

- Revoke rights if a user violates the contract in a license.
- Revoke a compromised component on the client.
- Revoke all content provided by the content provider.

Revocation capabilities offer content providers the ability to universally revoke a piece of content or all of its content without tracking individual users. In the license, retailers can send a revocation URL that the trusted client must contact periodically before playing content. Content providers can optionally revoke all content if necessary for business or legal reasons.

## Media Commerce Upgrade for RealPlayer

Secured media can only be played by Media Commerce Upgrade for RealPlayer from RealNetworks. Media Commerce Upgrade for RealPlayer offers enhanced security and enforces content access rights on the client application. This trusted client has a secured rights database in which it stores and validates all licenses.

### Features and Benefits of Media Commerce Upgrade for RealPlayer

Because Media Commerce Upgrade for RealPlayer and its rights database are the most widely distributed components of RealSystem Media Commerce

Suite, its security is extremely important. Some key features of this security are:

- A tamper-resistant architecture
- Database protection of the rights database
- Rights enforcement during offline playback

A tamper-resistant architecture ensures no components of the trusted client are compromised. A protected database safeguards the licenses stored on the client from the following attacks:

- Clock rollback
- Manual manipulation of rights

#### Rights Enforcement during Offline Playback

Media Commerce Upgrade for RealPlayer uses a secured rights database to track the current rights available to the client and enforces the business rules associated with the rights. Regardless of whether the user plays media online or offline, the media rights are enforced.

Furthermore, if a user attempts to play content without a license or with an expired or invalid license, playback is prevented and the user is sent to a Web page to obtain a valid license.

### How Media Commerce Upgrade for RealPlayer Works

Users initiate requests for secured data in one of two ways:

- Web browsing: Users go to a retail Web server and browse the store for content they want to view and obtain a license to access this content.
- Physical or online distribution: Users may obtain secured content without rights, for example, by clicking on a link to secured content or receiving a CD. When they attempt to view the content, the Web browser will send them to a page where they can obtain access.

In both cases, methods are provided for the retail Web server to retrieve information about the client that is then used to generate a license for that individual client.

#### Note

In either of these scenarios, if the client does not have the most recent Media Commerce Upgrade for

RealPlayer, the client initiates an upgrade before the process continues.

### Upgrading to a Secure Client

If a user attempts to play secure content without Media Commerce Upgrade for RealPlayer, the client seamlessly upgrades to a secure client. The client must upgrade itself before the licensing process occurs. The upgrade process involves upgrading to the most current version of Media Commerce Upgrade for RealPlayer to enforce usage rights and allow secured media access.

### License Verification

Media Commerce Upgrade for RealPlayer stores all licenses in a secured rights database. Each time Media Commerce Upgrade for RealPlayer attempts to play a secured media file, it checks the rights database and ensures:

- A valid license exists for that content.
- The time period and access rights are still valid.

If both these conditions are met, Media Commerce Upgrade for RealPlayer allows the content to be played. If it does not find a license or finds an expired license, the consumer is sent to the retailWeb server to purchase another license.

## Personal Privacy

Media Commerce Upgrade for RealPlayer does not expose any trackable information. This information is only sent between the customer and the licensor of the content, not RealNetworks.

## Backup and Restoration Capabilities

Media Commerce Upgrade for RealPlayer has the capability to back up licenses to a file for restoration in the event of a system failure. Content providers can choose to make their licenses restorable. For restorable licenses, Media Commerce Upgrade for RealPlayer offers users the ability to back up their licenses to disk. In the event of a system failure, a user can then restore the rights database. During the restoration process, Media Commerce Upgrade for RealPlayer contacts a RealNetworks server that verifies that these licenses have not been restored too many times. To prevent abuse, a license can only be restored a pre-defined number of times.

