

Microsoft PlayReady

Content Protection Technology

April 2015

Abstract

Microsoft® PlayReady® is the premier platform for protection and distribution of digital content. This white paper provides an overview of Microsoft PlayReady — it outlines challenges in the digital media ecosystem, how PlayReady solves these challenges, and how you can get started with PlayReady technology.

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Introduction

Well-understood business models for creating, distributing, and monetizing media content have seen considerable upheaval in recent years. The need for protecting the distribution of premium content has precipitated the need for digital rights management (DRM) systems. This white paper provides a brief summary of recent trends and challenges in the digital media ecosystem, followed by an introduction to Microsoft's content protection solution to these challenges: Microsoft PlayReady.

Media and Entertainment Trends

What we watch and how we watch is changing. We're at the beginning of a major historical shift from watching scheduled TV programming to watching Live TV and video on a plethora of devices, including mobile phones, tablets and smart TVs. Content formats and protection systems are no longer tied to a single consumption platform, and there is a growing trend to bring managed content experiences to unmanaged devices. The devices are now internet-enabled and mobile, and the number of these devices continues to grow. The availability of multiple consumption outlets helps to blur the distinction between web and broadcast media: consumers may consume content on smart phones, tablets, gaming consoles, smart TVs, IP streaming boxes, or connected Blu-ray players. In fact, web and broadcast media are becoming relatively indistinguishable to consumers and people are choosing to watch TV how and where they want.

As content becomes more expensive to produce and more of that investment is lost to piracy, robust DRM systems become even more important to content owners for protecting their investment.

Challenges

From the perspective of the digital media ecosystem, there are currently three main challenges:

- The number of digital media devices is growing.
- Consumers are consuming more content on these devices.
- Content providers are delivering higher quality and resolution of content.
- Tactics to protect and monetize content are more crucial today than in years past.

Customers want connectivity everywhere, and they want interactive personalized experiences on their device of choice, with their preferred applications. To meet the demands of consumers, network operators must deliver a huge amount of data in order to deliver compelling experiences with high quality. Because these content experiences are moving to multiple consumption outlets — some of which are unmanaged — well-understood business models for monetizing content are no longer the rule. For example, high-value movie content is often now available via over-the-top (OTT) services on the same day as it appears in movie theaters.

Content protection systems must be able to scale to the growing number of devices. Also, these content systems must be versatile enough to handle an increasing variety of consumption platforms while also maintaining the robustness required to provide reliable security across all services and devices. Content protection systems must be flexible enough to handle the various business scenarios that the expanding digital media ecosystem will inevitably produce.

The Future

The future holds several important shifts in the digital media ecosystem. Security is moving into hardware, apps are giving way to browsers, networks are becoming mere pipes for OTT content, and content delivery is moving to the cloud:

Today	Tomorrow
Software-based security	Software and Hardware-based security
Dedicated applications	Standards-based HTML5 playback
Managed networks	OTT streaming, and managed networks
On-premises based delivery	Hybrid (Cloud and on-premises) based delivery

Content protection systems must evolve to support these changes, embrace new standards such as HTML5 Encrypted Media Extensions (EME), move to open technologies such as Dynamic Adaptive Streaming over HTTP (DASH), and anticipate the shift to ultra-high resolution (UHD/4K) content.

The Solution: Microsoft PlayReady

Microsoft PlayReady is a comprehensive content delivery and management solution for entertainment products and services across all platforms and types of devices. Developed by Microsoft, PlayReady is the result of over 14 years and over \$2 billion in R&D. Thanks to a full IP patent portfolio, proven robustness, and backing by a dedicated breach response team, PlayReady has become the leading DRM system for protecting media content. Microsoft's ongoing commitment to secure, user-friendly protection of content and cross-platform capabilities inherently positions Microsoft PlayReady as a key enabler for the media and entertainment industry.

PlayReady is proven, versatile, and scalable throughout the digital media ecosystem:

- PlayReady is already approved by major Hollywood studios, the Digital Entertainment Content Ecosystem, UltraViolet™, and HbbTV®.
- PlayReady provides support for multiple business models including subscription, pay-per-view, rental, ad-based, and purchase.
- PlayReady offers multiple distribution options such as download, rental and streaming.
- PlayReady is available on multiple platforms including Android, iOS, Windows and Windows Phone, Xbox, and various types of consumer electronics devices.

HTML5 platforms have leveraged PlayReady and many PlayReady endpoints now support MPEG-Dash. PlayReady in Action

In general, content protection systems are designed to do the following:

1. Secure the distribution of digital content.
2. Allow rights to that content to be specified and enforced.

PlayReady secures content by encrypting data files. These encrypted files may be moved, archived, streamed, copied, or distributed without restrictions. In order to decrypt these data files, a digital *key* is required. This key is contained within a *license*. Each license also contains rights and policies that specify how the files may be used, and under what conditions.

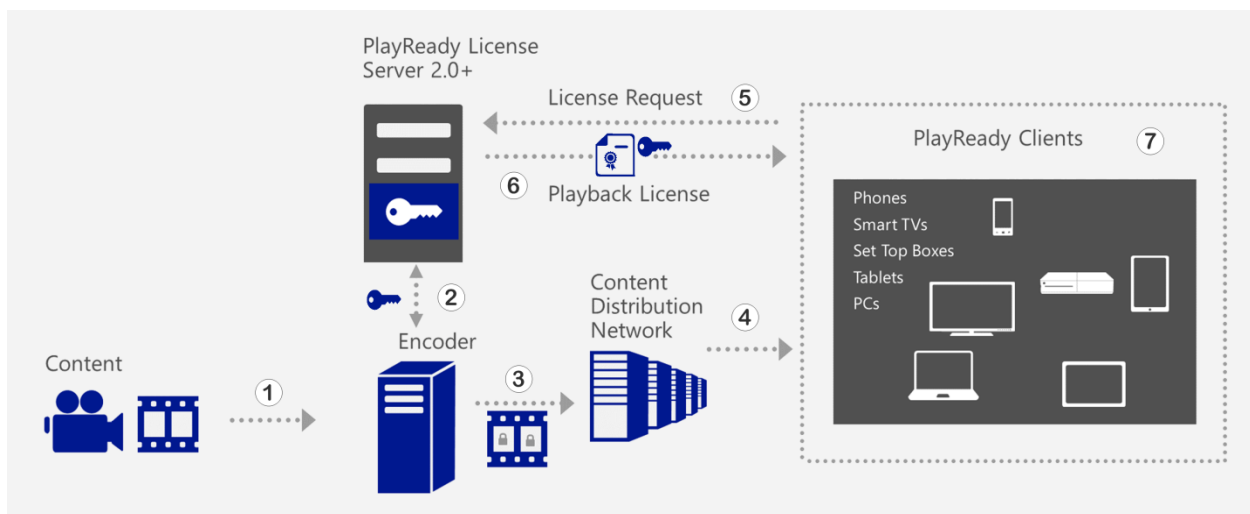


Figure 1 - Content Consumption Model

Figure 1 offers a typical example of how PlayReady secures and manages content consumption:

1. Before content can be distributed for playback, it must first go through an encryption step to protect the content.
2. An encoder encrypts the content using an encryption key that is also made available to the license server.
3. After the content is encrypted, it is staged for delivery to playback clients (typically via a content distribution network).
4. PlayReady clients discover content within the application developed for the service.
5. To decrypt content, a PlayReady client sends a license request to a PlayReady license server.
6. The PlayReady license server authenticates the client and issues a license back to the client.
7. As the client uses the license key to unencrypt the content, it plays back the content according to the policies specified in the license. Some of the common policies utilized are time based restrictions and output protections (for example, restricting playback to a secure HDMI port to safeguard against copying).

PlayReady supports many variations on this content consumption model. The license can be embedded in the content rather than distributed via a license server, and multiple clients can share a single license (domains).

Key Features

The following list summarizes the key features of PlayReady technology.

Secure License Delivery	PlayReady securely delivers licenses to clients — every client has a unique certificate that authenticates the client to PlayReady servers.
Key Rotation	For Live TV scenarios, PlayReady provides support for <i>key rotation</i> , where the encryption keys protecting the content change on a frequent and specified basis. PlayReady for Live TV also supports ad insertion and blackouts.
Output Protection	PlayReady can enforce the restriction of playback to output ports on playback devices based on license policies.
Domains	PlayReady supports the concept of <i>domains</i> . A PlayReady domain is a group of devices that can share a domain bound content license. PlayReady domains can also managed the number of devices a services allows per account.
Metering	PlayReady supports <i>metering</i> , where the playback client maintains a count of how many times a content file is played.
ND Streaming	PlayReady for Network Devices (ND) is designed for in-home streaming scenarios to extend the reach of a managed network to devices via DRM. PlayReady ND also enables CAS to DRM for in home viewing on devices.
Breach Response	PlayReady actively manages the device ecosystem and has industry-leading processes in place to manage clients in the unlikely event of a security breach.
Multiple Client Platforms	PlayReady supports a range of client platforms including Windows, Xbox, iOS, and Android. PlayReady is also available for set-top boxes and other consumer electronics devices such as TVs and media players.
Multiple Content Types	The format extensibility of PlayReady supports essentially any type of content, including movies, live TV, music, games, ringtones and images, and is commonly used with the following audio and video formats: For audio content, support includes AAC, AAC+, and WMA

	codecs. For video content, support includes H.263, H.264 and H.265 codecs.
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Business Models

PlayReady technology supports a wide range of business models for delivering digital content. Business models supported by PlayReady include:

Subscription	<p>Subscriptions allow a service provider to charge a flat rate for access to any or all content in the service provider's catalog. PlayReady supports subscription models through three mechanisms:</p> <p><i>Time Length</i> The license issuer can specify the length of time for which a license is valid, thus ensuring that access to the content expires when the subscriber cancels their subscription. While the subscription is active, the licenses are renewed prior to expiration so that the user enjoys uninterrupted playback.</p> <p><i>License Chaining</i> A service provider can provide a root license which contains the subscription's time based policies. Connected leaf licenses are delivered for each piece of content. If the root license expires and is not renewed then the leaf licenses will no longer work. This simplifies the license process for services which provide numerous offline files such as music subscriptions</p>
Pay-per-view	PlayReady supports the pre-delivery of content licenses as well as acknowledgement from the client that the license was successfully stored. This provides assurance to the service that the client can consume the content during the payment and provisioning process.
Rental	PlayReady supports rental scenarios by supporting time-based licenses. A movie download service can create licenses that satisfy consumer viewing habits while ensuring that the content is used in a way the content owners intended. For example, consumers can rent a movie that allows them to begin viewing at any time within 30 days and for 24 hours after the first viewing.
Purchase	Consumers purchase and download content files protected with PlayReady encryption from content service providers. This approach is often used for

	delivering, for example, music on a per-song basis rather than via subscription. Depending on the business rules in the license, the purchased songs could be copied, made transferrable, or converted into another protection scheme.
Ad-Based	PlayReady supports ad-based scenarios for all content types, and it supports ad-insertion for Live TV.

Distribution Options

PlayReady supports a number of options for distributing content:

Download	<p>Two flavors of download are supported. The media playback application renders the file in exactly the same way, regardless of the way it is downloaded:</p> <p><i>Basic Download</i> A content file is delivered in its entirety to local storage on the device and then played back — assuming a valid license is available.</p> <p><i>Progressive Download</i> Playback begins after the initial portion of the file has been downloaded. The rest of the file is downloaded in parallel with playback.</p>
Adaptive Streaming	Most PlayReady endpoints support adaptive streaming formats such as MPEG-Dash, Smooth Streaming, and HLS. With adaptive streaming the client requests media segments from various encoded bitrates of a media asset. The client chooses which bitrate to request the next segment from with its own heuristics such network and playback performance.

The PlayReady Product Suite

The PlayReady product suite is comprised of *PlayReady clients*, *PlayReady servers*, and software development kits for implementing these components.

PlayReady Clients

PlayReady clients acquire protected content, interpret licenses, enforce the rules contained in a license, and play back content. PlayReady provides numerous client options and offers several software development kits for developing clients:

Device Porting Kit	The device porting kit is typically used for devices such as set-top boxes, smart TVs, kiosks, and mobile devices. The porting kit includes the following:
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	<ul style="list-style-type: none"> • ANSI C source code that enables you to incorporate Microsoft PlayReady client functionality into any device, regardless of operating system. • API documentation. • Reference implementation and tools. • Test framework. <p>The included source code targets a variety of popular CPU architectures. The porting kit is the foundation for all clients.</p>
Android SDK	<p>If you are creating an Android app, you can use the PlayReady Client SDK for Android, which has these features:</p> <ul style="list-style-type: none"> • Supports Android 4.{0,1,2,3,4}, and 5 • Live TV, including key rotation, blackouts, and ad insertion • ND-Receiver functionality <p>Dev Tools:</p> <ul style="list-style-type: none"> • Android SDK + Eclipse IDE • Included sample player application
iOS SDK	<p>If you are creating an iOS app, you can use the PlayReady Client SDK for iOS, which has these features:</p> <ul style="list-style-type: none"> • Supports iOS 6.0 + • Supports HLS on iOS (VoD, Live) • Live TV, including key rotation, blackouts, and ad insertion • ND-Receiver functionality <p>Dev Tools:</p> <ul style="list-style-type: none"> • OSX 10.7 (Lion) + • Xcode 4.5.2 + • Included sample player application
Windows SDK	<p>For Windows 8, you can use the PlayReady SDK for Windows Store Apps to develop PlayReady-enabled Windows Store apps. On other Windows platforms, PlayReady functionality is available via Silverlight. Alternately, you can develop a web browser-based client as described below.</p>
Xbox	<p>Xbox 360 and Xbox One natively support PlayReady. The Xbox platform works with branded services to deliver media applications — if you have an app that you would like to be considered for the Xbox platform, please send inquiries to xboxapps@microsoft.com.</p>

Silverlight	If you are creating a Silverlight application for Windows or Mac OSX, Silverlight includes built-in PlayReady support.
Web Browsers	<p>With the recent standardization of EME in HTML5, it's now possible to create web browsers capable of securely consuming PlayReady encrypted smooth-streaming or DASH content. PlayReady supports HTML5 EME standards through the CDMi (Content Decryption Module Interface) specification.</p> <p>Open-source browsers on any platform can use the CDM plug-in (available in the Porting Kit) to access PlayReady-encrypted content. On Windows 8.1, PlayReady is part of the Media Foundation of the OS, so Internet Explorer 11 supports EME without the need for a browser plug-in. The Media Foundation APIs can be utilized by other browser vendors on Windows.</p>

For more information about PlayReady clients, see [Client Options](#). To learn more about PlayReady, HTML5, and EME, see [PlayReady & HTML5](#). For more about CDMi, see the [Content Decryption Module Interface Specification](#).

PlayReady Servers

PlayReady Servers prepare content for distribution, store and distribute content, manage licenses and domains, and meter content usage. PlayReady servers can be on-premises or located in the cloud.

The packaging server takes in unprotected content and packages it for distribution via encryption. After the content is packaged, it is copied to a distribution server, and the license information is transferred to a license server.

The distribution server stores and distributes content. Distribution servers are usually web servers — PlayReady does not require a specialized server for content storage and distribution.

PlayReady provides support for the following server types:

License Server	Stores the licenses for using the content. Before a client can play back protected content, it must acquire a license.
Domain Controller	Determines what a given domain represents (for example, a user, a family, or a group of users). For each domain, domain controllers hold a list of entities that are associated with that domain. The domain controller also enforces the policy defining how many devices or computers may join the domain.
Metering Server	Supports the metering feature described in <i>Key Features</i> .

You can use the PlayReady Server SDK to implement services for packaging and delivering PlayReady content, issuing licenses, managing domains, and tracking metering usage.

Get Started With PlayReady

Depending on your platform, there are several ways that you can quickly get started with PlayReady technology:

Windows 8, Windows Phone, Silverlight	<p>Windows 8, Windows Phone, and Silverlight include native support for PlayReady, so you can get started today in developing and deploying PlayReady-enabled client media applications on these platforms. If you are developing a Windows Store app, you can download the following to help you get started with PlayReady:</p> <ul style="list-style-type: none"> • PlayReady SDK for Windows Store apps • PlayReady sample application
Xbox	<p>To deploy PlayReady on Xbox, you can use the Xbox 360 or Xbox One application developments kits, which include built-in support for PlayReady. You can find out more by sending inquiries to xboxapps@microsoft.com.</p>
Android, iOS, Devices	<p>To deploy or develop with PlayReady technology with our SDKs for Android, iOS, or other platforms (such as consumer electronics devices), you must first sign up for a PlayReady license. If you want to try out PlayReady before purchasing a license, you can request a PlayReady evaluation agreement from wmla@microsoft.com. The evaluation agreement includes a PlayReady client SDK with a non-production SL150 certificate, so you can test your client app or device with PlayReady before purchasing a license.</p>

Which License Do I Need?

You do not need a license if you are developing and distributing PlayReady clients for Windows 8, Windows Phone, Xbox, or Silverlight. Please note that you will need a PlayReady Server Agreement to deploy a service to Windows endpoints.

For all other platforms you will need a license. When you purchase a license, you can download the SDKs and other packages associated with that license. Each client license includes a production-level SL2000 certificate. For every license, you must also sign the **PlayReady Master Agreement**.

Microsoft offers several PlayReady licenses, depending on how you will use and deploy PlayReady technology. The following table lists each license agreement and outlines the scenarios that apply to that license and the products included in the license package.

Agreement	Scenarios	Includes
Microsoft PlayReady Final Product License	For distributing PlayReady client devices to end users, or for using PlayReady clients in a commercial deployment.	PlayReady Certificate Generation Kit, PlayReady Client SDK for iOS/Android, PlayReady Document Pack, PlayReady Windows 8.1 Sample Application with ND, Client SDK SL2000 Library, and Company Device Certificate.
Microsoft PlayReady Intermediate Product License	For developing a PlayReady iOS or Android client, or for developing a client device such as a set top box, smart TV, or media player.	PlayReady Device Porting Kit, PlayReady Client SDK for iOS/Android, PlayReady Document Pack, PlayReady Windows 8.1 Sample Application with ND, CDMi Example Code for PlayReady, Client SDK SL2000 Test Library, Company Device Test Certificate.
Microsoft PlayReady Service Deployment License	For using PlayReady server technology in a commercial deployment or in end-user distribution.	PlayReady Certificate Generation Kit, PlayReady Document Pack, Deployment Certificate, Premium Deployment Certificate, Domain Certificate, Metering Certificate.
Microsoft PlayReady Server Development License	For developing a PlayReady server.	PlayReady Server SDK, PlayReady Documentation Pack, Deployment Test Certificate, Premium Deployment Test Certificate, Domain Test Certificate, Metering Test Certificate

Note that if you are developing and distributing a PlayReady client, you need two licenses:

- The Microsoft PlayReady Intermediate Product License.
- Microsoft PlayReady Final Product License.

Similarly, if you are developing and deploying a PlayReady server, you need:

- The Microsoft PlayReady Server Development License.
- Microsoft PlayReady Service Deployment License.

Instead of licensing PlayReady server directly, you can contract with a Microsoft PlayReady Server ASP licensee – these companies will run PlayReady servers on your behalf. Or, if you are

interested in deploying a service on behalf of a third party brand, you will want to execute the **Microsoft PlayReady Server ASP Agreement**.

For more information about the **Microsoft PlayReady Server ASP Agreement**, see [Approved Microsoft PlayReady Licensees](#).

For more information about PlayReady licensing, see [Licensing Frequently Asked Questions](#). If you have questions about the PlayReady licensing process, please contact Microsoft at wmla@microsoft.com.