Microsoft

PlayReady

Supporting In-Home Content Distribution with PlayReady for Network Devices

March 2015

Abstract

Microsoft® PlayReady® is the premier platform for the protection and distribution of digital content. This white paper provides an overview of PlayReady Digital Rights Management for Network Devices and explains how it can be used to protect and distribute digital audio and video content between devices that are connected to the same home network.

Microsoft

Table of Contents

Introduction

Consumer viewing habits and expectations have shifted significantly in recent years. Instead of playing premium audio and video content on a limited set of devices, consumers prefer and expect to play it at their convenience and on multiple consumer electronic devices — phones, tablets, game consoles, Smart TVs, and more — many of which are connected to the same in-home network. Media consumption and consumer expectations have shifted to an "anytime, anywhere, any device" ethos that marks a major change from the past. This shift poses significant challenges to well-understood business models for creating, distributing, protecting, and monetizing media content.

As access points and devices proliferate, piracy becomes a greater and more costly risk, limited device capabilities adversely impact distribution opportunities and consumer experiences, and extending existing infrastructure can be prohibitively expensive. For example, broadcasting TV directly to devices other than set-top boxes (STBs) is difficult because most consumer electronic devices don't provide built-in TV tuners. Although shifting to an over-the-top (OTT) service model is a possible solution, OTT services require different rights agreements and can't easily leverage existing broadcast and delivery infrastructure. In addition, piracy continues to be a costly risk, yet the proliferation of access points and devices means that media formats and protection systems can no longer be tied to a single consumption platform.

Microsoft PlayReady Digital Rights Management for Network Devices (PlayReady ND) helps address these challenges by protecting the rights of content owners and providers while also enabling consumers to enjoy premium audio and video content on multiple connected devices in the home. As part of the PlayReady system, PlayReady ND offers the same robust content protection for in-home distribution scenarios that PlayReady provides for other distribution scenarios. PlayReady supports:

- Multiple media distribution models, including subscription, video on demand (VoD), rental, ad-based, and purchase (download to own).
- Multiple media delivery methods, including live and on-demand streaming, and basic and progressive download.
- Emerging and established international and industry standards, including MPEG-DASH, HTML5 media extensions, Smooth Streaming, and Apple HTTP Live Streaming (HLS).
- A broad range of consumer electronic devices, including phones, laptops, tablets, STBs, Smart TVs, connected Blu-ray™ players, and HDMI dongles.
- All major client platforms, including Android, iOS, Windows®, Windows Phone®, and Xbox®.

PlayReady is also approved and adopted by major Hollywood studios, the Digital Entertainment Content Ecosystem, UltraViolet™, Smart TV Alliance, and HbbTV®.

With more than 15 years and $2 billion of research and development, a full IP patent portfolio, proven robustness, and backing by a dedicated breach response team, PlayReady has become the industry-leading, digital rights management (DRM) system for protecting media content on certified devices. It provides scalable, secure, user-friendly protection of content for a wide range of distribution and consumption options.

PlayReady ND brings that support to consumer electronic devices that are connected to the same Internet Protocol (IP) network. With PlayReady ND these devices can become digital media receivers, referred to as *receivers* and digital media transmitting devices referred to as *transmitters*. Because PlayReady is compatible with a variety of device classes, architectures, and system environments, a receiver or transmitter can be any type of in-home device — any device that is capable of receiving and displaying streaming content can be a PlayReady ND receiver and any device that is capable of sending streaming content can be a PlayReady ND transmitter. Consequently, PlayReady ND enables consumers to stream protected audio and video content to virtually all platforms and types of devices in their home network, while also enforcing the distribution rights and policies specified by content owners and providers.

In this white paper, we'll provide an overview of PlayReady ND and explain how it can be used to protect and distribute digital audio and video content between consumer electronic devices that are connected to the same home network. To learn about PlayReady technologies more generally, see Deploying PlayReady Technologies on the PlayReady website.

Understanding PlayReady ND

At it's core, PlayReady ND is a protocol that works with other PlayReady client and server technologies to share protected content securely between consumer electronic devices that are connected to the same IP network. It enables consumers to stream protected content remotely from a network device to applications on other network devices throughout the home. It also enables content owners and providers to specify and enforce the full range of rights and policies for that content, all by using PlayReady as a single DRM system that spans both in- and out-of-home distribution scenarios.

The PlayReady ND architecture implements two categories of digital media devices for distributing media content within a home:

- Transmitters – Perform tasks such as registering and validating other devices (receivers) within the same network, and subsequently issuing licenses and streaming audio and video content to those devices. Any device that is capable of sending streaming content to another device can be a transmitter. For example, a transmitter might be an STB, protected tuner, home media server, phone, or tablet.

- Receivers – Primarily discover, request, acquire licenses for, and stream content from a transmitter. Any device that is capable of receiving and rendering digital audio and video content can be a receiver. This includes phones, tablets, laptops, game consoles, Smart TVs, and more.

Only a device's hardware and platform capabilities restrict its ability to be a transmitter or receiver.

The PlayReady ND architecture also integrates with multiple delivery and distribution models, including conditional access systems (CAS) and over-the-top (OTT) services. Consequently, device manufacturers and content providers can implement PlayReady ND devices and applications that stream or play protected content from virtually any content source to virtually any type of media device in a consumer's home. For example, if a cable or satellite provider provisions an STB with PlayReady-ND transmitter functionality, a consumer can use one or more PlayReady-ND receiver devices — for example, a Windows tablet, Android phone, iPad, or Xbox One™ — within the same home network to connect to the STB, browse available channels, and stream channel content from the STB. Similarly, a consumer might use a Windows tablet or iPad provisioned with PlayReady ND to discover and stream content from a digital media server that is enabled as a PlayReady-ND transmitter and connected to the same network.

The following diagram illustrates the high-level architecture for PlayReady ND. In the diagram, content is streamed through a managed network to an in-home STB or modem/router that functions as a PlayReady ND transmitter, and then through an unmanaged in-home network to connected media devices (PlayReady ND receivers). In the diagram, content source "1" is a CAS from a cable or satellite provider. Content source "2" is an OTT service.

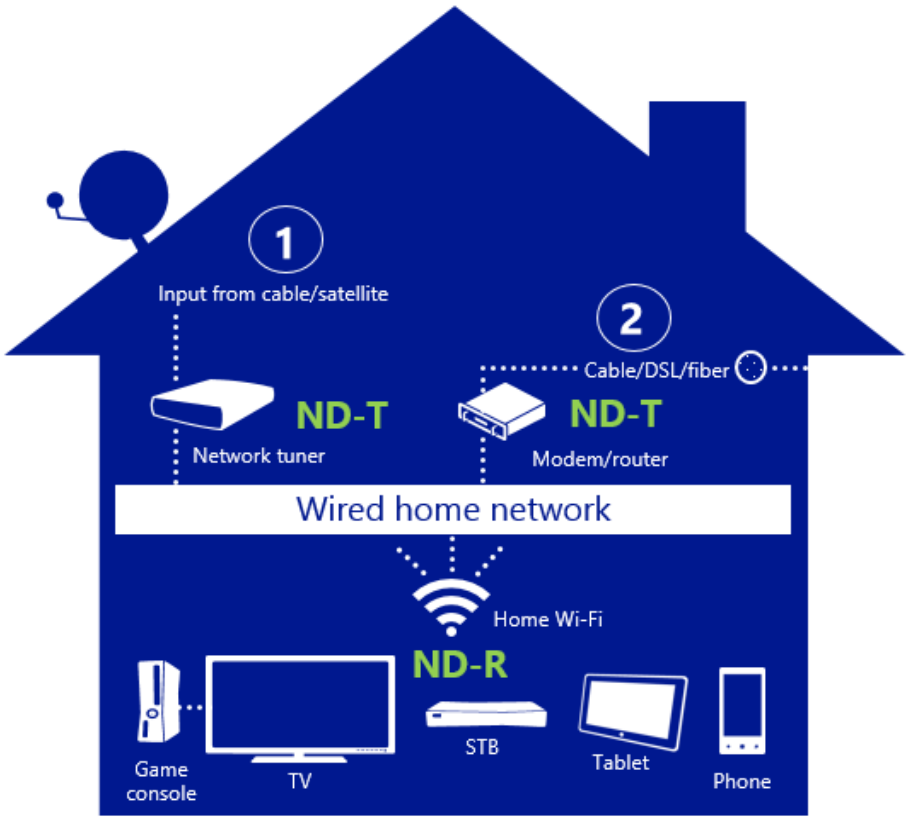

Figure 1 – High-Level Architecture for PlayReady ND

Within this architecture, the primary steps in the content flow are:

1. A PlayReady ND transmitter (ND-T) receives protected media files and the corresponding licenses either in stream or from a PlayReady license server.
2. If the content source is a CAS, the transmitter repackages the stream and optionally builds a locally generated license for it. For an OTT service, the transmitter retransmits the stream and optionally builds a locally generated license for it.
3. A PlayReady ND receiver (ND-R), which is any PlayReady-enabled media device in the same home network, uses a discovery service to find the transmitter and requests content.
4. The transmitter authenticates the receiver, issues one or more licenses to the receiver as appropriate, and sends the protected media files to the receiver.
5. The receiver decrypts and plays the media files according to the policies specified in the associated licenses.

Note that PlayReady ND provides end-to-end protection of the content as it moves from the content source through the network and transmitter and ultimately to the receiver. In addition, protection mechanisms span the full range of PlayReady features and technologies. When compared to other possible protection solutions for in-home distribution scenarios, such as link encryption for example, this architecture provides several advantages:

- Media content is encrypted, instead of the communication layer only, and the content remains encrypted for both streaming and offline playback.
- Licenses support the full range of policy settings, including output-protection levels and time-based restrictions.
- Devices are managed actively by using revocation data and processes.
- Hardware-based security can be implemented on devices for enhanced content protection.

In addition, the PlayReady ND transmitter acts as a bridge between PlayReady ND receivers in the home network and both the managed network and content source. This approach enables a content provider to extend delivery to a variety of connected media devices by using the quality of service and data bandwidth of a managed network. The transmitter also provides content discovery and built-in streaming services. Because the transmitter is PlayReady-enabled, those services are tightly coupled with robust content protection that includes client authentication and extensive licensing models that enable providers to control how and where content is consumed.

To ensure that content remains protected during in-home distribution, PlayReady ND provides extended support for and integrates with several PlayReady features, most notably the PlayReady authentication model, revocation data and processes, and output-protection levels in

license policies. In the following sections, we'll describe how PlayReady ND extends and integrates with these features. To learn more about these and related features and concepts, see Deploying PlayReady Technologies on the PlayReady website.

Authentication

As is the case with other distribution scenarios, PlayReady authentication occurs at two levels, the device and the user. PlayReady handles device authentication through use of device certificates — each PlayReady device has a unique device certificate that is derived primarily from the device's unique public and private key pair.

PlayReady ND transmitters use device certificates to identify a receiver device and, if the device is valid, to register or revalidate and issue licenses to the receiver. When it issues a license to a receiver, the transmitter uses the receiver's device public key to protect the content key in a license. The receiver then uses its device private key to decrypt and play the associated media file. This authentication model ensures that a license is valid and usable only on a specific device.

Within that model, PlayReady ND supports two types of authentication between transmitters and receivers:

- Receiver-only – The transmitter validates the receiver based on the device certificate that a receiver sends during registration and revalidation processes.
- Mutual – The transmitter validates the receiver based on the device certificate that a receiver sends during registration and revalidation processes, and the receiver validates the transmitter based on the device certificate that the transmitter sends during those processes.

Note that a receiver always sends its certificate to the transmitter during registration and revalidation processes, regardless of the authentication type being used. This is of course necessary for the transmitter to validate the receiver device. The primary difference between the two authentication types is whether the transmitter sends a device certificate to enable mutual authentication and how the receiver processes that device certificate. A receiver can require a transmitter to send a certificate, optionally support mutual authentication if the transmitter sends its certificate, or simply ignore the certificate, depending on how PlayReady ND is implemented on the receiver. If a receiver requires mutual authentication and the transmitter doesn't send its certificate, authentication fails.

For user authentication, PlayReady technologies and PlayReady ND are designed to integrate with the authentication model that a provider chooses to implement. In practice, user authentication is integrated with PlayReady in either of two ways: the transmitter sends license requests to a PlayReady license service indirectly through a proxy server, or the transmitter sends license requests to a PlayReady license service directly and includes an authentication token. The PlayReady SDKs provide detailed information about these authentication options and how to implement them.

Revocation

Revocation is a process that prevents a PlayReady device or application from acquiring licenses if its security or compliance is compromised. This is achieved primarily by revoking certificates for devices or applications — if a device or application has one or more revoked certificates it cannot acquire licenses or access and play protected content. For example, if a specific device model was compromised, the corresponding model certificate can be revoked to prevent devices of that model from obtaining licenses for protected content until the issue is addressed through a firmware or other type of update.

PlayReady ND primarily supports revocation through use of revocation packages that contain *certificate revocation lists (CRLs)*. A CRL contains the information that is necessary to revoke specific device and application certificates, and any certificate or chain of certificates can be revoked by updating a CRL. Each time a CRL is updated, a new revocation package is generated with an updated version of the CRL. Microsoft generates and maintains CRLs and revocation packages on behalf of PlayReady licensees and users, and each PlayReady device stores and maintains a revocation package in its cache. Revocation lists are used by PlayReady license servers and PlayReady ND transmitters to deny license requests from devices that have been revoked.

In a typical implementation of PlayReady ND, revocation packages are published to PlayReady license servers for distribution to client devices. During license acquisition, a transmitter provides the license server with its version of a revocation package and the license server determines whether there is a more recent revocation package. If a more recent package exists, the server sends the latest revocation package to the transmitter. The transmitter in turn updates its cache to store the latest package. The transmitter also shares the CRL with a receiver during registration and revalidation processes to ensure that the receiver has the latest CRL. The receiver checks the CRL before it shares any content with other network devices, which provides and additional layer of protection. If a receiver has a revoked certificate, it can neither register nor revalidate with the transmitter nor can it access any content within the network until it is removed from the CRL. In some CAS scenarios the CRL is pushed out to Transmitter over the managed network as the Transmitter might not make license requests to external services.

Output Protection Policies

PlayReady ND supports the full range of policy settings that PlayReady technologies provide for other distribution scenarios. Those settings span time-based restrictions that specify the time frame that a license is valid for, allowable-export rules that specify restrictions for moving or exporting content to a different protection scheme, and output-protection levels that specify whether playback is restricted to specific types of output ports on devices.

As media content is consumed by more devices within a home network, the risk of violating usage rules increases if the correct protection mechanisms aren't in place. Output-protection levels address that risk by enabling providers to create layers (levels) of rights protection and associating specific content types and formats with those levels — higher output-protection

levels indicate higher levels of security and lower output-protection levels indicate lower security. If a PlayReady ND receiver device doesn't support an output-protection level that is the same as or higher than the level specified in the license for a media file, PlayReady ND won't allow the device to play the file.

Note that providers can also restrict playback to specific types of devices — for example, restricting playback of premium video content to an STB only or prohibiting access to content from a device that doesn't support output protection. However, PlayReady supports these scenarios through authentication processes, not policies. If a receiver requests a license and the receiver device doesn't meet provider requirements, PlayReady doesn't issue the license and the receiver cannot play the content.

The PlayReady Documentation Pack, which you obtain when you purchase a license, provides extensive documentation about output-protection levels. This includes the definition of each level, guidance for implementing output protection on a PlayReady ND receiver, and currently supported output levels on commonly used types of receivers. You can also learn about output-protection levels and restrictions, as well as other types of policy settings, by reading the PlayReady Compliance & Robustness Rules on the PlayReady website or in your license agreement. Output protection and other types of policies are governed by the PlayReady compliance and robustness rules.

Transmitter and Receiver Interactions

To ensure end-to-end protection of media content, PlayReady ND transmitters and receivers perform a series of operations in a specific sequence:

1. Discovery – The transmitter and receiver find each other on a network, verify that they both support PlayReady ND, and determine which protocols they will use during subsequent interactions.

2. Registration, revalidation, and authorization – During registration and revalidation, the transmitter identifies a receiver and determines whether the receiver is a valid playback device. During authorization, the receiver obtains permission to acquire licenses and play media content from a transmitter. Authorization is different from but typically implemented as part of registration and revalidation processes.

3. Proximity detection – The transmitter and receiver exchange messages to determine whether the receiver is within an acceptable network distance from the transmitter.

4. License acquisition – The transmitter prepares and issues the appropriate licenses to the receiver and the receiver obtains the appropriate licenses from the transmitter.

5. Content streaming – Protected media content is streamed from a transmitter to a receiver in response to requests from the receiver.

PlayReady ND provides specific APIs for performing some of these operations while other operations can be implemented by using the methods, APIs, and device capabilities that a provider chooses to support. The following diagram illustrates the sequence of operations and interactions between PlayReady ND transmitters and receivers. In the diagram, operations that appear in shaded boxes are implemented by using APIs that PlayReady ND provides.

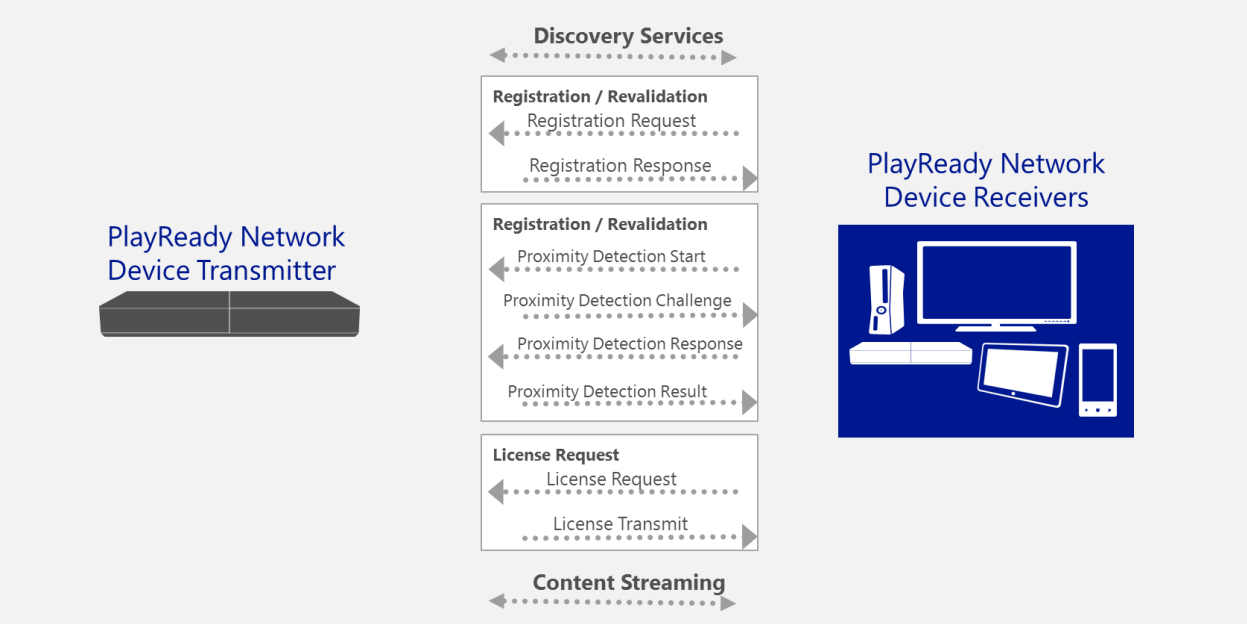

Figure 2 – Sequence of Operations and Interactions between Transmitters and Receivers

The following sections explain the purpose of each operation and the interactions that occur within it.

Discovery

During discovery, a PlayReady ND transmitter and receiver find each other on a network, verify that they both support PlayReady ND, and determine which protocols to use during subsequent interactions.

To enable discovery, providers can use the method of their choice to ensure that the transmitter announces its presence on the network and provides a way for receivers to locate content on the transmitter. In many implementations, providers use Universal Plug and Play (UPnP) protocols and the Simple Service Discovery Protocol (SSDP) for those tasks.

During discovery, the transmitter indicates which protocols it supports and can or must be used by a receiver in subsequent interactions between the two devices. If the transmitter supports multiple protocols, the receiver can choose which of the supported protocols to use. PlayReady doesn't require use of a specific protocol but UPnP, HTTP, and TCP are recommended and PlayReady development tools include detailed documentation about how to use those protocols to perform specific PlayReady ND tasks.

Registration, Authorization, and Revalidation

After discovery is complete, the transmitter determines whether a receiver is valid by using registration, revalidation, and authorization processes. These processes enable a transmitter to identify a receiver and determine whether a receiver is allowed to play protected content from the transmitter. A receiver cannot play protected content from a transmitter until it is registered (or revalidated) by the transmitter and authorized to do so.

Registration typically occurs the first time a receiver connects to a transmitter after discovery is complete. During registration, a receiver sends a registration request message to the transmitter. The message includes information about the receiver — for example, its device and PlayReady certificates (and related encryption keys), the version of PlayReady ND that the receiver is using, which types of *proximity detection* it supports, the current date and time on the device, and any custom data that a provider chooses to implement. The transmitter then processes the request and, if the receiver is valid, adds the receiver to its list of registered receivers. The transmitter also responds to the receiver with a registration response message that includes information such as the version of PlayReady ND to use, the type and channel to use for proximity detection, and, depending on the implementation, the transmitter's device certificate and any custom data. The transmitter also starts the proximity detection process, which we'll discuss in the next section.

At least once every 48 hours, a receiver should revalidate with the transmitter to avoid interruptions during playback. The revalidation process is similar to the registration process. The primary difference is that the transmitter already has a record of the receiver in its list of registered devices. During revalidation, registration and proximity detection procedures are performed again and the last revalidation time is updated. If revalidation doesn't occur within 48 hours of registration or the last revalidation process, the receiver's registration expires and the transmitter stops sending content to the receiver. The receiver must then register with the transmitter again.

Note that transmitters store a certificate revocation list (CRL) that identifies receivers whose certificates were revoked. For example, if a specific device model was compromised, the corresponding model certificate can be revoked to prevent devices of that model from playing protected content until the issue is addressed through a firmware or other type of update. A transmitter shares the CRL with a receiver during registration and revalidation. If a receiver has a revoked certificate, it cannot register or revalidate with the transmitter and therefore cannot access content from the transmitter until the receiver implementation is updated and certificate is renewed to one not on the CRL.

While registration and revalidation processes enable a transmitter and receiver to establish a relationship with each other, authorization processes enable a receiver to access media content from a transmitter — a receiver cannot acquire licenses for and play media content from a transmitter until it is authorized to do so, regardless of its registration or validation status. Authorization typically occurs as part of or at approximately the same time as registration. PlayReady doesn't require use of specific authorization procedures. However, in many

implementations the receiver is configured to include custom authorization data in registration and revalidation requests that it sends to the transmitter, and transmitters are configured to process the data according to implementation-specific requirements and processes.

Proximity Detection

After a transmitter and receiver successfully complete registration or revalidation, they're ready to perform proximity detection. During proximity detection, the transmitter and receiver exchange messages to determine the network latency between them, which indicates whether the receiver is within an acceptable network distance from the transmitter. If the latency is less than or equal to seven milliseconds, the receiver is considered "near" the transmitter and it can receive licenses and content from the transmitter. A transmitter will not share licenses and content with a receiver that is not "near" it. This helps prevent spoofing attacks and other types of unauthorized access to licenses and content.

Proximity detection occurs after registration ends successfully and again during each revalidation process. The transmitter starts the proximity detection process as soon as it responds to a registration or revalidation request from a valid receiver. (The transmitter's response to a registration or revalidation request specifies the type and channel that a receiver should use for proximity detection.) If the receiver doesn't respond to the transmitter within two minutes, the transmitter sends a message to the receiver indicating that proximity detection was unsuccessful and the detection process ends. The receiver must then register or revalidate itself with the transmitter again. If the receiver responds within two minutes, the transmitter sends a message to the receiver indicating that proximity detection was successful.

All transmitters must support use of TCP/IP for proximity detection but a transmitter can use a different type of detection if the receiver supports it. If a transmitter doesn't support any of the same detection types as a receiver, the registration or revalidation process ends unsuccessfully.

License Acquisition

After a transmitter and receiver successfully complete the proximity detection process, a receiver can begin acquiring licenses and accessing media files from the transmitter. Like other distribution scenarios, a receiver cannot decrypt and play a protected media file without first acquiring a license for the file.

PlayReady ND supports the full range of license types and acquisition models that PlayReady provides for other distribution scenarios — for example, a standalone license embedded in a media file, a standalone license issued separately from a media file, and root and leaf licenses that are part of a *chained license* or *scalable chained license*. In other words, transmitters are capable of preparing and issuing all types of PlayReady licenses and receivers are capable of receiving and processing them. Licenses are issued in eXtensible Media Rights (XMR) format.

A transmitter can prepare a license for a receiver in two ways:

- Bind and issue an existing license to the receiver – If the transmitter already has a PlayReady license for the media file that a receiver is requesting, the transmitter can bind the license to the receiver by using the receiver's device certificate and then issue the resulting license to the receiver. This is typically used in scenarios where a receiver is trying to stream content that is already stored on the transmitter. Note that a transmitter will also update an existing license and re-issue the license if it detects any policy changes for content that is being streamed to a receiver.

- Generate and issue a new license to the receiver – If a license doesn't exist yet for a media file that a receiver is requesting, the transmitter can build and issue a new license to the receiver by using PlayReady APIs that are designed to perform these tasks.

If a media file is protected by using PlayReady technologies during encryption and packaging processes, neither method requires a media file to be encrypted again.

As is the case with other scenarios, content keys in licenses are encrypted and decrypted by using device keys that are unique to the receiver device. This design ensures that each license is valid and usable only on a specific device. For chained licenses, leaf keys are encrypted by using associated root keys, which are bound specifically to the receiver device. For scenarios where content keys are rotated and licenses use a scalable chained license scheme, transmitters can issue root licenses that are specific to the device and, if necessary, also generate and embed associated leaf licenses in stream.

A receiver can acquire a license in two ways:

- License fetch – The receiver requests a license from the transmitter when it tries to play a protected media file. The request includes information such as an identifier for the file that the receiver wants to play and other data that allows the transmitter to determine which type of license to issue to the receiver.

- License push – The transmitter sends a license to the receiver proactively. Pushing licenses can improve performance because the license is already available when a user initiates playback. In addition, it's helpful in scenarios where licenses cannot be embedded in a media file or content keys are rotated on a regular basis. Note that a receiver might not support license push, depending on how the receiver was implemented and the protocol being used — licenses can be "pushed" only by using TCP/IP with or without HTTP. (UPnP, HTTP only, or another protocol cannot be used to push licenses.) Use of TCP/IP helps ensure that a receiver receives and processes licenses in the correct sequence, which reduces the risk of playback failures and interruptions.

After it receives a license from the transmitter, the receiver adds the license to its local license store and can begin decrypting and playing the associated media file.

Content Streaming

To play protected media files from a transmitter, a receiver must first acquire one or more valid licenses for those files. How licenses are created for and acquired by a receiver depends on many factors, such as the format of the media file, whether and how often content keys and policies change, whether the content is being delivered as a stream or download, and the content distribution model overall.

For example, a receiver might use an embedded license to play a media file from a DVR that is a PlayReady ND transmitter in the same home network. Alternately, a receiver might "fetch" a license from a transmitter while streaming a movie from an OTT service. In other models, such as Live TV, the receiver might receive a root license from an STB (transmitter) and play content by decrypting associated leaf licenses that are embedded in stream. Across the options, PlayReady ND provides the same mix of features and services that PlayReady technologies provide for other distribution scenarios. This means that providers have the flexibility to define and control how receivers acquire licenses and access media content from a transmitter.

Device and Platform Compatibility

PlayReady client technologies, including PlayReady ND, are compatible with all major platforms and virtually any type of device — they work on a variety of device classes, architectures, and system environments. This means that PlayReady ND doesn't require a specific device architecture and can be implemented on any type of in-home media device, including STBs, tablets, laptops, phones, game consoles, Smart TVs, and HDMI dongles. Only a device's capabilities restrict its ability to be a transmitter or receiver; any device that is capable of sending media content can be a transmitter and any device that is capable of receiving and playing media content can be a receiver.

In addition, a PlayReady client can use any application model that is supported by the target platform. For example, a PlayReady client might be a universal app for a Windows tablet and Windows Phone device, or an app for an Android phone or iPad.

The breadth of client options derives from a combination of factors — native PlayReady support on some platforms, PlayReady SDKs that are optimized for specific platforms such as Android and iOS, the PlayReady Device Porting Kit for virtually any platform or type of device. Another significant factor is the PlayReady architecture and development model. PlayReady makes extensive use of the media framework, interfaces, and APIs of the host platform and combines them with PlayReady APIs that add layers of content protection. Consequently, device manufacturers and content providers can build a custom client that uses the application model, features, and APIs that best suits their customers and business model.

To learn more about PlayReady development options and tools, see Developing PlayReady Clients on the PlayReady website.

Development Tools

Your choice of development tool for implementing PlayReady ND functionality on a device depends primarily on the target device and platform, the application model that you want to use, and the media formats and distribution methods that you want to support. For Microsoft platforms, you can use standard platform SDKs in combination with a PlayReady client SDK that's designed specifically for the platform.

To support development for other platforms, the PlayReady product suite includes the PlayReady Device Porting Kit and several software development kits (SDKs), including SDKs that are designed specifically for Android and iOS devices. Each kit provides tools, APIs, a sample media application, detailed technical specifications and reference information, and task-based guidance for implementing specific features on the target platform. Kit users can also access a fully functioning PlayReady license server for testing a client's ability to acquire licenses and decrypt and play content. You can obtain the Device Porting Kit or a PlayReady SDK by purchasing a PlayReady license.

Of the development tools provided, the PlayReady Device Porting Kit is frequently used to implement PlayReady ND on devices. It provides a complete set of PlayReady APIs, platform-independent source code for a client application, a test implementation of a PlayReady ND transmitter and receiver, and other tools, test resources, and documentation about implementing PlayReady ND functionality on a variety of system architectures, operating system environments, and types of devices — STBs, HDMI dongles, Smart TVs, gateway devices, game consoles, and more. To learn about the PlayReady Device Porting Kit and other development tools and options, see Developing PlayReady Clients on the PlayReady website.

Scenarios

PlayReady ND supports multiple models and methods for integrating with a content distribution system to deliver licenses and media content to connected media devices. The following sections describe and provide visual representations of how PlayReady ND transmitters and receivers might interact to stream and play protected content from a conditional access system (CAS) or an over-the-top (OTT) service.

Working with a CAS

In this scenario, live video content is streamed from a satellite or cable provider through a managed network to an in-home STB. The STB terminates the CAS and encrypts for PlayReady for delivery as a PlayReady ND transmitter. As a transmitter, the STB builds root licenses for and streams media content to valid PlayReady ND receivers that are part of the same in-home network — for example, a Windows tablet, iPad, Android phone, or game console. Note that this model can also be applied to downloadable content via CAS such as video on demand.

The following diagram illustrates the relationship and interactions between each system component and device.

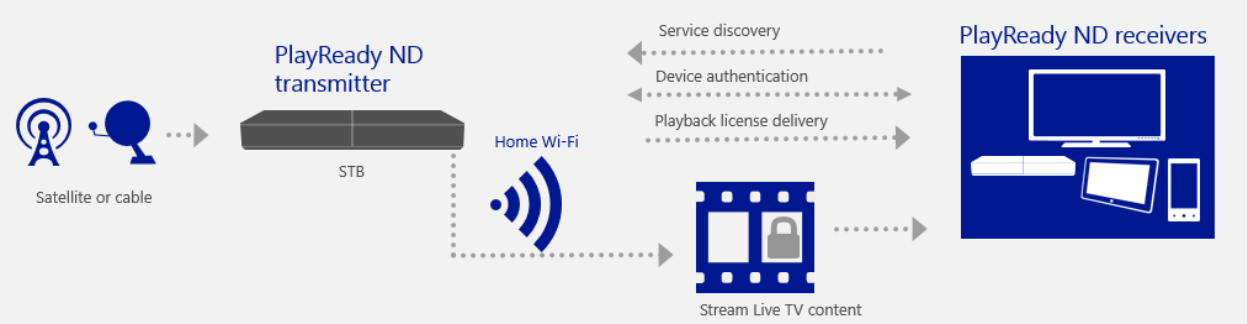

Figure 3 – Interactions between a CAS and PlayReady ND Devices

Assuming that the PlayReady ND receiver already registered successfully with the PlayReady ND transmitter (STB), the basic steps are:

1. The satellite or cable provider streams protected content to the PlayReady ND transmitter.
2. The PlayReady ND receiver uses discovery services such as UPnP to find the transmitter and discover media files that can be accessed from the transmitter.
3. The receiver requests the first media file in the stream from the transmitter.
4. The transmitter sends the media file to the receiver.
5. The receiver begins parsing the media file and obtains the content identifier (CID) for the file. The CID is embedded in the content URL.
6. The receiver uses the CID to “fetch” a license from the transmitter.
7. The transmitter builds and issues a license to the receiver, and then begins streaming the media content to the receiver..
8. The receiver parses each media file that it receives from the transmitter and uses its license to bind to and play the media files.

It’s important to note key aspects of the protection mechanisms in this scenario. First, the media files remain encrypted throughout the flow. In addition, the PlayReady ND transmitter acts as a bridge between the PlayReady ND receiver in the home network and both the managed network and content source. The transmitter also provides content discovery and built-in streaming services, as well as capabilities for locally generating and issuing licenses. Because the transmitter is PlayReady-enabled, those services and capabilities are tightly coupled with robust protection mechanisms that include device authentication and licenses that are specific to the receiver device.

Working with an OTT Service

In this scenario, a movie is streamed from an OTT service to an in-home game console. Licenses are issued separately to the console by a PlayReady license server and the system uses derivative licenses. In addition, media files are encrypted and protected by using PlayReady technologies during encoding and packaging.

The game console, acting as a PlayReady ND transmitter, has obtained a license from the service and it sends media files to valid PlayReady ND receivers that are part of the same in-home network. It also uses PlayReady technologies to build and issue local licenses to authorized receiving devices. Note that this model can also be applied to both live streams, video-on-demand and DVR content.

The following diagram illustrates the relationship and interactions between each system component and device.

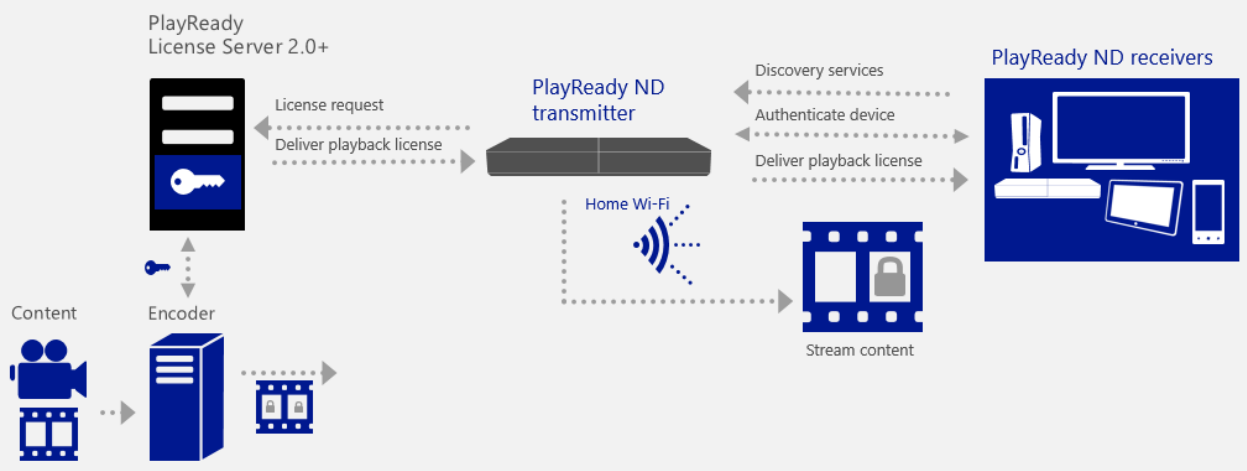

Figure 4 – Interactions between an OTT Service and PlayReady ND Devices

Assuming that the PlayReady ND receiver already registered successfully with the PlayReady ND transmitter (game console), the basic steps are:

1. A PlayReady ND receiver uses discovery services such as UPnP to find the transmitter and discover media files that can be accessed from the transmitter.
2. The receiver requests the media files in a stream from the transmitter.
3. The transmitter requests the media files from the OTT service.
4. The OTT service begins streaming the media files to the transmitter.
5. The transmitter finds the PlayReady header in the first media file that it receives. Because the file contains this header, the transmitter determines that the file is encrypted and a license must be acquired to play the file.

6. The transmitter checks the local license store for an existing license and doesn't find one.
7. The transmitter sends a license request to the designated license service. The request includes the device public key for the transmitter.
8. By using the transmitter's public key, the license service authenticates the transmitter and verifies that it is a valid client.
9. The license service sends a license to the transmitter.
10. The transmitter builds and issues a local license to the receiver, and then begins streaming the media to the receiver.
11. The receiver can then play the media content according to the policies specified in the license.

An alternate scenario for this model might be media files that contain embedded licenses and are stored on a device such as a DVR in the same home network. In that scenario, the transmitter would retransmit the stream to the receiver without building any licenses other than a root license provisioned for a receiver.

As is the case with the CAS scenario, the media files remain encrypted throughout the flow. In addition, the PlayReady ND transmitter acts as a bridge between PlayReady ND receivers in the home network and both the managed network and the OTT service. The transmitter also provides content discovery and built-in streaming services, as well as capabilities for locally generating and issuing root licenses. Because the transmitter is PlayReady-enabled, those services and capabilities are combined with protection mechanisms that include device-specific authentication and licenses that specify policies such as time-based restrictions and output-protection levels.

Licensing Options

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

Agreement	Scenarios	Includes
Microsoft PlayReady Final Product License	For distributing PlayReady client devices to end users or using PlayReady clients in a commercial deployment.	PlayReady Certificate Generation Kit, PlayReady Client SDKs for iOS and 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 a client device such as an STB, Smart TV, or media player.	PlayReady Device Porting Kit, PlayReady Client SDKs for iOS and 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 Server Deployment License	For using PlayReady server technology in a commercial deployment or 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

For every license, you must also sign the PlayReady Master Agreement.

Note that you do not need a license to develop and distribute a PlayReady client for Windows 8 or later, Windows Phone, Xbox, or Silverlight. Those platforms provide native support for PlayReady technologies. You do, however, need the appropriate PlayReady server license to deploy a service to Windows endpoints.

If you are developing and distributing a PlayReady client for any other platform, you need two licenses, the Microsoft PlayReady Intermediate Product License and the Microsoft PlayReady Final Product License. Similarly, if you are developing and deploying a PlayReady server, you need both the Microsoft PlayReady Server Development License and the Microsoft PlayReady Server Deployment License.

Instead of licensing PlayReady technologies directly, you can contract with a Microsoft PlayReady licensee to develop or host PlayReady technologies on your behalf. For more information, see Approved Microsoft PlayReady Licensees on the PlayReady website.

For information about PlayReady licensing more generally, see Licensing Frequently Asked Questions on the PlayReady website. If you have questions about the PlayReady licensing process, please contact Microsoft at wmla@microsoft.com.