

# **STREAMING MEDIA SOLUTION (SMS) 2.8**

## **WHITE PAPER**

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## Contents

Introduction	3
1 Downloading and streaming technologies	3
2 SMS 2.8 key features and capabilities	4
3 SMS 2.8 components	5
4 System architecture	6
5 Software architecture	8
5.1 DRM licenses server	8
5.2 DRM encoder and packager	9
6 Application program interface (API)	9
7 Additional modules	9

## Introduction

Typically, when accessing multimedia data across a network, users have to wait for the entire file to be transferred before they can use the information. Streaming, however, allows a user to see or hear the information as it arrives without delays.

Users benefit by experiencing instant playback without the frustration of having to wait for the entire data to be downloaded before they can determine whether it meets their needs or interests. In most cases, this download process took a long time, and was impractical for widespread acceptance.

Streaming is a server/client technology that allows live or pre-recorded data to be broadcasted in real time, opening up the network for traditional multimedia applications such as news, education, training, entertainment, advertising, and a host of other uses. Thus, streaming enables the Internet or company Intranet as a new broadcast medium for audio and video.

## 1 Downloading and Streaming Technologies

There are two major methods of delivering digital video content over the Web: **downloading** and **streaming**. The first method uses a standard Web server to deliver the audio and video data to a media player. The second method uses a separate streaming media server specifically designed for the audio/video streaming task. Our Streaming Media Solution offers both facilities.

Downloading and streaming media result in different customer experiences. Downloading can offer high quality viewing (near DVD quality) regardless of the customer's network connection, and the facility to transfer the downloaded file to portable devices. However, the customer must wait until the file has been downloaded before watching the film. With progressive downloads the same high quality can be offered with the advantage of being able to start viewing the film once part of the file has been downloaded. Streaming provides instant viewing but the quality of the viewing experience will depend on the speed and reliability of the customer's connection. Streaming requires internet connection throughout the viewing time.

Downloading and streaming also differ in their requirements in terms of provision. A standard Web server can be utilised for media downloads, whereas a Windows Media server is the best option for media streaming. Windows Media Services are designed specifically for streaming and all Windows Media components work together to enhance the end-user experience. Intelligent streaming, for example, involves Windows Media Encoder, Windows Media Services, and Windows Media Player.

**Table 1 - Comparison of features for downloading and streaming Windows Media-based content**

<b>Feature</b>	<b>Downloading (Web Server)</b>	<b>Streaming (Windows Media Server)</b>
Save to portable device	X	
View without internet connection	X	
Stream through most firewalls	X	X
Stream content with Digital Rights Management	X	X
Fast Streaming		X
Stream without downloading		X
Broadcast (live)		X
Intelligent streaming		X
Optimised for streaming Windows Media content		X
Indexing		X
Administering and logging		X

For more complete comparison, see Web Server vs. Streaming Server

(<http://www.microsoft.com/windows/windowsmedia/compare/webservvstreamserv.aspx>)

## 2 SMS 2.8 Key Features and Capabilities

- **Based on Windows Media™ DRM technology**

We have integrated all the latest approaches to media downloading and streaming plus DRM in one software solution that provides a reliable copy-protection solution. Our system is ready for quick implementation and integration.

- **Fully featured streaming and progressive downloading in one**

The Streaming Media Solution will cater for both downloading/progressive downloading and streaming models.

- **System scalability**

The system architecture and components are scalable. You can start with one server and then expand the system to enhance download/streaming performance by adding as many servers as you need. If you have a large amount of web activity, you can divide different functions of the Windows Media Rights Manager SDK across any number of servers. You have full control over setting up your digital rights management (DRM) system.

- **DRM Packager for efficient content management and relocation**

DRM Packager is a special application that codes the film using information received from the DRM Licence Server. In order to stream or download a new film, it must first be converted to Windows Media Video (WMV) format by the Content Encoder. Then DRM Packager codes the film, saves it to Protected Content Storage and sends notification to the Public Web Site. Thus the encoded film becomes available to customers.

- **Flexible Licensing Terms**

You can apply different licensing terms to one content item (film, music file) or a bundle of files (i.e. digital bundle including near DVD" and "basic" quality films). There is no need for the customer to download the files multiple times if he chooses a different licensing option. For example, if a film is downloaded when "To Rent" is chosen and a customer chooses later "To Own" the film you can just change the licence terms and issue a "To Own" key for the content item already delivered to this customer.

- **Detailed Statistics**

This module is incorporated into the Download and Streaming Media Solution configuration and can be tailored for particular project requirements. It tracks information on downloads and streams and shows data on the number of currently connected and streaming/downloading players, stream/download denials and errors, processors load (daily, weekly, monthly, yearly) and can generate bespoke reports, graphics and diagrams.

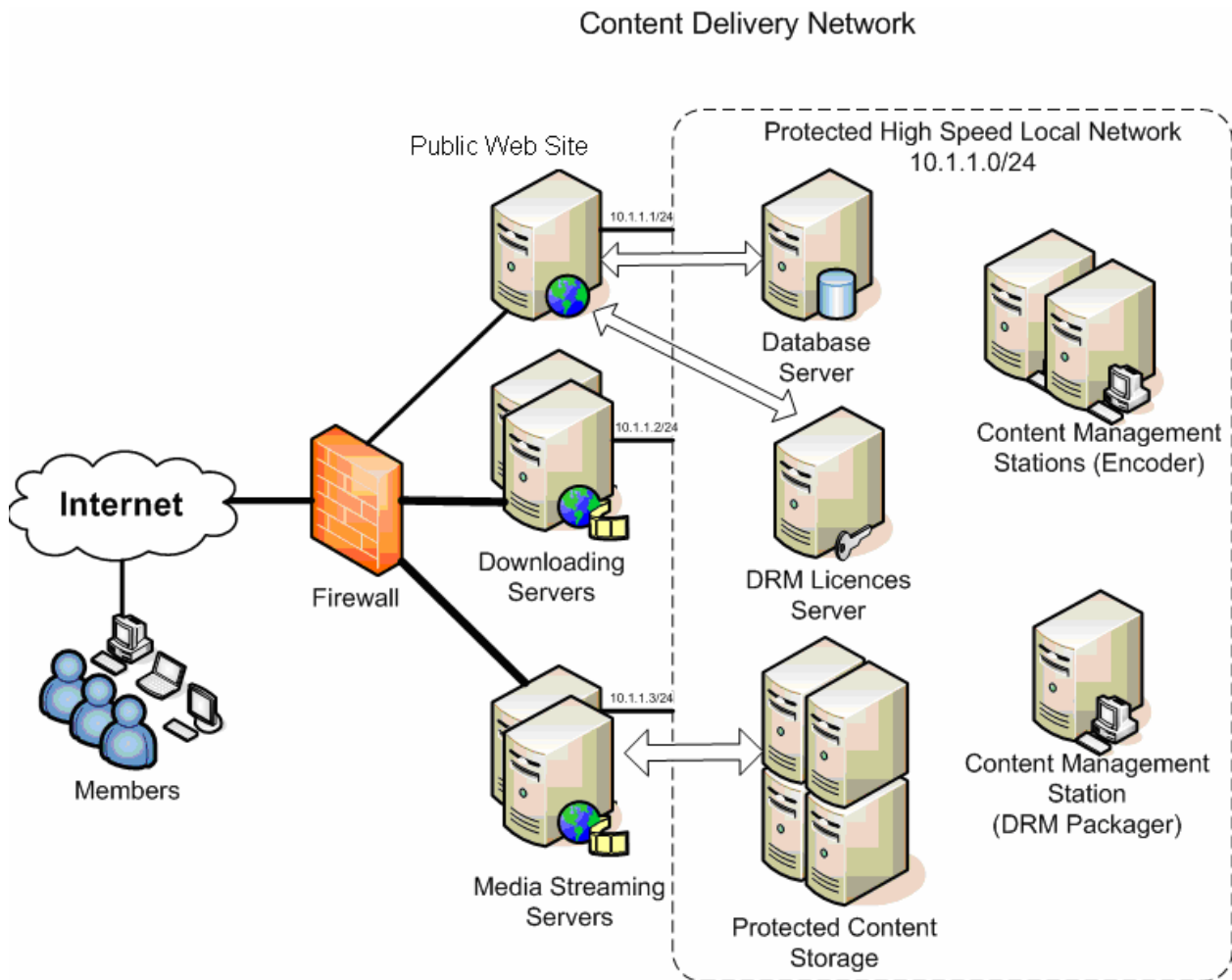
## **3 SMS 2.8 Components**

The Streaming Media Solution (SMS) utilises the following components:

- Windows Media Server for streaming/downloading
- Windows Media DRM encoder for secure content encryption and copyright protection
- Content Management Tool
- License Server
- Payment Module
- Microsoft Windows Media Player for customers to watch and/or listen to content

## 4 System Architecture

In order to cope with high amounts of data storage and traffic requirements, the system requires to be implemented on several high-performance servers and workstations.



**Figure 1 - System Diagram**

The *Encoding Station* ('Content Management Station' Figure 1 - System Diagram) is a computer that captures and typically encodes both audio and video live directly into the required streaming format. The most common systems used for encoding are Windows® XP or Windows® 2000 workstations equipped with audio and video capture cards. These systems must have computational power to encode one or more audio and video streams either in software or via a hardware codec. The use of a good capture card is critical in achieving these high rates with good picture quality. The card needs to be capable of capturing 640x480 @ 30 fps without dropping any pixels/frames, or having a high CPU consumption.

The *Encoding Station*, which needs to be near the *Video Source*, sends compressed audio/video streams on to the *Media Streaming Server* (typically via a LAN using UDP/TCP protocol). Individual compressed streams can

vary from 20 Kbps (Kilobits/second) to 500 Kbps or more. The connection between *Encoding Station* and *Media Streaming Server* must accommodate the total of the bandwidths of the individual streams and should be a clear and reliable one.

The *Media Streaming Server* is responsible for delivering compressed video to each individual request for a particular video stream. The bandwidth connection to the *Media Streaming Server* must accommodate the total bandwidth of all the requests for video stream, unlike the *Encoding Station*, which need only accommodate one copy of each. As a result, the *Media Streaming Server* usually has direct connection with a very high bandwidth line. For example, if there were 100 requests for a video stream compressed at 28.8 Kbps, the server would require at least a 3 Mbps connection. The *Encoding Station* and the *Media Streaming Server* can be one single system. An example of a start-up *Media Streaming Server* (exact specs will be available based on actual requirements) would have media content delivered to end users via two Dual 2.4 GHz servers with outgoing connection at 100Mbps, equipped with 2GB of RAM. These *streaming servers* will be used to deliver DRM-encrypted content/streaming to end users.

The *Downloading Server* is a special component used for organisation of progressive and simple downloading. Progressive downloading allows users to watch or listen to media as it is being downloaded from a standard web server to their hard drive. It ensures high-quality playback regardless of a user's Internet connection speed, although users with slower connections will wait longer before media starts to play.

The *Downloading Server* component based on Internet Information Server (IIS) platform can be installed on one server along with the *Media Streaming Server* component. Alternatively both components can be located on different servers to gain more scalability and load balancing. In this case the *Downloading Server* component can be installed either on Windows (IIS) or Unix-based machine (Apache).

DRM-protected content may be stored locally on auxiliary *storage servers* ('Protected content storage' Figure 1 - System Diagram), in this case each server will be equipped with 200GB hard drive and connected to a fast local network. The *DRM license server* may be implemented on a dedicated machine. ('DRM license server' Figure 1 - System Diagram).

The *Database server* can be based on a Dual 2.4 GHz Server, with 2 GB of RAM and placed also at high speed local network ('Database server' Figure 1 - System Diagram).

The *Public web site server* (will have an interface for public Internet connection and one interface for local network high speed secure communications ('Public web site' Figure 1 - System Diagram).

## 5 Software Architecture

The Streaming Media Solution (SMS) technology provides the software for the distributed system described above. All parts of this system are independent programming modules and can be installed in an existing system or any appropriate servers. The next sections describe the program components and their function.

### 5.1 DRM Licenses Server

DRM Licenses Server uses the technology of Windows Media™ Rights Manager - a powerful technology that provides the following benefits for protecting Windows Media files.

- **Security**

You can encrypt each Windows Media file, as well as applying additional levels of security. For example, you can restrict playback only to those applications that have received a security upgrade, require a minimum security level for all players and portable devices, or issue and deny licences based on a consumer's platform.

- **Robust features**

You can generate a complex set of rights for each Windows Media file, ranging from minimal control over playback to restrictions such as counted operations and expiration. You can also control how to issue licences and when. For example, you can pre-deliver licences to simplify the process for consumers.

- **You can easily set up promotional offers**

For example, you can distribute content that is valid for one week. When you want to charge full price for the same content, you simply issue a different licence at the point of purchase. You do not have to create and distribute a new version of the content. In addition, you do not have to ask consumers to download the same Windows Media file twice.

- **Scalability**

You have complete control over setting up your digital rights management (DRM) system. If you have a large amount of Web activity, you can easily divide the different functions of the Windows Media Rights Manager SDK across any number of servers. If you use a distributed retail model to protect, distribute and license Windows Media files, you can easily divide these functions among different organisations and track the source of each Windows Media file. In addition, because the Windows Media Rights Manager SDK uses COM objects, you can integrate the functions of Windows Media Rights Manager SDK into an existing system that uses your current database.



## 5.2 DRM Encoder and Packager

We have integrated content preparation procedures in one piece of software – ‘DRM Encoder and packager’. This software automatically reads film titles from the media file headers, submits and gets the list of corresponding films from the central server. Then it encodes the content based on Windows Media™ DRM technologies. It automatically submits information about the encoded film to the server and obtains a destination path for encoded content from the server. The server then analyses free space, Internet bandwidths and load of the content storage servers and returns a destination path for the new content.

The *DRM Encoder and packager* allows all the routines related to content preparation for streaming to be achieved by one mouse click.

## 6 Application Program Interface (API)

A fully featured API is provided with the Streaming Media Solution to allow integration with other software and systems. All internal components communicate between each other to ensure effective system performance and scalability using the SOAP protocol. Using the API the system can be easily integrated with external components such as catalogue management system, statistics and account systems, etc. SOAP and XMLRPC protocols or other remote procedure call protocols can be used if required. The API should be implemented at the ‘Service launch’ stage of the project.

## 7 Additional Modules

We can include the following modules into the package at your request:

- **Studios Module**

With this module content owners (i.e. film houses) can receive various reporting information related to their own content and track its sales performance as required. Modules can be developed for each studio individually, depending on their individual requirements.

- **Advanced Statistics Module**

The streaming reporting system can be built to deliver reports in nearly any format required.