



## **Video Streaming and the Internet**

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## Introduction to streaming

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Anybody watching video material over the internet is experiencing streaming media. Many Web content providers are using this technology to provide material to people visiting their sites because it is arguably the most effective way to communicate information. But although it may appear as very new, the basis of streaming technology is not exactly recent. The concept of streaming goes back to the invention of radio and television, and is closely linked to the idea of content broadcast, whereby a transmitter sends a continuous flux of information that certain receivers adequately tuned can receive in real time.

Applied to the internet, streaming refers to the technology that allows the distribution of video and audio through the net. A growing number of internet content providers are using it to provide their visitors with audiovisual material. However, internet streaming has some specific problems, inherent to the nature of the World Wide Web. Internet was not designed for real time streaming, but rather as a shared means to distribute content divided into small packages of information sent separately over the web. This means, in the case of video, having to download a whole video file before being able to reproduce it.

Streaming technologies partly solve this problem by using buffering techniques. This works by loading in the buffer a part of the content before beginning its reproduction. After the initial load, video begins to reproduce, and at the same time it downloads more content from the video server. Buffering also smoothes out traffic variations, inherent to the internet, and makes video reproduction much more fluid. This represents an advance in comparison to previous technologies.

## Video distribution solutions

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As we have seen, digital video must be compressed to make it more manageable and to reduce the amount of storage space it needs. There is a great diversity of video compression formats, including the standards MPEG-1, MPEG-2 and MPEG-4. However, most users who watch streaming contents use one of the three formats currently most extended in the market. All three of them are free for the final user and support Real Time Streaming Protocol (RTSP):

- **RealMedia:** It is widely extended (it is estimated that it is installed in about 90% of domestic PCs) and available for most operating systems, which has given it about 70% of the internet streaming market. Currently in its version 8, it supports over 40 media formats. The video server, RealServer, is also available for most operating systems. However, only the basic RealServer license for up to 25 users is free. Streaming is the main business of RealNetwork, which means that the company is unable to subsidize the technology to increase its market share (as is the case with Apple and Microsoft). That is the reason why serving more than 200 users simultaneously can be quite expensive, and is one of the main drawbacks of the system.
- **QuickTime:** Currently in its version 5, it was launched by Apple in 1991 and today it has over 100 million copies distributed over the world. Its main advantages are its maturity and the great number of available codecs, along with an open plug-in that allows adding third party codecs (QuickTime can support over 200 media formats). The QuickTime server is natively supported by MAC operating systems, but the open source Darwin Streaming Server is available for other platforms and is free as well.
- **Windows Media:** Currently in its version 8, it is a newcomer in the streaming world so there are less codec's available for this format (including the proprietary codec of Microsoft WMV). Given the marketing strategy of Microsoft, Windows Media Player is free and it is quickly becoming very popular. There are currently 220 millions of units in 26 languages throughout the world. Microsoft streaming

server, known as Microsoft Media Services, is free as well and is provided with Windows 200 Server. It can also be downloaded free of cost for Windows NT Server. Microsoft has not left the code open, which means that Windows Media Player cannot support other platforms. This is a great disadvantage as it makes the application much less flexible.

## Content distribution via internet streaming

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Streaming distribution systems can be used to broadcast video live or repeat. In any case, when carrying out a distribution of contents via streaming we must remember at all times that most final users who access the internet are generally restricted to 2Mbps. However, the generalization of cable access and ADSL is increasing bandwidth from 128kb/s to 512kb/s for a growing number of individuals. In the cases of higher bandwidth we can obtain video of a quality very similar to VHS, thanks to the latest compression techniques and sophisticated codec's technologies.

Besides bandwidth, other issues are important when distributing audiovisual material via streaming. The first one is content creation, which has to bear in mind at all times the compression that will be suffered by the video being produced. Because after compression the size of video images is likely to be smaller, certain visual information will be inevitably lost. In order to minimize this loss it is important for the content creator to ensure that the lighting throughout the video is good, the backgrounds are plain, camera movements are limited and close-ups are clear and plentiful.

A second issue that must be considered is the streaming server, which sends media clips to users. Real time streaming requires specific servers. As we have seen, RealNetworks, Microsoft and Apple have streaming servers. These servers give a better control on media products delivery, but they are also more complex to install and administer than a standard http server.

The role of the client and user is also important. Ideally, users must be presented with a simple interface requiring little more than a click to download or update streaming reproduction software. In reality, however, users often have to face huge files and complex procedures with many more options than it is strictly necessary. The good news is that this situation is progressively changing, and improvements are being made in this respect.

We have seen that streaming allows the distribution of audiovisual content to large audiences in a simple way over the internet. However, as a technology in constant evolution, it still has some limitations. To maximize its current potential, all parties (from content creators to clients and users) must be aware of them and act consistently.

## Benefits of streaming and future prospects

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In spite of a few problems, the advantages offered by streaming in comparison to traditional content distribution methods are many. Amongst the most important are the following:

- **Easy access to content:** internet content providers provide a link in the web page and its visitors can view the content by using free software that is easy to download.
- **Quick content distribution to target audiences:** given that streaming contents don't have to be previously downloaded to the computer, audio and video begin to reproduce very quickly, and the user doesn't have to put up with long waits.
- **Better content quality:** streaming software is specifically designed to distribute video and audio contents, which has a positive impact on the quality of all distributed material.

Given that video is increasingly incorporated into websites, and information exchange technology is constantly evolving, it is expected that internet streaming will soon be present everywhere. The next step will be to improve the way video is presented on the internet, to ensure that audiovisual content interesting for the user is rapidly located.