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DEFINITION

streaming media

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What is streaming media?

Streaming media is [video](#) or [audio](#) content sent in compressed form over the internet and played immediately over a user's device, rather than being saved to the device [hard drive](#) or [solid-state drive](#). During the streaming process, the media file that's played on the user's device is retrieved from a remote location and transmitted continuously over the [internet](#) using a wired or [wireless](#) connection.

Streaming explained

With streaming media, a user does not have to download an entire audio or video [file](#) to play it. Instead, the file is sent in a continuous stream of data to the user's device so it can play as it arrives in real time or near real time. The user can also pause, rewind or fast-forward the file, just as they could with a downloaded file, unless the content is being streamed live, in which case the user can only watch or possibly participate in the event.

Depending on the [streaming service](#), a user may be able to stream and consume different kinds of media, including the following:

- music
- videos
- movies
- TV shows
- [podcasts](#)

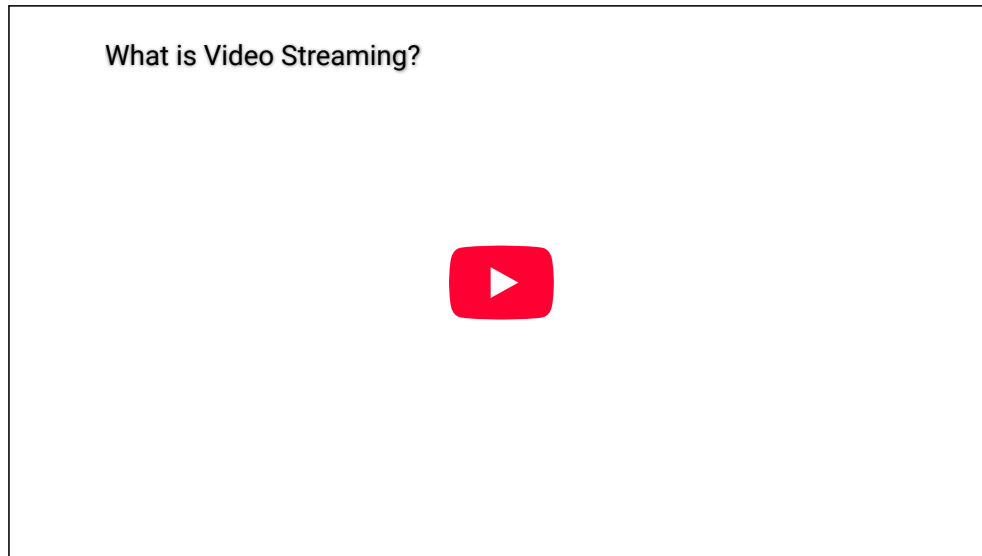
How streaming works

Streaming files -- audio, video and others -- are stored on a server somewhere on the World Wide Web ([WWW](#)). When a user requests the file, it gets transmitted over the web as sequential packets of data that are streamed instantly. Since streaming data is broken down into data packets, its transmission is similar to that of other types of data sent over the internet.

The file is played within a browser on the [client's](#) device. An audio or video player hosted by the browser accepts the flow of data packets from the streaming service's remote server and interprets them as video or audio, then plays the media for the user. Unlike traditional media systems where files are downloaded and stored on the device, streaming media files are deleted automatically once the user ends the streaming.

Some streaming services rely on User Datagram Protocol ([UDP](#)) to stream their content, while others use Transmission Control Protocol ([TCP](#)). Both UDP and TCP are transport protocols used to move data packets across networks. TCP opens a dedicated connection before transmitting data, which makes it a more reliable protocol than UDP. However, TCP also takes longer to transmit data compared to UDP. TCP and UDP are both used with the Internet Protocol ([IP](#)).

Most streaming services use content delivery networks ([CDNs](#)) to store content in locations that are closer to users. Such proximity reduces streaming [latency](#), speeds up content delivery and reduces buffering.



Streaming requirements

Streaming usually requires a reliable, high-speed internet connection because the media files must be retrieved from a remote location and then delivered to a user's local system with minimal lag or latency (delay). A slow connection decreases the speed at which the content is delivered, affecting the user's streaming experience.

Users must sign up with a streaming service to access and view media files on their local machines. They must also have a compatible display device with a [resolution](#) that's high enough to support incoming streaming video and a speaker that can play incoming streaming sound with adequate fidelity and clarity.

The receiving system must also include a media player to play the streaming content. The player can be part of a browser, a plugin, a separate program or a dedicated device.

Streaming services and over-the-top platforms

There are many streaming services that offer different kinds of streaming content, such as movies, TV shows, music and podcasts. Some examples of well-known internationally available streaming services include the following:

- Netflix
- Amazon Prime



- Hulu
- Disney+
- ESPN+
- Apple TV+

These service providers are also known as over-the-top (OTT) platforms. OTT simply means TV and film content watched via a streaming service instead of through a cable or satellite television provider. OTT includes services such as Netflix and Hulu, as well as providers that offer live streams with niche content like sports, lifestyle, music or cartoons.

Streaming vs. downloading

One of the fundamental differences between streaming and [downloading](#) is the way media files are saved and used. In streaming, the browser plays the video without creating a local copy or saving the file in the receiving device's memory or storage system. The video loads a little bit at a time and plays it back in real time or near real time.

In contrast, with downloading, a copy of the entire file is saved locally in the device's solid-state drive or hard disk. The file cannot be played until the entire file has been downloaded and is available to the media player software. As more files are downloaded, they take up considerable storage space and may eventually affect the device's performance. Storage issues are avoided with streaming. Furthermore, the performance of the streamed media file does not depend on the device memory. It is only affected by the user's internet speed (assuming they have a streaming-compatible device that adequately supports streaming sound and video).

Unlike downloaded files, streaming files are subject to buffering. Buffering is a process by which the streaming media preloads a few seconds of the stream into a memory [buffer](#) so that the file continues playing smoothly even if the internet connection is interrupted. On slower connections, a video can take a long time to buffer, affecting the user's streaming experience. That's why a reliable, high-speed internet connection is preferred when consuming streaming media. Downloaded files play locally so they don't require an internet connection and are not subject to buffering delays.



Advantages of streaming media

Streaming media offers multiple advantages over downloaded files. For example, with streaming, users can enjoy a vast variety of content and watch (or listen to) it on demand. They can also take advantage of interactive features like video search and personalized playlists to customize and enhance their streaming experience.

Streaming services --also known as content deliverers--can monitor the types of content visitors are consuming and, based on that information, the services may provide recommendations to further improve user experiences.

In addition, content creators retain greater control over their content (intellectual property) because the files are not stored on viewers' computers. Instead, the file is automatically removed once it has been consumed. In this way, a user gets to enjoy the content of their choice while the rights of the content creator are protected.

Live streaming

Streaming media is usually delivered over the internet using prerecorded files. However, it can also be distributed as a live broadcast feed. For live streaming, the video signal is converted into a compressed digital signal and transmitted from a web server as Multicast, sending a single file to multiple users simultaneously and in real time.

Many streaming content providers organize live streaming events. Some social media platforms, such as Facebook, YouTube and LinkedIn, also offer occasional live streaming events.

Users can watch a livestream on any compatible device with a fast internet connection such as the following:

- laptop
- desktop

- smartphone
- tablet
- [smart TV](#)

Depending on the streaming platform, users can watch a variety of live stream programming, including the following:

- music shows
- cooking demonstrations
- business workshops
- technology workshops
- sports events
- video games
- awards shows
- special one-time events

Factors affecting streaming performance

Numerous factors can affect the performance of streaming media. On the network side, the two primary factors are latency and network congestion. Network latency or lag refers to the delays in communication over the network. It affects the speed at which content is delivered to users. Network congestion occurs when too much data is sent through a network, resulting in connection timeouts and packet losses at the client's destination.

On the user side, the three key factors affecting streaming performance are internet connectivity, device compatibility and available [bandwidth](#). An unstable internet connection, perhaps due to [Wi-Fi](#) problems, results in interrupted streaming and a poor user experience. Restarting the local Wi-Fi [router](#) may stabilize the connection and improve streaming performance. A low-bandwidth internet connection also hampers streaming performance, which is why streaming content is best played on high-speed Wi-Fi or other networks, instead of over mobile networks which tend to be slower for video, live streams and some other kinds of streaming media.

Certain media files such as video may require a relatively high amount of processing power from the client device. An older device or a slow-performing device running multiple concurrent processes can affect performance.

Pseudo-streaming

Pseudo-streaming, also known as progressive downloading, is a hybrid approach pairing conventional downloading and streaming. The method is easier to implement than full streaming because it doesn't work in real time. Instead, a large chunk of the media file is downloaded into the web browser's cache. The browser then plays it simultaneously.

With a pseudo-streamed file, users cannot skip forward but must wait for the file to be downloaded until that point. Unlike streaming, the file remains in the browser cache and isn't automatically deleted.

In the past, browsers used [Macromedia Flash](#) files for progressive downloading. These files were served from a conventional web server and played on a Flash plugin installed on the user's browser. Modern browsers that use

HTML5 can pseudo-stream files without using Flash.

See also: [digital video broadcasting](#), [Real Time Streaming Protocol](#), [data streaming](#), [Internet Protocol television](#)

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