Selecting an Internet Content Delivery Service for Streaming Media

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What is Internet content delivery?

Internet content delivery is a category of services for content creators that improves the quality, reliability and performance of graphic content, streaming media and applications on Web sites. These services give content creators and their customers access to sophisticated distributed networks to deliver content without having to build or manage the global network themselves.

Importance for streaming media: As the number of users with high speed connection to the Internet increases at a rapid pace, more and more Web sites use streaming media to create engaging Web sites. While there is no shortage of ideas for creating exciting streaming media content, there are some difficulties with delivering this high bandwidth content over the Internet.

The Internet was not designed to handle these very large streaming files. Specifically, the transport layer that delivers streaming content is different than for non-streaming content. Non-streaming content uses Transmission Control Protocol, or TCP, a connection-oriented protocol. The result is that a file successfully transmitted over TCP, a logo for example, is always identical to its source—although the time required for transmission may vary widely depending on infrastructure and network conditions between client and server.

Streaming media uses the User Datagram Protocol, or UDP. UDP is a *connectionless* protocol, under which IP packets are sent from the server to the client without establishing a connection. This protocol enables streaming media's real-time nature: no need to wait to resend dropped packets. But it also means that the content quality may be degraded markedly between server and client, or that two different users may have a much different experience if the network between client and server degrades.

Streaming media performance can be jeopardized because of Internet congestion and architecture, but a powerful Internet content delivery service can overcome these limitations and deliver significant benefits including:

- Higher quality performance
- Higher reliability
- The ability to serve peak crowds around the world, even if unexpected

Evaluation Criteria for Internet Content Delivery Services for Streaming Media

Internet content delivery services designed to deliver streaming media vary widely in technological approach, ease of use, track record, and end results. Below are some questions Web site owners should ask when evaluating these services.

1. What kind of performance improvement can I expect?

A primary benefit of delivery services for streaming media is the ability to deliver high quality streaming content as close to the end users as possible. Streaming media files often degrade and become jerky as they traverse the Internet. For this reason, it is important that viewers receive the original streaming media content from streaming servers located close to

them in order to notice performance improvements. It's important to understand how the delivery service delivers these performance improvements. How is a specific streaming server chosen for each user? Good decisions are based on:

- Accurate information about the user's location on the Internet
- Knowledge about the status and performance of the service provider's streaming servers
- Extensive real-time data about Internet traffic conditions

The Internet is very dynamic, and conditions change rapidly. Therefore, effective streaming media delivery services will make different decisions at different times. For example, a dial-up user in Sacramento initially might be routed to a streaming server located at UUNet in Palo Alto. But if UUNet's performance begins to suffer, the delivery service should recognize the deterioration and redirect the user to a different location or even a different network, e.g. GTEi in San Jose. You should understand how rapidly the delivery service can sense and respond to such changes—does it take seconds, minutes, or hours?

2. How reliable is it?

Because the Internet inherently unreliable, Internet content delivery providers must work around these limitations to provide reliable service for streaming media. Every service provider understands this problem, so you won't find any who *don't* claim their offering is reliable. But true reliability is a consequence of the service offering's design—the technology used and how it's implemented. Web site owners can get a much better sense for a service's reliability by asking about exception cases:

- What happens if one of the content delivery service provider's computers, either a streaming server or domain name server, fails?
- What happens if a data center at which the provider's servers are located goes off-line, perhaps due to a power outage or fiber cut?
- Are there central points of activity that, if they failed, could result in service interruptions?

Of course service providers should use high-quality products and dependable vendors to minimize problems. But no single component is absolutely reliable, and sometimes things go wrong. The real key to reliability, then, is a system that *assumes* components will fail, and has the ability to *automatically* make adjustments in real-time so service isn't interrupted. This characteristic is known as "fault tolerance."

3. How large is the network over which the service is delivered?

There are three reasons you should care about the size of the service provider's network.

- The network is a shared resource, so you want to be sure the provider has the capacity to deliver your streaming media content as your needs grow and as its business with other customers expands.
- Performance and reliability depend on geographic and network diversity—the more places the streaming servers are, the more likely it is that there are servers close and with an uncongested path to your Web users.
- Network size is an indication of the network's scalability. A scalable content delivery service will support your largest streaming media audiences.

To learn about the service provider's network, ask how many servers it has deployed, where they are located, and how much bandwidth capacity they're connected to. Also ask about future deployment plans. Finally, understand how the service provider counts servers. Are they owned and controlled by the service provider? Or are they owned by a third party

(caches owned by an ISP, for example)? Servers owned by third parties can't be controlled, maintained, or upgraded by the Internet content delivery service provider—which can negatively impact quality of service.

4. Are leading Web sites using the service?

The quality and quantity of the provider's current customers provide a strong indication of the service's value. Speaking with Web site owners who are using the service will give you an unbiased view of the provider's offering and its people.

Moreover, the *amount* of business the provider is doing with its customers demonstrates the value of the service as well as the experience of the provider. Some ways to measure this are:

- The number of streams the service has delivered since inception
- The amount of traffic currently served in a typical day or week, as measured by the number of hits, streams, or megabytes delivered

5. How is live or broadcast streaming media delivered?

Live streaming media is especially difficult to stream over the Internet since there is no streaming media file to store at the edges of the network. Service providers use different technologies such as satellites and the terrestrial Internet to deliver live content. While both transport mechanisms are good to deliver the live streaming to the edge of the network, neither one is completely reliable nor can get the content close to every single user on its own. For this reason, look for service providers that make use of both satellites and the terrestrial Internet to deliver content in the most reliable, efficient manner to the points closest for every single user.

Questions to ask include:

- How do live and scheduled broadcast streams get sent over the Internet?
- What happens where there is packet loss in the live stream?
- How often does the service provider determine the optimal route the to the edge of the network for live streaming?

6. What streaming media formats does the service support?

To give you as many choices as possible for encoding formats, look for a content delivery service that can support all the major encoding formats such as Apple's QuickTime, Microsoft's Windows Media Technologies, and RealNetworks RealSystem G2.

7. What additional services are offered with the delivery?

Value added services are an important feature of content delivery services. Most service providers have some sort of reporting tools, but they vary in quality. Tools that allows the content creator to easily view their own statistics both in real time and on a historical basis give the content creator the most flexibility and insight into the success of their streaming media events. Also, some tools allow owners to know geographically where the Internet traffic came from.

Reports to ask about include:

- Number of concurrent streams
- Number of hits
- Minutes of content viewed
- Amount of content delivered
- Number of unique viewers

8. How easy is it to implement the service?

An advantage to using a sophisticated content delivery service is that content creators do not need to own or manage their own media servers. Typically, on demand streamed content is directed to the service provider's network from Web servers. Look for service providers that have created easy to use tools that can accomplish this with a one-step process after content has been encoded.

9. Does the service offer an end-to-end solution for streaming media?

There are many steps to preparing streaming media content to be streamed over the Internet. Content delivery services should offer an end-to-end solution that includes partnerships with leading encoding and production companies, content management, and reporting.

10. Does the service offer support for other types of Web content?

Streaming media is one important component of your overall content delivery needs. Additional types of content that increase the attractiveness of your site include rich graphics, applications, secure content and dynamic content.

Selecting a service provider that offers support for a number of content types in addition to streaming media means that you can work with one unified company to deliver all your content delivery needs.

About Akamai

Akamai Technologies is headquartered in Cambridge, Massachusetts and has offices in 17 cities around the world. Akamai is the leading provider of distributed content, streaming media, and applications delivery services, serving over 1,000 of the Web's most popular properties including over 800 streaming media customers and over 125 leading e-commerce companies. Akamai has deployed the broadest global network for content, streaming media, and applications delivery with more than 3,000 servers in over 45 countries directly connected to more than 150 different telecommunications networks. For more information, please contact:

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