

Volera Excelerator 2.0

Making Streaming Media Fly

by Cheryl Walton

Have you noticed that more and more web users are getting hooked on streaming media? According to one report, the number of at-home web users who accessed streaming media in November 2000 increased by 65 percent over the number of at-home users who accessed streaming media in November 1999. (See “Streaming Media Use Grows to New High.” You can download this article from http://cyberatlas.internet.com/big_picture/traffic_patterns/article/0,,5931_533211,00.html.) Another report indicates that although overall Internet usage is declining among Americans, American web users are spending more time online listening to and viewing streaming media. (See “Internet Study VI: Streaming at a Crossroads,” a study from Arbitron/Edison Media Research. You can download this article from www.arbitron.com in the Webcast Services section.)

Streaming media, as you probably know, refers to digital audio and video files that are streamed to a player on your computer rather than downloaded and then played. Streaming media’s popularity undoubtedly stems from its accessibility rather than from its audio and visual acuity (which streaming media arguably lacks on occasion). With an Internet connection and the right browser plug-in, anyone anywhere in the world can access streaming media.

Given its accessibility and popularity, streaming media may be able to help your company, assuming your company wants to woo more users to its web site. If you post streaming media content, users may come flocking. (In fact, if your company is in the media business, providing streaming content could soon be a must.)

Of course, attracting users once or twice is one thing, but turning these occasional visitors into loyal users is quite another. To keep users coming back to your company’s web site, your streaming media needs to be as crisp as is technologically possible.

Furthermore, the streaming media must literally fly to users’ media players. After all, if the streaming media on your company’s web site sounds and looks like something Mr. Magoo produced on a roller coaster, you probably won’t attract a steady stream of users (pardon the pun).



THE PROVERBIAL CATCH—AND THE CACHE TO AVOID IT

Getting streaming media to fly to users’ browsers is not an easy task. As a network administrator, you probably know only too well about the potential performance pitfalls that exist between a web site and users’ browsers. (For more information, see “What Keeps Media Streams From Being Beautifully Clear?” on p. 22.) What can you do to avoid these potential problems?

One thing you can do is deploy a caching appliance. Of course, you can’t just deploy any caching appliance. You need a caching appliance such as Volera Excelerator 2.0, which (unlike many caching appliances) accelerates all kinds of web content, including streaming media content.

The Caching Appliance Formerly Known as ICS

Announced last January, Volera is a new Novell operating company that provides software and services to help speed the delivery of high-quality content to Internet users. The name *Volera* is taken from the latin verb *volo*, which means “to fly.”

Although Volera is a new company, its products and services are not new. In fact, Volera’s main product, Excelerator, has been helping web content fly over the Internet for two years under the name Novell Internet Caching System (ICS).

Following the indirect sales model that Novell developed for ICS, Volera licenses Excelerator 2.0 to original equipment manufacturers (OEMs). These OEMs then deploy Excelerator 2.0 on Intel-based hardware to create a range of caching appliances that can meet the needs of any size of company. (For a list of OEMs, see “Where To Pick Up a Little Cache” on p. 30.) By the time this article goes to press, you should be able to purchase Excelerator 2.0 directly from Volera for use on Compaq DL360 and DL380 servers and Dell PowerEdge 2550 and 1550 servers. (For purchasing information, visit www.volera.com and select Buy from the menu bar.)

What Keeps Media Streams From Being Beautifully Clear?

The technology that enables streaming media is improving rapidly. In fact, although currently not as crisp and fluid as media on CDs and DVDs, streaming media may soon meet the standards of even the most persnickety consumers. Of course, web sites that provide streaming media will be able to please persnickety consumers only if those web sites can skirt the problems that muddy the otherwise clear media streams.

The clarity of the streamed sounds and images web users ultimately experience depends on a lot of things. For example, the clarity depends on how clear the original sound or image is. The clarity also depends on the software that your streaming media server uses to compress and encode sounds and images. (For more information about media editing software, see "I Stream, You Stream" on p. 26.) In general, the more information the server's software discards—that is, the more this software compresses a particular medium—the more blurred and jerky the medium is likely to be when users play it.

In addition, Internet traffic can adversely affect the way users experience your company's streaming media. For example, peering agreements between Internet backbone providers can result in torturous routes that add significantly to the number of hops that your company's streaming media packets must negotiate. (To ensure quality of service for their own customers, these providers often offload peering traffic at the first opportunity.) The more hops

a packet must negotiate during its long journey across the Internet, the greater the likelihood that the packet will fall by the wayside.

Peering points—the points at which backbone providers' networks intersect—can also become bottlenecks that cause packet loss, as can Internet service provider (ISP) access points. Lost packets, as you probably realize, can result in a blurry, jittery streaming media experience for Internet users.

Even in the unlikely event that no packets are dropped, excess Internet traffic can hamper your company's efforts to deliver a high-quality streaming media experience. For example, if your company's streaming media draws unexpectedly large crowds of Internet users, the demand for this media may surpass the ability of your company's streaming media servers to meet that demand. As a result, the overburdened streaming media servers can slow to a crawl, dramatically increasing the amount of time it takes for the buffers in users' media players to acquire enough data to begin playing the media stream.

As you probably know from your own experience, long waits do not enhance any web content, including streaming media. (*Long* means longer than the average wait from top-performing web sites such as the Yahoo! web site. See "You Want It When?" in "Pick Up Your Web Pace With Novell Content Exchange," *Novell Connection*, Jan. 2001, p. 8. You can download this article from www.ncmag.com/past.) If you want to keep users from straying to content on other, speedier web sites, you must ensure speedy delivery of your company's streaming media content. ●

Excelerator 2.0 integrates with any web server running on any common operating system, including NetWare, Windows 2000, Windows NT, UNIX, or Linux. Volera Excelerator 2.0 also supports two protocols that enable you to configure transparent proxy caching for the users on your company's network:

- Web Cache Control Protocol (WCCP), a Cisco Systems routing protocol
- Web Proxy Auto Discovery Protocol (WPAD), a browser protocol that enables Internet Explorer 5 browsers to automatically discover the presence of proxy caching appliances

You can purchase a new Excelerator 2.0 caching appliance from any of the OEMs that license Excelerator 2.0 technology from Volera. (See "Where To Pick Up a Little Cache" on p. 30.) You can also upgrade an existing ICS 1.3 caching appliance to Excelerator 2.0 by purchasing an upgrade from one of these OEMs.

In addition, you can purchase these upgrades directly from Volera. Excelerator 2.0 upgrades are available on CD-ROM and as downloads from Volera's web site. (To purchase an Excelerator 2.0 upgrade, visit

www.volera.com and select Buy from the menu bar. You can also select Buy from individual Volera product pages.)

MAKE CONTENT FLY!

Volera Excelerator 2.0 can operate in forward and reverse proxy mode to help solve a host of web content delivery problems. For example, to decrease the amount of time your company's users wait for web content, you can configure Excelerator 2.0 in forward proxy mode (which is also called Internet acceleration mode). To deploy Excelerator 2.0 in Internet acceleration mode, you configure users' browsers to request web content from Excelerator 2.0. You can also provide users with transparent Internet acceleration by configuring a Layer 4 switch to redirect browser requests to Excelerator 2.0.

Internet Acceleration Mode

When configured in Internet acceleration mode, Excelerator 2.0 significantly speeds up the delivery of frequently requested web content. In fact, Excelerator-based appliances have distinguished themselves in the Internet acceleration mode category in all three Cache Bake-Off competitions sponsored by the National Laboratory of Applied Network Research

(NLANR). For example, in the first Cache Bake-Off competition, a Dell PowerEdge 6350 caching appliance running what was then ICS beta code achieved the highest throughput of any single system configured in Internet acceleration mode: The Dell PowerEdge 6350 caching appliance handled 1,500 requests per second. (You can download the results of the first Cache Bake-Off at <http://cacheoff.ircache.net/N01>.)

In the second Cache Bake-Off competition, a Compaq C2500 appliance running ICS took top throughput honors in Internet acceleration mode. The Compaq C2500 appliance handled 2,400 requests per second. (See <http://ircache.nlanr.net/Polygraph/Results/bakeoff-2>.) In the third Cache Bake-Off, the Compaq C2500 caching appliance repeated its performance of 2,400 requests per second. (See www.measurement-factory.com/results/public/cacheoff/N03/report-by-alpha.html.)

These high numbers of requests per second translate into saved time. How much time can Excelerator 2.0 save Internet users? The answer, of course, depends on how much time users spend online and whether or not they frequently access the same web sites. An

InternetWeek product review suggests that Excelerator 2.0 configured in Internet acceleration mode can reduce the amount of time it takes to download a web page by 230 percent. (InternetWeek reviewed the previous version of the product, ICS 1.2. See "Pushing Content to the Internet's Edge," InternetWeek, Dec. 4, 2000, at www.internetweek.com/reviews00/rev120400.htm.)

Web Site Acceleration Mode

To speed your company's web content to Internet users (who are not-so-patiently awaiting that content), you can configure Excelerator 2.0 in reverse proxy mode (which is called web site acceleration mode). In this configuration, Excelerator 2.0 lightens the load on web servers by delivering the static portion of your company's web content from cache, thus freeing these web servers to handle requests for dynamic content.

Excelerator 2.0 in web site acceleration mode helps ensure that your company's web site performs consistently well—even when it is flooded by an unusually high number of users. When configured in web site acceleration mode, Excelerator 2.0 can handle 12,300 user requests per second, according to Volera's internal tests. Because one Excelerator 2.0 appliance can handle literally thousands of simultaneous user requests, an unexpected surge in popularity probably won't slow down your company's web site.

Improving a Good Thing

You may wonder what type of web content Excelerator 2.0 can deliver more quickly. The answer is pretty much any type of web content, including streaming media content.

In fact, Excelerator has supported what some in the industry call pseudo streaming "for as long as [the product] has existed," explains Jeff Harris, a product manager for Volera. Pseudo streaming refers to media streams that are encapsulated in HTTP and downloaded as files. Any version of Excelerator can speed the delivery of pseudo streaming content in either Internet acceleration mode or web site acceleration mode.

With Excelerator 2.0, Volera extends support for streaming media to include support for Real-Time Transport Protocol (RTP)/Real-Time Streaming Protocol (RTSP)—the streaming protocols that Apple QuickTime and other stan-

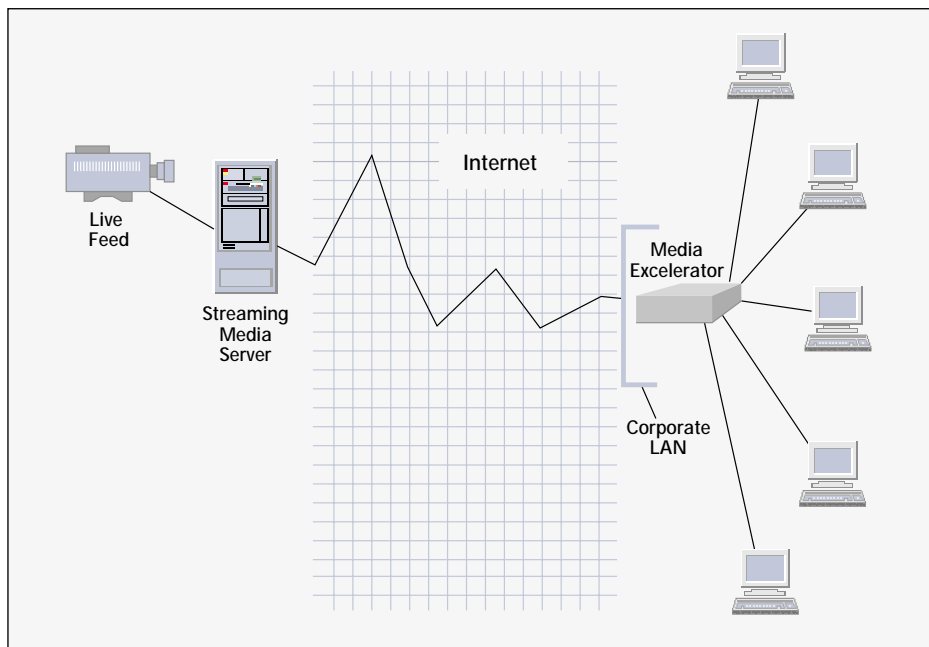


Figure 1. Configured in Internet acceleration mode, Media Excelsator can split a single live media stream into many media streams for requesting users on your company's network.

dards-based streaming media servers use. (QuickTime is among the most popular streaming media server software. For more information about QuickTime and other standards-based streaming media servers, see "Serving Standard Fare" on p. 28.)

RTP is an Internet Engineering Task Force (IETF) standard for transporting real-time data—such as audio and video data—across the Internet. RTSP is an IETF standard for controlling the delivery of this data. (For more information about RTP, see Request for Comments [RFC] 1889, and for more information about RTSP, see RFC 2326. You can download

these RFCs from www.ietf.org/rfc/rfc1889 and www.ietf.org/rfc/rfc2326, respectively.)

Volera further extends Excelerator 2.0 support for streaming media with Media Excelsator, Volera's new in-line service. An in-line service is a service that runs on Excelerator 2.0. As you know, Excelerator 2.0 resides in the flow of data between end users and your company's web servers. In other words, Excelerator resides in-line—hence, the name in-line services. (For information about how Excelerator 2.0 provides Media Excelsator and other in-line services over and above its caching services, see "COS and Its Effects" on p. 27. For more information

Services That Fall in Line

Volera offers in-line services as what it calls *service blades*, or software that you can add to an Excelerator appliance to extend the capabilities of that appliance. Volera uses the term *service blades* because the company believes in-line services extend Excelerator capabilities in the way hardware blades—such as Ethernet cards—extend the capabilities of networking hardware such as routers and switches.

For example, Excelerator 2.0 supports two new in-line services: Secure Excelsator and Media Excelsator. Secure Ex-

celerator enables you to offload computationally intensive Secure Sockets Layer (SSL) processing from your company's web servers. Media Excelsator provides support for HTTP Microsoft Media Streaming (HTTP-MMS), Microsoft's proprietary streaming protocol. (For more information about Media Excelsator, see the "Media Excelsator" section in the main article.)

You can purchase these service blades directly from the Volera web site, either as CD-ROMs or as software downloads. (Go to www.volera.com and select Buy, or select Buy from individual Volera product pages.)

about in-line services in general, see “Services That Fall in Line.”)

MEDIA EXCELERATOR

Media Excelerator extends Excelerator’s support for RTP/RTSP to include support for HTTP Microsoft Media Streaming (HTTP-MMS), a proprietary streaming protocol that Microsoft developed for Windows media. HTTP-MMS is a true HTTP streaming protocol. That is, Windows media players play the data in an HTTP-MMS stream as this data arrives rather than downloading the HTTP-MMS stream as a file and then playing it.

Excelerator 2.0 with Media Excelerator (henceforth called simply Media Ex-

celerator) enables you to deliver a large portion of the streaming media content available today from cache. Serving streaming media content from cache can save your company bandwidth. When you save bandwidth, as you know, you save time and money.

For example, suppose you worked for an advertising agency that required each of its 1,000 employees to review a multimedia advertising clip each day. To meet this requirement, these employees connected to an online service that streamed advertising content.

For the sake of discussion, suppose that this service’s advertising clips contained 20 MB of data. Further, this service provided high-quality streaming

media—near TV quality, for example—that is encoded at a delivery rate of 500 Kb/s, a figure that represents a fairly high-quality media stream. (For more information about encoded delivery rates, see “I Stream, You Stream.”) If all 1,000 employees had to connect to this service’s web site to view this advertising clip, a minimum of 20 GB of data would traverse the Internet from this web site to your company’s network each day.

Furthermore, if this service streamed its content live and the employees connected to this service’s web site at the same time each day, your company would need 10 T3 lines—at an estimated U.S. \$200,000 per month—to support these connections. Even if the service offered

I Stream, You Stream

Including streaming media on your company’s web site is not as difficult as you may think it is. However, streaming content to Internet users does present a few unique challenges. For one thing, you must select a streaming media server that supports your company’s media files—or vice versa.

For example, if your company wants to stream Moving Picture Experts Group (MPEG)-4 multimedia files, you must select a streaming media server that supports these files. MPEG-4 is a joint International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) standard (ISO/IEC 14496) for compressing audiovisual data. Many streaming media servers support MPEG-4, including Apple QuickTime Streaming Server 2.0.1. (For more information about MPEG-4, visit wwwam.HHI.DE/mpeg-video/standards/mpeg-4.htm.)

Conversely, if you have already chosen a particular streaming media server, you must select media editing software that can encode your company’s media in a format that this streaming media server supports. For example, suppose you want to stream audio data and you want to use Windows Media Server. In this case, you would have to select media editing software that can encode your company’s audio data in Windows Audio Format (WAV).

Media file formats usually compress raw digital media. That is, these formats actually remove some of the digital information that comprises that media. Compression is a necessary evil because uncompressed media files are often too large for computer hardware and software to handle.

For example, one second of CD-quality sound is comprised of about 1.4 million bits of data. Therefore, an uncompressed three-minute audio file is 252 million bits (or 31.5 MB).

Before a streaming media server can stream a file that is this large, you must encode the file using a compression format, such as MPEG-1 Audio Layer 3 (MP3). In this case, MP3 can compress this data into about 2.6 MB—a file size that streaming media servers can handle. (Obviously, even when compressed using MP3, a three-minute sound clip requires a lot of bandwidth.)

THE COMPRESSION BIT

Another challenge of delivering streaming media to Internet users is deciding the bit rate at which you want your company’s streaming media server to encode content for delivery. More specifically, you need to decide the bit rate at which you want the compression-decompression (codec) algorithm (that your streaming media server uses) to further compress your media files.

Generally, the bit rate you select will range anywhere from 28.8 Kb/s to as high as 1.5 Mb/s. The lower the bit rate you select, the more digital information the server’s codec software removes from your company’s media and, consequently, the lower the quality of that media.

The bit rate you select depends partly on the speed of users’ Internet connections. (The bit rate you select also depends partly on the format of the media files that you want to serve. For more information about optimal bit rates for selected file formats, visit www.ciscosystems.com/warp/public/cc/pd/mxsv/iptv3400/tech/ipcod_wp.htm.)

Therefore, the trick is selecting the highest bit rate at which your company’s target audience of Internet users can access your company’s streaming content. For example, if your company’s intended users have high-speed Internet connections, such as Digital Subscriber Lines (DSL) or cable modem connections, you can choose a codec of up to 1.5 Mb/s. On the other hand, if a significant number of users have low bandwidth connections, you should choose codec that encodes media at a rate of 28.8 Kb/s.

MEDIA EXCELERATOR —THE CLEAR CHOICE

Regardless of the bandwidth you select, Media Excelerator can help improve users’ experience with your company’s streaming content. You can use Media Excelerator to speed content delivery. You can also use Media Excelerator to deliver streaming content from the edges of the Internet, which can help ensure that your company’s streaming media arrives at users’ players in the same condition in which it leaves your company’s streaming media server. (For more information, see the “Fringe Benefits” section on p. 28 in the main article.) ●

its content on-demand and even if you could evenly space employees' access to the service's web site during the workday, your company would need at least two T1 lines (at an estimated cost of U.S. \$2,000 per month).

In contrast, if your company purchases a Media Excelerator appliance—which can cost as little as U.S. \$4,790 if you are upgrading an existing ICS appliance to Excelerator 2.0—your company only needs one T1 line. That is, this appliance can save your company a minimum of U.S. \$1,000 per month (the cost of one T1 line) and a maximum of U.S. \$199,000 per month (the cost of 10 T3 lines minus the cost of one T1 line). In addition, whether your company's employees request a live video stream or an on-demand video stream, that stream needs to traverse the Internet only once—a net bandwidth savings of 19.98 GB.

Divide and Conquer

If you are familiar with proxy caching technology, you probably understand how Media Excelerator enables thousands of users to access on-demand streaming media that traverses the Internet only once: A user requests an on-demand streaming media file. Media Excelerator intercepts this request and requests the streaming media file from the streaming media server on behalf of the user. The streaming media server delivers the streaming media, which Media Excelerator then caches. Media Excelerator then delivers this streaming media content to the requesting user. When Media Excelerator receives subsequent requests for this media, it serves that media directly from cache.

You may be wondering how Media Excelerator can enable hundreds or thousands of users to access a single live media stream. In a nutshell, Media Excelerator includes a technology that enables it to split a single media stream into many media streams. (See Figure 1 on p. 23.)

When a user on your company's network requests live streaming media, Media Excelerator intercepts that request. Media Excelerator then requests the live media stream from the streaming media server. The streaming media server sends the live media stream to Media Excelerator, which passes the stream through its cache to the requesting user. If other users on your company's network then

COS and Its Effects

Because caching appliances reside in the data flow between web users and web servers, these appliances are in a perfect position to modify that data flow through additional services, such as Excelerator's in-line services. Of course, to offer services above and beyond caching services, a caching appliance needs spare processing cycles. Fortunately, Excelerator 2.0's architecture provides the CPU headroom needed for additional services.

Excelerator 2.0's architecture includes a highly specialized storage and retrieval system called the *Cache Operating System* (COS). Among other things, the Excelerator COS can recognize all of the objects that belong to a single web page and can write all of those objects at once when a user requests that page. (Normally a user's browser would request—and receive—these objects one at a time.)

The Excelerator COS also writes data to disk only when Excelerator appliances are idle. As Drew Major, Volera chief technology officer, explained in an April 2000 interview, the Excelerator COS does not need to be aggressive about writing data to disk because it can always retrieve the data again if it needs to. Consequently, "if data sits in RAM for five minutes or so, who cares?" asks Major. (See "Talking to Drew Major About COS and Its Effects," *Novell Connection*, April 2000, p. 20. You can download this article from www.ncmag.com/past.)

These and other architectural efficiencies produce a caching appliance that has enough CPU headroom to provide services that go beyond caching. That is, these efficiencies allow for the spare CPU cycles that Excelerator 2.0 uses to support additional services such as Media Excelerator and Secure Excelerator. (For more information about these services, see "Services That Fall in Line" on p. 23.) ●

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request the same live media stream, Media Excelerator serves those requests from the same cache object.

How many ways can Media Excelerator split a single media stream? The answer to this question depends on the quality of the media stream. For example, if a media stream is encoded at 500 Kb/s, Media Excelerator can accommodate fewer user connections than it can if the media stream is encoded at 28.8 Kb/s—a lower quality stream. (You can view a 28.8 Kb/s media stream by visiting the CNN web site at www.cnn.com.)

Volera has not yet subjected Media Excelerator to third-party benchmarking tests. However, Volera's initial internal benchmarking tests indicate that Media Excelerator can handle a total bandwidth in excess of 800 Mb/s, which is enough bandwidth to split a 500 Kb/s live media stream 1,600 ways or a 28.8 Kb/s live media stream more than 27,000 ways. According to Jamshid Mahdavi, the manager of Volera's streaming media team, this estimated total bandwidth is a conservative estimate.

A Fortunate Reversal

Media Excelerator's stream-splitting capability works equally well in web site acceleration mode. Configured in this mode, Media Excelerator can save your company the cost of purchasing additional streaming media servers as demand for your company's streaming media content increases. (See Figure 2.)

For example, the number of simultaneous media streams that a streaming media server can support is typically in the hundreds. Suppose your company wanted to deliver live streaming media that was encoded at 300 Kb/s to 1,000 corporate subscribers. Further, suppose your company chose a streaming media server that could serve a maximum of 300 simultaneous media streams.

In this case, your company has two options: It can either purchase four streaming media servers at U.S. \$60,000 to \$80,000 (based on a conservative estimate of U.S. \$15,000 to \$20,000 per server), or it can purchase one streaming media server and one Media Excelerator appliance for as little as U.S. \$19,790 to

\$24,790 (if you are upgrading an existing ICS appliance to Excelerator 2.0).

Furthermore, if your company purchased four streaming media servers, your company could provide a maximum number of 200 additional streams. In contrast, with a Media Excelerator appliance, your company could provide more than 1,600 additional media streams.

"One of the limitations of streaming media servers is that they really cannot handle a great deal of traffic," Henry Liu, Volera product manager, summarizes. "One of the benefits of putting [Media Excelerator] in front of a streaming media server is that it allows content publishers to scale up their ability to serve streaming media without having to buy multiple media servers to meet the demand."

Fringe Benefits

In this hypothetical example, your company was able to control the number of users who accessed its streaming media content. As a result, your company could control the quality of the media streams leaving your company's web site. However,

Serving Standard Fare

If you are planning to include streaming media on your company's web site, you need at least one streaming media server. Excelerator 2.0 supports HTTP Microsoft Media Streaming (HTTP-MMS), a Windows Media Services streaming protocol. (Windows Media Services, which ships with Windows 2000 Server, includes a streaming media server.) Excelerator 2.0 also works with streaming media servers that support Real-Time Transport Protocol (RTP)/Real-Time Streaming Protocol (RTSP). For example, Excelerator 2.0 supports RTP/RTSP servers such as the following:

- **Apple QuickTime Streaming Server 2.0.1.** This streaming media server supports streaming for a number of compression formats and also supports HTTP streaming. (For more information about the advantages of RTP/RTSP and HTTP streaming, visit <http://devworld.apple.com/techpubs/quicktime/qtdevdocs/REF/Streaming.5.htm>. For information about the compression formats that QuickTime supports, visit www.apple.com/quicktime/authoring/fileformats.html.) In addition, QuickTime Streaming Server 2.0.1 supports Mac OS X Server 1.0.2 or later and is available as a free download. For more information about QuickTime, visit www.apple.com/quicktime/products/qtss.
- **Cisco Systems IP/TV 3400 Series Servers.** These streaming media servers support streaming for a number of compression formats and include Windows Media Technologies, which support Microsoft streaming protocols. The IP/TV 3400 series servers are available on Cisco hardware. For more informa-

tion about the IP/TV 3400 series servers, visit www.ciscosystems.com/univercd/cc/td/doc/pcat/3400.htm.

- **Darwin Streaming Server 2.0.1.** This streaming media server is an open-source version of Apple QuickTime Streaming Server 2.0.1. Darwin Streaming Server 2.0.1 runs on FreeBSD 3.5, Red Hat Linux 6.2, Solaris 7, Windows 2000, and Windows NT. For more information about Darwin or to download Darwin binary and source code files, visit www.publicsource.apple.com/projects/streaming.
- **JStreamer 1.0.** This Java-based streaming media server streams MPEG-1 Audio Layer 3 (MP3) audio files. JStreamer 1.0 requires Java media framework (jmf) and Java Developer Kit (JDK) 1.3. For more information or to download JStreamer and JStreamer source code, visit <http://basit.yi.org/jfs>.
- **Kasenna MediaBase.** This streaming media server comes in two editions: MediaBase Enterprise Edition and MediaBase Network Edition. MediaBase Enterprise Edition integrates with Windows Media Services and runs on SGI IRIX 6.5.10, Red Hat Linux 7.0, and Solaris 7 and 8. MediaBase Network Edition, on the other hand, integrates with Windows Media Services and runs on SGI IRIX 6.5.10. For more information about Kasenna MediaBase, visit www.kasenna.com/products/mediabase.
- **Streaming21 Media Server.** This streaming media server supports several media compression formats and also supports HTTP streaming. Streaming21 Media Server runs on Windows NT 4.0 with Service Pack 3 and above. For more information about Streaming21 Media Server or to download a personal version of this server, visit www.streaming21.com/products/prod_html/prod_01.html. ●

simply placing Media Excelerator in front of your company's streaming media server won't ensure that customers see and hear the same high-quality video and audio that Media Excelerator is sending. What these customers see and hear—and the amount of time this content takes to reach them—depends largely on Internet traffic, and Media Excelerator can't do anything about that, right?

The answer to this question depends on where Media Excelerator is located. Strategically located, Media Excelerator can help mitigate the detrimental effects of Internet traffic—such as slow delivery and dropped packets—that can otherwise frustrate users' attempts to get a clear picture of the content that your company has to offer. Strategically placed, Media Excelerator can also help reduce the overall amount of Internet traffic.

When Media Excelerator is configured in web acceleration mode, you should place it as near as possible to the users

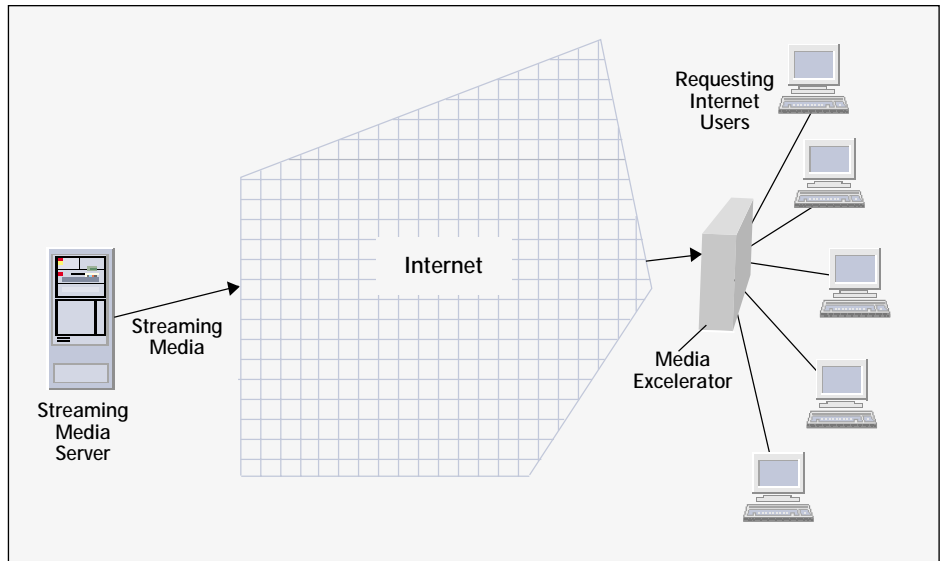


Figure 2. Configured in web site acceleration mode, Media Excelerator can deliver a live or on-demand media stream to hundreds or even thousands of users from the edges of the Internet.

who want to access your company's streaming media—that is, at the edge

of the Internet. (See Figure 2.) As Liu explains, “most Internet traffic has to go

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Where To Pick Up a Little Cache

The following original equipment manufacturers (OEMs) are now selling Volera Excelerator 2.0 caching appliances, either directly or through their own reseller channels.

Volera Excelerator 2.0 Appliance	OEM	Contact Information
Compaq TaskSmart C-Series	Compaq Computer Corp., USA	www.compaq.com/tasksmart/cseries You can also call 1-800-888-0220 (within the United States and Canada). Outside the United States and Canada, visit www.compaq.com/corporate/overview/world_offices.html .
PowerApp.cache	Dell Computer Corp., USA	www.dell.com/us/en/biz/Products/series_pwrap_servers.htm You can also call 1-800-915-3355 (within the United States and Canada). Outside the United States and Canada, visit www.dell.com and select the appropriate country.
CachePilot	DICA Technologies AG, Germany	www.dica.de You can also call +44 (0) 1793 603700 (in Germany).
Primergy WebAccelerator	Fujitsu Siemens Computers, Germany	www.fujitsu-siemens.com/primergy/en/appliances/webaccelerator.html
WebMax	Hitachi, Ltd., Japan	www.hitachi.co.jp/Prod/comp/OSD/pc/ie/8000-ie.htm#webmax * You can also call +813-5471-8992 (in Japan).
Netfinity ICS	IBM Corp., USA	www.pc.ibm.com/us/netfinity/ics You can also call 1-800-426-7777 (within the United States and Canada).
iCache	Legend Group, China	www.ics.legend.com.cn/product/server/iapliance/icache * You can also call (852) 2590 0228 (in China). You may also e-mail inquiries to ccd@legendgrp.com .
Intelli-App	MICROBITS, Australia	http://Intelliapp.microbits.com.au
Express 5800/Cache Server OctPower	NEC, Japan	www.express.nec.co.jp/ins/appliance/cacheserver/index.html * You can also call +813-3455-5800 (in Japan).
Stratacache Caching Appliances	Stratacache, USA	www.stratacache.com You can call 1-800-244-8915 (within the United States and Canada). Outside the United States and Canada, call 1-937-224-0485.
MAGNIA CS	Toshiba, Japan	www.toshiba.co.jp/about/press/1999_12/pr_j2001.htm * You can also call +813-3457-2725 (in Japan).

* You need a language plug-in to view these web sites. ●

over about 10 hops” between an origin server and a user. Each of these hops represents a risk for streaming media degradation. With Media Excelerator serving pristine streaming media from cache at the edge of the Internet, routing hops are no longer a cause for concern. “Reducing the number of hops that this information has to negotiate means

the quality of service to the end user is much better,” Liu concludes.

Placing Media Excelerator at the edge of the Internet also reduces the total amount of Internet traffic. For example, suppose 10,000 Internet users wanted to connect to your company’s live media stream, which amounts to 10 MB of data. Even supposing that you had the server

capacity to support this number of users, 10 GB of data would traverse the Internet. With Media Excelerator at the edge of the Internet, the Internet would carry only 10 MB of data.

Obviously, companies that have access to the edges of the Internet can easily benefit from deploying Media Excelerator there. For example, Media

Excelerator can help Internet service providers (ISPs) improve the quality of streaming media for their customers. Furthermore, Media Excelerator can help ISPs control the amount of Internet bandwidth that customers who request streaming media consume.

Large corporations can also use Media Excelerator at the edges of corporate Virtual Private Networks (VPNs) or WANs to deliver company-related streaming media to employees. For example, you can use Media Excelerator to deliver corporate video conferences. In addition, some large corporations own data centers, in which these corporations can easily deploy Media Excelerator.

Small companies, on the other hand, can contract with hosting providers to deliver streaming content from the edges of the Internet. These small companies can then deploy Media Excelerator in front of the servers that deliver that content.

Of course, placing Media Excelerator at the Internet's edges cannot guarantee that users behind corporate firewalls can receive your company's streaming media—no matter how clear that media is. After all, not all corporate firewalls have ports available for RTP/RTSP. Fortunately, Media Excelerator enables you to reach users behind firewalls by configuring your company's streaming media server to embed its packets in HTTP. (For more information, see "Why Good Old HTTP?")

STREAMING INTO THE FUTURE

How likely is the possibility that your company will someday include streaming media on its web site? If your company wants to attract the growing number of Internet users who are hooked on streaming media, the possibility is quite likely. When these users—who are often called streamies—get hooked, they really get hooked. In fact, in the future, serving streaming media may be the only way that your company can reach streamies.

For example, a recent survey reveals that one-third of Americans who currently have Internet access would give up their television sets rather than the Internet if they were forced to choose between the two. Among the streamies who participated in this survey, this number rose to 41 percent. Obviously, your company probably won't get its money's worth if it targets this audience

Why Good Old HTTP?

Companies that want to ensure delivery of their streaming media often embed that media in HTTP packets at the streaming media server. By doing so, these companies know that "anyone who can view their streaming media content, Jamshid Mahdavi, Volera streaming media engineering manager, explains.

"A lot of audio and video today is encapsulated in HTTP," observes Jeff Harris, a product marketing manager for Volera. The reason audio and video are

encapsulated, Harris explains, is that companies don't want to poke additional holes in their firewalls so that users can receive streaming media. It's a security issue.

Luckily, finding streaming media servers that support HTTP streaming is not difficult. Most streaming media servers—including Apple QuickTime and Windows Media Server—support HTTP streaming. In fact, many of these servers support both real HTTP streaming and pseudo HTTP streaming. (With pseudo HTTP streaming, an entire media file is downloaded before it is played.) ●

with its television advertisements. (See Internet Study IV: Streaming at a Crossroads," p. 3. You can download this article from www.arbitron.com in the Webcast Services section.)

In other words, if streaming media is not already on your company's radar, it may be soon. If you do find yourself implementing streaming media content for

your company, remember this: Excelerator 2.0 can help you overcome the inherent difficulties of providing high-quality streaming media content to users in a secure, timely fashion.

Cheryl Walton is a regular contributor to Novell Connection. Cheryl works for Niche Associates, an agency that specializes in technical writing and editing. ●

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