Streaming Media Solutions in the Enterprise Environment

Testing strategies for successful deployments

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Executive Summary

Streaming media has quickly emerged as a technology that enterprises must deploy to facilitate both internal and external communication. However, it's not enough to simply deploy streaming media hardware and applications within the enterprise — in order to ensure quality delivery and a scalable solution that will support future growth, proper testing and infrastructure assessment strategies are essential.

Significantly, implementing a testing system does not have to be complicated or time-consuming. This document explores capacity testing and quality assessment strategies that enterprises can use to successfully implement a streaming media solution. A clear discussion of the risks and potential problems associated with building, upgrading, and testing a streaming media network will be provided. The challenges and questions discussed in this document will document proven technologies for achieving a high-availability solution and a smooth deployment.

About the Author

Dan Rayburn is recognized as the "voice for the streaming media industry" and as one of the Internet industry's foremost authorities, speakers, and writers on Streaming and Digital Media Technologies for the past ten years. As a passionate leader and spokesperson in the field of streaming and digital media, Mr. Rayburn is noted for his expertise and insight pertaining to digital media business models, strategy, industry foresight, hardware and software products, delivery methods and cutting edge technology solutions in the U.S. and abroad.

He is Executive Vice President for Streaming Media Inc., a diversified media company with a mission to serve and educate the streaming media industry and corporations adopting Internet based audio and video technology. Its website, www.StreamingMedia.com and its tradeshows Streaming Media East and West are considered the premier destinations both in person and online for professionals seeking industry news, information, articles, directories and services. StreamingMedia.com publishes the largest industry newsletter delivered to over 40,000 weekly subscribers and is the number one online destination for professionals seeking industry news, information, articles, directories and services.

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1. Streaming Media Comes of Age

Today, enterprises realize they can both make money and save money by using streaming media technology. Streaming media is a win-win for enterprise applications, offering a tangible return on investment. This return can be realized in the form of increased profits, reduced costs, and time savings — as well as boosting employee and client confidence through enhanced communications.

Press coverage typically focuses on the consumer-related streaming media applications, such as news organizations delivering breaking stories with streaming video or Internet radio stations expanding their reach via streaming audio. In spite of this perception, the reality is that streaming media is making a bigger impact within enterprises than in any other vertical market. On the surface, enterprise streaming media applications may not appear to be as compelling as consumer applications such as gaming, music, and streaming video, but enormous potential exists for creating more effective corporate communications.

To be truly effective, streaming media systems must work in concert with other collaborative technologies. Enterprises need to address this integration proactively, with full awareness of the business value that streaming media solutions can offer. This technological convergence demands seamless integration to move enterprise-class systems and solutions to the next level — and requires proper testing to do so.

1.1 Strategies For Success

Enterprises are using streaming media to inform, educate, and instruct users both inside and outside their organizations. Although webcasting and webconferencing are growing the fastest, corporations are using streaming technology for more than just one-off communication events. Streaming media has emerged to join other core communications technologies, and is becoming an essential business tool across all verticals with strong signs of continued growth.

As streaming media technology enters its second decade, cost-effective implementations and upgrades are now available that provide an immediate return on investment. Every industrial vertical — including financial, pharmaceutical, and manufacturing — can benefit from implementing streaming media solutions. Success stories are emerging from all types of businesses that showcase the benefits of implementing streaming and digital media technologies and applications across the enterprise.

The demand for rich-media content is continuing to increase, and corporations are facing new IT challenges. Deploying new networks or upgrading the existing infrastructure to deliver global access to streaming content — without sacrificing quality or availability — requires careful planning. Ensuring that both the enterprise data network and high-performance streaming systems will deliver optimal performance under heavy loads is a tough challenge, and requires proactive testing to ensure success. It is essential to realize that implementing a testing system does not have to be complicated or time-consuming.

2. Risks and Challenges of Streaming Infrastructures

There is an inherent level of risk in making changes to any network infrastructure. The challenge is to ensure that the network is well-designed, carefully deployed, and tested properly. In today's economy most companies are operating under tight budget constraints, and the task of building, upgrading, and testing a streaming media network needs to be cost-effective — without sacrificing quality. Network designs must be robust and scalable in order to meet current business demands and support future growth. Fortunately, the testing resources and tools necessary to help IT managers achieve these goals are readily available.

2.1 The Importance Of Viable Testing Strategies

Successful deployments rely on understanding the real-world limitations of your deployment and a viable strategy for testing what you've built. Most corporations conduct some form of pre-testing, but it is typically limited to using a mathematical formula to calculate available bandwidth, or estimating the number of streams a server can handle based on the manufacturer's specifications. However, by thoroughly testing the entire streaming media infrastructure during the development phase, including the both the streaming servers and the network as a whole, IT managers can ensure more successful deployments and upgrades. A well-designed and executed testing plan dramatically increases the probability of achieving a successful implementation.

2.2 The Damaging Effects Of Not Testing

When real-world capabilities fall short of estimated capacities, the result can be costly. These costs are realized in terms of the time and effort required to correct the situation, and also in lost productivity encountered when employees struggle to use a streaming media resource that is not performing properly. Even worse, potentially devastating financial losses can be caused by poor performance, network outages, and downtime.

When insufficient testing impacts the quality of streaming content delivery, users may reject the solution and avoid using it. Load balancing, stream splitting, caching, and overall network performance must be tested to ensure that end users receive high-quality on-demand content delivery. If the solution is not pre-tested to ensure compelling, interactive performance, the adoption rate will suffer and the deployment will fail.

The right testing solution delivers optimum streaming performance by simulating the demands that real-world traffic will place on your network. This proactive approach enables IT managers to test the network with a high degree of realism, and ensures that the streaming media infrastructure will provide superior performance from the moment that service is turned up.

A leading bank in the mid-West planned a large webcast from their CEO to employees across the company that would be viewed on the internal network. Confident that there was sufficient capacity from existing distribution hardware, splitters, and ingress servers to make the event a success, the company decided to use their existing streaming media network to handle the event.

The only concern was to ensure each office location would have enough available bandwidth, which was upgraded for the live webcast. On the day of the event, sufficient bandwidth to receive the CEO's webcast was available at each office location. However, the lack of a comprehensive pre-testing plan resulted in a wide variety of problems, including:

- The Web site used for the webcast was incapable of supporting the volume of requests generated by the event, causing numerous log-in problems
- The numbers of users supported by the servers was not as high as expected. Most viewers were expected to be within the company at a controlled bit rate of 80 Kbps. However, a large number of requests from remote workers at 300 Kbps caused problems, since load testing had not quantified the number of users each server could support at varying bit rates
- Viewers from different geographic regions experienced long delays, and in some cases the audio and video was out of sync. Although splitters were in place, capacity had not been tested to ensure employees from other parts of the globe would receive clear transmissions

Without sufficient testing to ensure success, the event was costly in terms of lost productivity from both the IT staff and the webcast viewers, and the failure of the infrastructure to efficiently communicate an important message from the CEO of the company.

2.3 Adding Capacity Does Not Alleviate The Risks

Many network operators believe they can avoid the need for testing by adding bandwidth, servers, and processing power to increase capacity. However, simply adding capacity does not necessarily increase the quality, reliability, or scalability of the deployment. There are many components of the distribution chain, and adding additional hardware can actually cause the risk of a network failure to increase. Only through careful testing can IT managers quantify the performance levels that the deployment is capable of, and where network failures are most likely to take place.

With a live webcast there is no margin for error. Many companies test video components such as cameras and encoders, but overlook the fact that a well-produced webcast means nothing if the

network is incapable of delivering it. Comprehensive testing of every component in the creation, storage, and delivery chain is the best way to ensure success.

Proactive testing is far more efficient and cost-effective than trying to troubleshoot a network that has already gone wrong. The answer to achieving successful new service rollouts is to rigorously test the capacity of your network and server configuration before service is turned up.

3. Successful Testing Strategies

While each streaming media deployment is unique in size and scope, the same basic elements exist in every infrastructure. Testing can only become an exact science when the components to be tested have been isolated and the proper tools identified. It does not have to be a tedious process or one that requires a large and costly deployment of testing devices within your network.

3.1 Differentiating Between Static Content and Rich Media Testing

Successful testing starts by understanding the differences between static and rich media testing. Static testing is typically used for content delivered via the HTTP protocol. Rich media testing is ideal for content such as streaming media, which is typically delivered via the RTSP or MMS protocol.

Testing for static-based content generally requires testing fewer components, and there are fewer points of failure that can affect the end user's Web experience. Page-loading delays caused by packet retransmission are an annoyance, but can be tolerated with static content. However, when it comes to rich media-based content — especially audio and video — packet loss, delay, and excessive jitter cannot be tolerated. There are numerous potential points of failure in the delivery chain, including ingress servers, splitters, servers, storage devices, network switches, routers, firewalls, load balancers, and Web servers. In complex enterprise environments of this type, testing the delivery process from content creation throughout each step of the distribution process is essential.

3.2 Testing From Creation To Distribution

Unlike content delivered via HTTP, streaming media content can be delivered via multiple protocols. These protocols may perform differently under certain circumstances, and content delivery can degrade if all packets are not delivered quickly and efficiently. Different encoding rates can be selected, changing the capacity of the total load that the infrastructure can handle.

Depending on the size and complexity of the deployment or planned upgrade, all components involved with the streaming media process — from content ingestion to content delivery — should be tested. For an infrastructure that supports video-on-demand, it is essential to test the servers delivering content as well as the storage components, the Web server that the content is linked from, the server used for content upload, and the load-balancing and routing components across the network.

For infrastructures that supports live webcasting, it is essential to test the splitters, rollover servers, and other devices within the firewall at remote office locations. Ingress servers that pull content into the infrastructure for delivery can be the single biggest point of failure, but are frequently

overlooked. If content can't be placed on the network efficiently, it doesn't matter how effective the delivery system may be.

Live webcasting typically generates "flash" crowds with large numbers of simultaneous viewers. To meet these heavy demands, testing to determine the number of users you can support — and at what encoding speeds — can make the difference between successful webcasts and failures. However, there are more elements to the equation that just delivering content. Key parameters such as frames per second, delay encountered before content starts to play, and maintaining consistent playback to avoid re-buffering all contribute to the quality of the end user's experience.

3.3 How Proper Testing Alleviates The Risks

As mentioned earlier, the primary reason for infrastructure testing is to minimize the risks associated with deployments and upgrades. In tough economic times businesses are required to operate with smaller budgets, and funding for testing can suffer. However, this represents false economy. Lack of testing results in deployment delays, as well as drains on internal resources when troubleshooting and network reconfiguration is required to meet desired performance thresholds.

IT organizations face the challenges of making informed decisions concerning the amount and type of hardware to be purchased and choosing optimal software solutions to meet specific needs. Pre-purchase testing is essential for evaluating the capacity and performance of streaming media components, enabling businesses to make cost-effective, informed decisions on "right-sizing" the infrastructure. This critical process delivers a key advantage when dealing with vendors, and prevents businesses from incurring high costs by being oversold.

When it comes to testing streaming media infrastructures, the bottom line is the actual end user experience. While capacity is usually the focus, performance statistics are measured for one reason — a way to quantify the network's ability and performance to deliver quality content. Regardless of the vertical market using the technology, end users will only adopt and increase consumption of streaming media systems that are easy to use and deliver a quality experience.

4. Real-World Testing Solutions from Spirent Communications

The Avalanche and Reflector network testing appliances from Spirent Communications offer the most comprehensive testing solution available for end-to-end analysis of the streaming media infrastructure. Avalanche simulates an almost unlimited number of users requesting streaming content, enabling network managers to ensure that the streaming media infrastructure will excel under real-world conditions. Reflector emulates the behavior of large streaming server environments, and when used with Avalanche, readily enables any device or network connected between the two systems to be tested to capacity.

The Spirent testing appliances enable IT professionals to determine exact threshold capacities by configuring multiple, simultaneous user scenarios that offer extremely realistic simulations of real world network behavior. For testing live webcasts where users are required to log in or register, Avalanche is capable of interacting with sites using dynamic content, links, and fill-in HTML forms. Avalanche emulates multiple browser types for hyper-realistic network testing and analysis.

By using protocol-accurate stress testing with extremely high loads to identify potential points of failure, Avalanche and Reflector enable organizations to accelerate deployment and upgrades of streaming media infrastructures. Pre-testing the infrastructure ensures that a network can stand up to the large-scale, multi-protocol traffic loads consistent with video-on-demand and live webcasting.

The Avalanche and Reflector testing appliances are rack-mountable devices that eliminate the need for cumbersome, expensive testing infrastructures of PCs and other test devices. This cost-effective, emulation-based solution also frees IT staff from time-consuming management of hardware and software test installations. Portable models of both products are also available for field testing.

4.1 Industry-Leading Testing Solutions

When choosing a testing solution for streaming media infrastructures, the key factor is selecting a vendor familiar with the technical requirements for delivering audio and video in the enterprise network environment. Spirent Communications is the market leader among Fortune 1000 companies currently conducting streaming media-based solution testing. By delivering testing solutions that accurately simulate the performance of the world's largest networks, Spirent ensures that deployments and upgrades meet their performance targets and deliver quality end-user experiences.

All products offered by Spirent Communications are backed by comprehensive warranties, and extensive maintenance and support packages are offered as well. Unlike other vendors, Spirent offers a wide variety of professional services designed to assist IT staff in devising testing programs that result in optimal network performance.

5. Conclusion

In order for enterprises to stay competitive in today's marketplace, streaming media technologies must be adopted as an integral part of effective internal and external communications strategies. IT organizations face a unique challenge in deploying and upgrading this performance-intensive technology, and that's why developing a successful strategy requires comprehensive and proactive systems testing.

To ensure that streaming media deployments and upgrades accomplish their business objectives, IT professionals must test both streaming media components and the streaming infrastructure. As the budget for developing and implementing a streaming media solution is determined, rigorous testing needs to be included to ensure success.

Only through careful pre-testing and analysis can IT professionals ensure that network systems and infrastructure are capable of meeting capacity and performance thresholds — and delivering a quality user experience. Instead of troubleshooting failed deployments, implementing a proactive testing strategy can help ensure that the corporate IT department delivers a reliable, scalable, and robust streaming media solution that is capable of enhancing the success of the enterprise.

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