STREAMLINING MULTI-CDN IMPLEMENTATION

Many companies that need to deliver content online at scale use Content Delivery Networks (CDNs) to improve performance. However, even with a reliable CDN, there can be issues with service quality in different regions, insufficient capacity during peak periods, and lack of resiliency and diversification. To address these concerns, some companies distribute their delivery load across more than one CDN, a concept often called a multi-CDN implementation. In this paper, we'll explore frequently-asked questions and best practices for implementing multi-CDN workflows based on extensive experience.

ABOUT MULTI-CDN

This paper assumes basic knowledge of CDNs. For more background on multi-CDN, please see the following white paper:

5 Things You Need to Know About Implementing a Multi-CDN Strategy

It is an introduction to the topic of multi-CDN that provides insights on the basics of multi-CDN, how it works, the benefits, determining if multi-CDN is right for you, and choosing a partner.

COMMON QUESTIONS ABOUT IMPLEMENTING MULTI-CDN

Here are a few common concerns about implementing a multi-CDN strategy.

WHAT ARE THE BENEFITS OF MULTI-CDN?

The benefits of a multi-CDN environment depend on your goals, configuration, load-balancing strategy and other factors. Improved availability is a common benefit, as multi-CDN is a diversification strategy which reduces exposure to downtime. Improvements in performance, overall capacity, regional coverage quality and security are additional benefits that companies have seen from multi-CDN. You can find more information in 5 Things You Need to Know About Implementing a Multi-CDN Strategy.

WHAT’S THE IMPACT ON RESOURCES?

Some companies are concerned that adding and managing an additional CDN will place an undue burden on their engineering and IT teams. While supporting multiple CDNs will add steps to your content delivery process, there are ways to offload or streamline some of the effort, gaining benefits while minimizing the resource impact and cost.

First, employing best practices can avoid wasted time and effort. Second, leveraging the CDN provider’s technical team can reduce impact on internal staff while delivering the desired results quickly and correctly. Third, identifying ways to streamline day-to-day operations, such as using a control and reporting web portal or integrating into your current workflow via API (Application Programming Interface), can minimize impact on your staff.
HOW SHOULD I TRACK PERFORMANCE AMONG CDNS?
In comparing performance of CDNs, start by identifying which metrics make the most sense to track. Depending on your workflow, metrics may include startup time, buffer exit rate, video rebuffer rate, average bitrate, download completion rate, throughput, time to first byte, time to last byte, and number of bitrate switches. During the vendor evaluation phase, you can compare performance using services such as Cedexis or Catchpoint, making sure to examine all your target regions. Once vendors are selected and the multi-CDN environment is up and running, you can use performance information for decisions on allocating traffic.

HOW SHOULD I SWITCH AMONG CDNS?
There are a number of approaches for allocating traffic among CDN providers. One situation may require switching based on performance, another based on cost, another based on status relative to traffic commitments with the various CDNs. Technical methods of allocating traffic include DNS-based, static, round robin, weighted round robin, geolocation, and performance-based switching. For more detail on these methods, see the “How does Multi-CDN work?” section of 5 Things You Need to Know About Implementing a Multi-CDN Strategy.

BEST PRACTICES FOR IMPLEMENTING MULTI-CDN
Based on extensive experience implementing multi-CDN environment, Limelight offers the following best practices.

CONFIGURATION PARITY
To be able to allocate traffic among multiple CDN’s, it is important that the CDNs share common configurations and feature parity. Various CDN vendors use different software, configurations and terminology. In addition, each deployment has its own unique configurations.

- Provide your current CDN configuration details to your new CDN vendor to ensure existing capabilities are supported by the new CDN.
- Review the configuration with technical staff from the new CDN to confirm viability and prepare for enablement.

ENABLEMENT
Once the current configuration is understood, the new CDN provider should work with you on enablement.

- Start with planning. Meet with the new CDN team and detail the steps necessary to produce a comparable configuration in the new CDN. An experienced CDN provider can collaborate with you to determine the best ways to mirror your current capabilities on the new network. The planning phase is the time to surface and plan for potential issues such as location of origin storage, authentication plans, type of content (objects) being delivered, pre-packaging (e.g. video transmuxing/transcoding), API calls and various technical details.
- Once the plan is in place, work with the new CDN to execute the plan and extend your workflow to include the new CDN.
- Monitor all your CDNs for unusual traffic patterns, bad status codes, and file errors. Compare cache efficiency between providers and stay in communication with the new CDN to ensure a smooth transition to your multi-CDN workflow.

CUSTOMIZATION
In some cases, customization may be required. An experienced CDN provider’s technical team can provide assistance or perform the customization for you. Areas that may require customization include:

- Correcting for variations in how different CDNs implement features.
- Implementing special capabilities that are not standard features in all CDNs.
- Configuring security (certificates, ciphers, CORS).
- Setting up cache optimization such as special rules that would overrule the file headers.
- Customizing purge capabilities.
- Configuring origin storage.
- Creating or customizing reports.

CDN SWITCHING / LOAD BALANCING
Multi-CDN environments require a CDN switching solution with some form of load balancing to allocate traffic across CDN’s. There are a number of techniques and tools available.

- DNS-based load balancing is an effective, proven method. For many websites and applications that deliver static objects, DNS load balancing is sufficient.
- In cases that involve more dynamic content, you may need a load balancing solutions with more advanced features.
- Some load balancing solutions also incorporate RUM (Real User Monitoring) data for improved performance based on realtime results.
CACHE FILL FOR MULTIPLE CDNS
Deploying multiple CDNs means more cache sites to fill, which can translate to more retrieval and transfer of content from origin to cache, increasing latency and cost. There are a number of techniques that can reduce the impact of cache fill for multiple CDNs:

- Origin shielding can be used to assign one or more cache sites as a proxy for origin, improving response time and reducing calls to origin storage.
- High-performance origin storage with capabilities such as multi-region replication and automatic retrieval from the fastest location help improve performance on cache miss.
- Optimizing transit from origin to the requesting CDN can reduce latency when compared with transit over the public internet.

VIDEO FORMAT CONVERSION AND DRM
Streaming video to a range of devices requires multiple streaming formats and Digital Rights Management (DRM) formats. With multiple CDNs, it’s less likely that the requested combination of formats will be found in cache, increasing the need for retrieval of the required content from origin. It can be cost-prohibitive to pre-encode every possible combination for every video-on-demand title and store them all individually. Techniques to mitigate this challenge include:

- Instead of storing many version of the same video, reduce storage costs by storing MP4s behind a secure network and then performing on-the-fly processing to create different versions.
  
  - On-the-fly transmux to streaming formats such as HLS, MPEG-DASH, HDS and MSS provides compatibility with a range of viewer’s devices.
  
  - On-the-fly DRM encryption helps protect content from unauthorized access. Make sure you can support all three major DRM systems: Google Widevine, Microsoft PlayReady and Apple FairPlay DRM.
- Distributed processing in regional PoPs around the world can significantly reduce latency.

TRAINING AND RESOURCING
It’s important to fully train your staff prior to implementing your new multi-CDN workflow, and to ensure adequate resourcing. Typical tasks include:

- Staff augmentation to support the transition and the expanded environment.
- Training on changes to the workflow and operations to accommodate multi-CDN.
- Training on how your load-balancing solution will allocate traffic among the CDNs.
- Training on operational details of the new CDN.

LIMELIGHT AND MULTI-CDN
As part of a multi-CDN environment, Limelight offers exceptional CDN performance and extensive experience with multi-CDN integration, with a world-class technical team to help you manage the transition. Here are some ways that Limelight can make a strong contribution to a high-performance, streamlined multi-CDN implementation:

- **Delivery Performance.** In multi-CDN environments, Limelight provides exceptional response time and throughput, caching efficiency, low video rebuffer rates, and low buffer exit rates.
  
  - Limelight is architected for efficiency, with a global QoS-enabled network of over 80 Points-of-Presence (PoPs) in more than 40 metropolitan locations populated with a high density of fast servers with SSDs (Solid State Disks).
  
  - Limelight’s private fiber backbone enables content to bypass the congested public internet, resulting in faster, more reliable, and more secure content delivery. Limelight owns and operates one of the world’s largest private networks.
  
  - Limelight’s EdgePrism software stack delivers optimal performance over any network connection type or speed without requiring any special client-side code. Limelight continually monitors a user’s connection and optimizes how content is delivered based upon realtime analysis.
  
  - Limelight origin shield assigns one or more Limelight PoPs (Points of Presence) to act as a proxy for your origin, which greatly reduces requests to origin, minimizes origin egress costs, and improves user experience.

- **Origin storage.** With more cache sites to fill, origin storage can play a larger role in multi-CDN delivery. Limelight Origin Storage is specifically engineered for driving great user experience through CDNs. It features ingest automation, high availability, global scale, and multi-CDN support, all at an excellent value. The result is up to 200% faster content retrieval and more reliable content delivery. For migrating from current storage, Limelight’s Intelligent Ingest automatically migrates content to Limelight Origin Storage based on either audience requests or a list of content you provide.
• **Video format conversion and DRM.** For video multi-CDN, on-the-fly processing tools can satisfy workflow requirements while reducing storage costs. Limelight can provide video processing services for Limelight or all CDN’s without storing multiple renditions of each video.
  - On-the-fly format conversion to ensure compatibility with the user’s device (HLS, MPEG-DASH, MSS, HDS)
  - Multi-DRM on-the-fly to the major DRM systems (Google Widevine, Microsoft PlayReady and Apple FairPlay)
  - Processing of the above in distributed PoPs to minimize latency

• **Load balancing.** Limelight Traffic Director provides DNS load balancing for situations where preconfigured load balancing is sufficient. If dynamic load balancing is required, Limelight has also worked extensively with other companies’ load balancing solutions, and is able to support virtually any load balancing solution and make introductions to reliable vendors.

• **Expertise To Extend Your Capabilities.** Limelight has skilled resources that can act as an extension of your team. Whether it is your initial implementation, responding to changing business requirements, implementing new services, or training and augmenting your staff, experts are available to help you succeed. Activation, implementation, workflow consulting, training, staff augmentation and live event support are just some of the capabilities available. Limelight applies its extensive experience in multi-CDN environments to tasks including:
  - **Planning and Configuration.** The Limelight technical team has experience helping customers plan and configure multi-CDN workflows, and can help make the process painless.
  - **Enablement.** Limelight’s Advanced Services team has extensive experience working with different CDNs and can help you configure your Limelight deployment to be compatible with your existing CDN. Limelight can also perform configuration testing and quality assurance to accelerate bringup. In addition, we can help you head off future problems by setting up custom headers and debug logic. In the event of future problems or anomalies, these techniques provide information that can be invaluable in isolating the problem area.
  - **Staff Augmentation.** Limelight’s Advanced Services Architects can provide project management services to help you accelerate your deployment and increase ROI.
  - **Training.** Limelight’s technical experts can train your team on the intricacies of multi-CDN operations and provide ongoing training as needed.

**CONCLUSION**

Delivering online content via multiple CDNs can provide many benefits. Adding Limelight’s CDN capacity, coverage, and performance to your existing CDN helps you improve availability and performance, increase your global capacity and regional coverage, provide higher quality delivery to your customers. Limelight has worked with many leading organizations and brands to implement effective multi-CDN strategies. If you are considering multi-CDN, Limelight can help you maximize the benefits while minimizing the pitfalls. Contact Limelight to learn more.

**ABOUT THE ORCHESTRATE PLATFORM**

The Limelight Orchestrate Platform is built upon a global, private backbone network with the speed, capacity, and availability to deliver the experiences today’s audiences demand. This industry-leading Platform includes integrated content delivery, web acceleration, origin storage, video management, cloud security, and support services. The unique combination of global private infrastructure, advanced software, and expert services surpasses other CDNs, to enable today’s and tomorrow’s workflows and put audience experience first.

**ABOUT LIMELIGHT NETWORKS**

Limelight Networks Inc., (NASDAQ: LLNW), a leading provider of digital content delivery, video, cloud security, and edge computing services, empowers customers to provide exceptional digital experiences. Limelight’s edge services platform includes a unique combination of global private infrastructure, intelligent software, and expert support services that enable current and future workflows. For more information, visit www.limelight.com, follow us on Twitter, Facebook, and LinkedIn.