APPEX
NETWORKS

What does AppEx do for Content Delivery Networks

Maximizing Network Performance, Responsiveness and Availability

Background

Content Delivery Networks (CDN's) have been around for many years now and are one of the major reasons that companies are expanding their web presence and global distribution of products on the Web. The challenges of delivering content from a single location to the world are partially solved by the distributed proximity of the CDN edge nodes or points of presence (PoP's) and the connectivity of their networks. Building PoP's in remote geographical regions is expensive and impractical in many cases. Only a few players can afford to invest the money to cover far corners of the world, so many CDNs are stuck with regional coverage which is a decided disadvantage when customers are choosing which CDN to sign up for. The ease of deploying content on a CDN for companies is a two edged sword for the CDN's themselves. It is extremely easy to test and compare competing services but is also easy to switch CDN's at the end of a contract. The result of this is price erosion for all of the CDN players in the market. This makes it even more important for CDN's to have good coverage in as many places in the world as possible. Global benchmarking companies like Cedexis, CloudHarmony, Gomez and Keynote are continually measuring the CDN's performance and consistency all over the world.

The CDN market is growing quickly because market prices are eroding and more companies are discovering the benefits of outsourcing and offloading this task to third parties to focus on their core skills. Unfortunately the price erosion makes it harder for a CDN to survive in today's competitive market. Customers use measurement tools and services to gauge how well a CDN can deliver its content head to head in a particular region and only the fastest networks can price their service at a premium.

The purpose of this document is to outline and summarize the strategic vision that AppEx has for Content Delivery Networks and how AppEx technology can help CDNs deploy new services quickly as well as speed up the legacy delivery to compete more cost effectively on a global basis.

AppEx and its customers have tested a broad range of content from many global locations to validate that its acceleration technology can work successfully in massive, distributed networks. All size objects ranging from 8k files to entire web pages to multi-gigabyte movies and database backup files can be moved around the world more quickly with AppEx technology. There are many places inside of a CDN where AppEx can be utilized. It is just a matter of identifying the right use cases and then testing and deploying.

Following are a few things that are possible with AppEx technology in any CDN or hosting infrastructure:

• *Extend the global performance reach of the current network* to new geographical regions without investing in infrastructure.

• *Create a dynamic site acceleration service* (DSA) to complement the download, caching and streaming services.

• *Accelerate the movement of content* between edge nodes

• *Minimize the effects* of cache misses on web page and streaming delivery

• *Accelerate the last mile* from the edge caches to the end user (long last mile)

• Video Streaming *without interruption*

• Help deliver *a better user experience for mobile applications*

1 *What does AppEx do for Content Delivery Networks*

All of these things are accomplished with AppEx technology whether it is deployed as an appliance, software or virtual instance. Any of these deployment options are available to fit the specific network.

Extend the global performance reach of the current network

Acceptable Performance Range before AppEx deployment

Service rings in milliseconds

Service rings represent acceptable performance
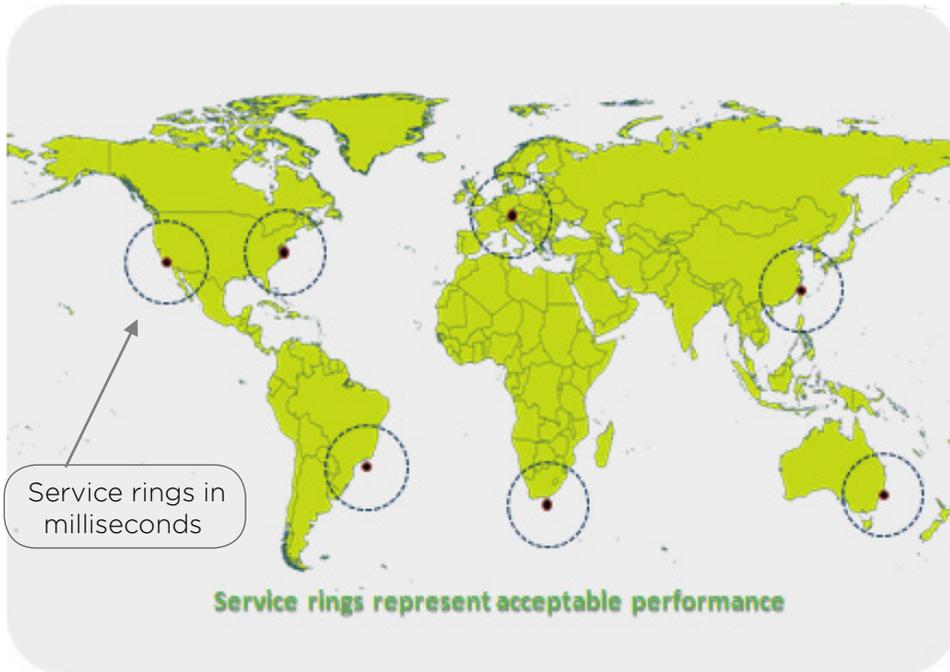
The download and caching markets have become commoditized with very low margins and the name of the game here is traffic volume and cost reduction. Deals are often won by proximity in a geographic region and the best Cedexis, Gomez or Keynote results. If the CDN footprint (number of PoP's) can be smaller and the Gomez and Keynote performance can stay the same or improve, then the CDN has a competitive advantage. The first CDN's spent vast amounts of money to build out their network presence. The newer CDN's cannot afford this capital investment. With AppEx technology CDN's can serve remote geographical regions from fewer PoP's.

Acceptable Performance Range after AppEx deployment

AppEx provides acceptable performance to a wider area making each POP more effective

When AppEx technology is deployed in the network, the acceptable performance range around each node is automatically extended by many milliseconds. This effect enables a CDN to deliver content into geographic regions where a new PoP was required before, but now the content can be delivered from a location that is farther away thus saving the capital expense of building a new data center in the region. One example is an AppEx customer who delivers content from Los Angeles through Miami to Brazil with good performance rather than building a PoP in Sao Paolo. Another customer hosts its website in San Francisco to serve users in Japan with little or no performance impact. This can save a great deal of capital expense.

Create a dynamic site acceleration (DSA) service

Gomez Testing Results Example customer(8-07-2010 thru 8-9-2010)

Customer Home Page

Location	Un-accelerated in Seconds	Accelerated in Seconds	% Faster
Overall All Locations	4.188	3.286	27%
US Locations	1.936	1.346	44%
South American Locations	5.57	4.408	26%
European Locations	4.829	3.825	26%
Asian Locations	4.417	3.564	24%

Customer Networking Page

Location	Un-accelerated in Seconds	Accelerated in Seconds	% Faster
Overall All Locations	5.882	3.951	49%
US Locations	2.242	1.604	40%
South American Locations	8.174	5.311	54%
European Locations	6.97	4.626	51%
Asian Locations	6.14	4.263	44%

Customer Support Page

Location	Un-accelerated in Seconds	Accelerated in Seconds	% Faster
Overall All Locations	2.93	2.32	26%
US Locations	1.332	0.998	☐☐%
South American Locations	4.034	3.149	28%
European Locations	3.573	2.806	27%
Asian Locations	3.141	2.591	21%

Transactions: Average

Selected Tests: Accelerated - Belkin - All objects (analyze last 24 hours); Unaccelerated - Belkin - All objects (analyze last 24 hours)

Time Period: Sat, 07 Aug 2010 15:00 to Mon, 09 Aug 2010 14:00
(GMT -07:00) Pacific Daylight Savings Time

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1: Buenos Aires
2: London
3: Miami
4: Oslo
5: Paris
6: San Diego
7: Sao Paulo
8: Seattle
9: Seoul
10: Sydney
11: Tokyo

■ Accelerated - Belkin - All objects
■ Unaccelerated - Belkin - All objects

Data Summary

Test Name	Avg Response Time (sec)	Availability (%)
Accelerated - Belkin - All objects	3.184	100.00
Unaccelerated - Belkin - All objects	4.062	100.00

A few years ago Akamai decided to create a new market around dynamic site acceleration (DSA) and released new products like Dynamic Site Accelerator and Web Application Accelerator aimed at higher profit margins and differentiation in the crowded CDN market. These services are much more profitable than static content CDN services. This segment of the business is growing quickly and other CDN's are now adding this type of service. Most of the CDN's are getting ready to add dynamic services to their existing download and caching businesses if they have not already done so. Soon this will be a crowded market as well. The first companies to market will gain the most market share and have the best chance to survive.

The options here are to build a dynamic service, which takes a great deal of time and money, or purchase and deploy existing technology in a short amount of time. AppEx would enable the latter approach.

This would be accomplished by placing AppEx technology in strategic locations close to the customer, and then redirecting the origin dynamic traffic through that closest PoP with AppEx technology in it. This would be the onramp for the dynamic content. From that point forward the traffic would be accelerated until it reached the end user. The traffic could be directed across the CDN backbone utilizing TCP keep alive and other techniques or across the Internet outside of the CDN network. This enables acceleration of dynamic content and applications from origin web servers. Any CDN could quickly create a Premium service that would compete with other dynamic services. Rapid deployment of this service would enable market share growth with a profitable service. Tables in left are some examples of the benefit delivered by AppEx to customers in various trials over the past few years:
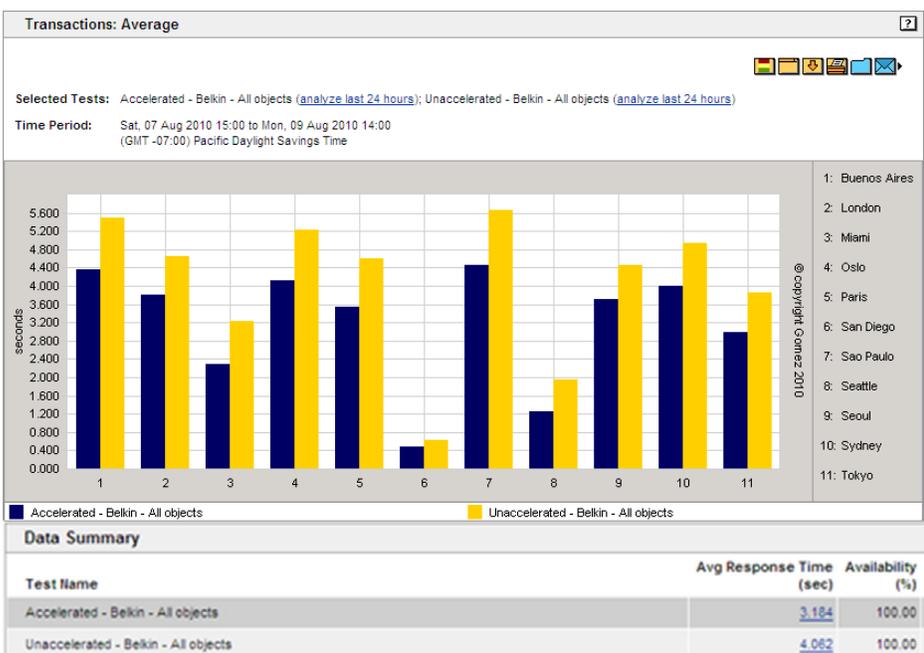
Accelerate the movement of content between the edge nodes

This is a general benefit from having AppEx in all of a CDNs edge nodes and data centers. Any content that needs to be moved around inside of the network, regardless of the network path, will move faster and more efficiently on the network. Log files, secondary cache files, long tail content, backup and recovery files, etc., will all transfer faster.

Minimize the effects of cache misses

Most CDNs have a caching strategy that migrates seldom used content to regional or central origin caches leaving often used content active in the edge caches. This architecture cuts down on the resources required at the edge of the network, but creates some latency issues when there is a cache miss and the content must be retrieved from a remote data center. Some types of content are stored in central locations to be distributed as requested by the edge servers in real time and this can also cause delays on an active web page. AppEx technology minimizes the delay when content is coming from regional or central caches which gives the CDN maximum flexibility in designing its network and caching architecture.

Accelerate the last mile from the edge caches to the end user

The one thing that no managed service provider controls is the "last mile" – in other words the network distance between the closest edge node and the end users browser. AppEx is an end to end solution (origin to browser) and, depending on the latency in the "last mile" from the edge, AppEx can help. Any network latency greater than 10ms will see improvement and the longer the last mile the greater the improvement. If the last mile is from Beijing to Indonesia for example (40-50ms on a good day), AppEx would make a noticeable difference. AppEx helps to insure against bad Internet days. The Internet is notoriously inconsistent with latency varying from day to day. AppEx technology helps to smooth out the bad days delivering much more consistent user experience.

Video Streaming without interruption

AppEx technology stabilizes the stream and minimizes the effects of packet loss and jitter on the viewing experience. The data stream from server to video player starts faster and is more consistent with minimal delay. Packet loss is not only avoided but also quickly recovered. Any variable bitrate streaming technology benefits from AppEx. The highest bit rate is delivered more often and since the stream is more consistent the bit rate changes less often. A good example of this is an AppEx customer who was having problems streaming HD Content from the West Coast of the US to film distributors in Europe across the internet. The application delivers encrypted HD videos which run at high resolution. The TCP streams were unwatchable because of packet loss and delay. The customer implemented AppEx technology in front of the streaming server and the distributors can now watch full length movies across the Internet with very little disruption. Any latency sensitive applications like streaming or thin client (Citrix ICA, RDP, etc.) would see improvements in user experience with AppEx technology.

Summary

It is not very often that a technology comes along that can be easily deployed in a large network and can deliver a better user experience to the massive audiences that view content across that network.

The CDN market has become extremely competitive with eroding margins and more emphasis on regional coverage. Publically available benchmarks are available that compare regional performance of every CDN. There is constant pressure to reduce the cost of delivering content to keep up with the falling prices while at the same time increasing performance in specific regions.

AppEx technology has been battle tested in some of the largest networks in the world. If deployed properly AppEx could become a strategic weapon in any CDN's head to head battle with their most troublesome competitor. AppEx can help any CDN deliver files and web pages faster in regions such as Asia and South America, and be a difference maker in global Cedixis, Gomez or Keynote testing.

AppEx is easy to test in the network and the results can be recorded in Gomez, Keynote or any number of performance measurement platforms. AppEx pays for itself quickly in any CDN and can be deployed in production rapidly with minimal changes to any network.

Contact AppEx today for more information and to discuss a free trial.

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