Content Delivery Network: Driving business growth through richer content delivery

Abstract
Organizations in industries such as media, entertainment, gaming, software and online retail want to ensure that their digitally rich content reaches their audience as quickly and as reliably as possible. End-users want a high-quality online experience whether they are watching a movie, streaming a live event, playing an online game, shopping online or downloading a large software update. Slow performance or buffering or freezing can alienate customers. Content Delivery Networks (CDN) are a solution to this problem. This white paper explains what a Content Delivery Network is, why and where it is used, and how it can help organizations provide their end-users with an enhanced user experience.

Introduction
The worldwide market for Content Delivery Network (CDN) services is estimated to reach nearly US $6.9bn in 2017, driven primarily by growth in the video delivery segment, according to US firm BCC Research. Mobile devices now drive almost 20% of all global Internet traffic with 61% of India's Internet traffic coming from mobile devices.

The quality of content, speed of online delivery and website performance are factors that affect user experience. E-commerce websites risk alienating customers if the user experience is unsatisfactory. Rich media content and improved picture quality have led to an increase in object size or file size, be it high-definition videos or software applications. User choice and personalization is also on the increase with organizations offering a broader choice of downloadable audio, video and software. The audience has become global and Internet traffic is growing as users spend an increasing amount of time online through a proliferation of devices such as PCs, laptops, tablets and mobile devices. Social media adoption is increasing and has become another important medium for content promotion. Organizations want to be prepared to handle all demand spikes and capitalize on the opportunity.

Why CDN? What is a CDN?
The Internet has enabled the delivery of content and information to the far corners of the earth. Transmitting information over long distances involves multiple intermediate steps that can cause delay or latency. In case of audio or video streaming, this delay is more significant, leading to degradation in quality and an unsatisfactory user experience. Peak traffic or demand spikes can place a huge strain on network resources that can affect speed of delivery and performance, and can sometimes bring down servers leading to service outages. CDN provides a way to overcome these challenges.
A CDN or Content Delivery Network is an interconnected system of computers on the Internet that provides web content rapidly to numerous users by duplicating or caching the content on multiple servers and directing the content to users based on proximity².

CDNs can secure content through Digital Rights Management and limit access through user authentication. They can prevent certain content from specific regions.

CDNs can deliver content to set-top boxes, smart phones and can be used as a delivery mechanism for cloud computing services.

CDNs can deliver different content to different users depending on the kind of device requesting the content. They are capable of detecting the type of mobile device and can deliver device-specific version of content.

They can deliver advertising through ad insertion into video streams and in web pages.

They provide better reporting of end user statistics and geographic usage of content, which can be used for sales and marketing purposes.

Benefits

Enterprises that experience a huge number of hits on their web pages can benefit greatly from CDN. When a large number of users simultaneously access a web page or some specific content such as a video, a CDN enables that content to be sent to each of them without delay. CDN also reduces latency and the “jitter” or buffering that is seen when streaming audio or video leading to a better user experience.

Another benefit is redundancy. In the event of an outage, damage or a large scale attack that disables many servers, content is still available to some users as duplicate copies exist on geographically dispersed servers.

CDNs improve reliability and performance of video delivery, large files and applications and provide the user with an enhanced user experience. Organizations can reduce networking costs by using a CDN provider’s network rather than building their own.

CDNs also offer secure storage capacity for content such as videos for enterprises that need it, as well as archiving and enhanced data backup services.

² www.whatis.techtarget.com/definition/content-delivery-network-CDN
³ www.marketingland.com/mobile-close-to-20-percent-of-internet-traffic-globally-58015
Usage of CDN

While a CDN can be used for any type of website, it is primarily used in three application areas:

Media Distribution or Media delivery:
- Usually used for entertainment such as sporting events, television programs, movies as well as by news media
- Live broadcasts over the Internet of one-time events such as a swearing-in ceremony of a head of state
- Corporate Communications such as corporate videos, weekly meetings, earnings reports

Website Acceleration/Caching:
- Usually used for websites whose users are spread over a wide geographic area such as retail, online reservations and ticketing and online newspapers

Large File/Software Delivery
- Used by gaming companies or software providers to distribute software

Media Distribution

Media distribution of content over the Internet is fairly common today, with three possible types of media delivery. One is the live streaming of global or one-time events such as award ceremonies or a political leader’s swearing-in ceremony. The second and the most common is Video-on-Demand such as YouTube videos in FLV, MP4 and M4V formats. A third form is an Internet based 24/7 channel that plays pre-recorded content at scheduled times similar to a TV channel.

An organization first has to decide on the type of media delivery and the criteria relevant to that type of media delivery.

For live delivery, the number of nodes or POPs that can service the intended audience, redundancy and 24/7 customer support are deciding factors. Users can access live broadcasts, weekly meetings and 24/7 channel broadcasts through a variety of devices such as PCs, laptops, tablets (iOS, Android) mobile devices (iOS, Android, Windows 7) and set-top boxes. The questions to ask would be: Does the carrier have a global reach and a high capacity network that is scalable and can it deliver the live broadcasts instantly without buffering or freezing? With respect to performance and scalability, can streaming be supported for up to hundreds or thousands of simultaneous viewers worldwide? What is the delay between the live feed and the feed at the end-user? Is there support for DVR-like controls so that users can pause, rewind, restart and jump to any point in a live broadcast? Real-time reporting of user statistics is valuable for live broadcasts.

With on-demand video delivery, videos should start instantly and play uninterrupted. Network reach and the type of architecture available for storage and delivery of videos may be important considerations. Content owners could push files to the CDN provider’s origin servers and leverage the provider’s distributed architecture, or have the files pulled from their origin server or cloud storage account. Analytics such as most watched videos, geographic location of users and viewing time are valuable statistics to obtain from the CDN provider.

Website Acceleration

Website acceleration speeds up the delivery of content to visitors accessing the website and reduces the need to scale infrastructure when traffic increases or becomes more geographically dispersed, thereby improving user experience. For businesses that run a reservations system, online ticketing or have an online market place, website acceleration improves speed of delivery by improving the HTTP or HTTPS performance.

Most CDN providers offer one of four complimentary technologies for website acceleration or caching. These are static site caching, dynamic site caching, web application acceleration or IP acceleration.

Static site caching uses a mechanism called GEO-DNS2 to cache the content in geographically diverse areas. The technology helps CDN point its distributed network at an origin server and cache its content in the correct geographical region. This is also known as ‘reverse proxy caching’.

Dynamic site caching is applicable to dynamic data such as pricing or account balances. These change over short periods of time and thus cannot be cached for long durations.

Web application acceleration methods typically focus on improving HTTP and HTTPS performance. The techniques used could be HTTP protocol acceleration and compression or tuning of packet sizes. Browser defaults are most commonly targeted to improve performance.

IP Acceleration focuses on improving Transport Control Protocol (TCP) traffic unlike web application acceleration methods. However since TCP is more suited for accuracy than speed, some CDN providers prefer to work on solutions for accelerated IP.
Large File/Software delivery
Enterprise application vendors, anti-virus software providers and gaming companies usually distribute large files over the Internet and want this process to go smoothly. Securing the content via delivery over the SSL (Secure Socket layer), authenticating user access, large file optimization and download analytics are important factors.

Choosing a CDN provider checklist
The following checklist can help an organization choose a CDN provider:
What is the geographic reach of your content? Where are your users located? Some CDN providers may have a strong regional presence versus a national or global one.
What are your site’s traffic patterns, peak times of usage, type and size of content accessed and user location?
What is the projected future demand, keeping in mind that content is likely to become richer and larger in size?
What is the type of content being distributed? If it is live streaming, a CDN’s streaming capacity in that region assumes importance. For a gaming company, the provider’s large-object HTTP capacity is important.
Can the CDN provider ensure sufficient storage and delivery capacity at most strategic locations?
Is the CDN architecture Internet-based or a private network CDN that has nodes connected via a dedicated private network? Both have their strengths but the Internet based one may be cheaper since the provider does not have the overhead costs of maintaining their own network.
Does the CDN support your distribution format such as Adobe Flash, HTTP streaming, Microsoft Silverlight and iDevice?
What type of Service Level Agreement (SLA) makes sense for the type of content your business handles? Can the provider provide 100% uptime? Are there penalties or credits if there are outages?
Is pricing fixed rate or based on consumption with respect to bandwidth and storage? Are there overage charges and credit for down time?
Can the CDN meet your security requirements such as authorizing certain users, web sites and media players (for streaming content), URLs based on expiry time, allowed or disallowed countries or metros IP address etc.?
What types of end-user devices are supported such as flash-enabled PCs, mobile devices (Android, iOS) and set-top boxes?
Does the content owner have control and the ability to add, delete and update content?
Can the CDN control where content may or may not be viewed at the country, regional or metro level?
Can the CDN provide Reporting & Analytics whether real-time, near real-time or historic textual reporting?
What type of customer support is needed? 24 x 7 phone support
In the case of telecom providers that provide CDN services, the last mile connectivity between end-user and nearest Point Of Presence can bring further traffic optimization.

Conclusion
The richness and variety of digital content available to consumers and businesses today is on the rise and will continue to be so. CDNs have a significant role to play in how that content reaches the end-user and shapes the end-user experience. Organizations that are looking to drive better business growth through richer content delivery and an enhanced user experience that is quick and reliable and provides global access with lower capital costs, should consider the benefits that CDNs can provide. The type of CDN provider also makes a difference. A network based provider offers significant advantages over an Internet based one such as greater visibility and control over routing traffic, avoiding outages and congestion, better speed of delivery to the point of presence (POP) nearest the user, and in the case of telecom providers, the last mile connectivity between end-user and nearest POP enables further traffic optimization. Mobile networks are being upgraded to improve speed, reliability and to deliver rich media to mobile devices. This puts additional strain on central servers and can impact an organization’s ability to compete without a CDN solution.

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