A content delivery network (CDN) is a group of geographically distributed servers that speed up the delivery of web content by bringing it closer to where users are.

CDNs rely on a process called "caching" that temporarily stores copies of files in data centers across the globe, allowing you to access internet content from a server near you. Content delivered from a server closest to you reduces page load times and results in a faster, high-performance web experience. By caching content like web pages, images, and video in servers near your physical location, CDNs allow you to do things like watch a movie, download software, check your bank balance, post on social media, or make purchases without having to wait for content to load.

You could think of a CDN like an ATM. If your money were only available from one bank in town, you'd have to make a time-consuming trip and stand in a long line every time you wanted to withdraw cash. However, with a cash machine on practically every corner, you have fast and easy access to your money any time you need it.

As content providers began delivering more rich web content such as graphics and video over the internet, CDN services were created to solve the problem of network congestion that resembled a traffic jam. Getting content from centrally located servers to individual users simply took too long. CDNs have now grown to include everything from text, graphics, scripts, and media files to software downloads, documents, portals, ecommerce, live streaming media, on-demand video streaming media, and social media sites.

For more than 20 years, CDNs have formed the unseen backbone of the internet — improving website performance and delivering online content for businesses quickly and at scale. Today, a large portion of all internet content is delivered through CDNs.

How does a CDN work?

A content delivery network relies on three types of servers.

- **Origin servers.** Origin servers contain the original versions of content and they function as the source of truth. Whenever content needs to be updated, changes are made on the origin server. An origin server may be owned and managed by a content provider or it may be hosted on the infrastructure of a third-party cloud provider like Amazon's AWS S3 or Google Cloud Storage.
- **Edge servers.** Edge servers are located in multiple geographical locations around the world, also called "points of presence" (PoPs). The edge servers within these PoPs cache content that is copied from origin servers, and they are responsible for delivering that content to nearby users. When a user requests access to content on an origin server, they are redirected to a cached copy of the content on an edge server that's geographically close to them. When cached content is
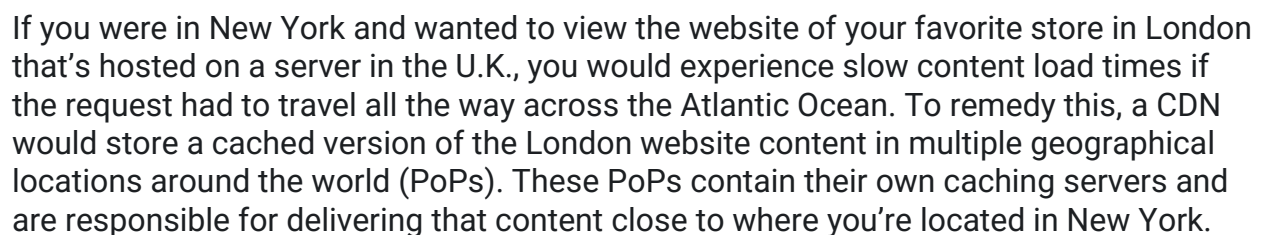
out of date, the edge server requests updated content from the origin server. CDN edge servers are owned or managed by the CDN hosting provider.
- **DNS servers.** Domain Name System (DNS) servers keep track of and supply IP addresses for origin and edge servers. When a client sends a request to an origin server, DNS servers respond with the name of a paired edge server from which the content can be served faster.

A large portion of all internet content is delivered through CDNs. Here's how it works in practice:

If you were in New York and wanted to view the website of your favorite store in London that's hosted on a server in the U.K., you would experience slow content load times if the request had to travel all the way across the Atlantic Ocean. To remedy this, a CDN would store a cached version of the London website content in multiple geographical locations around the world (PoPs). These PoPs contain their own caching servers and are responsible for delivering that content close to where you're located in New York.

To deliver the optimal viewing experience, CDNs perform two essential functions.

- **Reduce latency**. Latency is that annoying delay you experience when trying to access a web page or video stream before it fully loads on your device. Although measured in milliseconds, it can feel like forever, and it may even result in a load error or time-out. Some content delivery networks alleviate latency by reducing the physical distance that the content needs to travel to reach you. Therefore, larger and more widely distributed CDNs are able to deliver website content more quickly and reliably by putting the content as close to the end user as possible.

- **Balance loads**. A CDN balances overall traffic to give everyone accessing internet content the best web experience possible. Think about it like routing traffic in the real world. There may be one route that's usually the fastest from point A to point B if no other cars take it — but if it starts getting congested, it's better for everyone if the traffic gets spread out over a few different routes. That may mean that you get sent on a roadway that's a few minutes longer (or milliseconds, when scaled to internet speeds), but you don't get stuck in the traffic jam that's forming on the shortest route. Load balancing enables content providers to handle increases in demand and large traffic spikes while still providing high-quality user experiences and avoiding downtime.

The benefits of a CDN

CDNs carry a large portion of the world's internet traffic. They help solve the toughest challenges of delivering content over the internet. From small and medium content providers to the world's large corporations, businesses everywhere take advantage of key CDN benefits to provide a seamless web experience to their customers.

- **Boost performance**. Performance is the difference between a click giving you immediate access to new content and a click followed by a seven-second wait while a page loads or a video buffers. That wait time is called "buffering" and is symbolized by a familiar swirling circle icon on the screen. To ensure high performance and minimize buffering, CDNs deliver content that's been pre-saved on nearby servers on the CDN's network rather than sending requests to origin servers which may be halfway around the world. If the content isn't already pre-saved, the CDN uses its programmed knowledge of the necessary connections to overcome any challenges. Advanced CDNs use additional technologies that resolve any issues in the delivery of uncacheable dynamic content and to determine the appropriate type of content to deliver to different devices. With CDNs, content providers can deliver fast, quality web experiences to all their end users; no matter what location, browser, device, or network they're connecting from. Web pages render more quickly, video buffering time is reduced, and website visitors stay more engaged.
- **Ensure availability**. Availability means that content remains accessible to end users even during periods of excessive user traffic when many people are accessing content at the same time or if there are server outages in some parts of the internet. When traffic loads peak at millions of requests per second, even the most powerful servers are put to the test. Without a content delivery network, all this traffic must be absorbed by a content provider's infrastructure. This can cause failures and poor end-user experiences. The widely distributed server infrastructure offered by CDNs is designed to alleviate these issues. Advanced CDNs, with their highly distributed architecture and massive platform of servers, can absorb 100+ Tbps of traffic and make it possible for content providers to stay available to even larger user bases.

- **Enhance security**. CDNs can also improve website security with increased protection against malicious actors and threats like distributed denial-of-service (DDoS) attacks. Today's most advanced content delivery networks provide unique cloud-based security solutions and DDoS protection.
- **Gather intelligence**. As carriers of nearly half of the world's internet traffic, CDN providers generate vast amounts of data about end-user connectivity, device types, and browsing experiences across the globe. This data can provide CDN customers with critical, actionable intelligence and insights into their user base. Intelligence from CDNs also enables services such as real user monitoring, media analytics that measure end-user engagement with web content, and cloud security intelligence to keep track of online threats.
- **Improve customer experiences**. Content, application, and website owners — including ecommerce sites, media properties, and cloud computing companies — use CDNs to improve customer experiences, lower abandonment rates, increase ad impressions, improve conversion rates, and strengthen customer loyalty.
- **Offload traffic**. With the explosive growth of online streaming and other rich media services, and higher user expectations about web performance across multiple device types, many of today's network service providers are finding their content distribution networks to be highly stressed. By responding to a request for web content with a cached version from servers closer to the end user, a CDN can offload traffic from content servers and improve the web experience.
- **Reduce bandwidth costs**. By delivering content from servers closer to users, CDNs reduce bandwidth consumption and the associated costs.

Who uses CDNs?

Almost everyone that accesses the web uses a CDN. They were created to provide a faster and more reliable experience for people accessing the internet. They are used by the content and application owners and network service providers that supply those benefits to their customers.