Solutions brief

CDN services: Pros and Cons of Build Versus Buy

For years, larger-sized businesses have wrestled with whether to enlist the services of a Content Delivery Network (CDN) provider or build and manage their own global network. This choice is crucial for decisions regarding infrastructure, scalability, and performance. Said differently, as the demand for content delivery grows and expectations for speed increase, businesses are confronted with a pivotal decision—rely on the expertise and infrastructure of one or more CDN providers or take on the complex task of constructing and maintaining a private global network.

This solutions brief explores the advantages and challenges of both approaches, providing a detailed examination of the critical factors that influence this decision. For organizations opting to construct a global network independently, the appeal lies in the prospect of complete control, customization, and potentially lower long-term costs. However, this path comes with its own set of obstacles, including substantial initial investments, ongoing operational complexities, and the necessity for specialized expertise.

Conversely, partnering with a CDN provider offers immediate access to a globally distributed network with optimized performance, significantly lower upfront costs, and the ability to concentrate internal resources on core business activities. It also entails entrusting a third party with content delivery, likely sacrificing some control and customization.

Although Fastly, a CDN provider, naturally has a bias, we aim to present a balanced perspective in this paper. We will explore the advantages and drawbacks of both options, providing valuable insights for those contemplating the CDN route and those interested in architecting a network. Ultimately, the best decision depends on business goals, resources, and long-term vision for growth and performance.

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What motivates the decision to build?

Despite the flexibility and capabilities of modern CDNs, some organizations see strategic value in owning and controlling their entire delivery infrastructure. Whether it's for complete control, meeting specific performance requirements, or long-term cost efficiencies at a certain scale, some companies are finding that their unique needs push them to look beyond what the standard CDN model offers.

Several key motivations drive organizations to decide to build a private global network rather than rely on existing CDN services. As mentioned above, it's sometimes about maintaining complete control over their infrastructure—ensuring that every aspect of content delivery, from routing to security protocols, is tailored specifically to their unique needs. For others, it's about achieving performance gains or cost efficiencies at scale that they believe can only be realized by owning and managing their network.

Organizations with highly specific performance requirements, especially those that rely on low latency or custom traffic routing, may find that the flexibility offered by building their network allows for greater optimization than a general-purpose CDN. Additionally, data sovereignty, regulatory compliance, and security concerns can be strong motivators for businesses looking to minimize reliance on third-party providers and keep sensitive operations in-house.

The direct cost associated with running your own global network

While traffic levels and the initial acquisition costs of infrastructure can be relatively straightforward to estimate, the complexities of building a CDN extend far beyond these basic calculations. The unknowns in a custom-built CDN often revolve around the time and effort required to design, build, and deploy the network. Estimating the hours needed during the build phase is notoriously difficult, as every aspect—routing, caching, redundancy, and optimization—requires careful consideration, planning, and skilled engineering. These uncertainties can lead to project delays and budget overruns, significantly impacting time-to-market.

Beyond the initial build, maintaining and scaling the network presents ongoing challenges. Organizations must dedicate resources to network upkeep, including constant monitoring, troubleshooting, and upgrading to accommodate evolving traffic patterns. Additionally, third-party applications and tools—ranging from monitoring and analytics to security—are often necessary to ensure the CDN performs optimally. Each of these adds layers of cost and complexity, often exceeding the initial estimates. As a result, the total cost of ownership can quickly spin out of control, making buying an established CDN service a more attractive option for organizations looking to avoid these unforeseen expenses.

Further, failing to properly estimate the cost of building and maintaining a network can lead to a dangerous shortfall in resources, leaving teams scrambling to keep the project afloat. This can result in a sub-par network that lacks the necessary performance, reliability, and scalability, stacking the odds against it from the very beginning. Without adequate investment and foresight, such a network may struggle to meet growing demands, compromising user experience and business goals.

Initial traffic estimates can often be wrong, with content becoming more popular than anticipated, requiring far more capacity than originally planned. There's no room for shortfalls—just like a CDN, a self-hosted network must be able to scale instantly to meet demand. Failing to do so risks degraded performance, poor user experience, and significant damage to the company's reputation, as users expect seamless service regardless of sudden traffic spikes.

How running a global network will affect your resources

When it comes to something as fundamental as an organization's underlying network infrastructure, the IT department is typically tasked with building and managing it. However, the reach of such infrastructure extends far beyond IT, impacting almost every department within the company. This means that before even beginning the design process, requirements must be gathered not only from IT but also from key stakeholders in departments like security, operations, compliance, and even customer service. Each department has its own unique needs and concerns. For example, security might demand enhanced encryption and monitoring tools, while operations could require specific routing optimizations to ensure efficient global traffic flow.

The challenge lies in balancing these diverse demands, ensuring that the network is both secure and high-performing while also meeting the business's operational and compliance requirements. Coordinating these various inputs, addressing potential conflicts, and ensuring that the global network fulfills the complex needs of the entire organization can quickly turn into a highly intricate and lengthy process. Without careful management and precise planning, this cross-departmental alignment can easily become a bottleneck, further complicating an already resource-intensive build.

The financial considerations of building your own global network are significant, and it's likely only worth considering once you've reached a scale where the investment can be justified. Achieving critical mass is key—without it, the costs far outweigh the benefits. It's not just the acquisition cost of infrastructure that needs to be accounted for; the hardware lifecycle plays a major role as well. While the upfront expense might seem manageable, hardware failures, necessary upgrades, and replacements over time can drastically alter the cost structure. Factoring in the potential downtime and maintenance expenses is crucial to understanding the true long-term financial burden.

On top of these financial concerns, global compliance adds another layer of complexity. Navigating the maze of regulations around data privacy, residency, and security in different regions can quickly derail even the most well-planned projects. Ensuring compliance across multiple jurisdictions requires significant time, legal expertise, and continuous resources, adding yet another potential risk to the network's launch and long-term success. Without a strong plan for addressing these challenges, the project could become unmanageable and unsustainable.

Obstacles that might be outside your control

When companies opt to build their own CDNs rather than partnering with established providers, they often encounter challenges in securing priority with peering internet service providers (ISPs). Unlike large-scale CDN providers that deliver massive volumes of traffic globally, these companies typically lack the traffic volume needed to justify special treatment from ISPs. This lower volume can make it difficult to negotiate favorable peering agreements, often leaving their content with lower priority, higher latency, or even increased costs due to reliance on transit providers rather than direct peering arrangements. This disadvantage can impact the overall performance and reliability of their CDN, limiting its effectiveness and potentially compromising user experience.

Building your own CDN infrastructure may seem attractive for organizations looking for complete control over their content delivery, but it requires careful consideration. While the initial investment in hardware, data centers, and networking might be substantial, the real challenge lies in the ongoing costs of maintaining and optimizing the infrastructure. Running a CDN means continuous investment in bandwidth, edge server management, and software updates to ensure optimal performance. Additionally, the expertise needed to fine-tune latency, handle traffic spikes, and mitigate security threats like Distributed Denial-of-Service (DDoS) attacks can be resource-intensive. As the infrastructure ages, the need to replace outdated components or expand capacity can drive costs even higher. By contrast, buying CDN services allows companies to leverage established providers' scale, security, and expertise without the significant upfront and operational overhead, enabling a more predictable and scalable solution.

Reasons to build your own delivery infrastructure

There are several factors driving large organizations to build global delivery infrastructures themselves. Here's a closer look at five key motivators:

Increased control

The location of POPs and larger hubs doesn't matter. Most CDNs have significant global reach. Also, with the decision to manage delivery world-wide comes an excruciating task of understanding local rules and what you must do to comply.

Increased customization

While this might be true with a few legacy codecs, in reality, many providers provide access to a wide variety of controls through management UIs and API interfaces. Also, technologies provided by CDNs typically offer far more advanced customization than those built from scratch. Finally, the cost to maintain a network operation center is extremely expensive.

Increased security

GDPR, in some cases, carries strict requirements for where data is stored. Having greater control of where your data is stored is justified, but a modern CDN will be able to work with you to make sure you comply with rules and regulations and can safely store data where you must.

Less dependency on vendors

There are no commitment limits to adhere to, which is accurate. However, this ultimately depends on contract negotiations and ensuring there is flexibility and elasticity included. Regarding capacity building, Fastly, like any modern CDN, has dedicated teams focused on network optimization and expanding capacity as necessary.

An improved bottom line

The idea that savings will be substantial after making the initial investment comes with considerable risks. A dedicated team will be necessary to maintain the network, and ongoing efforts will be required to continuously fine-tune and expand the infrastructure. Additionally, equipment will need to be replaced when it fails. As mentioned earlier in the brief, establishing a private network demands significant capital investment, which is challenging for many companies currently trying to reduce their capital expenditures.

How modern CDNs deliver robust performance at scale

CDNs are more capable, flexible, and affordable than ever before. They offer tried and proven robust performance with global coverage, delivering – no pun intended – fast, reliable, and secure content distribution. Many have evolved into highly customizable, API-friendly platforms that integrate into a wide range of demanding applications, from web and mobile experiences to video streaming and large-scale, low-latency gaming. Services like advanced caching, load balancing, real-time analytics, and security features such as DDoS protection and Web Application Firewalls (WAF) provide great value for organizations.

Moreover, as CDNs have matured, the pricing for services has steadily decreased. Businesses can leverage enterprise-grade infrastructure with minimal upfront investment, avoiding the need to build and maintain expensive, complex global networks. With ease of use, accessibility, and lower costs, CDNs have become somewhat of a commodity that most businesses can quickly adapt to achieve scalability, performance, and reliability without the heavy lifting.

A major advantage of using CDNs is their ability to optimize content delivery by caching data close to end-users. This leads to faster load times, better user experience, and less pressure on a company's origin servers. CDNs also come equipped with advanced features like DDoS protection, load balancing, and traffic routing, all of which contribute to better performance and enhanced security. As a result, opting for a CDN over building and maintaining a proprietary global network allows companies to focus on their core business while still delivering a high-quality user experience worldwide.

CDN providers benefit from economies of scale by distributing their infrastructure costs across a large customer base. This approach allows them to offer high-performance services at lower prices than most companies could achieve independently. By utilizing a shared infrastructure model, CDNs can invest in extensive, globally distributed networks, ensuring fast and reliable content delivery with reduced latency. By passing these cost savings on to customers, CDN providers enable businesses to deliver optimized content worldwide without the need to invest in or maintain costly server infrastructure themselves.

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Five Recommendations if You Decide to Build Yourself

Of course, it is possible that building your own infrastructure is the right thing to do in your situation. We believe the five areas below are essential for a successful outcome performance network that can effectively serve your global audience. From securing the necessary funds for both immediate and long-term needs to building a platform that integrates with existing technologies, each step requires thoughtful planning and execution.

1. **Secure funds – for immediate and long-term allocation**

   Building a global network requires significant upfront investment in hardware, data centers, networking equipment, and infrastructure. Without careful planning, there is a risk of underestimating the initial rollout, leading to long-term performance issues. Ongoing operational expenses for maintenance, upgrades, and repairs must also be anticipated to ensure the network remains sustainable. Thinking large-scale from the start allows for a comprehensive budget that covers both the initial build and long-term operational needs, ensuring strong, scalable performance worldwide.

2. **Build an open platform**

   Data delivery on a global scale is a massive undertaking, and no organization can or should build everything from scratch. It's crucial to ensure that your infrastructure can work seamlessly with external technologies, whether you're buying, licensing, or sourcing them. This means choosing solutions that are compatible with industry standards and can easily integrate with tools and platforms widely used across the globe. Tapping into established, proven technologies helps you focus on core customizations without reinventing basic elements that industry leaders have already perfected.

3. **Think globally**

   When setting up a global delivery network, deploying PoPs in strategic regions far from the organization's core market is crucial. This reduces the physical distance between services and users, minimizing latency. Establishing strong relationships with local internet service ISPs and negotiating peering agreements is essential for managing how data flows across different networks. These partnerships reduce latency and improve connectivity. Without careful attention to peering and interconnects, even a well-placed network might struggle to deliver the low-latency, high-performance experience that users expect globally. Read more about this topic in our Global CDNs in China solutions brief.

4. **Build an organization and a solution that scale**

   It's important to consider scalability for both the organization and the technical solution. A scalable organization ensures that teams and processes can grow alongside the network. The technical solution itself should be designed to handle increasing data volumes and user traffic without requiring a complete overhaul. Without scalability, the network can become inefficient and costly to maintain in the long run.

5. **Hire, grow, and retain operational expertise**

   Optimizing large-scale and worldwide data delivery is a complicated task. You will need staff that implements sophisticated routing traffic algorithms efficiently. Also, managing a global network requires round-the-clock monitoring to both detect issues and address them before they affect users. This involves staffing and training a dedicated network operations team to handle outages, performance issues, and security incidents.

Conclusion

The choice between building a custom CDN or buying an existing solution depends on a nuanced understanding of your organization's unique needs, resources, and strategic objectives. Building a CDN can provide significant advantages in terms of customization, specific security features, and scalability for organizations expecting high traffic. However, this route comes with substantial upfront and ongoing investments, as well as hidden costs that can strain both financial and technical resources. For example, many "build-your-own" initiatives encounter unexpected operational challenges and opportunity costs within the first 12 months, often realizing too late the complexity of achieving and maintaining the necessary resilience.

On the other hand, purchasing a CDN offers advantages like faster time-to-market, predictable costs, and established global reach. This option is often a better fit for organizations that prioritize speed, cost efficiency, and streamlined operations or lack the in-house resources to manage CDN infrastructure. Furthermore, if resilience and redundancy are priorities, leveraging a multi-CDN approach has become an industry best practice. Multi-CDN setups reduce dependency on a single provider, enhancing uptime and performance, which is difficult to replicate with a standalone, in-house solution.

Ultimately, whether you choose to build or buy, it's essential to weigh all factors carefully, including future scalability, resilience, and your organization's long-term goals.

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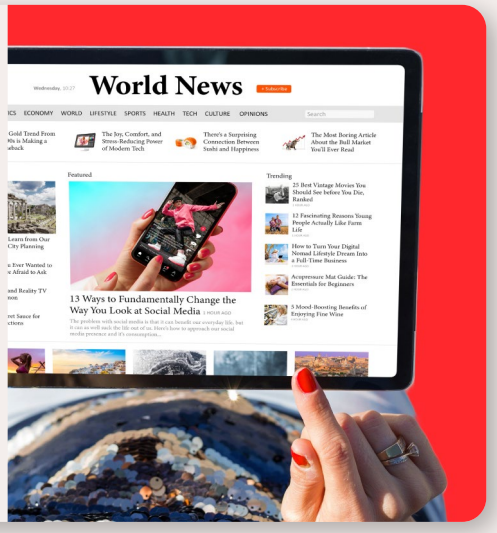

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