

For: Application
Development
& Delivery
Professionals

Market Overview: CDN Platforms And Digital Performance Services

by Mark Grannan, May 12, 2015

KEY TAKEAWAYS

Digital Performance Shortcomings Create Experience Gaps

Driven by pervasive, always-on mobile devices, customers expect to find digital experiences are: 1) near-instantaneous; 2) convenient; 3) personalized; and 4) trustworthy. As organizations maintain the status quo, the gaps between expectations and delivery widen. Ignore digital performance at your peril.

Digital Performance Products Meet Video, Web Performance, And Security Needs

Modern digital performance capabilities now sit on a two-pronged foundation: advanced delivery networks and a rich developer and practitioner toolkit. Upon that foundation, vendors have built three primary products to handle video, web performance, and security. Additionally, specific use cases add a twist on top of those three categories.

Differentiated Go-To-Market Strategies Are A Boon To Customers

Many customers view CDN capabilities as a commodity, and as such are looking for cheaper, easier and more friendly vendors. Digital performance vendors are enabling flexible cost models, self-service deployment options, and improved customer and professional service. In all cases, customers win.



Market Overview: CDN Platforms And Digital Performance Services

CDNs Have Evolved To Close Experience Gaps With Web, Video, And Security Digital Performance Services

by [Mark Grannan](#)

with [Ted Schadler](#), [Ed Ferrara](#), Danielle Geoffroy, and Kevin Driscoll

WHY READ THIS REPORT

Content delivery networks (CDNs) have been around for 15 years using localized caching to improve web performance. But the relentless growth in mobile engagement and the demands of digital experience delivery are now forcing CDN providers to expand their performance-enhancing techniques to address the challenges of dynamic content, mobile, video, and software-as-a-service (SaaS), as well as serving as the first line of defense against security threats. As a result, application development and delivery (AD&D) teams must now consider digital performance investments as part of a broader cloud strategy. This report will help you understand the trends forcing the CDN market to evolve, and the packaging of digital performance services to close your customers' experience gaps. This is an update of a previously published report; Forrester reviews and updates it periodically for continued relevance and accuracy; we substantially revised this edition.

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Forrester takes dozens of briefings from vendors and hundreds of inquiries from clients annually and also conducted a data gathering survey of vendors in this space in Q1, 2015.

Related Research Documents

[CDN And Digital Acceleration Vendor Landscape, Q3 2014](#)

[Fuse Business Acceleration Technologies To Optimize User Experiences](#)

[Quick Take: Akamai Acquires Prolexic, Doubling Down On DDoS Mitigation Services](#)



DIGITAL PERFORMANCE SHORTCOMINGS CREATE EXPERIENCE GAPS

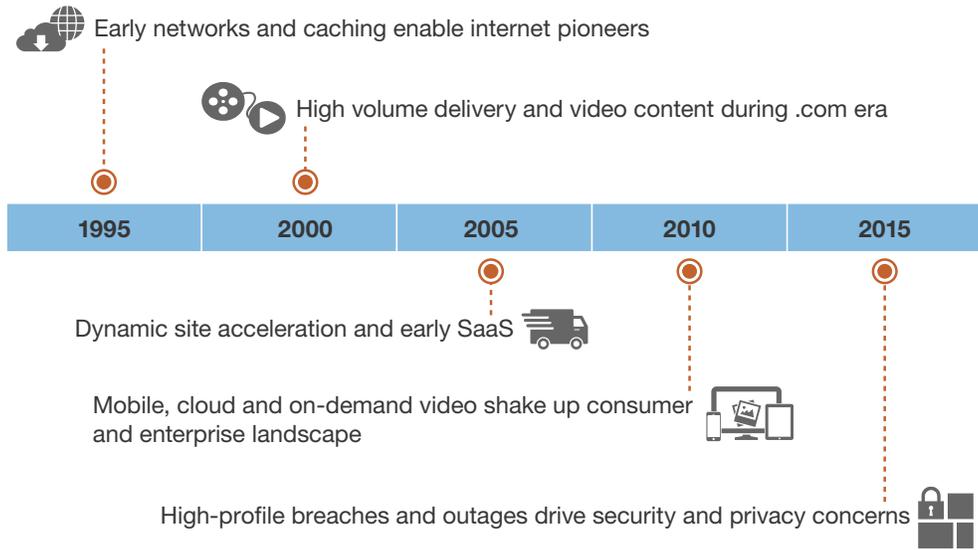
Driven by pervasive, always-on mobile devices customers expect digital experiences that are: 1) near-instantaneous; 2) easy-to-use; 3) personalized; and 4) trustworthy.¹ This raises the bar for AD&D pros on performance. Not only do AD&D teams need to deliver a great experience anywhere at any time; they must also shield applications from the demands of sudden events that spur unprecedented peak traffic loads or distributed denial of service (DDoS) attacks that threaten to take down their site entirely. Reinforcing these expectations, influencers such as Google's search results actively reward sites that are fast and mobile-friendly, such that customers may never find your site if it's buried on page two of their search results.²

Forrester speaks with hundreds of application development & delivery (AD&D) professionals every year about how best to improve digital experiences. We find that most clients think gluing a content distribution network (CDN) on the front of a website is enough to solve the problem. Looking back, it's clear why an outdated understanding of digital performance technologies still exists (see Figure 1). CDNs sprang up 15 years ago to accelerate small and large object delivery with geographically distributed caching. But that was long ago. When the first CDNs were born, connections were wired, content was static, displays were uniform, and all logic and control could be maintained behind the firewall.

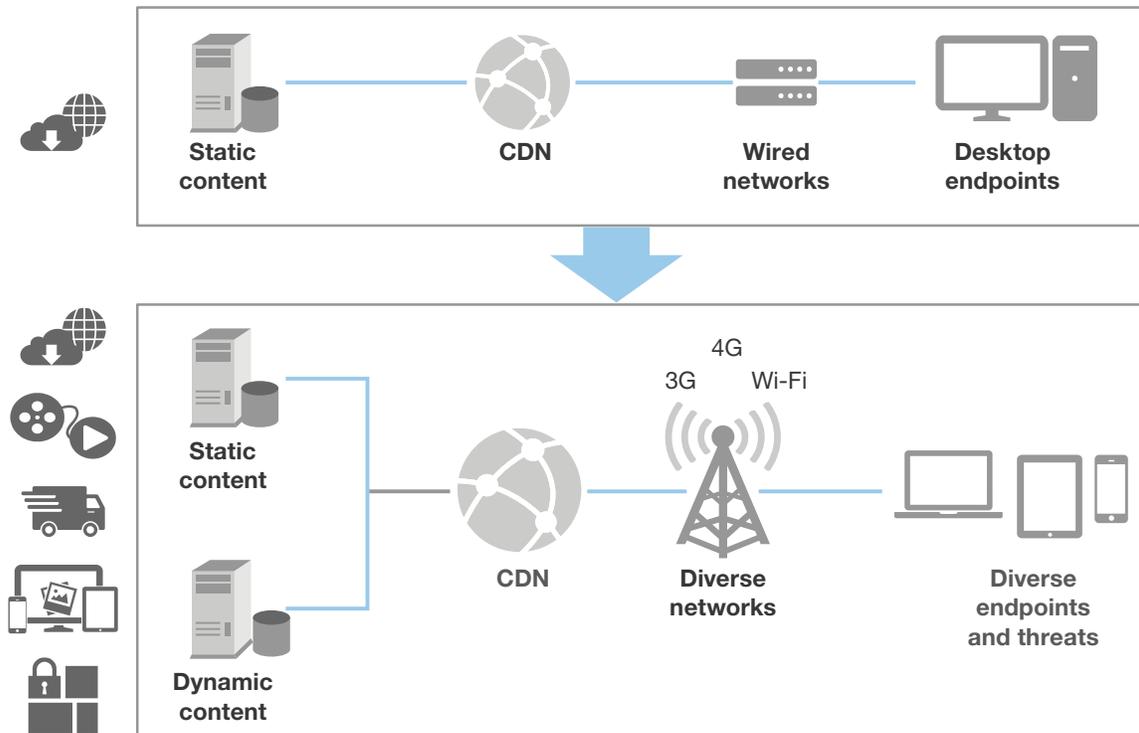
Today, video providers like Netflix eat the bulk of bandwidth during prime viewing hours, while the mobile Web is overtaking desktop traffic. Content is delivered from a myriad of sources and is composed at runtime, a sea of devices and browsers creates a countless number of content permutations, and wireless network technologies are endlessly varied and evolving across the globe, region, country, state, city, and even neighborhood. CDN and digital performance solutions have evolved to meet these emerging needs.

Figure 1 Digital Performance Technologies Evolved By Necessity

1-1 | Fly-by CDN evolution timeline



1-2 | CDN evolution and network content diversity are intertwined



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CDNs Are Evolving To Become Digital Performance Services

As organizations maintain the status quo, the gaps between expectations and delivery widen. Forrester surveyed smartphone-using adults in the US and Europe in 2014. These surveys revealed that when online consumers face slow or non-optimized mobile experiences, over 30% give up entirely and more than 16% go to a competitor.³ Ignore digital performance at your peril.

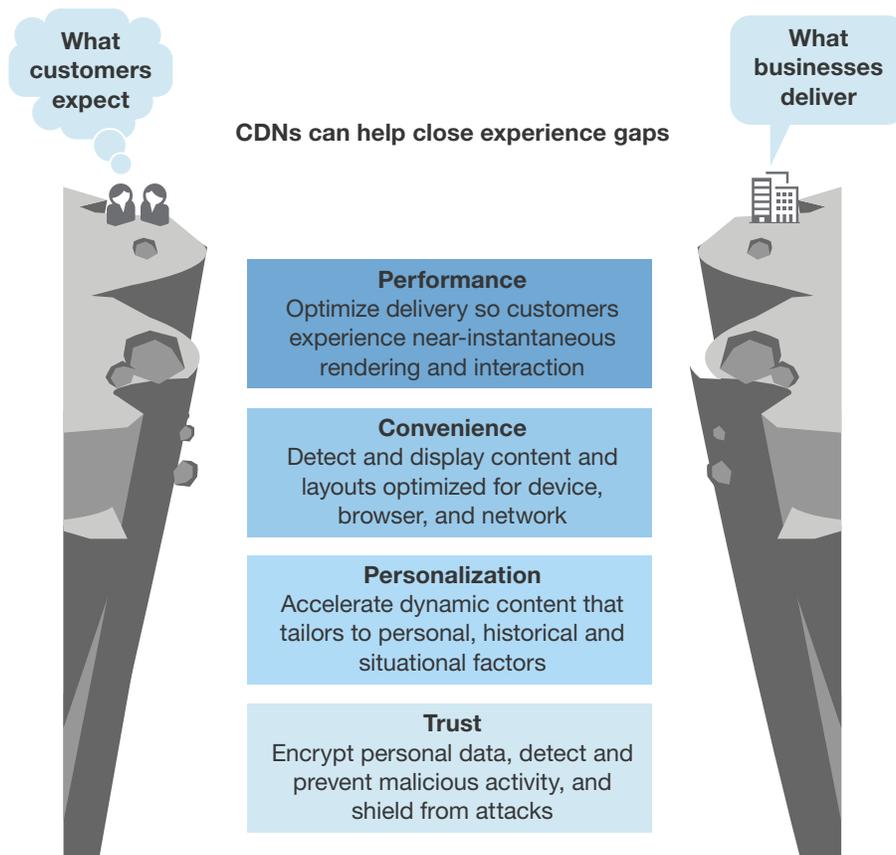
A handful of media, entertainment, retail, and travel companies now embrace CDNs for more than content caching and delivery because they know business success hinges on four pillars of engagement: performance, convenience, personalization, and trust — what we call the experience gaps.⁴ And now that video and rich images play a critical role in all digital services, the lessons these advanced companies are learning will help every company improve their digital experience delivery.

Modern digital performance services can help (see Figure 2):

- **Speed a customer's perception of performance.** Digital performance services deliver content close to the user, bundle requests to minimize round-trip times (RTT), and compress content to cut down on the bandwidth needed. Some solutions now stream the most important parts of a page to ensure the fastest perceived experience.
- **Improve usability on any device.** While fast is convenient, digital performance services go one step further. By detecting the device, browser, network, and location parameters, digital performance services adaptively send the right version, format, size, and video bitrate of the content.
- **Drive relevant, personal content.** As content is increasingly dynamic — composed on the fly based on personal, situational, or historical factors — caching is not enough. Digital performance services accelerate content routing and maintain the connection across the public Internet to ensure that dynamic pages and content also load quickly.
- **Detect and prevent malicious activity.** Customers increasingly put financial and personal trust in digital services. Digital performance services help maintain this trust by supporting secure standards, shielding the site from attacks, and detecting and preventing malicious activities.

Figure 2 Digital Performance Services Can Help Close Experience Gaps

2-1 | CDNs Can Help Close Experience Gaps



2-2 | Multiple levels of CDN capabilities

- 1) **Static content caching** to reduce geographic latency, offload bandwidth usage
- 2) **Non-cacheable content routing** optimization across public Internet congestion
- 3) **Video** workloads and adaptive bitrate delivery to optimize quality of service and offload bandwidth
- 4) **Front-end optimization** to compress, consolidate, transform and sequence assets (including images) for faster rendering
- 5) **Security** buffer to absorb DDOS attacks, web firewall to prevent scripting injections, and protocols to detect DNS hijacking

START BY MASTERING THE NEW DIGITAL PERFORMANCE LANDSCAPE

In response to these rising demands and motivated by the need to add services on top of commodity content delivery, digital performance vendors now offer new and advanced functionality in three core areas (see Figure 3):

1. **Video services.** Online video continues to grow: Cisco's Visual Networking Index projects IP video to be 79% of all traffic by 2018, up from 66% in 2013.⁵ Increased volume pairs with increased difficulty. As a result, digital performance vendors now offer video players, transcoding services to optimize video formats for different devices, adaptive bitrate streaming to handle network congestion, ad insertion and targeting, and customer usage metrics tracking for both attribution and to adapt the experience on the fly.

For media companies transitioning to a digital distribution model, picking the right vendor to reliably deliver high quality video at scale is business critical. Some media companies will need deep control over content via digital rights management (DRM) capabilities. But as every video services buyer must understand: Fast is paramount. Video analytics provider Conviva shows consumers have decreasing tolerance for buffering and are increasingly likely to abandon subpar video experiences.⁶

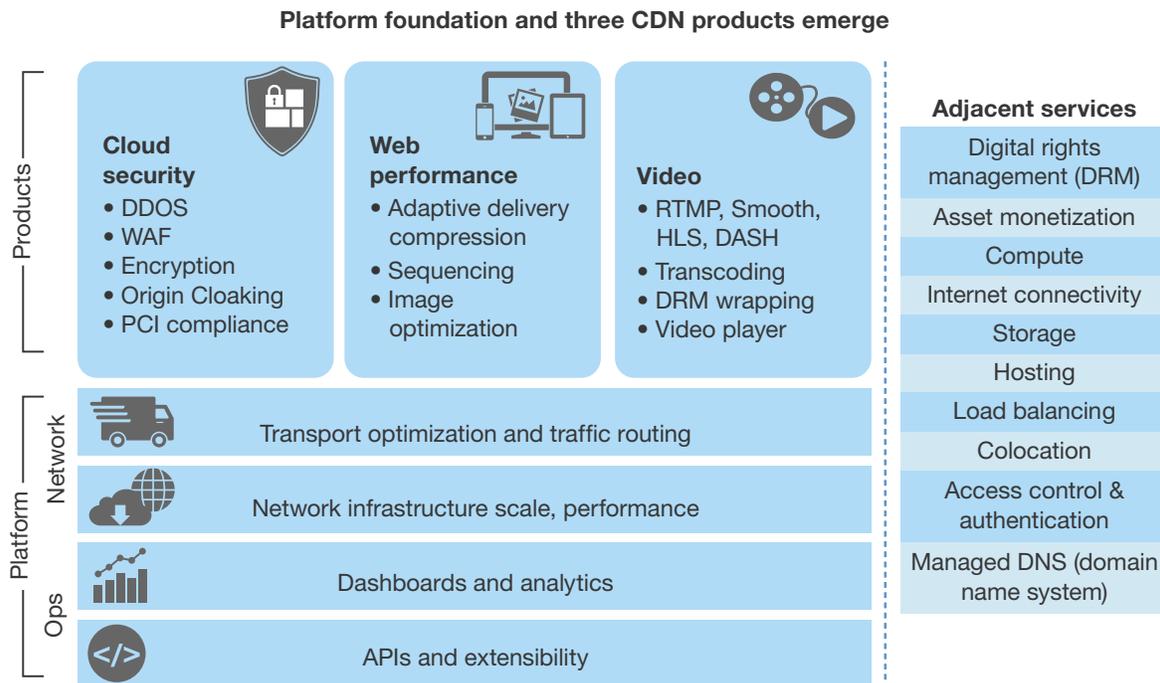
2. **Web performance.** Web performance — across a myriad of devices, browsers, and networks — demands a multifaceted approach. Caching's ability to reduce latency can't be overlooked for static content. Dynamic content acceleration addresses network congestion problems for non-cacheable content. For the true "last mile," web performance optimization — often called front-end optimization (FEO) — manipulates assets to optimize time-to-first-render and time-to-first-interaction. Web performance optimization solutions achieve these feats by: 1) bundling assets and images to make fewer roundtrip calls; 2) sequencing elements, e.g., focusing on above the fold content first or progressively painting content; 3) compressing code and images; and 4) image format, resolution, and art direction changes.

If this optimization improves the user's perception of performance, then retailers, media, and entertainment companies are the most eager buyers of web performance products because incremental performance correlates with conversions. The correlation of page load times with views, conversions, and customer satisfaction is well established. For example, in 2009, Amazon cited a 1% loss in sales per 100ms of latency. In 2012, Walmart.com demonstrated increased conversion rates of up to 2% for every second of performance improvement.⁷

3. **Cloud security.** Secure transactions on any endpoint — from blogs to online banking — require SSL/ TLS encryption support. Web attacks now reach unprecedented sizes — measured in hundreds of gigabits (Gbps) —and security breaches make front-page news.⁸ Web security needs push digital performance providers to support distributed denial of service attack (DDoS) mitigation for volumetric attacks, domain name service (DNS) security, and web application security (e.g., web application firewalls protect web services against things like SQL injection and cross site scripting).⁹

Mission critical digital experiences in particular are pushing security considerations alongside raw speed, capacity, and price when looking at digital performance services. Online organizations with compliance requirements such as HIPAA for healthcare, PCI for retailers, and FFIEC, FDIC, and SEC for financial services cause some digital performance vendors to maintain separate networks to meet these needs. Meeting this profile, one VP of technology at a large transportation services company told Forrester that security eclipsed performance criteria in their most recent vendor selection because, in his words, “if the site is down, it doesn’t matter how fast it is.”

Figure 3 The New Digital Performance Landscape



Digital Performance Services Are Built On Delivery Networks And Practitioner Tools

The digital performance technology evolution over the past 20 years spawned new breeds of digital performance provider (see Figure 4). In the fight to win, serve, and retain customers, providers must recognize that the unique value proposition from 10 years ago is now a commodity. The packaging of modern digital performance capabilities now sits on top of a two-pronged platform foundation:

- **Global networks become platform building blocks.** As vendors like Google and Amazon race to the bottom of storage pricing — for example, Google Cloud Storage with Standard Storage is priced at \$0.026 per GB per month — digital performance vendors must follow suit.¹⁰ Some vendors have invested heavily in modern storage (e.g., solid state drives), but those differentiators enjoy shortened timelines. Even dynamic routing capabilities are blurred from one vendor to the next and lose their luster.

Many vendors are accepting that these storage and routing capabilities — the original defining attribute of CDNs — are now foundational to new capabilities. The remaining “legacy” digital performance vendors who can’t or won’t accept this will struggle to compete with the likes of Amazon on price and reach.

- **Software, analytics, and operations tools empower developers and practitioners.** Digital performance vendors are stitching their organic and acquired capabilities with software. They’re making the tools easier to enable non-technical practitioners, configure and manage deployments, and extract insights via dashboards. Enterprise business stakeholders now push performance analytics data into a third-party dashboard, enabling a 360-degree view of the customer (e.g., combining with Google Analytics’ real user monitoring [RUM] data).¹¹ Modern developers demand control over their caches to reduce downtime, improve performance, and drive down costs. The digital performance market responded by enabling development tools such as licensing open source tools like Varnish.

Figure 4 CDN And Digital Performance Offerings By Vendor

Vendor	Standalone platform offering	Web acceleration 	Video delivery 	Cloud security 
Akamai Technologies	Akamai Intelligent Platform	[Akamai Web Performance]	[Akamai Media Delivery]	[Akamai Cloud Security]
Amazon Web Services	Amazon Cloudfront			
Aryaka Networks		Web Application Delivery as-a-Service		
Cache Networks	CacheFly			
CDNetworks	CDNetworks	[Web Performance Suite]	Media Acceleration	Cloud Security
ChinaCache [†]	ChinaCache			
ChinaNetCenter [†]		Whole Site Acceleration	Streaming Media Solution	Website Security Service
CloudFlare	Cloudflare CDN	Cloudfare Optimizer		
DataCamp	CDN77.com			
Fastly	Fastly Content Delivery Network	Fastly Dynamic Site Acceleration	Fastly Streaming	
Hibernia Networks	HiberniaCDN			
Highwinds Network Group	Highwinds CDN	Highwinds Web Acceleration*	Highwinds EveryStream*	
Incapsula		Incapsula Content Delivery Network		Incapsula Website Security and Incapsula DDoS Protection

 = features are available, but standalone product is not currently offered or standalone can be achieved by turning off product-specific features
[†] = Forrester used publically available information
 [] = family of products
 * = product release pending

Figure 4 CDN And Digital Performance Offerings By Vendor (Cont.)

Vendor	Standalone platform offering	Web acceleration 	Video delivery 	Cloud security 
Instart Logic		Performance Suite		Security Suite
Internap	Internap CDN			
LeaseWeb				
Level 3 Communications	Level 3 CDN			Level 3 DDoS Mitigation
Limelight Networks	Limelight Orchestrate	Limelight Orchestrate Performance	Limelight Orchestrate Video	Limelight Orchestrate Security
MaxCDN	MaxCDN			
Tata Communications		Whole Site Acceleration	Video Cloud	
Verizon		Verizon Web Acceleration Solution	Verizon Deliver	Verizon Defend, Verizon Protect, Verizon Route
Yottaa		Yottaa		Context S.A.F.E.*
Enterprise upgrades over freemium offerings				
Nginx	Nginx Plus			
Varnish Software	Varnish Cache			

 = features are available, but standalone product is not currently offered or standalone can be achieved by turning off product-specific features
 † = Forrester used publically available information
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Digital Performance Specialties Satisfy Traditional Needs, With A Twist

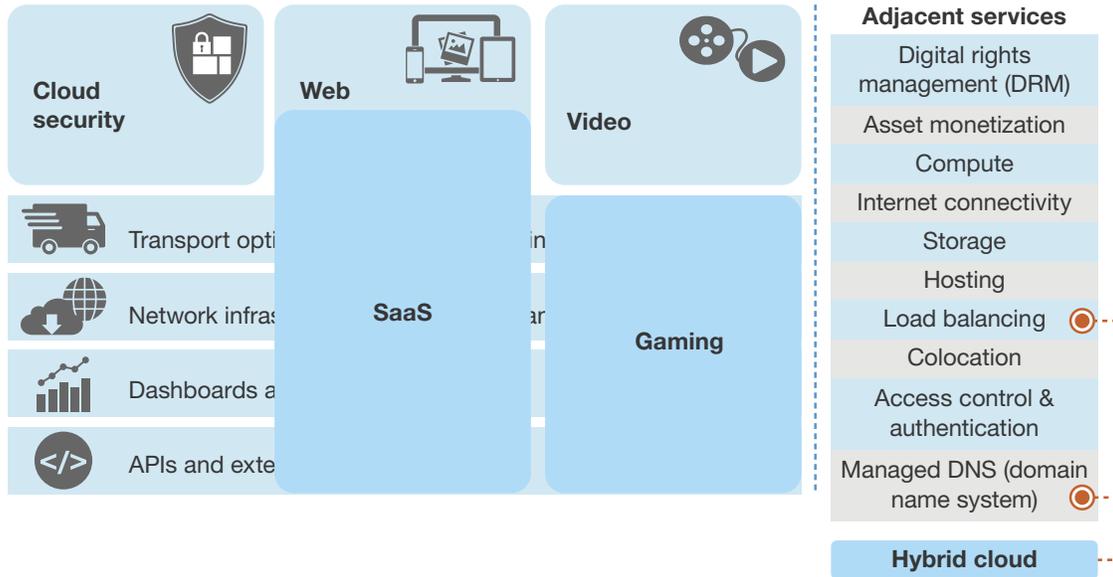
Beyond the three digital performance specialties, enterprise needs demand niche solutions to satisfy specific needs. In some cases, these specialties stem from a vendor’s current client base and reputation, while others are truly differentiating in the following areas. Forrester speaks with customers whose needs align against one or more of the following needs:

- **Geographic-reach.** Certain regions stand out as a special challenge for enterprise buyers who simply must deliver content to local users. Digital performance providers are commonly partnering with local companies to resell their services in highly regulated regions (e.g., China), while others are building out infrastructure in underserved regions (e.g., Africa and Latin America).

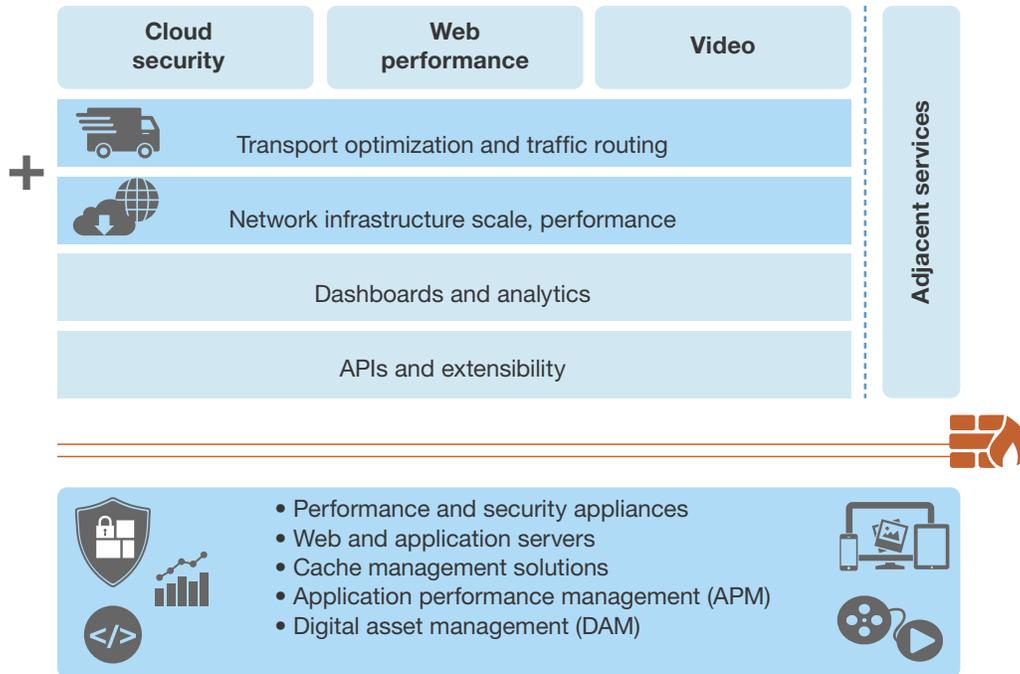
- **SaaS.** In many ways, SaaS resembles web performance needs; however, the business-critical nature of the software and the dynamic content tweaks buyer needs enough to often cast it as a standalone niche. SaaS performance solutions like Aryaka Networks double down on capacity and security, while layering on wide-area network (WAN) hybridization, granular controls, analytics, and commercial terms to satisfy SaaS product owners and their clients.
- **Gaming.** Gaming solutions are essentially media delivery with a twist. Gaming clients often need to release new titles or patches, and dedicated fans around the globe will hit the systems simultaneously. Additionally, online gameplay has zero tolerance for latency. Digital performance vendors recognize a growing list of gaming clients and a few have unveiled a gaming-specific solution (e.g., Highwinds and Limelight) and focus on their low-latency, high capacity prowess.
- **Hybrid cloud.** Public cloud services are in a state of hyper growth: Forrester projects the public cloud market will reach \$191 billion by 2020, up from 2013's total of \$58 billion.¹² Thus more enterprises commonly rely on multiple cloud services to gain redundancy, failover, and load-balancing benefits. Niche load balancing services providers such as Cedexis and Dyn focus solely on optimizing traffic loads across multiple cloud sources.
- **Behind the firewall.** Regulated or engineering-centric buyers have always put capabilities behind the firewall and will continue to do so. A wide range of digital performance technology vendors offer software (e.g., Varnish), servers (e.g., Nginx), and appliances (e.g., Radware) to these buyers. Now, cloud-based digital performance providers are moving in to compete by offering some of their capabilities on-premises (see Figure 5).
- **Telco and cloud.** Telecommunication and large cloud services companies often resell CDN capabilities under their brand. Some large digital service providers have packaged up and white-labeled their offering to attract these big-fish clients.

Figure 5 Digital Performance Specialists Satisfy Traditional Needs, With A Twist

5-1 Vertical-specific and hybrid use cases repackage CDN capabilities



5-2 Engineering-centric solutions maintain services behind the firewall



WHEN DIGITAL PERFORMANCE VENDORS COMPETE, YOU WIN

Differentiating between digital performance services is difficult. Digital performance vendors actively market their capabilities that appear to differentiate, but often achieve the same result as vanilla versions of CDN. Therefore, the conversation moves from a “what” to a “how” for many enterprise customers. Digital performance vendors differentiate with the following techniques — all of which are a boon to customers:

- **Flexible cost models.** Grassroots growth tactics like a freemium model work well for vendors like CloudFlare, for whom a majority of their traffic are non-paying customers, while they generate revenue with their top-tier customers. Larger vendors now enable transparent, tiered pricing as an end-run around enterprise contract pain points.
- **Self-service.** Speed-to-deploy new services is a breath of fresh air for web teams who have chafed against enterprise contract negotiations and buy cycles, not to mention the slow technical roll-outs. Vendors like Fastly give access to the Varnish software under the hood to enable developers to affect changes immediately, while Akamai is rolling out Cloudlets to click and deploy new modular capabilities.
- **Customer and professional service.** In one camp, legacy CDN customers complain to Forrester that they’re tired of paying premium prices for mediocre customer service and a commoditized technology. In the other camp, enterprise organizations find it impossible to hire and retain talented technical resources. Both camps view hungry, friendly, and skilled digital performance services partners as essential to a successful relationship.

RECOMMENDATIONS

CHOOSE BASED ON EXPERIENCE GAPS IMPROVEMENT — NOT JUST PRICE

Too often customers are switching from one legacy CDN service to the next based on price alone. Swapping one outmoded service for a cheaper clone won’t improve an AD&D pro’s digital performance. Instead, Forrester advocates the following steps to sharpen your approach to enabling digital performance capabilities:

- **Understand your performance pain points and requirements.** Is your traffic spiky and unpredictable? Has mobile network latency eroded your confidence in delivering fast experiences? By getting a full picture of your performance priorities, your team will be able to make smarter decisions. In addition, establish a baseline understanding of your content types, bandwidth averages, peak bandwidth usage, and geographic distribution of customers to name a few. These answers will quickly winnow down the full market list of digital performance service providers to a more manageable number.

- **Layer on digital performance techniques.** If you do decide to invest, focus on the low-hanging fruit by using traditional caching, which by itself can have a dramatic impact on performance. Once you've established a performance improvement baseline and understand the impact of faster page load times on business metrics like conversions, you can begin to investigate whether investment in newer technologies is worth the improvement to your digital performance.
 - **Monitor performance using third-party data.** Performance around the globe is constantly shifting as providers build and launch new capabilities, add new points-of-presence (PoPs), and extend their latest capabilities across those PoPs. Buyers should cut through the confusion by using objective third-party RUM data from providers such as Cedexis and Conviva (for video) that sell their services to the digital performance market, but offer free information to consumers. Some digital performance vendors are even going so far as to fix the poor service-level agreement (SLA) tracking among their customer base by turning to providers like Cedexis to act as the provider of record for SLA monitoring. Buyers should leverage this data in combination with their targeted proof of concept (PoC) efforts to evaluate which providers and specific services offered best meet their needs.
 - **Scrutinize the price/performance benefits of multiple products and multiple providers.** Is there an advantage to getting everything — storage, compute, hosting, caching, etc. — from the same provider? Current Amazon clients might say yes. On the flip side, Web-performance and SaaS-centric digital performance vendors can easily deliver large, static files, but can another legacy CDN deliver those assets at a better price? Buyers should also weigh security offerings alongside what they may already be getting from a Neustar, Symantec Verisign, their carrier, or their application delivery controller.
 - **Be prepared for continuous optimization.** Upon going beyond basic caching, it becomes harder for web teams to fully understand the impact of optimization techniques on performance. As one CTO of a North American retailer told Forrester, "In any modern development scenario where you have Ajax calls interconnected with JavaScript, it's scary that you don't have control over what the CDN provider is doing to the code, and we can't know for sure that the site won't break." The safe path this CTO took was simple: Isolate a few sites with limited value to serve as guinea pigs. By slowly turning on features across a growing subset of sites, the team avoided the risk of breaking everything at once — and left some sites unoptimized as they encountered problems.
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ENDNOTES

- ¹ Companies that want to improve customer experience will increasingly rely on technology to close gaps in performance, convenience, personalization, and trust. Forrester has created a catalog showing which technologies can help close each of these four gaps. For more information, see the “[Closing The Experience Gaps](#)” Forrester report.
- ² See Google’s February 26, 2015 announcement: “Starting April 21, we will be expanding our use of mobile-friendliness as a ranking signal. This change will affect mobile searches in all languages worldwide and will have a significant impact in our search results. Consequently, users will find it easier to get relevant, high quality search results that are optimized for their devices.” Source: “Finding more mobile-friendly search results,” Google Webmaster Central Blog, February 26, 2015 (<http://googlewebmastercentral.blogspot.com/2015/02/finding-more-mobile-friendly-search.html>).
- ³ Forrester surveyed smartphone using adults in the US and Europe who have encountered some problems while using their mobile web browser, asking “When you encounter problems accessing the Web from your mobile browser, what are you most likely to do as a result?” 31% of Europeans and 33% of US online adults said they would give up, while 16% of Europeans and 17% of US online adults said they would turn to a competitor. Sources Forrester’s European Consumer Technographics® Consumer Technology And Telecom Survey, 2014 and Forrester’s North American Consumer Technographics Consumer Technology And Telecom Online Benchmark Recontact Survey, 2014.
- ⁴ Companies that want to improve customer experience will increasingly rely on technology to close gaps in performance, convenience, personalization, and trust. Forrester has created a catalog showing which technologies can help close each of these four gaps. For more information, see the “[Closing The Experience Gaps](#)” Forrester report.
- ⁵ Globally, consumer Internet video traffic will be 69% of all consumer Internet traffic in 2017, up from 57% in 2012. This percentage does not include video exchanged through peer-to-peer (P2P) file sharing. The sum of all forms of video (TV, video on demand [VoD], Internet, and P2P) will be in the range of 80% to 90% of global consumer traffic by 2017. Source: “Cisco Visual Networking Index: Forecast and Methodology, 2012-2018,” Cisco Systems, June 10, 2014 (http://www.cisco.com/c/en/us/solutions/collateral/service-provider/ip-ngn-ip-next-generation-network/white_paper_c11-481360.html).
- ⁶ Source: “How Consumers Judge their Viewing Experience,” Conviva, 2015 (<http://www.conviva.com/csr-2015/>).
- ⁷ See the February, 2012, Cliff Crocker, former senior engineering manager for Wal-Mart Labs, “Wal-Mart, Real User Monitoring” presentation. Source: “Real User Monitoring,” Minus (<http://minus.com/msM8y8nyh#1e>).
- ⁸ The HTTP Archive tracks HTTPS requests over time. From June 1, 2013 to June 1, 2014 the percentage of secure requests rose from 4% to 9% for the top 1,000 sites. Source: “Trends,” HTTP Archive (<http://httparchive.org/trends.php?s=Top1000&minlabel=Jun+1+2013&maxlabel=Jun+1+2014>).

- ⁹ For more information on each of these three areas of security, Forrester recommends the following articles. Source: Matthew Prince, “The DDoS That Knocked Spamhaus Offline (And How We Mitigated It),” CloudFlare, March 20, 2013 (<http://blog.cloudflare.com/the-ddos-that-knocked-spamhaus-offline-and-ho>); Liam Tung, “Evernote struck down by DDoS attack for several hours,” ZDNet, June 11, 2014 (<http://www.zdnet.com/evernote-struck-down-by-ddos-attack-for-several-hours-7000030417/>); and Jeff Goldman, “Two Thirds of U.S. Companies Were Breached by SQL Injection Attacks in 2013,” eSecurity Planet, April 17, 2014 (<http://www.esecurityplanet.com/network-security/two-thirds-of-u.s.-companies-were-breached-by-sql-injection-attacks-in-2013.html>).
- ¹⁰ See the Google pricing breakdown for cloud storage in the following link. Source: “Google Cloud Storage,” Google Cloud Platform (<https://cloud.google.com/storage/pricing#storage-pricing>).
- ¹¹ For example, Yottaa demonstrates integration with Google Analytics in the following blog post. Source: Alex Pinto, “Are Your Google Analytics Site Speed Metrics Accurate?” Yottaa blog, August 15, 2014 (<http://www.yottaa.com/blog/application-optimization/are-your-google-analytics-site-speed-metrics>).
- ¹² Public cloud services continue to drive big changes in the markets for software, hardware, and IT outsourcing, while providing a foundation for age of the customer innovations. How much and when will cloud transform these markets? For more information, see the “[The Public Cloud Market Is Now In Hypergrowth](#)” Forrester report.

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