

Enterprise eCommerce: Harnessing PhotonIQ to Elevate the Customer Experience



eCommerce Services, Powered by AI

Introduction	3
Five steps to improve the website experience & revenue results	4
Step 1: Remove friction by boosting site performance	4
Step 2: Maximize crawl budget and SEO by prerendering	5
Step 3: Optimize tags and site speed	5
Step 4: Manage visitor traffic and uptime with virtual waiting rooms	5
Step 5: Identify visitors to personalize and stop fraud with fingerprints	5
PhotonIQ - your trusted co-pilot in enterprise eCommerce	5
The need for website speed	6
Fast performance drives more sales	7
Why Lighthouse and Core Web Vitals scores matter	7
Tackling speed at scale: automated proxies to the rescue	8
PhotonIQ Performance Proxy (P3)	8
Targeting the right customer with better SEO	11
How do SEO engines rank and what matters?	11
The magic of prerendering	12
PhotonIQ Prerendering	12
Maximize page speed while retaining visitor insights	13
The pros and cons of different tag management approaches	14
PhotonIQ Edge Side Tagging (EST)	14
Accelerate Mobile Experiences Through Streamlined Tagging	15
Data Anonymization	15
Data Residency	15
Addressing website traffic and uptime challenges	16
Positive waiting room vs. negative waiting room experience	17
Pre-qualify visitors with the most interest and/or more likely to buy	18
Make waiting fair and safe	18
PhotonIQ Virtual Waiting Room	19
Unlocking the potential of anonymous visitors	21
The challenge of coupon fraud and eCommerce scams	23
Identifying “good” and “bad” visitors	24
Fraud prevention and security	24
Personalization and targeted advertising	24
PhotonIQ Fingerprint	24
Precise identification for personalization and bot detection	25
Enhanced fraud prevention	25
Coupon Assignment Service	25
Integration with VWRs	26
Optimized efficiency	26
Future-proofing	26
Implement PhotonIQ services in 30 days or less for fast ROI	26

Introduction

Competition for customers online is fierce, and eCommerce companies must ask themselves: Where along the customer's shopping journey is friction occurring? And how does my competition remove that friction?

Optimizing the customer's experience is pivotal, and intrinsically tied to website performance and efficiency. Research shows nearly [90% of buyers](#) say their experience with a company is just as important as the product itself.

The *strategic* deployment of technology can promptly address the vast majority of website issues. The hurdles to overcome these technical challenges have been reduced over the past decade, and transformative solutions are within reach, promising a positive eCommerce impact. But doesn't every vendor say that they can offer digital transformation? What that often means is that they promise new technology that will come in to replace your old technology, but then the remnants of that old technology will remain somewhere, untouched, resistant to updates and tied to important actions, with consequences we can only imagine.

Not all digital transformation is created equal, and hardly will it be "seamless", "easy", "quick", "cost-effective", or any other buzzword. The key, as mentioned above, is "transformative solutions within reach." Rather than force enterprises to operate differently, Macrometa's PhotonIQ is about bringing change and improvements with as little disruption as possible for the implementer.

For big brands catering to customers online, the experience needs to be consistent no matter where visitors are in the world, and this requires bringing data and compute to the edge. PhotonIQ's AI-driven services not only bring this dynamic data and compute to where visitors live, it uses the latest advancements in AI and Machine Learning to strengthen these improvements over time. The goal is to ultimately improve performance, personalization, and privacy.

To enable this, PhotonIQ offers fully managed solutions that can power complete digital experiences or integrate with existing infrastructure. PhotonIQ helps leading internet sites, SaaS providers and enterprises boost speed for exceptional user experiences and increased revenue opportunities. Seamlessly integrating with major CDNs and clouds, we provide turnkey performance capabilities without added overhead.

Let's examine five critical areas that can enhance shopping experiences and drive revenue opportunities.

Five steps to improve the website experience & revenue results



With competitors only a click away, [71% of shoppers](#) switched brands as priorities shifted in 2021. Delivering great experiences is crucial for forging lasting bonds between brands and online shoppers.

Behind the scenes, IT experts, SREs, and marketers focus on SEO and site performance metrics like page load speeds or Lighthouse scores, uptime, and unique visitors.

Step 1: Remove friction by boosting site performance

Customers expect effortless navigation when browsing, and this requires multiple areas of attention: Third-party [APIs](#), JavaScript and CSS, media files, poor server performance, absence of caching, traffic on page, etc. Enhancing [website speed](#), interactivity, and responsiveness through performance optimizations improves the experience, but is also multi-faceted. When customers can browse, select, and checkout quickly with less friction in between steps, it results in higher conversion rates and greater revenue as customers complete purchases efficiently.

Step 2: Maximize crawl budget and SEO by prerendering

Fast-loading pages boost [SEO](#) by enabling search engine crawlers to fully index rich, interactive content rather than just raw HTML. This showcases more informative and representative site experiences to search bots for improved organic visibility. Together this optimization increases discoverability for brands by elevating the quality of page content indexed by crawlers.

Step 3: Optimize tags and site speed

Ecommerce brands heavily depend on various third-party tags like analytics services, chat tools, and remarketing pixels to understand customer behavior. However, each additional tag contributes to slower page load speeds, leading to increased bloat. Moreover, sending data to third-party servers can pose risks to privacy and data residency requirements. The solution lies in managing these heavy tags on edge servers to optimize performance and comply with privacy regulations while maintaining valuable insights.

Step 4: Manage visitor traffic and uptime with virtual waiting rooms

Maintaining reliable website uptime provides customers with a consistent, uninterrupted experience. Solutions like [virtual waiting rooms](#) and traffic load balancers help manage spikes in traffic volume, preventing site crashes and disruptions even during peak periods of usage - something eCommerce retailers know all too well during the holidays. Keeping the website available and stable for customers avoids lost revenue due to downtime.

Step 5: Identify visitors to personalize and stop fraud with fingerprints

Understanding visitor behaviors and preferences enables personalized experiences and security enhancements. Tracking visitor interactions respectfully allows businesses to [tailor content](#) and [recommendations](#) to usage patterns. Recognizing behavior that is “normal” versus abnormal helps identify bad actors and potential threats - move suspicious visitors into waiting rooms until you’re sure they’re safe and recognize the visitor on subsequent visits. Knowing customers well is key to building trust and loyalty.

PhotonIQ - your trusted co-pilot in enterprise eCommerce

An effective digital strategy requires ongoing optimization across all facets of the customer experience, from foundational SEO and performance to traffic management and visitor

identification. [PhotonIQ](#) makes this achievable. This suite of AI-powered, turnkey services built on the Macrometa [Global Data Network \(GDN\)](#) delivers services for accelerating site speeds, fortifying cloud offloading, and tracking anonymous visitors while maintaining privacy.

By starting with their existing technical foundation then layering on enhancements based on their key challenges, [eCommerce](#) companies can craft comprehensive digital strategies that continually improve customer satisfaction and revenue growth. PhotonIQ provides the services to optimize across these critical dimensions through rapid deployment of the latest AI innovations - leveraging a global edge network. The results are powerful - reduced friction, deeper insights, and rapid ROI. When every customer touchpoint is fully optimized, the customer experience reaches new heights.

The need for website speed



[Converting visitors into paying customers](#) is number 3 in the top ten eCommerce challenges based on research. A reasonable assumption is that if the goods are what the customer wants and the price is right, that should lead to a sales conversion. While that is a key factor, website speeds can drive up conversion rates. Let's face it, we are in an era where time is sometimes more important than money.

One blog about "[Why Time Is The New Currency of Commerce](#)," explained that Amazon Prime's success shows people will pay for a better, frictionless experience. Consumers carefully invest their limited time, so eCommerce should optimize experiences by removing accepted friction points. So that brings us to some key website metrics that can affect not only conversion rates but average order value.

Fast performance drives more sales

It's clear that fast site performance is critical for converting site visitors into paying customers. Competition is only a click or two away, so visitors will not wait around if they feel it is not worth the waiting time. Consider these statistics below.



1. [Portent Study 2022](#), 2. [Unbounce Study, 2018](#), 3. [Deloitte study, 2020](#), 4. [Digital.com Survey, 2022](#)

Slow load times frustrate users, eroding trust, and make them less likely to complete purchases as patience wears thin, [50% of visitors](#) abandon a website if it takes more than 6 seconds to load. Fast performance builds confidence in a site's quality, security, and reliability, engaging users longer to comparison shop and purchase more. Quick, responsive sites create an interactive feel that drives longer sessions. Ultimately, speed has a dramatic impact on conversion rates and revenue.

Why Lighthouse and Core Web Vitals scores matter

A high Lighthouse score and strong Core Web Vitals directly correlates with a better user experience - fast page loads, strong mobile optimization, accessibility, and higher search rankings. As mobile shopping increases, making [52% of mobile traffic](#) and [65% of online sales](#), delivering smooth experiences on phones and tablets becomes critical.

Lighthouse provides a comprehensive performance grade assessing site speed, responsiveness, SEO and more. Within speed, Core Web Vitals specifically measure user-centric dimensions like page load times, interaction delay, and visual stability. Optimizing these complementary metrics ensures both technical and experiential quality

across devices. Fast Lighthouse scores reflect efficient site architecture and code while strong Core Web Vitals signal smooth, frustration-free journeys.

Together these KPIs capture load efficiency and real-world shopper experience - both critical for sustaining engagement and conversions. Prioritizing scores means structuring sites to technically perform while delighting customers.

Fast performance keeps visitors engaged and reduces frustrations that lead to bounces. Quick, responsive sites boost engagement and lower bounce rates. Good scores also improve SEO, as Google considers speed and mobile-friendliness in rankings.

Optimizing for Lighthouse and Core Web Vitals is essential but can be challenging to balance with other priorities. As the site evolves, metrics change, data increases, and priorities shift, maintaining an optimal score requires ongoing adjustment. But enhancing these metrics reflects a user-friendly, efficient site that leads to happier visitors, increased engagement, and higher conversions.

Tackling speed at scale: automated proxies to the rescue

Achieving fast performance at scale is enormously challenging for large eCommerce sites. Complexity from distributed teams, fragmented systems, technical debt, code bloat, and traffic spikes creates roadblocks. Diagnosing and fixing optimization opportunities across massive, interconnected codebases strains even the most seasoned engineering teams. [Automated proxies](#) emerge as an "easy button" solution by accelerating page and asset delivery through AI-powered optimizations tailored to each site and audience. With rapid, non-invasive deployment, proxies start enhancing performance immediately without architectural changes. By continuously tuning speed, they alleviate tremendous pressure on engineering teams. Proxies make excellent performance at enterprise scale finally achievable.

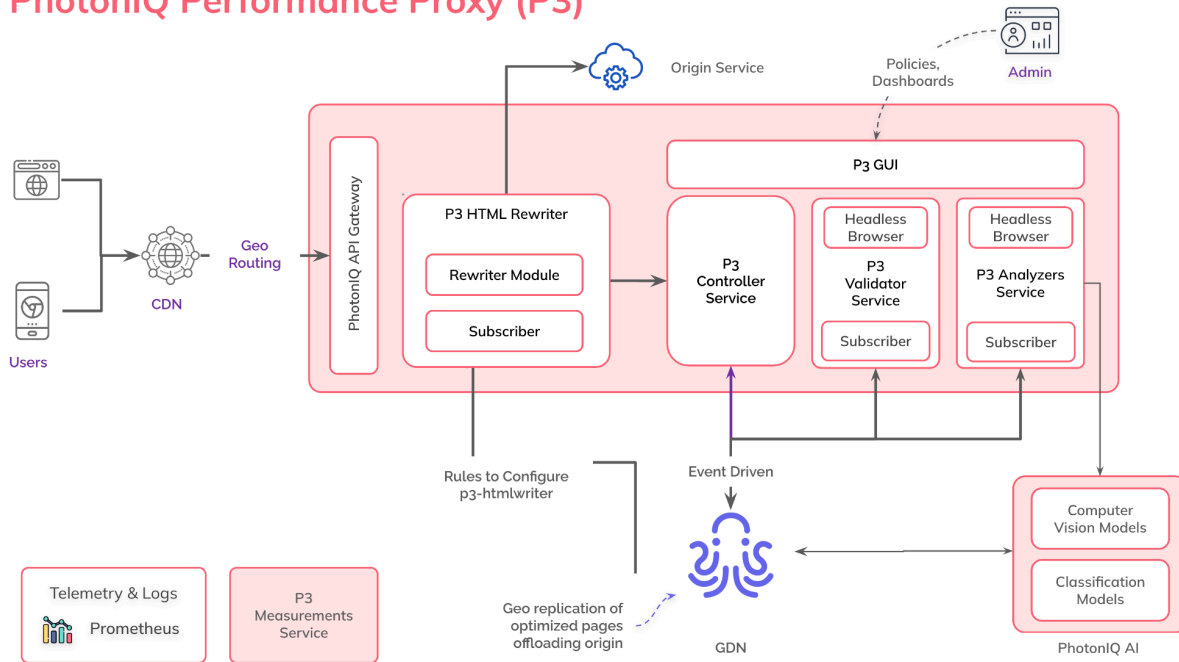
PhotonIQ Performance Proxy (P3)

[PhotonIQ Performance Proxy \(P3\)](#) is an advanced AI-driven proxy service positioned between CDNs and origin servers. It operates on Macrometa's resilient GDN, featuring strategically placed edge nodes. What sets P3 apart is that it enhances website performance without necessitating any alterations to the existing codebase.

Our fully managed service diminishes the need for manual oversight, thereby saving client resources. P3 adeptly resolves common performance optimization obstacles like inconsistencies between mobile and desktop, reducing high bounce rates that deter engagement, and easing continuous site enhancements. By elevating Core Web Vitals and

corresponding Lighthouse scores, it heightens user engagement and search visibility to drive more organic traffic and revenue.

PhotonIQ Performance Proxy (P3)



Now, let's explore three key features that make up P3:

1. AI-Powered dynamic performance optimization

At the core of P3 lies a sophisticated AI-driven optimization engine that continuously improves page performance by adapting to shifting traffic patterns with machine learning algorithms. P3 acts as a filter that performs tasks such as image compression, code minification, asset prefetching, and lazy loading in real-time. Regardless of the codebase, P3 analyzes and provides real-time fixes that continue to improve over time.

Powerful computer vision detects visual differences across changes. Optimizations then adjust to preserve branding, style, layout, and functionality invariance. ML validations check stability, integrations, and flows to prevent disruption. Parallelized JS execution coordinates asset loading simultaneously to accelerate availability for faster rendering. Critical CSS/JS automatically inlines into pages for instant starts while non-essential resources are deferred. Offloading heavy personalization, localization, and more to the edge liberates site resources for responsiveness.

2. Reduce page payload with edge side tagging

A component often used with P3 is Edge Side Tagging (discussed on p.13), a solution that executes JavaScript tags at the edge, reducing page payload. The outcome is enhanced Core Web Vitals scores, contributing to a smoother web experience.

3. SEO excellence with prerendering

Prerendering (discussed on p.11) improves organic visibility by serving pre-generated static snapshots of fully interactive pages to search engine crawlers. Rather than crawling raw HTML source code, bots can access rich rendered content to index comprehensive site experiences. Ultimately prerendering advances SEO rankings and attracts a more targeted audience through superior content discoverability and indexing thanks to complete page rendering.

See the difference P3 can make to improve site speed and experiences!



P3 Real World Results

- ✓ Over **350%** Lighthouse improvement for mobile devices
- ✓ Improve Speed Index by up to **50%**
- ✓ Reduce Blocking Time by over **90%**
- ✓ Accelerate product and loading pages by **100-1000s ms**

Performance is key for user experience but higher SEO rankings bring visitors already actively searching for related topics and thus are "high-intent" and more likely to convert. Let's talk about how SEO bots can easily index content for higher rankings and better results.

Targeting the right customer with better SEO



Photo by [Firmbee.com](#) on [Unsplash](#)

According to recent research, targeting the right customer is the [second most significant challenge](#) for eCommerce companies in 2023. This task can be costly through ads, emails, and marketing campaigns. One cost-effective and efficient method to reach ideal customers is through organic search. When people actively search for something, they are already interested, making organic search a highly effective way to generate leads and conversions.

However, appearing high in the ranking list is essential. Over [40% of eCommerce website](#) traffic originates from organic search and paid search ads. Companies that secure top positions on their Search Engine Results Page (SERP) within their niche achieve [click-through rates \(CTR\) of 39.8%](#). Moreover, moving up just one spot in the search results can boost CTR by 2.8% per the same SEO article. Astonishingly, less than 1% (0.63%) of Google searchers click on results beyond the first page.

How do SEO engines rank and what matters?

The next logical question is how do businesses raise their ranking. The first thing to consider is how do SEO bots create their lists? Google and other search engines like Bing rely on web crawlers, also known as SEO bots, to create their lists of websites and web pages. These [bots](#) systematically browse the internet, following links from one page to another, and index the content they find along the way. They analyze various factors like page content, keywords, meta tags, and user experience to determine the relevance and quality of each web page. A [very slow load time](#) can be a negative Google ranking factor. These search engines constantly update and refine their lists to ensure users receive the most accurate and valuable search results.

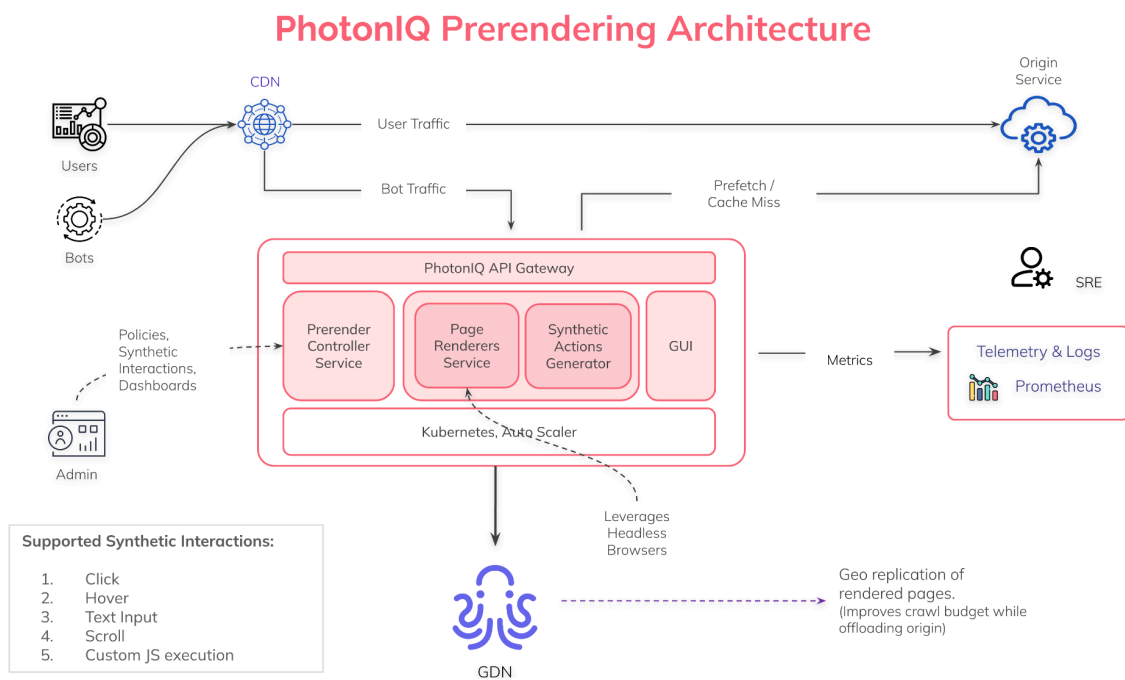
The magic of prerendering

There are many [different prerendering methods](#) to consider - some shine in delivering static content quickly such as Static Site Generation, while others take more resources and time to deliver dynamic content like Client-Side or Server-Side Rendering.

There are pros and cons to these methods, but the real magic happens when you can intelligently deliver the best of both worlds - most recent cached content and/or dynamic content depending on the audience.

PhotonIQ Prerendering

With [PhotonIQ Prerendering](#), eCommerce companies can seamlessly accelerate site delivery and indexing for search engines without infrastructure changes. This service greatly reduces time-to-interactive and delivers complete page renders in milliseconds! Prerendering generates static pages from dynamic sites, executing JavaScript for full content indexing while accelerating page loads.



The service handles optimized prefetching, on-demand rendering, global edge caching, and synthetic interactions that simulate user journeys to expand dynamic content before prerendering. This ensures search engines can index truly representative pages.

Minimally invasive integration unlocks speed and SEO in one customizable, future-proof solution tailored to an organization's unique needs. Distributed architecture runs lightweight prerender engines to snapshot fully interactive pages on-demand.

Search bots often miss content within JavaScript when indexing, hindering pages from reaching full SEO potential. Prerendering generates static snapshots of interactive pages, accelerating load times while allowing more comprehensive crawling. By simulating live user journeys such as clicking and hovering across sites search bots can index more relevant - and previously hidden - content. The outcome is heightened discoverability, higher quality organic visibility into the most impactful on-site content and experiences. See it in action in our [Prerendering demo!](#)

The next step on our journey now that customers can find the site to browse and purchase, is to ensure tag analytics can provide timely feedback without slowing down the customer experience.

Maximize page speed while retaining visitor insights



Tags serve as the data infrastructure for website analytics, feeding platforms like Google Analytics and Adobe Analytics with visitor behavior and journeys. Scripts fire on interactions - page loads, clicks, form submissions - to capture experiences. They supply intelligence around traffic sources, conversions, content resonance and more. Tags additionally power campaign tracking via marketing utm codes and other markers for spend attribution. Comprehensive analytics requires robust tag implementation; tags provide the crucial

signals to then report on and optimize both sites and promotions. They enable understanding audiences and context to improve digital engagement.

As pages become more dynamic and personalized, the number of third-party tags continues to proliferate. Scripts from analytics tools, marketing attribution pixels, chat integrations, remarketing, and more provide visitor insights but weigh down performance. Tags now can represent over half of browser processing time, slowing page loads. According to a [Pingdom study](#), the average load time for the top 50 news sites was 9.46 seconds with trackers loading, and 2.69 seconds without. These sites averaged 41 trackers per site. This poses a dilemma - either preserve tags and insights but sacrifice speed, or strip tags and lose intelligence and attribution.

The pros and cons of different tag management approaches

Tag management systems (TMS) streamline this process, allowing efficient management from a central interface. This enhances integration across channels and systems, driving end-to-end experiences.

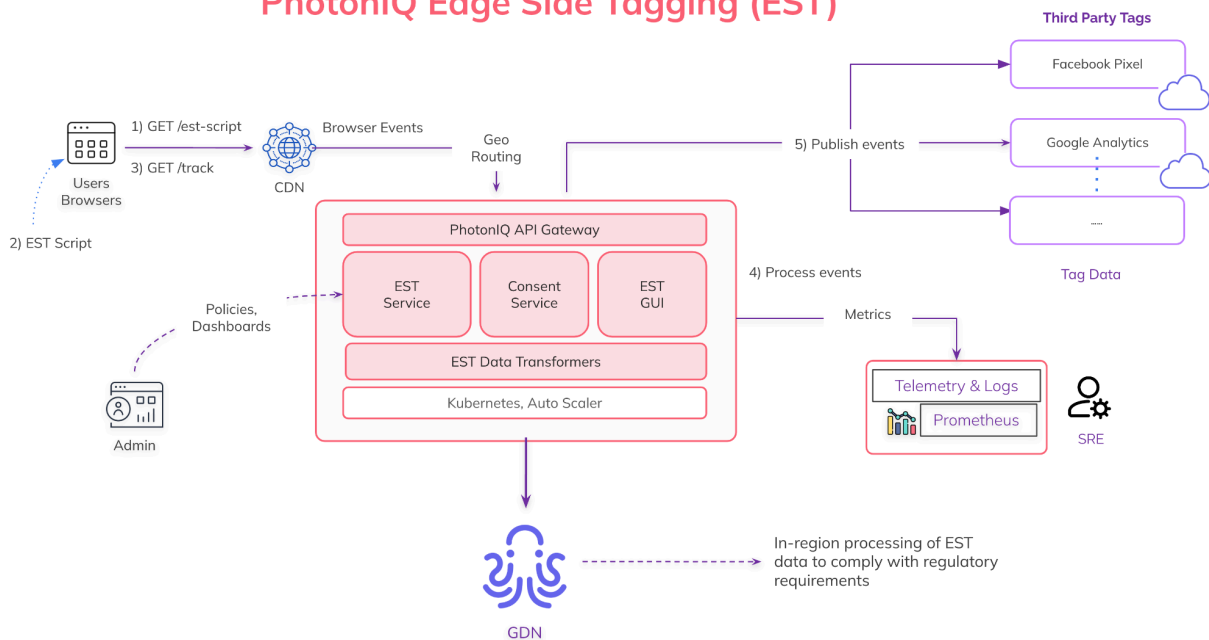
Browser-based tag management has long been the norm, where the TMS script is loaded in the webpage header, fetching tags from a central server after the HTML parsing. However there are limitations, including poor data quality and slow page loads. Security and compliance risks are elevated, and deploying new tags can be cumbersome. Customization options are limited, hindering innovation and advanced functionality.

Centralized server-side tag management enables earlier firing of tags and offers control within your infrastructure, without requiring frontend website changes. However, it often provides only minimal performance gains and poses scalability challenges, leading to increased costs. Additionally, the risk of a single point of failure necessitates additional infrastructure for redundancy.

PhotonIQ Edge Side Tagging (EST)

[PhotonIQ Edge Side Tagging \(EST\)](#) solves this tradeoff through optimized edge side execution. Rather than running bulky tags in endpoint browsers, our globally distributed edge network offloads all scripts. When pages call tags, PhotonIQ gathers vital metadata to power analytics then serves back simplified scripts to accelerate page loads, while still executing full tag logic on edge servers. Website operators retain control including customizing what data is shared with vendors to meet regulations.

PhotonIQ Edge Side Tagging (EST)



With Edge Side Tagging, brands finally achieve the ideal balance - faster page loads to drive engagement and conversions plus preserved visitor intelligence to continually improve experiences.

Accelerate Mobile Experiences Through Streamlined Tagging

With websites now executing over 20 scripts per page on average, third-party tags consume up to 4.2 seconds of processing time on mobile devices (desktops take only .06 seconds in comparison) per [HTTPArchive](#) - significantly slowing experiences. Our edge side execution shifts bulky, resource-intensive vendor code off of browsers to prevent bloated page payloads from hampering performance. By handling tagging on the edge instead, processing avoids device limitations like battery and CPU throttling.

Data Anonymization

EST enables compliance by allowing brands to configure rules to anonymize data prior to third-party transmission. As EST gathers analytics input, sensitive PII fields like names, emails, addresses and more can be tokenized or redacted to protect identities. This data processing occurs on edge nodes before flowing to vendor tools, upholding privacy policies and regulations globally.

Data Residency

For regulations limiting cross-border data transfers like GDPR and CCPA, PhotonIQ EST features in-region edge processing to facilitate compliance. As the globally distributed edge

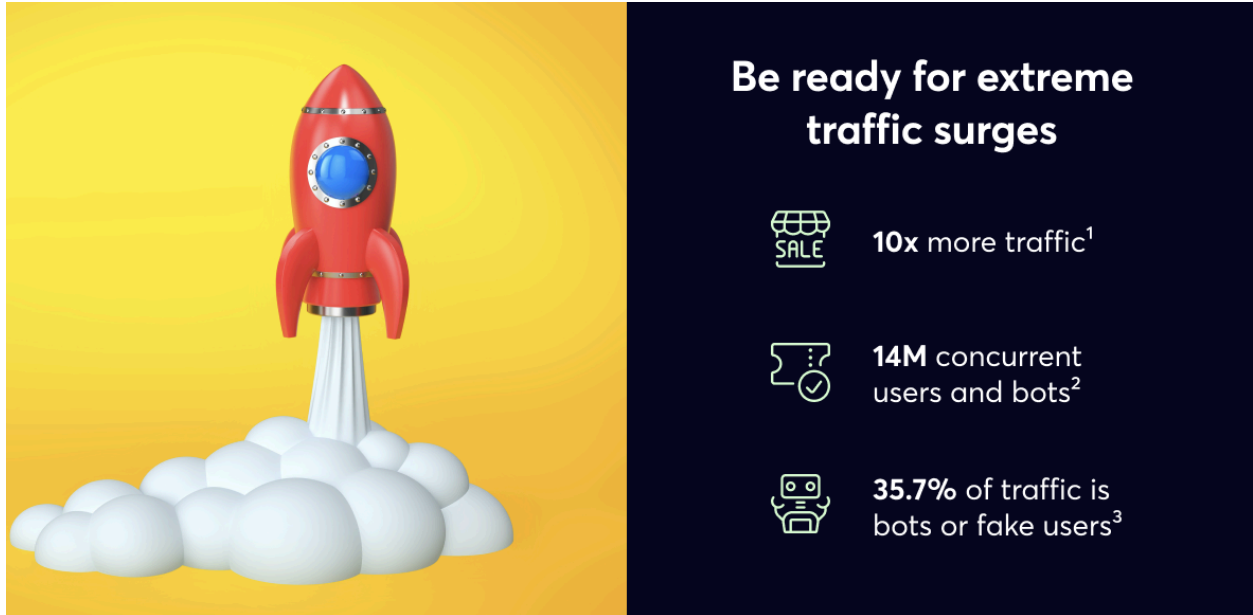
network absorbs analytics data via tags, our rules engine can selectively redact or tokenize information within the geographic boundary prior to transmission. PhotonIQ processes data locally to satisfy privacy laws, then routes compliant information onwards, enabling functionality while meeting regional standards globally.

While maintaining page speed and collecting analytical data are critical to optimize sites and understand customer behaviors, it is equally important to keep the site up and running - even during times of unpredictable traffic.

Addressing website traffic and uptime challenges



eCommerce is seasonal by nature. Take, for example, the frenzy of [Black Friday weekend](#), back to school, Labor and Memorial Day, etc. Preparing your infrastructure to gracefully handle traffic spikes, often reaching tenfold or more, can be a formidable challenge, even with meticulous chaos engineering and [stress testing](#). Teams eventually face a dilemma: justifying investments in backend resources and feature enhancements for transient surges when those budgets could be allocated to year-round improvements.



1. [Digital Commerce 360 Insights & Analysis, 2022](#), 2. [Forbes, 2022](#) 3. [Cybernews, 2022](#)

Here are a few of consequences of high traffic and a overloaded site:

1. Sluggish performance: The first being slow performance and stalling when searching for something on the site site or even navigating page to page.
2. Unresponsive checkout: Having stock jump out of carts or pressing the purchase button multiple times can be completely frustrating.
3. Having difficulty getting in or staying in a site can be annoying especially if there is an early bird promotion etc. and you don't want to miss it.
4. The last is when the site crashes and no one can get on - whether it is seconds, minutes, or hours.

Outages can cost US eCommerce sites (excluding Amazon) around [\\$650,000 per hour](#) on an average day - perhaps even more during peak events. Amidst the struggle, many have turned to virtual waiting rooms, only to encounter crashes, frustrating queues, and scalability issues that strain costly infrastructure.

Positive waiting room vs. negative waiting room experience

A wait bar with timing is psychologically powerful. When people know how long they'll wait, it reduces anxiety and creates a sense of control. University [research](#) has shown that more frequent progress updates improve the customer experience and sets clear expectations. A visual countdown makes waiting feel more manageable and purposeful, improving the overall customer experience.

The other piece is if folks are willing to wait seconds or even minutes to buy a product, it seems like an ideal time to share some exciting new products. These visitors may also appreciate some promotions for being a “first-in-line” VIP, be willing to watch entertaining videos, or even answer some survey questions.

Pre-qualify visitors with the most interest and/or more likely to buy

The other interesting phenomenon is that shoppers that stay in the queue are more likely to buy. That is important because as website resources are limited, you would prefer that they go to those who can offer the most revenue.

This behavior is rooted in psychological and economic principles. People tend to value things more when they're rare or in limited supply because the difficulty of obtaining them makes them more desirable. The fear of missing out on a scarce opportunity drives action, a concept recognized by psychologist [Robert Cialdini](#).

On the other end of the spectrum, visitors can enter waiting rooms and be stuck in endless queues, without being notified of their place in line. They may even continue to lose their place in line, and never actually to enter the site. Or when they enter the site, it is too late to get their product. This is [bad news](#) all around because meeting customer’s high expectations was number four on eCommerce companies top challenges of 2023. Going way beneath their expectations is unlikely to lead to any future attempts at purchasing.

Some virtual waiting rooms may not be fully able to recognize all bad bots or distinguish an SEO bot from another type of bot. This may mean the site is still at risk for DDoS attacks, and may waste resources on bad bots they haven’t seen before. SEO bots may get the full interactive experience, while customers are still waiting with their debit cards out.

Make waiting fair and safe

Intelligent [virtual waiting rooms](#) offer a treasure trove of insights into customer behavior, facilitating service optimization and better personalization. By monitoring real-time metrics and analyzing long-term trends, companies gain invaluable data for refining the customer experience. These metrics encompass user queue sizes, average wait times, abandonment rates, content views, and survey responses. Viewed as an extension of the customer experience and brand identity, the virtual waiting room becomes a feedback loop, continually fine-tuning operations based on real user signals.

Maintaining fairness is paramount, and intelligent virtual waiting rooms achieve this through advanced algorithms that go beyond FIFO. These algorithms prioritize users based on configurable policies, ensuring equitable access while accommodating specific business

needs. For instance, eCommerce can prioritize users with filled shopping carts, preventing cart abandonment due to long wait times. Customizable queue placement models guarantee fair resource distribution tailored to individual business use cases.

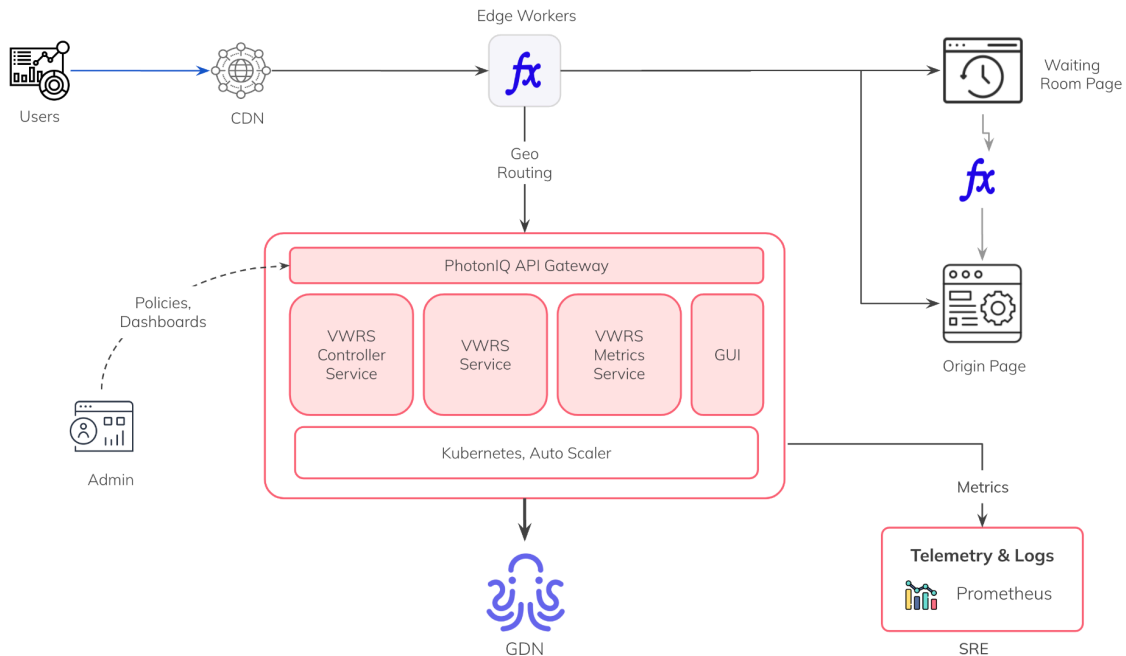
Furthermore, intelligent virtual waiting rooms can serve as an effective defense against DDoS attacks and malicious activities. During large events, attackers often exploit the chaos to launch attacks or engage in [fraudulent](#) activities. These virtual waiting rooms help control incoming traffic and filter out suspicious requests, thwarting DDoS attacks and safeguarding online platforms' integrity and availability. This protection frees up security teams to focus on fraud prevention rather than traffic management.

PhotonIQ Virtual Waiting Room

[PhotonIQ Virtual Waiting Rooms \(VWRs\)](#) offer lightning-fast response times and surge protection with low latency. Ideal for eCommerce, these VWRs are gatekeepers that intelligently manage website traffic. With fully programmable queuing and access rules, VWRs adapt to various conditions, including backend loads, suspicious traffic patterns, origin thresholds, geographic regions, traffic spikes, and more.

Most critically, by sustaining website availability through severe demand surges, PhotonIQ prevents brand reputation damage, infrastructure over-spend, and direct sales revenue losses from outages during traffic peaks - whether seasonal promotions or campaign launches. Companies conserve budgets while protecting revenue continuity even through extreme recurring events.

PhotonIQ Virtual Waiting Rooms Service (VWRs)



Advanced routing capabilities distinguish previous customers, divert suspected bots to looping queues, or serve cached site versions to SEO crawlers without burdening the origin server. Users experience seamless access worldwide, and intelligent AI mechanisms enable swift decision-making based on key metrics like request success rate, peak queue length, and more.

PhotonIQ VWRs uniquely operate geo-distributed queues linked for efficient distributed load balancing during regional traffic spikes, yet still presenting users a unified experience. Advanced analytics within queues enable extracting signals to optimize future waiting experiences and engagement.

Queue management options such as FIFO, random, and lottery offer versatility. FIFO maintains order based on arrival time, while random and lottery modes ensure fairness and equal chances for users regardless of their arrival time or internet speed. Strategic queue segmentation by region, domain, and requests per second enhances personalized experiences and optimizes resource distribution.

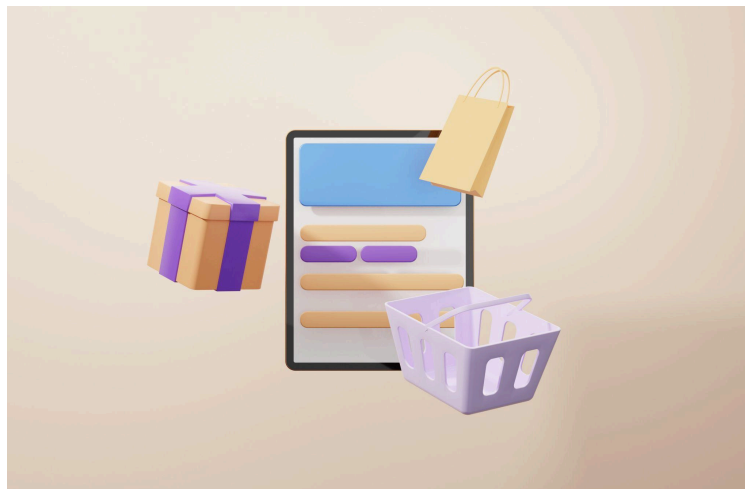
VWRs also feature Intelligent Flow Control, dynamically adjusting dequeuing rates to ensure server stability. Proportional, integral, and derivative control mechanisms fine-tune dequeuing rates based on configured limits and actual user counts.

These intelligent VWRs double as effective defense mechanisms against DDoS attacks and bad bot activity, filtering suspicious traffic and safeguarding website integrity. PhotonIQ Fingerprint further identifies bad bots and can trap them in a [honey pot](#), allowing businesses to allocate resources effectively. Additionally, good bots like SEO crawlers can receive a cached version of the site, instead of being added to the queue ahead of real users.

Furthermore, VWRs prioritize privacy by using PhotonIQ Fingerprint to track users across sessions, browsers, and devices without relying on cookies or logins, ensuring a comprehensive understanding of waiting room visitors while respecting privacy laws.

See different VWRs features in a comprehensive [walkthrough](#) of different use cases from holiday peaks to unplanned traffic surges! And now let's talk about identifying visitors to your site without logins or cookies.

Unlocking the potential of anonymous visitors




The [majority of website visitors](#) do not reveal their identity during their online interactions. This anonymity presents both challenges and opportunities for organizations looking to maximize their online presence.




[Privacy laws](#), such as GDPR and CCPA, have heightened the importance of respecting user privacy and data protection. With regulations evolving and becoming more stringent, companies must navigate a delicate balance between personalization and privacy compliance.

However, there's a compelling reason to engage with anonymous users. Studies have shown that [personalized experiences](#) are more likely to convert anonymous visitors into customers. Tailoring content, recommendations, and offers to the individual preferences and

behaviors of anonymous users can significantly increase the chances of turning a casual visitor into a paying customer.



Deliver Personalization to Anonymous Shoppers = Better Conversion Rates

-  **86%** of online visitors are anonymous¹
-  Anonymous visitors are **5.3x** more likely to buy with engagement¹
-  **76%** of customers expect personalization²

1. [Braze, 2022](#) 2. [McKinsey report, 2021](#)

Anonymous user engagement can also help in identifying potential fraudsters or malicious actors. By analyzing user behavior and digital fingerprints, orgs can distinguish between genuine visitors, repeat visitors, search crawlers, account takeover bots, or other malicious bots. This proactive approach to security not only safeguards the integrity of online platforms but also protects genuine users from potential threats.

Creating a website that is welcoming and relevant to both anonymous visitors and known customers is a strategic imperative. The ability to deliver tailored experiences without compromising privacy is increasingly becoming a competitive advantage. As privacy laws continue to evolve, businesses that can effectively engage with anonymous users while respecting their rights will be better positioned to thrive in the digital marketplace.

Many organizations have turned to fingerprint services but the heavyweight code associated with legacy solutions can affect website performance, making them less suitable for high-volume days when performance is critical. [University research](#) in 2020 indicated that browser fingerprinting is on more than 10% of the top-100K websites and over 25% of the top-10K websites, based on Alexa ranking, However, some of these scripts are not used for customer tracking and are applied for fraud detection.

The challenge of coupon fraud and eCommerce scams

Coupon fraud is a growing concern across various industries. It commonly involves the misuse of coupons including counterfeit coupons, coupon stacking (using multiple coupons for a single item), or using expired coupons. This fraudulent activity not only results in financial losses but also disrupts the tracking and measurement of marketing and promotion campaigns. Companies invest significant resources in creating and distributing coupons as part of their marketing efforts, making it crucial to protect these investments.



[1. Kount survey, 2023](#), [2. Ekata, 2021](#), [3. Ponemon Institute, LLC, 2017](#)

Major shopping events often see a surge in coupon fraud attempts. Stores typically run promotions during these events, providing discounts and incentives to attract customers. However, fraudulent coupon usage can undermine these promotions, eating into profits and eroding the impact of marketing initiatives.

The rise of online shopping has further complicated the issue. Anonymous online transactions can make it challenging to identify and apprehend individuals engaged in coupon fraud or other forms of eCommerce scams. This anonymity provides cover for fraudsters, making it difficult for businesses to distinguish between genuine customers and those seeking to exploit promotions for personal gain.

eCommerce fraud poses another significant threat to online businesses. Fraudulent activities can range from identity theft and credit card fraud to account takeovers and refund abuse. These fraudulent activities not only result in financial losses but also damage a company's

reputation and erode customer trust. Research shows cybersecurity and fraud as the [number one challenge for eCommerce companies](#) in 2023.

[Fingerprint](#) technology has emerged as a valuable tool in the fight against fraud. It can help identify suspicious behavior and prevent unauthorized access. However, older technologies may struggle to recognize increasingly sophisticated spoofing techniques used by fraudsters.

Identifying “good” and “bad” visitors

Fingerprint methods play a pivotal role in creating seamless customer experiences while preventing fraudulent activities. It involves the identification and tracking of online users across various devices and sessions, all without relying on traditional cookies. This process generates a unique "fingerprint" for each device by analyzing attributes such as browser configurations, operating systems, IP addresses, and more.

Fraud prevention and security

Fingerprints serve as a powerful tool in the fight against online fraud. It recognizes returning devices and establishes correlations with suspicious activities, enabling the detection of fraudulent devices, account linkages associated with scams, and bot networks engaged in automated attacks. This enhances security by expediting authorization for legitimate users while thwarting unauthorized access attempts.

Personalization and targeted advertising

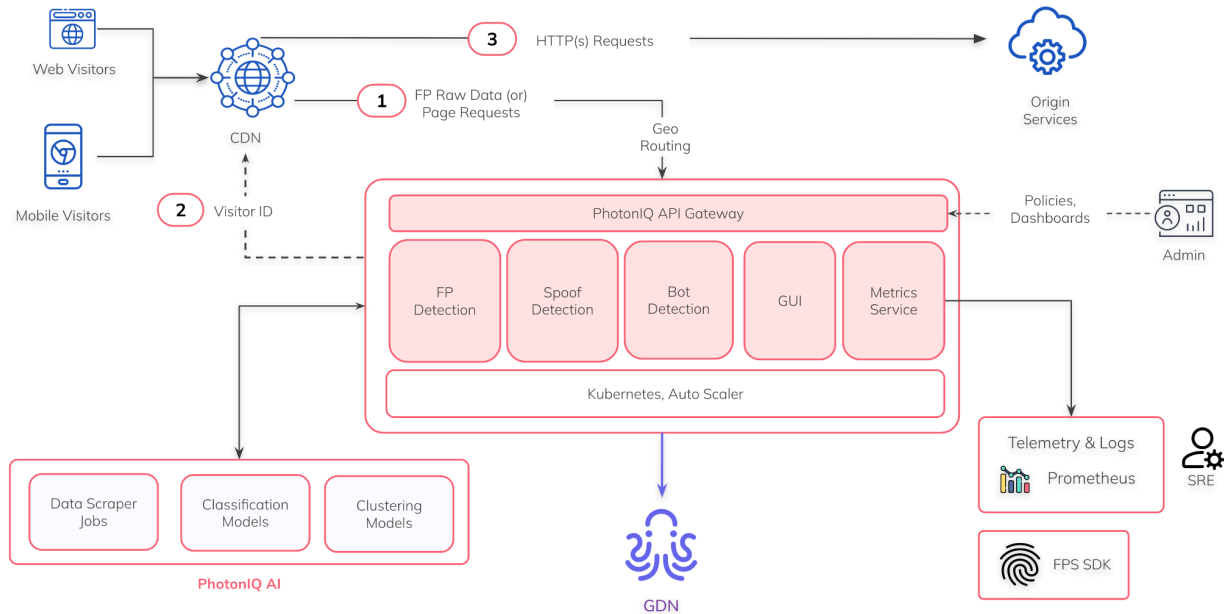
Fingerprint empowers businesses to gain a comprehensive understanding of user behavior across different devices, enabling the delivery of [tailored content](#) and recommendations. This can help businesses present relevant ads and other content based on their observed user interests and habits. Users can enjoy consistent personalization without the need for constant re-identification when switching between devices.

All of this information allows businesses to take holistic user analytics across multiple devices and provide companies with a comprehensive view of customer journeys. This allows businesses to make more informed decisions based on a complete understanding of user engagement.

PhotonIQ Fingerprint

Where customer anonymity prevails, [PhotonIQ Fingerprint](#) is a pragmatic solution for businesses seeking to identify, engage, and secure their online user base. Fingerprint offers 99.5% accuracy for visitor identification - enabling companies to gain valuable insights without resorting to methods like cookies or logins.

Fingerprint Service Architecture



Precise identification for personalization and bot detection

By analyzing over 300 distinctive attributes, Fingerprint creates persistent unique visitor IDs that follow users across sessions, browsers, and devices, even in incognito mode. This enables accurate identification of individuals for personalized promotions, recommendations, and smoother checkout.

Enhanced fraud prevention

Fingerprint correlates returning devices with suspicious activities in real time to detect fraudulent devices, scam account linkages, and bot networks launching attacks. Businesses can intervene proactively before substantial harm occurs. This is applicable across various fraud types like coupon fraud, account takeovers, fake logins, and card testing.

Coupon Assignment Service

By tracking users across devices, it identifies suspicious redemption patterns like excessive coupon uses from specific accounts or devices. This allows businesses to flag fraudulent accounts and block associated devices to prevent further abuse. Fingerprint services can help preserve promotional budgets by recognizing scam activity early before significant losses occur. [View](#) a quick demo on coupon codes, dynamic paywall, and visitor identification.

Integration with VWRs

Together with Virtual Waiting Rooms, Fingerprint services provide a multi-layered defense against bad actors seeking to exploit anonymity and disrupt eCommerce operations.

Optimized efficiency

With lightweight code designed for minimal impact on performance, Fingerprint's scalability accommodates traffic surges without compromising user experience or overloading resources.

Future-proofing

As the eCommerce landscape evolves, adopting technologies like PhotonIQ Fingerprint is instrumental in staying ahead and driving success.

Implement PhotonIQ services in 30 days or less for fast ROI

As eCommerce continues to evolve amidst new complexities, the infusion of AI innovations and an edge approach has rejuvenated familiar solutions like prerendering, performance optimization, virtual waiting rooms, and fingerprint. These technologies now deliver faster, smarter, and more effective outcomes than ever before. Together, they tangibly improve customer experiences, boost revenue, ensure uptime, and thwart fraud.

With rapid implementation possible in **30 days or less**, opportunities to increase revenue opportunities await. By connecting with our [Enterprise Solution Architects](#), businesses can propel their eCommerce strategy to new heights through the transformative power of these leading-edge solutions. The future looks brighter than ever for companies ready to embrace the magic of AI and the edge.