LIVE STREAMING SOLUTION BRIEF
A VIEWER-CENTRIC SOLUTION FOR LIVE EVENTS
Passionate Engagement on a Global Scale

Live, large-scale events drive nearly 10 times more viewer engagement than on-demand video.¹ This should not be a surprise. The shared experience of watching elections, sporting events, or breaking news unfold in real time toward an unpredictable outcome carries an emotional charge that on-demand content simply can’t match. The fact that users can watch these events through mobile devices magnifies these engagement opportunities immensely.

Viewers' increasing preference for watching live events over the Internet is a significant trend. Live Internet video will account for 13% of Internet video traffic by 2021.² Peak live event–related traffic on the Akamai network grew from 21 Gbps in 2004 to more than 23 Tbps in 2018 — a 1,000-fold increase.³

Although this is a trend content providers should consider taking advantage of, bringing these events to an online global audience instantly, at broadcast-level quality, with as little latency as possible, is a difficult task given the unprovisioned nature of the Internet, fragmentation of devices, and increasing volume and expectations of online viewers.

Growth of live event traffic over the Akamai network and key milestones since 2011

2011 Royal Wedding audiences push peak traffic volumes to 1.3 Tbps.⁴
2012 Super Bowl XLVI audiences push peak traffic to 1.4 Tbps.⁵
2014 FIFA World Cup audiences push peak traffic to 6.9 Tbps.⁶
2016 The Brazil games drive 100x more live streaming than London & Sochi, at 2x speed, & 3x the traffic peaks.⁷
2017 Akamai sees record-breaking peak event traffic at 17 Tbps driven by a live keynote; 61.3 Tbps of total traffic is delivered over the network — a 27% increase over the previous record.⁸
2018 The Indian Premier League reaches 10.3 million concurrent viewers at its peak.⁹

A new record was set with 65.3 Tbps of total traffic delivered over the network.
THE KEY IS QUALITY

Live event viewers are as demanding as they are passionate. Engaging with content on an older device in a location with spotty cellular service does nothing to dampen their demand for a pristine viewing experience. Anything that comes between them and the action — slow startup time, low-resolution video, the dreaded spinning pinwheel — means lower engagement, higher abandonment, a poor brand perception, and a lower likelihood that they’ll return.

Although the importance of quality has been the subject of discussion within the industry for several years, content providers committed to long-term success must now adopt a more disciplined approach toward delivery and measurement — the stakes are too high to ignore the links between video quality, viewer expectations, and business performance.

“MUST-HAVE” CAPABILITIES FOR A LIVE STREAMING SOLUTION

Live streaming technology has progressed over the past decade. But streaming live events is still a complex endeavor.

The past decade has seen tremendous advances in live video streaming technology. Unfortunately, live events themselves are still logistically complex; orchestrating people, processes, and technologies into a flawless viewer experience is still incredibly difficult.

Fortunately, Akamai has identified six must-have capabilities to deliver live events over the Internet at broadcast-level quality. Getting these right should be the top priority of every event provider’s technology strategy.

AKAMAI, THE TRUSTED LEADER IN LIVE STREAMING

With 63.9 Tbps\(^{10}\) of record-breaking traffic delivered over our network, Akamai is capable of handling any challenge.
1. Purpose-Built Origin

Live streaming is not broadcast. A significant gap still remains between traditional TV and online streaming in terms of performance and quality. For any live streaming event, quality starts at ingest, where a significant number of issues that impact a viewer’s experience can occur. Flawless planning and execution are essential for achieving reliable performance and for providing consistent experiences to individual viewers at scale. With two decades of experience delivering some of the world’s largest live streaming events, our solution is built to deliver the reliability, consistency, and performance required in a live solution to bring the experience of TV to online audiences.

Akamai’s Media Services Live is a stand-alone service that helps content providers ingest and prepare their live streams to provide the smoothest viewing experience. In addition, operating from the cloud helps manage the costs and complexities of providing a live streaming service, while the ability to provide support for multiple delivery channels allows for flexibility in content distribution. Media Services Live offers several purpose-built capabilities known as liveOrigin™, which operate in concert to provide unmatched reliability, consistency, and scale.

The combination of these capabilities include:

- **Ingest Acceleration**: Reliable, secure video ingest acceleration, from encoder into the Akamai cloud, using UDP transport protocol. This technology provides improved consistency in throughput of higher-resolution streams and mitigation of poor network connectivity.
• **Low-Latency Support**: Purpose-built architecture delivers content on par with broadcast, with 10-second, hand-wave latency, and addresses the need for online and broadcast content to provide near-simultaneous playback for viewers. Delays between broadcast signals and online streams are significantly minimized from what has traditionally been 30 seconds or more.

• **Self-Healing Network**: A highly distributed ingest network is complemented by advanced mapping technology — routing content by dynamically matching encoders to an optimal entry point. In addition, content is replicated to multiple, geographically dispersed locations, so even if an entire region is down or congested, streams can flow seamlessly through the network without interruption.

• **First-Mile Reports**: Near real-time reporting into server-side performance that affords customers critical insights into content and first-mile ingest performance with customizable thresholds to trigger alerts when exceeded.

• **TLS Support**: Ability to deliver content over a TLS session from the encoder in the first mile, while securing content in the last mile from the edge of the Akamai network and out to viewers via Adaptive Media Delivery, so content is delivered securely from end to end.

• **DVR & Archive**: Provide alternative ways to control and consume content by offering functionalities such as “live rewind” that viewers are accustomed to from TV.

• **Support for Leading Video Formats**: Akamai supports ingest for all leading video formats, including HLS, DASH, HDS, and CMAF (which targets both HLS and DASH-supported devices), to provide flexibility for content providers to reach a fragmented online audience on a variety of devices.
2. Reliable, Scalable, Secure Delivery

Online audiences are unpredictable and demanding; content providers looking to stream live events must be able to handle sudden spikes in viewership from anywhere in the world. Working with a partner who can take concerns about quality, reliability, and scale out of the equation is a critical step in building your service around your viewers’ expectations. Akamai can help in the early stages of planning to ensure your success. We can also help you scale to serve larger and more diverse audiences.

Akamai’s Adaptive Media Delivery ensures high-quality live streaming to viewers, regardless of their location or device type, and across a variety of network types. With more capacity globally than all other Content Delivery Networks (CDNs) combined, Akamai’s scale maintains superior video quality reliability for the largest online audiences. Additionally, Adaptive Media Delivery is origin agnostic, and capable of integrating with any third-party origin provider.

Security in the media & entertainment industry means securing the entire content consumption path. Any OTT or streaming company that wants to serve or distribute its content to end users must protect its content against an ever-evolving plethora of online piracy and cyber threats. There are different types of threats across the content consumption path. While companies need enterprise security solutions to safeguard themselves at the acquisition, production and distribution stages, they also need specific security solutions to safeguard themselves against piracy and threats to the content assets itself.

Content owners deeply care about unauthorized content distribution. One of the popular ways this is done, is link sharing, where a bad actor can take an authenticated link and share it on social channels or with other illegit users. In many cases, the content owners are pulling out rights from content providers for their premium content as they do not have adequate security measures in place.

Akamai’s content security approach is to provide a robust security solution that acts as a lightweight alternative to a DRM solution in certain cases and as a complimentary capability in others. An overview of our content security capabilities:
**Secure Communication**

Customers have multiple options to secure communications over the last mile of the Internet, between the edge of the Akamai network and viewers, by delivering content over HTTPS, using Transport Layer Security (TLS).

**Standard TLS:** New secure delivery option for media companies that encrypts data in transit using TLS to prevent hijacking or snooping. This capability provides performance at scale by delivering HTTPS traffic with the same offload, throughput and latency as HTTP traffic, throughput and latency as HTTP traffic, supporting custom domains.

**Enhanced TLS:** For media companies that require secure (HTTPS) delivery with a custom certificate along with physical security guarantees and PCI compliance of Enhanced TLS (eSSL).

**Protect Access**

Capabilities content providers can use to protect content access from illegitimate users, from unauthorized regions and devices etc.

**Enhanced Proxy Detection:** Enhanced Proxy Detection is a geo-blocking service that will allow companies to check a requesting IP address against GeoGuard’s proxy database to validate association with an anonymous proxy or VPN services. If a match is found, the request can be allowed, denied, or redirected at a category level. The capability will allow media companies who license content to meet their contractual obligations with their rights holders.

**Content Targeting:** Uses EdgeScape for IP geo-location tracking and adds to our geo-blocking functionality by enabling additional delivery configuration settings to detect whether the requesting IP address matches IP addresses on the Edgescape database.

**Prevent Theft**

Capabilities to prevent the loss of the content asset itself, due to actions like Link Sharing, Content Piracy etc.

**Token Authentication:** Provides a lightweight method for content authentication by using tokens to prevent unauthorized sharing of links. Akamai supports “Cookieless” Token where the token is included as a query parameter on the URL and “Hardened” Tokens make the session token stickier to the end-user’s playback session, thereby, making it more difficult to share the token/content URL.

**Media Encryption:** The feature protects media companies against piracy or unauthorized viewing by securing prepackaged HLS video segments delivered to viewers using the AES 128 encryption standard. The feature includes support for the latest HLS spec (including fMP4), offers per-session encryption and enables companies to encrypt pre-packaged content from Akamai storage or 3rd party origins.
Akamai also offers add-on services that enhance connectivity between video content stored in centralized public cloud platforms or customer-managed infrastructures and the Akamai Edge. These include:

- **Cloud Wrapper**: For providers that store their content in the cloud, this solution maximizes offload and protects origin infrastructures, delivering significant cost efficiencies. The service provides a highly efficient custom caching layer that wraps around centralized cloud infrastructures, shielding the origin from high volumes of requests and spikes in traffic.

- **Direct Connect**: This provides private connectivity between a provider’s data center and Akamai, enabling those who manage their own origin infrastructure to achieve reliable, secure, and cost-effective first-mile transit for their online video.

Captivating your audience starts well before the delivery of high-quality videos. The journey begins at the EPG (Electronic Program Guide) with high-quality digital images. Research from Netflix shows that viewers abandon a service if they don’t find a show they want to watch after 60-90 seconds of browsing (10-20 titles across 1-2 screens). So that means that EPG better perform flawlessly, no matter which device the viewer is on, and regardless of their connectivity profile.

Akamai’s **Image Manager** makes image optimization simple. It is an easy-to-use, automated solution that optimizes each image for the best combination of size, quality, and format tailored for each viewer and device. It also offloads the transformation of derivative image assets to the cloud.

- **Responsive HTML5 Media Viewer**: Simply upload digital images, group them together as a collection using an ID, and display them via a mobile-aware HTML5 interactive 360° viewer for customers to seamlessly explore image galleries or slideshows, leading to increased viewer engagement.

- **Perceptual Quality Algorithm and Preview**: Lighten the weight of digital images while maintaining the best visual quality by intelligently calculating and applying a precise degree of compression for the maximum level of byte reduction that is imperceptible to the human eye.

- **Auto-Convert Image Format**: Automatically detect and convert online images to software-specific image formats to take advantage of the advanced levels of compression that WebP, JPEG-XR, and JPEG 2000 can offer for customers on Chrome/Android, iOS/Safari, and IE/Windows software.

- **Auto-Resize for Mobile Screens**: Automatically resize website images for mobile devices based on viewport width so that mobile users are not over-downloading images that are larger (and slower) than needed to fit their screen size.

- **Easy and Flexible Integration**: You can use any web-accessible storage location, and Image Manager is also compatible with your existing publishing and purging workflows, giving you full control over your digital image assets and infrastructure decisions to gain maximum benefit from your CDN solution.

- **Dynamic Policy-Based Artistic Transformations**: Set image-level policies using query string parameters (QSPs) to speed up code development. Say goodbye to admin consoles.
The move of video consumption to online channels has created a newer set of challenges around monetization of content. Content providers can no longer reach their audiences through a single viewing device and single viewing experience; viewers are using an ever-growing array of devices, each with an ever-changing ad-blocking landscape. To continue to monetize effectively, content distributors need to become more efficient in targeting their viewers and generating revenue from content.

Manifest manipulation capabilities through Akamai’s Dynamic Ad Insertion keeps audiences engaged and allows for effective monetization of content at scale. Utilize market-leading technology that dynamically stitches ads on the server side while targeting them at the viewer level. This results in an overall improved viewing experience for your audience and creates additional opportunities for monetization of your video assets.

- **Server-Side Implementation**: Allows for improved mitigation of ad blocking while serving targeted ads at the viewer level, and providing clickable and dynamic overlay ads to enhance engagement
- **Frame-Accurate Signaling**: Coupled with server-side stream manipulation, allows for delivery of seamless and frame-accurate transitions between ads and content
- **Conditional Blackout and Program Replacement**: Enables limitation or replacement of content for specific audiences without the need for additional encoding or packaging
- **Near Real-Time Analytics**: A telemetry API provides reporting into real-time statistics on user engagement, ad server performance, and key metrics essential for optimizing the revenue from your streams and in line with IAB specifications

Akamai’s Dynamic Ad Insertion solution is platform agnostic and capable of working with most third-party ad-decisioning providers and ad servers. Integration with Media Services Live or Adaptive Media Delivery provides a highly robust media distribution solution to provide the highest-quality viewing experience for their live content, while targeting viewers at scale.
3. Dependable Security

Hosting your content online via a website provides an unprecedented level of contact with viewers. In addition to hosting videos, your website is also a place where business information (login, credit card, etc.) can be easily accessed by third parties — often using automated tools known as "bots." For many organizations, bots represent 50% or more of their overall website traffic, from good bots engaged in essential business tasks to bad bots conducting fraudulent activities. Regardless of business impact, bot traffic can reduce website performance for legitimate users and increase IT costs. Organizations need a framework to manage their interaction with different categories of bots and the impact that bots have on their business and IT infrastructure.

**Bot Manager** provides organizations with a flexible framework to better manage the wide array of bots accessing their websites every day. It offers the abilities to identify bots as they first arrive, categorize different types of bots, and apply the most appropriate management policy for each category. This allows greater control over how each organization interacts with different types of bots, maximizing business benefits while minimizing any negative business or IT impacts.

- **Bot Directory:** Continuously updates Akamai’s directory of more than 1,400 known bots in 17 categories that commonly interact with our customers
- **Customized Actions and Policies:** Creation of custom bot signatures and categories to identify specific bots, and assignment of a wide range of actions to take to manage different types of bots (such as alert, block, delay, serve alternate content) based on parameters such as URL, time of day, or percentage of traffic
- **Unknown Bot Detection:** Detection of traffic from unknown bots through intelligent techniques that include behavior analysis, browser fingerprinting, automated browser detection, HTTP anomaly detection, high request rate, and more
- **Bot-Centric Reporting and Analysis:** Real-time and historical reporting on bot traffic, from high-level statistics for insights into bot trends to detailed analysis of individual bots or segments of your bot traffic with sampled HTTP requests and responses

Since websites and applications are accessible from the Internet, they offer a relatively simple entry point to access valuable data and are often subject to attacks. Akamai’s **Kona Site Defender** protects websites and applications from downtime and data theft caused by opportunistic and targeted web attacks, as well as DDoS attacks. Akamai’s visibility into 15 to 30% of the world’s web traffic provides intelligence into the threat landscape that allows us to constantly evolve rules to thwart the latest attacks. Our expert services team is available to work with customers to integrate optional components to maximize security and enable organizations to conduct their business without constantly fearing intruders.

**BUSINESS BENEFITS:**
- Reduce risk of downtime, defacement, and data theft
- Protect revenue, customer loyalty, and brand equity
- Maintain performance even under attack
- Reduce costs from spikes in attack traffic
- Reduce capital expenditure on security hardware and software

**TECHNICAL BENEFITS:**
- Integrate easily with existing IT infrastructure and DevOps
- Get deep threat insight visibility
- Maximize uptime and availability during DDoS attacks
- Defend web application infrastructure
- Protect against direct-to-origin attacks
- Scale on demand
- Leverage best-in-class application security expertise
Broadcasters employ an army of freelancers and third-party companies to make and deliver content. These can include video editors, post-production houses, and OB/SNG/ENG providers, all of whom need access to internal business and collaboration applications to perform their assignments. VPNs (virtual private networks) can provide them with access to unnecessary information, systems, and networks. Big picture: Today, talent is widely distributed and remote, and they need to access applications to do their jobs.

Akamai’s Enterprise Application Access (EAA) provides simple and secure access and delivery of enterprise applications. It gives individual access to internal applications on a per-app basis without providing full network access, thus improving an organization’s security posture by reducing their attack surface and not allowing lateral movement within the network. EAA is a cloud-based solution that is simple and quick to configure, manage, and maintain. IT organizations get a centralized managed solution that does not rely on traditional remote access technologies (VPNs, VDI, RDP, or proxies) or deploying hardware or software within the enterprise infrastructure.

With EAA, there is no direct path into your applications. Instead, Enterprise Application Access dials out a secure, mutually authenticated TLS connection and brings the application to the user. Since there are no tunnels, there is no path for malware to land inside your network and potentially spread to sensitive or privileged systems. All user connections are stopped in the cloud, terminating on secure proxies while applying strong authentication and security controls. You can add your own security controls for increased protection of highly sensitive applications.

Broadcasters are also prone to hackers and attacks by malicious actors. They have three asset classes that are worth stealing: viewer PII, premium video files, and executive communications. With the shift from advertising to subscription-based monetization, broadcasters and native OTT providers must now collect and secure customer PII — including payment card information, as these profiles have significant value. Likewise, the era of peak TV means content piracy of hit shows makes exfiltration of these files extremely lucrative for hackers.

Targeted threats such as malware, ransomware, data exfiltration, and phishing are increasing in volume as the enterprise threat landscape evolves. Simultaneously, malicious actors are getting better at circumventing traditional security approaches.

Enterprise Threat Protector (ETP) leverages real-time Akamai Cloud Security Intelligence and Akamai’s proven, globally distributed recursive DNS platform to proactively identify and block targeted threats. Security teams can centrally manage and enforce unified security and acceptable use policies in minutes for all employees, protecting content and operations from security threats.

- **Significantly improve security defenses** by proactively blocking DNS requests to malware and ransomware drop sites, malware command and control (CnC) servers, and DNS data exfiltration and phishing domains based on unique and up-to-date threat intelligence.

- **Instantly add protection without complexity or hardware** with a 100% cloud-based solution that can be configured and deployed in minutes (with no disruption for users) and rapidly scaled.

- **Simply reduce risk and improve security** for off-network laptops without using a VPN with the lightweight Enterprise Client Connector, which enforces your security measures and acceptable use policies.

- **Easily reduce management time** by administering security policies and updates from anywhere in seconds to protect all locations.

- **Quickly and uniformly enforce compliance and your acceptable use policy** by blocking access to objectionable or inappropriate domains and content categories.

- **Immediately increase DNS resilience and reliability** with Akamai’s carrier-grade global intelligent platform.
Media Acceleration: Enhances the performance of media delivered over the unprovisioned Internet and enables the reliable and secure transport of content delivered from an origin to end-viewer devices. UDP transport protocol improves the quality, speed, and consistency of delivering content to a variety of viewer devices.

Akamai’s Adaptive Media Player is an extension of our live streaming solution. It simplifies media player deployment by providing an excellent foundation for a truly high-quality media playback experience optimized for multiple device viewing.

5. Visibility and Insight

Visibility into the quality of video performance is critical to uncovering insights that impact the viewer experience. Akamai’s Media Analytics is a cloud-based, self-service solution composed of two key modules that help content providers get a pulse of their business through data and insights critical to engage, retain, track, and further monetize their online audiences.

- **Quality of Service Monitor** offers real-time visibility into the quality and performance of video streams, as content is streamed live, through key metrics that include startup time, rebuffer rates, audience size, bitrate, availability, errors, and more.

- **Audience Analytics** provides a comprehensive overview of key trends and audience behavior as they engage with video content. Customizable Business Summary and Quality of Service dashboards give a snapshot of factors influencing the video experience.

To complement client-side visibility, Akamai’s Media Reports provide server-side insights into traffic, visitors, and video streaming performance to track content and make sure it’s reaching the viewer with the highest quality for the best streaming experience. Included with Media Services Live and Delivery products, Media Reports provide significant enhancements in monitoring the performance of video operations — helping close the reporting gap required by businesses to stay relevant and differentiate their services to their online audiences.
Your website’s user experience directly affects your business outcomes, especially if it aids new subscriber acquisition or ad revenue, or hosts your video content. The challenge with site performance is quantifying “how much” it impacts your digital experience — balancing page speed against site changes for the highest business outcome and best customer satisfaction. Akamai’s mPulse provides visibility into the immediate impact of user-perceived performance on session length, engagement, revenue, and other key business metrics, in addition to contextual intelligence and easy-to-understand visualizations for effective decision making.

When preparing for this year’s largest live event, content providers can expect large audiences. To ensure your audience doesn’t miss a second of action, your end-to-end architecture must be ready for future demand and sudden peaks in visitor traffic. Ensure that every viewer is satisfied — and doesn’t jump to your competitor — with Akamai’s scalable, global performance-testing platform, CloudTest.

Akamai CloudTest helps you stress test your website and OTT architecture from end to end. Offered as a managed service, it delivers testing at any scale via the cloud in production or inside a pre-production environment. You’ll benefit from the expertise of Akamai’s performance engineers to create, manage, and report the findings of your tailored test plan. Testing capabilities include test video workflows for live and on-demand streams, web and mobile apps, APIs, databases, and web services, all with full support for continuous integration. Real-time analytics and customizable dashboards provide actionable intelligence, allowing for root-cause analysis while tests run, and granular control to dynamically ramp tests up or down. When paired with Akamai’s real-user monitoring service mPulse, testing scenarios can be scripted based on real-user traffic patterns, allowing for the most realistic and accurate testing.
6. Expert Services and 24/7 Support

The Broadcast Operations Control Center (BOCC) is a managed solution that provides end-to-end visibility into your live linear workflows through 24/7 proactive monitoring, alerting, and live support. The support tools provide operational insight into network conditions and telemetry across your entire video operation. These tools, paired with access to media experts and engineers, help evaluate and quickly mitigate issues that could potentially arise during your live broadcast, while allowing for rapid root-cause identification within your workflow.

Akamai’s Services and Support team acts as an extension of your own. Our globally distributed media experts provide trusted advice and assistance from initial deployment through to ongoing support, maintenance, monitoring, and management. With a round-the-clock point of contact, you can minimize the impact of time-sensitive issues.