



Broadcasting an eSports Tournament – Keys to Success

Broadcasting an eSports Tournament – Keys to Success addresses the challenges of broadcasting live eSports events to global multi-screen audiences.

WHITE PAPER

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Introduction

The popularity of live eSports tournaments creates larger and larger online audiences. Events such as the Intel Extreme Masters (IEM) in Katowice, Poland drew 100,000 fans per day, and hundreds of thousands of online concurrent viewers. The League of Legends 2015 World Championship from Riot Games set online viewing records with 36 million people watching over 15 days and 1.1 million¹ viewers tuning in concurrently for the final rounds. These tournaments are just a couple of examples of the monumental growth of eSports so big that everyone is jumping into the game—from major AAA title holders like Blizzard to Turner Broadcasting. Sponsorship now makes up 36% of all eSports revenues² and increasingly, major consumer brands are investing in eSports.



Figure 1: Sample logos from consumer brands sponsoring eSports³

What does it take to pull off a successful online event? You need the right game, the right players, and the right venue but there's another aspect that is becoming increasingly important—live streaming. IEM, Riot, and the success of sites like Twitch, demonstrate that people want to watch eSports events live online, especially when they can't attend the event in person.

To keep viewers engaged—eSports producers must bring the excitement of the tournament experience to whatever screen their fans employ. While PC's make up over 60% of the viewing platforms⁴, fans are increasingly mobile, tuning in with tablets and smartphones to catch the action. However, fans who regularly enjoy high definition TV, and screens developed specifically for gaming, have no tolerance for poor quality, slowness, or delay in their video streaming.

Thankfully, today's eSports producers can draw on lessons and techniques from other live entertainment industries and adapt them to their unique challenges. In this whitepaper, we review best practices for live online events and cover key steps to making online viewing as exhilarating as the live competition.

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Key Challenges

Whether your event is a major final, or a multi-month series, the pressure on your live broadcast grows as the competition intensifies. For this reason we've identified four key challenges that you must address at the outset to ensure a successful event:

Broadcast Quality—like other live event audiences, eSports fans want the highest quality stream. That means no buffering, no interruptions, and no inferior color or resolution. The action needs to turn on instantly, and the screen needs to capture the speed and visual richness the live competitors are experiencing.

Device Proliferation—for a successful, live eSports event, millions of viewers across PCs, smartphones, and tablets need access to the event simultaneously. But converting content to meet the needs of individual devices is complicated and may require significant encoding expertise.

Scale—the ability to handle the sheer size of the eSports audience, plus event-driven spikes, is key. A successful broadcast has to adapt to a constantly changing online audience mix, and spikes in viewership, seamlessly.

High Availability—since every second counts in a live event, it's important to have failover capability at every point in your workflow, and built into your broadcast network so that, in the event of an issue, users don't experience any interruption.

If you are doubting just how popular live online streaming is in eSports, just check out Figure 2 that compares the total online unique viewers of some popular games with online viewership of one of the world's most watched sporting events: the US Super Bowl.

Event	Total Online Unique Viewers	Peak Online Concurrent Viewers
League of Legends World Championship, Las Vegas, NV; October 2015	36 million	1.1 million ⁵
The International Dota 2 (2014)	20 million	2 million ⁶
Intel Extreme Masters, CS:GO Katowice, Poland; March 2015	30 million	570,090 ⁷
Super Bowl 50	3.96 million	1.4 million ⁸

Figure 2: Sample eSports Live Tournaments and Audiences Compared with Super Bowl 50

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Keys to Online Success

Drawing from best practices for live events and online broadcasting, here are key “pre” and “going live” steps you can take to deliver a great experience to your audience:

- **Pre-event:** online audience profile
- **Pre-event:** workflow for multi-device delivery
- **Pre-event:** assemble your expert team
- **Pre-event:** set the metrics
- **Pre-event:** test run
- **Pre-event:** ensure high availability
- **Going-live:** communication and escalation
- **Going-live:** event support
- **Going-live:** real-time analytics

Pre-Event: Online Audience Profile

Audience size, location, and viewing platforms are key inputs to setting up both your broadcast workflow and your delivery network. To properly profile your audience, look at such factors as:

- Event location(s)
- Estimated audience size
- Hour by hour event schedule with estimated peak audience for each segment
- Geographical breakdown (where your users will be watching)
- Data from previous events (such as qualifying events)
- Audience devices and platforms (estimated)

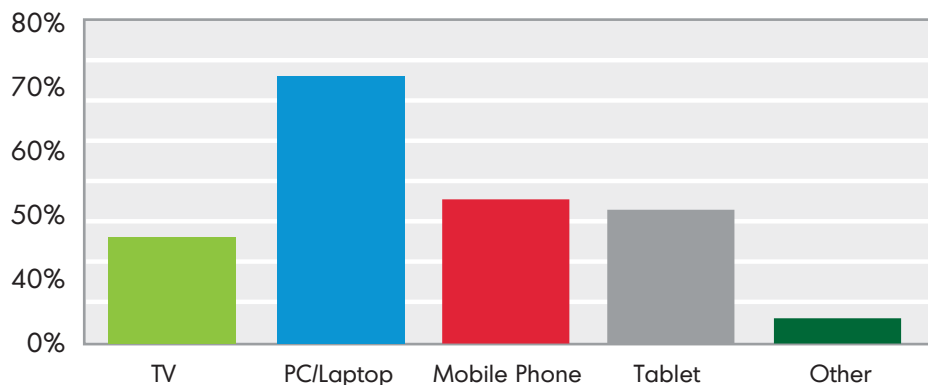


Figure 3: Devices Used to Watch Online Video – eSports Enthusiasts*

*US Data

Source: Newzoo Consumer Insights 2015

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Pre-Event: Workflow for Multi-Device Delivery

Your workflow can be onsite or cloud-based but needs to be designed to feed up to millions of devices with minimal latency. Starting with the action on the stage and moving out to your viewers, here are some of the key workflow elements you should consider:

- **Location**—Stadium or studio? Will you broadcast from the same location as your event? If not, the link to the broadcast center needs to be high performance and high availability (see the section “Bandwidth from the Live Event” below).
- **Broadcast Streams**—Today, a single live event is likely to generate multiple broadcasts. The main broadcast will cover the match itself while additional coverage captures side events and provides for foreign language streams. As part of the overall audience growth for eSports, it’s also becoming common to have a unique broadcast for new viewers who need clearer, simpler, explanations of the action.
- **Formatting**—Formatting your video stream for an eSports broadcast should produce the highest quality image that each device type allows. Formatting is often done in three stages: encoding, transcoding, and transmuxing. Encoding captures your video streams and compresses them in preparation for digital broadcast, while transcoding and transmuxing convert these streams to be playable on iPhones, Android Phones, tablets, PC’s, and Xboxes at the bitrates you choose.
- **Encoding**—Overall you are better off encoding each video stream in the highest bitrate possible. Make sure you time-synch all your encoders so that in the case of a failover, your viewers won’t see a gap or stutter in the stream.
- **Transcoding and Transmuxing**—Transcoding is necessary to meet the format requirements of different devices and players. Typically, to prepare encoded video for delivery over the Internet you transcode your stream into the MP4 format in multiple bitrates. Transmuxing then converts your stream (without changing any video characteristics like bitrate or aspect ratio) into a variety of formats for today’s popular devices:
 - HLS (HTTP Live Streaming)—great for Apple devices, newer Android devices, and gaming consoles like Xbox.
 - HDS (HTTP Dynamic Streaming)—used for delivery to Flash players rather than using RTMP.
 - MSS (Microsoft Streaming Service)—for Microsoft devices although the Xbox now supports HLS.
 - RTMP (Real-time Media Protocol)—this is the Flash player protocol. Many desktop computers still use Flash.
- **Bandwidth from the Live Event Site**—The amount of bandwidth you will need from your live event location to your transit network is a key calculation. Without enough bandwidth, your viewers will see lots of restarts and pauses as your transit network tries to deliver content at different bitrates.
- **Transit Network**—Because of the real-time nature of a live event, it pays to seriously consider a content delivery network (CDN) for your delivery. A do-it-yourself strategy using the public Internet could have a significant negative impact on your viewers’ quality-of-experience (QoE). Depending on viewer distance from the live venue, requests may need to make multiple hops, causing significant delays in response. Certain CDNs, like Limelight, offer a fully dedicated backbone of proprietary fiber-optic lines that enable your stream to avoid Internet congestion. Think of it like a content delivery super highway!
- **Network Traffic**—Be sure to overprovision your network bandwidth to allow for spikes in viewer traffic. Also, given the large number of devices tapping into eSports, it is common to use an adaptive bitrate delivery strategy, which allows you to send a package of different bitrates to support any viewer’s bandwidth.

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Pre-Event: Assemble Your Expert Team

Make sure the technical personnel from each step in your workflow meet before the event. Ideally your network team will supply you with:

- **Project Manager**—to coordinate the event and the resources
- **Operations Engineer**—to monitor the ingest and troubleshoot as needed
- **Advanced Services Architect (as needed)**—for special configurations, monitoring and/or reporting as needed
- **Network Engineer (as needed)**—assess and monitor network capacity
- **Signal Acquisition Manager**—company that is handling signal acquisition
- **Stream Encoding Manager**—company that is handling encoding

Pre-Event: Set the Metrics

Overall goals for the event should influence the network monitoring goals. Today's eSports events are monitoring some or all of the metrics below:

Business Metrics

- Viewers by country
- Concurrent viewers by match
- Total viewers
- Live sessions on broadcast platform (Twitch)
- Twitter and Facebook impressions
- Live Attendees

Network Monitoring Metrics

- Total throughput
- Average bitrate
- Peak bitrate
- Throughput by region

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Pre-Event: Test Run

A test run is essential no matter how small or large you expect your live event to be. Running a stream through the entire process of uplink, encoding, transcoding, and transmuxing out to your CDN and viewers will help you identify hidden causes of latency. It also allows your content delivery Advanced System Architect to optimize the configuration of the CDN. Figure 4 shows three keys to eliminating latency at each major phase of the workflow. Last but not least, it is a final opportunity, before you go live, to make sure everyone is working from the same assumptions around audience size, traffic levels, and event timing.

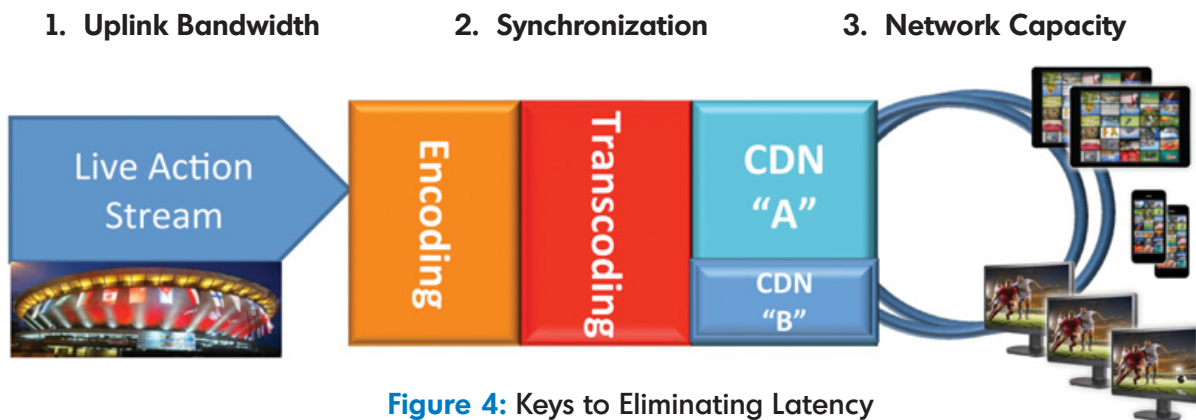


Figure 4: Keys to Eliminating Latency

FROM LEFT TO RIGHT: 1) Uplink bandwidth from the broadcast site must be high enough to ensure that your overall broadcast runs smoothly. 2) By focusing on synchronizing the encoding and transcoding/transmuxing process, you can eliminate latency while preparing your streams for play on multiple devices 3) Ensuring you have enough network capacity and that your network throughput is optimized is essential to handling large numbers of online viewers.

Pre-Event: Ensure High Availability

Virtually every step in your broadcast workflow should have built-in redundancy. The minimum standard is a seamless failover from one component to a backup with no impact on viewers. Even better is to have controlled failover that you can implement when a piece of infrastructure starts to underperform, rather than waiting for the equipment to give out completely.

Workflow Step	Minimum Redundancy Strategy	Notes
Video streams from live event	Ensure high capacity uplink bandwidth	Consider use of Satellite uplink
Encoding	Enough to handle peak traffic, plus a a back-up set	Time synchronize
Transcoding/Transmuxiing	Same as encoding	Consider moving to the cloud
Content Delivery Network	A minimum of 3 CDNs; Actively use 2, keep one warmed up and in reserve	Use load balancing and failover tools like Nice People At Work or Cedexis

Figure 5: Protecting Your Live Event Investment

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Going Live: Communication and Escalation

Seconds matter in a live broadcast. This is why you need to create a clear communication and escalation strategy. Simple as it may sound, just standardizing the communication method (e.g. email, Skype, IM, mobile etc.) goes a long way to eliminating problems. Document the strategy and share it with the broadcast team.

Going Live: Event Support

Your expert team should have members onsite for the whole event. Your CDN operations center will want to monitor network performance for the entire event and respond to any signs of performance degradation both during encoding and delivery.

Going Live: Real-time Analytics

Setting up real-time analytics for both the network and the end-user ensures you can identify trouble spots and fix them before viewers even experience a problem. For example, if you see that parts of Asia are getting less than expected throughput, you can adjust your traffic distribution. Likewise, measuring the number of individual connections at the end-user level gives you a sense of the geographic concentration of your audience as well, and can guide your real-time network management. Both CDN's and independent analytics platforms can now provide you with a sophisticated set of metrics that allow real-time adjustment and protect your event while it's taking place.

Important Network Metrics	Important End-User Experience Metrics
Active users by geography	Individual connections
Traffic distribution by geography	Number of devices used by type
Average bitrate	Length of time viewers were watching
Total event traffic	Player failures
Average throughput	Average bitrate consumed by the player
Consistency – variability in delivery speeds	

Figure 6: Network and End User Experience Metrics

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“It’s that moment when your heart is pumping, your face is literally in the screen, you’re watching every single movement in anticipation of what’s to come... you sit back down in wonder of how someone could craft such a beautiful set of movements in their mind.”

– Reddit commentator on the appeal of eSports

Conclusion

Esports planners have an opportunity to combine the best practices of live TV broadcasting with the rapidly expanding world of live online video. To create a successful event online, there is no substitute for robust infrastructure, detailed planning, test runs, and live-event monitoring. The global popularity of eSports demands expertise in multi-device broadcasting and capacity planning. However, planners who execute these steps have a chance to be successful on an unprecedented scale, enabling millions to share the excitement and put their faces “in the screen” to watch.

About Limelight Networks

Limelight Networks Inc., (NASDAQ: LLNW), a global leader in digital content delivery, empowers customers to better engage online audiences by enabling them to securely manage and globally deliver digital content, on any device. The company’s award winning Limelight Orchestrate™ platform includes an integrated suite of content delivery technology and services that helps organizations secure digital content, deliver exceptional multi-screen experiences, improve brand awareness, drive revenue, and enhance customer relationships — all while reducing costs. For more information, please visit www.limelight.com, read our blog, follow us on Twitter, Facebook and LinkedIn and be sure to visit Limelight Connect.

¹ “League of Legends World Championship Opener Had 1m Concurrent Twitch Viewers.” MCV UK. N.p., n.d. Web. 24 Mar. 2016. <<http://www.mcvuk.com/news/read/league-of-legends-world-championship-opener-had-1m-concurrent-twitch-viewers/0158342>>.

² *The Global Growth of Esports*. Research Report. 1.0st ed. Vol. 1.0. Amsterdam: Newzoo, 2015. Print. Esports.

³ “Big Brands Gravitating towards ESports.” *Fortune Big Brands Gravitating towards ESports Comments*. N.p., 24 July 2014. Web. 09 Feb. 2016. <<http://fortune.com/2014/07/24/esports-sponsors/>>.

⁴ Newzoo Consumer Insights, 2015

⁵ “League of Legends World Championship Opener Had 1m Concurrent Twitch Viewers.” MCV UK. N.p., n.d. Web. 24 Mar. 2016.

⁶ “Dota 2 International 2015 Breaks Own Record for Largest ESports Prize Pool at £7m and Counting.” *International Business Times RSS*. N.p., 05 June 2015. Web. 24 Mar. 2016.

⁷ “The 2016 Intel Extreme Masters World Championship Officially the Most-watched Non-major Counter-Strike Event!” *The 2016 Intel Extreme Masters World Championship Officially the Most-watched Non-major Counter-Strike Event!* N.p., n.d. Web. 24 Mar. 2016.

⁸ “CBS Says Super Bowl 50 Broke Streaming Records With 3.96 Million Unique Viewers.” *TechCrunch*. N.p., n.d. Web. 22 Feb. 2016.



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