

# WHITEPAPER: 6 Steps to Delivering a Successful Live Online Broadcast

## INTRODUCTION

Successfully delivering an exceptional live event over the web is a complex process. Perfecting the process from acquisition to delivery to multiple devices takes practice and experience and the ability to quickly troubleshoot and resolve issues as they arise.

Throughout a live event video workflow there are a number of considerations that require forethought and planning. The more knowledgeable you are about these variables, the better you'll be able to prepare for your event and the higher your chances for a successful execution.

This paper will walk through the process of broadcasting a major live event online. We'll uncover some of the complexities associated with each step in streaming a major live event including:

- Live A/V capture and content acquisition
- Encoding for high quality video playback on multiple platforms and devices
- Onsite versus offsite encoding
- Publishing and delivery
- Player customizations and capabilities
- Live and post event analytics

## Expanding Your Video Footprint with Live Online Events

There are many benefits to be gained from broadcasting a live event online. The biggest benefit is the ability to go beyond the limits of your live audience to a vast, connected audience. With the proliferation of video-capable, connected devices it's now truly possible to reach people wherever they are at any time on their choice of device. For enterprises this means the ability to webcast critical content like shareholder meetings, and executive keynotes, reaching out to customers, investors, partners, and employees with your message. For media companies, online and OTT video is making the move from early adoption to mass market behavior, and consumers are quickly learning how to find the content they want on different platforms, including mobile devices, connected set top boxes, smartTVs, and game consoles. The ability to rapidly expand your digital media footprint means bigger audiences, more revenue opportunities, and greater overall impact of your live event.

## Live Event Workflow

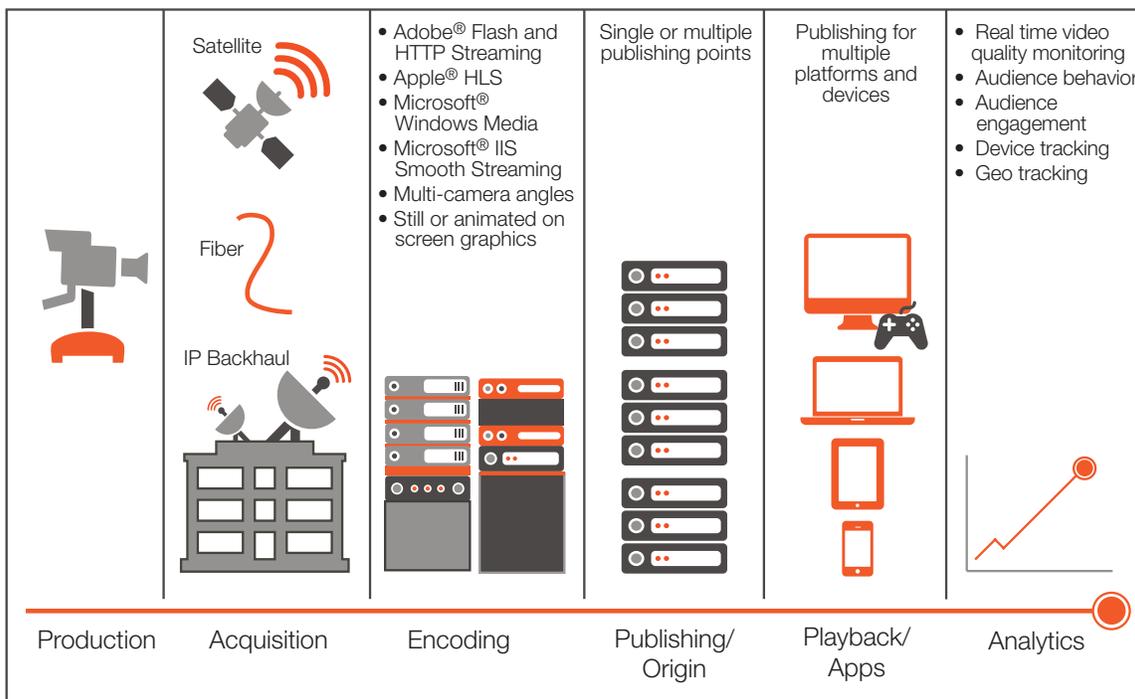
No matter what type of live event you're broadcasting, the video workflow process will include the following steps:

1. Content creation or production
2. Acquisition
3. Encoding



4. Publishing/Origin services
5. End user experience/Players and apps
6. Post event analytics

These 6 steps include a number of processes within each and there are many considerations, variables and decisions to be dealt with at each point in the process. This paper will provide you with a checklist to prepare for your live event, and put you on a path for a successful execution.



**Video Workflow**

## Step 1: Content Creation or Production

The first step of the event is the actual production. You'll want to make sure that you have a plan for all necessary production services including lighting, staging, sound and the actual video production package itself. And since you are planning to broadcast your event online you'll need to think about what is onscreen and audible for your online audience before your event starts. If you are planning to use multiple cameras, will you be including each camera as an individual feed or simply broadcasting a switched feed? If you are incorporating elements from various geographical locations, which of those elements will be incorporated as audio or video? each platform. You'll also want to take varying screen size into consideration when you plan for an optimal playback experience on each device.

**Production Checklist**

- Do you have a provider(s) for your production needs: lighting, staging, audio, cameras?
- Is the event being captured in standard definition (SD) or high definition (HD)?
- Will you be using multiple cameras?
- Will you be broadcasting from multiple locations?

## Step 2: Signal Acquisition

Producing an event creates a live feed which then has to be 'acquired' or delivered to the system that ultimately streams the event to your audience. After you plan your production capabilities you'll want to determine if you are going to require onsite or offsite acquisition. The most common scenario, and often the most economical, is offsite acquisition, meaning you are sending (transmitting) the broadcast to a remote facility that's acquiring or downlinking the broadcast via a satellite or fiber connection. In the case of offsite acquisition, you'll need to uplink your feed to satellite or transmit it to the remote encoding facility over a dedicated video fiber network.

Most major live events will use a satellite truck. Satellite is very reliable and the trucks are staffed by experienced professionals. There are a few issues to be aware of with satellite acquisition:

- Satellite transmission can be affected by weather
- You need unobstructed sky exposure
- In the case of a mission critical event you may consider both satellite and fiber as a backup.

Onsite acquisition is considered more complex than offsite acquisition because all of the equipment, backup equipment and personnel that are necessary in acquiring the content have to be mobile, which increases the variability in the system and the chance that something can go wrong. For onsite acquisition your event venue will need a good broadband connection since you will be connecting and delivering the online broadcast from within that venue.

### Step 3: Encoding

Once you've acquired the broadcast the next step is encoding of the content so that it can be delivered over the internet. Encoding is a fairly straightforward step until you introduce variables such as multiple formats for multiple devices, multiple sources, security, and adaptive bit rates, each of which we'll explore further.

#### Onsite vs. offsite encoding

Encoding is another step where you will make a decision early on whether you'll want this performed onsite or offsite. As with onsite acquisition, the quality of your connection from the encoder to the internet will be an important consideration if you want to encode onsite. You need to know your options for backup in the case of a network failure or worse, a power outage. For example, if you want the event to be accessible by both PCs and mobile device, you will require an encoder that can generate multiple bit rates to enable adaptive bitrate (ABR).

Connectivity between the encoder and the next point in the process, the media server entry point or an HTTP origin server, is another important factor.

For a major event we recommend offsite encoding because you have more options to provide failover and redundancy. For example if you're using one of the iStreamPlanet's offsite Broadcast Operations Centers (BOCs) you have the built-in advantage of 3x network redundancy, automated power backup and racks of state-of-the-art encoders.

#### Number and types of encoders

Regardless of the type of encoding solution you choose, you'll need to determine how many encoders your event will require. Every video source that you intend to capture requires one encoder. For larger events you'll also need to add encoders that are dedicated to backup or failover. At a minimum you'll need one encoder and one back-up encoder, but you may need several more. If you are planning to provide viewers with a multi-camera experience, you'll need one encoder plus back-ups for each camera angle.

#### Devices and formats

Another consideration when determining your encoding specifications is which devices and platforms you are targeting for playback. You'll need to know this well in advance of your event because as mentioned previously, this can be another limiting factor if you choose onsite encoding. The types of devices you're targeting will determine the formats and encoding profiles you'll require. iPads and tablets, desktops, phones, PCs and MACs, Xbox, PlayStation, Roku or Apple TV each require different encoding profiles because they play back different formats.

#### Bit rates

You'll want to consider the bit rates that you need. This depends on your audience, your desired video



quality, and the type of content you're broadcasting. For example sports content where the players are moving quickly will require much higher bit rates than a keynote speaker. iStreamPlanet is capable of encoding at bit rates that will support up to 1080p HD at 60 frames per second. For this type of content to be watchable by most end users, adaptive bit rate encoding is required. This provides the viewer with a stream of video at a bit rate that dynamically matches their broadband connection. If their connection speed slows down the stream drops to a lower bit rate.

### Encryption

In order to secure your streams so they can't be recorded and shared without permission you'll need to make sure you're encrypting the streams as they're being digitized or encoded. Standard encryption or DRM formats include AES encryption, Adobe Access and Microsoft PlayReady DRM. It's important that the player you provide to viewers supports the security you are setting up during the encoding process. Your CDN partner can also help you add other layers of security for your stream such as token authentication.



### Encoding Checklist

- Will you require onsite or offsite encoding?
- What devices do you want to target with your online broadcast?
- What formats will this require?
- What bitrate will you require? Single or adaptive?
- How many encoders will you require?
- Will you secure your streams via encryption?
- What is your failover and redundancy plan?

### HIGHLIGHT: ADAPTIVE BIT RATE

Adaptive bit rate (ABR) is important for those who plan to deliver live content to more than just a single format and bandwidth (e.g., a desktop computer). Today's viewers expect to be able to continue to watch an online event wherever they are, so you need the ability to generate multiple bit rates and resolutions that can be served to several device types on varying network types such as cellular, Wi-Fi, or fixed-line cable or DS. ABR converts a video stream into fragments or chunks, often 2-10 seconds in length. ABR creates discrete streams at various bit rates and then uses feedback from the internet user's video player to dynamically detect the optimum network speed for delivery of the video clip. As network conditions change – for better or worse – the stream with the most appropriate bitrate is served for that given chunk of time. As this is a streaming solution, it keeps the content owner happy by limiting the bitrate and delivery of content to just what the viewer will consume, and it benefits the Content Delivery Network (CDN) by limiting the number of specialized streaming servers needed for on-demand video delivery.

## Step 4: Publishing and Origin Services

The origin server is used to transmit the feed out to the Internet for viewing. For smaller events where the audience is located in the same area, content can be delivered directly to an audience from the origin sever. But for larger events, the origin server relies on a content delivery network (CDN) and its large HTTP caching infrastructure. This server can be within your own environment, within a CDN's network or within a service provider's environment. Since the origin is the starting point for your HTTP based live streams it's important that your origin services are built with failover and redundancy. For example iStreamPlanet's origin servers for serving content in the US are located within the Switch Communications SuperNAP data center, the largest data center in the US with backup power, failover servers, access to multiple networks and cloud infrastructure capabilities. Dynamic, cloud based origins provide advantages such as scalability, redundancy and failover without the overhead or cost of building local server implementations.

You will want to ensure your origin services are monitored so you are aware of any server



### Publishing Checklist

- Where will you publish your live video streams to distribute them to the Internet?
- Who will provide your origin servers?
- Who will provide content delivery?
- Will you require an origin capable of pointing to multiple CDNs?
- What are the failover and redundancy features of your origin services?
- Who will be monitoring your origin servers?

errors or load imbalances and are able to roll over to other servers without any interruptions to your stream.

### Content Delivery Networks

Content delivery networks cache and serve your live video streams with the goal of a great end user experience that has little to no interruptions or buffering. CDNs have developed their own intelligent applications and infrastructure to optimize the delivery of content. CDNs may also have capabilities to provide real time monitoring of video quality as well as analytics on audience behavior and engagement.

If you anticipate a very high volume of traffic you may consider a multi-CDN strategy so you can easily roll traffic to other CDNs, splitting traffic for load balancing and redundancy. This would be a key consideration for high impact, mission critical events.

#### HIGHLIGHT: 24/7 LIVE LINEAR BROADCAST OF BIG BROTHER

Real Networks provides viewers a live online broadcast of CBS's hit show Big Brother as part of Real Network's Super Pass subscription which offers audiences exclusive video and online engagement with popular reality TV shows. This live channel broadcasts from the Big Brother house 24/7 for almost 3 months every season. The live linear broadcast is encoded in Adobe HTTP Dynamic Streaming as well as Apple HTTP Live Streaming enabling video playback and publishing to a wide number of mobile devices, as well as the browser.

## Step 5: End User Experience/Players and Apps

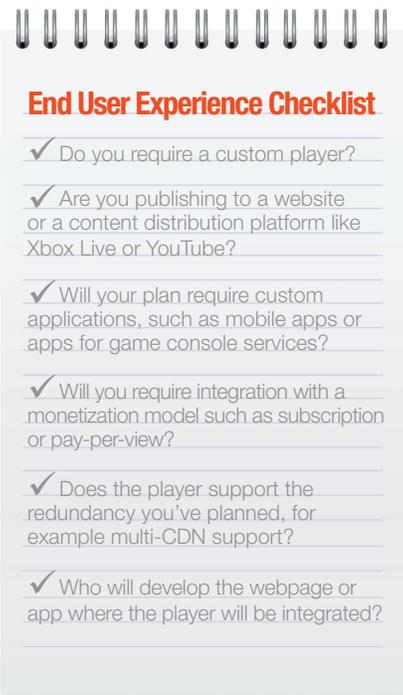
The online broadcast of a live event is judged primarily on the end-user experience. Even if all of the other elements are flawless, it is this key aspect that could spell success or failure. It's imperative that your player is developed to support all of the systems that you've put in place earlier in your video workflow and your overall strategy for your online event for example the ability to support multiple CDNs, your DRM or token authentication technology, or DVR controls.

### Multiple Players for Multiple Devices

Just as you need to encode in specific formats for specific devices, you'll likely have to create custom players or apps for each device you're targeting to provide a great playback experience for each viewer: one for Android devices, iOS devices, desktops, etc. Live events accessed via content distribution platforms like Xbox LIVE and YouTube will also have specific requirements. Understanding, planning and developing for these platforms can add significantly to your workback schedule, you'll want to consider these platforms very early in your strategy to provide enough time for development and testing.

Additional things to think about with regards to player development include the CDN and their particular network. For example Akamai's HD Network has certain player requirements that you need to be aware of so you can match their network services to your player.

You will also want to think about the webpage or application that users will go through to get to your player. It's important to involve your web development team in the technical discussions with the team responsible for the player development.



**End User Experience Checklist**

- Do you require a custom player?
- Are you publishing to a website or a content distribution platform like Xbox Live or YouTube?
- Will your plan require custom applications, such as mobile apps or apps for game console services?
- Will you require integration with a monetization model such as subscription or pay-per-view?
- Does the player support the redundancy you've planned, for example multi-CDN support?
- Who will develop the webpage or app where the player will be integrated?

## Enhancing the User Experience

Rich media players can provide a deep level of customer engagement totally different from traditional broadcast. You'll want to strike the right balance of enhancing the viewing experience without distracting or confusing your viewers. Many players today are incorporating some level of social interaction by incorporating live Twitter feeds, and enabling sharing or instant messaging (M) within the player. Creating a custom player enables you to incorporate the elements that add to your event experience, such as on demand content easily accessed from the player, enhanced user controls, and ways to engage viewers after your event is over. Custom players and apps are necessary if you are interested in publishing your content on connected devices like the Xbox LIVE service.



**Xbox LIVE Application**

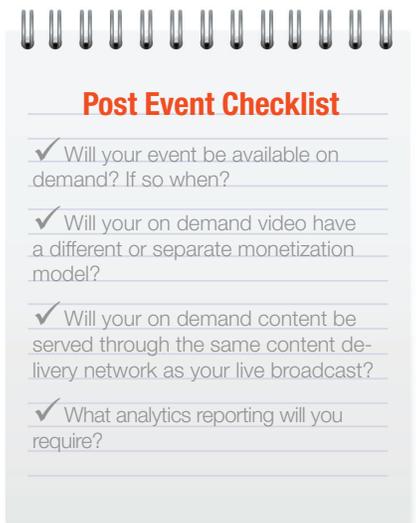
## Step 6: Post Event Analytics and Replay

Once your live event is over there are still a number of tasks that you'll want to plan for. Live events are often made available for on demand viewing immediately after the event, but you can schedule the availability of that on demand video content for any time.

You'll also likely be interested in your event analytics. Basic to detailed analytics are available from your service provider, CDN and through third party analytics services. You should be able to gauge the success of your event based on any number of parameters, such as viewers, viewing time, sharing, as well as pinpointing viewers' devices, geographies, and complete advertising analytics. Providers have the capability of providing very deep analytics to better track and optimize your video execution with real time video quality monitoring, audience behavior and engagement.

## Conclusion

Viewing a major event online, whether that's a sports event, a concert or a keynote, is becoming a mainstream activity with more viewers tuning in via more connected devices, for longer periods of time. It is a guaranteed path to expanding your digital video footprint with many opportunities for deep viewer engagement. The process is complex with a number of variables at each step in the video workflow pipeline, and becoming more so with the rapid expansion of new platforms and devices. Working with an experienced service provider like iStreamPlanet will help ensure the success of your online event and provide you with the confidence to take full advantage of the rapidly growing universe of connected viewers.



## About iStreamPlanet

iStreamPlanet is a multi-platform managed broadcast solutions provider committed to bringing high quality video experiences to connected audiences around the world. With over a decade of managed broadcast experience iStreamPlanet has built a comprehensive offering of video workflow and content management products and services. iStreamPlanet's innovative approach has been chosen by the world's leading sports, entertainment and technology brands including NBC, Turner Broadcasting, AMC Networks, the US Olympics Committee, AT&T, Microsoft and others. Founded in 2000, the privately held company is headquartered in Las Vegas with offices in Redmond, Washington and London, UK. More information can be found at <http://www.istreamplanet.com>.

## iStreamPlanet Managed Broadcast Services

Onsite and offsite acquisition	Satellite Fiber IP
Encoding	Adobe Flash and HTTP Streaming Apple HLS Microsoft Windows Media Microsoft IIS Smooth Streaming Multi-camera angles Still or animated on screen graphics
Publishing	Origin services Multiple platforms and devices: PCs, Macs, iOS, Android, game consoles, connected devices, and OTT devices including Apple TV, Google TV, Roku and Boxee Tightly partnered with all leading CDNs
Custom Player and App development	Custom video players and applications Silverlight SD/HD players for Live video content, Flash and HTML 5 players Full DVR controls Data visualizations, overlays and metadata Custom applications for iPad, iPhone, Xbox LIVE, Sony PlayStation and other platforms

A silhouette of a crowd of people with their arms raised in a cheering gesture, set against a dark background. The silhouettes are in various shades of grey and black.

For more information on  
delivering live, live linear  
or on demand video to  
multiple platforms, visit  
[www.iStreamPlanet.com](http://www.iStreamPlanet.com)