

Enhancing Your Business

With HD Video Content and Live 2-Pass VBR

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As you read this, millions of new blogs are being created, millions of videos are being streamed, and millions of pieces of archival content are being transcoded into digital formats for video-on-demand distribution. But people like Jean-Pierre Loislil from Paris are doing something new: creating HD content and broadcasting it live online using 2-pass variable bit rate (VBR) streamable encoding.

Loislil and Marc Pasteau operate a small company called Kali Net that focuses on broadcasting live classical concerts throughout Europe and around the world. Loislil is building a media business online, delivering content that has many people tuning in to see live performances with guest conductors such as Zubin Mehta and star performers such as violinist Joshua Bell and opera singer Anne-Sophie von Otter.

Recent advances, such as streamable live 2-pass VBR, have made it possible to encode live content with the same quality as on-demand encoding using the standard Flash player and VP6 codec. This has opened up new opportunities for companies such as Kali Net.

Extending Your Reach

Traditional broadcasters used to develop and control the majority of content, which was mainly driven by whatever the largest audience was. Advertisers aligned with this philosophy, since they are also interested in reaching the largest possible audience.

It used to be that we all tuned in to see the latest of pop culture on the tube, but times have changed, the media industry is growing rapidly, and the game has been turned upside down. Today, it's not just pop culture. People in every country across the globe have the power to find exactly what interests them—anything from Super Motocross races to hot-dog-eating contests—not just what's available on Channel X. This equates to more slices in the advertising-dollar pie available for media producers of all

sizes. Now, producers large and small are on a somewhat level playing field; they are producing and distributing their content directly to their audience without the considerable capital and infrastructure that were required before the technological advancements of today.

Solving the Live Problem

Most online content is delivered on demand, meaning it is pre-encoded and available whenever a viewer wants to watch it. The quality of the content continues to get better, and encoding tools are more readily available to producers of all sizes. Some content, however, such as sporting events and concerts, is best viewed live. The audience wants to see the action as it happens, not when it's day-old news.

Until recently, streaming of live content on the web hasn't lived up to expectations. Quality of live encoding has been subpar, and the tools

for live encoding typically aren't as easy to use. Recently, ITV (the UK's leading commercial television channel) launched a project to deliver live streaming of Formula One (F1) races. The desire was to provide a higher picture quality than what ITV's standard real-time encoding tools would provide. The problem the company faced was one of picture clarity and blocking with the fast pace and breakneck motion of screamingly fast F1 cars. Adding to the problem was constrained bandwidth on the client side combined with the requirement that the event be streamed live with redundancy. As such, ITV was not left with many encoder options.

Both Loislil at Kali Net and Andrew Horne, video solutions architect at ITV, found a solution with Kulabyte, a manufacturer of video-encoding tools based in San Marcos, Texas.

"Thanks to Kulabyte's XStream Live Nomad encoder, we are now able to take our satellite

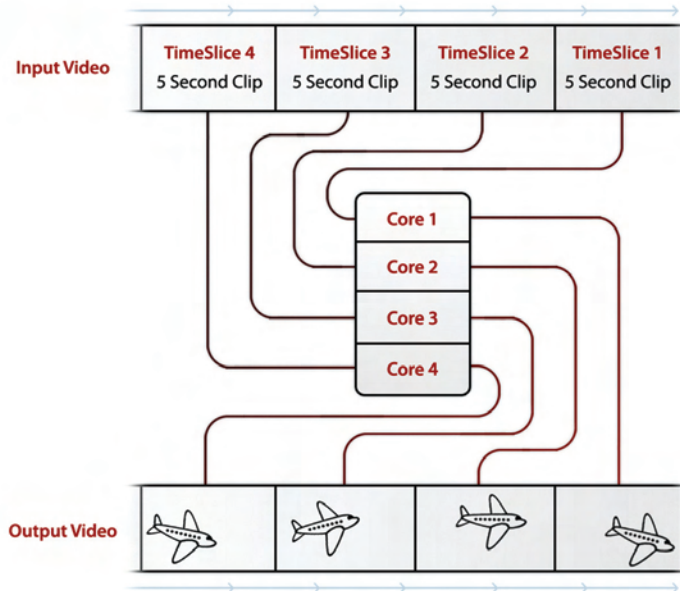


Figure 1. A four-processor configuration using Timeslice for streamable live 2-pass VBR encoding

feed, encode it, and stream it live at 500Kbps with outstanding quality, making the content available to a wider audience,” said Horne. “Having Kulabyte’s technology available is enabling us to reach a much broader audience than we could ever do before.”

The Timeslice Solution

There are three main technical issues that prevent content providers from offering live video streams on their websites:

The video quality of live encoding is typically not as good as on-demand encoding; historically, live video could only be encoded using 1-pass encoding. When producing video for on-demand delivery, the encoding process is usually completed in two passes, providing better quality but taking twice as much time.

Video encoding is very processor-intensive, and many of the popular codecs in use today cannot encode high-resolution video in real time using their highest quality setting, even with 1-pass encoding and when using multiple processors in the encoding system.

Streaming video (both live and on demand) is typically encoded using a constant bit rate (CBR) encoding method that keeps the flow of data at a steady rate across the network. VBR encoding produces the same quality using 20% less total bandwidth, but the peak bitrate is very high when there is a lot of action in the video. This means that VBR is better for achieving high-quality video. However, it requires significant peak bandwidth, which isn’t network friendly; on the other hand, CBR is network friendly but often results in lower video quality.

Kulabyte solves all three of these live encoding issues with a unique process called Timeslice, which is the key to streamable live 2-pass VBR. “The Timeslice technology is a very elegant solution,” says Chris Gottschalk, co-founder of Kulabyte. “It really solves some of the fundamental problems with accelerating and enhancing the video encoding process.”

The process chops the video into short segments, typically five seconds per Timeslice. Each Timeslice is then sent to a processing core, utilizing as many cores as needed to encode the video in real time. (Standard-definition video can be encoded with four processors, while high-definition video requires eight.) Each processing core can then treat a Timeslice as a separate video file,

meaning that it can encode that segment of video using the codec’s 2-pass VBR encoding for the highest quality video (see Figure 1). In this configuration, each processor has 20 seconds to encode a five-second Timeslice using 2-pass VBR.

Two-pass VBR encoding normalizes each segment to match the specified target bit rate, and as each segment is the same length, the size of each Timeslice is the same size (in bytes) no matter how much motion there is in the scene. The end result is a network-friendly CBR-compliant stream without the bit rate peaks of traditional VBR encoding.

Kulabyte in Action

For broadcasting F1 races, the ability to encode fast-motion video makes all the difference in the world. “It really is the best of both worlds,” said Horne. “We can provide our viewers with the highest quality video stream available, and we can now do it live.”

More importantly, this can be done with the Adobe Flash Player as the only client-side plugin, making it much easier to reach a broader range of end users. With higher quality encoding, advertisers are much more likely to allocate budget for new and emerging niche markets.

Kali Net, for example, has been able to expand from its European base and has recently streamed live music events over the internet from such diverse locations as the recent New York Philharmonic Orchestra performance in Pyongyang, North Korea and the Aspen, Colorado Music Festival in conjunction with partner www.mediciv.tv.

MySpace, one of the largest repositories of on-demand video on the web, has also been expanding its production of live events. The recent Operation MySpace—in cooperation with the U.S. Department of Defense’s Armed Forces Entertainment Program—was a webcast of a concert for U.S. troops in Kuwait that marked the debut of live HD Flash streaming.

The concert was viewable in three bit rates, the highest at 1.3Mbps. HD content originated in 1080i and was transmitted via satellite to the eastern U.S., the closest place for line of sight for the satellite uplink and downlink. The video was then downsampled to 480p for streaming.

After the unicast stream was encoded with Kulabyte’s live 2-pass VBR VP6 encoder, it was sent to Akamai for distribution to computers across the internet. Aside from a

few moments when the satellite feed to the encoding truck in California went down, the event went off without a hitch.

“We are thrilled with the response we got from this event,” said Gottschalk. “The feedback has been incredibly positive. All of the pieces of the distribution chain worked really well together, and the quality was outstanding. This was the highest bit rate ever streamed through Akamai for a live event.”

Reaping the Rewards

Content producers of all sizes can now take advantage of live 2-pass VBR encoding. This network-friendly method of encoding produces higher quality and allows the producer to use processor-intensive codecs that normally don’t perform well in live encoders.

In conclusion, it’s fair to say that broadcasting and media presentation have undergone tremendous changes, and there is still logarithmic growth and change in these fields. There are also challenges and opportunities. Companies such as Kali Net, ITV, and MySpace have faced these obstacles, leapt over them to reach a larger audience, and achieved incredible success. Although challenges remain, a few innovative companies, such as Kulabyte, have made great strides in overcoming the technical barriers to provide encoders for high-quality live streaming, allowing content producers to push their businesses forward, reach new audiences, and gain the support of advertisers.

ABOUT KULABYTE

With the world’s only Live 2 Pass Variable Bit Rate encoding process, Kulabyte is a leading developer of advanced video solutions for live streaming of high quality video, multi-format capturing, encoding and transcoding. All Kulabyte products incorporate our multi-core TimeSlice™ technology that significantly accelerates the encoding and compression process, increases picture quality, and reduces the required bandwidth for video transmission. Video can now be encoded and transmitted at full SD and HD quality for web distribution at consumer-level broadband speeds. Our solutions consist of software and hardware products that are scalable and high performing. Kulabyte products are designed for professionals to full enterprise large scale networks that are distributing content Live and On-demand. For more information visit www.kulabyte.com.