Xilinx Provides Twitch with Plug and Play VP9 Transcoding Solution for Live Video Streaming

Delivers 25% Cost Reduction with No Compromise to Video Quality

AT A GLANCE:

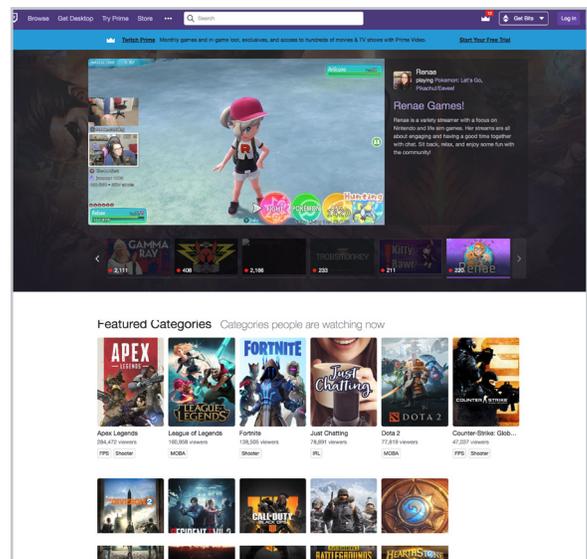**Customer:** Twitch.tv and Twitch Interactive, a subsidiary of Amazon

Industry: Entertainment; live video game and eSports streaming media

Headquarters: San Francisco, CA

Founded: 2011

Employees: 500+

www.twitch.tv

CHALLENGE:

Lowering the cost to stream real-time, broadcast quality video and scaling its delivery to millions of viewers worldwide.

SOLUTION:

Xilinx Ultrascale+™ FPGA acceleration and NGCodec's VP9 encoder IP for HD video compression and transcoding.

RESULTS:

Twenty-five percent bitrate savings without compromise to live broadcast quality video (1080p at 60 fps). Achieved 120 frames per-second on a single FPGA representing a 30X performance improvement over CPU implementation.

Adaptable. Intelligent.

OVERVIEW

Online gaming and eSports are gaining in popularity and their participation and consumption, particularly by millennials, is rising dramatically. Twitch.tv is a live streaming media company that broadcasts interactive video game content and eSports to an audience of millions globally. The company, a subsidiary of Amazon, is the largest and fastest growing live streaming video platform in North America and the first to offer a free and interactive network for watching gaming and eSports competitions.

> "The beauty of how Xilinx and NGCodec developed their solution is that no one at Twitch had to become an FPGA expert to use the technology. "
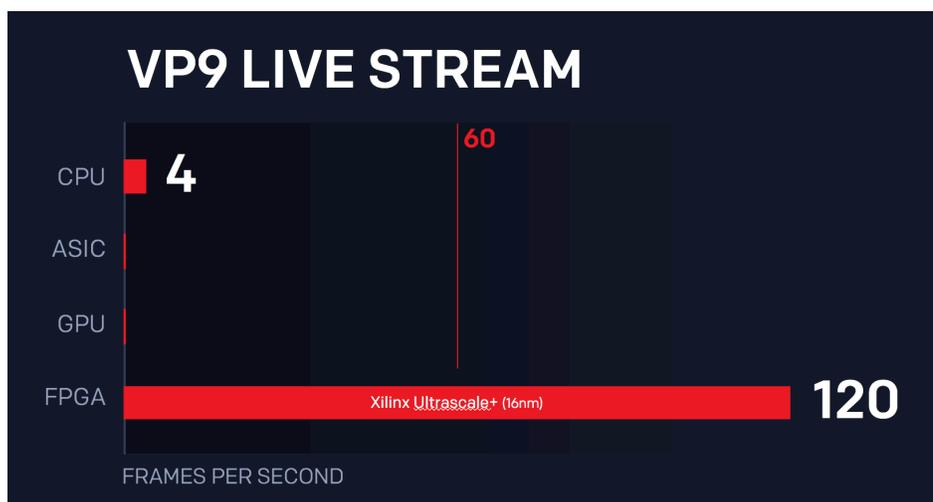
Twitch has made two innovative contributions to the live streaming industry. 1) It has greatly reduced the barrier to entry for live broadcast. On Twitch, anyone can broadcast free using a simple setup and Internet connection. 2) It has created a new broadcast paradigm based on real-time interaction between broadcasters and audience, which is what makes Twitch content so interesting to watch. The audience uses chat to interact with the game player during the broadcast session and the player responds to viewer comments while the game takes place.

As Twitch's viewership for interactive content grew rapidly to more than 3 million concurrent viewers each requiring 6Mbps bitrate, the company faced significant limitations in computer server bandwidth and latency in its data centers. To scale delivery of its live video streaming services for peak demand, the company spun up more and more servers at considerable operating expense.

Dr. Yueshi Shen, Principal Research Engineer at Twitch, led the video transcoding project and successfully implemented the VP9 encoder IP from Xilinx partner NGCodec without the need to know about FPGA design or hardware engineering. NGCodec's VP9 encoder is available for on-prem private cloud deployments and on the AWS marketplace.

3M	6Mbps	18Tb
Viewers	Broadcast Quality	Bandwidth Required

LIVE	>25%	Quality
Real-Time Encoding 1080p at 60FPS	Bitrate Savings	Broadcast

Dr. Shen said, "The beauty of how Xilinx and NGCodec developed their solution is that no one at Twitch had to become an FPGA expert to use the technology. We didn't have to change the way we interface with our streaming technology, so this saved significant time and allowed us to simply plug into the VP9 transcoding solution with minimal work."

Adaptable. Intelligent.

VP9 LIVE STREAM

CPU	**4**
ASIC	
GPU	
FPGA	Xilinx Ultrascale+ (16nm) **120**

60

FRAMES PER SECOND

Dr. Shen found that the Xilinx and NGCodec solution significantly reduced its operating cost without compromising the quality of its video or the immersive and interactive viewer experience. For example, at peak demand last year Twitch data centers streamed content totaling 18 terabits per second over the internet.

Dr. Shen explained, "VP9 is the most widely supported next-generation video format, so viewers can consume our content on a variety of different devices and browsers. It is the only video compression format that we can put into production and still meet our bitrate savings goals. Encoding VP9 actually requires a lot of computation power. We found in our implementation that even on high-end CPUs, we can only achieve 4 frames per second, which is not even close to our live streaming requirement of 60 fps. There are no ASIC or GPU solutions for us to even consider. With Xilinx FPGA acceleration we were able to reach 120 fps on a single FPGA and become the first company in the industry to deploy VP9 streaming at broadcast quality. We strongly recommend that the entire streaming industry look at VP9, FPGA acceleration."

Additional Resources:

Xilinx Blog

Twitch Blog

XDF Keynote