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FASTLY, THEO, AND WOWZA:

LOW-LATENCY HLS SOLUTION

Low-Latency HTTP Live Streaming (HLS)

Since its release by Apple to combat scaling issues in 2009, **HTTP Live Streaming** (HLS) has become one of the most popular and widely supported streaming protocols today. Throughout the last decade we have seen the market change and **the demand for lower latencies is higher than ever**.

In this mini guide, we'll discuss the most recent updates to Apple's Low-Latency HLS (LL-HLS) spec, and how Wowza is teaming up with Fastly and THEO to implement a seamless end-to-end solution.

Low-Latency HLS

From Twitter's Periscope LHLS version in 2016, to the community's L-HLS in 2018, and then LL-HLS from Apple in 2019, Low-Latency HLS is finally here. During the WWDC in June, Roger Pantos announced **the spec is officially out of beta** and LL-HLS will be available on iOS14, tvOS 14, watchOS 7, and macOS in Apple's GA release (expected in October 2020).

Further updates to the spec are also expected during Apple's GA release.

The most important changes which make up LL-HLS include:

- **Blocking Playlist Updates:** effectively reducing round trip times to retrieve an up-to-date playlist.
- **Introduction of Parts:** significantly reducing the delay between content creation and availability on the server.
- **Preload Hints:** further reducing delay between content creation and download ability by the client.
- **Delta Playlists:** greatly reducing overhead introduced by frequent downloads of media playlists used to discover segments and parts.
- **Rendition Reports:** allowing rapid retrieval of up-to-date playlists when switching variants.

You can read about the evolution of LL-HLS HERE

Implementing an LL-HLS Solution

There have been many versions of Low-Latency HLS and vendors spearheading LL-HLS adoption have had to adapt with each revision, thus delaying development. The server and client must support the same version, not the older HTTP/2 PUSH-based version, or the intermediate draft version. While players and packaging vendors may have started implementation at different points in time, they might not cover all subtleties of the specification just yet.

For example, the latest version made blocking playlist reload optional instead of it being mandatory in the intermediate draft version. That said, the removal of HTTP/2 PUSH should simplify adoption, as this was initially a challenge for CDNs.

It's **crucial** to have an end-to-end solution optimised for the latest version of the LL-HLS specification.

Fastly Inc., THEO Technologies, and Wowza Media Systems have worked closely together to give you a seamless end-to-end LL-HLS implementation, up to date with the latest version.

How do Fastly, Theo, and Wowza work together in an end-to-end solution?

Together, **Fastly**, **THEO**, and **Wowza** have been testing to **ensure full compatibility** to allow customers to easily deploy Low-Latency HLS.

An LL-HLS end-to-end solution does not differ much from other live streaming solutions:

- First, an encoder will compress a stream using H.264/H.265 (HEVC)/... codecs for video and AAC/AC-3/... codecs for audio.
- From there, content can (optionally) be sent into a (often cloud hosted) transcoder to generate a full ABR ladder.
- Next, content is sent to the **Wowza Streaming Engine** server software for transcoding and packaging. **Transcoding** allows content distributors to generate **adaptive bitrate** renditions for delivery to users across varying bandwidth environments, whereas repackaging enables the creation of Low-Latency HLS video outputs. The media server is crucial to the conversion process required for streaming in LL-HLS for this reason.
- Specifically, Wowza's technology is responsible for preparing the correct playlists with new tags, attributes, segments, and LL-HLS parts to be offered up to an origin.
- The origin also receives some additional responsibilities from an LL-HLS perspective.

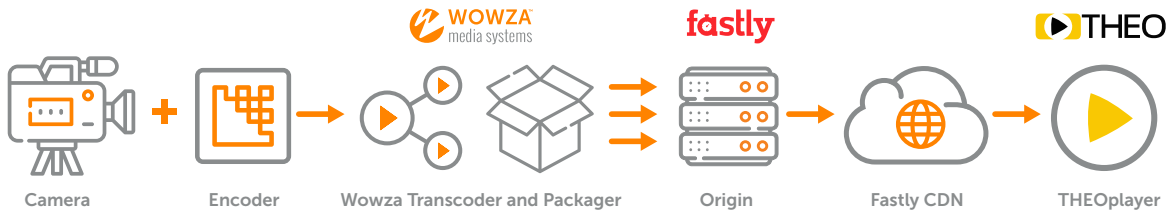
The additional responsibilities the origin receives, from an LL-HLS perspective, include three major changes:

- Where in the past, HLS did not require query parameters, the new HLS version allows for specific query parameters to be sent, which influence the presented playlist.
- The origin also has to support blocking playlist reloads and blocking preload hints, meaning it has to be able to keep a request open for a longer time.
- Finally, HTTP/2 is required to be supported on the origin.

THEOplayer can request the relevant media information from Fastly's global CDN, which in turn will request it from the origin – often via collapsing several requests using Fastly's MediaShield. Fastly's global CDN allows for global distribution and reduced latency, due to more cached content closer to the viewer.

Finally, THEOplayer UVP remains responsible for refreshing the playlists, observing network capabilities and environments (and shifting to the correct variant stream when changes are detected), providing accessibility features such as subtitles and alternative audio tracks, etc.

An LL-HLS End-to-End Solution



LL-HLS SOLUTIONS: FASTLY

The underlying architecture of Fastly's edge cloud platform is radically different from legacy CDNs. Utilizing a pull – rather than a push – model means Fastly's platform is format-agnostic. Fastly simply distributes the data, and you as the content owner maintain full control over the content delivery rather than waiting on a vendor to support new formats. This ensures efficient delivery and allows viewers to get the best possible experience. For example, Fastly was able to support HTTP3, QUIC, and Apple Low-Latency HLS as soon as the specs were released.

The primary benefit of a format-agnostic approach is that it frees you from specific requirements normally imposed by your delivery chain, such as an encoder pushing specific formats or segment lengths. In other words, a pull model allows you to continuously experiment and optimize on your terms.

Fastly's fully programmable developer's edge, modern architecture and advanced request collapsing capabilities have allowed the edge cloud platform to become a leading innovator in live streaming and video delivery, accelerating customers' time to success.

As Fastly continues to push the envelope, this integration will serve as the foundation for advanced analytics, emerging low-latency technologies, and edge-compute capabilities that bring real-time processing and decision-making closer to the user.

LL-HLS SOLUTIONS: THEO

THEOplayer UVP supports LL-HLS for content to play, including its new playlists, updates to support playlist parameters (delta playlist, sequence numbers, ...), a new download loop, executing blocking requests, as well as LL-HLS parts. To simplify, LL-HLS parts are the new segments where players should buffer three parts (with a relevant IDR-frame) and then playback can start.

From there, THEOplayer UVP is responsible for everything it would do from a normal HLS perspective, meaning refreshing the playlists, observing network capabilities and environments (and shifting to the correct variant stream when changes are detected), providing accessibility features such as subtitles and alternative audio tracks, etc.

THEO has optimized new ABR algorithms and bandwidth estimators in order to ensure an optimal experience while taking into account the specifics of LL-HLS (parts, preload-hints, ...).

LL-HLS SOLUTIONS: WOWZA

Low-Latency HLS powered by Wowza enables broadcasters to stream content to a variety of endpoints with as low as two seconds in latency, while also ensuring backward compatibility with legacy clients. As one of the first vendors to implement support for the LL-HLS extension, Wowza's video experts are committed to driving adoption of this emerging technology by developing against the evolving specification.

Wowza's LL-HLS solution integrates with CDNs and players to provide an end-to-end architecture for interactive streaming at scale, and we're working to extend this functionality across our entire product portfolio. Wowza's live streaming platform plays an essential role in repackaging live content for LL-HLS streaming. Specifically, Wowza's software generates partial segments using the fMP4 container format for low-latency delivery to the billions of active Apple devices (iPhone, iPad, iPod touch, and Apple TV) and desktop computers (macOS) around the world, as well as third-party platforms such as Android, Microsoft, and Linux. Put simply, LL-HLS combines the simplicity, scalability, and quality of traditional HLS with significant improvements in latency.

And by choosing Wowza as their packager, broadcasters can deploy these capabilities on-premises, hosted in the cloud, or as an SaaS solution.

Fastly, Inc.

Fastly helps people stay better connected with the things they love. Expectations for online interactions are changing: consumers demand a fast, reliable, and secure internet experience.

Fastly helps our customers exceed those expectations by creating great digital experiences quickly, securely, and reliably by processing, serving, and securing our customers' applications as close to their end-users as possible, at the edge of the internet. This becomes more tangible with edge computing, which aims to move compute power and logic as close to the end-user as possible.

Wowza Media Systems

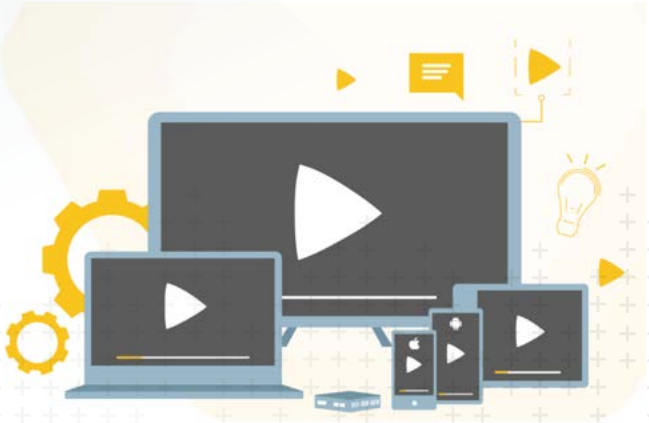
Wowza is the global leader in live streaming solutions. Our full-service platform powers reliable, secure, low-latency video delivery for companies worldwide. With more than a decade of experience working with 35,000+ organizations in industries ranging from media and entertainment to healthcare and surveillance, Wowza provides the performance and flexibility that today's businesses require.

We work with each customer to ensure their success in putting streaming to work for their business. Our promise is simple: If you can dream it, Wowza can stream it.

THEO Technologies and THEOPlayer

THEOplayer is at the forefront of the video player industry. Our Universal Player with HTML5 capability provides organizations with a single player across all major devices, platforms and browsers. The Universal Player is pre-integrated with components including **streaming**, **analytics**, **DRM**, and **advertising solutions**.

We cover all industry segments and regions, and we are committed to being not just a vendor, but a **solution life cycle partner**. We understand that you want to create a unique experience for your customers, and our THEO experts are available from the inception of the solution through its evolution with innovations over time. At THEO we have the expertise to power some of the biggest **publishers**, **broadcasters**, **telcos**, and **digital natives** across the world, and we are ready to help **you**.



Stay Up to Date on Apple's Low-Latency HLS Development

Stay in the loop about our current developments. We'll send you access to the latest version of Low-Latency HLS, test streams, documentation, and further information about feature enhancements as they're made available.

Don't miss out on this cutting-edge technology – which combines the simplicity, scalability, and quality of traditional HLS with significant improvements in latency.

Sign Up Here

About Wowza Media Systems

Wowza Media Systems is a streaming solutions provider committed to powering live streaming for today's most innovative companies. With more than a decade of experience deploying more than 38,000 streaming implementations, our full-service platform is the gold standard for live streaming technology. We provide the performance and flexibility today's businesses require to engage their audiences, increase revenue, and invent new opportunities.