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iPhone Live Video Delivery: A study on available technologies

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History The Operating System for iPhone, when it was first introduced, did not support live audio/video streaming. The only delivery method available is/was through progressive download and playback of multimedia assets. This is sufficient for Video On Demand services but can not deliver any live/streaming type of multimedia service.

Soon various iPhone applications were developed to fill the need for streaming video delivery. Those typically use the same delivery mechanisms used for MobileTV (RTP/RTSP) and require the use of a streaming server. Further, those applications require authorization from Apple in order to be installed on the iPhone.

With the introduction of iPhone OS v. 3.0 however, Apple enabled iPhone devices to receive streaming audio and video over HTTP from an ordinary web server. The architecture is shown below.

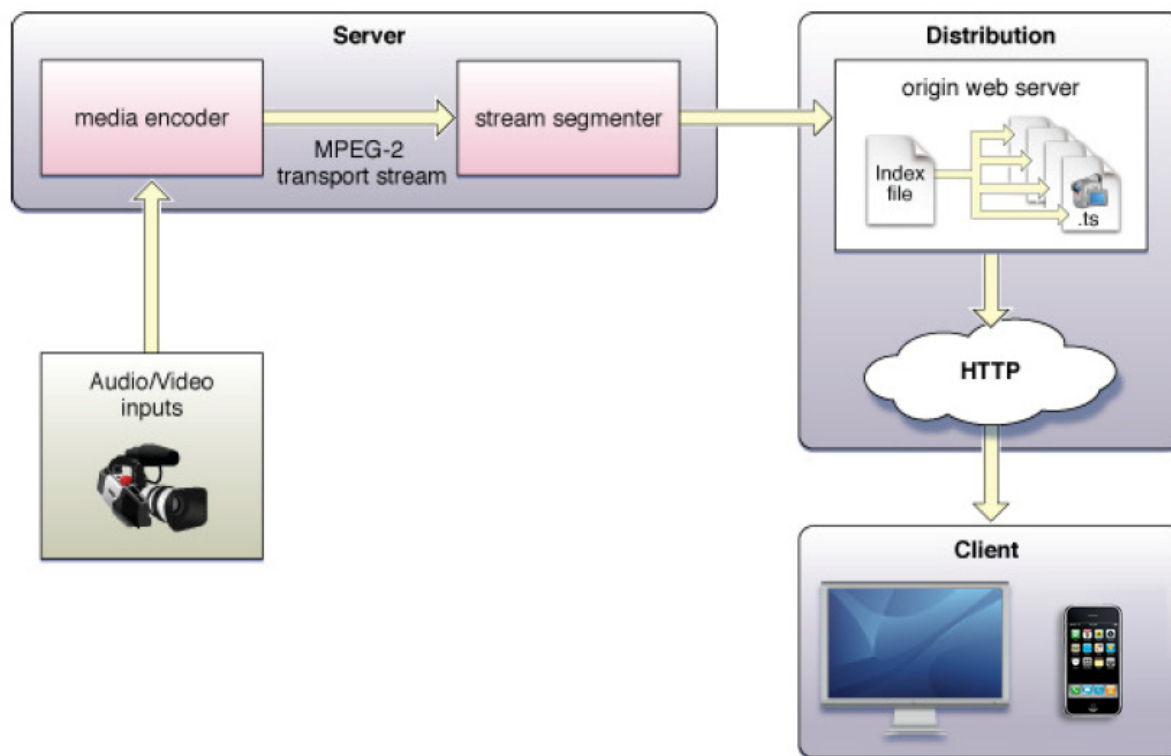


Figure 1: HTTP-based video streaming architecture

Advantages Availability

Since HTTP-based streaming is natively supported by the device there is no need for:

- Developing and maintaining a custom player/application for the iPhone.
- Waiting on Apple's authorization process.
- Forcing (and supporting) the user to download and install an application on the device.
- Tolerating lower battery life due to inefficiencies in the 3-party decoder application.

Overall this translates to shorter Time-to-Market and therefore earlier access to new revenue

streams for the operator and service provider. This becomes paramount as more and more operators are approaching the end of their iPhone exclusivity contracts with Apple and are seeking ways to increase customer loyalty.

Delivery

HTTP-based streaming does not require any specialized servers to deliver the video/audio data. A conventional web-server is sufficient. Furthermore, this approach is natively supported by Content Delivery Networks (CDNs) and no specialized caching/load balancing mechanism is needed. Thus, compared to RTSP-based streaming, HTTP-based delivers:

- Significantly lower infrastructure cost, related to streaming servers and connection licenses.
- Full compliance with existing traffic management/acceleration platforms, such as proxy/cache servers, media distributors and edge devices.

Accessibility

The HTTP series of small chunks allows the media to be easily and inexpensively cached along the edge of the network, closer to clients. Most importantly, this delivery mechanism does not require special considerations and provisions on firewall and router devices, contrary to RTSP-based delivery. This provides:

- Unrestricted access regardless of network (cellular, WiFi) and provider/setup.
- Enhanced user experience and instant gratification.

Security

As the screen size and video quality increase, content owners express concerns about the secure and authenticated distribution of their assets. Both RTSP and HTTP based delivery can provide authentication and decryption services. However, OS v. 3.0 enabled native support of end-user authentication (HTTPS) and decryption on the device for the HTTP-based delivery. This results in:

- No need for custom application/client on the device to implement user authentication and media decryption.
- Significantly lower cost of deployment related to device authentication and media decryption licenses.
- Access to richer content as content owners feel more confident of the distribution channel.

Quality

Even though the video quality is not directly related to the delivery mechanism, the overall quality of experience (QoE) is directly affected. HTTP streaming on the iPhone natively supports network adaptation mechanisms which allow the device to pick the best video/audio quality based on heuristics that determine the network conditions. Similar mechanisms have been implemented with RTSP streaming, however these are complex and require specialized, and quite often proprietary, server/client setup.

Furthermore, the chunk-based approach of HTTP streaming allows for better buffering of the media content which provides significant QoE to the user with fewer buffering interruptions. RTSP streaming tends to be quite sensitive to network hiccups, while HTTP streaming can recover from those without impacting user experience.

Challenges Latency

MobileTV inherently presents higher latency than conventional IPTV due to the distance, medium

and equipment used for the delivery. This makes delivery of time-sensitive multimedia content quite challenging. HTTP-based streaming introduces an additional layer of latency due to the segmentation technique, while RTSP streaming does not present that challenge. HTTP streaming services for the iPhone present latency of as low as 10 seconds and about 30 seconds on average, while RTSP streaming can bring latency down to 3-5 seconds.

Stream "Recycle"

Since MobileTV delivery utilizes RTSP streaming in the majority of deployments, it is often argued that a unified delivery mechanism for both the iPhone and conventional mobile phones make better sense. However, given the larger screen size and elevated QoE expectations from the iPhone users it is quite unlikely that the same streams will be delivered to both iPhone and mobile phone users. Furthermore, Media Excel's HERA 4000 m solution delivers a unified platform for both iPhone and cellular MobileTV delivery regardless of the streaming technology.

Conclusion HTTP-based streaming for the iPhone delivers significant advantages for the operator and system integrator; however it is important to also understand the challenges and the limitations of this approach.

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