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TEL AVIV

Streaming Realtime Rendered HLS Videos Using Lambda@Edge

Shay Lichtin | December 25th, 2018





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Meet SundaySky

Shay Lichtin | December 25th, 2018





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Proven Business Value for industry-leading Brands



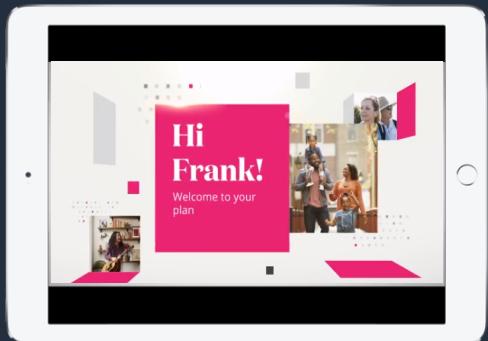


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Personalized Video demo for healthcare insurance onboarding customers



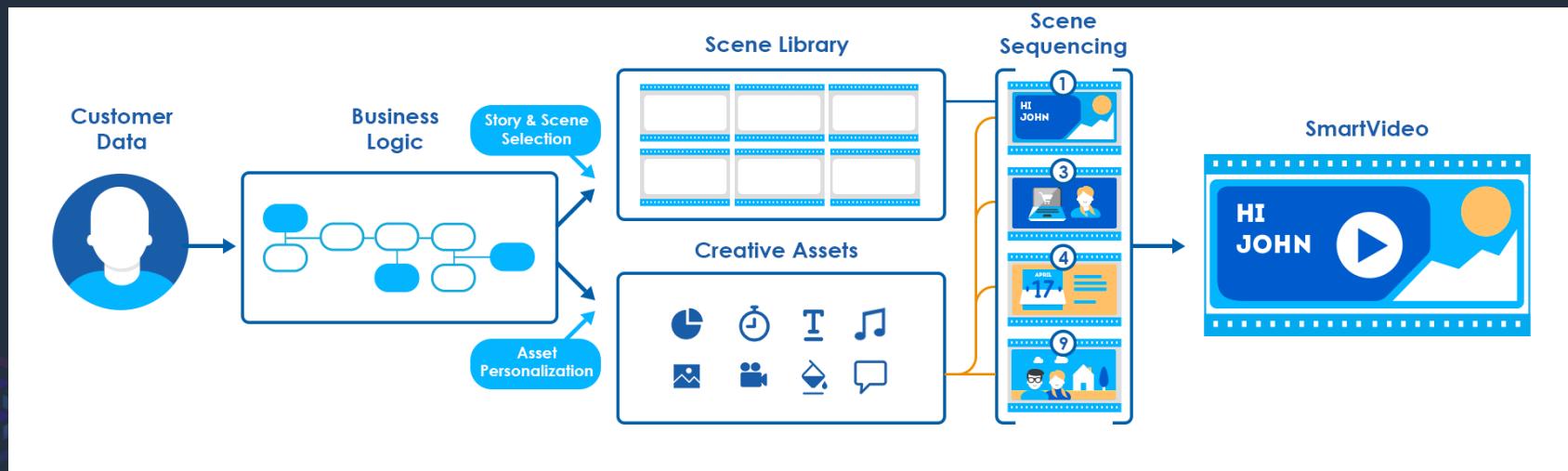
| Member benefits | | |
|---|---|----------------------------|
| | In network you pay | Non-designated you pay |
| Deductible (ded* individual/family*) | \$6,400/\$12,800 | \$17,100/\$14,200 |
| Member coinsurance | 0% | 40% |
| Out-of-pocket maximum (individual/family*) | \$7,100* | \$14,200* |
| Primary care visit | \$40 copay, ded waived | \$17,100 copay after end |
| Hospital stay | Covered in full after ded* | 40% after end |
| Outpatient surgery (ambulatory surgical center/hospital) | Covered in full after ded* | 40% after end |
| Emergency room | Covered in full after ded* | 40% after end |
| Urgent care | \$60 copay, ded waived | \$17,100 copay after end |
| Prescription drugs | Covered in full after ded* | Covered in full after ded* |
| Annual routine eye exam (annual per member per year) | | |
| Diagnostic X-ray | | |
| Imaging (CT/PEI scans, MRI) | | |
| Orthodontia | | |
| Pediatric eye exam (1 visit per year) | | |
| Pediatric glosopharyngeal tonsillectomy & lymphoidectomy (medically necessary only) | | |
| Annual dental checkup/prevention dental care | | |
| Basic dental care | | |
| Major dental care | | |
| Orthodontia (medically necessary only) | | |
| Plumbers/dentist | | |
| Preferred brand drugs | | |
| Nonpreferred drugs | | |
| Specialty drugs* | | |
| In network you pay | | |
| Membership (off* individual/family*) | \$6,350/\$13,700 | |
| Deposits to out-of-pocket maximum* | | |
| Member coinsurance | 0% | |
| Out-of-pocket maximum (individual/family*) | \$6,350/\$13,700 | |
| Primary care visit | Covered in full after ded* | |
| Specialist visit | Covered in full after ded* | |
| Hospital stay | Covered in full after ded* | |
| Outpatient surgery (ambulatory surgical center/hospital) | Covered in full after ded* | |
| Emergency room | Covered in full after ded* | |
| Urgent care | Covered in full after ded* | |
| Prescription drugs | Covered in full after ded* | |
| Annual routine eye exam (annual per member per year) | Covered in full after ded* | |
| Diagnostic lab | Covered in full after ded* | |
| Diagnostic X-ray | Covered in full after ded* | |
| Imaging (CT/PEI scans, MRI) | Covered in full after ded* | |
| Pediatric eye exam (1 visit per year) | Covered in full after ded* | |
| Pediatric glasses/contact lenses (coverage is limited to 1 set of frames or lenses or eyeglass lenses per calendar year)* | Covered in full after ded* | |
| Pediatric dental | Covered in full after ded* | |
| Dental checkup/prevention dental care (2 visits per year) | Covered in full after ded* | |
| Basic dental care | Covered in full after ded* | |
| Major dental care | Covered in full after ded* | |
| Orthodontia (medically necessary only) | Covered in full after ded* | |
| Pharmacy | | |
| Pharmacy deductible | Deposited in full after ded* | |
| Preferred brand drugs | Generic, Covered in full after ded* | |
| Nonpreferred drugs | Covered in full after ded* | |
| Specialty drugs* | Generic & brand, Covered in full after ded* | |
| | \$1 copay | |





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What Happens When a Viewer Presses Play?





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HLS Streaming

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What is HLS Streaming?

- HLS stands for HTTP Live Streaming.
- Over the past decade, Adobe's Flash protocol has been replaced increasingly by video delivered using protocols like HLS streaming and played in HTML5 video players.
- Apple originally launched the HLS streaming protocol in 2009. They timed this release to correspond with the debut of the iPhone 3. Previous iPhone models had experienced many problems with streaming media online, partially because these devices often switched between Wi-Fi and mobile networks mid-stream.





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What is HLS Streaming? Cont.

- The protocol splits video files into short segments with the .ts file extension, usually 4-10 seconds long.
- Streaming starts from an .M3U8 playlist file (e.g. manifest file) that serves as an index for the video chunks. The playlist file points towards additional index files for each existing quality options.

```
#EXTM3U
#EXT-X-VERSION:5

#EXT-X-MEDIA:TYPE=AUDIO, GROUP-ID="audio", NAME="English stereo", LANGUAGE="en", AUTOSELECT=1

#EXT-X-STREAM-INF: BANDWIDTH=628000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=320x180, AUD=0f8e80da-bf1d-4e3d-8899-f0f6155f6efa_video_180_250000.m3u8
#EXT-X-STREAM-INF: BANDWIDTH=928000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=480x270, AUD=0f8e80da-bf1d-4e3d-8899-f0f6155f6efa_video_270_400000.m3u8
#EXT-X-STREAM-INF: BANDWIDTH=1728000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=640x360, AUD=0f8e80da-bf1d-4e3d-8899-f0f6155f6efa_video_360_800000.m3u8
#EXT-X-STREAM-INF: BANDWIDTH=2528000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=960x540, AUD=0f8e80da-bf1d-4e3d-8899-f0f6155f6efa_video_540_1200000.m3u8
#EXT-X-STREAM-INF: BANDWIDTH=4928000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=1280x720, AUD=0f8e80da-bf1d-4e3d-8899-f0f6155f6efa_video_720_2400000.m3u8
#EXT-X-STREAM-INF: BANDWIDTH=9728000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=1920x1080, AUD=0f8e80da-bf1d-4e3d-8899-f0f6155f6efa_video_1080_4800000.m3u8
```



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What is HLS Streaming? Cont.

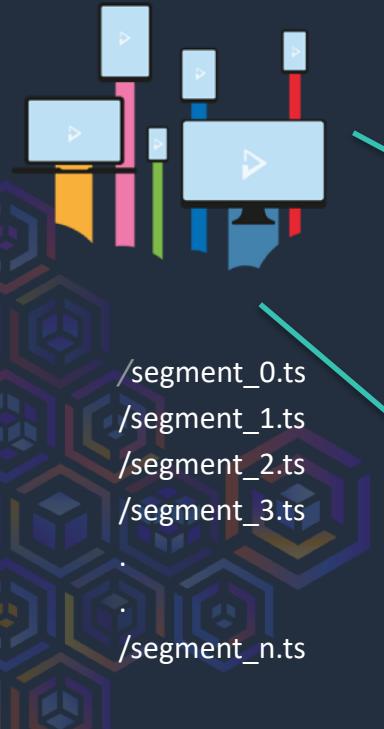
- On the client side, the hls player can detect deteriorating or improving network conditions.
- If either occur, the player goes back to the playlist, determines which quality video is ideal and then reads the quality-specific index file to determine which chunk of video corresponds to the current video position the viewer is watching.
- The entire process is seamless for the user.

```
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#EXT-X-VERSION:5
#EXT-X-MEDIA:TYPE=AUDIO, GROUP-ID="audio", NAME="English stereo", LANGUAGE="en", AUTOSELECT=1
#EXT-X-STREAM-INF: BANDWIDTH=628000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=320x180, AU
f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_180_250000.m3u8
#EXT-X-STREAM-INF: BANDWIDTH=928000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=480x270, AU
f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_270_400000.m3u8
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#EXT-X-STREAM-INF: BANDWIDTH=4928000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=1280x720, AU
f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_720_2400000.m3u8
#EXT-X-STREAM-INF: BANDWIDTH=9728000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=1920x1080, AU
f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_1080_4800000.m3u8
```



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Playlist Files & Video Segments



<https://acme.net/playlist.m3u8>

./f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_180_250000.m3u8

```
#EXTM3U
#EXT-X-VERSION:5

#EXT-X-MEDIA:TYPE=AUDIO, GROUP-ID="audio", NAME="English stereo", LANGUAGE="en", AUTOSELECT=1

#EXT-X-STREAM-INF: BANDWIDTH=628000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=320x180, AU
f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_180_250000.m3u8

#EXT-X-STREAM-INF: BANDWIDTH=928000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=480x270, AU
f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_270_400000.m3u8

#EXT-X-STREAM-INF: BANDWIDTH=1728000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=640x360, AU
f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_360_800000.m3u8

#EXT-X-STREAM-INF: BANDWIDTH=2528000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=960x540, AU
f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_540_1200000.m3u8

#EXT-X-STREAM-INF: BANDWIDTH=4928000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=1280x720, AU
f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_720_2400000.m3u8

#EXT-X-STREAM-INF: BANDWIDTH=9728000, CODECS="avc1.42c00d,mp4a.40.2", RESOLUTION=1920x1080,
f08e80da-bf1d-4e3d-8899-f0f6155f6efa_video_1080_4800000.m3u8
```

```
#EXTM3U
#EXT-X-VERSION:3
#EXT-X-MEDIA-SEQUENCE:0
#EXT-X-TARGETDURATION:4

#EXTINF:4.0
.../video/180_250000/hls/segment_0.ts
#EXTINF:4.0
.../video/180_250000/hls/segment_1.ts
#EXTINF:4.0
.../video/180_250000/hls/segment_2.ts
#EXTINF:4.0
.../video/180_250000/hls/segment_3.ts
#EXTINF:4.0
.../video/180_250000/hls/segment_4.ts
```

Index file for current bandwidth



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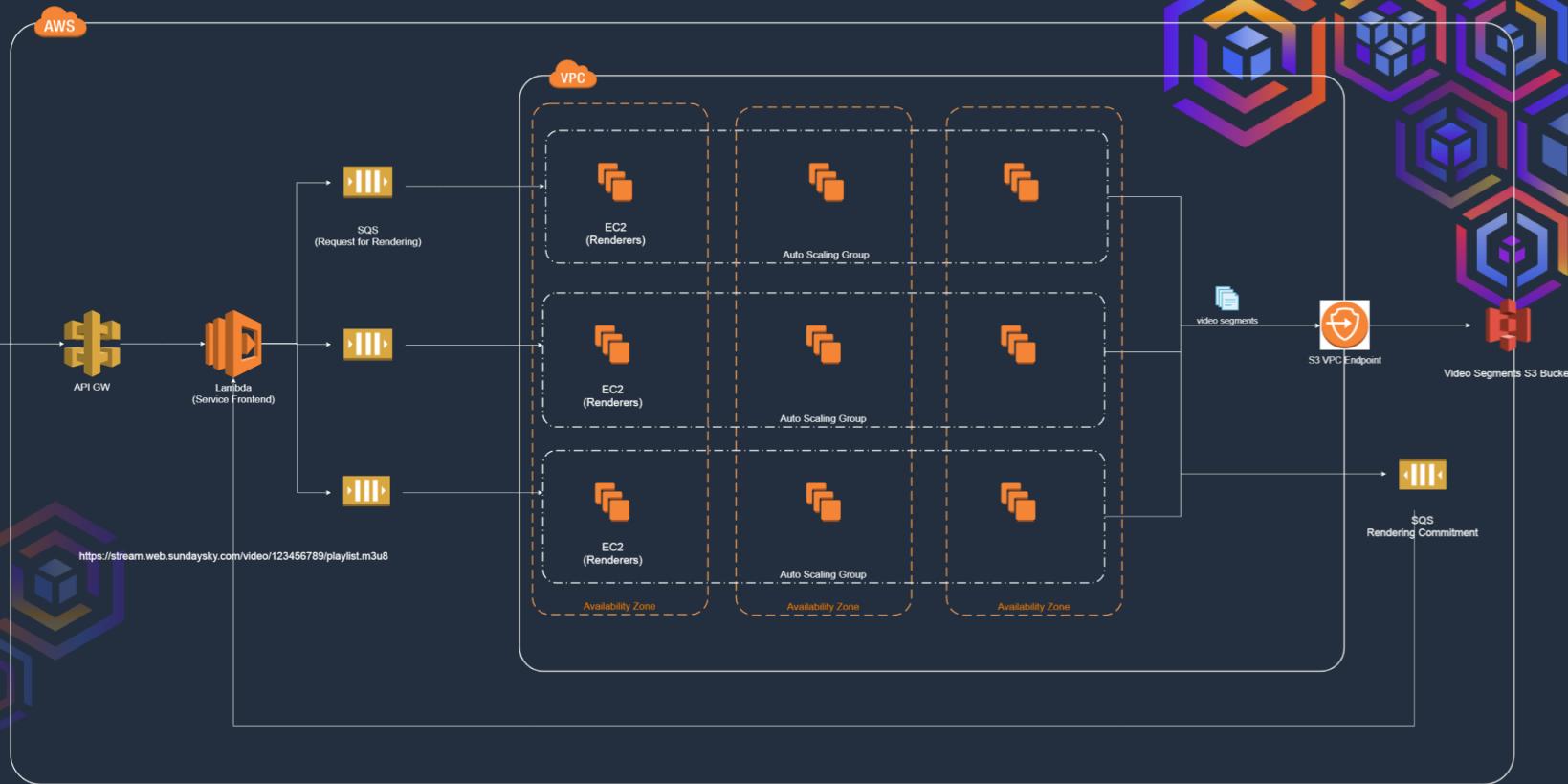
Video Rendering Architecture

Shay Lichten | December 25th, 2018





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Streaming HLS Video Segments

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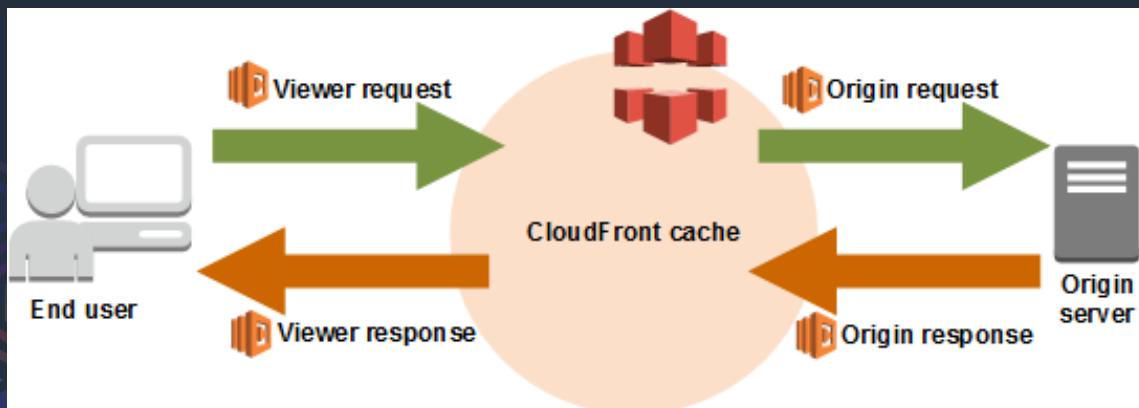
Before Going Serverless...





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Lambda@Edge

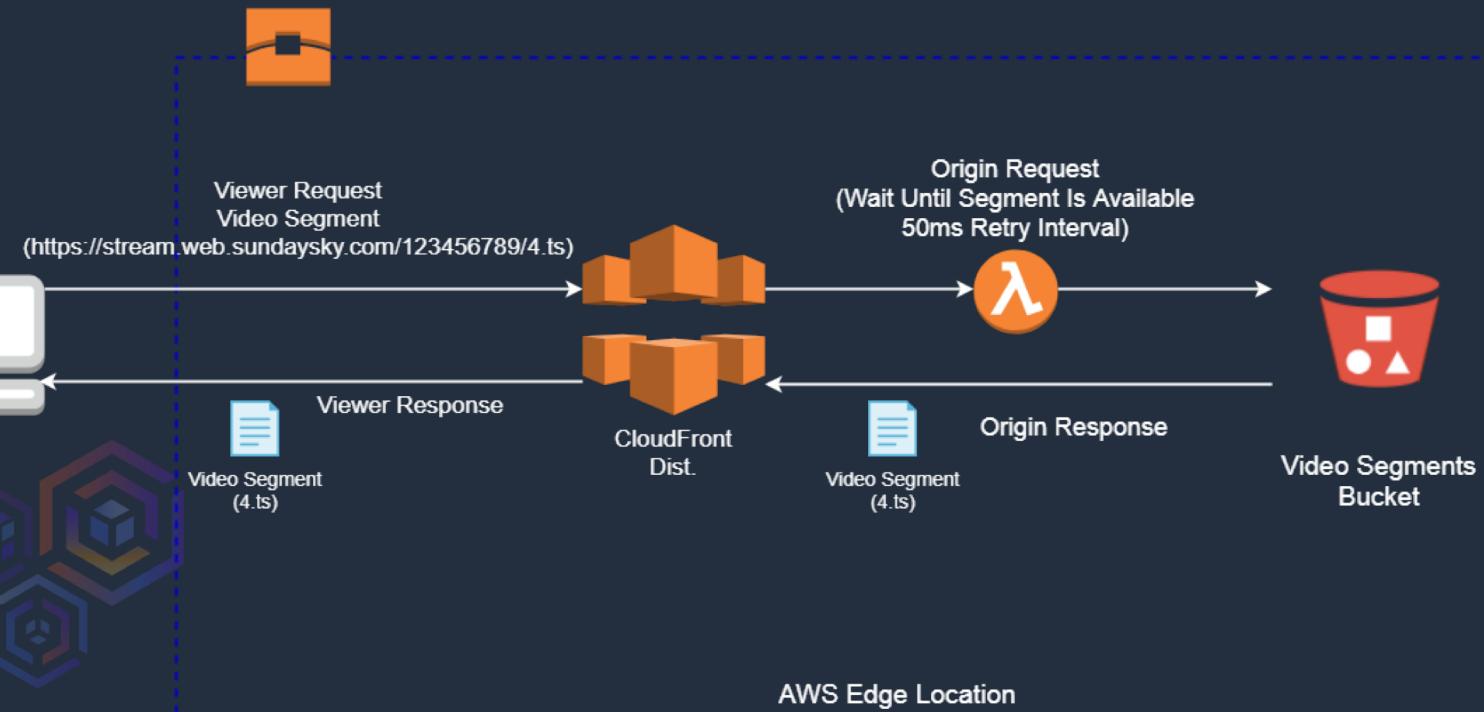


| Entity | Origin request and response event limits | Viewer request and response event limits |
|--|--|--|
| Function resource allocation | Same as Lambda limits | 128 MB |
| Function timeout. The function can make network calls to resources such as Amazon S3 buckets, DynamoDB tables, or Amazon EC2 instances in AWS Regions. | 30 seconds | 5 seconds |
| Size of a response that is generated by a Lambda function, including headers and body | 1 MB | 40 KB |
| Maximum compressed size of a Lambda function and any included libraries | 50 MB | 1 MB |



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Streaming Video Segments Using Lambda@Edge





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Ups & Downs

Advantages

- Scalable. Managed.
- Reducing operational overhead.
- Cost of ownership- focusing on business logic.

Drawbacks

- CF takes way too long to populate.
- Lambda@Edge execution logs are harder to trace.
- Expensive, costs x3 more compared to Lambda.





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Next Step- Experimenting with API GW WebSockets



Amazon API Gateway Simplifies Building Real-Time Two-Way Communication Applications with WebSocket APIs

Posted On: Dec 18, 2018

You can now use WebSocket APIs to build real-time two-way communication applications in Amazon API Gateway—all without having to provision and manage any servers.

Fully managed WebSocket APIs allow you to reduce the overall cost and complexity of building two-way communication applications for use cases such as chat, alerts and notifications, and real-time dashboards. Using WebSocket APIs, [API Gateway](#) maintains a persistent connection between connected clients and handles message transfer between them. WebSocket APIs also allow you to simplify your development process by enabling backend services to push data to clients and devices without a client request or complex polling mechanisms.

To get started with WebSocket APIs in API Gateway, use the AWS Management Console, AWS CLI, or AWS SDKs. To learn more about using WebSocket APIs, read our [documentation](#), follow a step-by-step walk-through from our [blog post](#), or watch our introductory [WebSocket API webinar](#).

WebSocket APIs are available in all regions where API Gateway is available. To see all regions where API Gateway is available, see the [AWS region table](#).





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