Amazon Interactive Video Service

Quality of Experience Monitoring Dashboard

Purpose

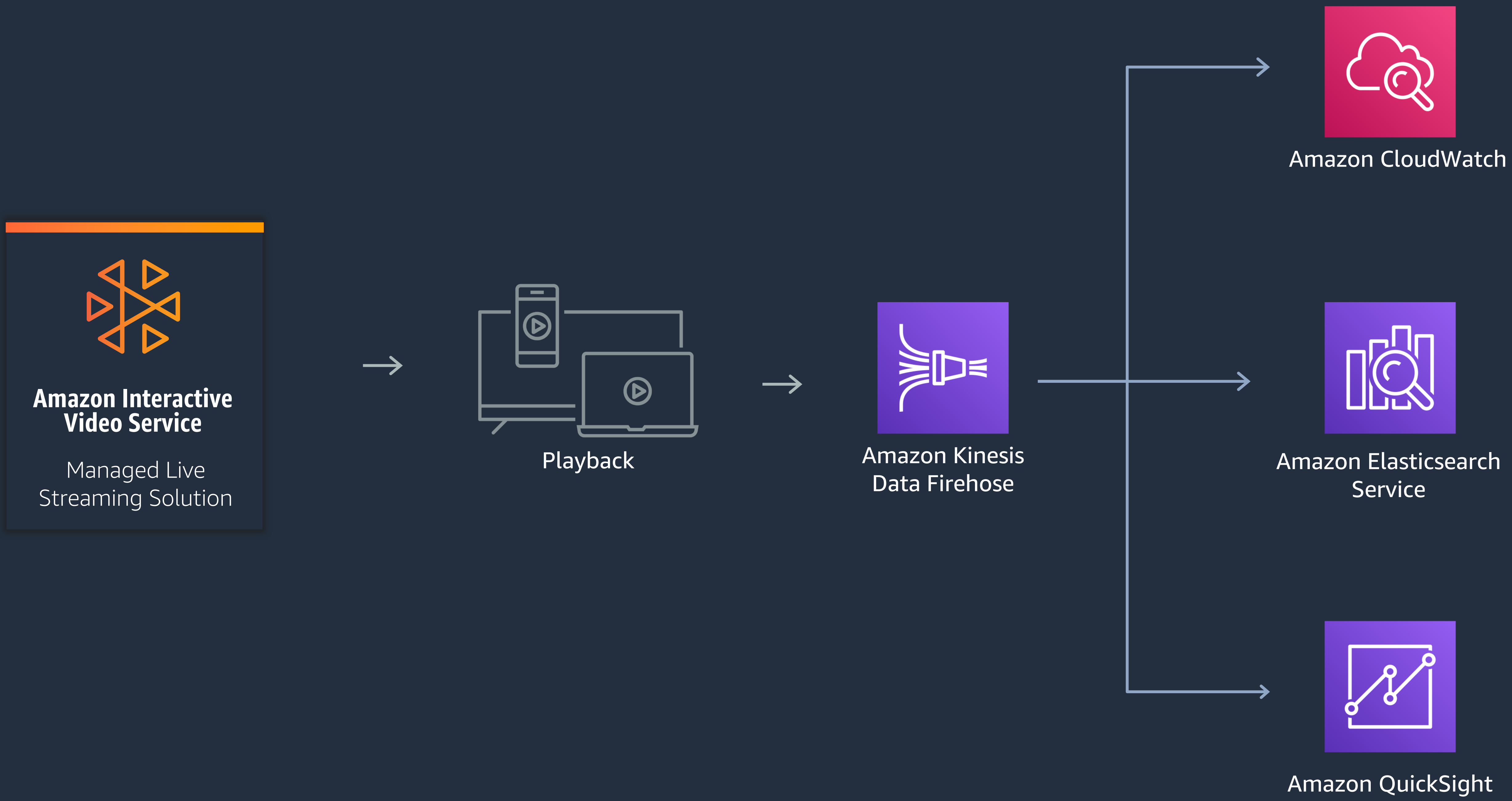
Monitor
quality of service

- Capture metrics on delivery performance and viewing experience
- Build dashboards and alerts for operations teams to proactively understand customer experience

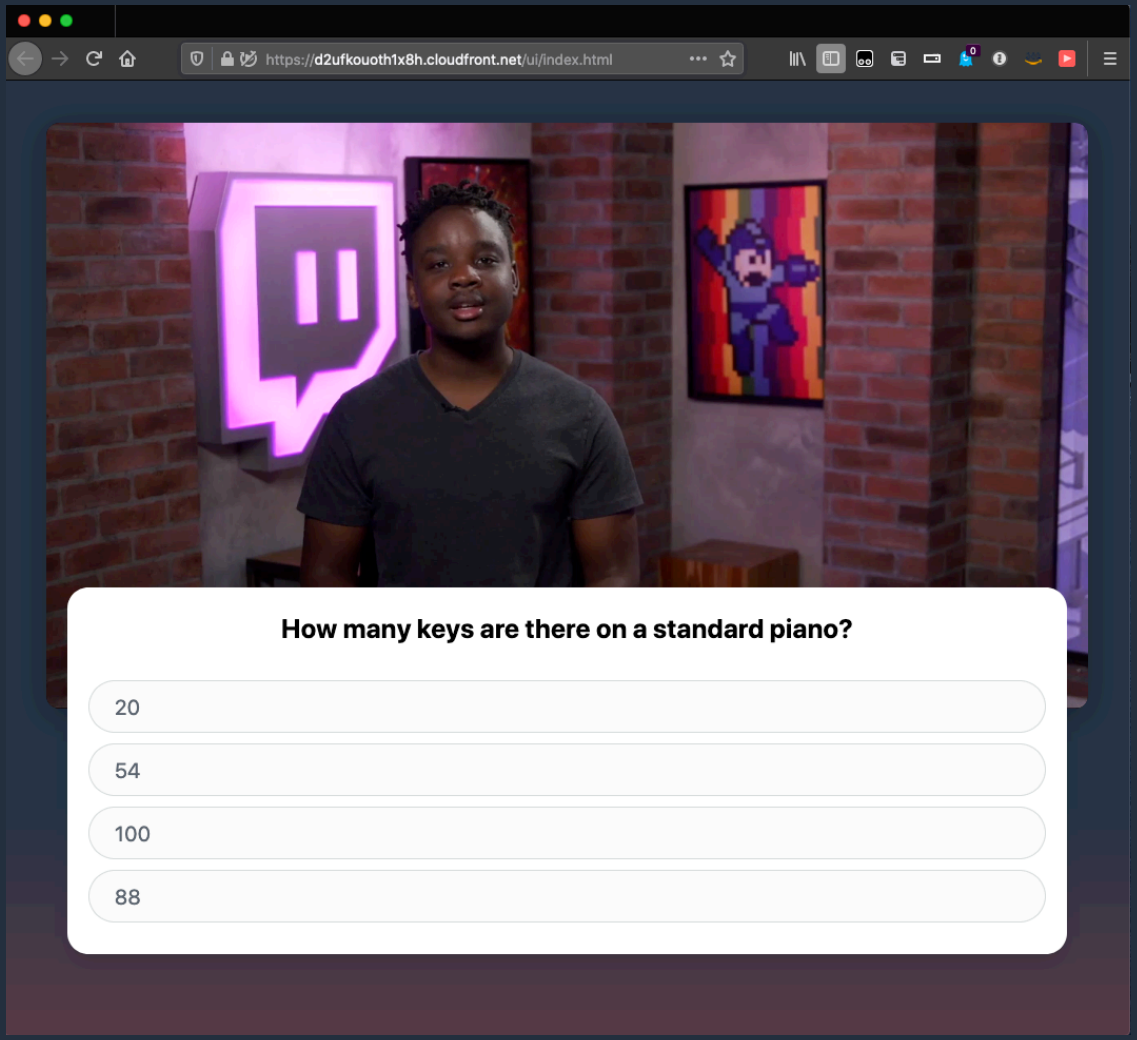
Measure
quality of experience

- Monitor and measure interactions
- Understand consumption behavior and user interactions

Solution Components


Amazon Interactive Video Service
Managed Live Streaming Solution
Playback
Amazon Kinesis Data Firehose
Amazon CloudWatch
Amazon Elasticsearch Service
Amazon QuickSight

Client Architecture



How many keys are there on a standard piano?

- 20
- 54
- 100
- 88

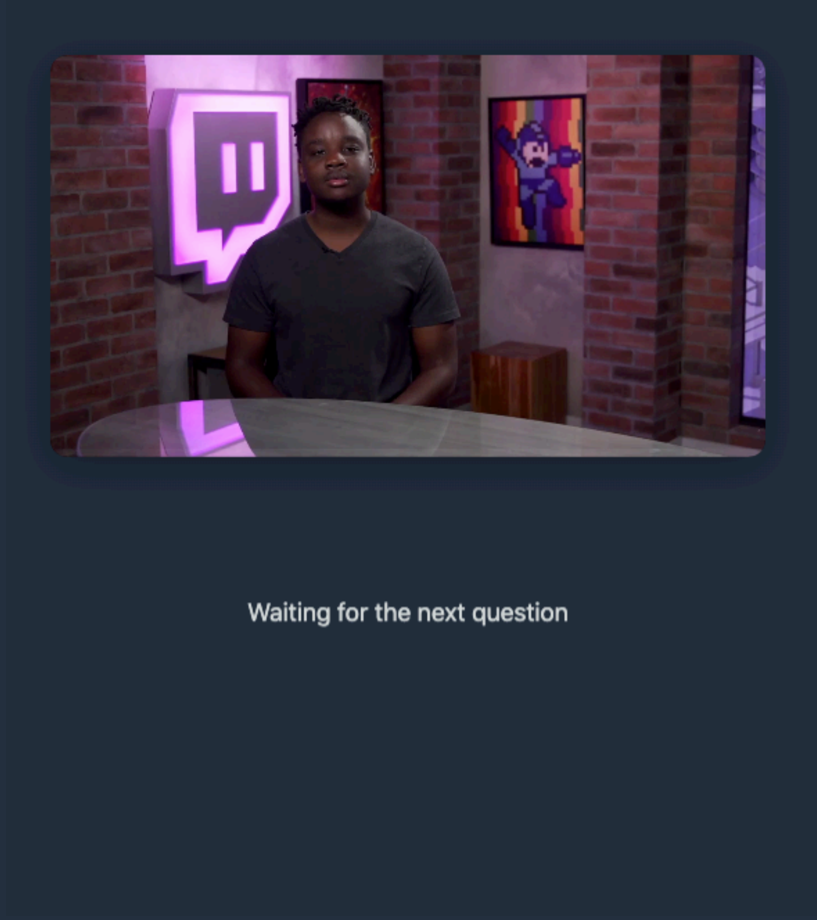
→

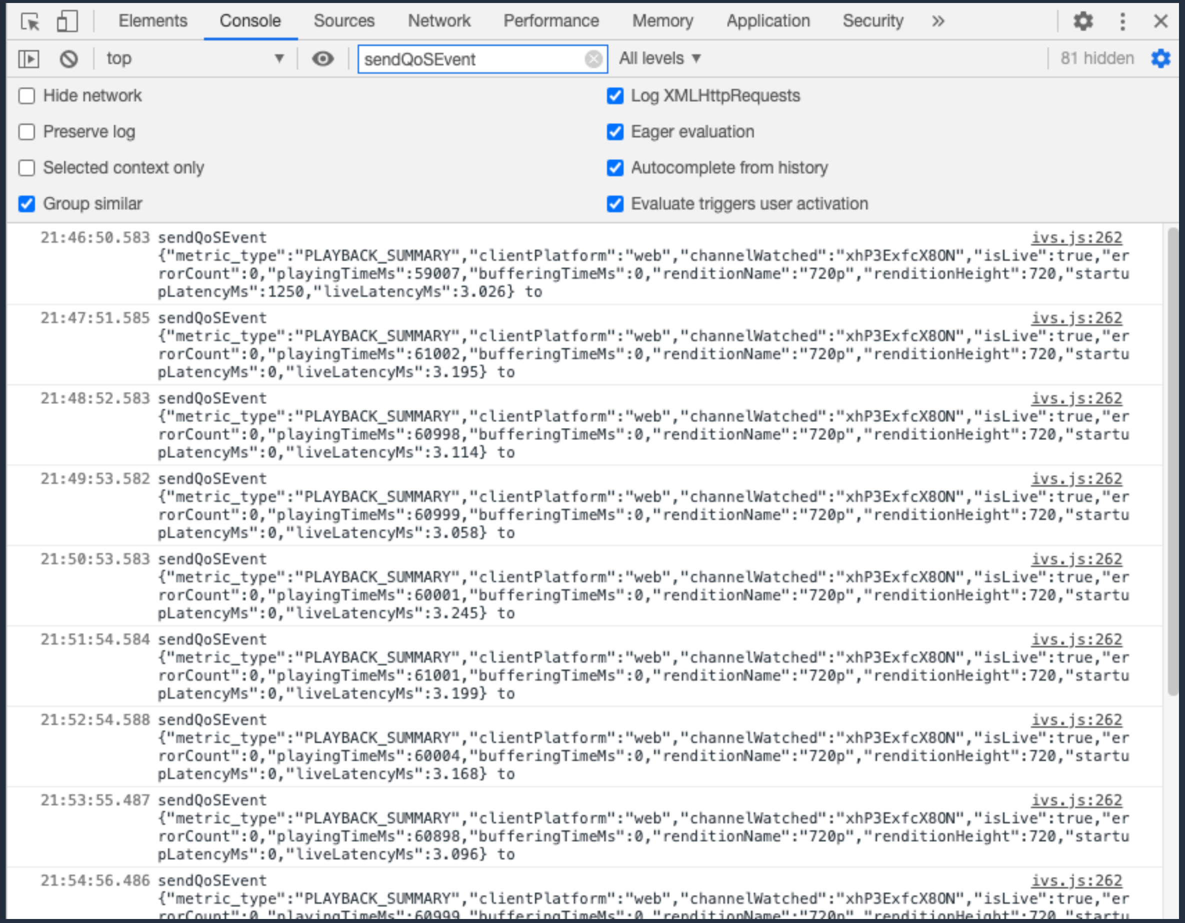
```
{
    "metric_type":"PLAYBACK_SUMMARY",
    "client_platform":"web",
    "channel_watched":"xhP3ExfcX8ON",
    "is_live":true,
    "error_count":0,
    "playing_time_ms":60030,
    "buffering_time_ms":0,
    "rendition_name":"720p",
    "rendition_height":720,
    "startup_latency_ms":0,
    "live_latency_ms":2
}
```

Sample JS Player

To get started: please read the web/IVSplayer/README.md

The sample player by default plays an IVS test channel, generating one QoS event each minute (configurable, tradeoff between latency and cost)





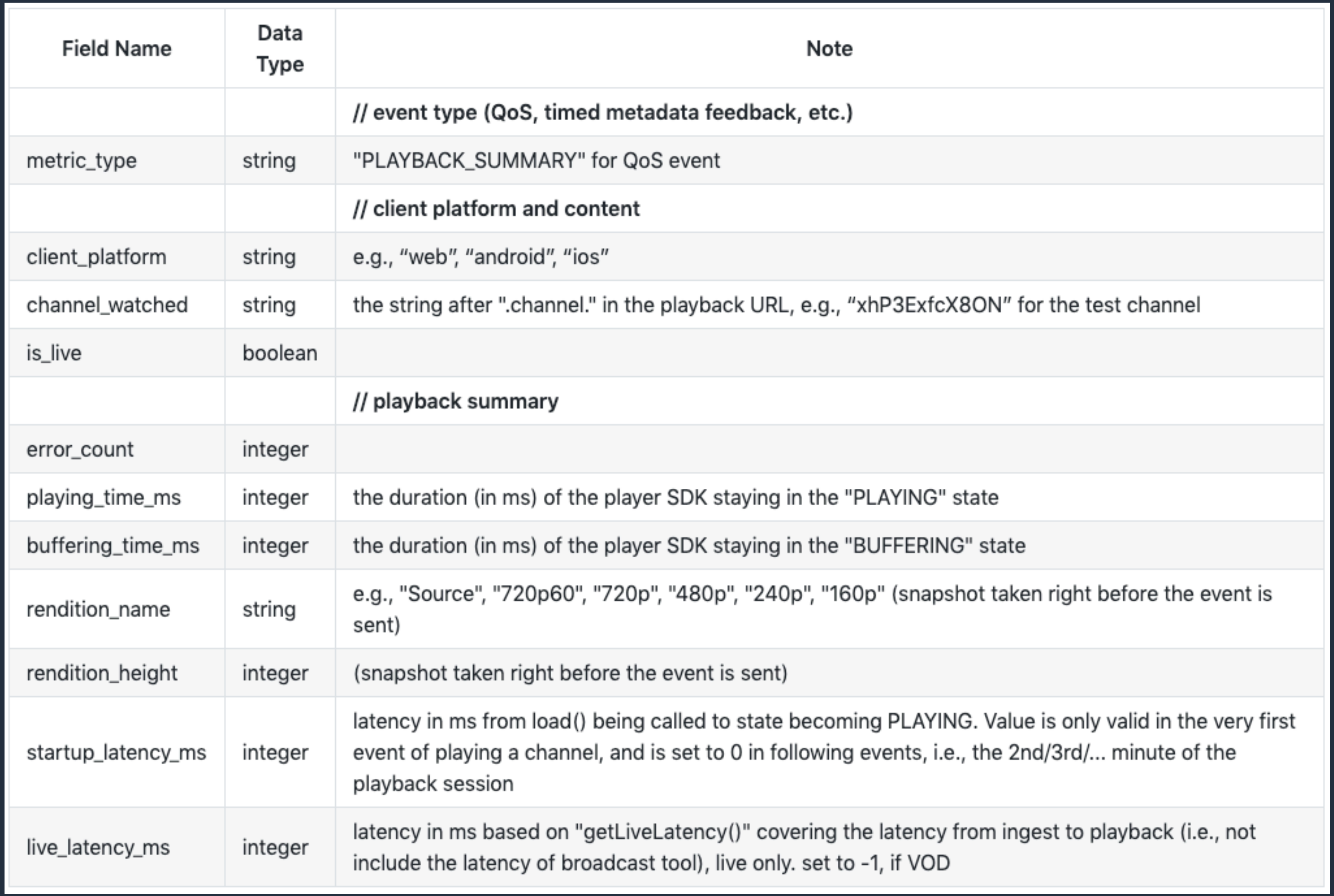
sendQoSEvent

- [ ] Hide network
- [ ] Preserve log
- [ ] Selected context only
- [x] Group similar
- [x] Log XMLHttpRequests
- [x] Eager evaluation
- [x] Autocomplete from history
- [x] Evaluate triggers user activation

```
21:46:50.583 sendQoSEvent                                                                                          ivs.js:262
             {"metric_type":"PLAYBACK_SUMMARY","clientPlatform":"web","channelWatched":"xhP3ExfcX8ON","isLive":true,"er
             rorCount":0,"playingTimeMs":59007,"bufferingTimeMs":0,"renditionName":"720p","renditionHeight":720,"startu
             pLatencyMs":1250,"liveLatencyMs":3.026} to
21:47:51.585 sendQoSEvent                                                                                          ivs.js:262
             {"metric_type":"PLAYBACK_SUMMARY","clientPlatform":"web","channelWatched":"xhP3ExfcX8ON","isLive":true,"er
             rorCount":0,"playingTimeMs":61002,"bufferingTimeMs":0,"renditionName":"720p","renditionHeight":720,"startu
             pLatencyMs":0,"liveLatencyMs":3.195} to
21:48:52.583 sendQoSEvent                                                                                          ivs.js:262
             {"metric_type":"PLAYBACK_SUMMARY","clientPlatform":"web","channelWatched":"xhP3ExfcX8ON","isLive":true,"er
             rorCount":0,"playingTimeMs":60998,"bufferingTimeMs":0,"renditionName":"720p","renditionHeight":720,"startu
             pLatencyMs":0,"liveLatencyMs":3.114} to
21:49:53.582 sendQoSEvent                                                                                          ivs.js:262
             {"metric_type":"PLAYBACK_SUMMARY","clientPlatform":"web","channelWatched":"xhP3ExfcX8ON","isLive":true,"er
             rorCount":0,"playingTimeMs":60999,"bufferingTimeMs":0,"renditionName":"720p","renditionHeight":720,"startu
             pLatencyMs":0,"liveLatencyMs":3.058} to
21:50:53.583 sendQoSEvent                                                                                          ivs.js:262
             {"metric_type":"PLAYBACK_SUMMARY","clientPlatform":"web","channelWatched":"xhP3ExfcX8ON","isLive":true,"er
             rorCount":0,"playingTimeMs":60001,"bufferingTimeMs":0,"renditionName":"720p","renditionHeight":720,"startu
             pLatencyMs":0,"liveLatencyMs":3.245} to
21:51:54.584 sendQoSEvent                                                                                          ivs.js:262
             {"metric_type":"PLAYBACK_SUMMARY","clientPlatform":"web","channelWatched":"xhP3ExfcX8ON","isLive":true,"er
             rorCount":0,"playingTimeMs":61001,"bufferingTimeMs":0,"renditionName":"720p","renditionHeight":720,"startu
             pLatencyMs":0,"liveLatencyMs":3.199} to
21:52:54.588 sendQoSEvent                                                                                          ivs.js:262
             {"metric_type":"PLAYBACK_SUMMARY","clientPlatform":"web","channelWatched":"xhP3ExfcX8ON","isLive":true,"er
             rorCount":0,"playingTimeMs":60004,"bufferingTimeMs":0,"renditionName":"720p","renditionHeight":720,"startu
             pLatencyMs":0,"liveLatencyMs":3.168} to
21:53:55.487 sendQoSEvent                                                                                          ivs.js:262
             {"metric_type":"PLAYBACK_SUMMARY","clientPlatform":"web","channelWatched":"xhP3ExfcX8ON","isLive":true,"er
             rorCount":0,"playingTimeMs":60898,"bufferingTimeMs":0,"renditionName":"720p","renditionHeight":720,"startu
             pLatencyMs":0,"liveLatencyMs":3.096} to
21:54:56.486 sendQoSEvent                                                                                          ivs.js:262
             {"metric_type":"PLAYBACK_SUMMARY","clientPlatform":"web","channelWatched":"xhP3ExfcX8ON","isLive":true,"er
             rorCount":0,"playingTimeMs":60999,"bufferingTimeMs":0,"renditionName":"720p","renditionHeight":720,"startu
```

JSON Schema

Metrics of user activity (concurrent viewers, etc.) and QoS (buffering, latency, etc.)



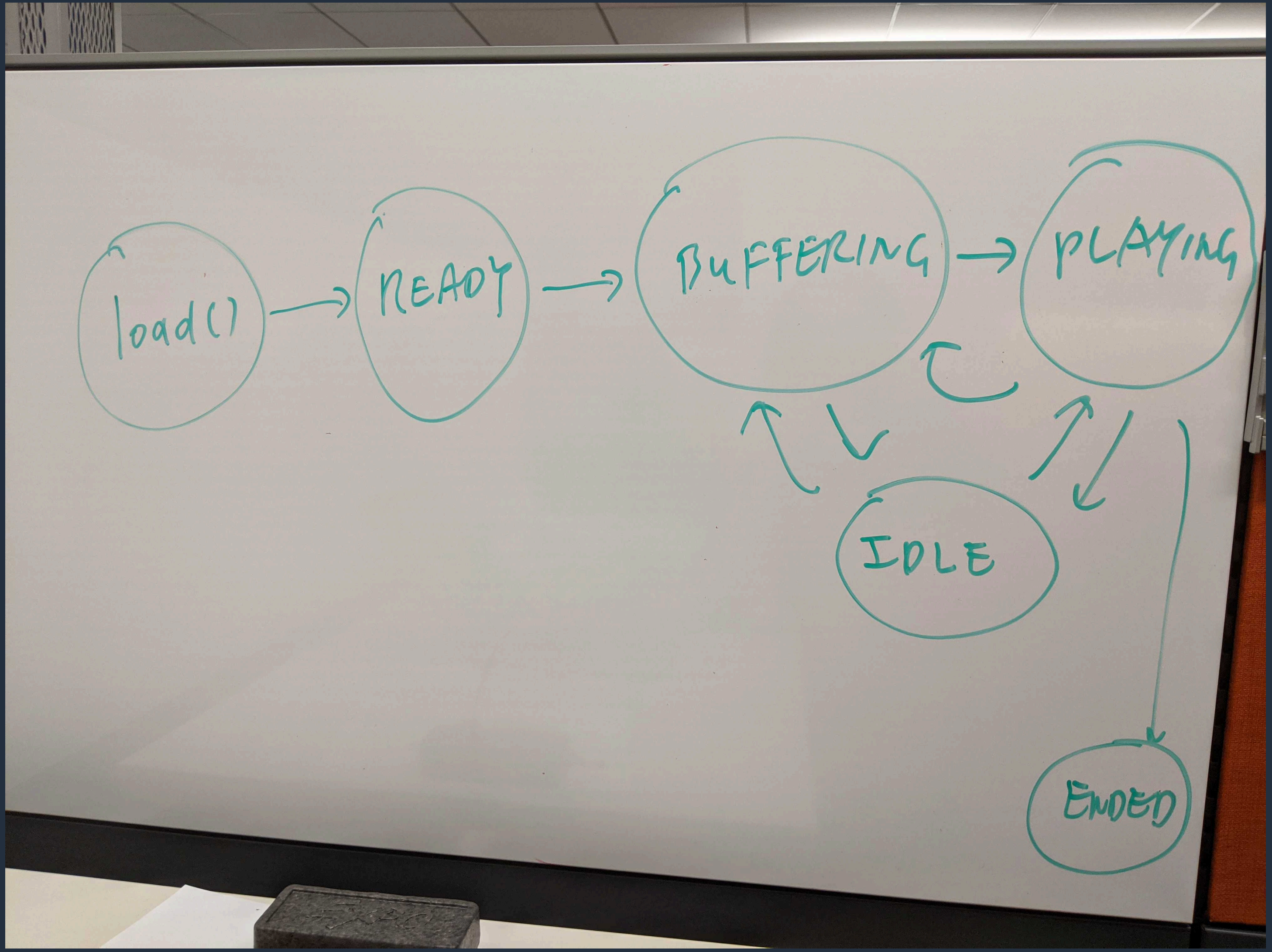
Field Name	Data Type	Note
		// event type (QoS, timed metadata feedback, etc.)
metric_type	string	"PLAYBACK_SUMMARY" for QoS event
		// client platform and content
client_platform	string	e.g., "web", "android", "ios"
channel_watched	string	the string after ".channel." in the playback URL, e.g., "xhP3ExfcX8ON" for the test channel
is_live	boolean	
		// playback summary
error_count	integer	
playing_time_ms	integer	the duration (in ms) of the player SDK staying in the "PLAYING" state
buffering_time_ms	integer	the duration (in ms) of the player SDK staying in the "BUFFERING" state
rendition_name	string	e.g., "Source", "720p60", "720p", "480p", "240p", "160p" (snapshot taken right before the event is sent)
rendition_height	integer	(snapshot taken right before the event is sent)
startup_latency_ms	integer	latency in ms from load() being called to state becoming PLAYING. Value is only valid in the very first event of playing a channel, and is set to 0 in following events, i.e., the 2nd/3rd/... minute of the playback session
live_latency_ms	integer	latency in ms based on "getLiveLatency()" covering the latency from ingest to playback (i.e., not include the latency of broadcast tool), live only. set to -1, if VOD

Implementation

Check section 3.1.3 of web/IVSplayer/README.md

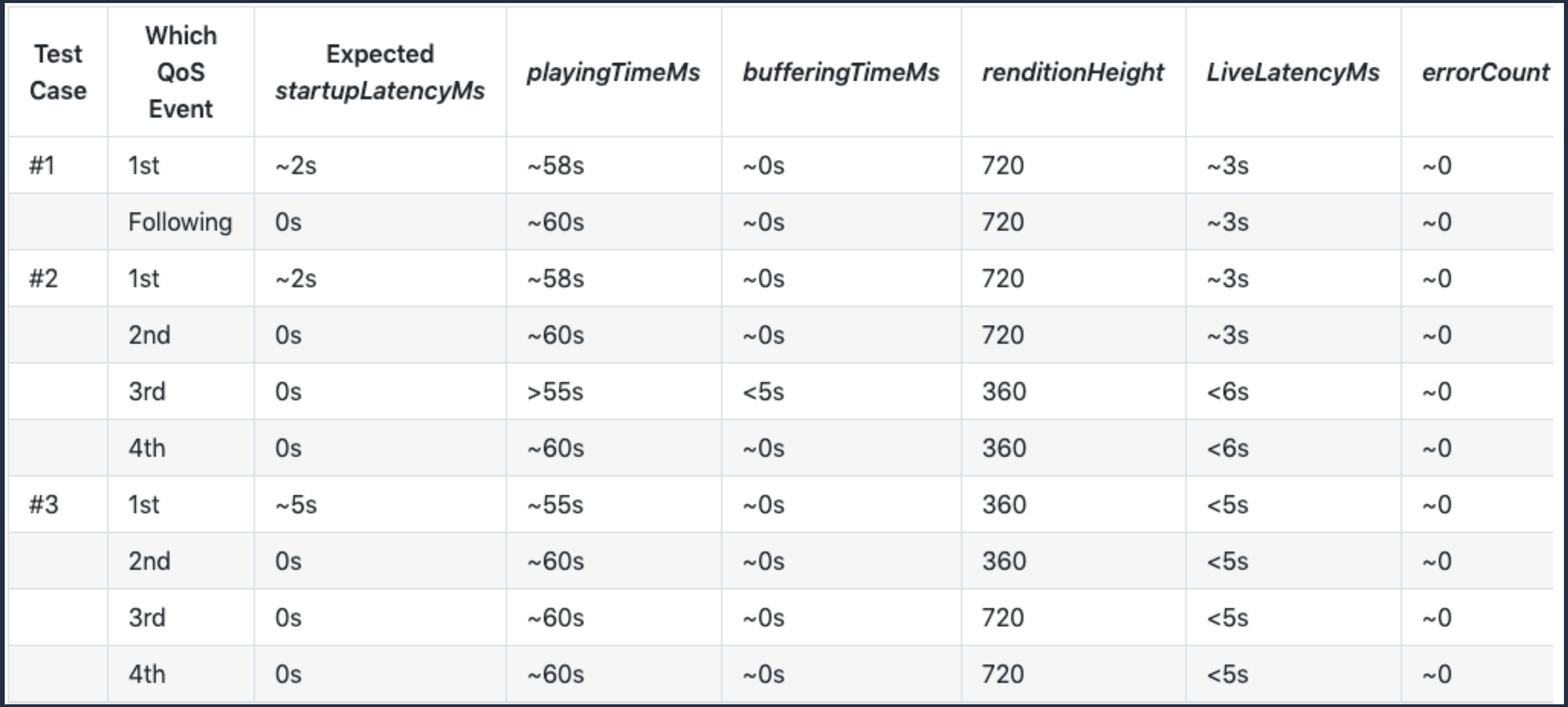
Search “QoS event” in web/IVSplayer/js/ivs.js

Most logic is in the transition of player state



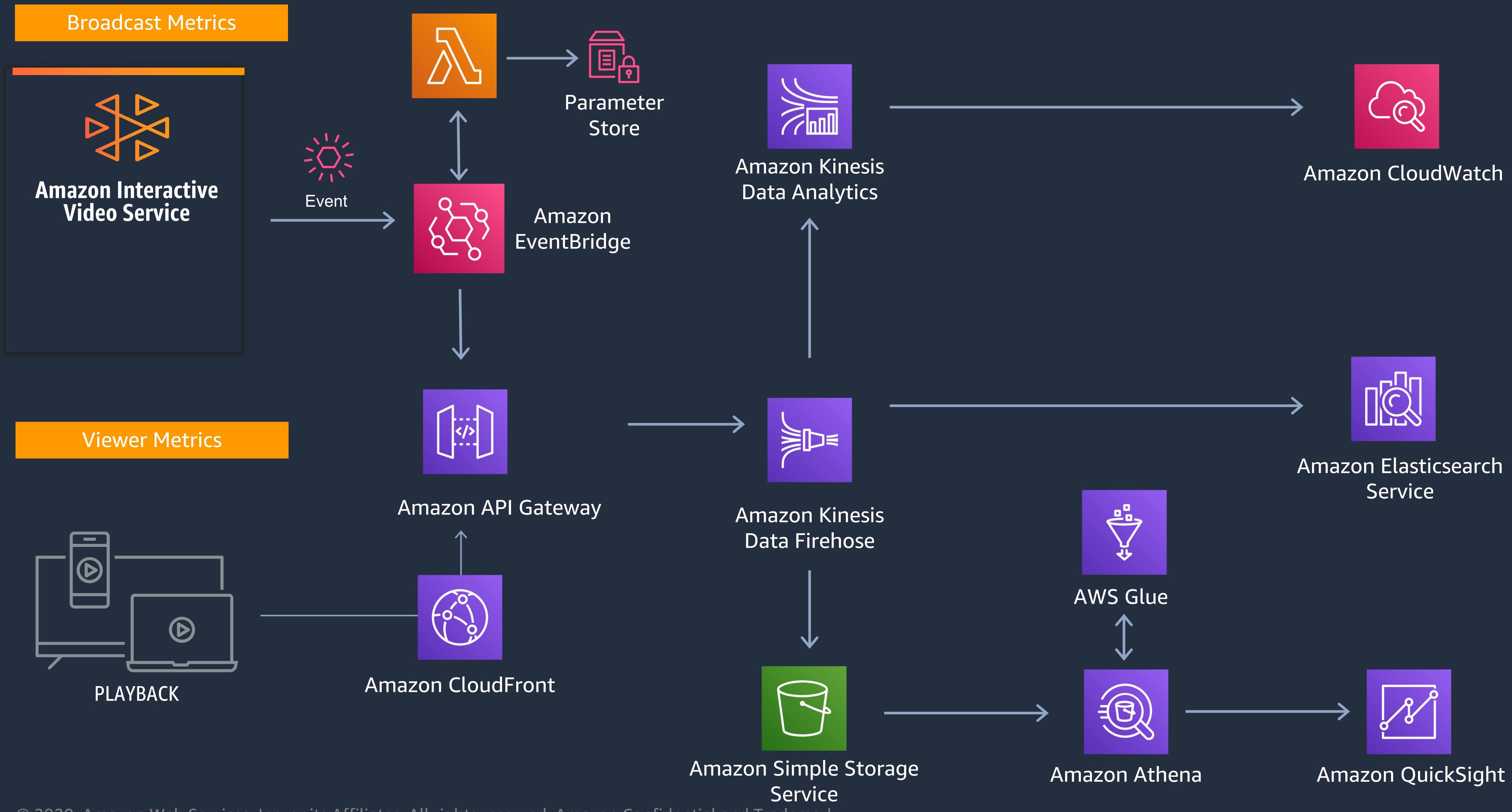
Verification

Multiple test cases with simulated network conditions (use Chrome Developer Tool to throttle network)



Test Case	Which QoS Event	Expected *startupLatencyMs*	*playingTimeMs*	*bufferingTimeMs*	*renditionHeight*	*LiveLatencyMs*	*errorCount*
#1	1st	~2s	~58s	~0s	720	~3s	~0
	Following	0s	~60s	~0s	720	~3s	~0
#2	1st	~2s	~58s	~0s	720	~3s	~0
	2nd	0s	~60s	~0s	720	~3s	~0
	3rd	0s	>55s	<5s	360	<6s	~0
	4th	0s	~60s	~0s	360	<6s	~0
#3	1st	~5s	~55s	~0s	360	<5s	~0
	2nd	0s	~60s	~0s	360	<5s	~0
	3rd	0s	~60s	~0s	720	<5s	~0
	4th	0s	~60s	~0s	720	<5s	~0

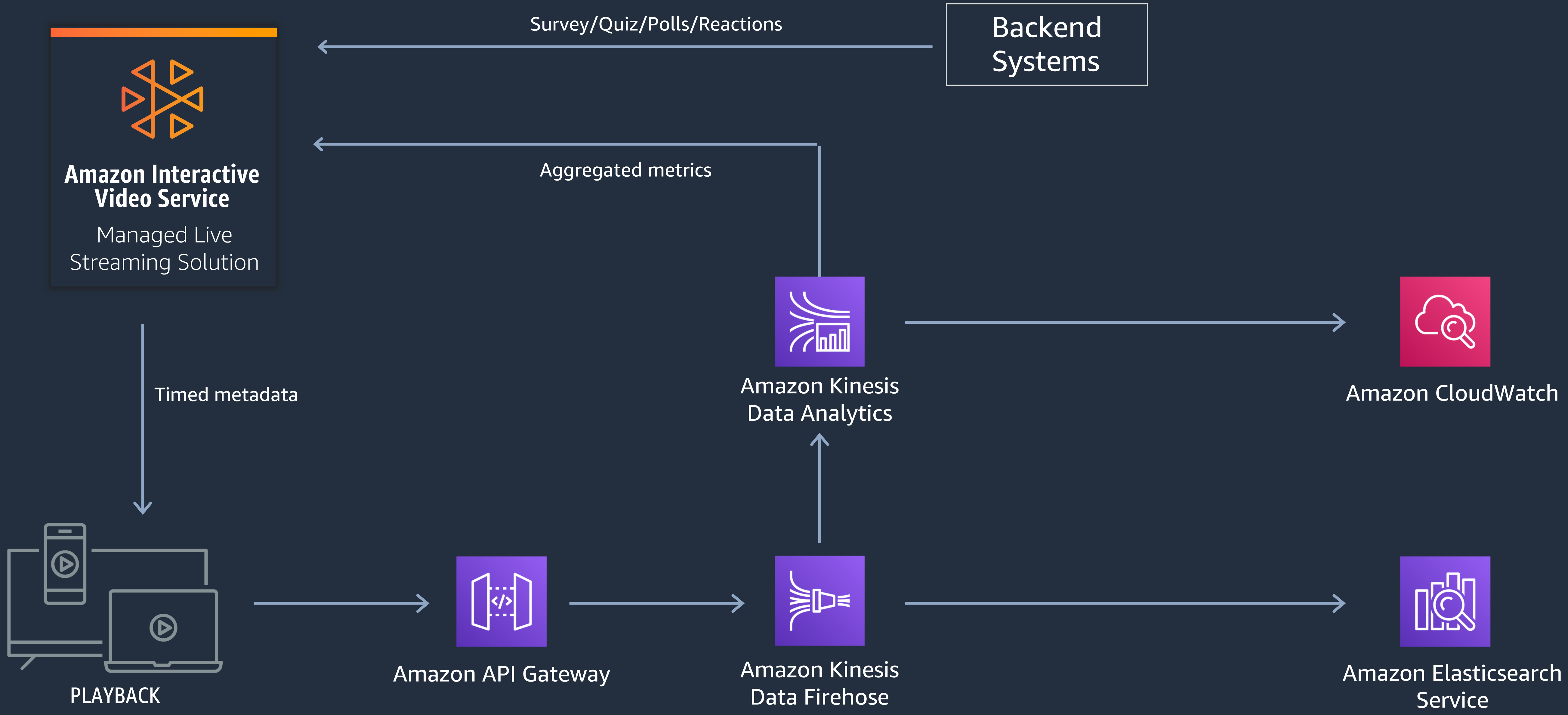
Backend Architecture: Analytics



Cost Estimates

Components	Costs	Cost variability by traffic
Ingests	$218.40 per Million Hours	High
Kinesis Analytics Processing	$84.20 per Month (1 KPU)	Stepwise
CloudWatch Dashboards	$4.50 per Month	Consistent
ElasticSearch Dashboards	$232.50 per Month (2x m4.large w/ 100GB storage)	Stepwise
QuickSight Dashboards	$12/user/month + S3 Data scan charges	Usage based

Beyond QoS/E – building interactions


Survey/Quiz/Polls/Reactions
Backend Systems
Amazon Interactive Video Service
Managed Live Streaming Solution
Aggregated metrics
Timed metadata
Amazon Kinesis Data Analytics
Amazon CloudWatch
PLAYBACK
Amazon API Gateway
Amazon Kinesis Data Firehose
Amazon Elasticsearch Service

Right tooling

CloudWatch	ElasticSearch	QuickSight
Near real time	Near real time	Long term
Operational metrics-notifications	More flexibility Developer comfort	Business reporting

Next Steps

https://github.com/aws-samples/amazon-ivs-qos-dashboard-timed-metadata-sample