

Track 2 | Session 4

# 全民直播時代的多CDN架構監控 與觀看體驗最佳化

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HD 1080p

A close-up photograph of a black electronic device, likely a camera or a high-quality speaker. The left side of the device features a prominent, curved grille with a dense pattern of small, circular perforations. To the right of the grille, the text "HD 1080p" is printed in a white, sans-serif font. Further to the right, a circular lens or sensor is visible, partially obscured by a dark, concentric ring. The device has a sleek, modern design with sharp edges and a matte black finish. The lighting is soft, highlighting the texture of the grille and the clarity of the text.

# Common real-time data streaming use cases

Milliseconds



Messaging between  
microservices

Response analytics  
(web and mobile  
app notifications)

Seconds



Log ingestion

IoT device  
maintenance

Change data  
capture

Minutes



Streaming extract,  
transfer, and load  
(ETL) into data  
lakes and data  
warehouses

# What is a Live Event?

Live Sports  
Stream?



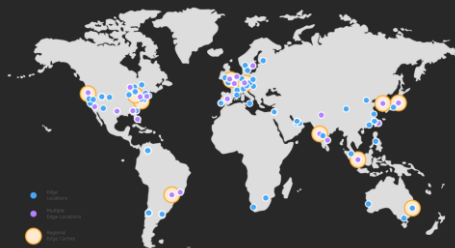
Popular VOD Series  
Finale?



Answer: They both are

# What Drives Live Event Scale?

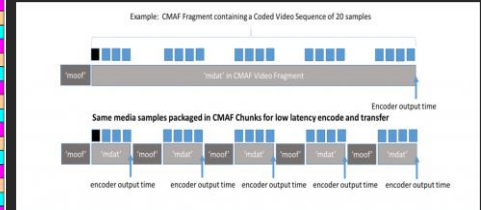
## Audience Characteristics



- Peak Concurrent Viewers
- Join Rate
- Geographic/Regional Concentration

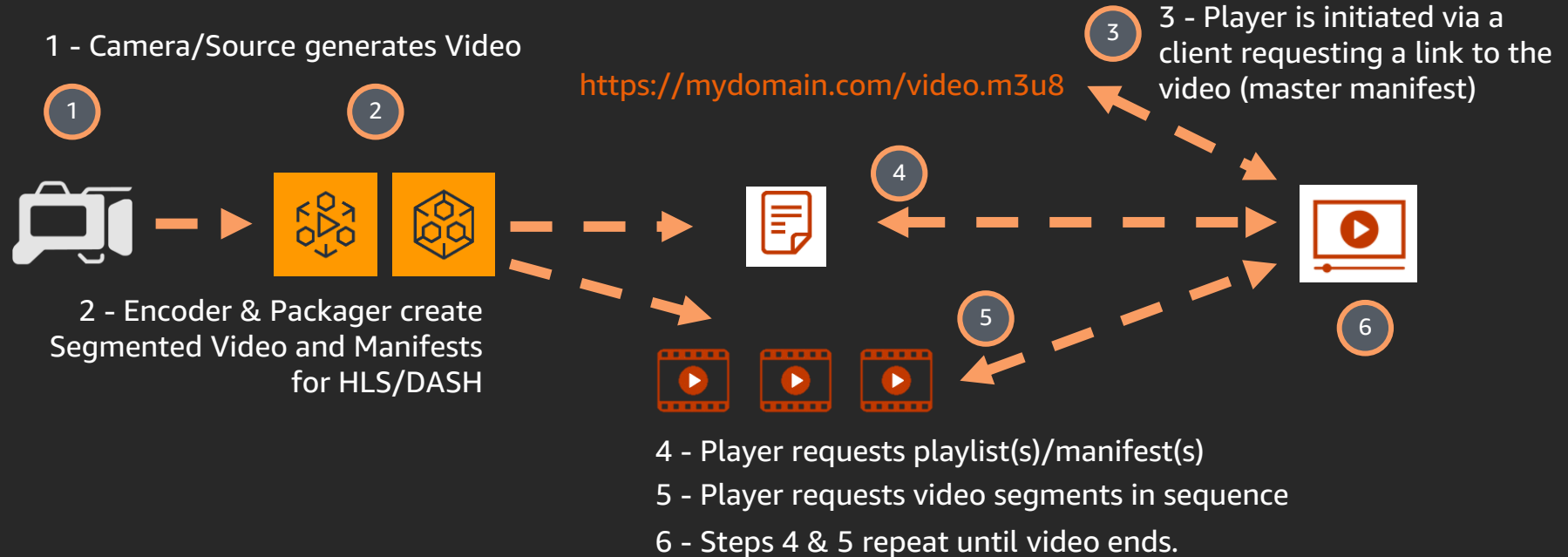
## Video Characteristics

Width	Height	FPS	Quality	kbps requirements
1920	1080	60	0.1	12442
1920	1080	30	0.08	9953
1920	1080	60	0.06	7465
1920	1080	30	0.1	6221
1920	1080	30	0.08	4977
1920	1080	30	0.06	3732
1280	720	60	0.1	5530
1280	720	30	0.08	4424
1280	720	60	0.06	3318
1280	720	30	0.1	2765
1280	720	30	0.08	2212
1280	720	30	0.06	1659
640	480	60	0.1	1843
640	480	30	0.08	1475
640	480	60	0.06	1106
640	480	30	0.1	922
640	480	30	0.08	737
640	480	30	0.06	553

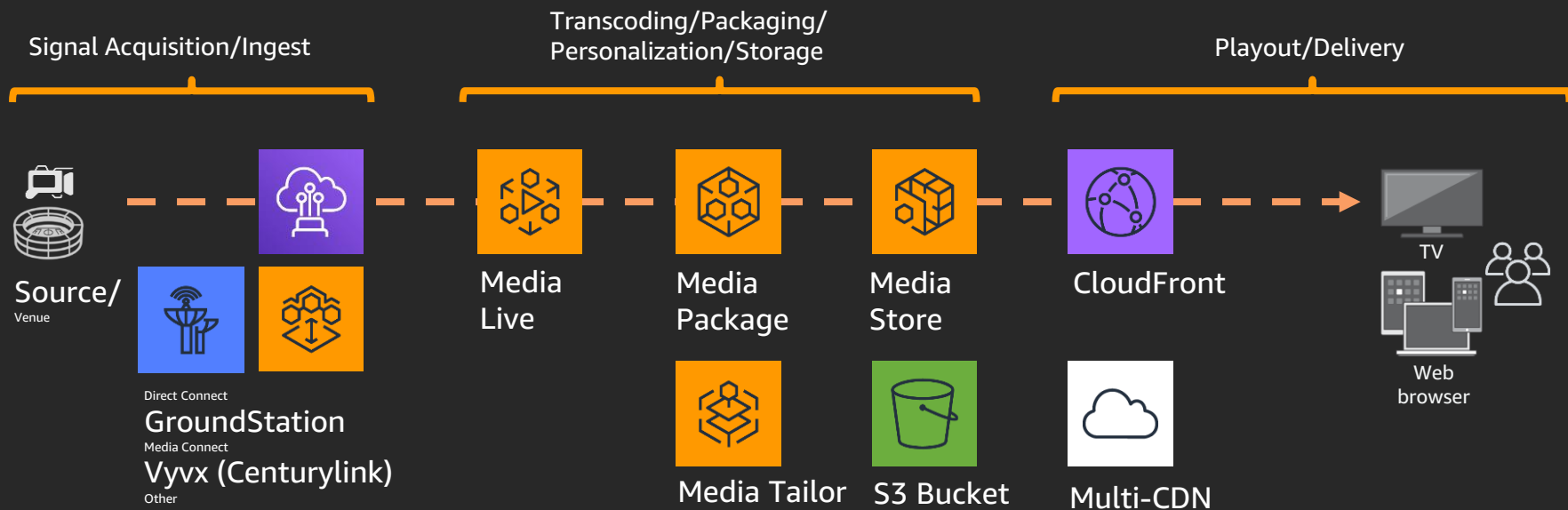


- Encoded Bit Rate
- Number of formats & profiles
- Segment Duration

# How does internet Video work?



# Typical Components of a Video Workflow with AWS Components



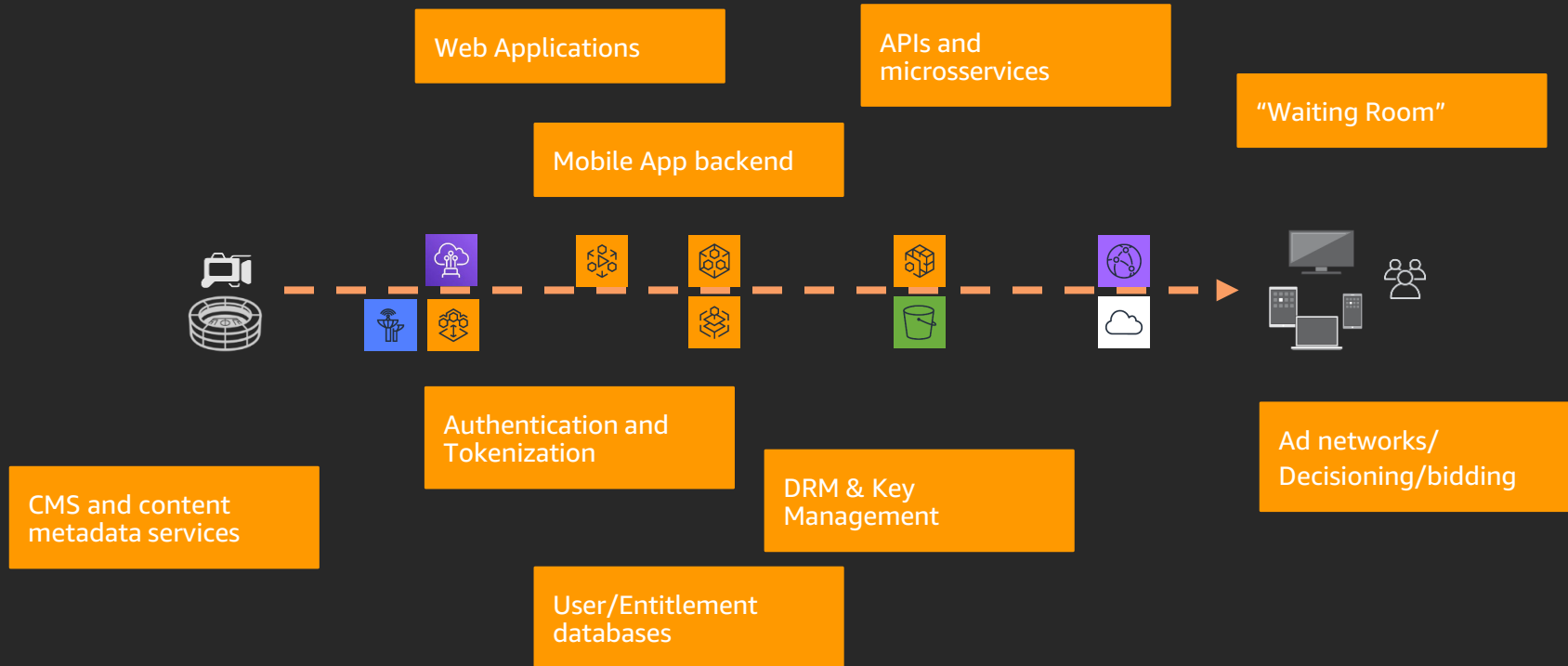
# Being Redundantly Redundant



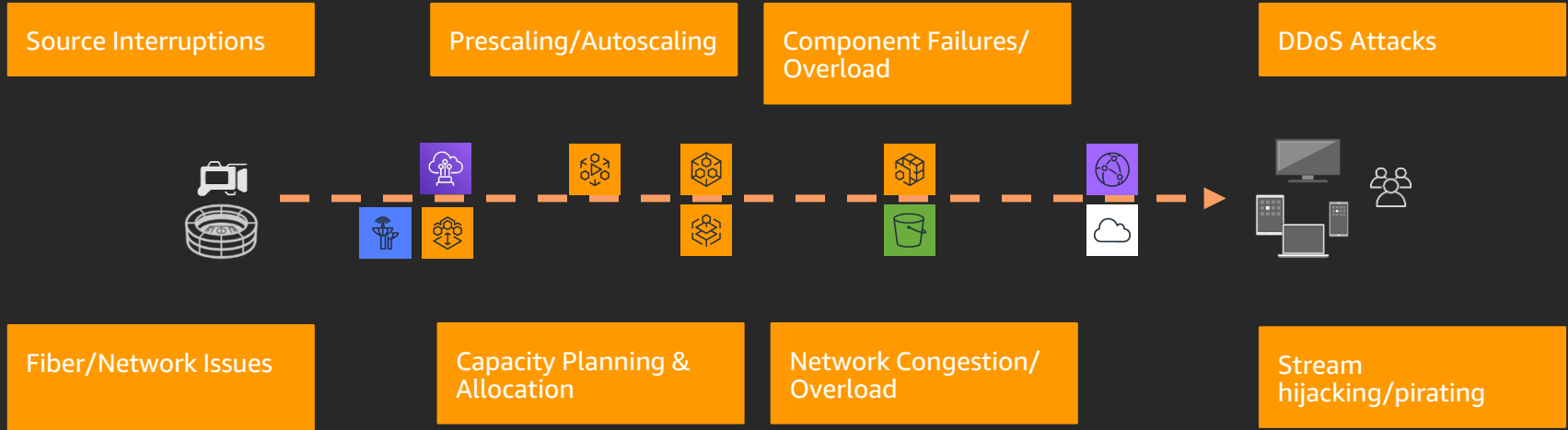
- Diverse signal acquisition paths (satellite, terrestrial, multiple networks/links)
- Redundant Encoders with time/epoch locking (primary/**secondary stream**)
- Encoders writing to redundant origins (packagers/storage) in multiple regions
- DNS-based or API-based traffic management and stream selection by region
- Health checks and failover between primary/secondary in region or across regions



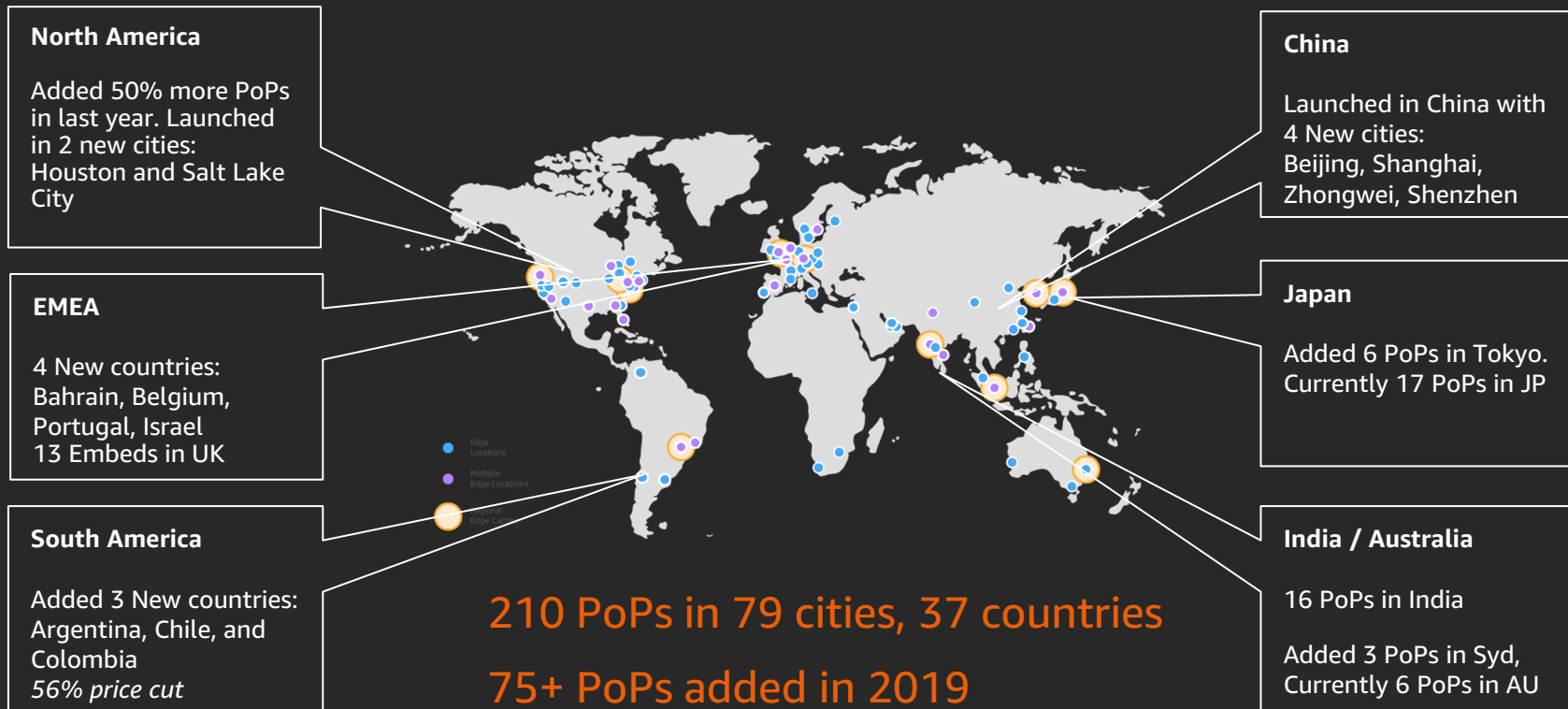
# It's not just about the Video



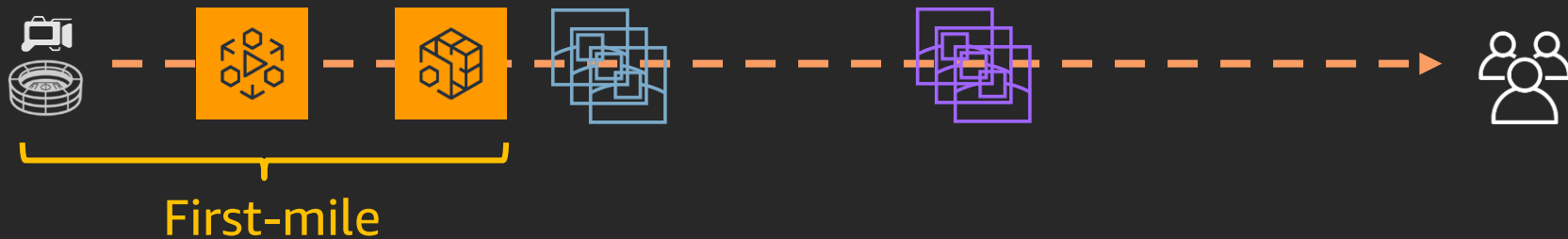
# Many predicate failure modes



# AWS Advantages: Capacity, Scale, Performance, Reach

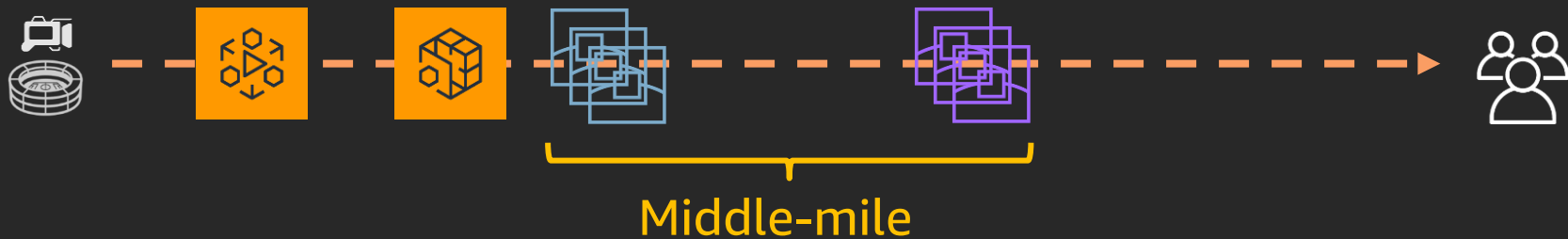


# Video Delivery Optimization



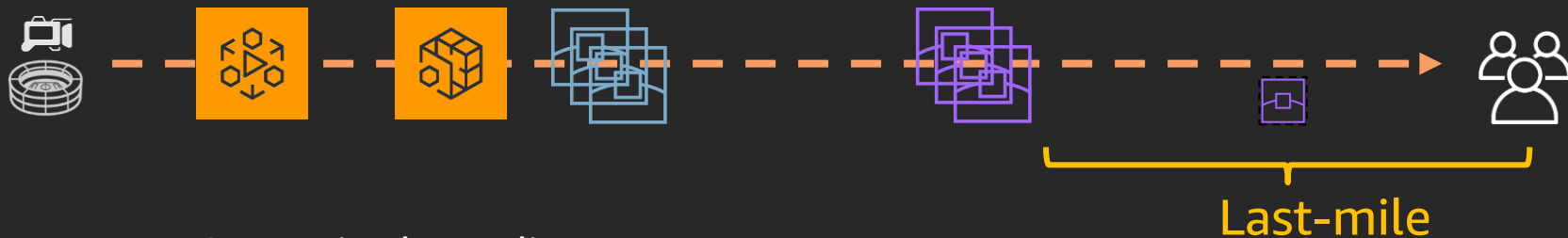
- Ingest optimization via S3TA, Media-Connect, Direct Connect or other methods
- Redundancy and regional localization as appropriate
- Encoding/Packaging configuration

# Video Delivery Optimization in CloudFront



- Connection keep-alive in cache fill path all the way to origin
- Chunked-transfer encoding
- Hierarchical/Regional caching and Connection Collapsing
- AWS Backbone provides low-latency, high throughput, low-congestion network
- Range Request consolidation & background fetching
- Negative Caching to protect origin

# Video Delivery Optimization in CloudFront



- Connection keep-alives
- Protocol Optimization (BBR, MTU, HTTP-2, QUIC/HTTP-3)
- Lots of capacity (>120Tbps of network connectivity)
- Direct Peering with many networks
- Embedded POPs deeper within major consumer ISP networks
- Perimeter Protection @ Edge with WAF & Shield

# 浪Live串流服務的監控與體驗最佳化

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# 浪Live 旭瑞文化傳媒

才藝直播 - 浪Live



浪  
LIVE

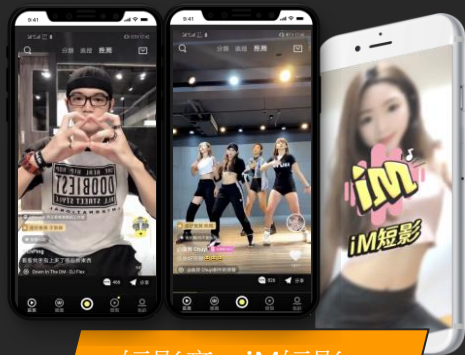
浪  
PLAY

iM  
短影



電競直播 - 浪Play

短影音 - iM短影





# Agenda

為何需要多CDN架構

如何收集數據了解用戶觀看體驗

推拉流的用戶體驗數據監控架構

導入AWS服務

如何利用卡頓數據改善觀看體驗

# Why Multi-CDN strategy ?

# Why Multi-CDN Strategy ?

## 網路覆蓋

推拉流端的設備以及網路環境多樣

跨國的網路覆蓋

## 備援

降低單一**CDN**故障的風險

**CDN**廠商的局部節點錯誤

# Why Multi-CDN Strategy ?

## 容量擴展

大型活動的流量提早分配

非預期的瞬增流量

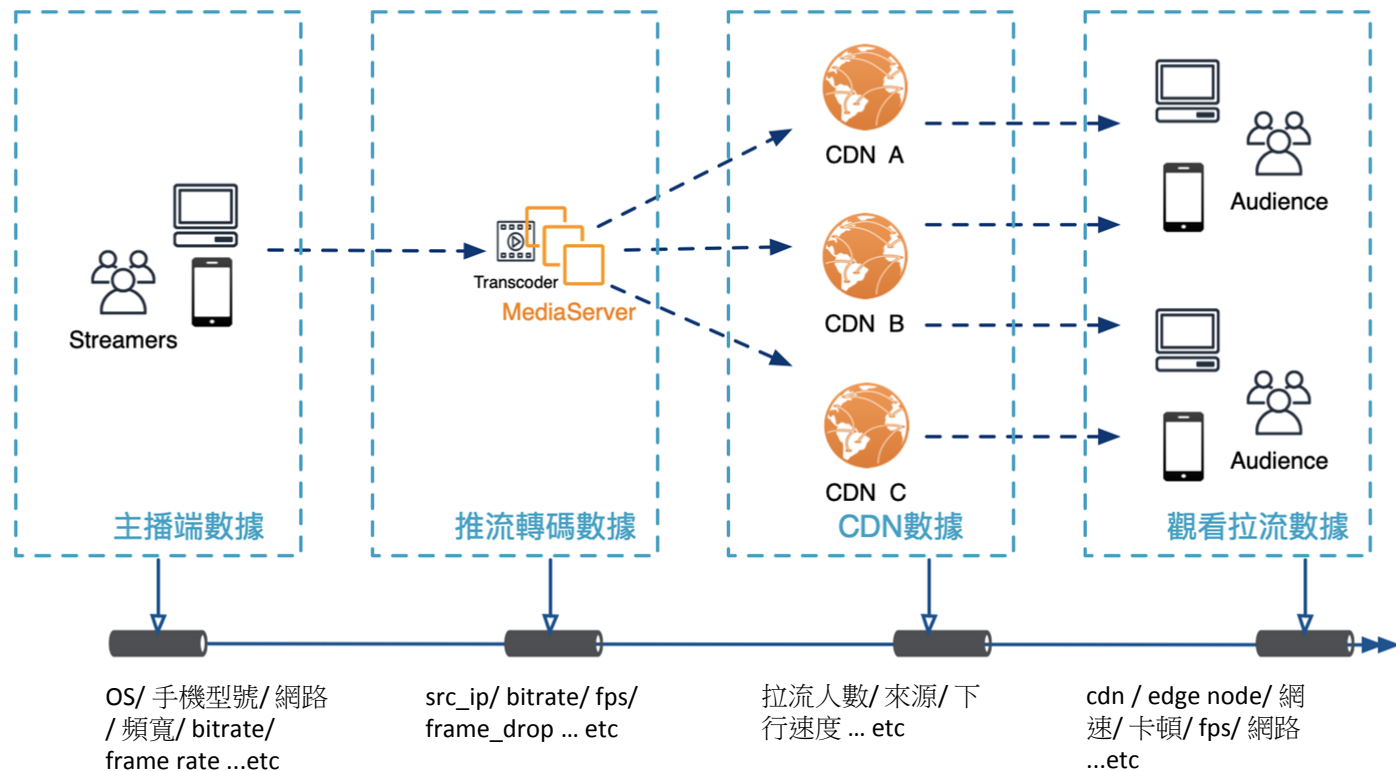
## 成本彈性

預算控制 (流量計價 v.s. 峰值計價)

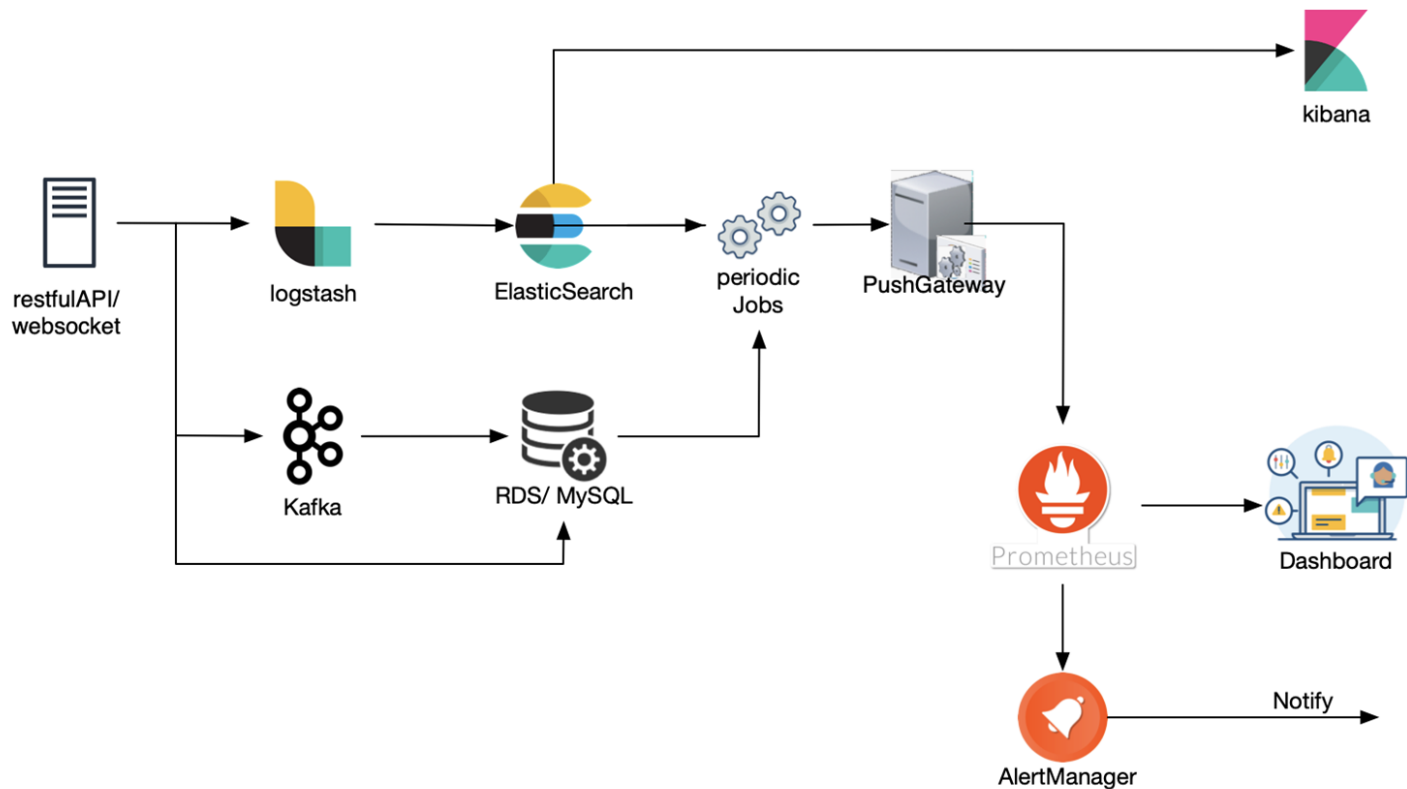
議價空間

# True Visibility into User Experience

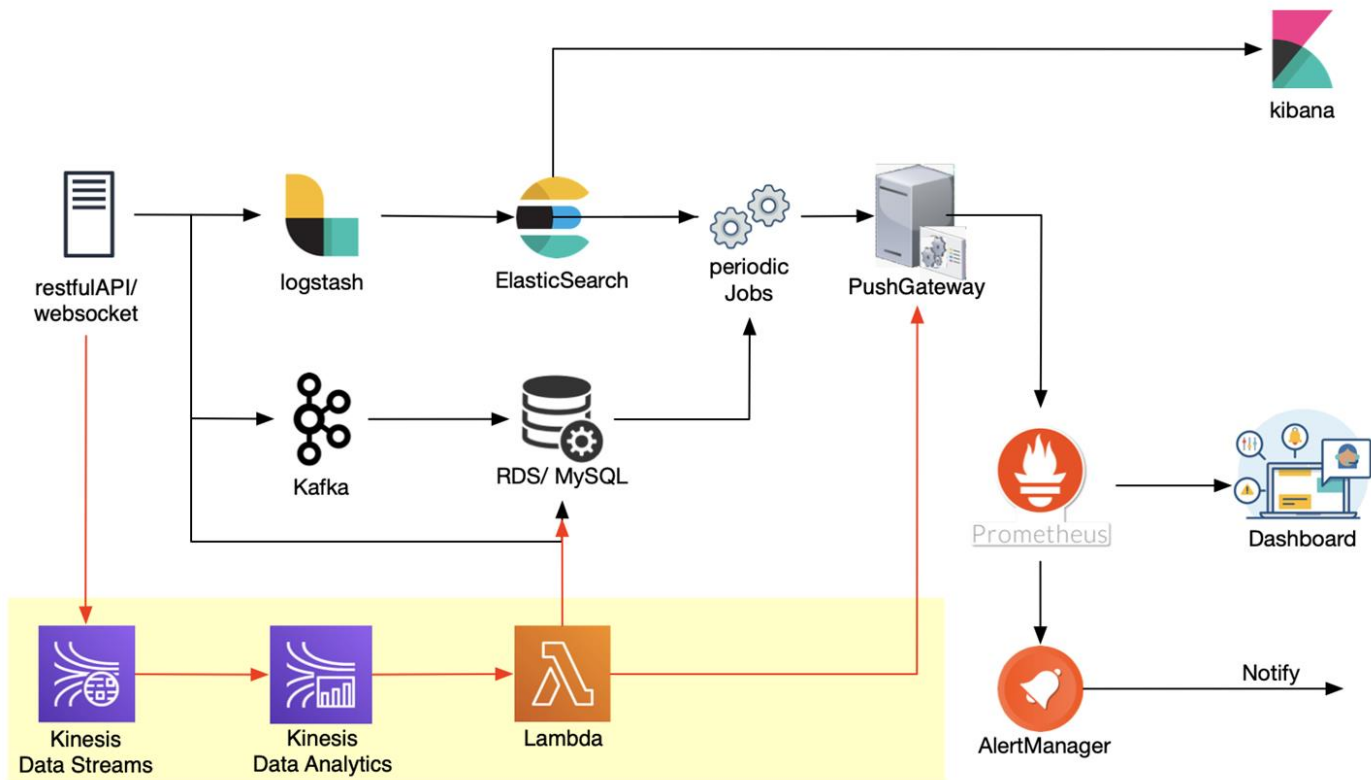
# 數據收集



# 推拉流狀態監控架構



# 推拉流狀態監控架構 (Phase II)





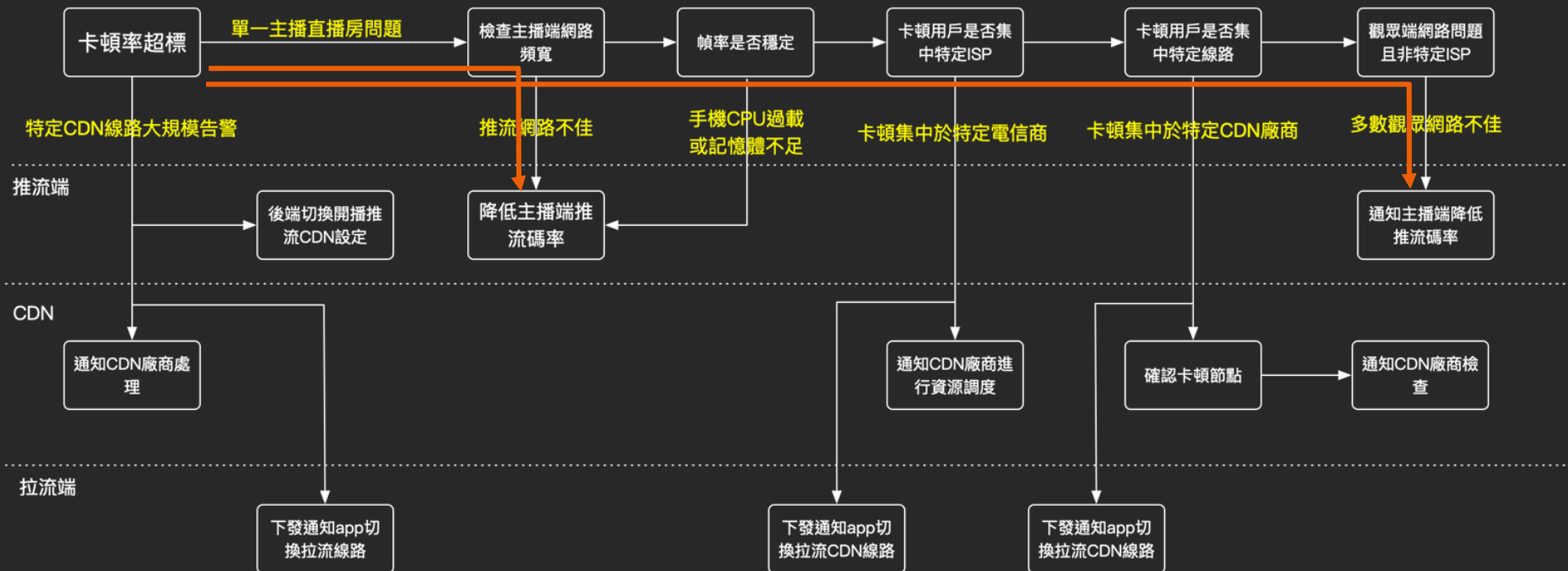
# 觀看體驗的監控與警報



# 觀看體驗的監控與警報

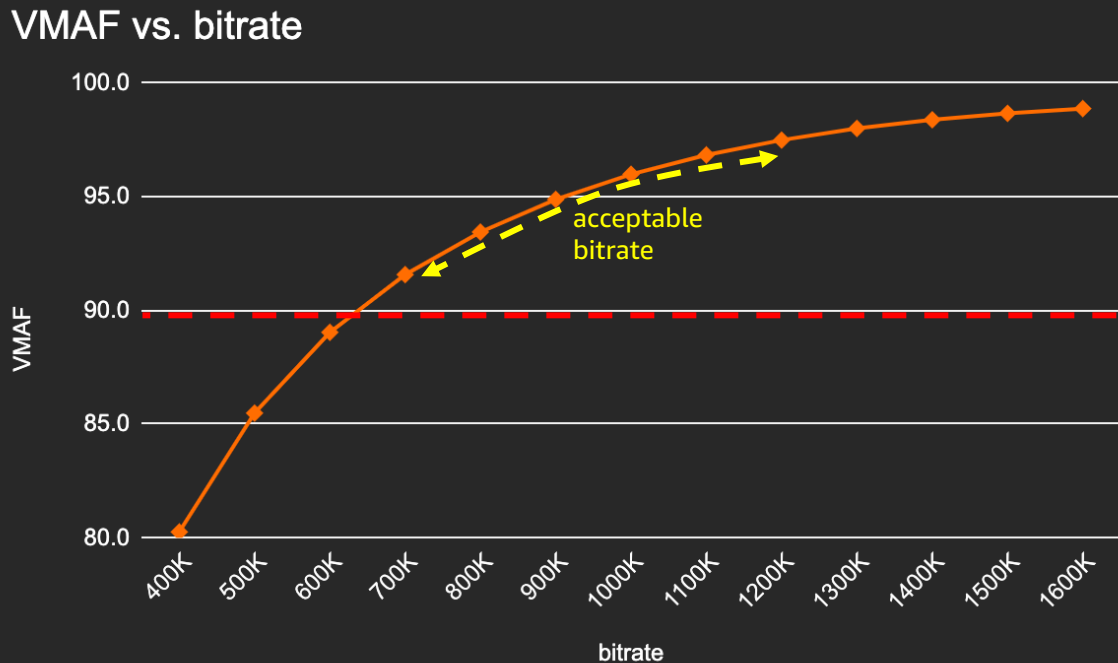


# 觀看體驗的監控與警報



# 利用監控數據改善用戶體驗

**Dynamic bitrate manipulation:** 局部最佳化 → 全局最佳化



# 利用監控數據改善用戶體驗

透過AI手段, Region-of-Interest(ROI) Encoding

original



image matting

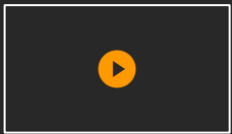


Lower bitrate



ROI encoding enhanced





# Take Away

- Multiple CDN is always a good strategy
- Choose right services to serve business
- Reliable storage to persist logs for monitoring
- Enhancement by whole picture understanding



# Thank you!

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