

# How Netflix Delivers Joy to the World

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TWNOG 5

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# What makes a great **streaming** experience ?



- **Start Quickly**
- **Great Quality**
- **No Interruptions**

**NETFLIX**

# Diverse networks and devices

3G Cable 1700+ device models

LTE Fiber

5G Wifi

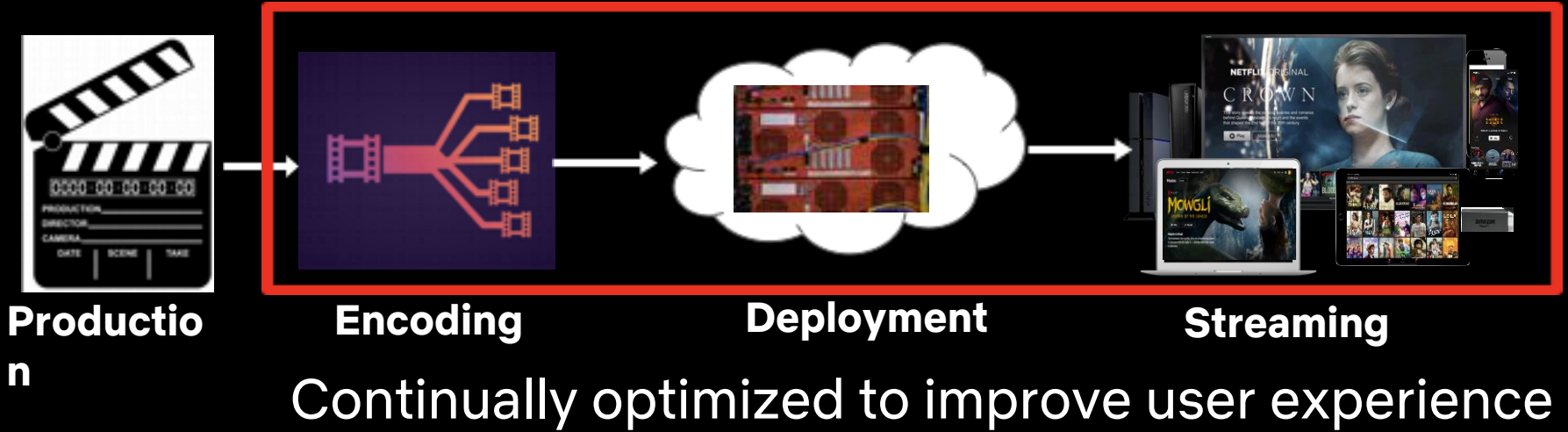
4K HDR

HD SD



NETFLIX

# The Building Blocks of **Netflix Experience**





2011

**One-size-fits-all  
encoding**

**All Titles:**  
Standard Definition  
(SD) at 1000 kbps

2015

**Per-title encoding**

**Titles Vary:**  
640 kbps - 1000 kbps

Today

**Per-shot encoding**

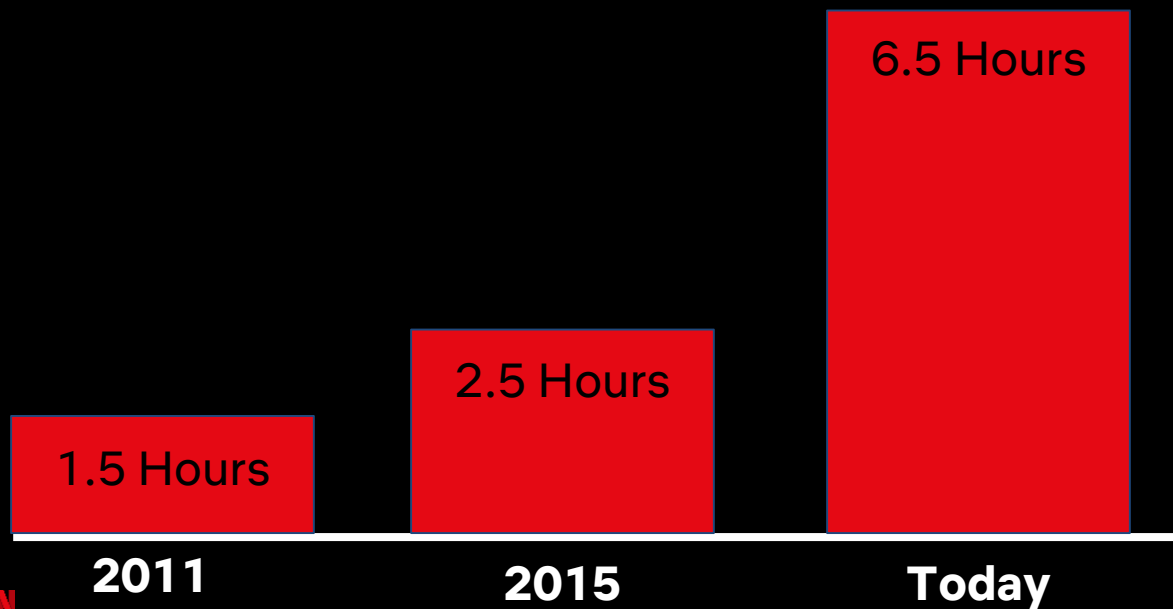
**Dynamic:**  
As low as 250 kbps  
to many Mbps



Video at 250 kbps

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# Hours of Netflix on 1GB of data



**~8 episodes**





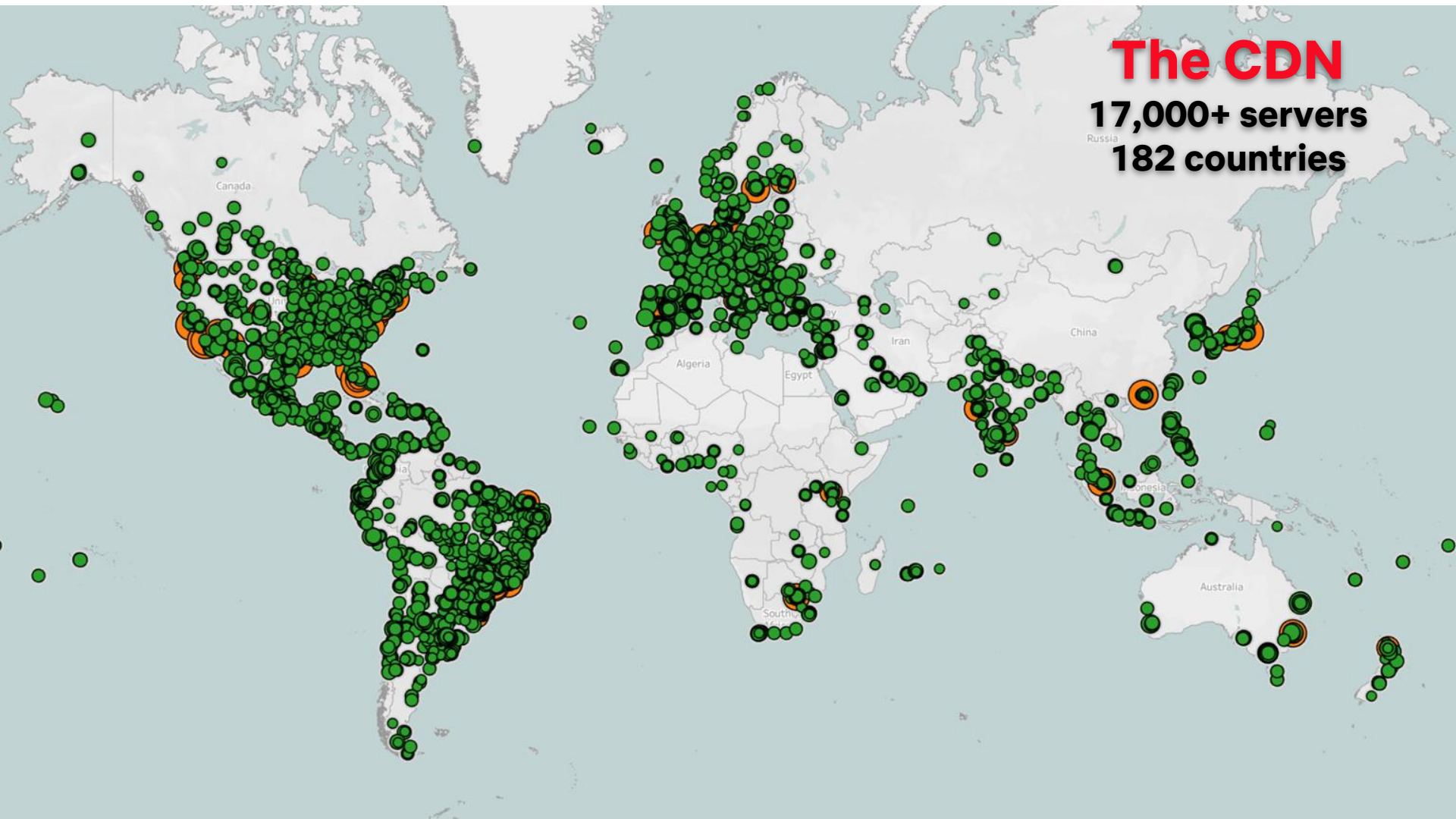
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**Open Connect**

# The CDN

17,000+ servers

182 countries

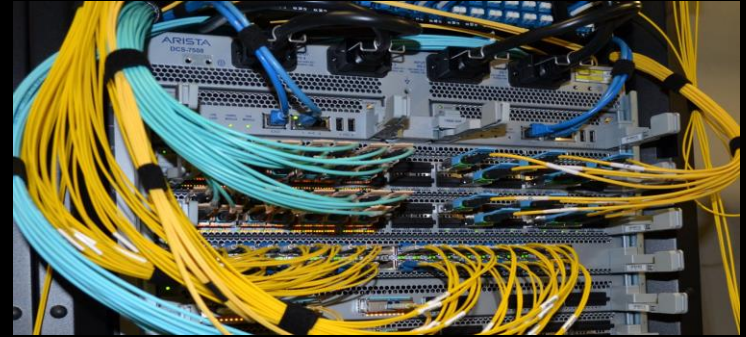




## servers (OCA)



## networks



# Deployment Model



# Internet Routing- BGP

- Border Gateway Protocol
  - Dynamic + Standard method to exchange IP reachability
  - Best path selection algorithm
- BGP “attributes” are used in the best path selection process.

## OUR ASN

**2906**

For Peering

**40027**

For Caching

# Ranking = Best path selection

## Proximity determination

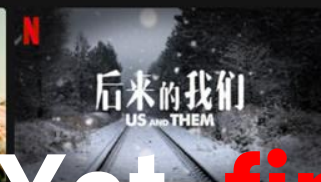
- ❑ Longest prefix
- ❑ Shortest AS path
- ❑ Lowest MED
- ❑ Closest Geolocation

\* When all values are the same then the tie-breaker becomes geographic location.

- ❑ For more information about BGP path selection [explained](#) here.



So much of **Content!**

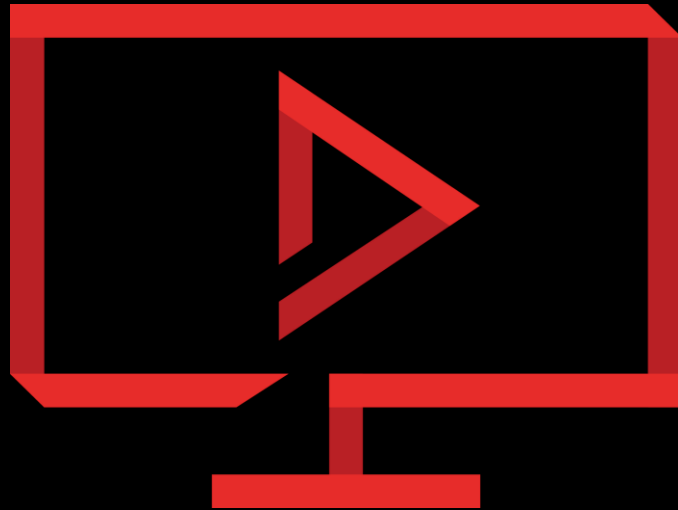


Yet, **finite**

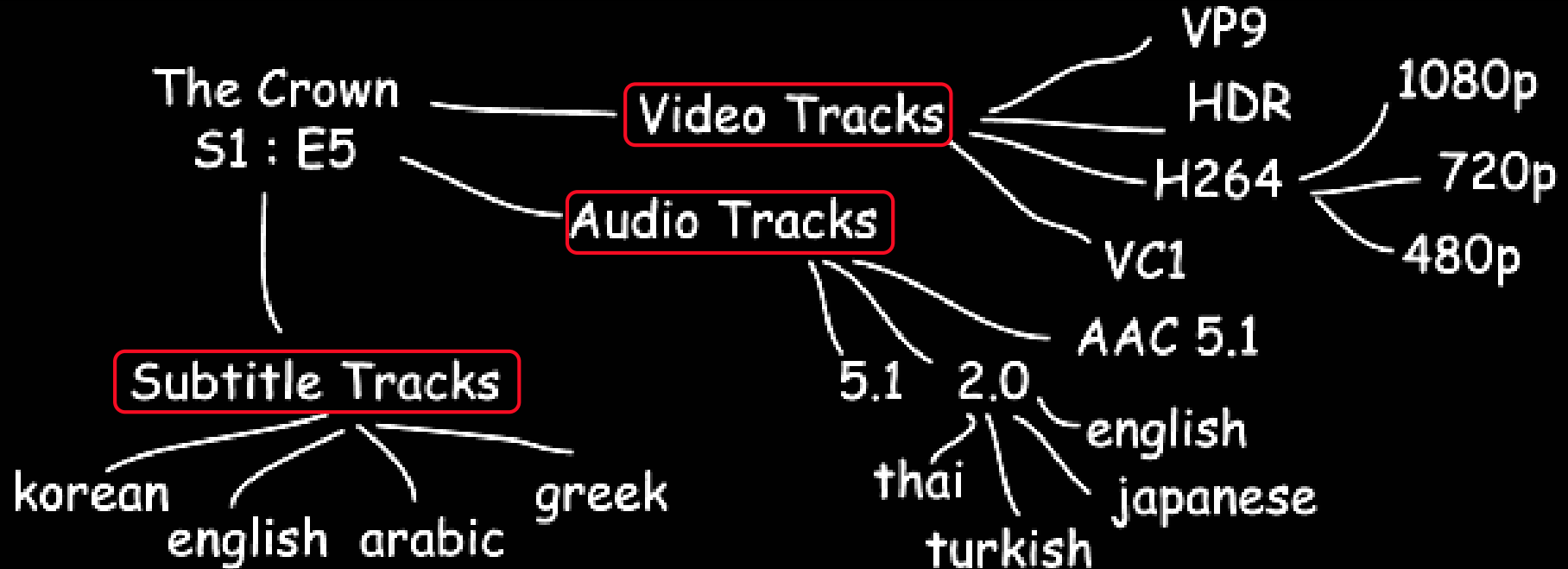




Every bit starts with a member pressing “Play”



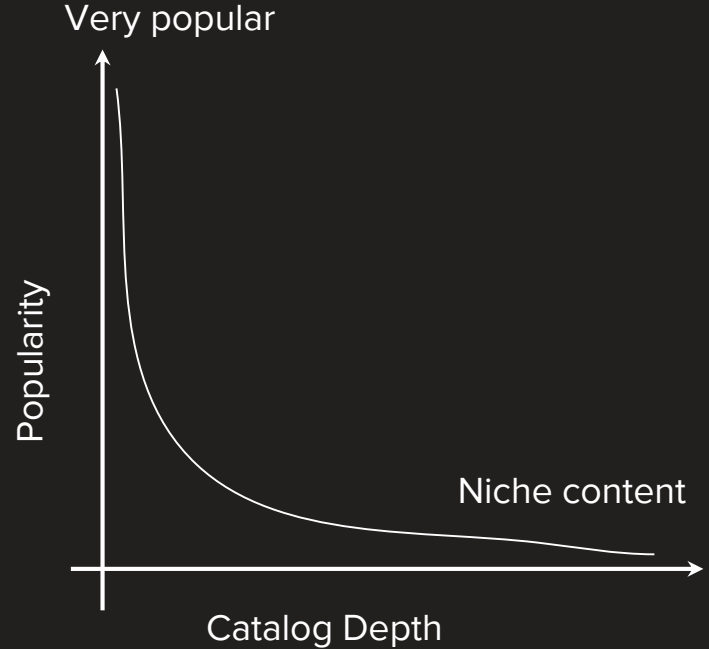
# What makes up a title?

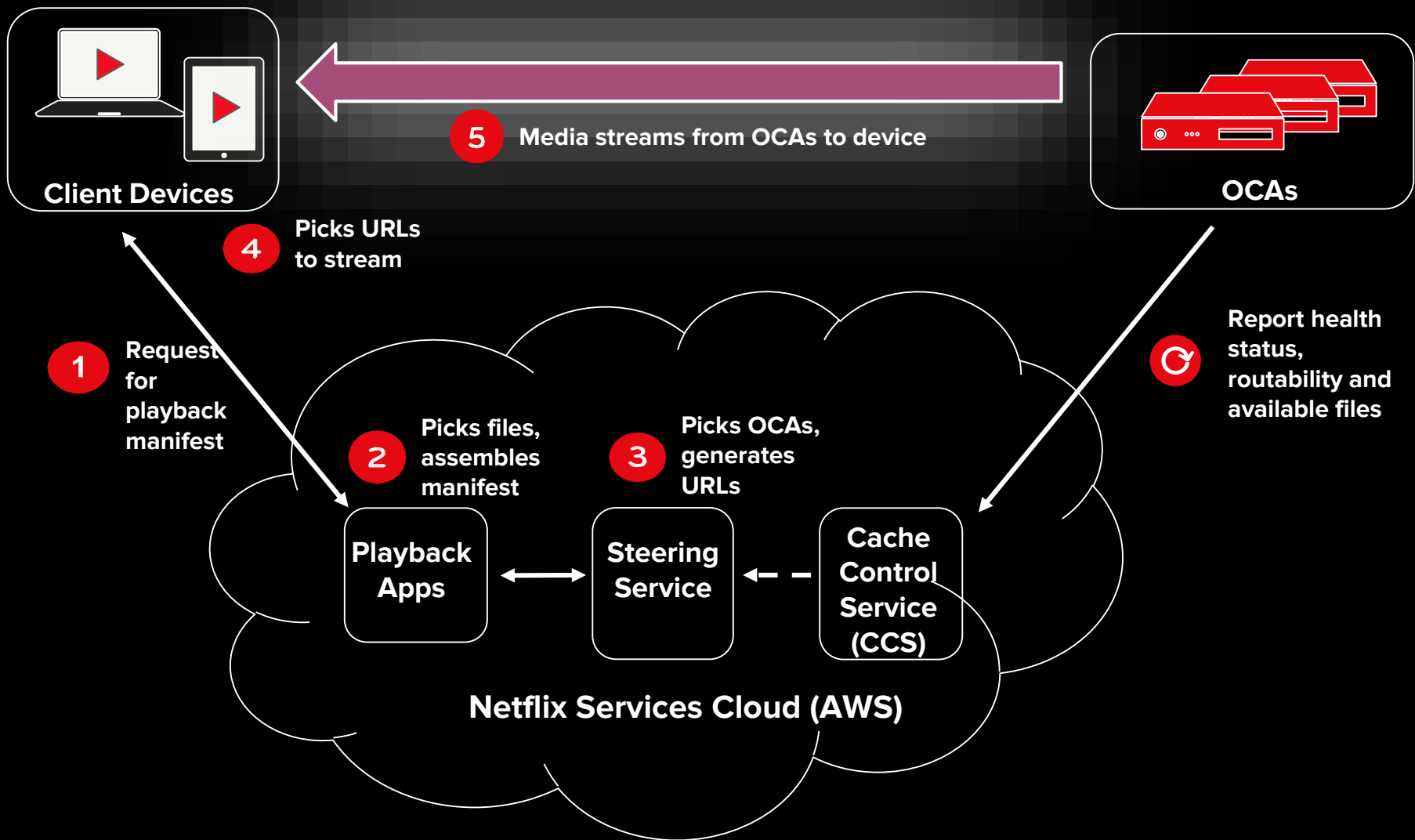


**Content Or Files**

# Predicting Content Popularity

- Historical viewing patterns
- For some titles, we predict based on how heavily the title will be marketed.
- For content that is launching on Netflix for the first time, we look at various internal and external forecasts to come up with a prediction of how a title will perform and normalize this with 'organic' predictions.



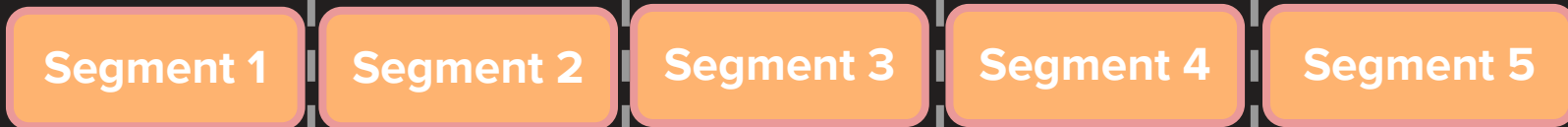


# Video quality adapts based on changing network conditions

High quality



Mid quality



Low quality



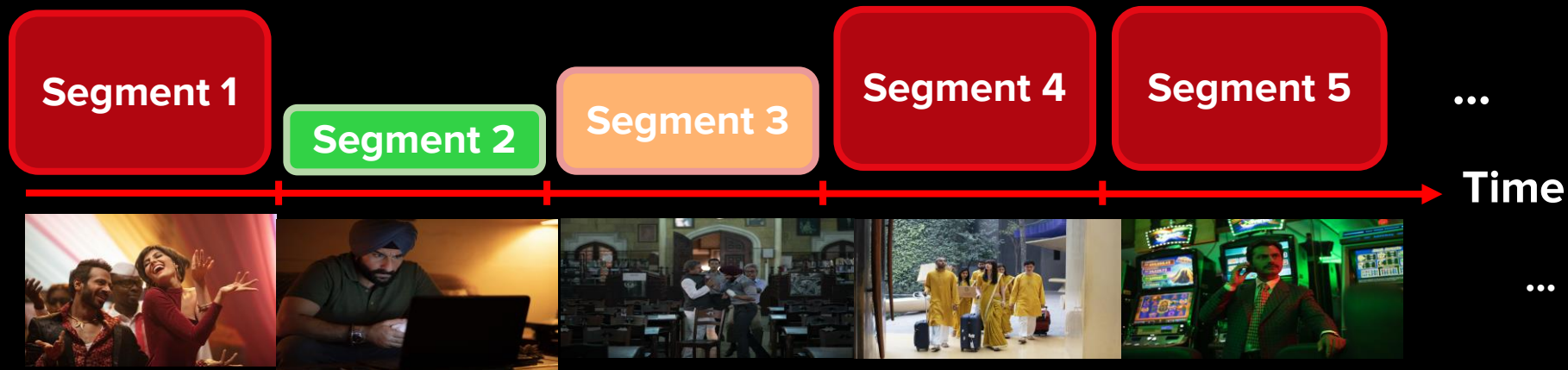
Time





# Adapt video quality based on changing conditions

Resulting experience



# NETFLIX TOP 10



Taiwan (TV) Apr 15 - Apr 21, 2024

# NETFLIX TOP 10



Taiwan (Films) Apr 15 - Apr 21, 2024

# Thank You