



BEST PRACTICES: CROSS-BORDER STREAMING DELIVERY TO CHINA & SOUTHEAST ASIA

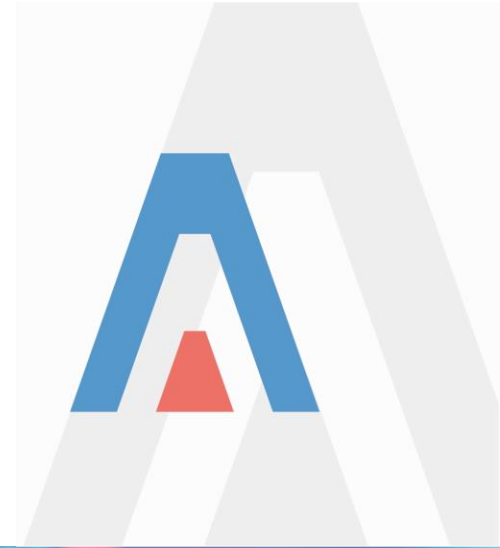
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BaishanCloud North America Corporation



Agenda

- Internet opportunities in China and Southeast Asia
- Challenges to deliver streaming content to these areas
- Best practices and case studies
- How Baishan helps
- Q&A





About BaishanCloud

- A leading global cloud data service provider focusing on cross-border cloud content delivery and edge security.
- BaishanCloud's cloud delivery platform is designed to fulfill the data-transmission, data-security, and data-governance needs of Internet and enterprise customers

370

Employees

7

Offices Globally

600+

Corporate Clients

400+

IP Patents Filed

70%

R&D Workforce





Cloud Delivery

Fast, reliable and secure content delivery to users



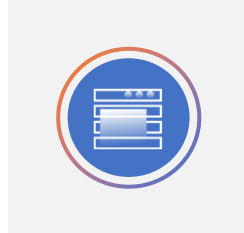
Streaming

Seamless streaming experience to users anywhere on any device



Cloud Security

Ultimate security protection against all types of cyber-attacks



Dynamic Acceleration

Reliable real-time, interactive and personalized content delivery at the edge



BaishanCloud Product Offering

BaishanCloud provides advanced cloud technology and solutions to deliver seamless digital experience to millions of users in China, Asia and beyond.



BaishanCloud Global Network Footprint



400+ PoPs Globally

300+ Cities across 6 Continents

30+ International Partners

Strong ISP Interconnectivity



Trusted by over 600 Corporate Clients



Streaming Opportunities in China

China Internet Market:

- Home to the largest internet community in the world; 854 million internet users in 2019, 3 times of US
- 847 million mobile netizens, 99.1% of total

China Streaming Market:

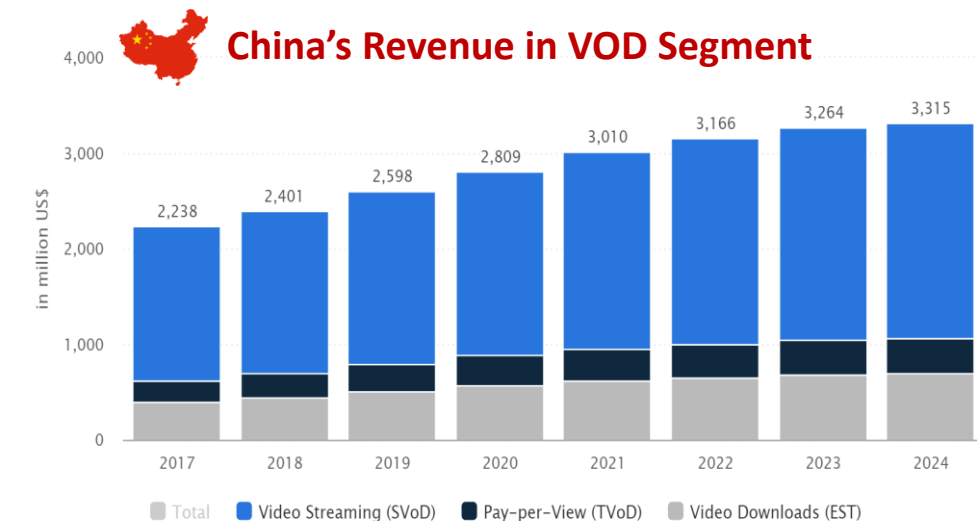
- World's largest live streaming user base (500million)
- World's largest game market with live game streaming growing at a GAGR of 18.9%

Drivers:

- Extended access to mobile internet
- Faster internet service with lower cost
- Popularity of live e-commerce; online gaming, short-videos; social streaming, etc
- Strong economy and spending power

Impact:

- Regardless of strong local competition, China has a growing appetite for streaming services from outside of the country, such as enterprise conferencing/streaming solutions, e-sport/game streaming; luxury brand event streaming; online education streaming, etc.



Streaming Opportunities in Southeast Asia

SE Asia Internet Market:

- 360 million internet users in 2019
- Fastest growing internet economy in the world

SE Asia Streaming Market:

- 4 million SVOD accounts 2019; 6.2 million by 2022
- SVOD market valued at \$390 million by 2022

Drivers:

- Increased access to internet
- Mobile devices becoming more affordable
- World's fastest growing mobile gaming market
- Rising middle class; uplifted living standards

Impact:

- Social entertainment, online gaming, online travel and e-commerce live-streaming are gaining strong momentum
- Now is strategic time to enter the emerging markets and grow as consumers develop mobile internet habits

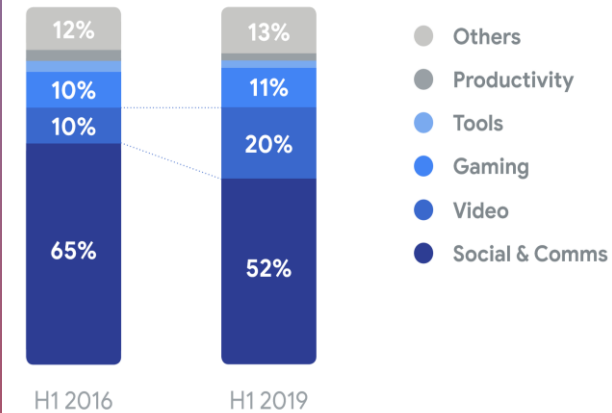
\$11B

in Online Advertising,
Gaming, and
Music & Video on Demand

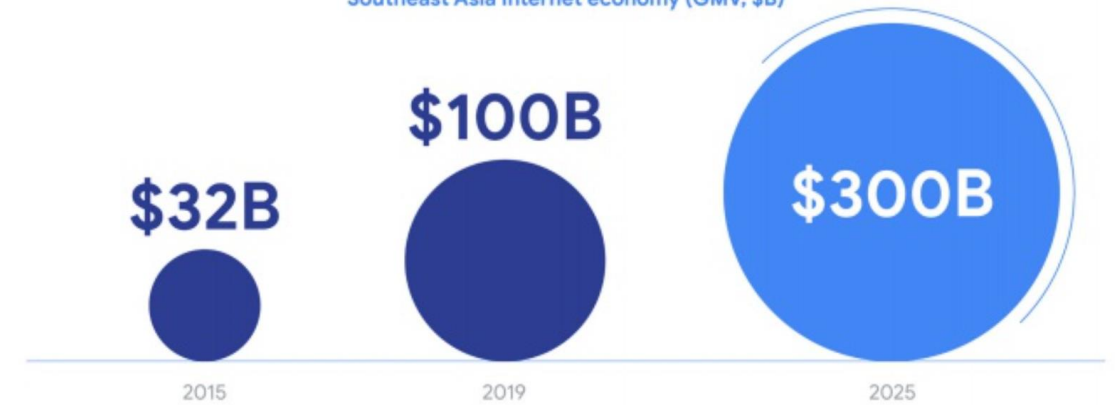
#1 most engaged
mobile users
globally live in
Southeast Asia



Share of time spent (Apps by category, %)



Southeast Asia Internet economy (GMV, \$B)



From US\$32 billion to US\$300 billion within 10 years. IMAGE: e-Economy SEA 2019 report.

Challenges for Streaming Delivery to China and Southeast Asia

Network

- Unique network environment
- Network coverage; in-country service PoPs
- Interconnectivity with local carriers and ISPs

Security

- Sophisticated cyber-attack types
- Higher cyber-attack volume vs. other regions in the world
- Importance of customer data/privacy protection

User Experience

- Slow video playback
- Poor service availability
- High buffer rate
- Compromised user experience and decline of viewership

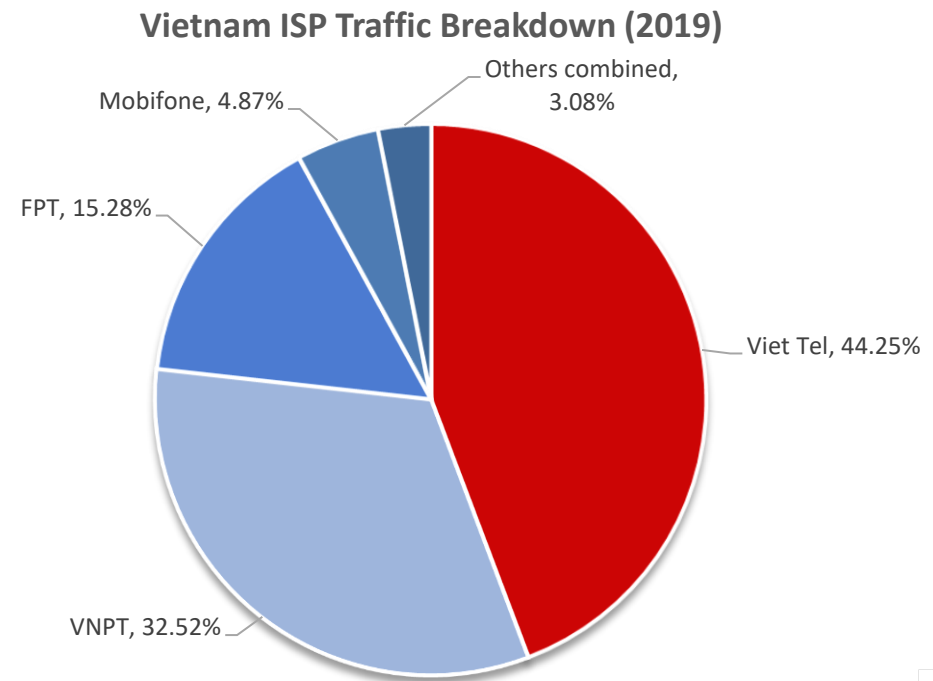
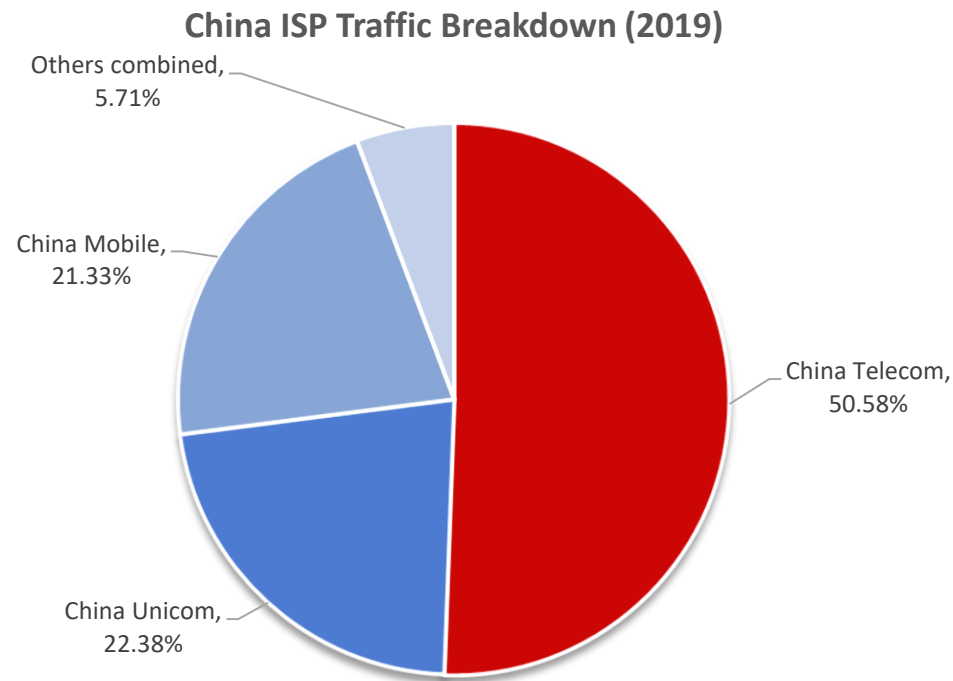
Local Compliance

- Network setup and operation rights
- ICP registration requirement
- Local compliance on nature of content delivery in China and SEA countries.



Best Practice 1 – Understand Your User Distribution

- **PoP location matters.** Understand your audiences' geographical distribution and network environments then choosing the solution provider with the most appropriate resources.
- China and many SEA countries are dominated by state-owned telecommunication providers with limited peering between each other.



Best Practice 1 – Understand Your User Distribution (Cont'd)

China Cross-City and Cross-ISP Network Latency

Data: Baishan backbone monitoring

	Beijing, CU	Beijing CT	Beijing, CM
Beijing, CU	0.5 ms	5ms	13ms
Shanghai, CT	30ms	15ms	35ms

High packet-loss from Beijing CT to Beijing CU

```
My traceroute [v0.85]
lt-beijing-beijing-10-123-125-16-19 (0.0.0.0) Wed Mar 25 02:08:13 2020
Keys: Help Display mode Restart statistics Order of fields quit
          Packets
Host      Loss%  Snt  Last  Avg  Best  Wrst StDev
1. 123.125.16.1      15.8%   20   0.3   0.4   0.3   0.5   0.0
2. 100.64.255.1     10.5%   20   0.3   0.3   0.2   0.4   0.0
3. 61.135.112.53     0.0%   20  15.4   5.5   0.6  22.3   7.9
4. ???
5. 219.232.11.253     0.0%   20   1.7   2.9   1.5  16.4   3.4
6. 123.126.0.125     0.0%   20   1.4   2.1   1.2   9.6   1.8
7. 219.158.13.78     0.0%   20   2.2   4.1   1.3   7.8   2.1
8. 219.158.44.118    78.9%   20   2.1   2.1   2.1   2.2   0.0
9. 202.97.88.238    15.0%   20   2.4   2.3   2.1   2.7   0.0
10. 220.181.177.242  84.2%   20   2.5   2.5   2.4   2.5   0.0
11. ???
12. 218.30.109.86     0.0%   20   1.8   3.1   1.8  26.3   5.4
13. ???
14. ???
15. 106.38.222.5      0.0%   19   2.4   2.4   2.3   2.5   0.0
```

- **PoP location matters.** Understand your audiences' **geographical distribution** and **network environments** then choose the solution provider with the most appropriate resources.
- When testing solutions provider, make sure to test from the cities and ISPs of where you users are.
- Useful metrics: connect time, time to first frame, play per users, buffer rate, duration per user.
- Useful tools to understand your users network environment for China and SEA countries:
IP database: <https://www.ipip.net/>
Network latency: <https://www.17ce.com/>



Best Practice 2 – Optimize Your Stream Quality and Availability

Users are expecting high quality streams at their fingertips.

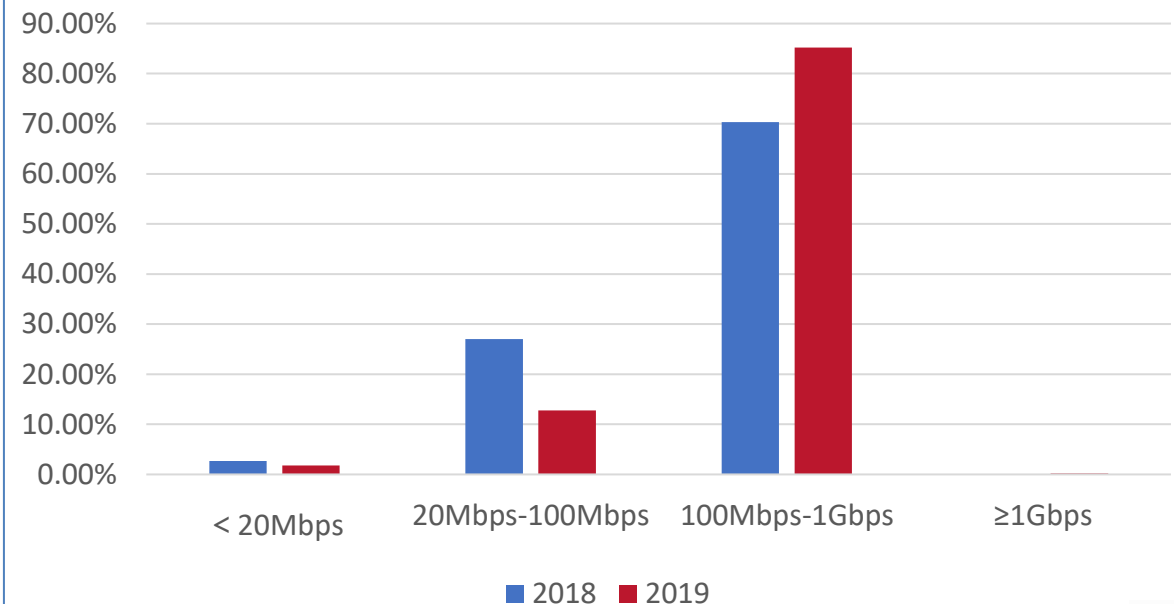
- Move library or stream source closer to the users.
- Set up redundancy and programmatic failover for both VOD and live streaming.
- Adaptive bitrates from the lowest to the highest bitrate to cover all network types and clients.
- Cache manifest file for live streams.
- Real-time logging to react instantly.

Average Network Latency

Data: Baishan backbone monitoring

	Taiwan	Hong Kong	Tokyo	Seattle	Paris	London
China	100ms	130ms	150ms	250ms	180ms	185ms

Average Household Bandwidth in China



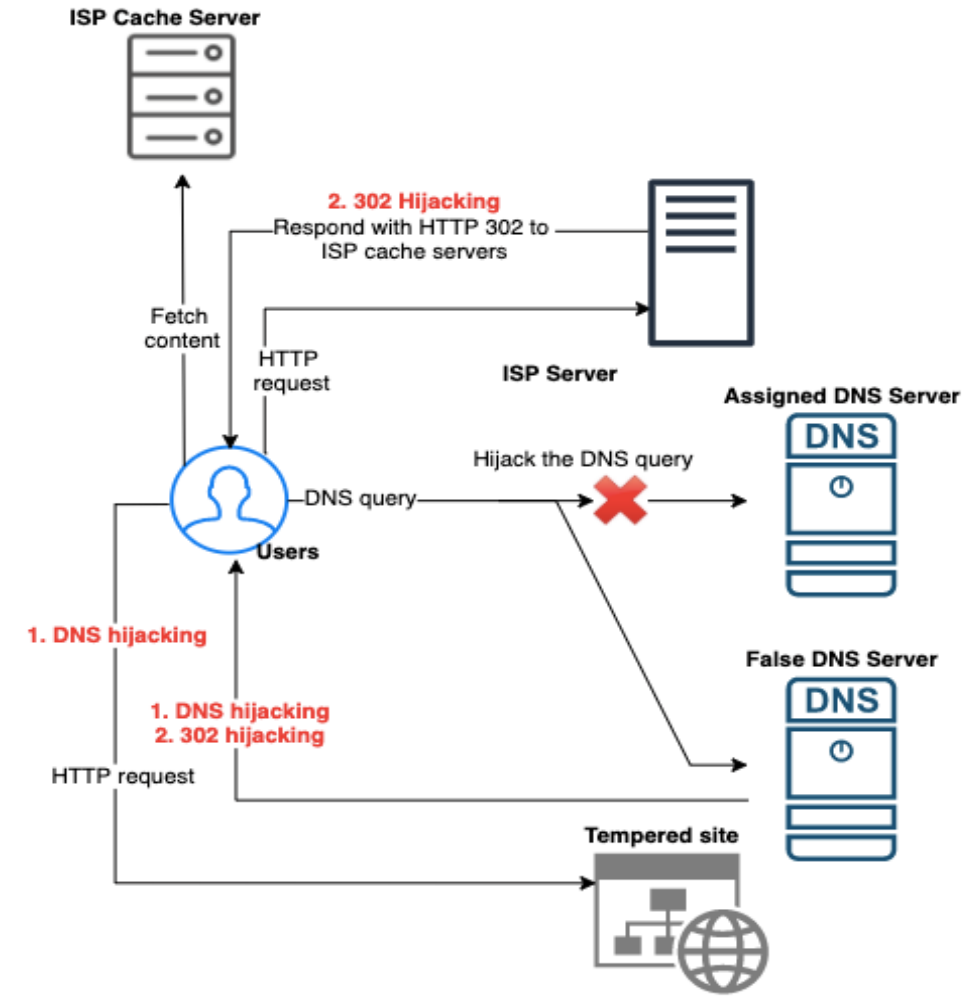
Best Practice 3 – Ensure Content Compliance

- Audit the content to ensure the compliance with regulation and to avoid getting on local government's radar.
- Review your content library.
- For user generated videos or live streams,
 - Enable instant content control to purge sensitive content without impacting other broadcasters
 - Implement image-based filtering logics to audit streams frame by frame.
 - Recruit local support for auditing the content manually.
 - Work with solution providers with established abuse reporting process with local ISPs.



Best Practice 4 – Recognize Regional Hijacking Behavior

- Content hijacking from ISPs is very common in China.
- **Reasons of the hijacking users' requests:**
 - Reduce cross-network bandwidth cost
 - Advertisement monetization
 - Prevent users from accessing the site
- **Two common types of ISP hijacking:**
 1. DNS hijacking – respond with false DNS record to lead users to tampered sites with advertisement.
 1. Domain hijacking by issuing 302 redirection – redirect users to their own cache servers in order to serve the requests within network.
- Work with solution provider to report to ISP



Case Study 1

Online Game Tournament Live Streaming

Background:

- One of the largest online gaming platforms
- US-based streaming platforms with over 90 million monthly active users globally.

Challenge:

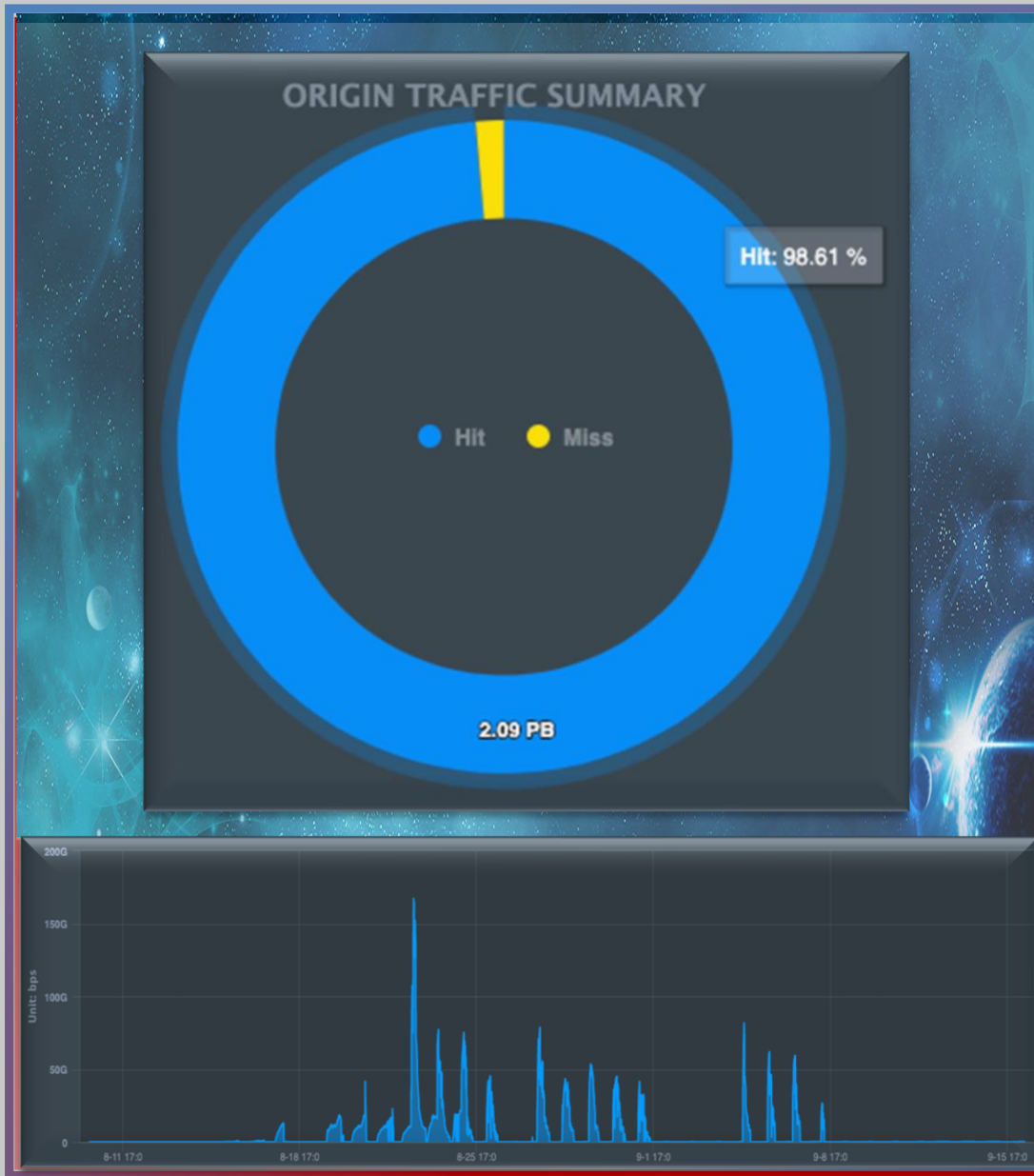
- Biggest tournament was starting in a week, but the performance provided by previous provider was not satisfactory.

Solution:

- Baishan live streaming solution for HLS and DASH
- Moved stream source to Hong Kong
- Adaptive bitrate and file-based caching

Results:

- Successfully delivered live tournament with 100k concurrent users at 163Gbps peak
- 150% improvement in per segment throughput
- 98% hit rate during live event



Case Study 2

Short Video Social Media App

Background:

- Largest short-video social media app with growing user base in Southeast Asia
- China-based short-video app looking to improve their performance in Southeast Asia as they have users spreading across every ISP. Over 500 million monthly active users worldwide. 150 million users Southeast Asia.

Challenge:

- Slow performance on certain ISPs in Southeast Asia.
- Due to company policy, they've moved content auditing to each country and need instant content control.

Solution:

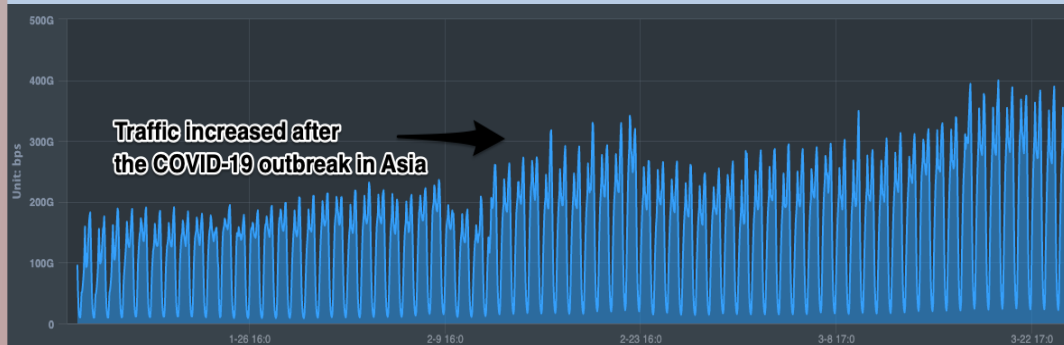
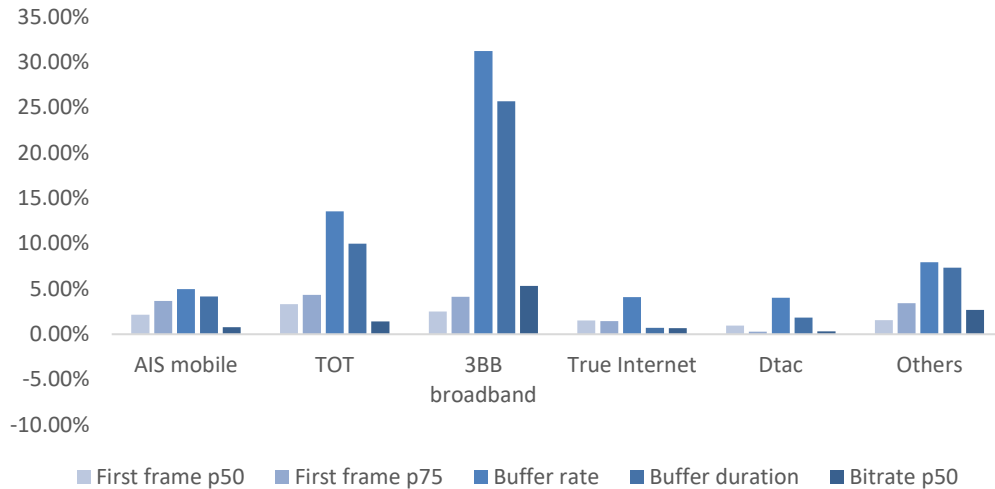
- Baishan's local resources in Southeast Asia
- Localized content auditing using Beishan's fast prewarming and purging feature.

Results:

- Increased local content auditing efficiency by 50%
- Average of 1% increase in video played per user
- Positive performance improvement in major ISPs
- Support growing traffic due to COVID-19 outbreak

Baishan Per-ISP Performance Improvement

Comparing to Previous Provider



How Baishan helps?

Our extensive network coverage, expertise in hard-to-reach markets, highly customizable solutions and top-class global service have made us a preferred and trusted provider of cloud data services to clients all over the world.


Download our corporate deck for more details.



**Extensive
Network
Presence**



**China/Asia
Expertise**



**Full-Service
Edge Delivery
& Streaming
Solution**



**Global
Professional
Support**



Thank You! Questions?



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