



The OTT Challenge

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ThaiNOG Day 2019
Bangkok, Thailand
8th May, 2019



Agenda

Akamai Introduction

- Who's Akamai?
- Akamai Intelligent Platform

OTT

- What is OTT?
- What is the challenge?
- What are the expectations?
- The OTT Trend

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Challenges and Approaches

- Akamai Approach
- What can ISP do?

Summary

Akamai Introduction

Akamai Overview

Who is Akamai?

Akamai is a leading provider of a Cloud platform, which delivers, accelerates and secure content and APPLICATIONS over the Internet. Our key differentiator is our highly distributed (intelligent) platform, made up of more than 239,000 servers in 130 countries.

- Publicly traded: (NASDAQ: AKAM)
- Found: August 1998
- Headquarters: Cambridge, MA, USA
- 30+ worldwide offices, including Europe and Asia
- 7,600+ employees worldwide

The Akamai Intelligent Platform

The world's largest on-demand, distributed computing platform delivers all forms of web content and applications

The Akamai Intelligent Platform:

239,000+
Servers

3,900+
Locations

1,600+
Networks

1300+
Cities

130+
Countries

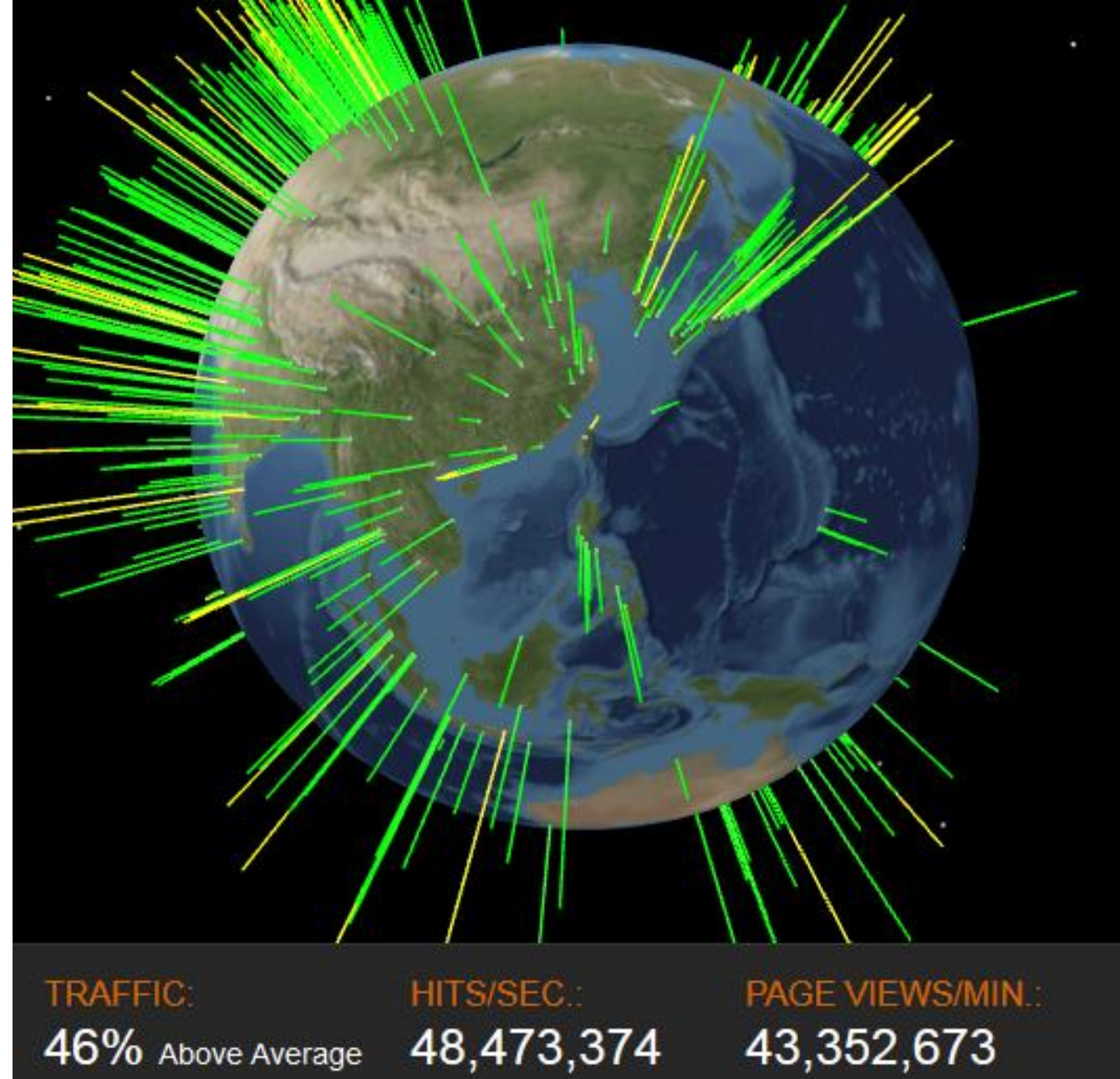


Typical daily traffic:

- More than **3 trillion** requests served
- Delivering over **70 Terabits/second**

Traffic Snapshot

Traffic view shows Internet traffic levels by Akamai server locations in data centers all over the world. Data includes current hits per second and total page views per minute.



What is OTT?

What is OTT?

In [broadcasting](#), *over-the-top content (OTT)* is the audio, video, and other media content delivered over the [Internet](#) without the involvement of a [multiple-system operator](#) (MSO) in the control or distribution of the content.

The Internet provider may be aware of the contents of the [Internet Protocol](#) (IP) packets but is not responsible for, nor able to control, the viewing abilities, copyrights, and/or other redistribution of the content. This model contrasts with the purchasing or rental of video or audio content from an [Internet service provider](#) (ISP), such as [pay television](#), [video on demand](#), and from internet protocol television (IPTV).

OTT refers to content from a third party that is delivered to an end-user, with the ISP simply transporting IP packets.

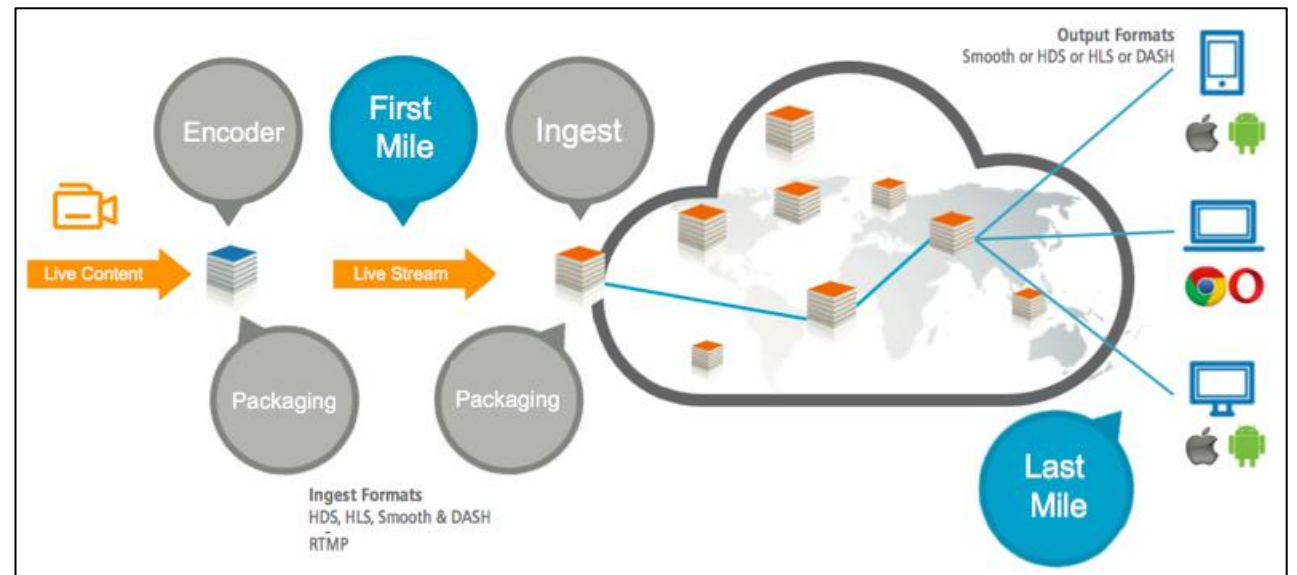
Quote from: https://en.wikipedia.org/wiki/Over-the-top_content

What is the challenge?

By definition, no single entity is responsible for the end to end quality.

For example:

- Broadcasters are responsible for Encoders
- CDN is responsible for Ingest Servers and Delivery
- Local carrier is responsible for First Mile and Last Mile
- End User is responsible for Device



What is the challenge?

Who is responsible for the performance?



All of us are the stakeholders 😊

What are the expectations?

End Users and Content Owner

Expectations

End Users	Content/Broadcaster
<p>Access the video content from anywhere, any devices, anytime</p> <ul style="list-style-type: none"> • Mobile network / Wifi / home broadband from subway, bus, café, etc • Multi-device such as Tablet, Phone, Set Top Box, Game Console, Laptop; etc 	<p>Support all devices, platforms and formats</p> <p>Flash, Silverlight, iOS apps, Android and HTML5</p>
<p>Fast startup times and minimal delay</p> <p>Video plays instantly</p> <p>Minimal buffering time and delay</p>	<p>Scalable capacity for Traffic Spikes</p> <p>Popular concert / sporting event / user generated live content / drama series / movies launch</p>
<p>Personalised and Interactive video</p> <p>Varieties of content such as K-PoP, Japan Animation, Hollywood, Bollywood</p> <p>Localised content such as language and culture</p> <p>End user can consume or broadcast Live Streaming on gaming and daily life</p>	<p>Audience Engagement</p> <p>Concurrent viewers, visits, plays, play duration, low abandonment rate</p>
<p>Video quality comparable to Traditional / Linear TV</p> <p>Higher bit rate e.g. HD / 4K / 8K & Minimal re-buffering or freezing</p>	
<p>Minimal/No subscription fee</p> <p>Minimal/No Ads</p>	<p>Monetise Content / Traffic</p> <p>Premium Content / Subscription Base</p> <p>Target advertising</p> <p>Copyright Protection</p> <p>DRM / Media Encryption / End to end SSL</p> <p>Low Cost of delivery</p>

The OTT Trend

From Akamai Point of View

How big are the online events in the last decade?

Concurrent Users 9.7M

Peak traffic
(Gbps)

4.6M

25000
20000
15000
10000
5000
0

2004 US Election Day 2008 Major Golf Tournament 2009 TV Everywhere 2011 Royal Wedding 2012 Super Bowl 2014 Sochi Coverage 2014 FIFA World Cup 2016 Euro Cup 2017 US Inauguration Day

21

444

1000

1300

1400

3500

6900

7300

8700

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Internet »

IPL 2018

video streaming

Hotstar

video

star india

sports

live sports

Hotstar sets new streaming record with over 10 million concurrent viewers

Star India had earlier paid a staggering Rs 16,348 crore (\$2.39 billion) to secure IPL's television and digital rights for five years in September last year.

Vikas SN | ETtech | May 28, 2018, 17:36 IST

f Share 14 G+ Share in Share T Tweet

Star India's video streaming service Hotstar set a new world record on Sunday with more than 10 million concurrent viewers logging onto the platform to watch the final match of the Indian Premier League (IPL) tournament.

This development comes days after the service had broken the earlier record by notching a record 8.26 million concurrent viewers during the first IPL qualifier match.



CISION
PR Newswire

Hotstar and Akamai set Global Streaming Record during VIVO IPL 2018

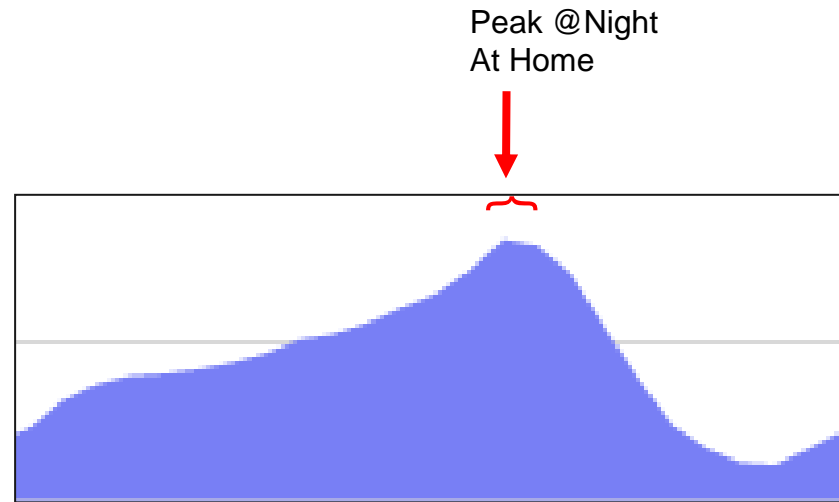
A record for peak concurrent viewers on Hotstar was established during the match between Chennai Super Kings and Kolkata Knight Riders; CDN powered by Akamai



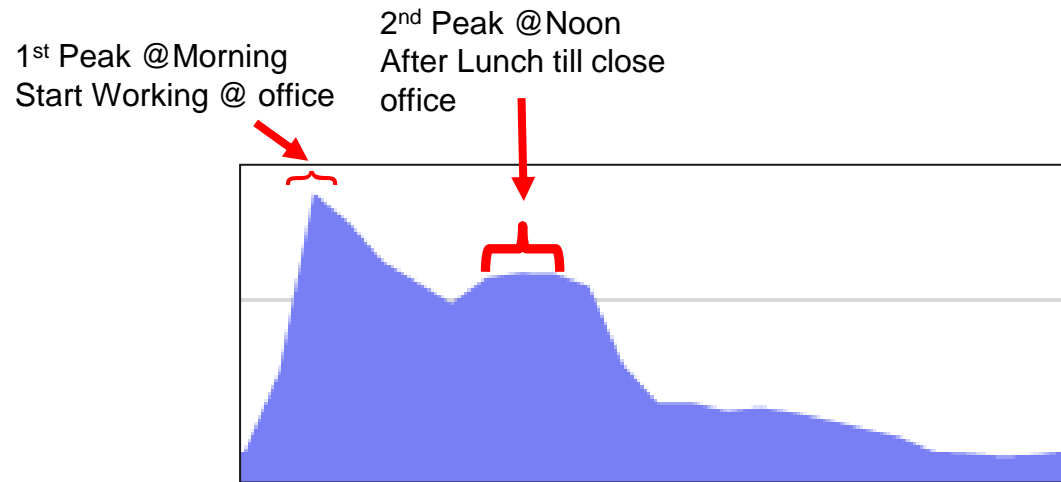
Transformation of Traffic Pattern

Classic Traffic Pattern

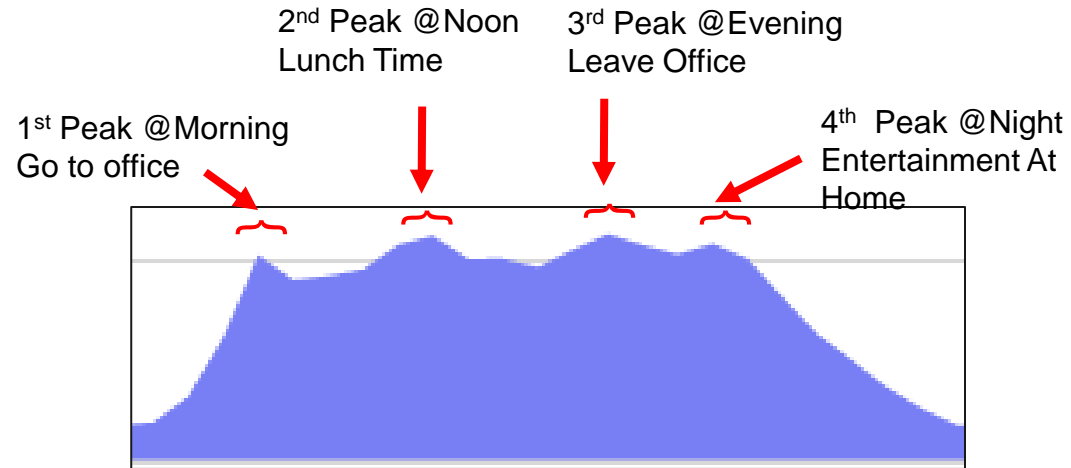
Classic Traffic Pattern: Residential Internet



Classic Traffic Pattern: Corporate Internet



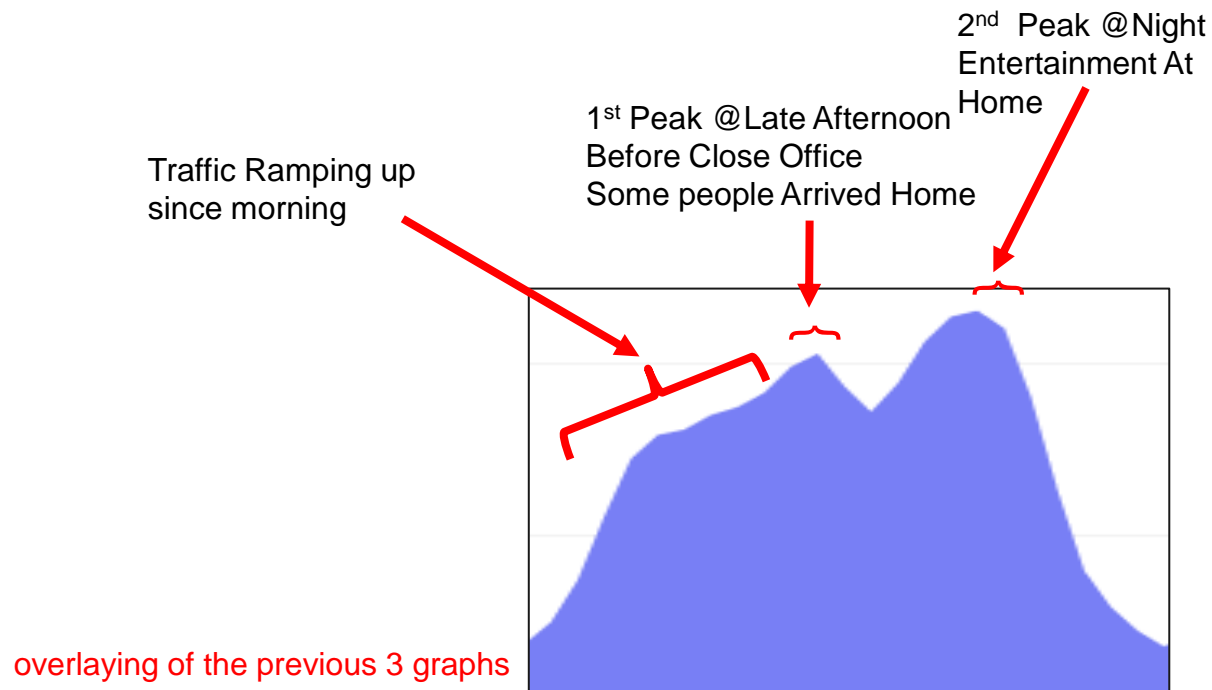
Classic Traffic Pattern: Mobile Internet



Classic Traffic Pattern: Residential + Corporate + Mobile

Classic Strategy

- Let's fully utilize the network by combining Residential, Corporate and Mobile Market

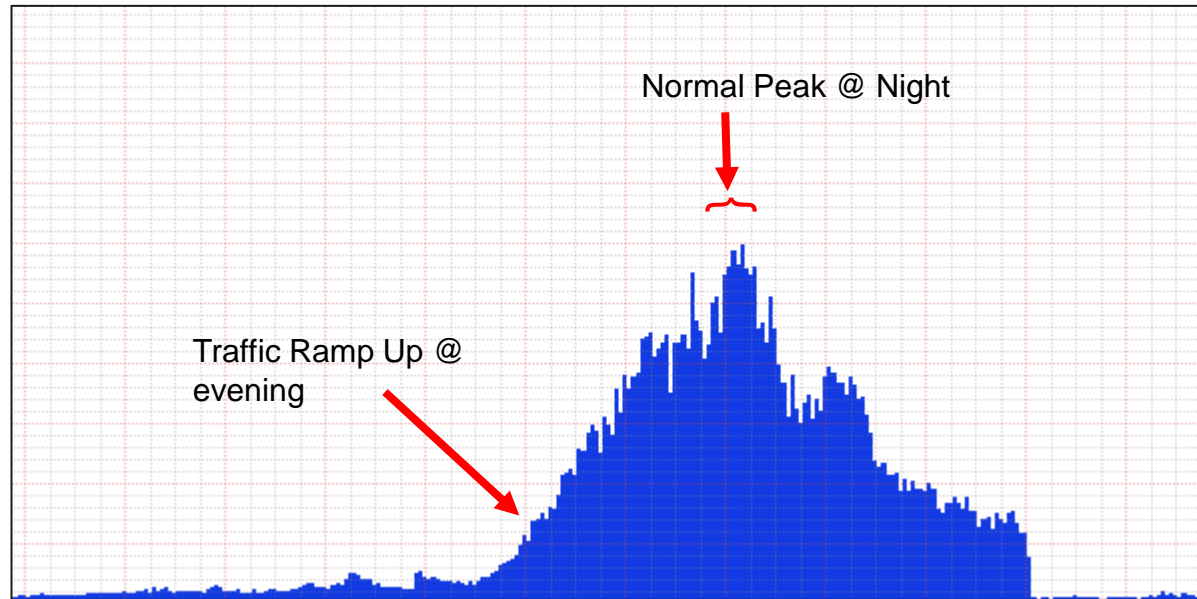


Transformation of Traffic Pattern

New OTT Traffic Pattern

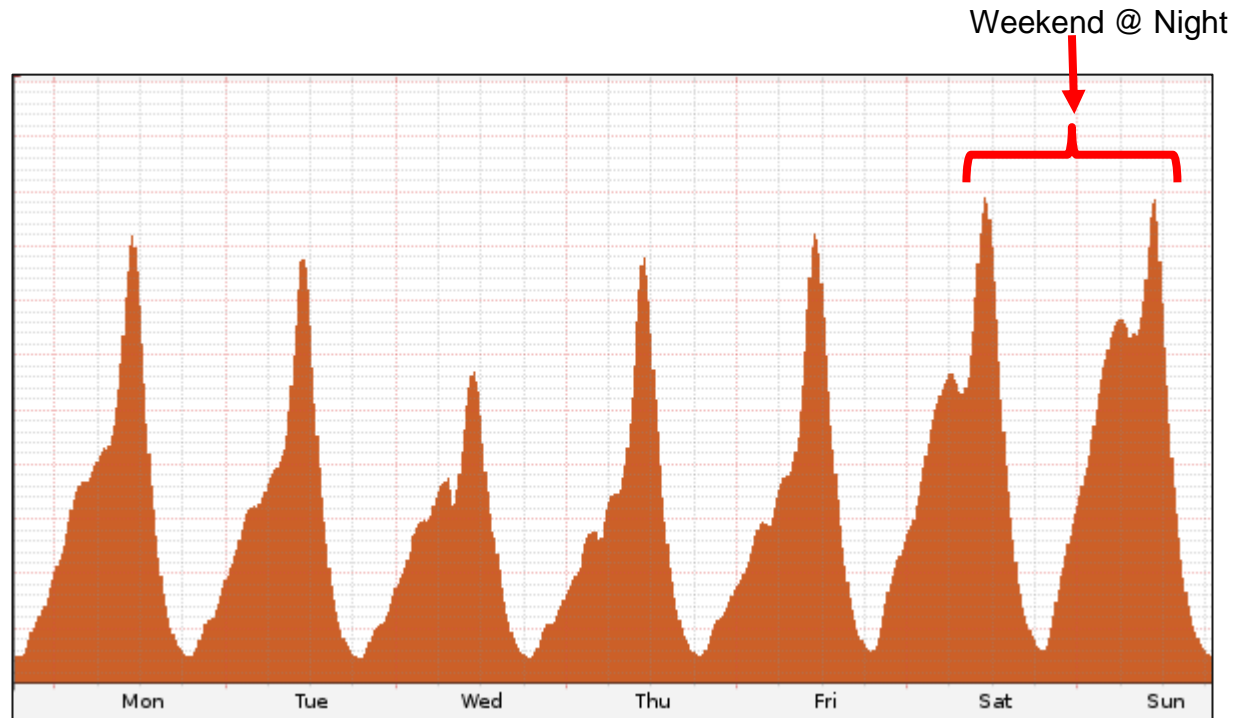
OTT Traffic Pattern: Live TV Streaming

- Most users offline and go to bed on 11pm every night



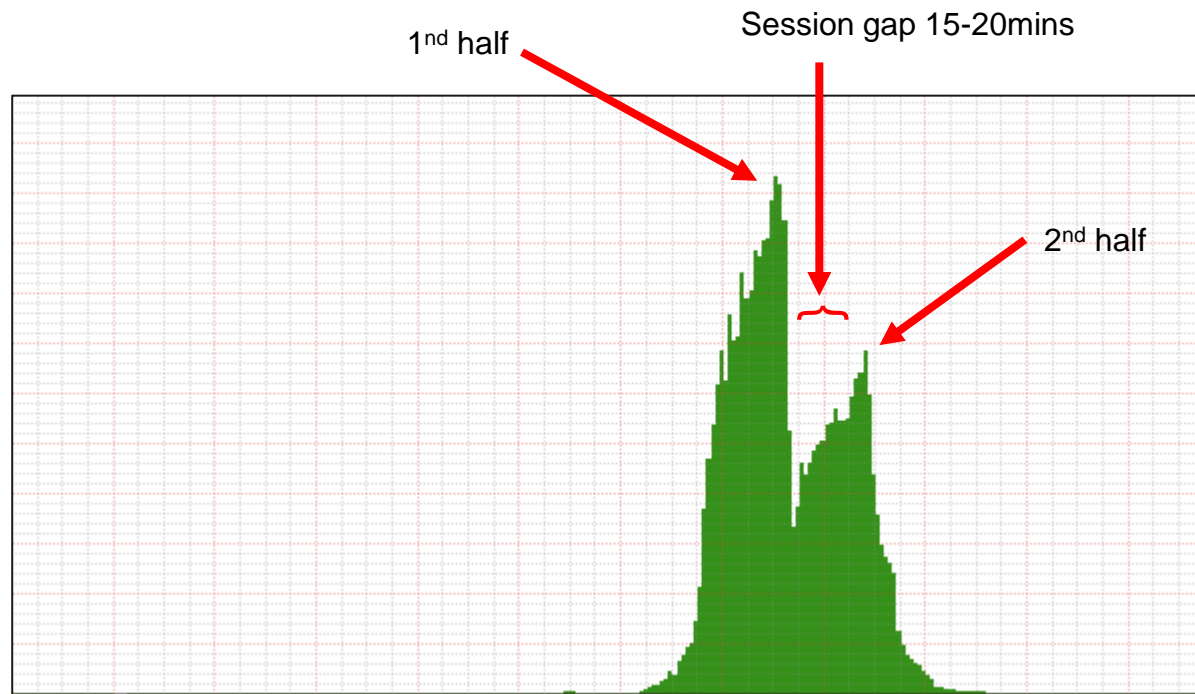
OTT Traffic Pattern: Video On Demand

- Weekday total traffic is higher than weekend, but users consume more video in the weekend and holidays



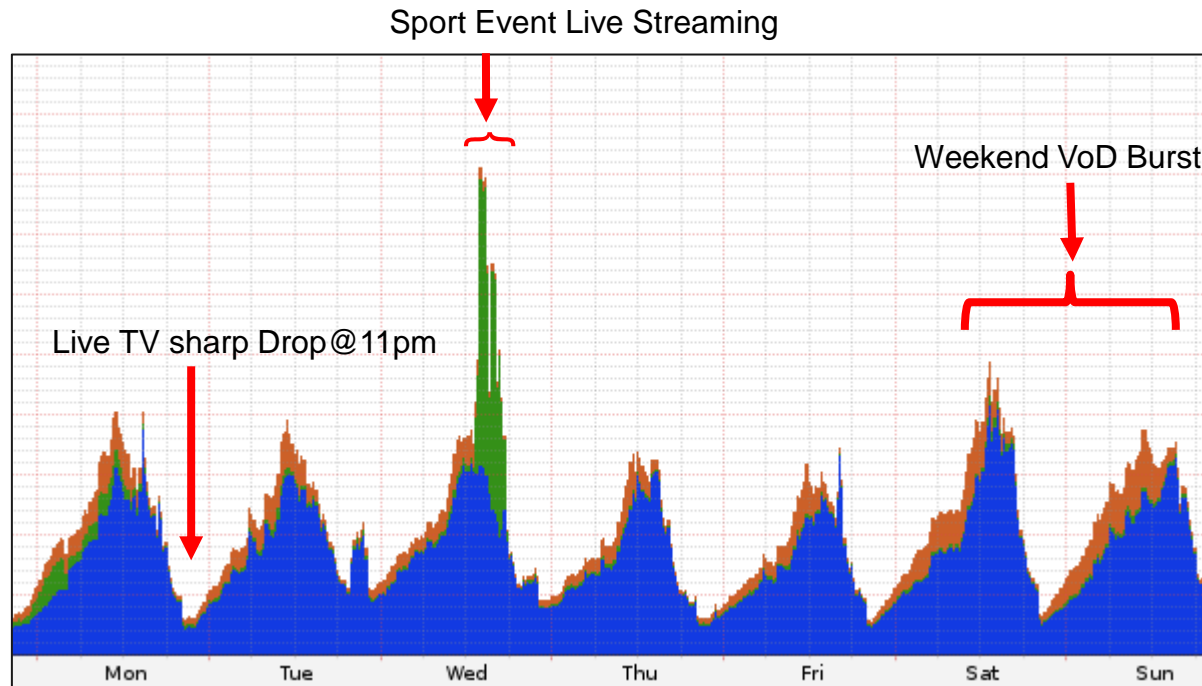
OTT Traffic Pattern: Sport Event – Cricket Live Streaming

- The traffic is 4 times of baseline
- V shape traffic pattern before daily peak time



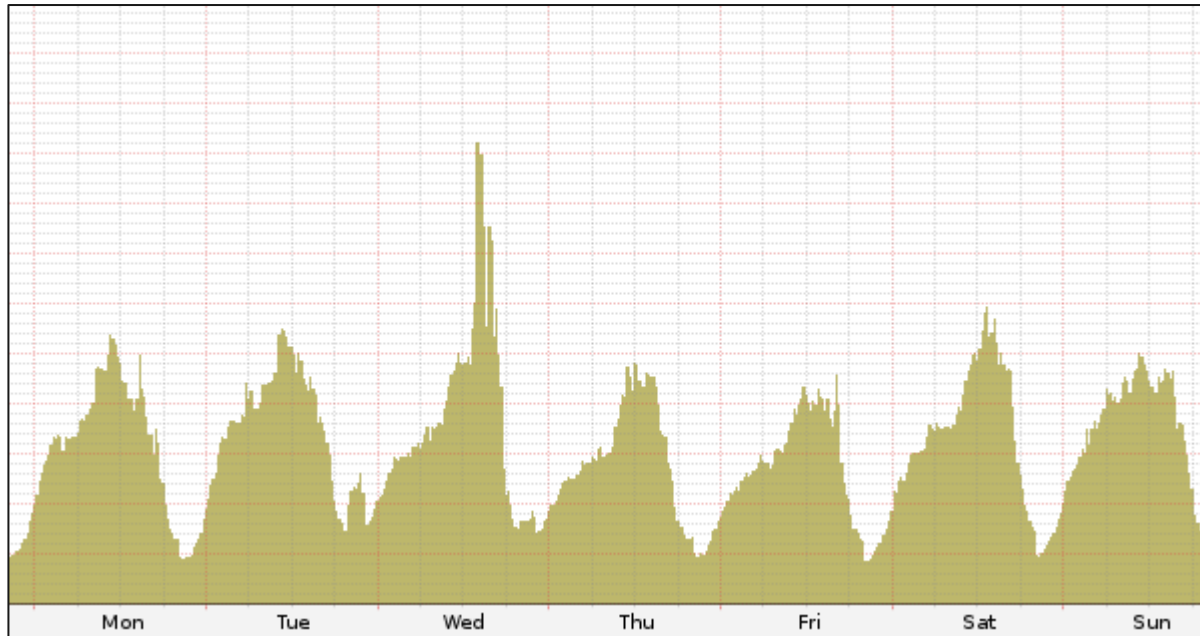
OTT Traffic Pattern: Explain the New Norm

- Let's overlay the 3 graphs and color it



New Traffic Pattern: From Provider Point of View

- There is also e-commerce, software update and all kinds of traffic
- How ISPs interpret it?



Challenges and Approaches

Akamai

Challenges for Akamai?

- Akamai does not own or produce the content
- Flexibility and rich features to cope with different content owner requirement and delivery workflow

Features:

- Broad Protocol support for ingest live
 - e.g. RTMP,HLS, HDS, Microsoft Smooth, MPEG-DASH
- Support Pre-packaged or pre-encrypted video
- Support Stream Packaging for original video
 - On-the-fly packaging and off-line on the cloud pre-packaging
- Support Media Encryption for clear video
 - Encrypt video with HTTP or SSL delivery option
- Broad Protocol Support for delivery
 - HTTP based live and on demand streaming media
 - e.g. HLS, HDS, Microsoft Smooth, MPEG-DASH
- Token Authentication to prevent link sharing
- Content Targeting to manage content availability by IP address /Geo Association

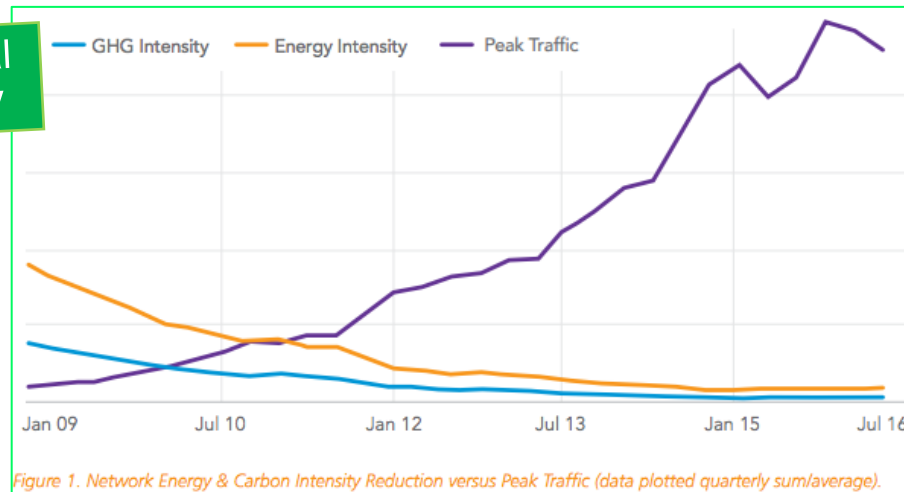
Challenges for Akamai?

- Each feature consumes different CPU cycles on the server
 - Similar to router 😊
 - E.g. Encryption uses more CPU cycles
- Live Streaming does not require large disk size
 - Everyone basically watching the same video segment at the same time.
 - Only required to cache for a short period of time
 - Hit rate is usually good in popular Live Streaming event
- Video on Demand requires large disk size
 - Everyone starts watching different video at irregular time
 - Higher cache hit rate reduce video re-buffering
 - Better Transit Savings for ISP
- Each ISP is having different mixture of traffic types, and it varies along the time!
- The same hardware delivers very different throughputs with different traffic profiles, it is challenging to determine what and how many servers to deploy in every ISP partners' network

Our Approach: Hardware

- Prefer to purchase new generation servers whenever possible
- Server interface
 - 1G → 2xGE link bundle → 10G → 2x10G link bundle
- Increase server density per rack every year
 - 2U → 1.5U / 1U / 0.5U server
 - 1.5U can install more disks
- Lower power consumption in each server generation
- Use bigger SSD and Hard Disk in each server generation
- Goal: Increase throughput per server in each server generation

Environmental
Sustainability



Our Approach: Software

- TCP Optimisation and FastTCP
- UDP Technology including Proprietary UDP protocol, QUIC support
- P2P Technology Algorithm to improve Live video quality
- Optimise kernel to improve server throughput
- Adaptive Bitrate Streaming according the connection type (e.g.. Mobile / Broadband)
- Enhance Media Architecture over time

FastTCP@FastSoft

UDP@QUIC

P2P@Octoshape

Our Approach: Operation

- Established 24x7 Broadcast Operations Control Center (BOCC) in April 2016
- To pro-actively monitor and support mission critical Live events



Akamai Opens Broadcast Operations Control Center To Support OTT Video Providers

<https://www.akamai.com/us/en/about/news/press/2016-press/akamai-opens-broadcast-operations-control-center.jsp>

Our Approach: Capacity Planning Cycle

- Closely collaborate with ISPs
- Review the traffic profiles
- Localise traffic in each metro
 - Lower distance to end users
 - Maximise burst capability
 - Reduce ISP backbone usage
- Peer with ISP on all commonly present IX
- Encourage IPv6 to both ISPs and Content Owners, which usually improve throughput and removes CGNAT in many scenarios

What can ISPs do?

The OTT Challenge

Why can ISPs do?

- Know your end users
- Monitor end user performance statistics
- Understand the trend and popular festival / events
- Attend conference and NOGs to understand the new trend
- Closely collaborate with CDN and Content/Broadcaster for market trend and capacity planning

Conclusions

Summary

Summary

- End users expect OTT to be comparable or better than Linear TV
- By OTT definition, no single entity is responsible for the end to end quality, we all are the stakeholders
- The best solution is collaboration among all stake holders to ensure the end user experience
- ISP can collaborate with CDN closely for understanding the trend and capacity planning
- Akamai ensures the quality delivery by improving hardware, software and operation
- Akamai collaborates with ISP closely on capacity planning

Questions?

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More information:

Peering: <https://as20940.peeringdb.com>

End

Thank You! ขอบคุณ!