Gaming Internet Resiliency with CDNs

Benefits of a Multi-CDN strategy

Pulse Internet Measurements Forum –
Feb 24, 2025

Christoff Visser, Romain Fontugne
IIJ - Research Lab

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- Reduce latency
- Prevent DoS attack
- Increase availability
- Cloud Gaming

Why gaming?

Forbes

FORBES > INNOVATION > CONSUMER TECH

What's Caused The Biggest UK Broadband Traffic Spike In The Past Week? 'Call Of Duty,' Not Coronavirus

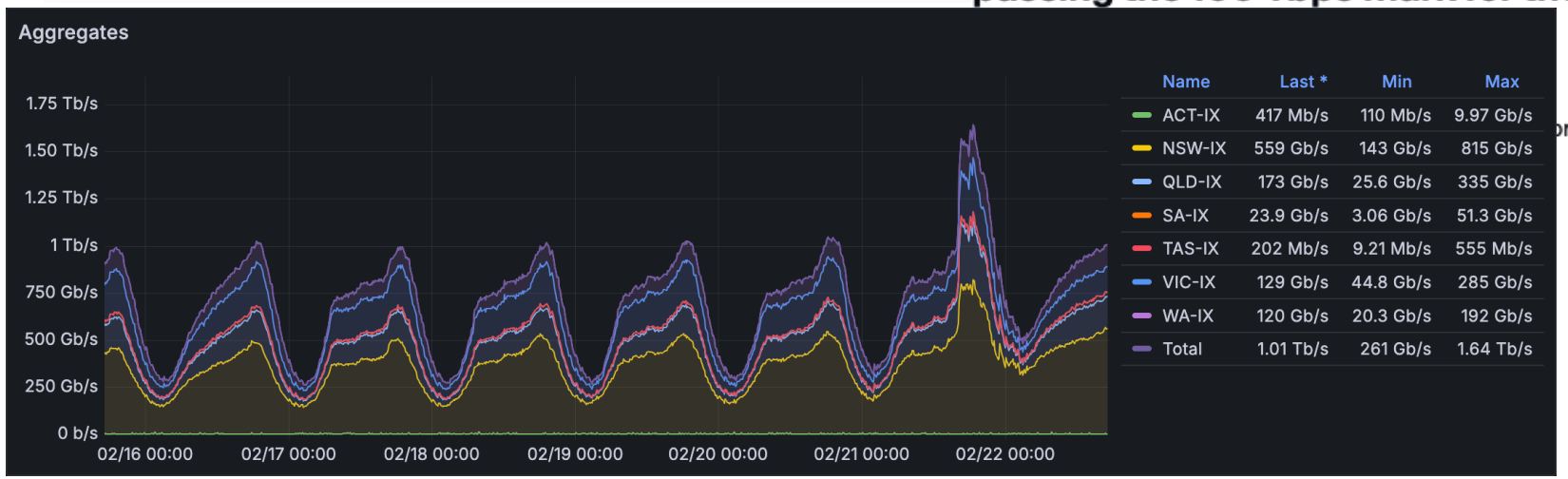
Barry Collins Contributor

I am a consumer tech expert writing about Windows, PCs, laptops, Mac, broadband and more.

Home / Innovation / Cloud

Last week's Fortnite update helped Akamai set a new CDN traffic record

Akamai said CDN traffic peaked at 106 Tbps last week, passing the 100 Tbps mark for the first time.



Name	Last *	Min	Max
ACT-IX	417 Mb/s	110 Mb/s	9.97 Gb/s
NSW-IX	559 Gb/s	143 Gb/s	815 Gb/s
QLD-IX	173 Gb/s	25.6 Gb/s	335 Gb/s
SA-IX	23.9 Gb/s	3.06 Gb/s	51.3 Gb/s
TAS-IX	202 Mb/s	9.21 Mb/s	555 Mb/s
VIC-IX	129 Gb/s	44.8 Gb/s	285 Gb/s
WA-IX	120 Gb/s	20.3 Gb/s	192 Gb/s
Total	1.01 Tb/s	261 Gb/s	1.64 Tb/s

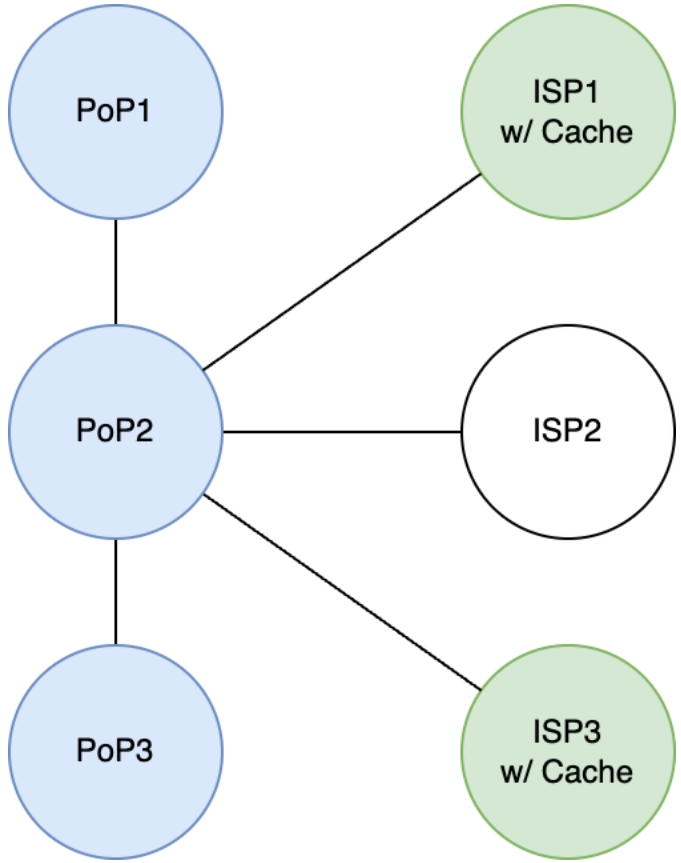
…r on Oct. 23, 2019

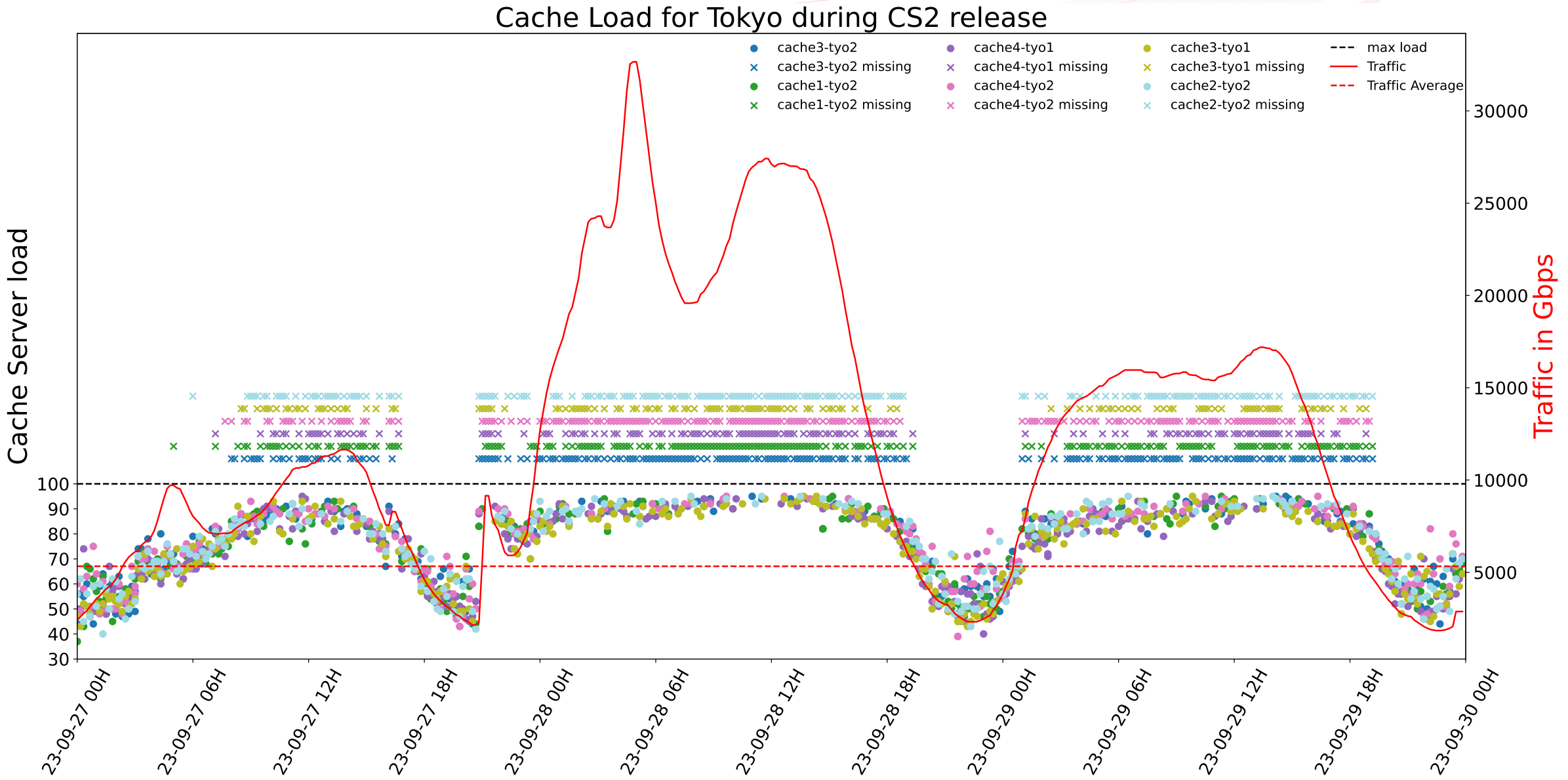
Internet Association of Australia

- Unique Cache requirements
- Wide variety of content
- Sufficient bandwidth for “Big game” releases
  - Big in size + popularity
- Global release time
- Full download required
- Baldur’s Gate 3 – 150GB
  - Global Traffic
  - 15 Tbps -> 144 Tbps

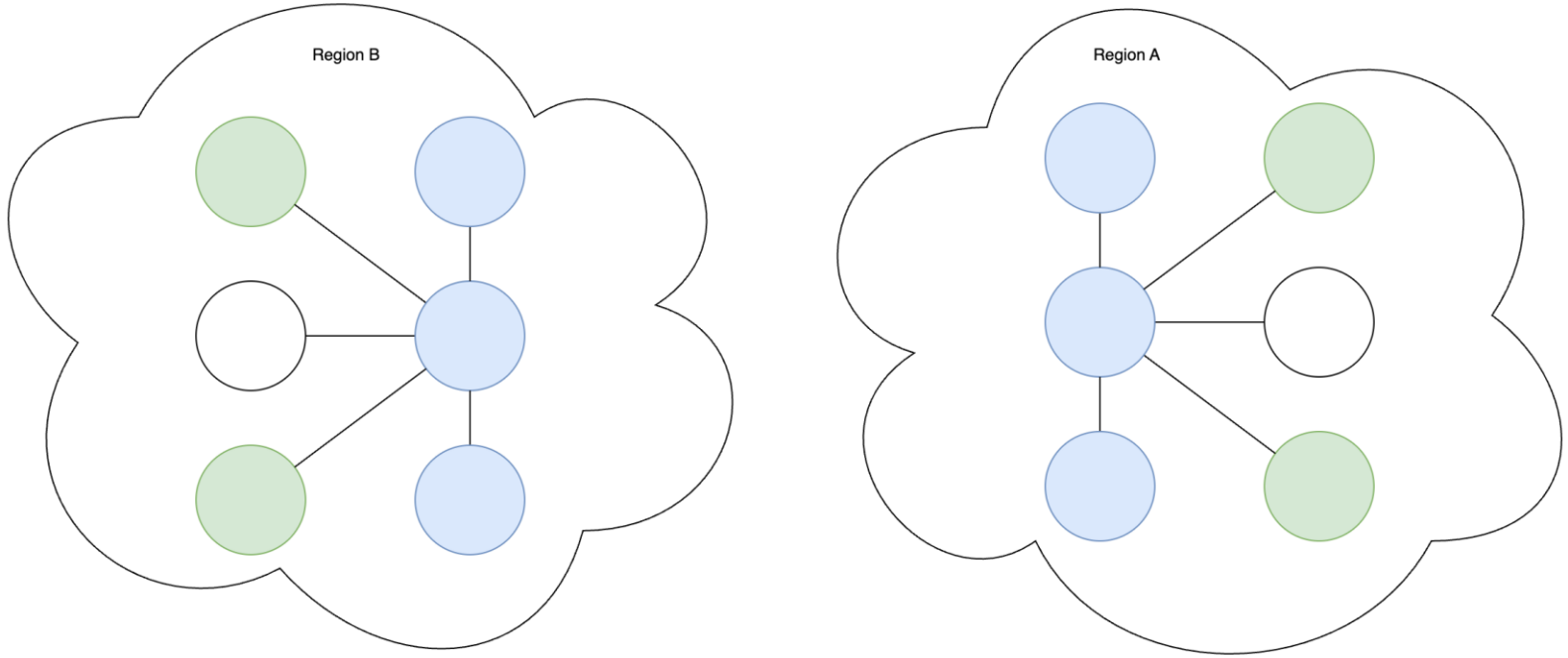
	Steam	Sports	Windows	Netflix
Urgency	ASAP	1h+/Streamed	‘Patch Tuesday’	1h+ / streamed
Time	World Sync On-Demand	World Sync	Rolling Update	On-demand
Localization	Steam Cache + CDN	Multi CDN	Multi CDN	Netflix Cache
Catalogue	++++	-	-	++
Users	132+ Million	3 Billion	1.4 Billion	232.5 Million
Size	Up to 150GB	1~7GB/h	114MB ~ 5.4GB	1~7GB/h
Frequency	1 shot	1 shot	Low frequency	Daily

- Caches within ISPs where possible
- Local PoPs
  - ISPs without their own cache
  - When the ISP cache is overloaded



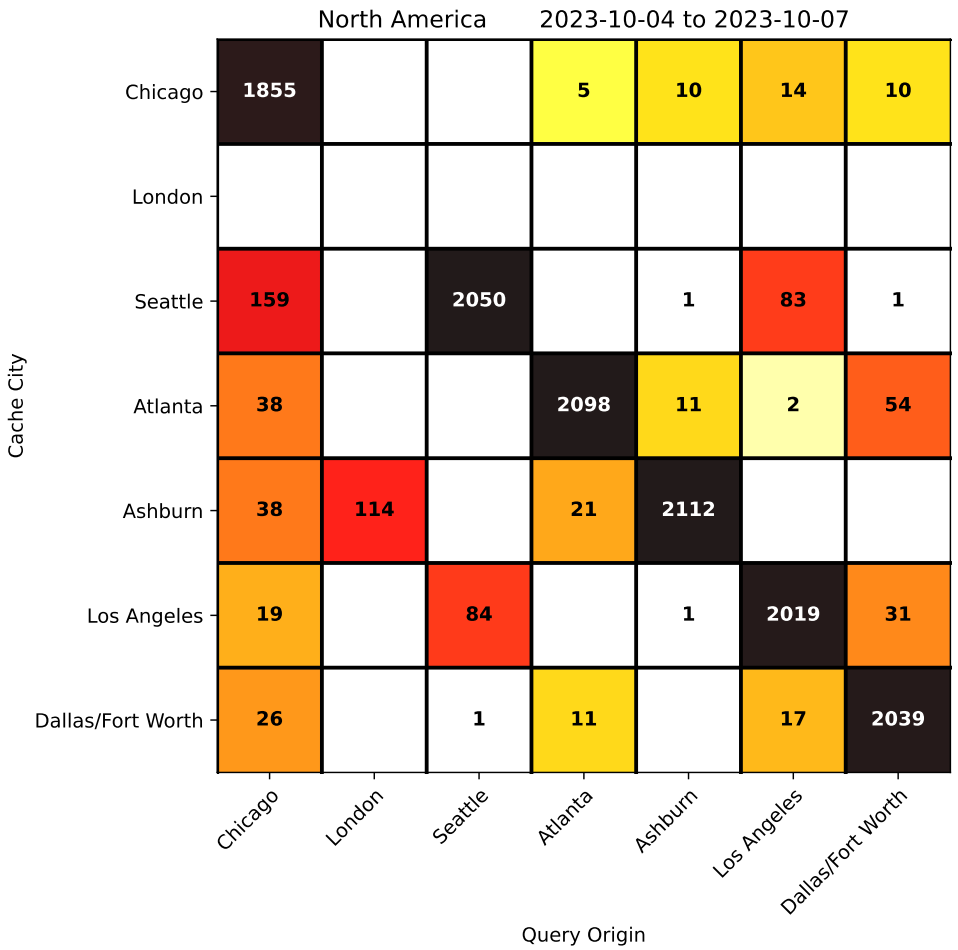

Cache Load for Tokyo during CS2 release
Cache Server load
Traffic in Gbps
cache3-tyo2
cache3-tyo2 missing
cache1-tyo2
cache1-tyo2 missing
cache4-tyo1
cache4-tyo1 missing
cache4-tyo2
cache4-tyo2 missing
cache3-tyo1
cache3-tyo1 missing
cache2-tyo2
cache2-tyo2 missing
max load
Traffic
Traffic Average
100
90
80
70
60
50
40
30
30000
25000
20000
15000
10000
5000
23-09-27 00H
23-09-27 06H
23-09-27 12H
23-09-27 18H
23-09-28 00H
23-09-28 06H
23-09-28 12H
23-09-28 18H
23-09-29 00H
23-09-29 06H
23-09-29 12H
23-09-29 18H
23-09-30 00H

- Load Balancing
- Backup when overloaded

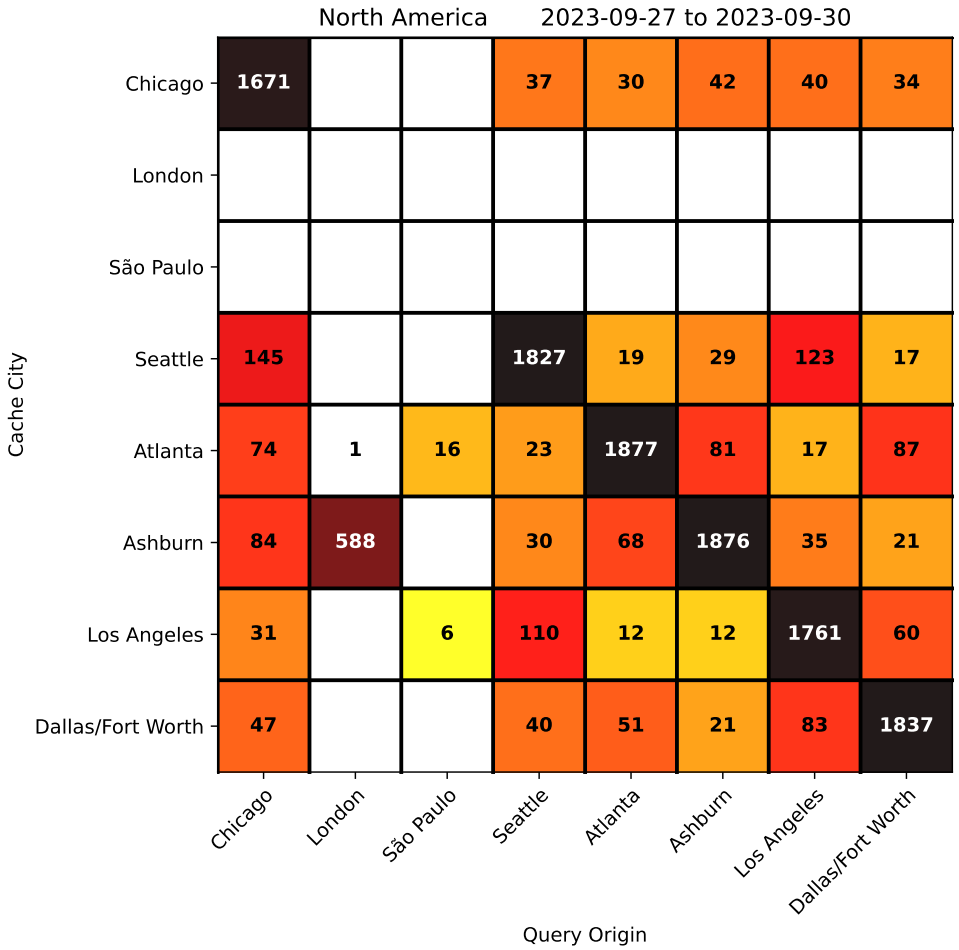


Cache offloading between cities

Baseline

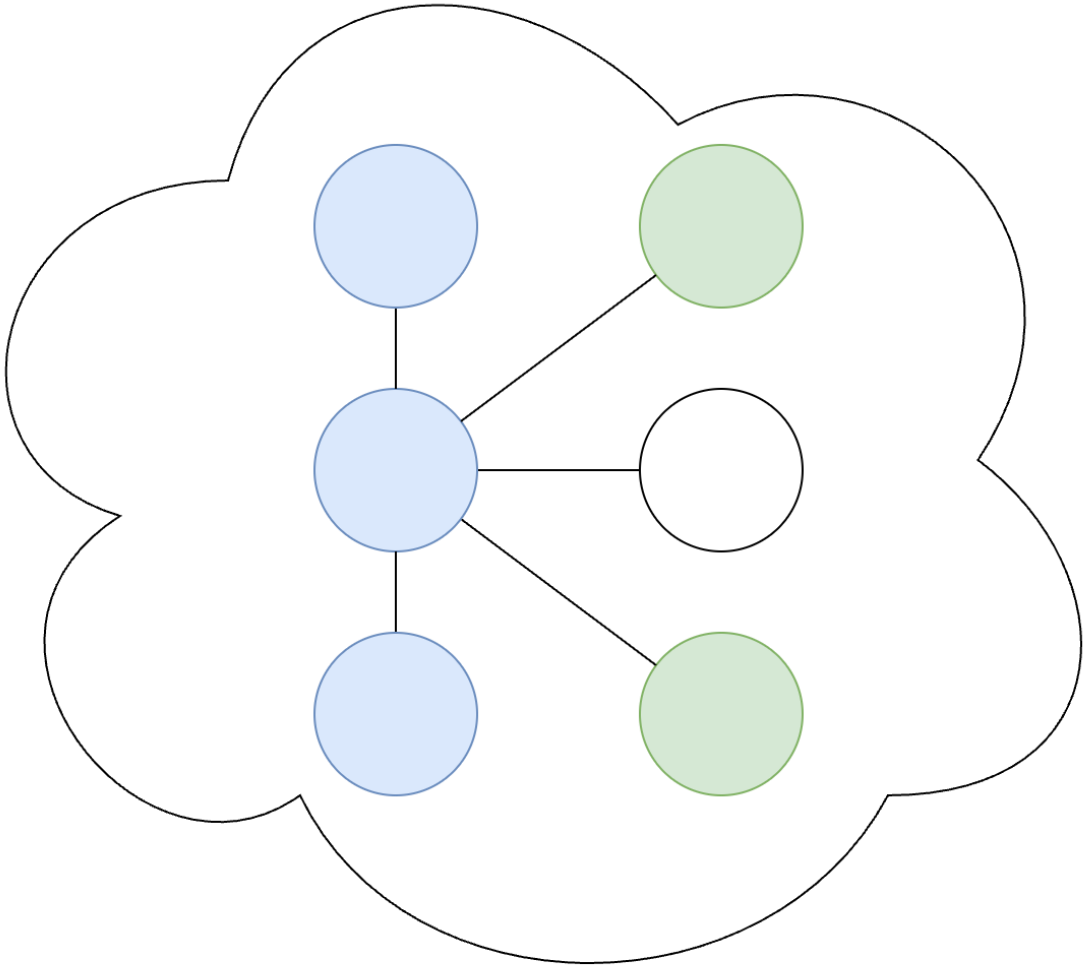


Counter Strike 2 Release

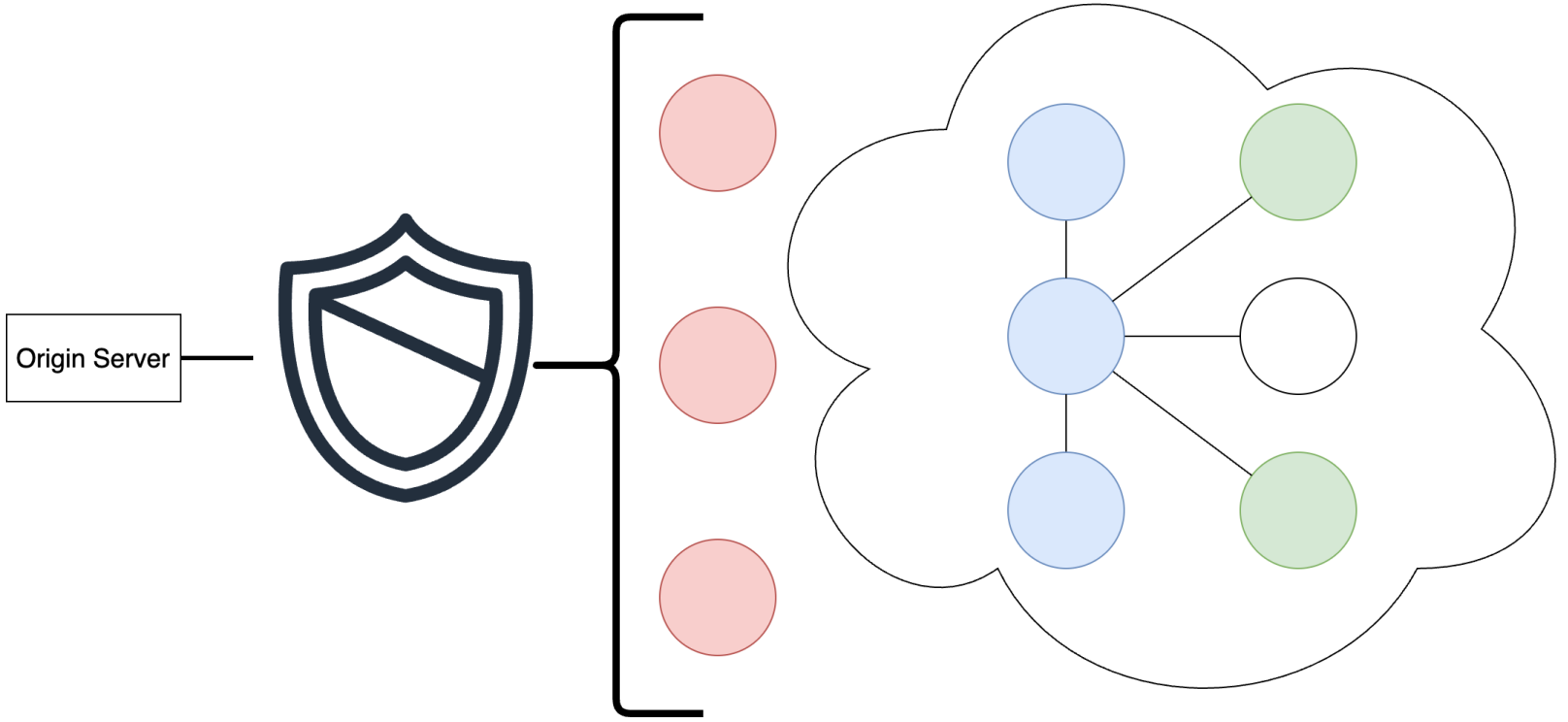


- Increased load balancing during game releases
- Cross region offloading

- Availability in areas without PoPs
- Backup when region is overloaded
- Multiple different providers
  - Backup
  - Load balance

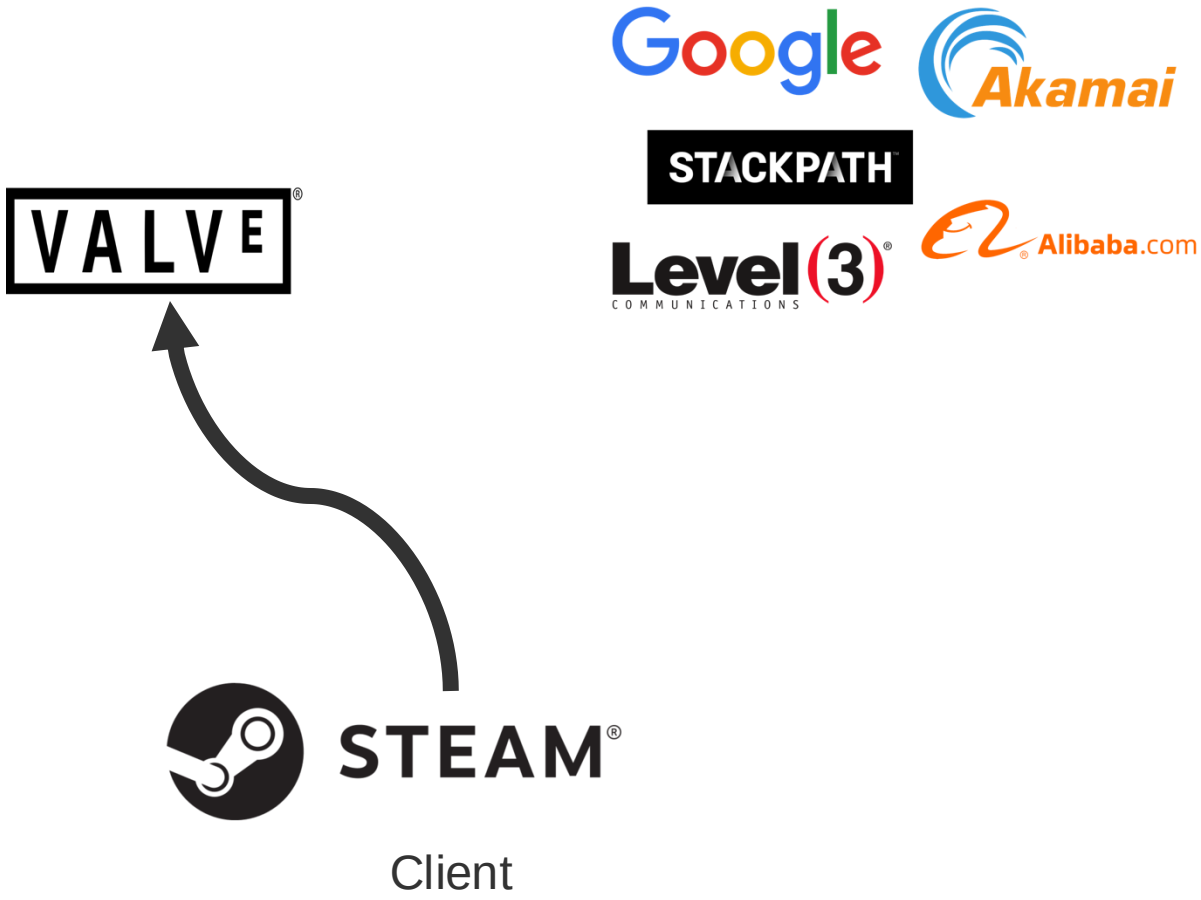


- Push when possible
  - Analytics
- Pull only when needed
  - Origin shield
  - Rate limit etc



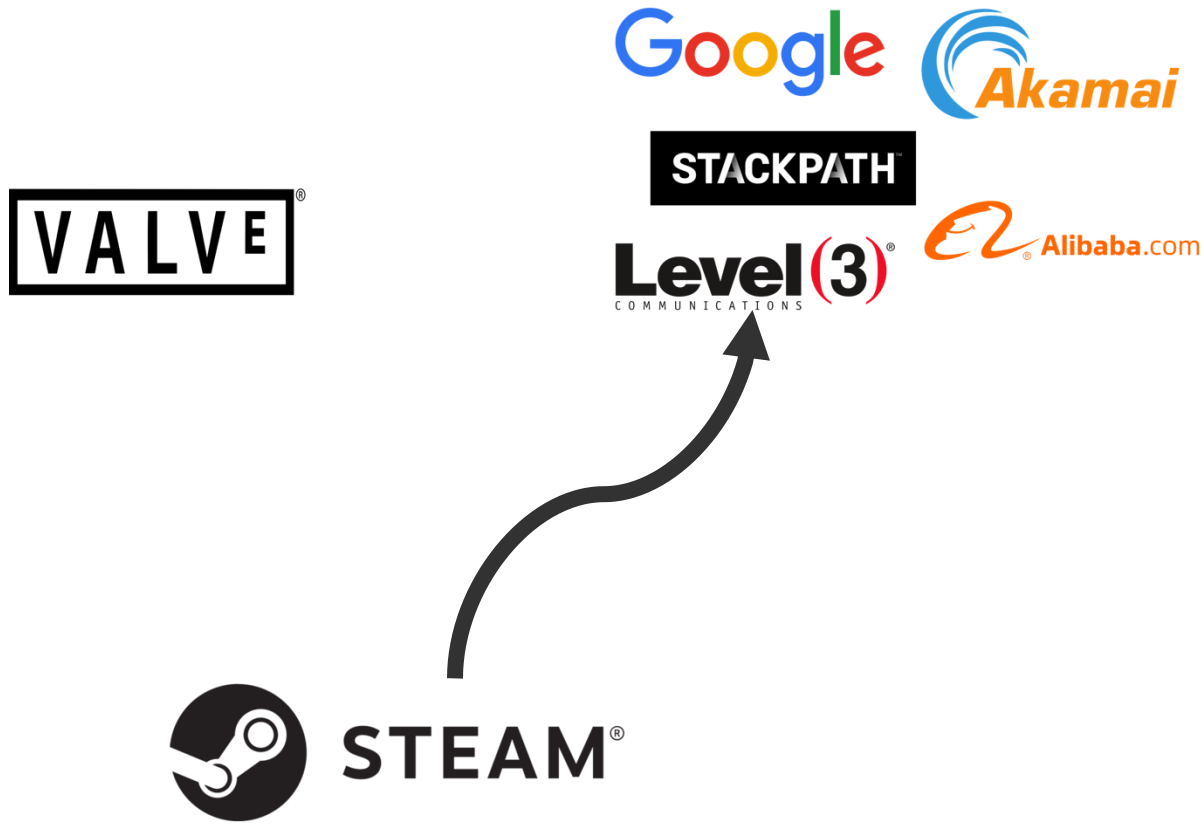
Where does the traffic come from?

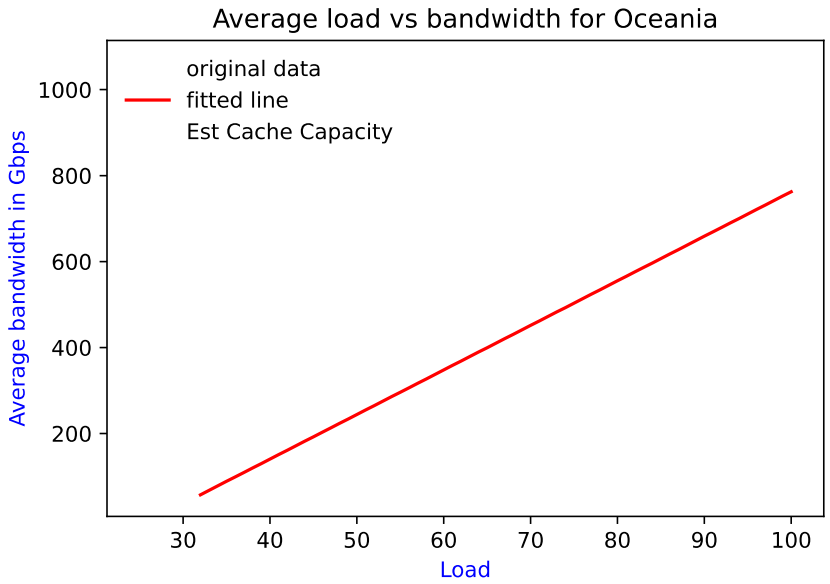
type	SteamCache
load	39
weighted_load	27.44
host	cache3-lhr1.steamcontent.com
preferred_server	true
type	SteamCache
load	47
weighted_load	60.89
host	cache7-lhr1.steamcontent.com
preferred_server	true
type	CDN
load	0
weighted_load	130
host	steampipe.akamaized.net
preferred_server	false
type	CDN
load	0
weighted_load	130
host	google2.cdn.steampipe.steamcontent.com
preferred_server	false

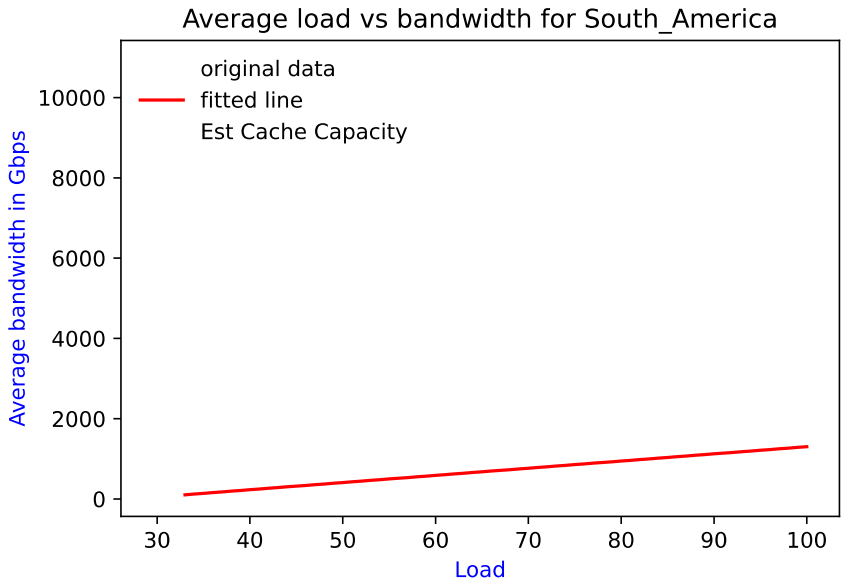


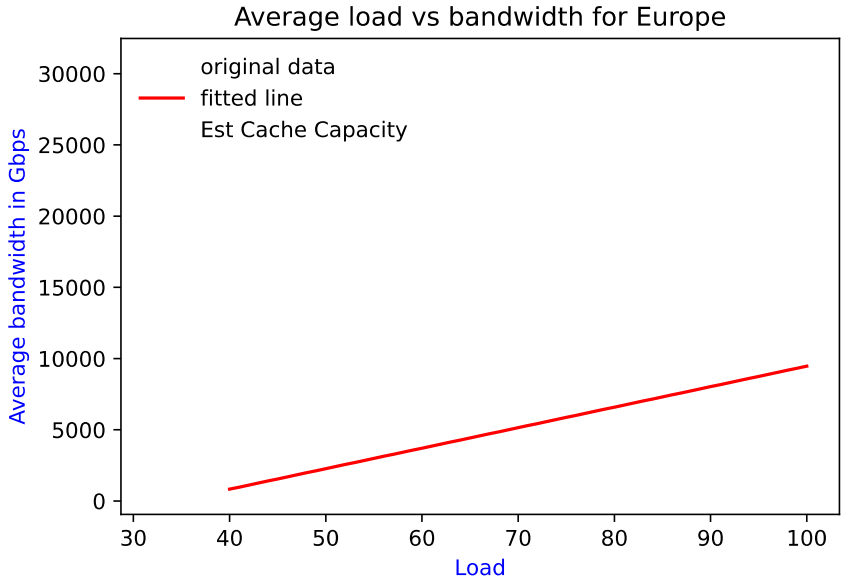
Where does the traffic come from?

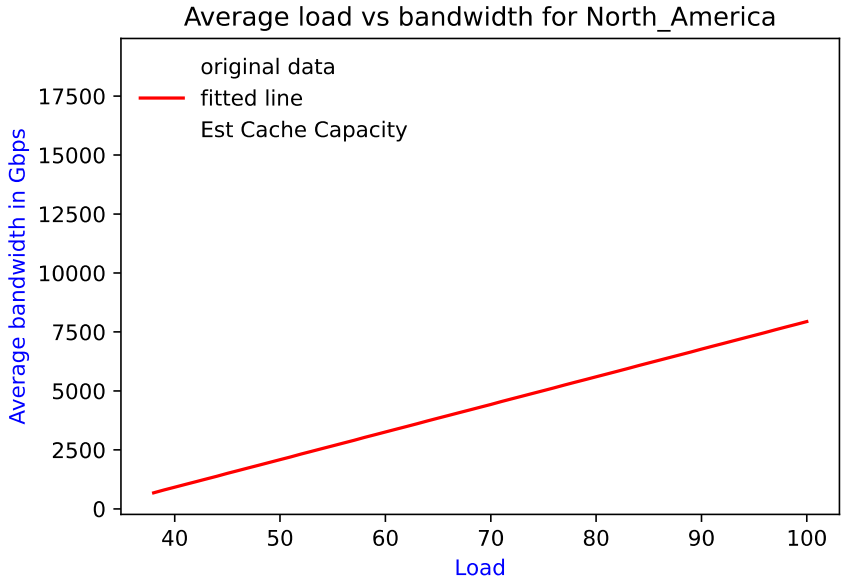
type	CDN
load	0
weighted_load	130
host	google2.cdn.steampipe.steamcontent.com
preferred_server	false
type	CDN
load	0
weighted_load	130
host	steampipe.akamaized.net
preferred_server	false
type	CDN
load	0
weighted_load	130
host	alibaba.cdn.steampipe.steamcontent.com
preferred_server	false
type	CDN
load	0
weighted_load	130
host	level3.cdn.steampipe.steamcontent.com
preferred_server	false




Average load vs bandwidth for Oceania
original data
fitted line
Est Cache Capacity
Average bandwidth in Gbps
Load
1000
800
600
400
200
30
40
50
60
70
80
90
100


Average load vs bandwidth for South_America
original data
fitted line
Est Cache Capacity
Average bandwidth in Gbps
Load
10000
8000
6000
4000
2000
0
30
40
50
60
70
80
90
100


Average load vs bandwidth for Europe
original data
fitted line
Est Cache Capacity
Average bandwidth in Gbps
Load
30000
25000
20000
15000
10000
5000
0
30
40
50
60
70
80
90
100


Average load vs bandwidth for North_America
original data
fitted line
Est Cache Capacity
Average bandwidth in Gbps
Load
17500
15000
12500
10000
7500
5000
2500
0
40
50
60
70
80
90
100

Steam Cache Capabilities

Region	% Content served from Steam Cache	% Traffic served from Steam Cache	Estimated Cache Capacity (Gbps)	Peak Traffic Observed (Gbps)
Africa	90.95	82.88	106	281
Asia	96.09	89.50	13556	32657
Europe	97.75	93.42	9470	30954
North America	98.60	96.24	7940	19025
Oceania	99.17	97.66	763	1064
South America	59.22	33.79	1303	10883

3-2-1

- Backups
  - Three copies of your data
  - Two different media types
  - One copy off-site
- Service resiliency
  - Three points of access (ISP cache, PoP, Third party CDN)
  - Two different providers
  - One off-site (out of region)

Sony’s PlayStation Network reports major global outage

By Auzinea Bacon, CNN

2 minute read · Updated 7:19 PM EST, Sat February 8, 2025

BOXING

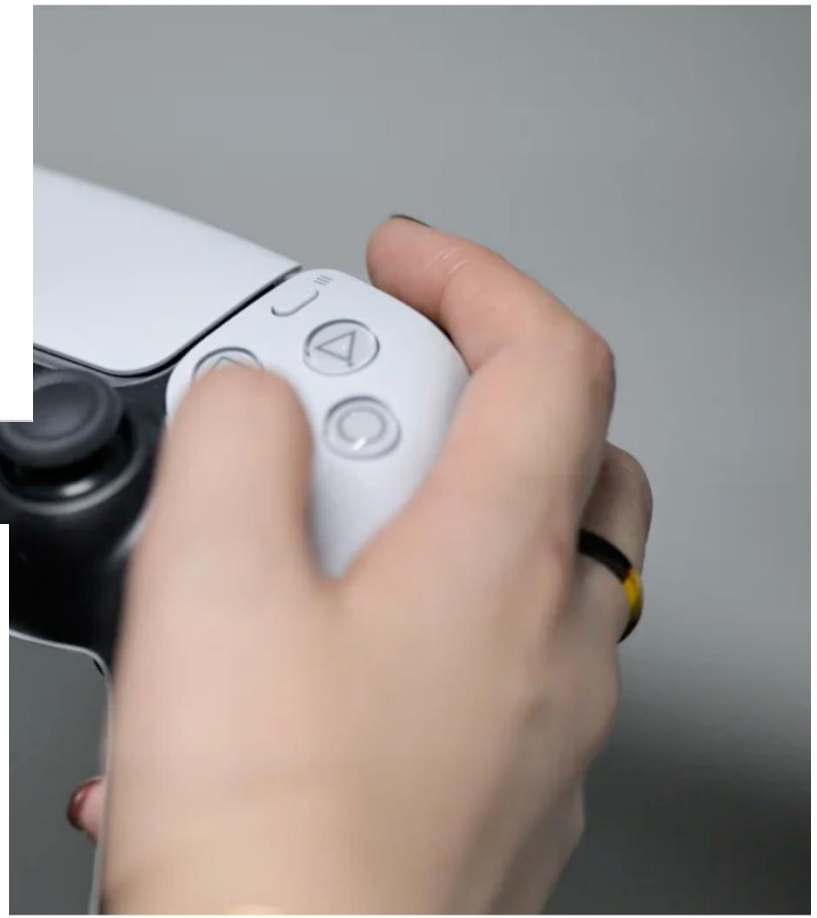
Netflix streaming issues leaving Mike Tyson-Jake Paul viewers livid

By Bryan Fonseca

Published Nov. 15, 2024, 11:49 p.m. ET

DeSantis’ presidential campaign announcement plagued by glitches on Twitter

Politics May 25, 2023 12:03 AM EST



e PlayStation 5 Pro console, at the Sony

headquarters building in central Tokyo on November 27, 2024. Richard A. Brooks/AFP/Getty Images/File

	Steam	Sports	Windows	Netflix	Netflix Jake Paul + Mike Tyson
Urgency	ASAP	1h+/Streamed	'Patch Tuesday'	1h+/Streamed	1h+/Streamed
Time	World Sync On-Demand	World Sync	Rolling Update	On-demand	World Sync
Localization	Steam Cache + CDN	Multi CDN	Multi CDN	Netflix Cache	Netflix Cache
Catalogue	++++	-	-	++	--
Users	132+ Million	3 Billion	1.4 Billion	232.5 Million	Peak 65 Million Concurrent 108 Million Total
Size	Up to 150GB	1~7GB/h	114MB ~ 5.4GB	1~7GB/h	1~7GB/h
Frequency	1 shot	1 shot	Low frequency	Daily	1 shot

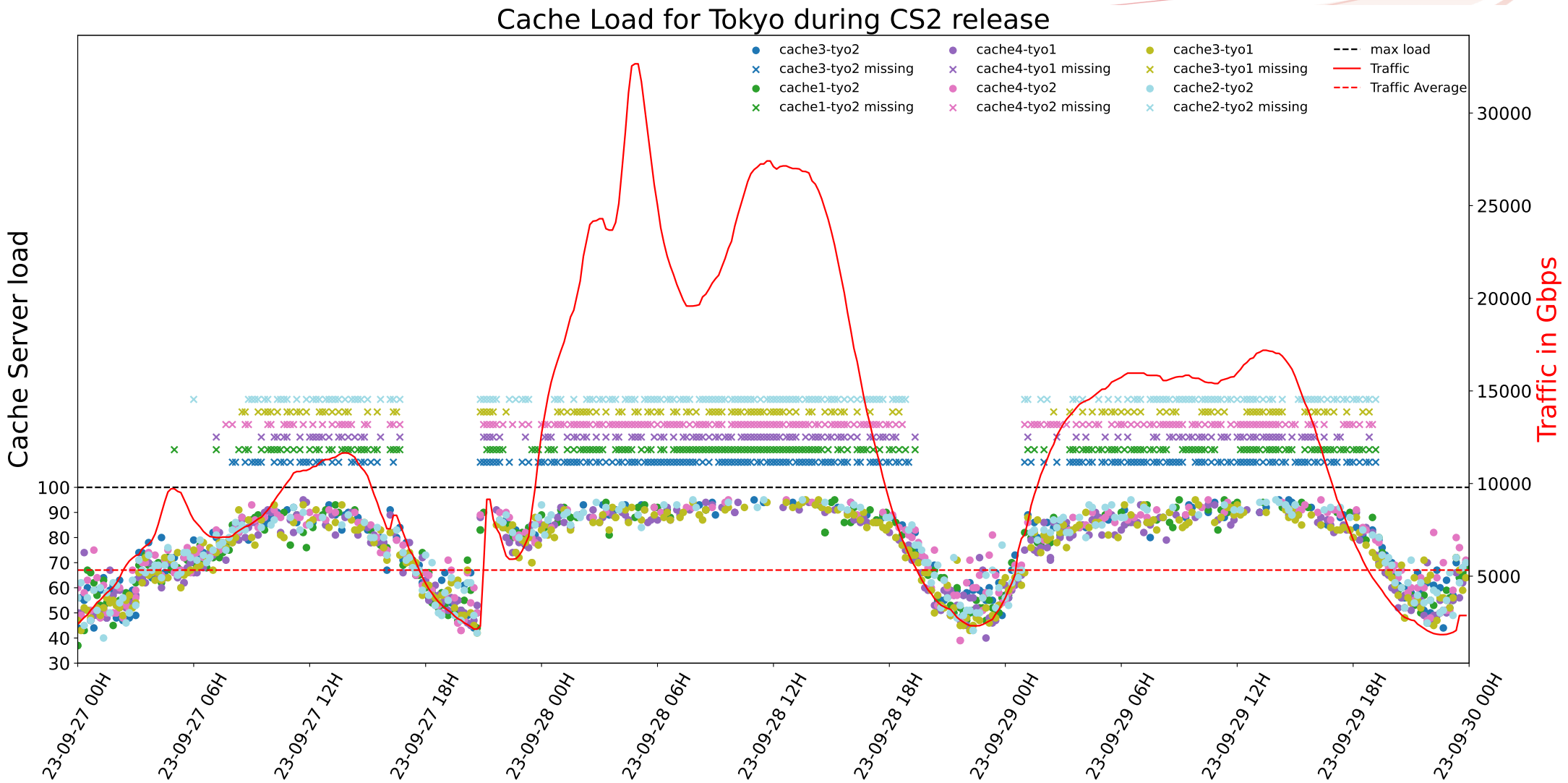
A survey amongst EBU members showed the following strategies are in use:

- Use own CDN till maximum capacity and commercial CDNs as overflow
- Use own CDN for on-demand, and commercial CDNs for live content
- Use own CDN for in-region requests, and commercial CDN for out of region
- Fixed percentage request split between CDNs
- Use of Multi-CDN

- Peer-to-peer (maybe?)

https://tech.ebu.ch/files/live/sites/tech/files/shared/techreports/tr068.pdf

Questions?



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