

# Public DNS Resolver Usage

A follow up to OCTO-032

Alain Durand

IDS 2024

25 September 2024



# Motivation

---

- ⦿ OCTO published a study in 2022 “DNS Resolver Usage in the EU” OCTO-032.
- ⦿ OCTO received a request to make a follow-up study, this time focusing on the US.
- ⦿ This work was undertaken as a response to that request.

# How to Measure DNS Resolver Usage?

---

- DNS resolver operators do not provide statistics
  - Need external measurement system
  - Beware of selection bias!
  - Need very large number of measurements of a daily basis
- Partnership with APNIC labs

# Methodology

---

- Based on APNIC labs / Geoff Huston data
  - From 04/01/2024 to 07/31/2024
- Different approach from the 2022 study (OCTO-032):
  - Start from list of very large operators
  - Brake it down between Broadband and Cellular
  - Compare with selected EU operators
  - Only focus on public resolvers (not in-country/out-of-country)
- Expectations going into the study:
  - similar results than in 2022 (4%, mostly to Google public DNS)
  - Maybe bumped up a little
  - Maybe derive a different profile for Cellular vs Broadband
- Pitfalls
  - Some operators use multiple ASNs due to mergers & acquisitions
  - Some operators use the same ASN for both B2C and B2B

# List of Public Resolvers

---

- 114 DNS
- AliDNS
- Alternate DNS4
- Baidu DNS
- CleanBrowsing
- Cloudflare (commonly called 1.1.1.1)
- Comodo Secure DNS
- CNNIC SDNS
- DNS PAI
- DNSPod
- DNS.Watch
- Oracle Dyn
- Free DNS
- Freenom World
- Google Public DNS  
(commonly called 8.8.8.8)
- Green Team DNS
- Hurricane Electric DNS
- Level 3
- Neustar
- One DNS
- OpenDNS
- Open NIC
- puntCAT
- Quad9
- SafeDNS
- TWNIC Quad 101  
(101.101.101.101)
- Uncensored DNS
- Verisign Open DNS
- Yandex DNS

# Reference Point: Worldwide Public Resolver Usage

9.7%

Source: <https://ithi.research.icann.org/graph-m10.html>

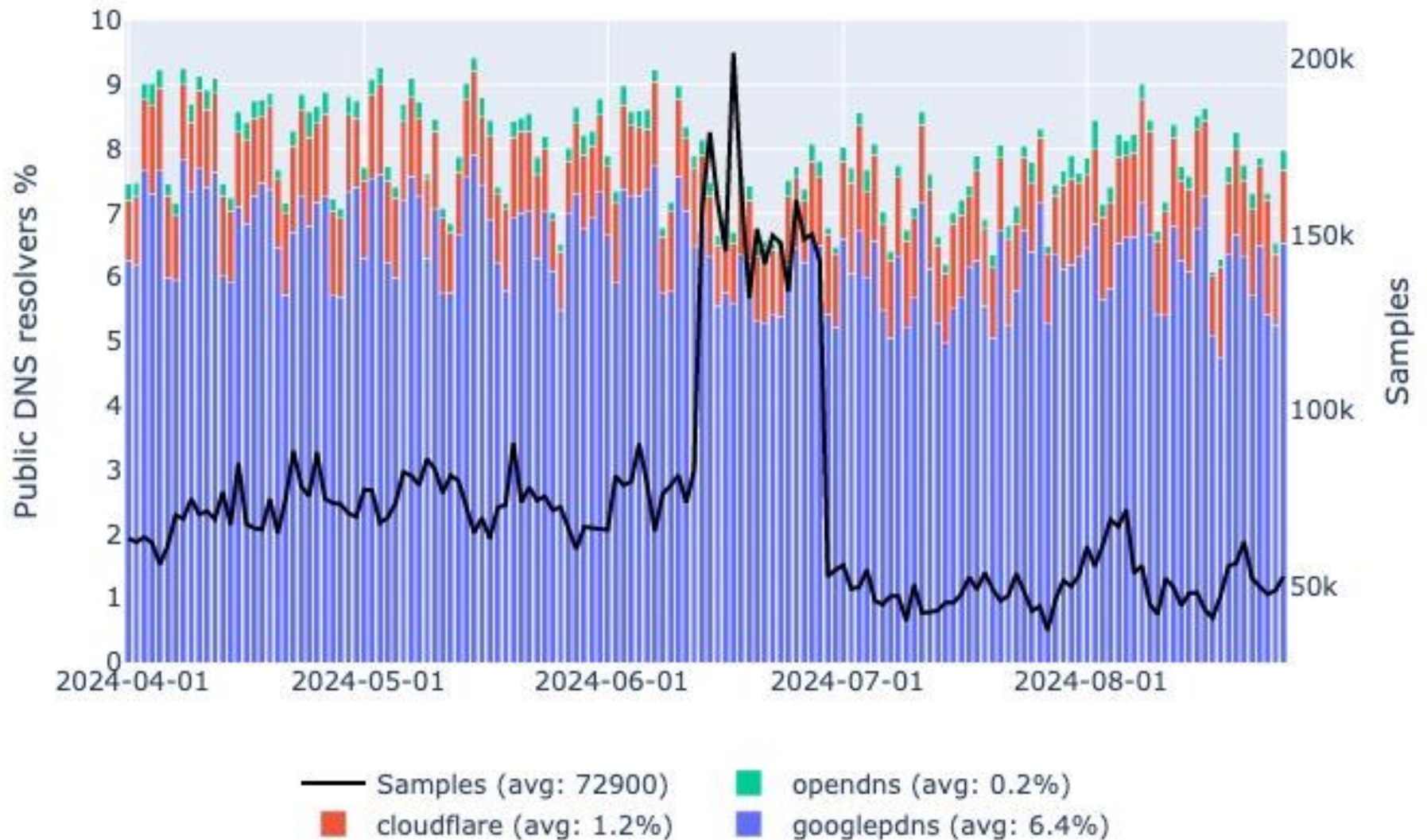


---

# Argentina

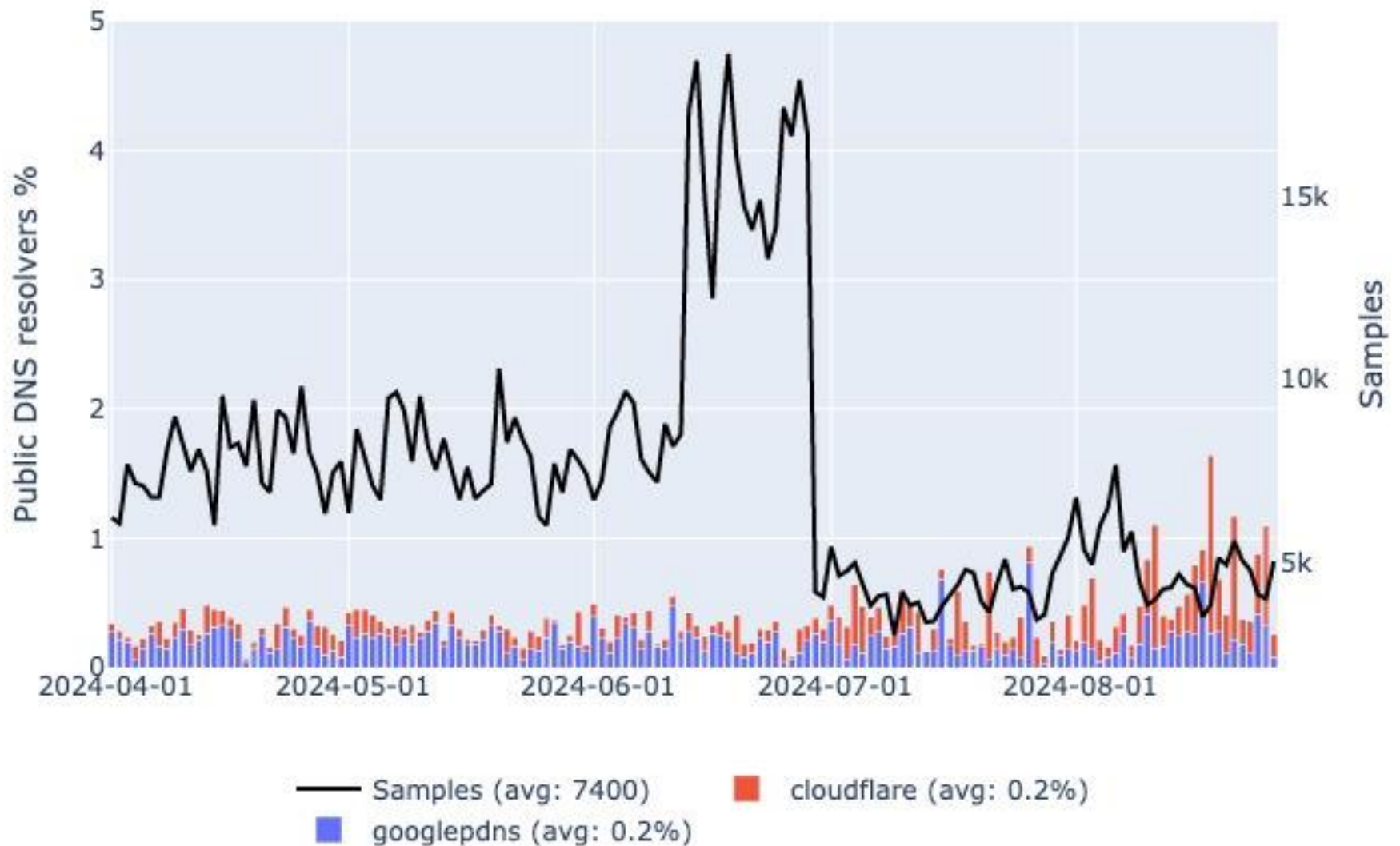
# Telecom Argentina: 7.8%

AS7303 Telecom Argentina S.A. Broadband: 7.8%



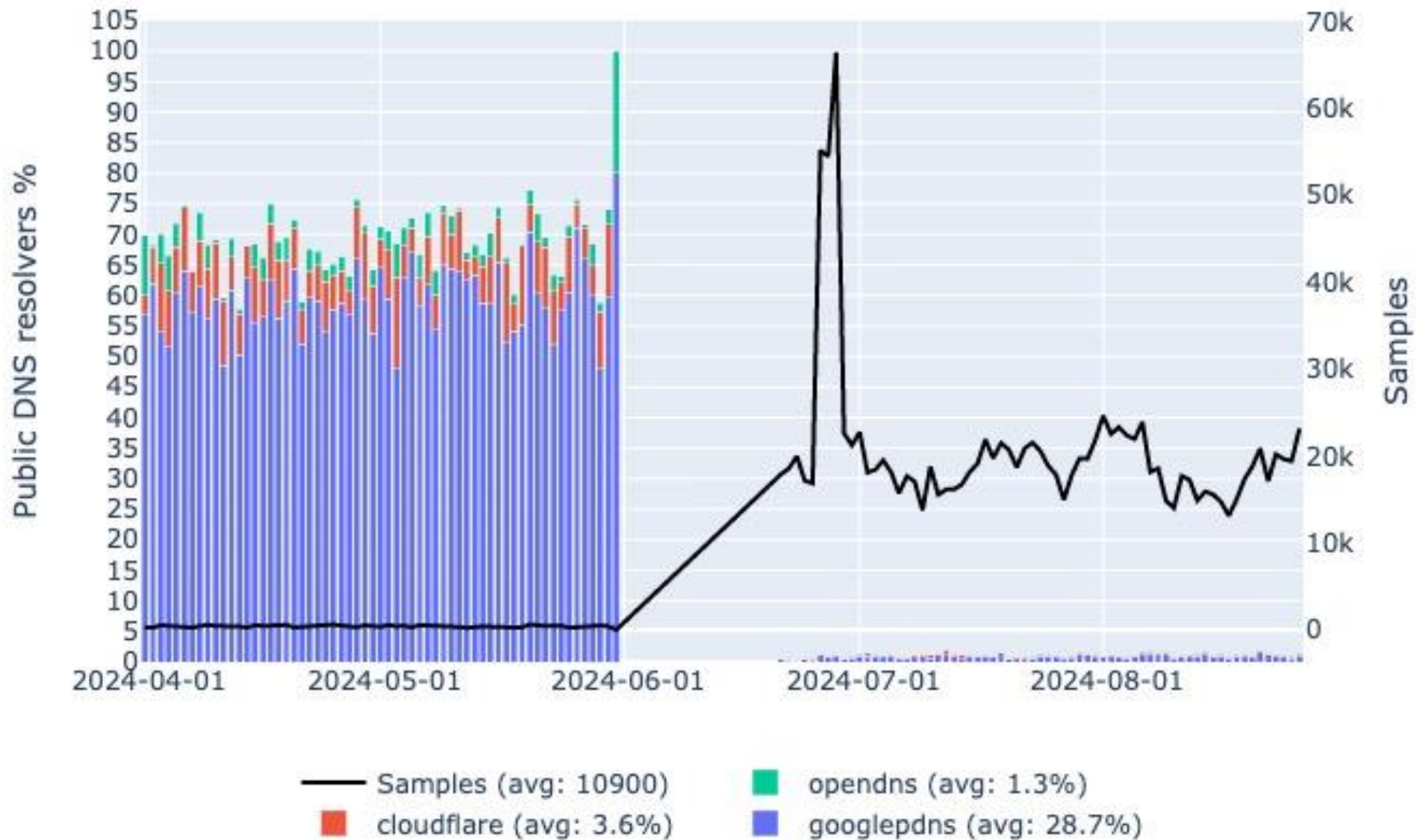
# Telefonica Moviles: 0.4%

AS11315 Telefonica Moviles Argentina S.A. Movistar Argentina Cellular: 0.4%



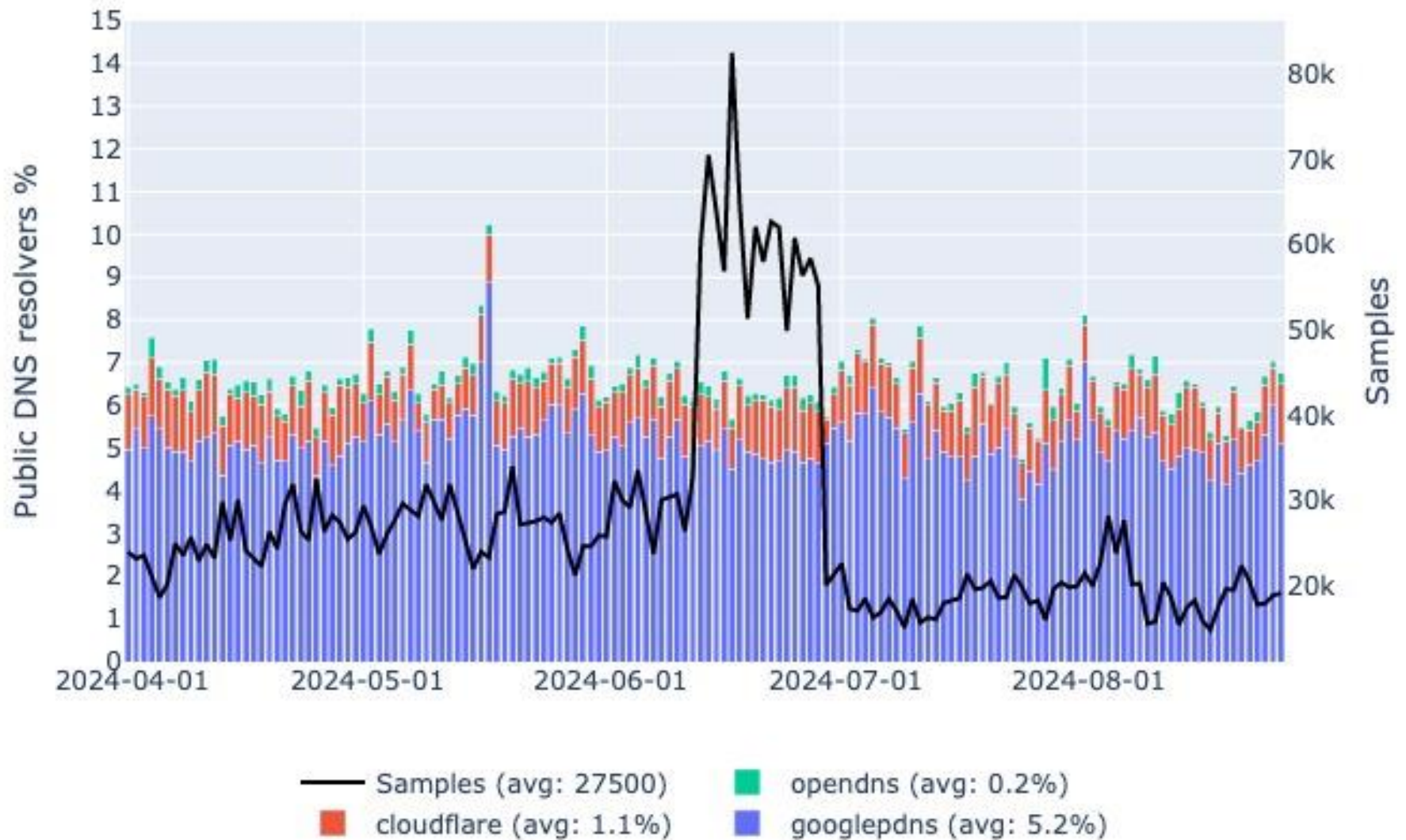
# AMX Argentina: 65% to 1%

AS19037 AMX Argentina S.A. Cellular: 33.6%



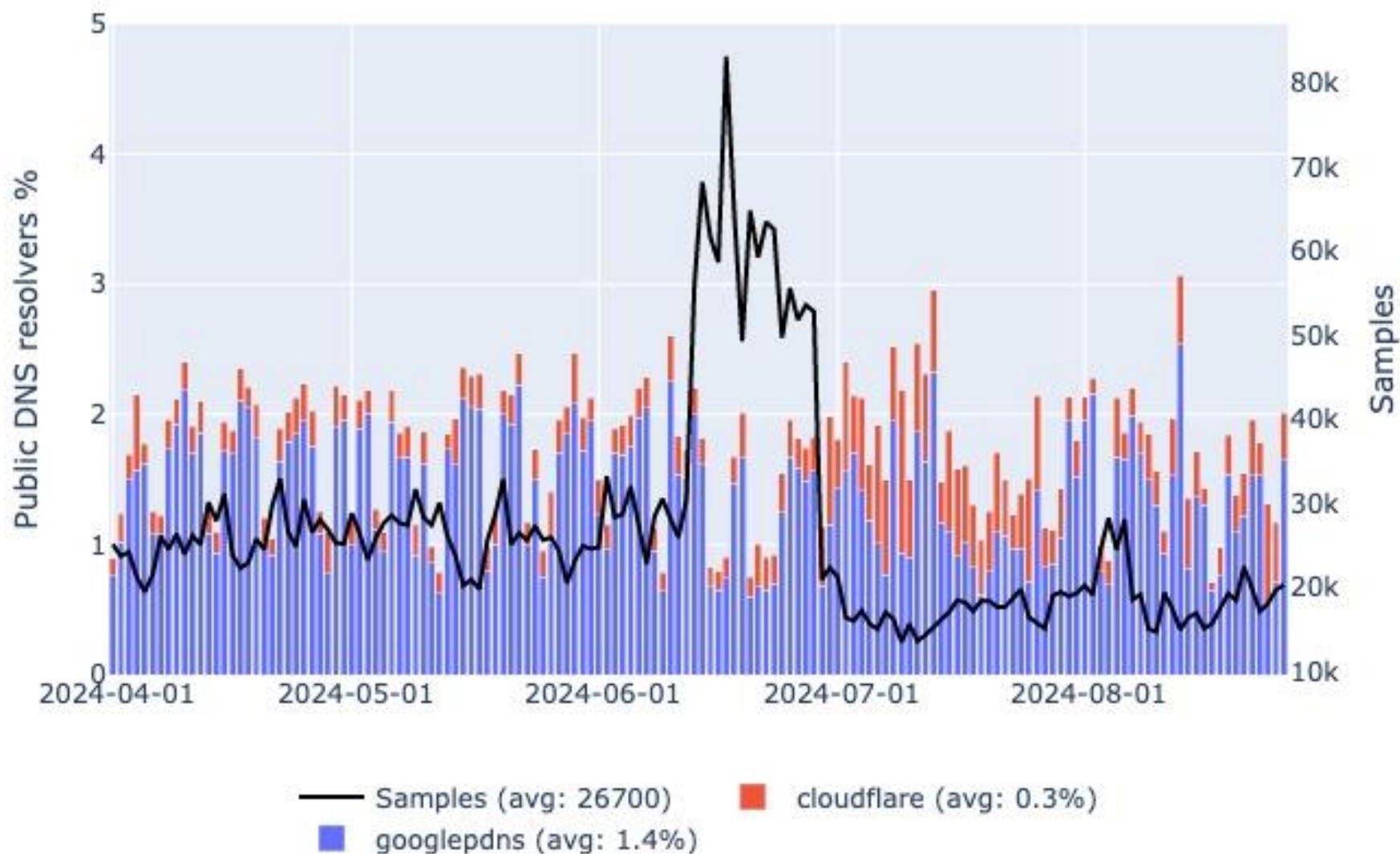
# Telefonica Argentina: 6.5%

AS22927 Telefonica de Argentina Cellular: 6.5%



# Telecentro: 1.7%

AS27747 Telecentro S.A. Broadband: 1.7%

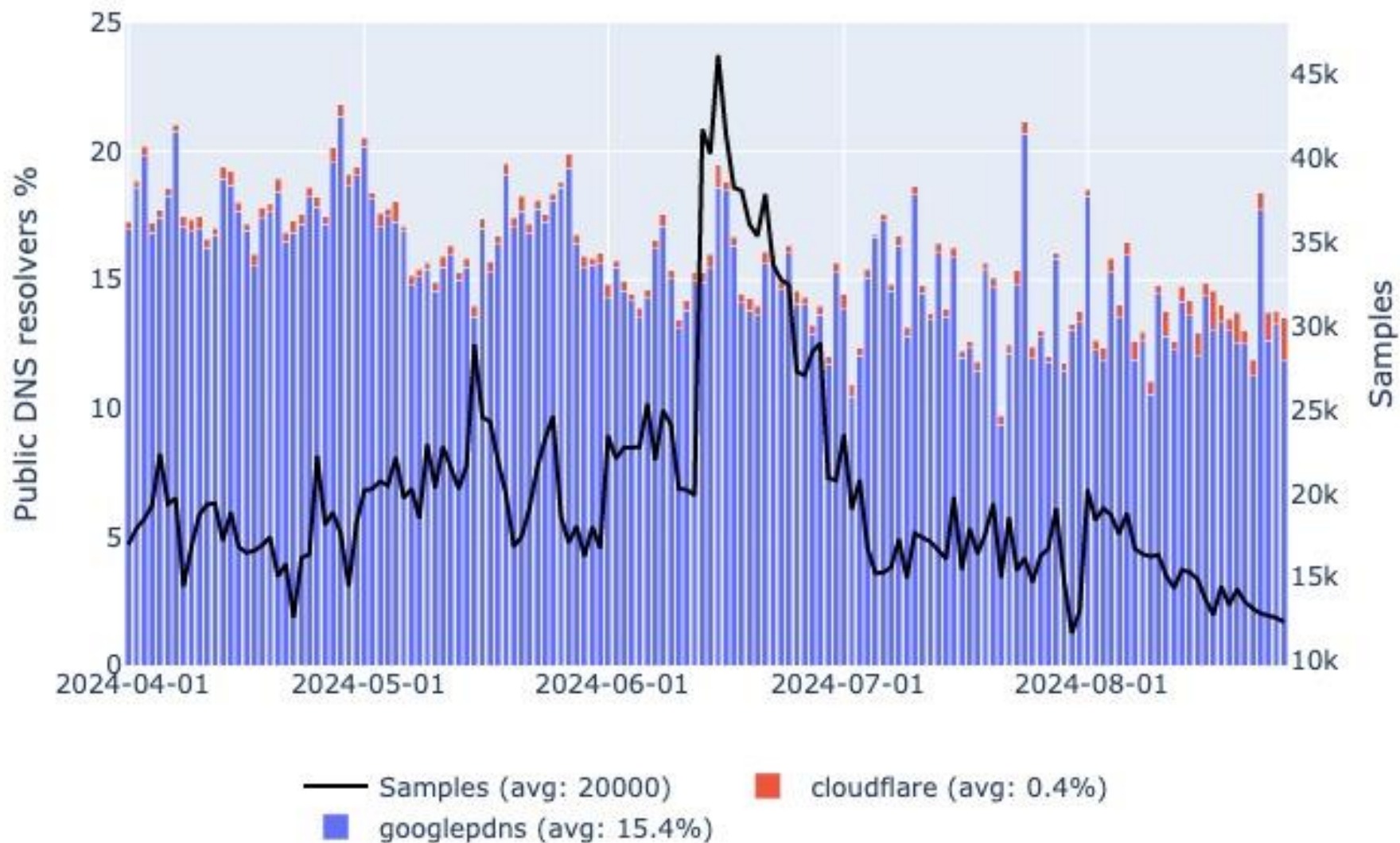


---

# Bolivia

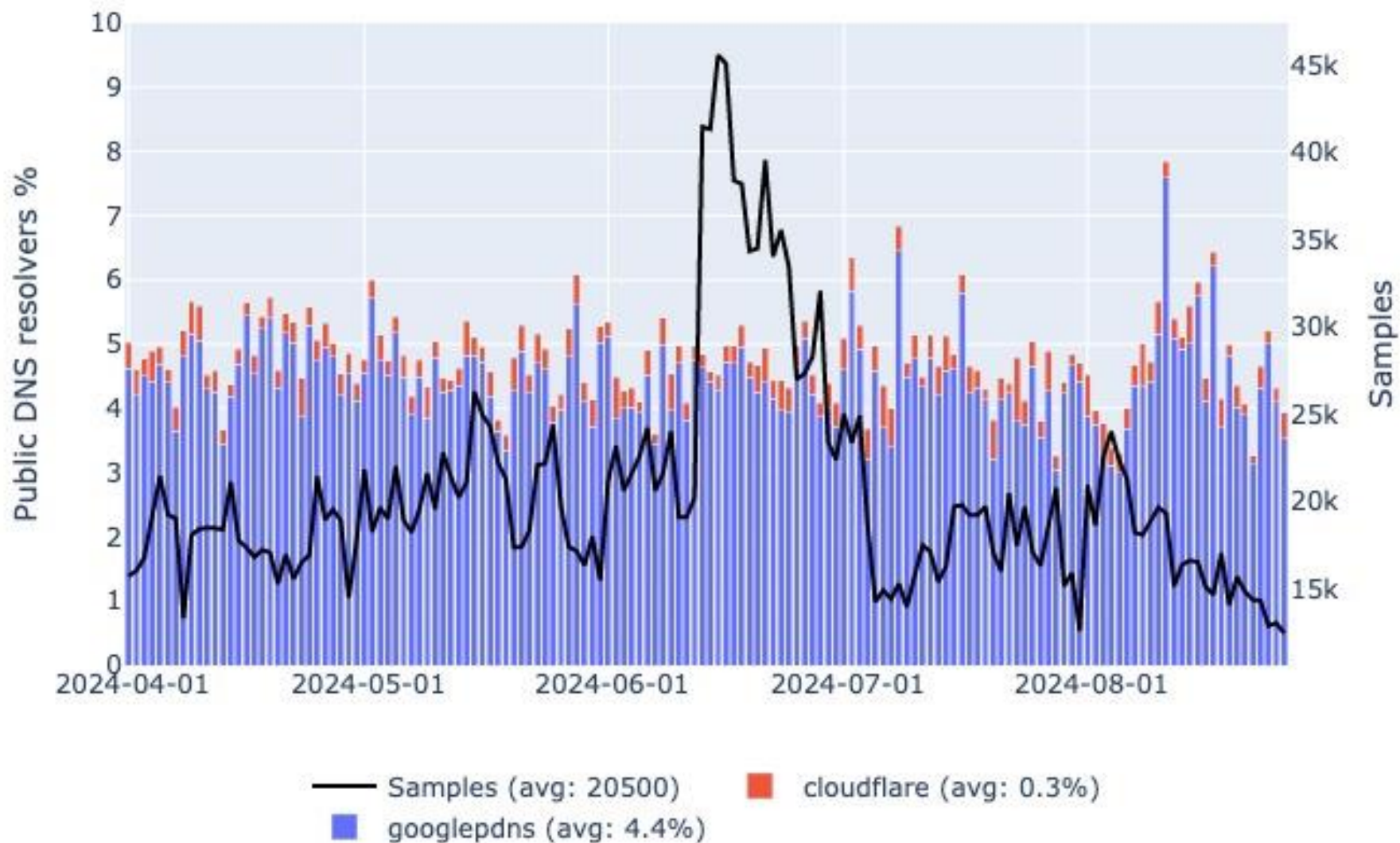
# Entel: 15.8%

AS6568 Entel S.A. - EntelNet Broadband: 15.8%



# Telefonica Bolivia: 4.8%

AS27882 Telefonica Celular de Bolivia S.A. Cellular: 4.8%

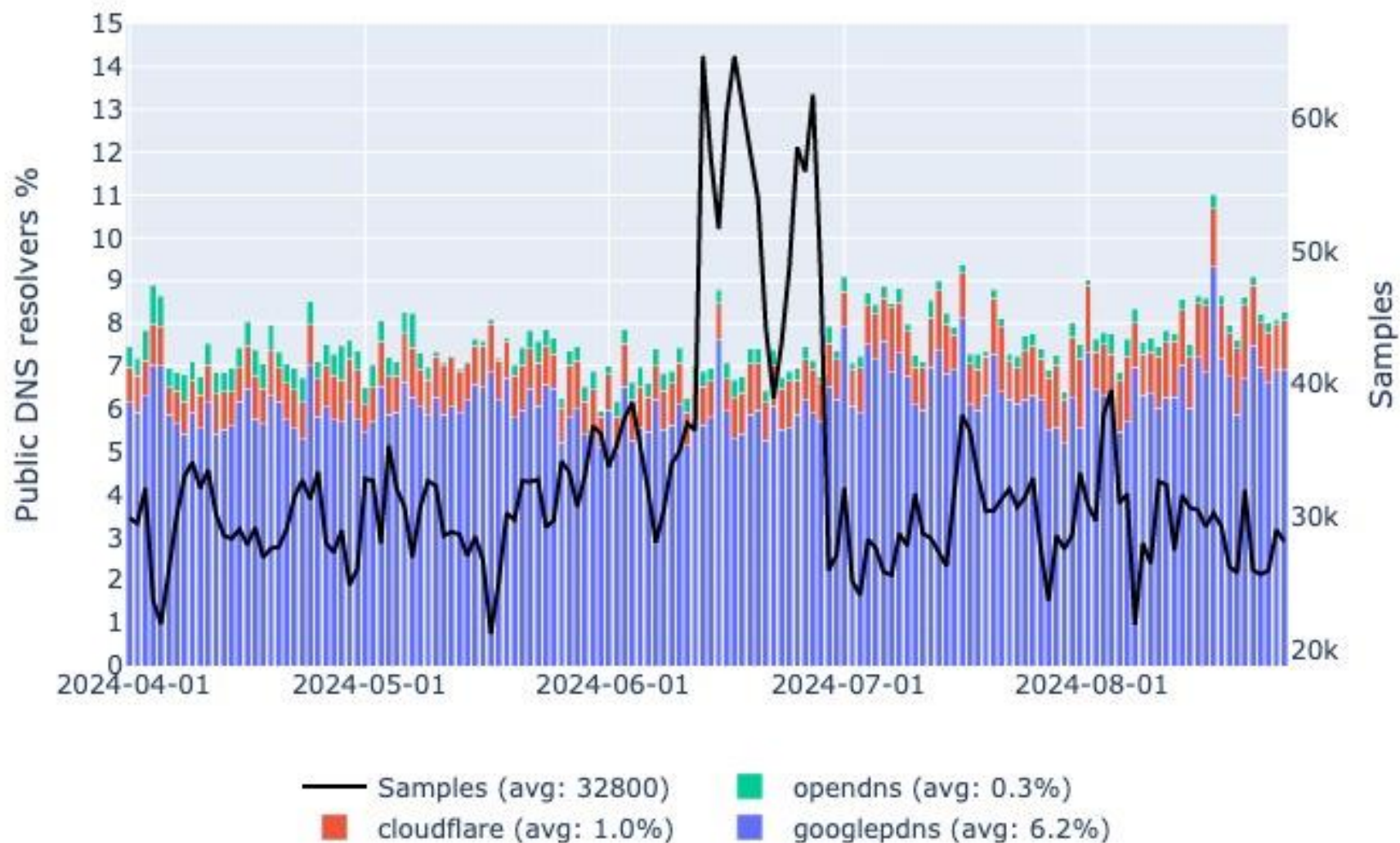


---

# Brazil

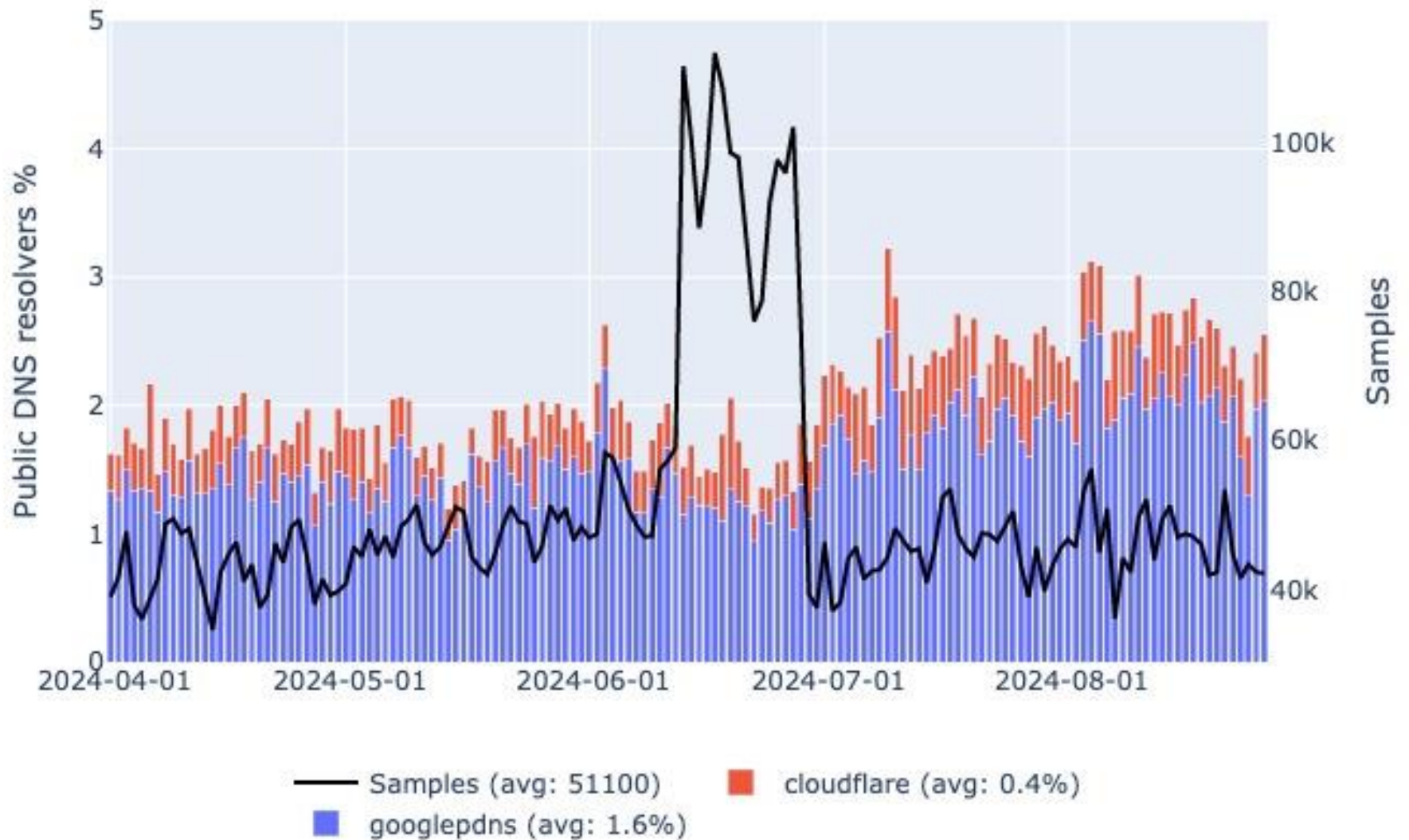
# V tal: 7.5%

AS7738 V tal Broadband: 7.5%



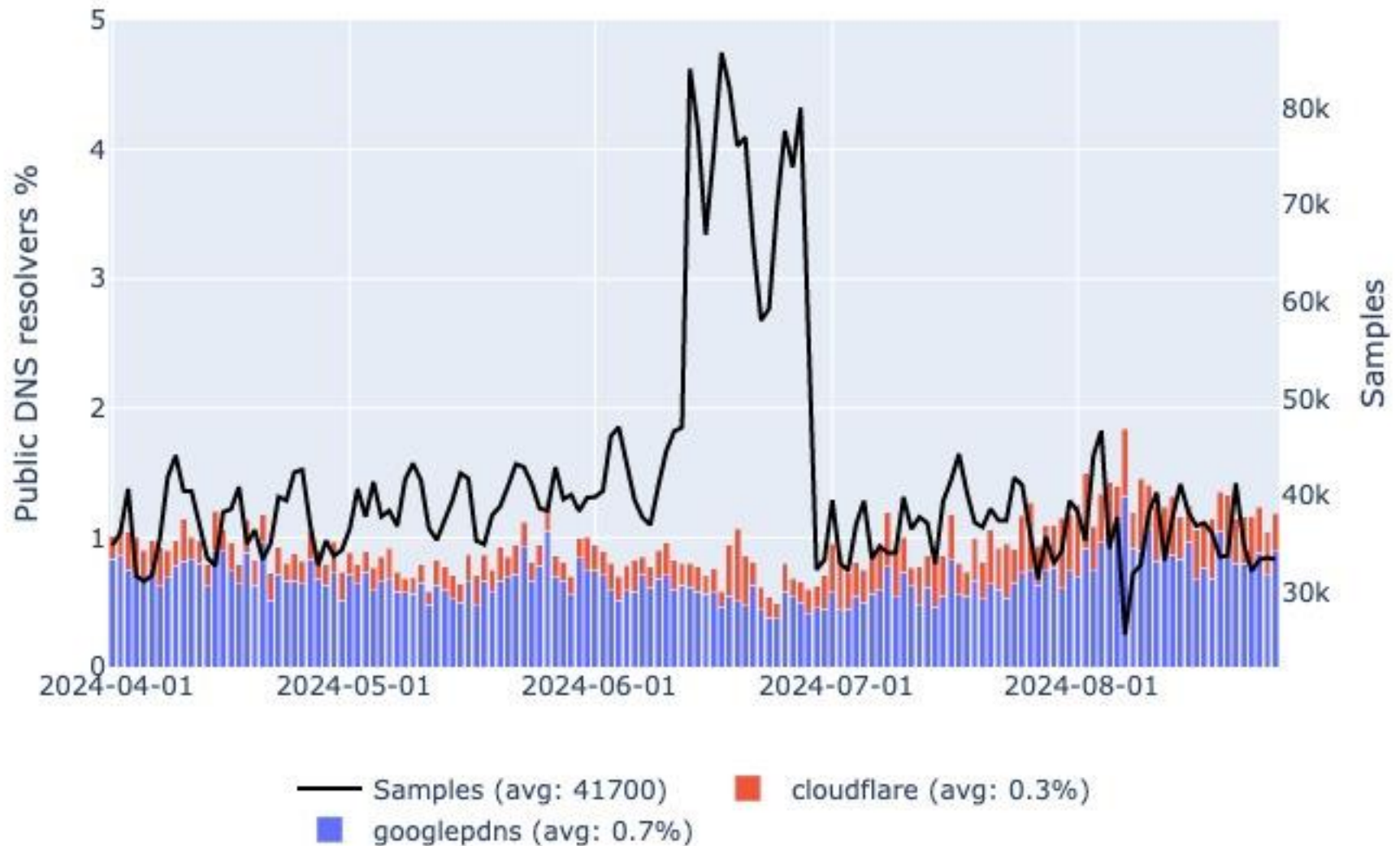
# Telefonica Brasil: 2.0%

AS26599 TELEFONICA BRASIL S.A Cellular: 2.0%



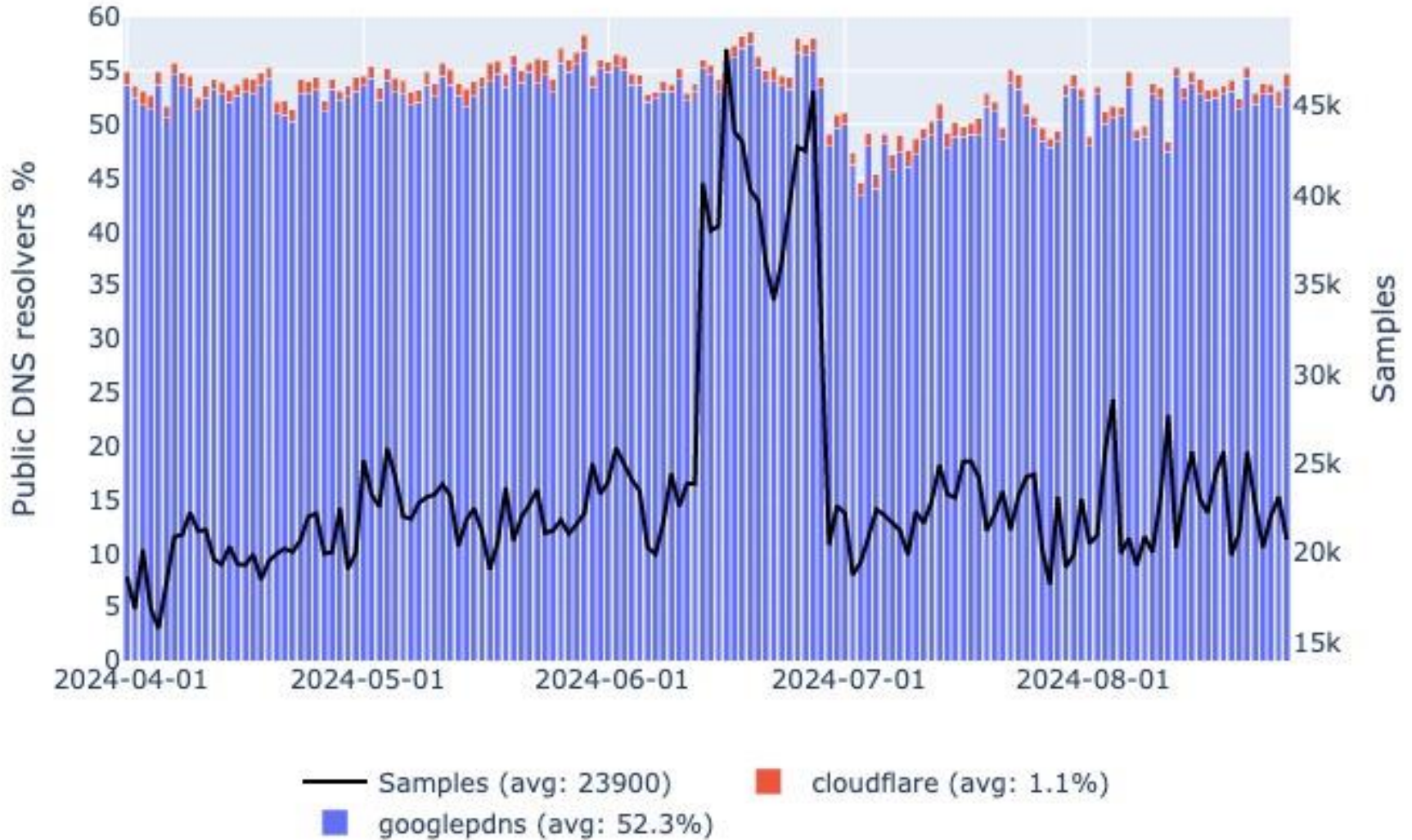
# TIM: 0.9%

AS26615 TIM SA Cellular: 0.9%



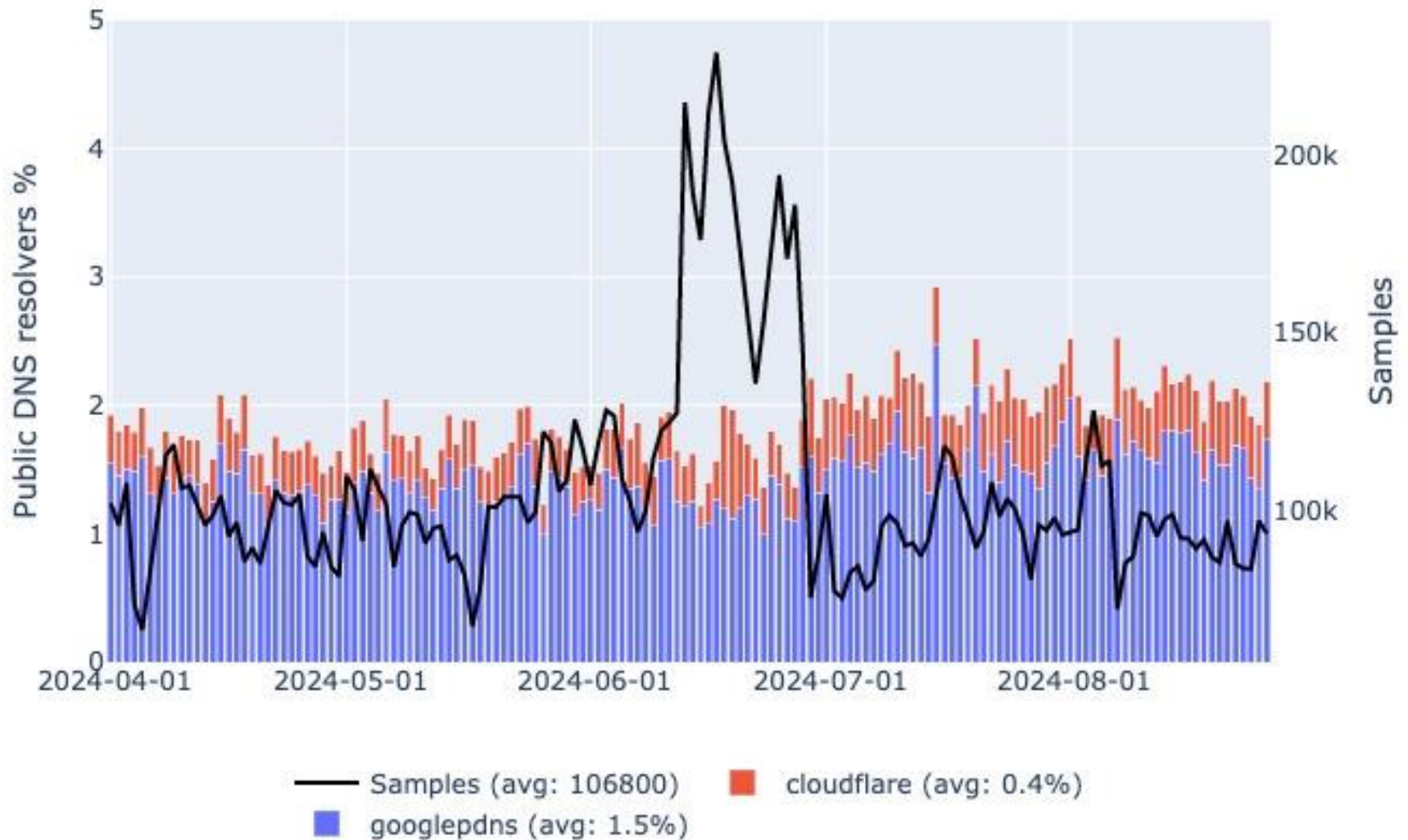
# Brisanet: 53.4%

AS28126 BRISANET SERVICOS DE TELECOMUNICACOES S.A Broadband: 53.4



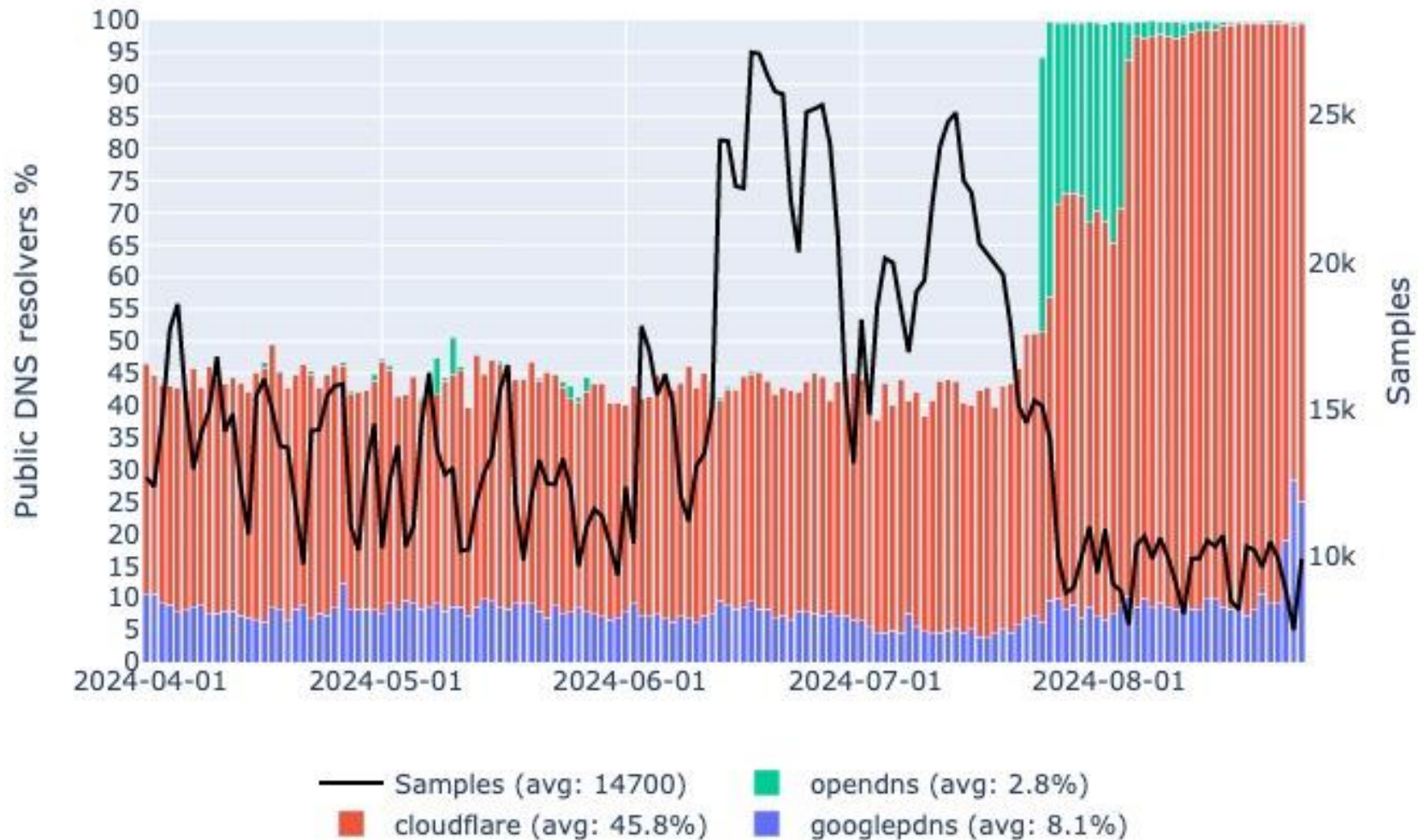
# Claro: 1.9%

AS28573 Claro NXT Telecomunicacoes Ltda Cellular: 1.9%



# Qnax: 56.7%

AS268581 QNAX LTDA Broadband: 56.7%

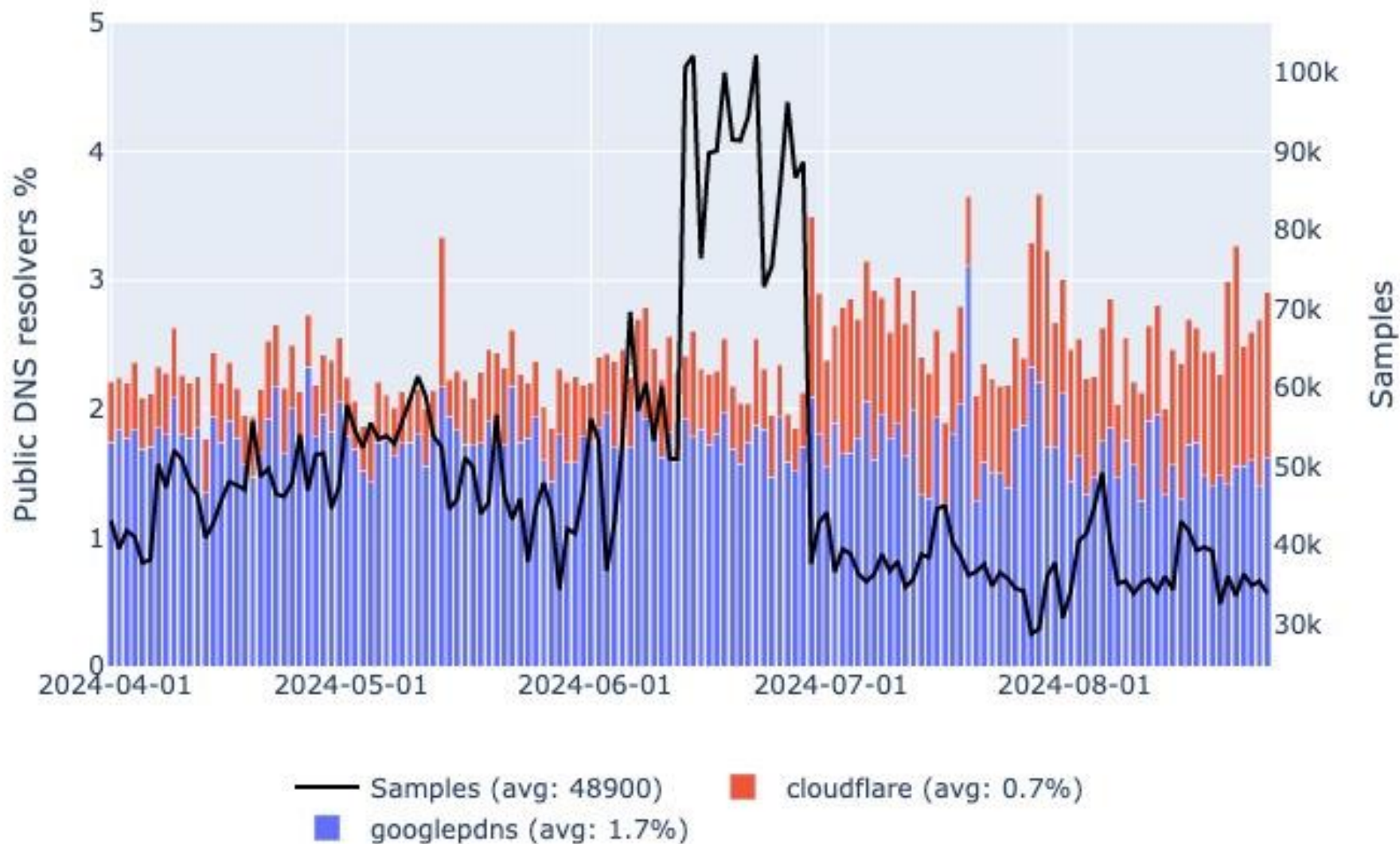


---

# Chile

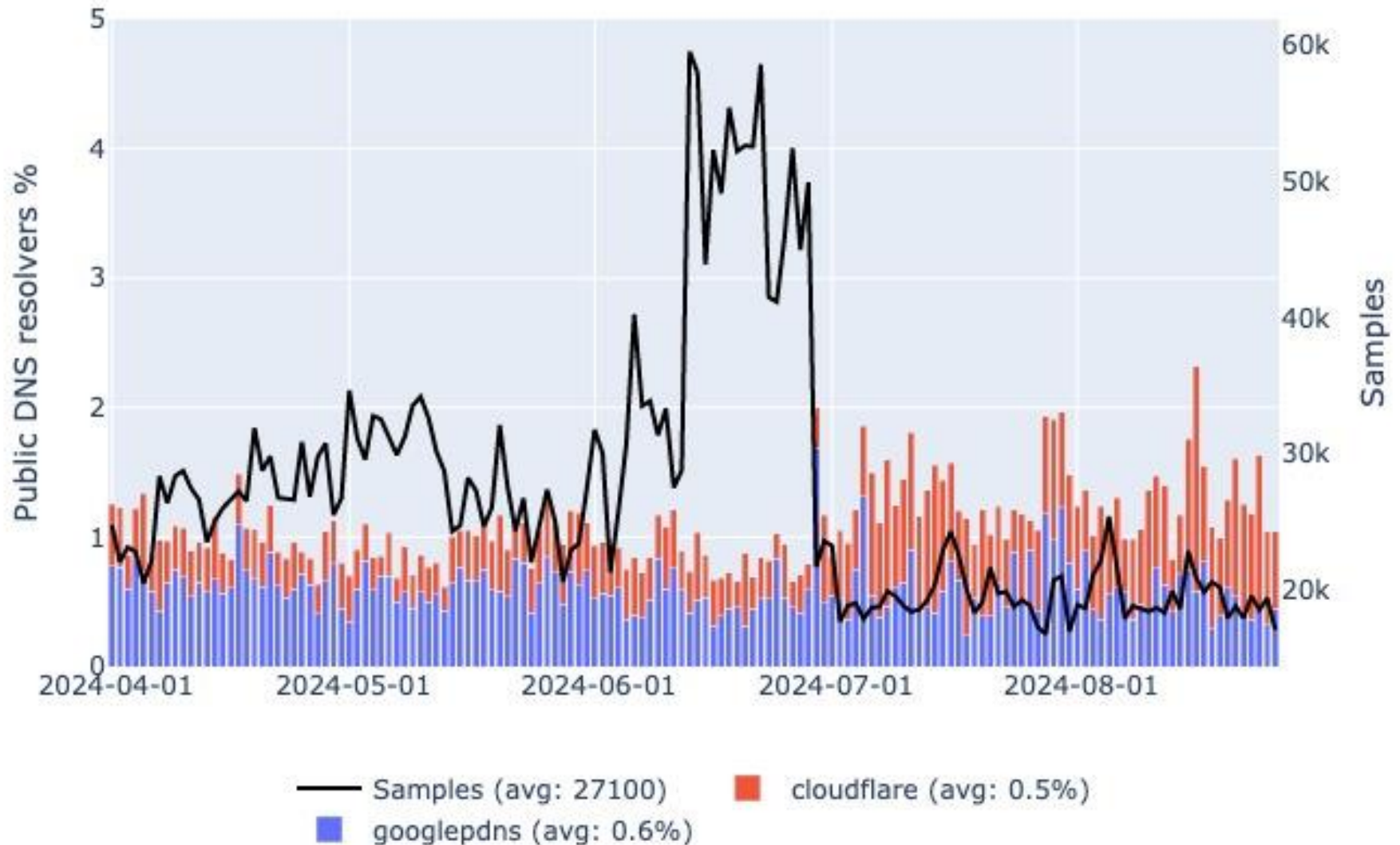
# Telefonica Chile: 2.4%

AS7418 TELEFONICA CHILE S.A. Cellular: 2.4%



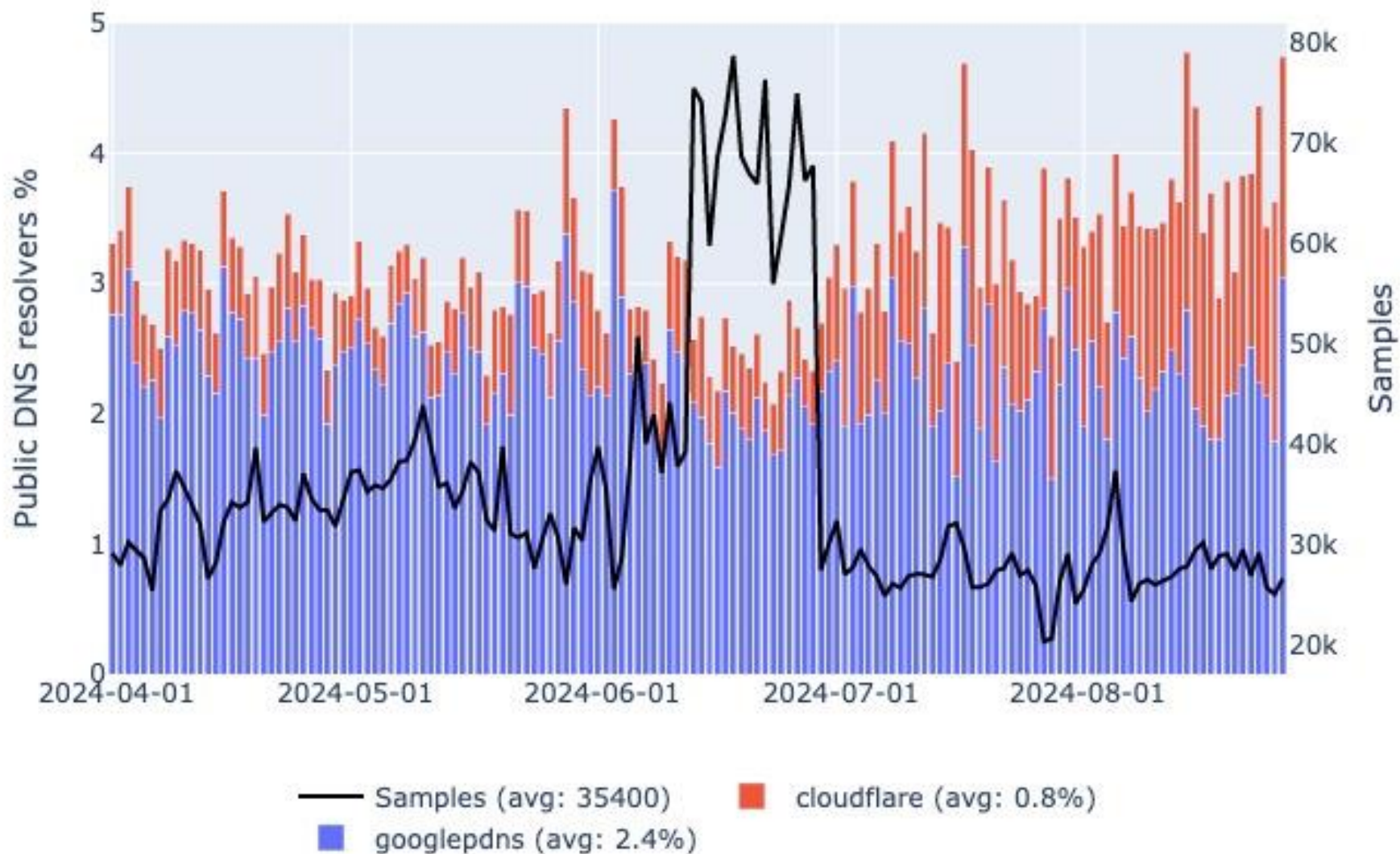
# VTR Banda Ancha: 1.1%

AS22047 VTR BANDA ANCHA S.A. Broadband: 1.1%



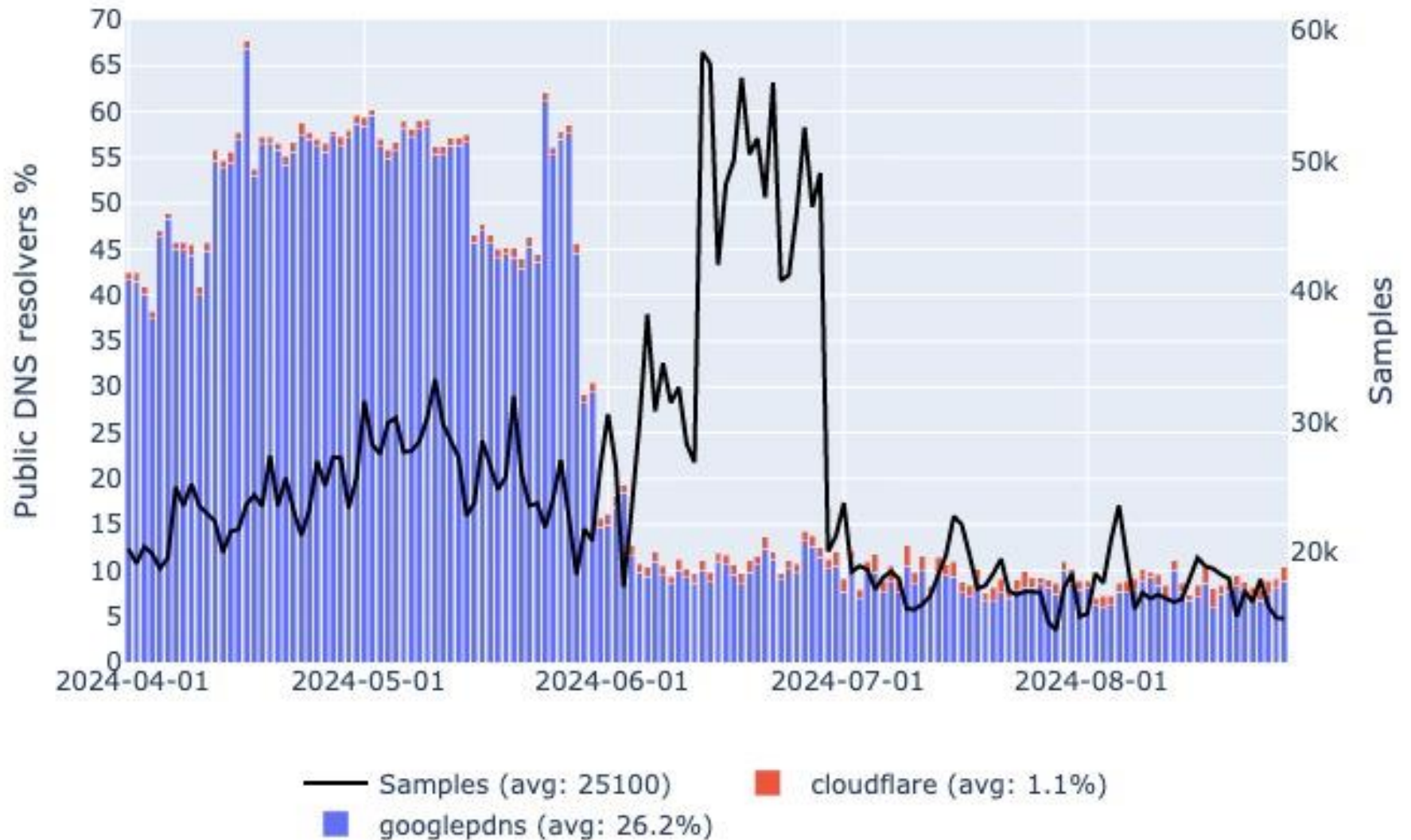
# Entel Chile: 3.2%

AS27651 ENTEL CHILE S.A. Broadband: 3.2%



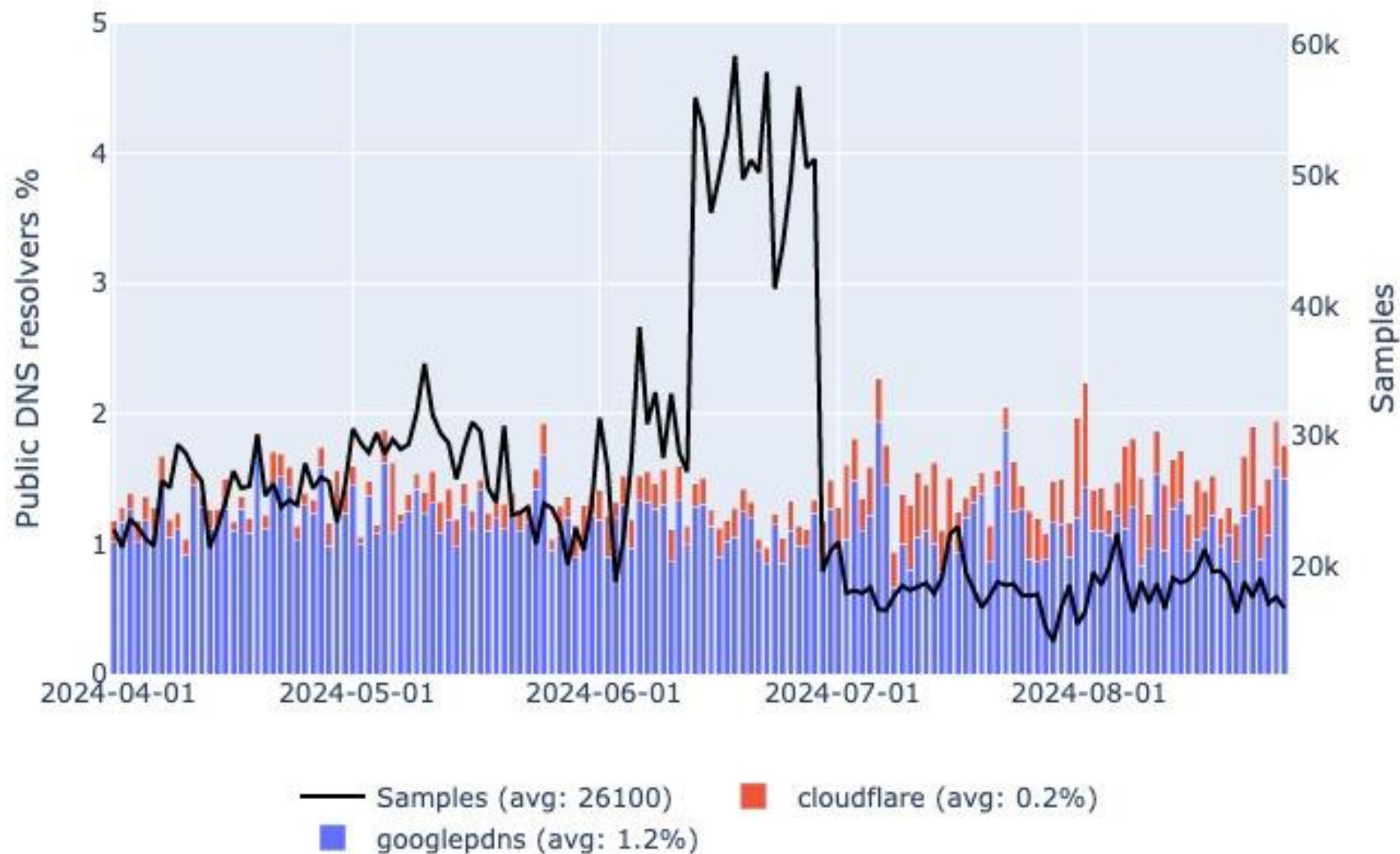
# Pacifico Cable: 27.3%

AS27901 Pacifico Cable SPA. Broadband: 27.3%



# WOM: 1.4%

AS52341 WOM S.A. Broadband: 1.4%

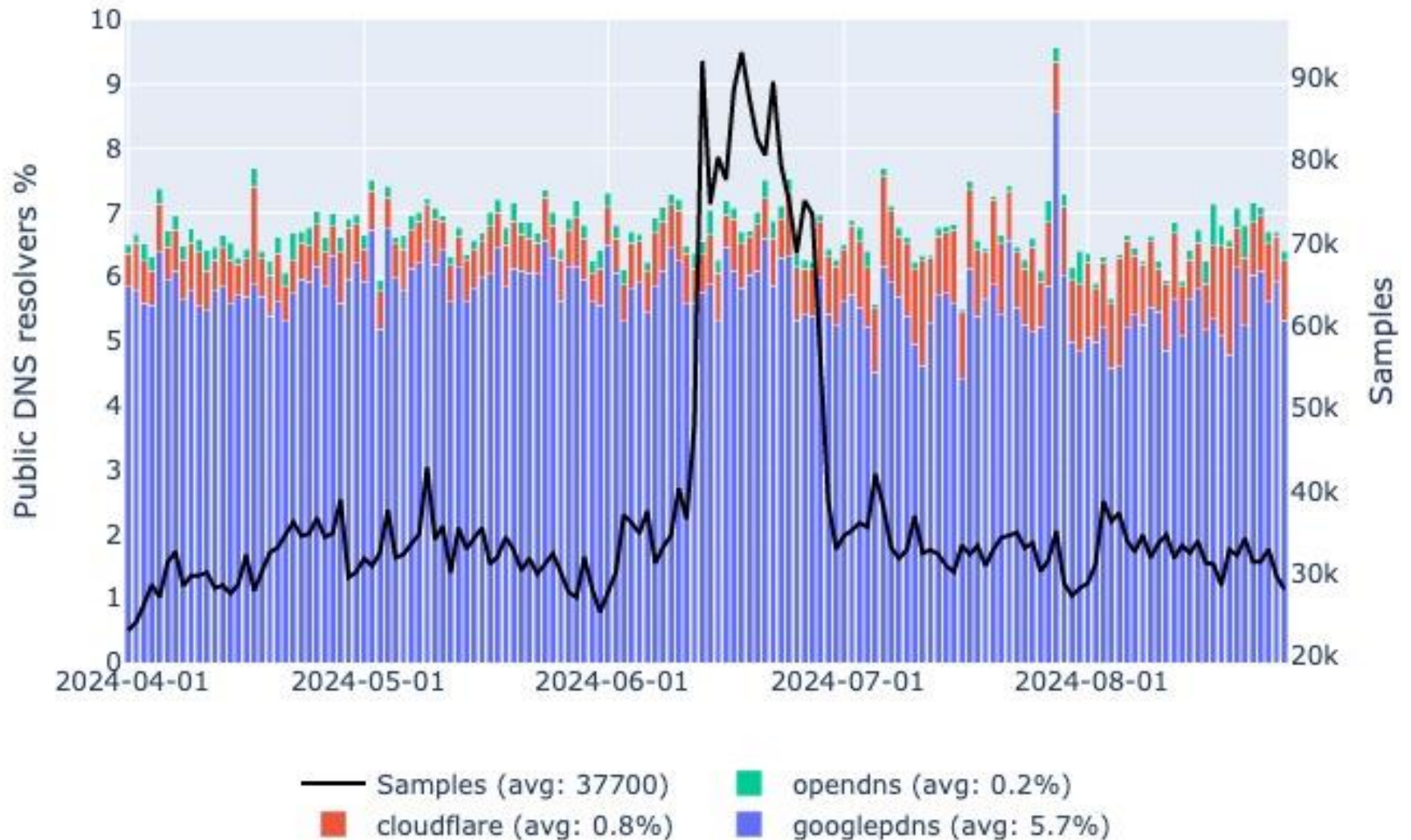


---

# Colombia

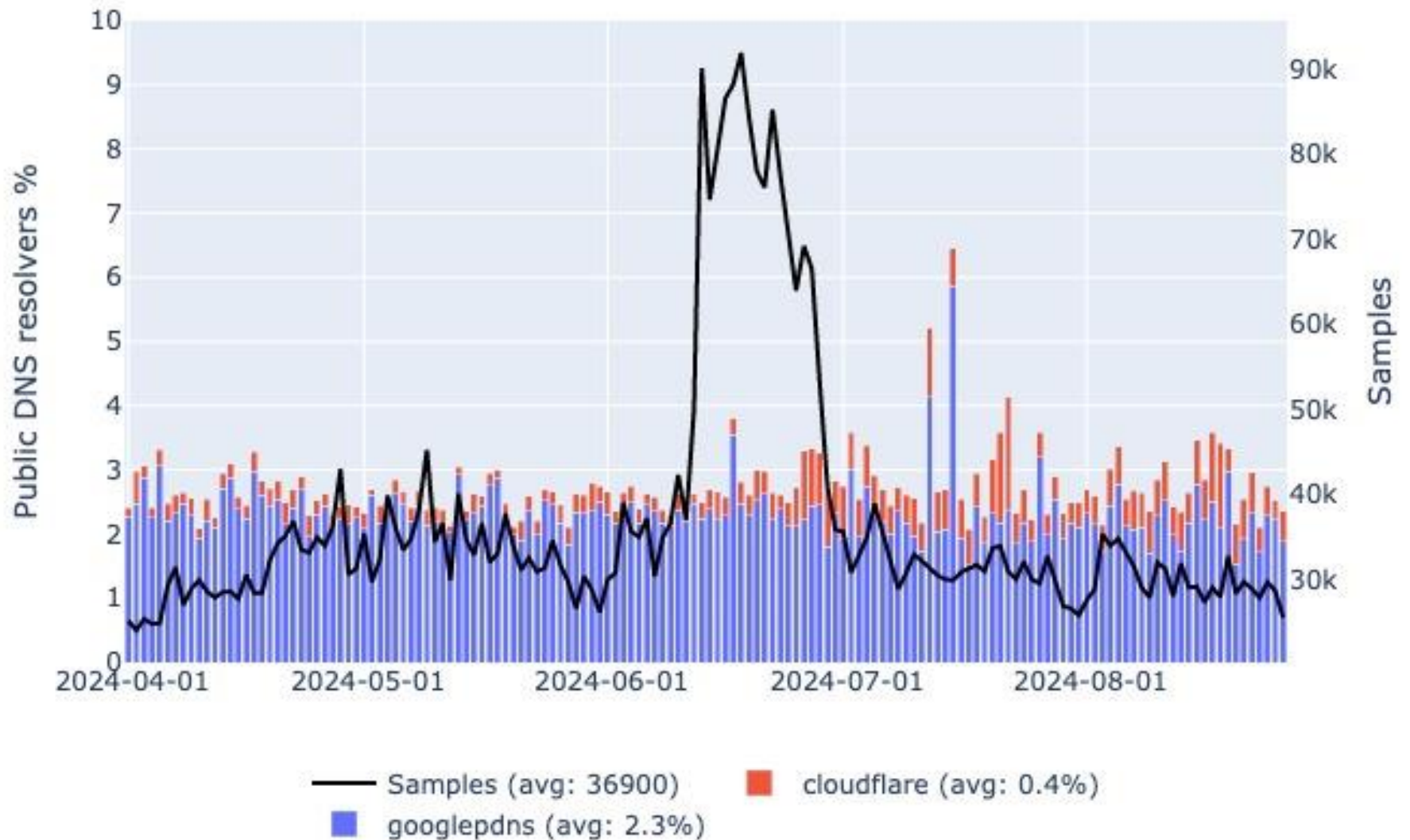
# Colombia Telecomunicaciones: 6.7%

AS3816 COLOMBIA TELECOMUNICACIONES S.A. ESP Broadband: 6.7%



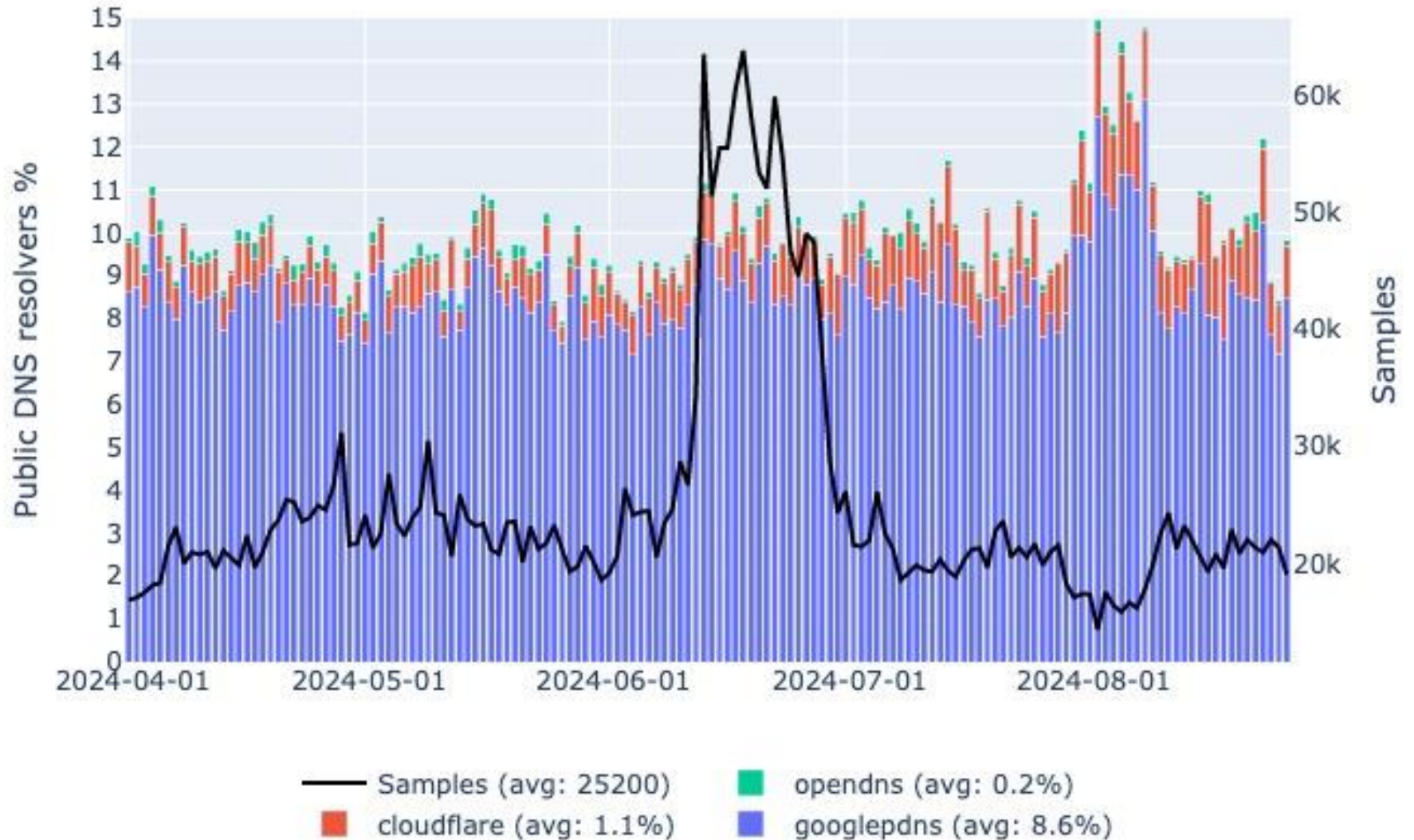
# Telmex Colombia: 2.7%

AS10620 Telmex Colombia S.A. Cellular: 2.7%



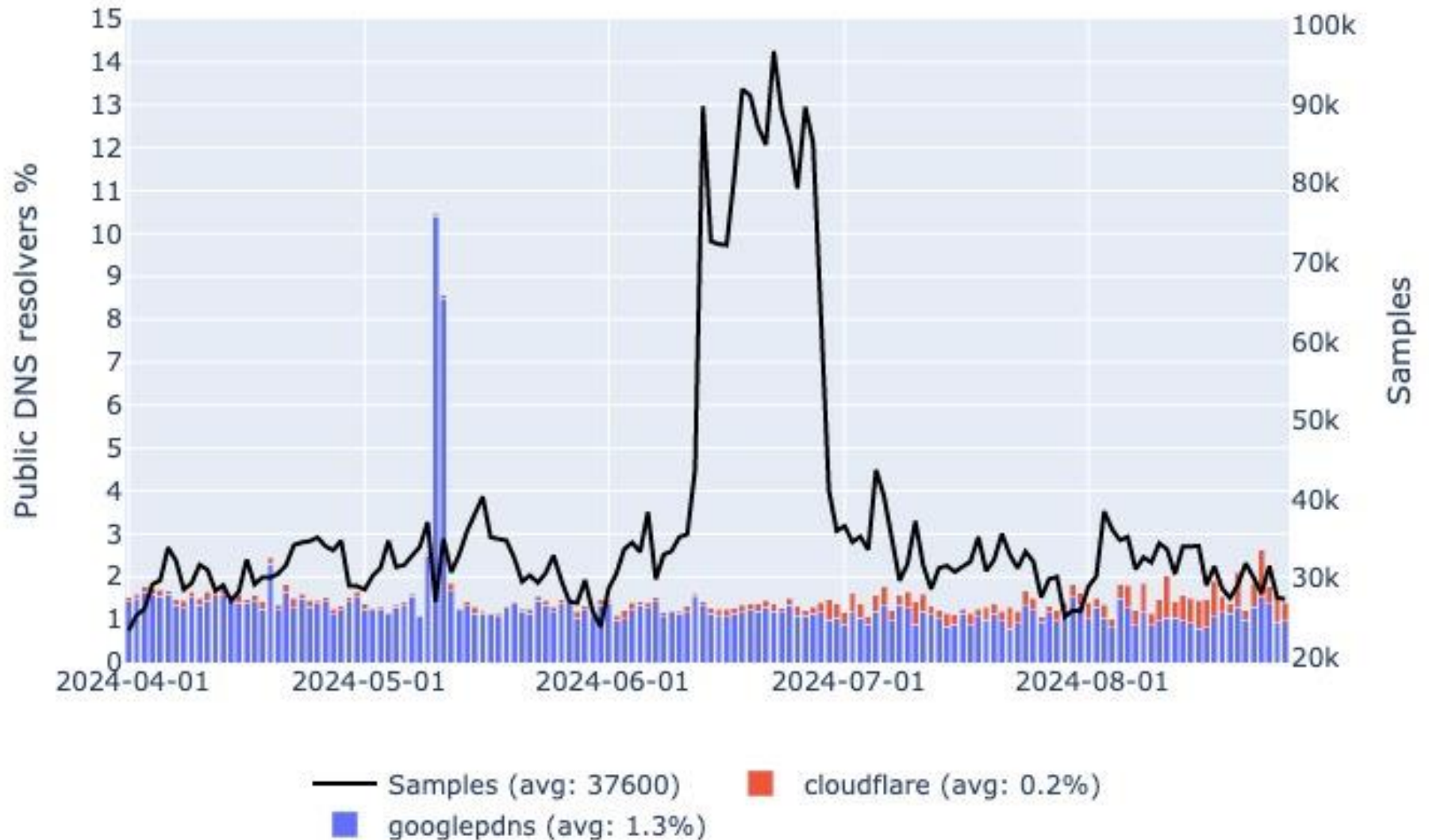
# EPM Telecomunicaciones: 9.9%

AS13489 EPM Telecomunicaciones S.A. E.S.P. Broadband: 9.9%



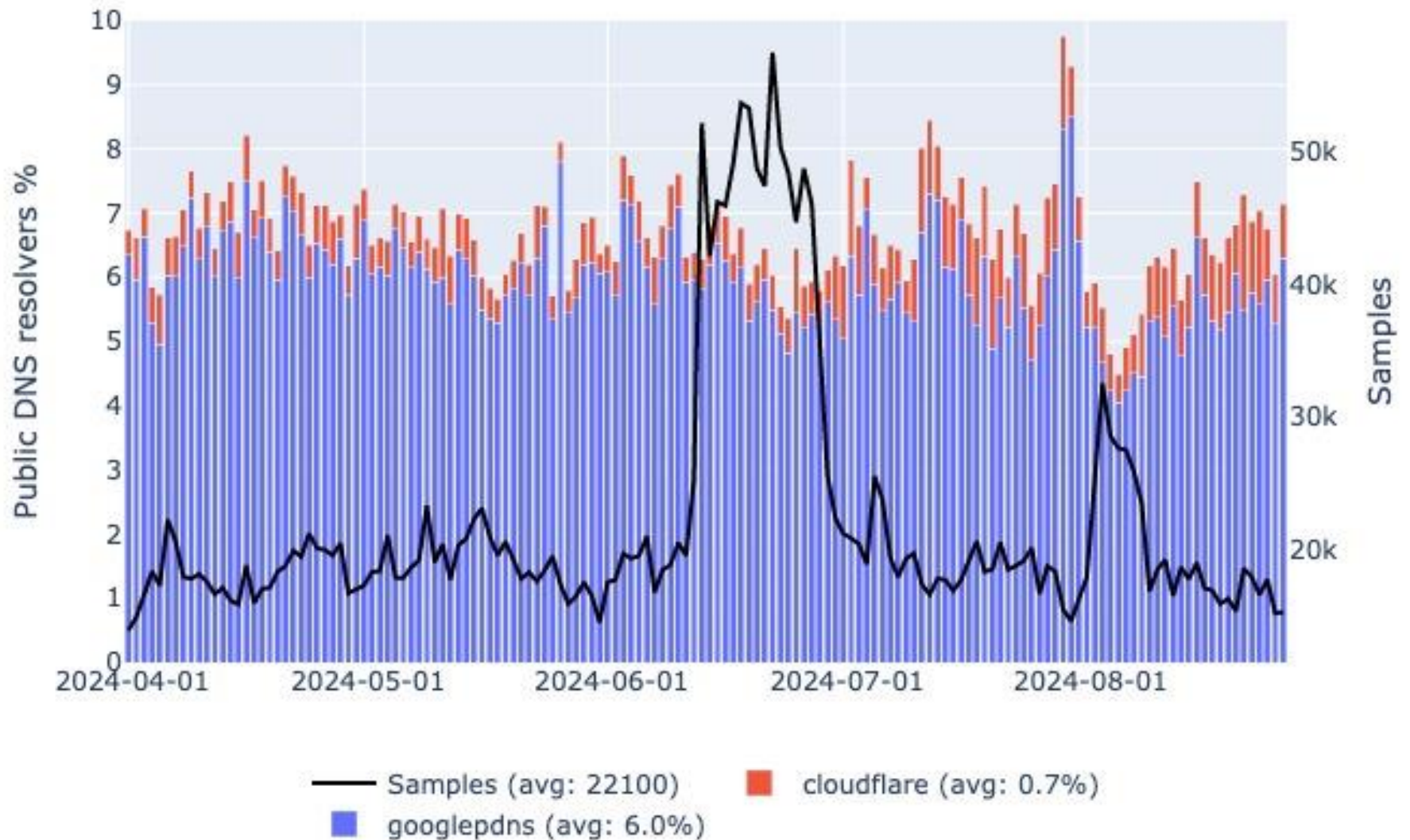
# Communication Celular: 1.6%

AS26611 COMUNICACION CELULAR S.A. COMCEL S.A. Cellular: 1.6%



# Colombia Movil: 6.7%

AS27831 Colombia Movil Cellular: 6.7%

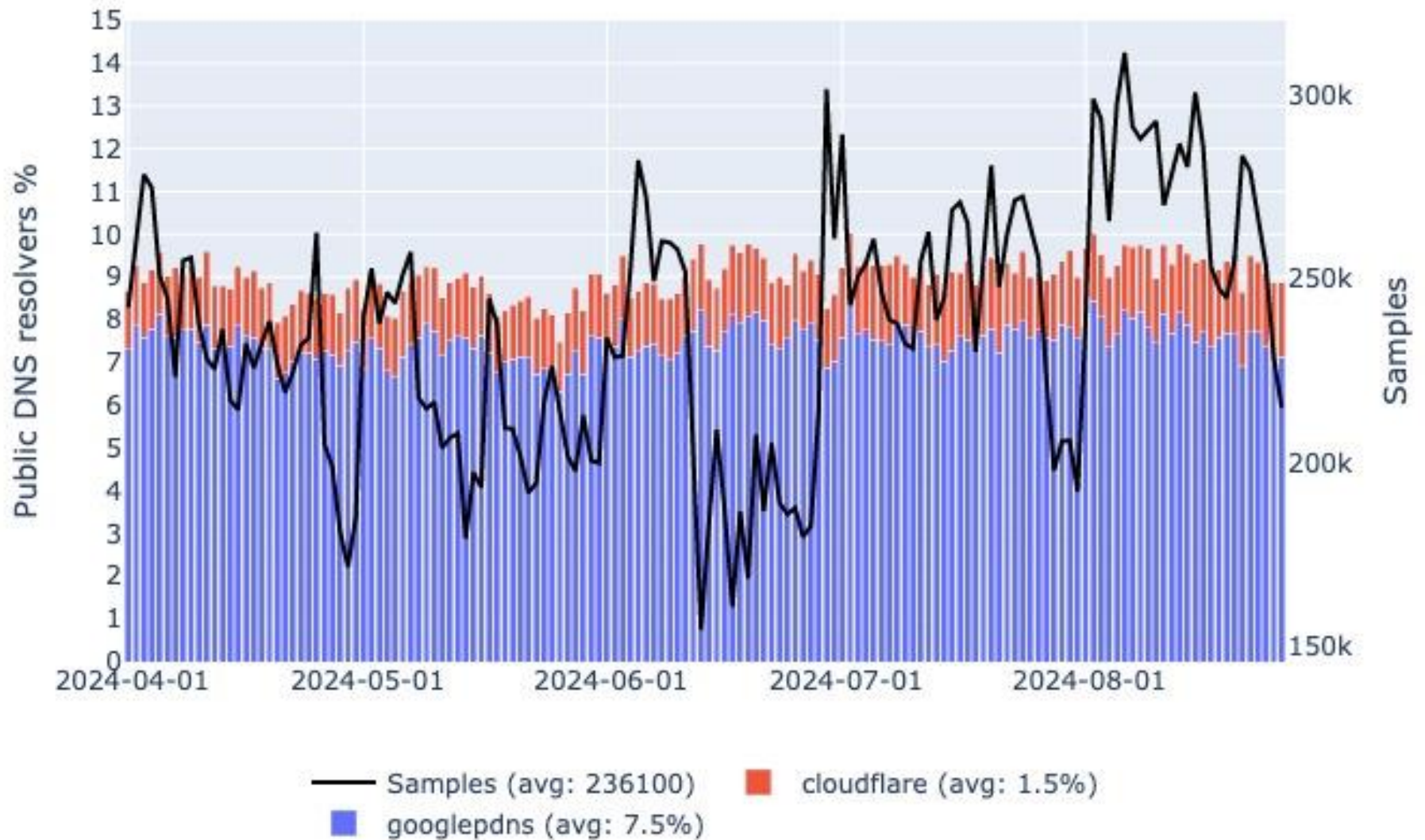


---

# Mexico

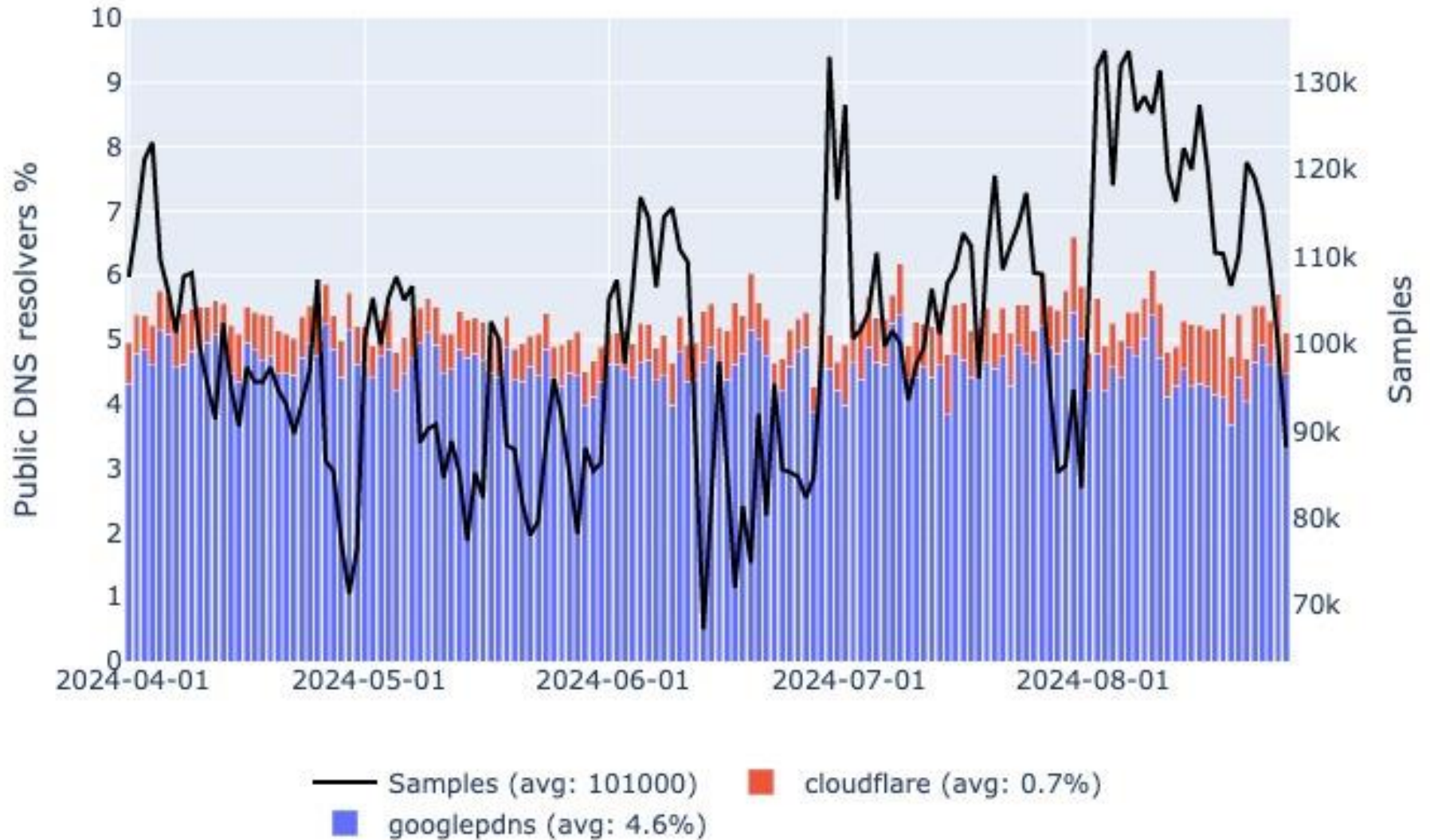
# UNINET: 9.0%

AS8151 UNINET Broadband: 9.0%



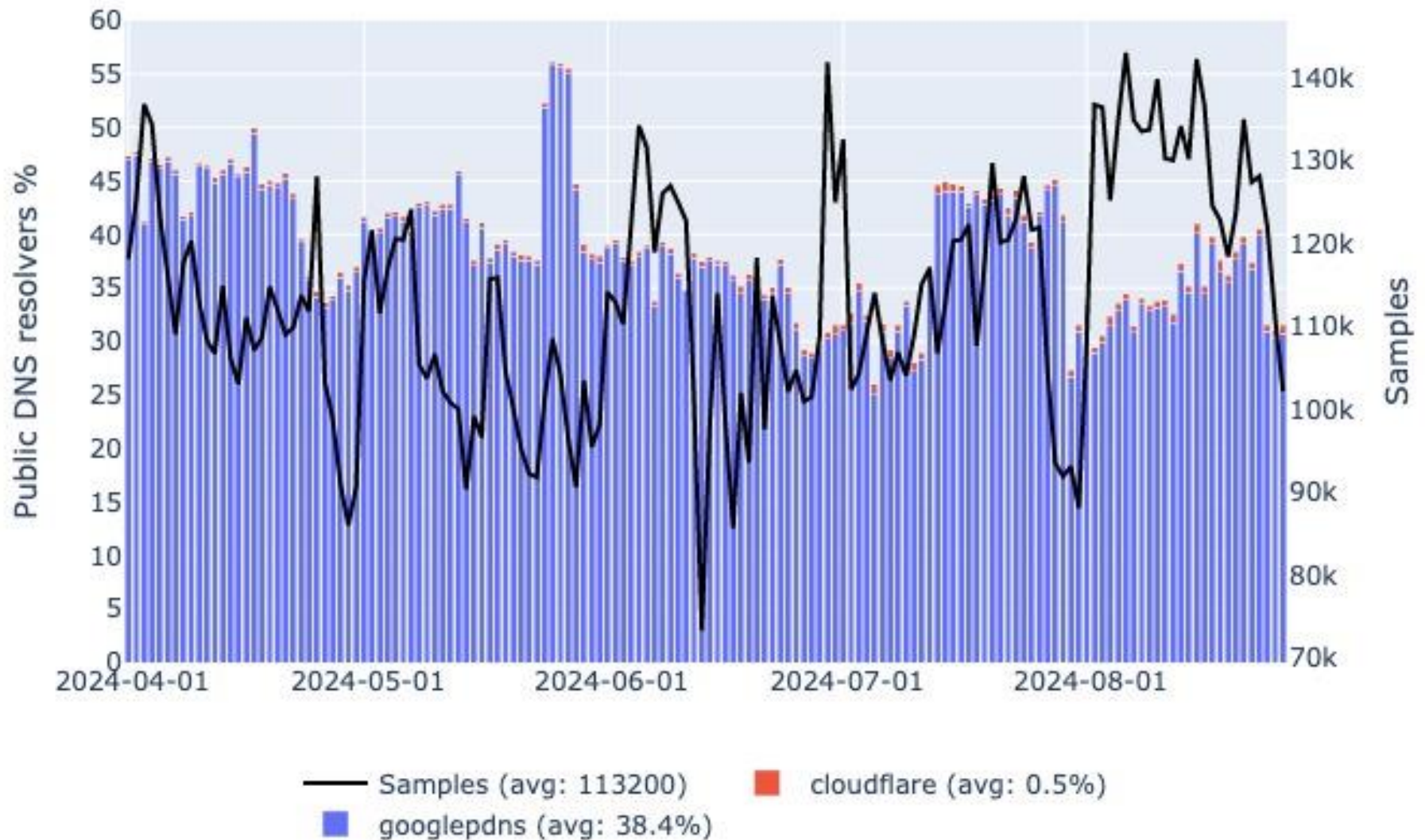
# Mega Cable: 5.3%

AS13999 Mega Cable S.A. de C.V. Broadband: 5.3%



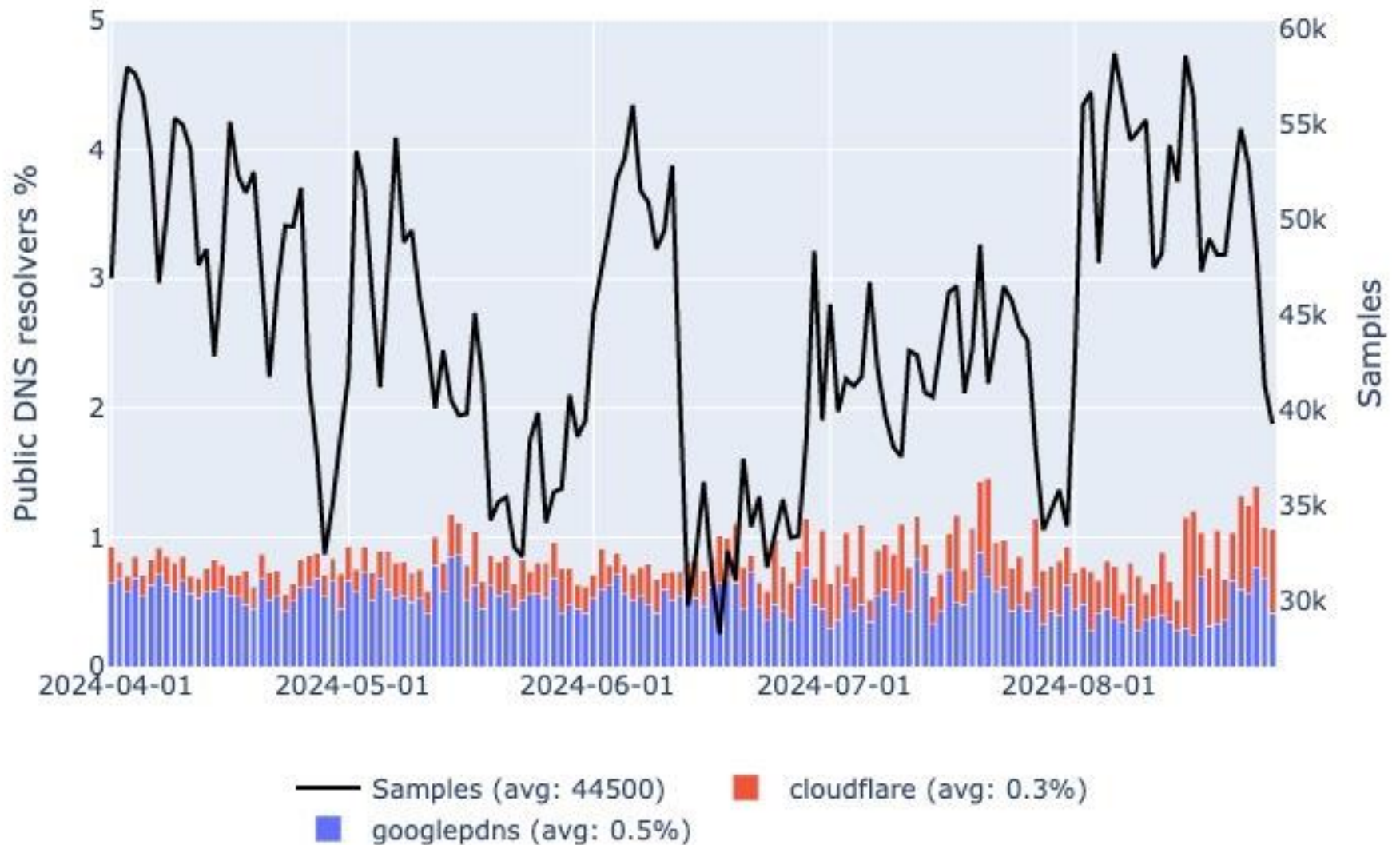
# Total Play Telecommunications: 38.9%

AS17072 TOTAL PLAY TELECOMUNICACIONES SA DE CV Broadband: 38.9%



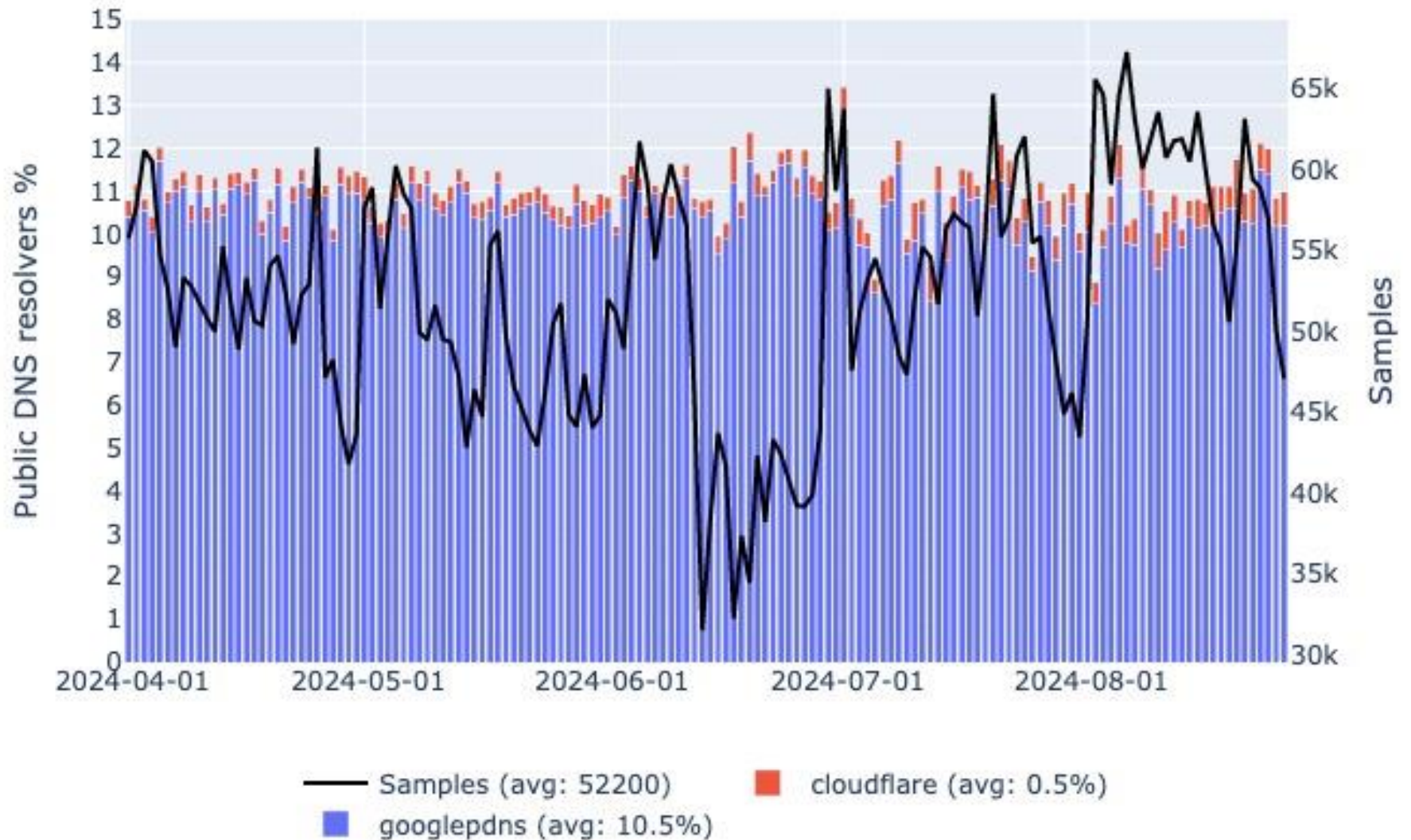
# RadioMovil Dipsa: 0.8%

AS28403 RadioMovil Dipsa S.A. de C.V. Broadband: 0.8%



# Cablevision: 11.0%

AS28548 Cablevision S.A. de C.V. Broadband: 11.0%

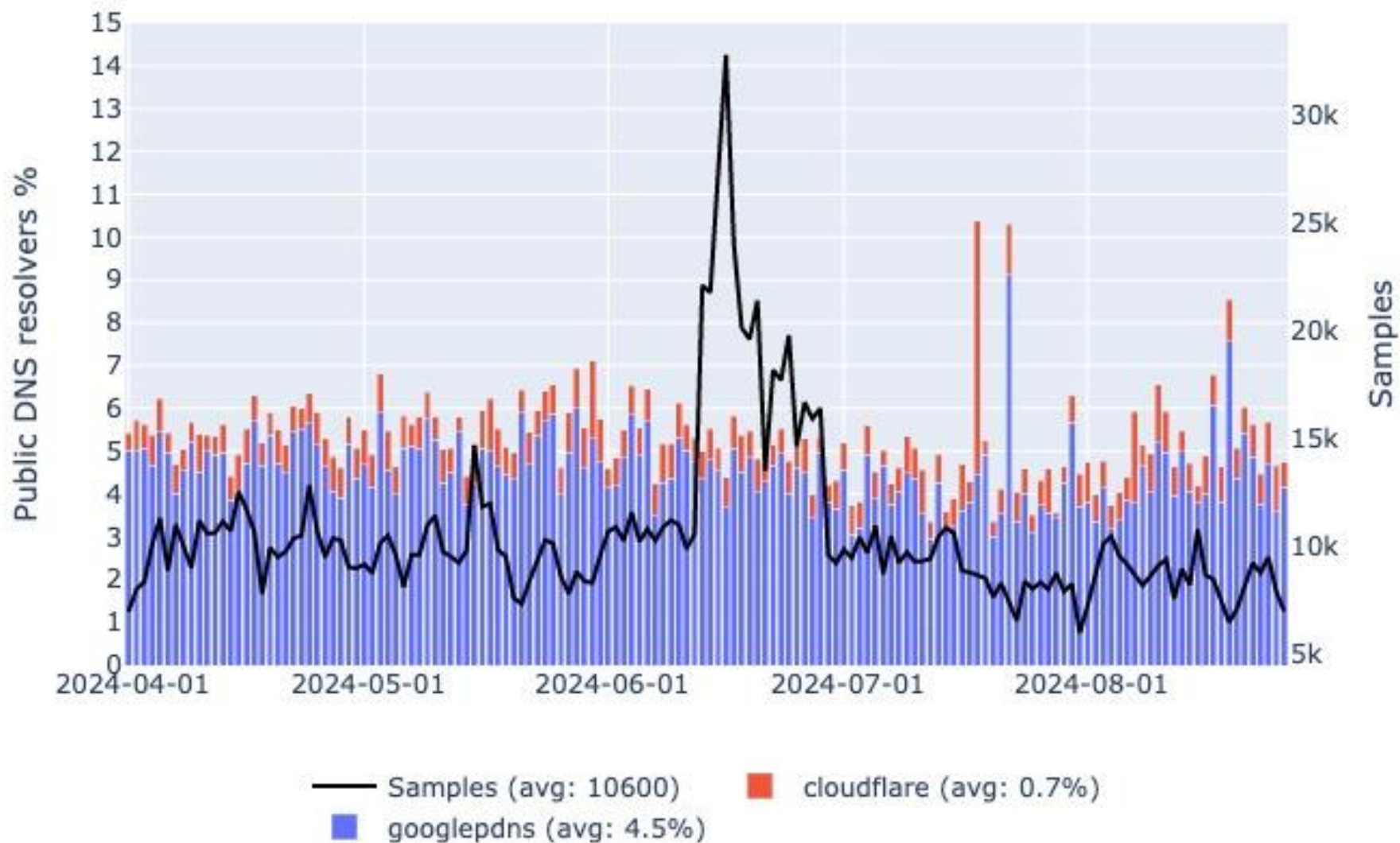


---

# Paraguay

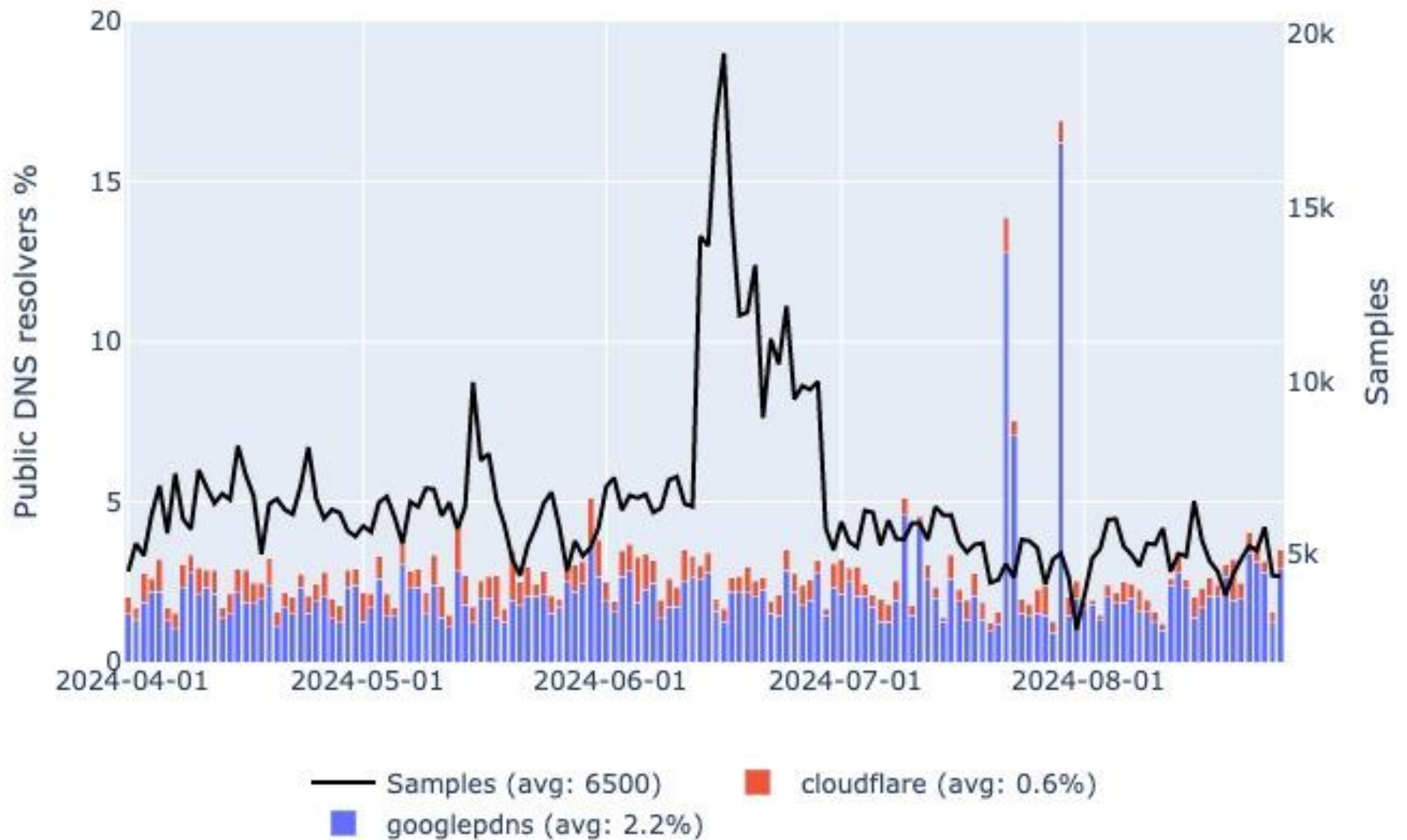
# Telecel: 7.8%

AS23201 Telecel S.A. Cellular: 5.3%



# Nucleo: 2.8%

AS27895 Nucleo S.A. Cellular: 2.8%

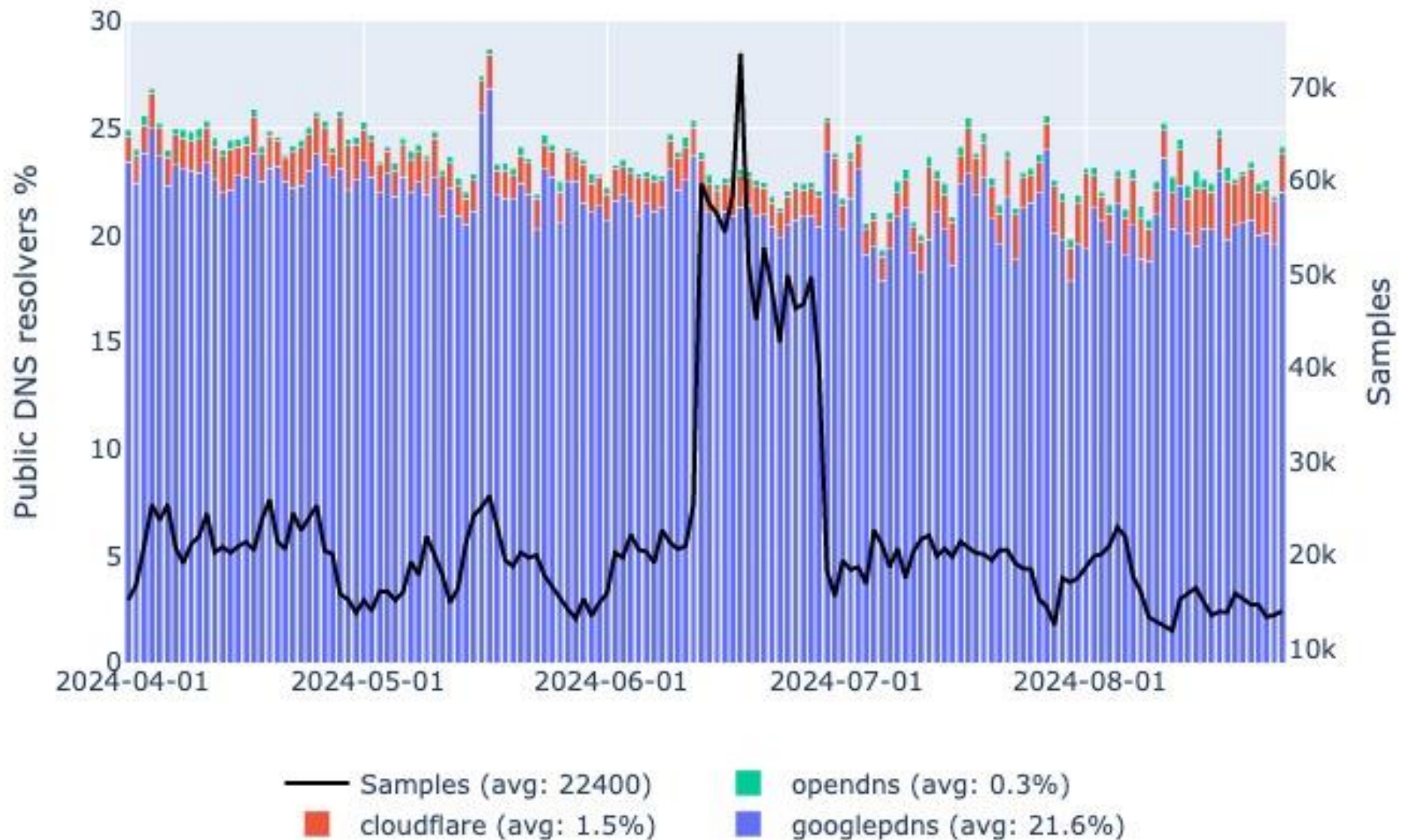


---

# Venezuela

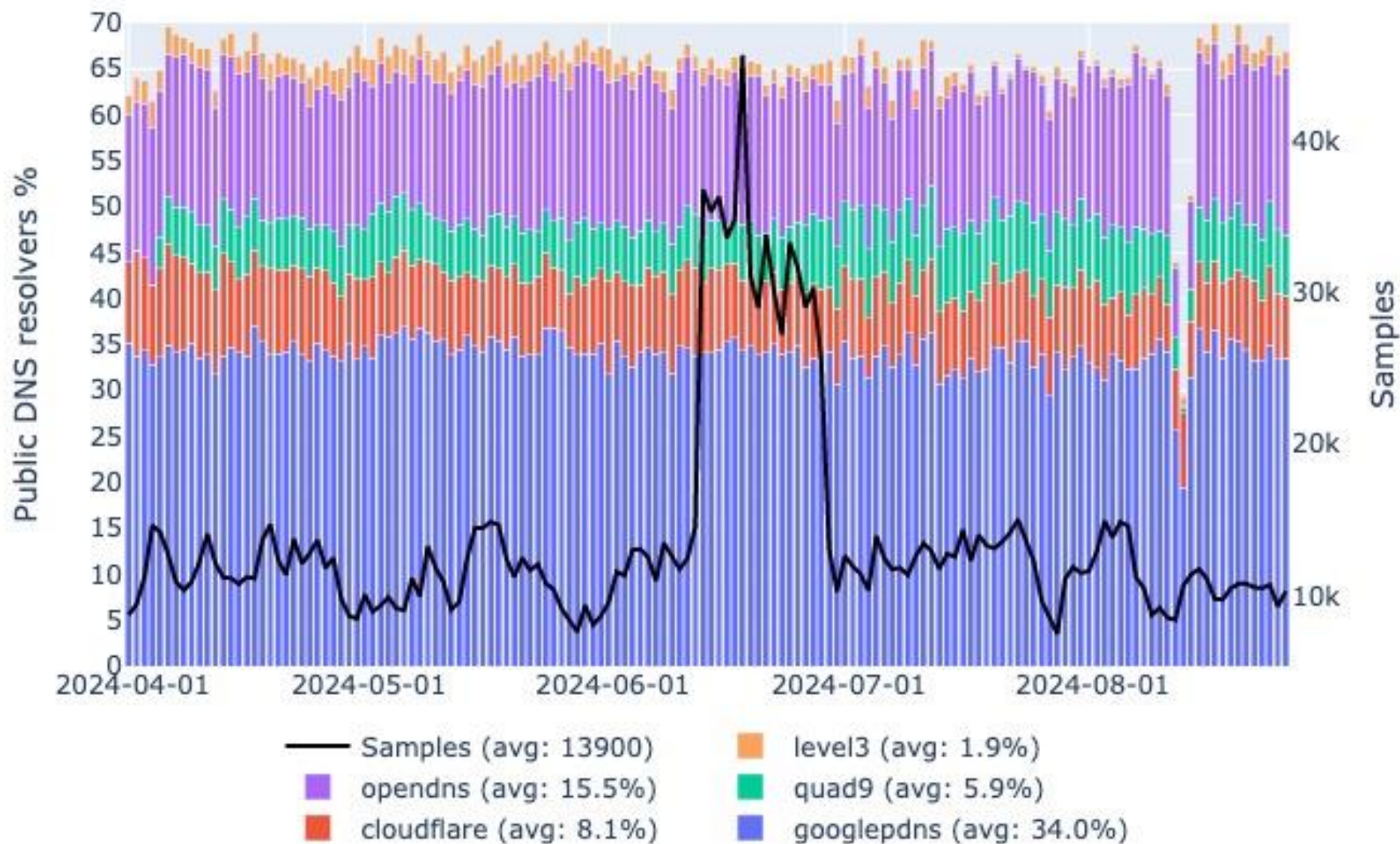
# CANTV: 23.4%

AS8048 CANTV Servicios Venezuela Broadband: 23.4%



# Telemic: 65.4%

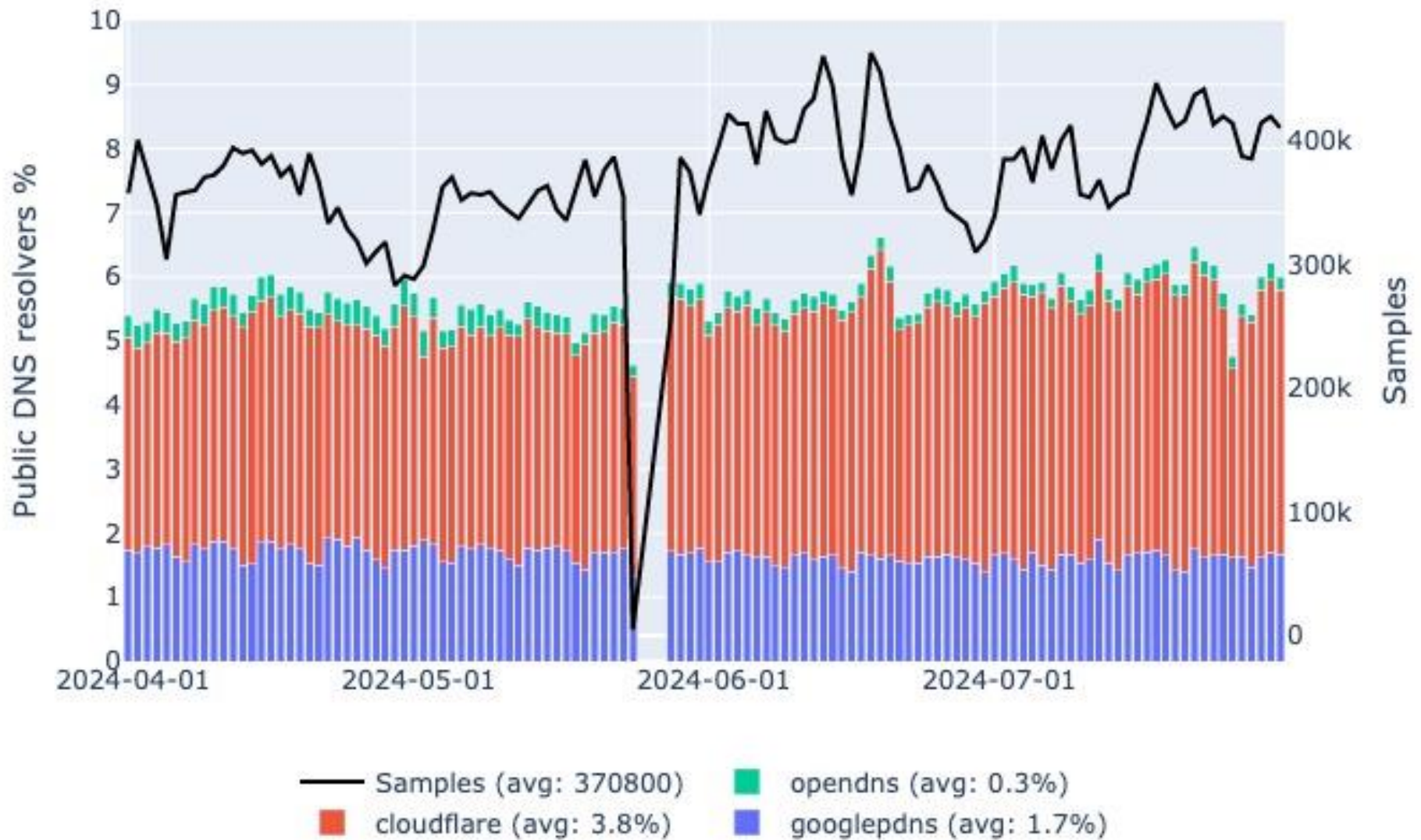
AS21826 Corporacion Telemic C.A. Cellular: 65.4%



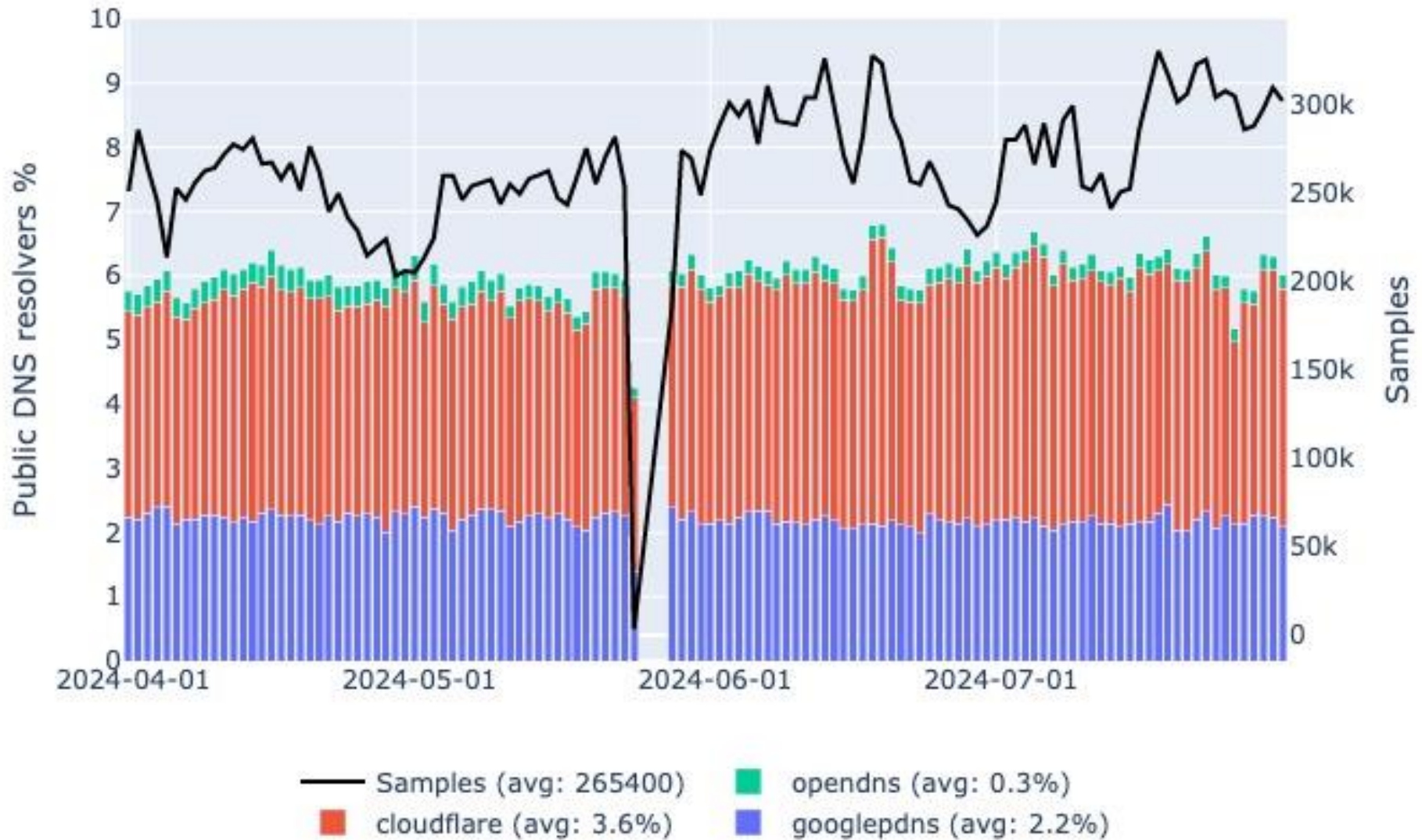
---

# US Broadband Operators

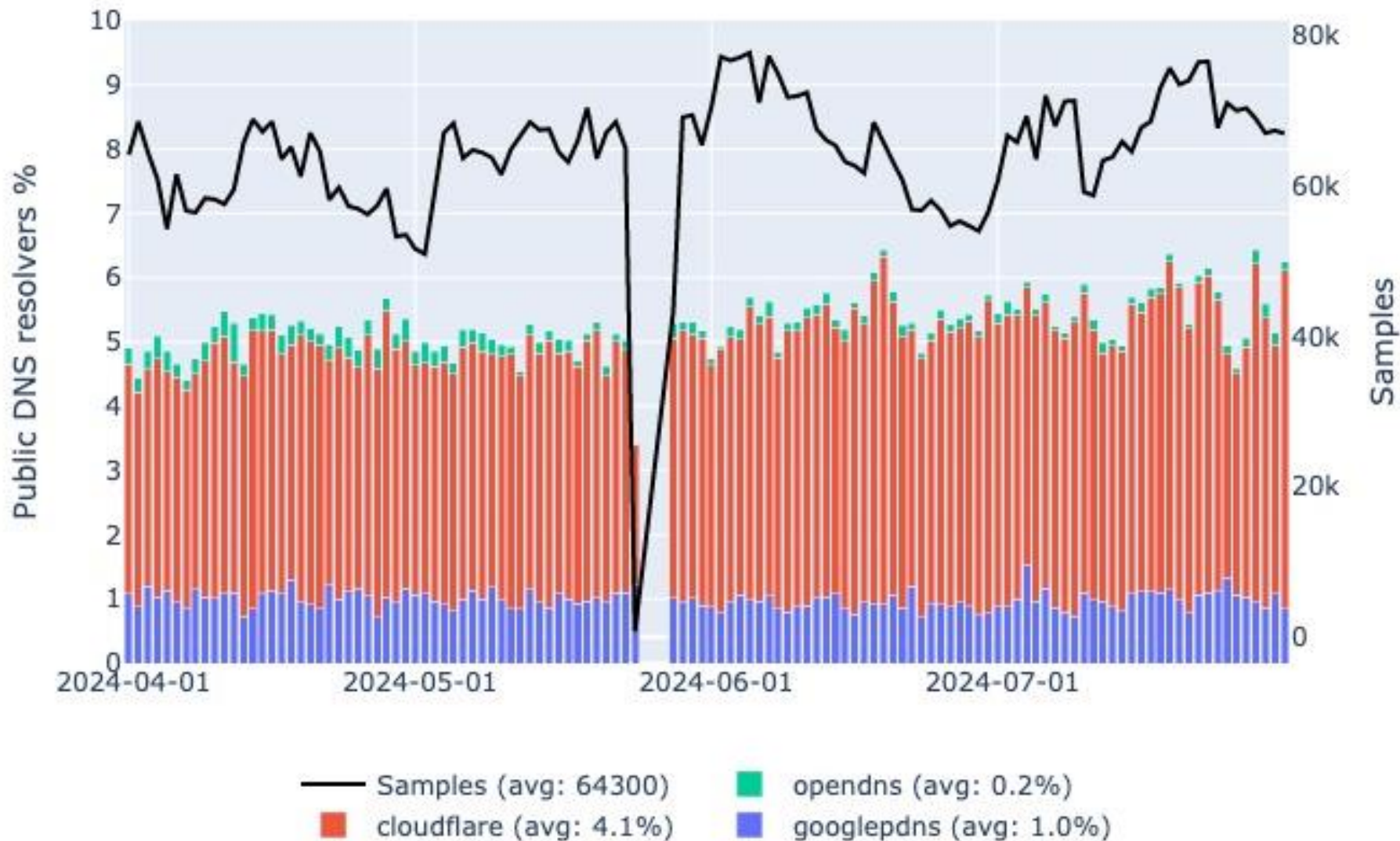
# Comcast (AS7922): 5.7%



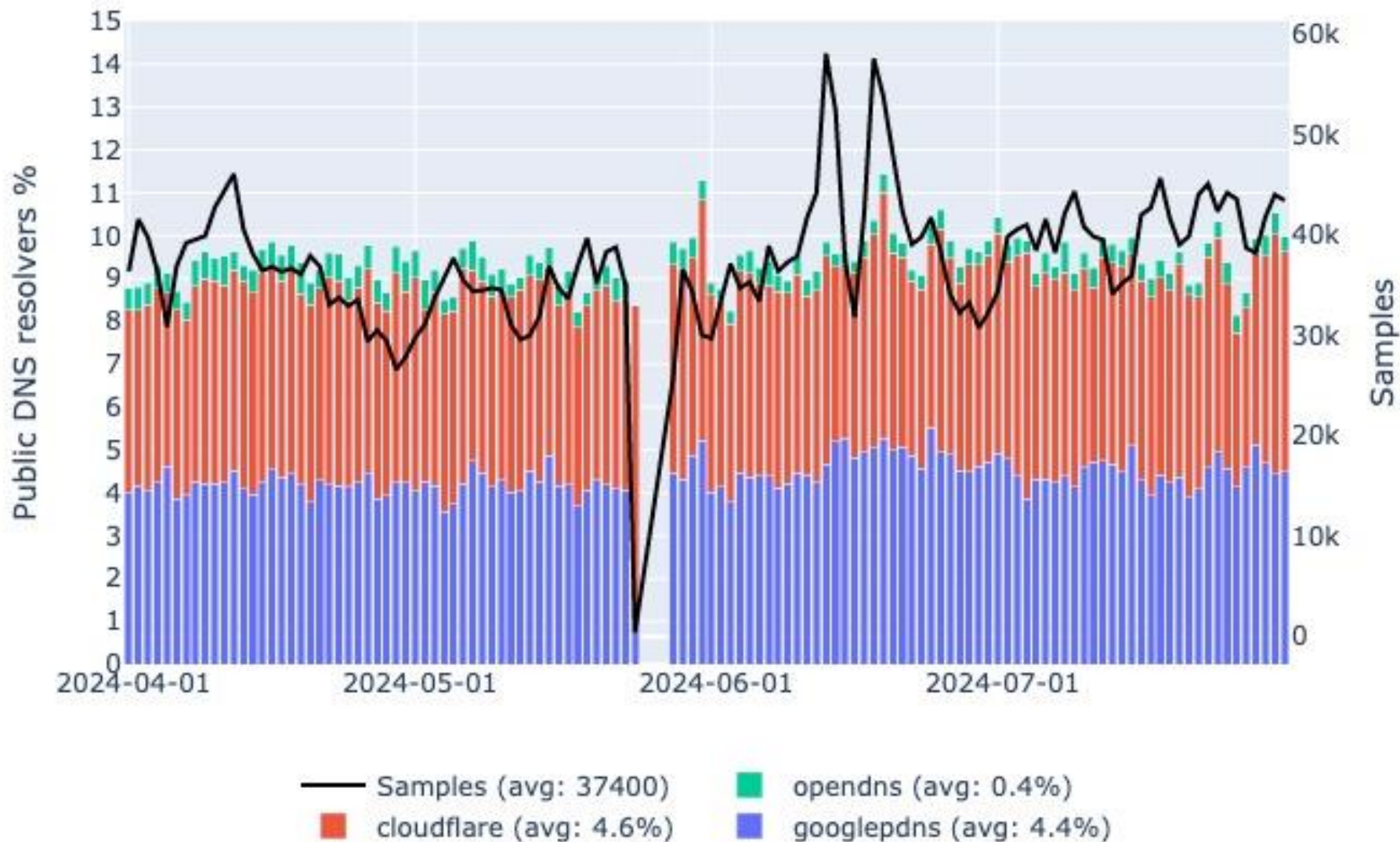
# Charter (AS20115+...): 6%



# Cox (AS22773): 5.3%



# FIOS (AS701): 9.4%

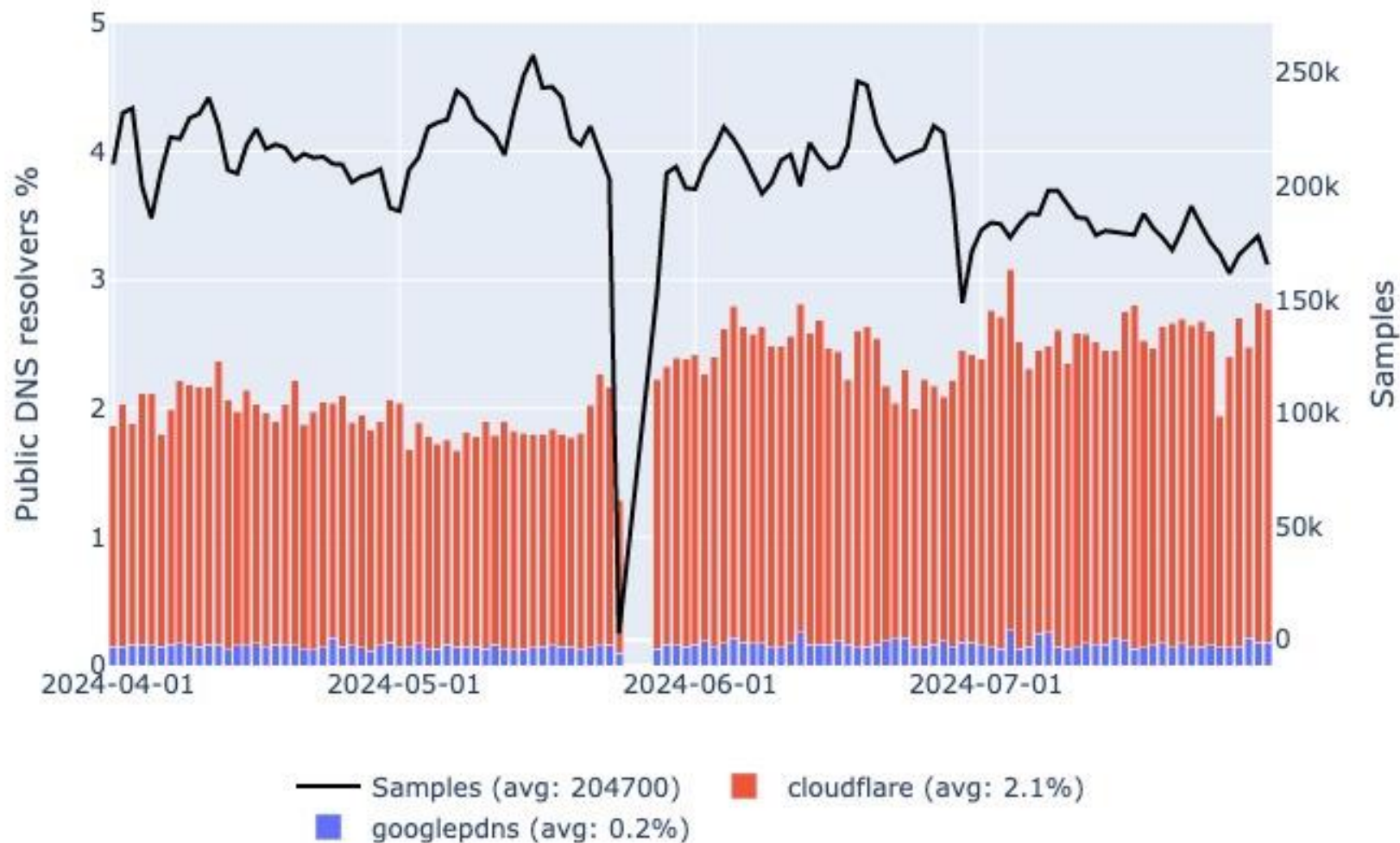


---

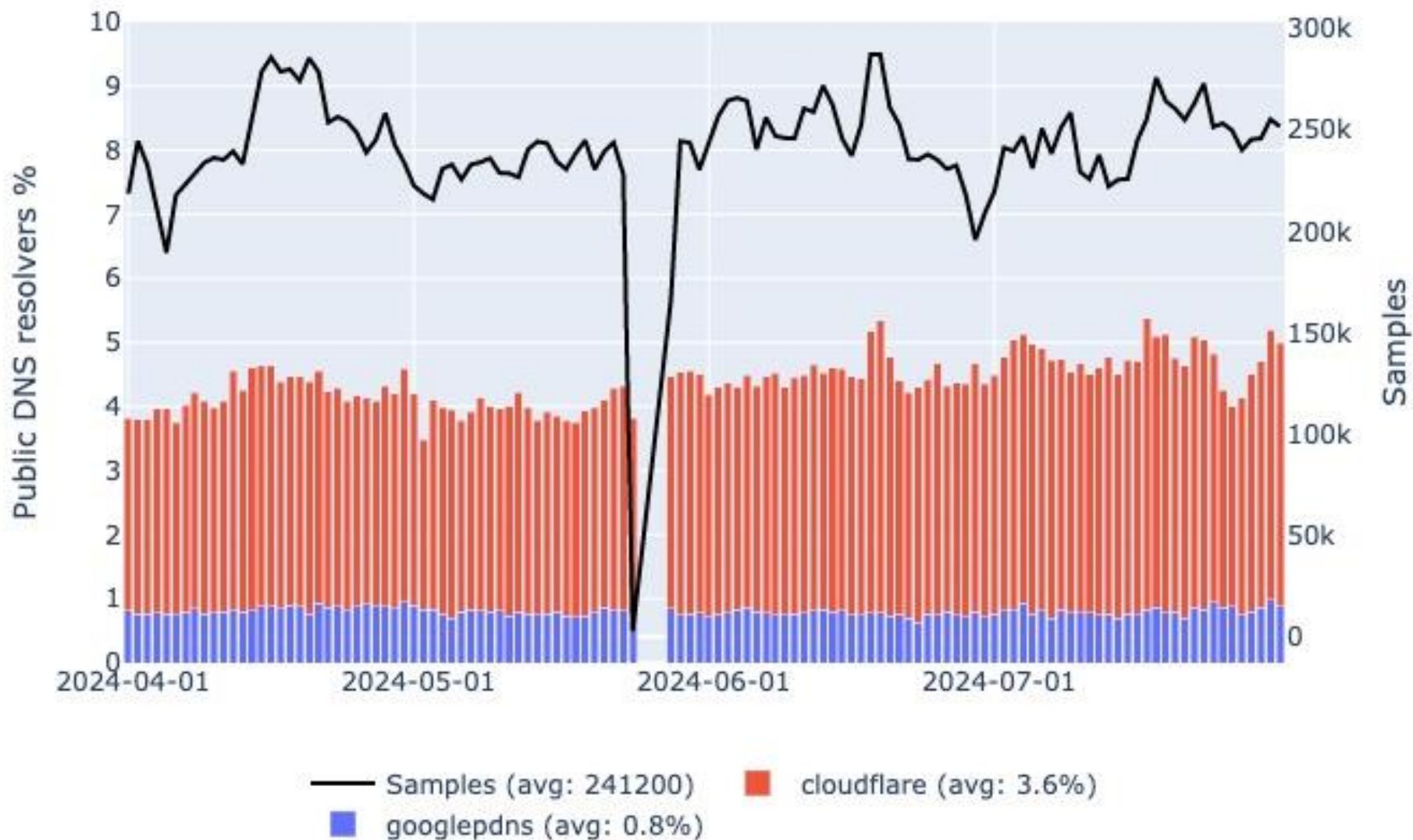
# US Cellular Operators

# Verizon Wireless (AS6167): 2.2%

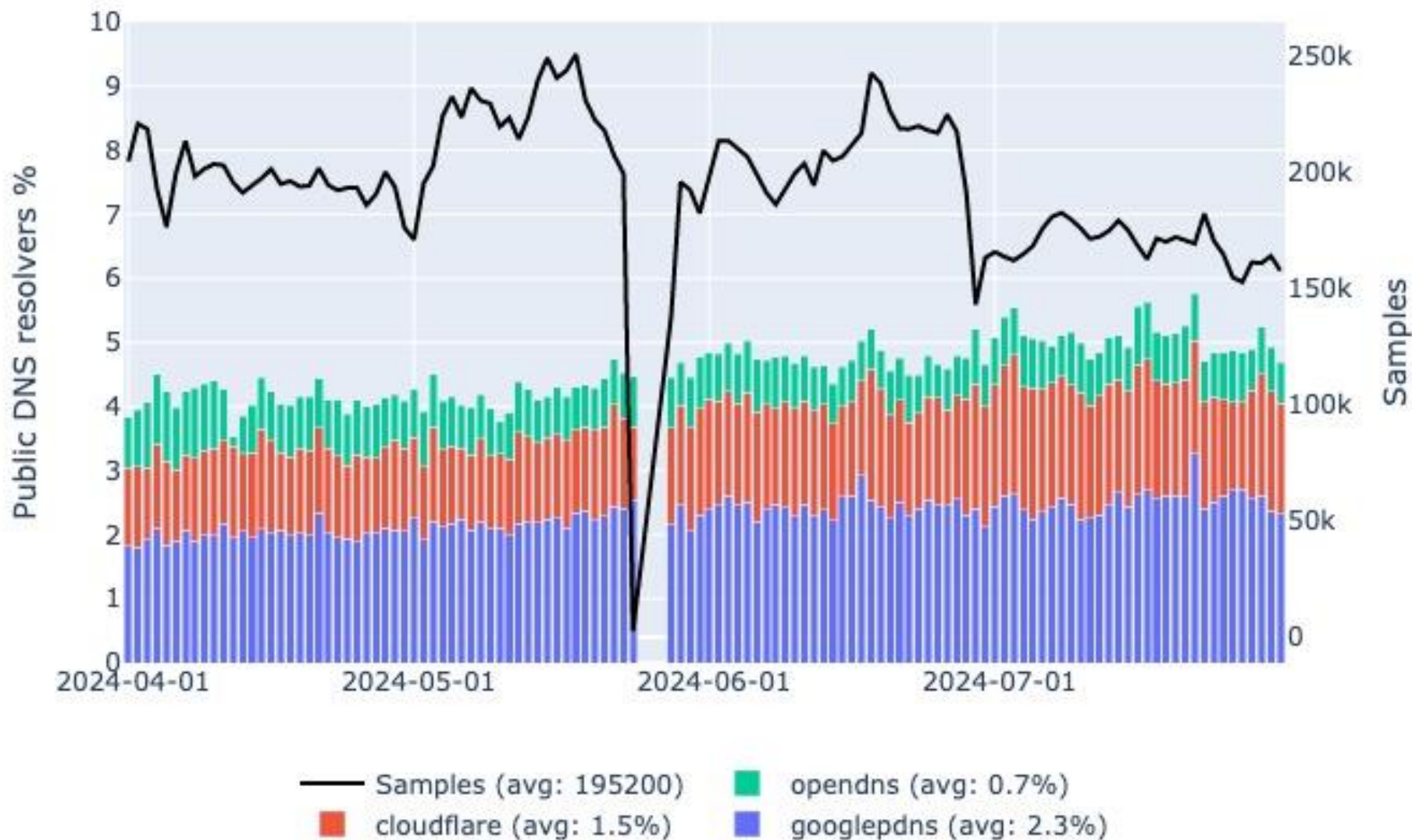
Public DNS Resolvers for AS 6167 Verizon Cellular: 2.2%



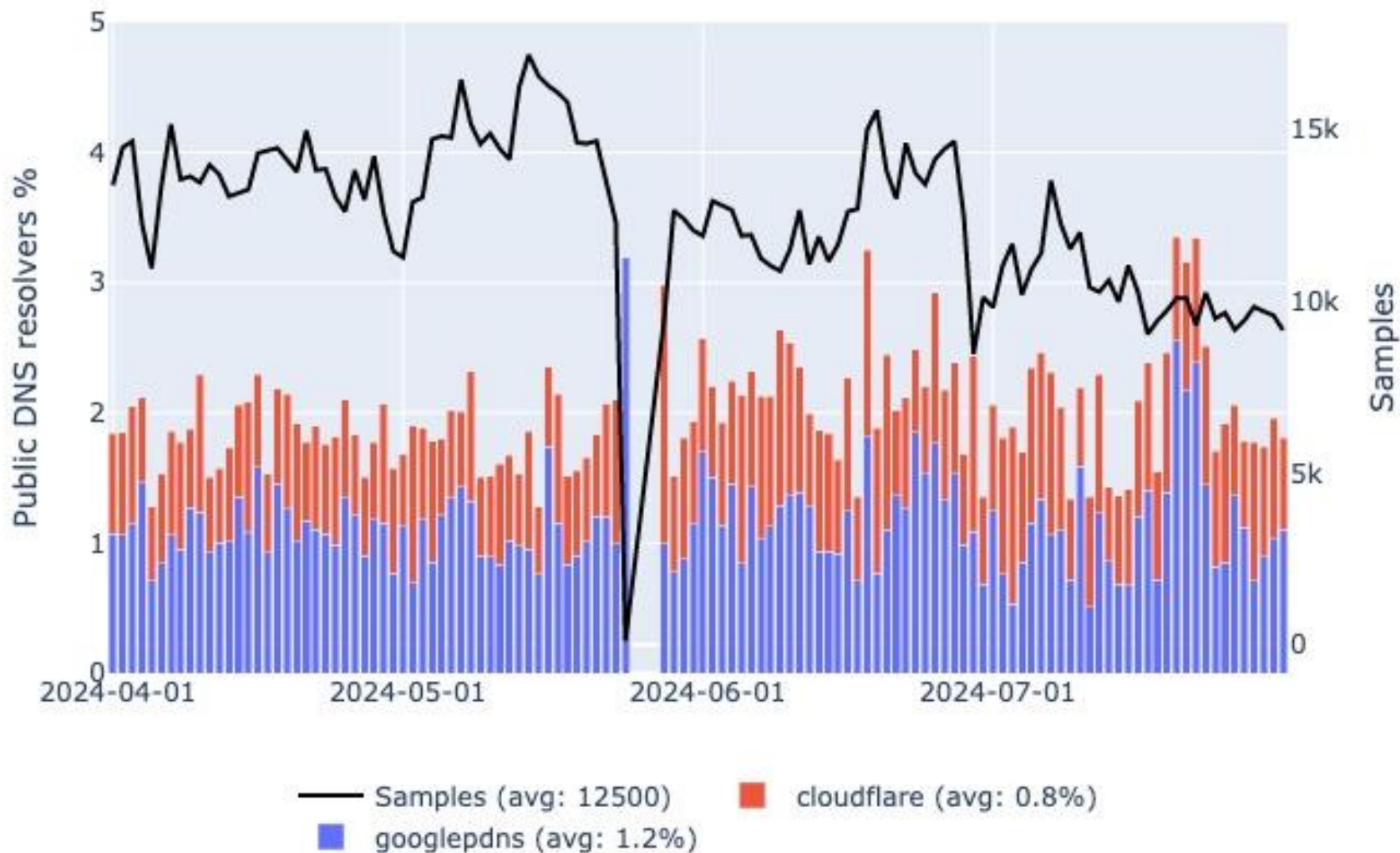
# AT&T Wireless (AS7018): 4.4%



# T-Mobile (AS21928): 4.6%



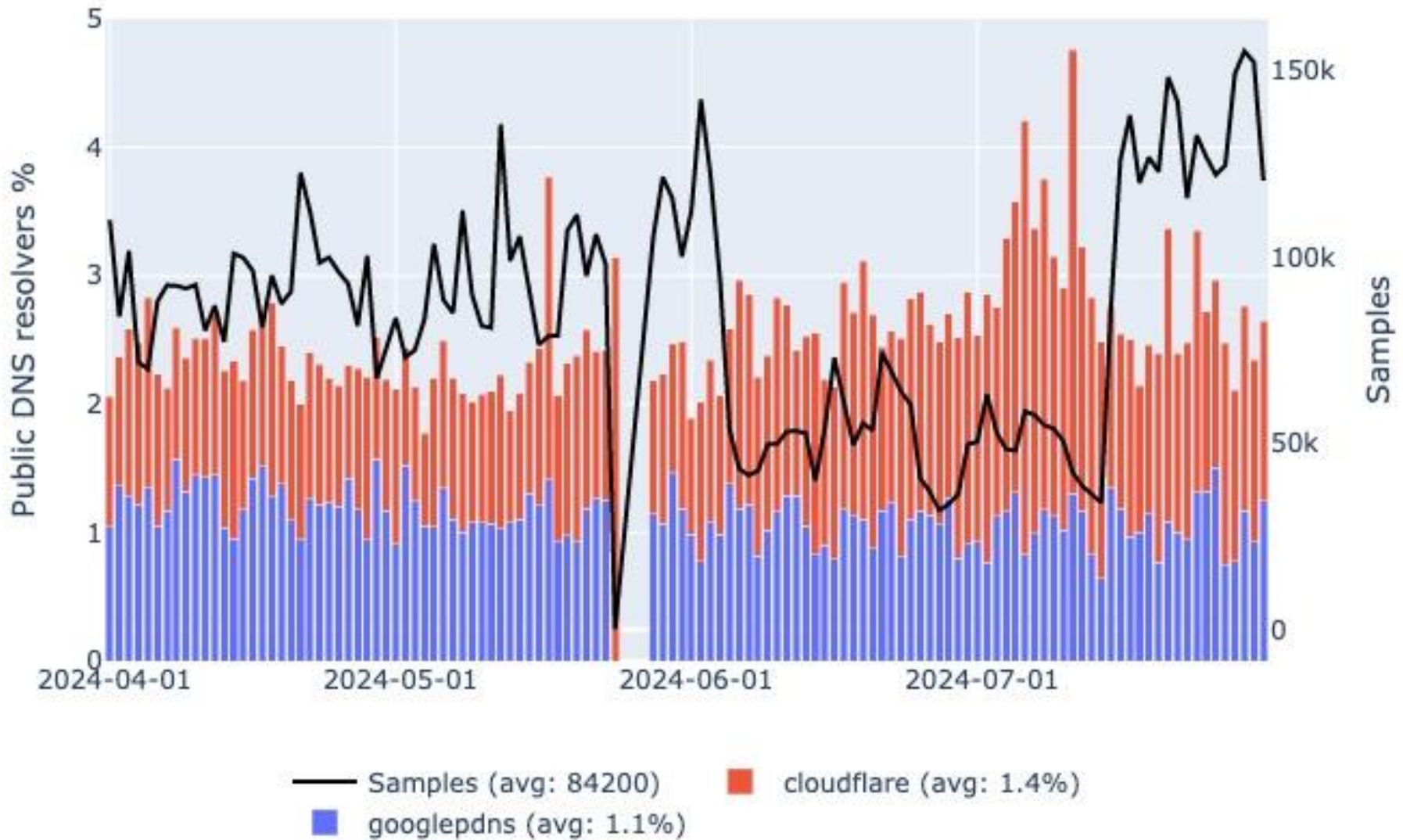
# US Cellular (AS6614): 2.0%



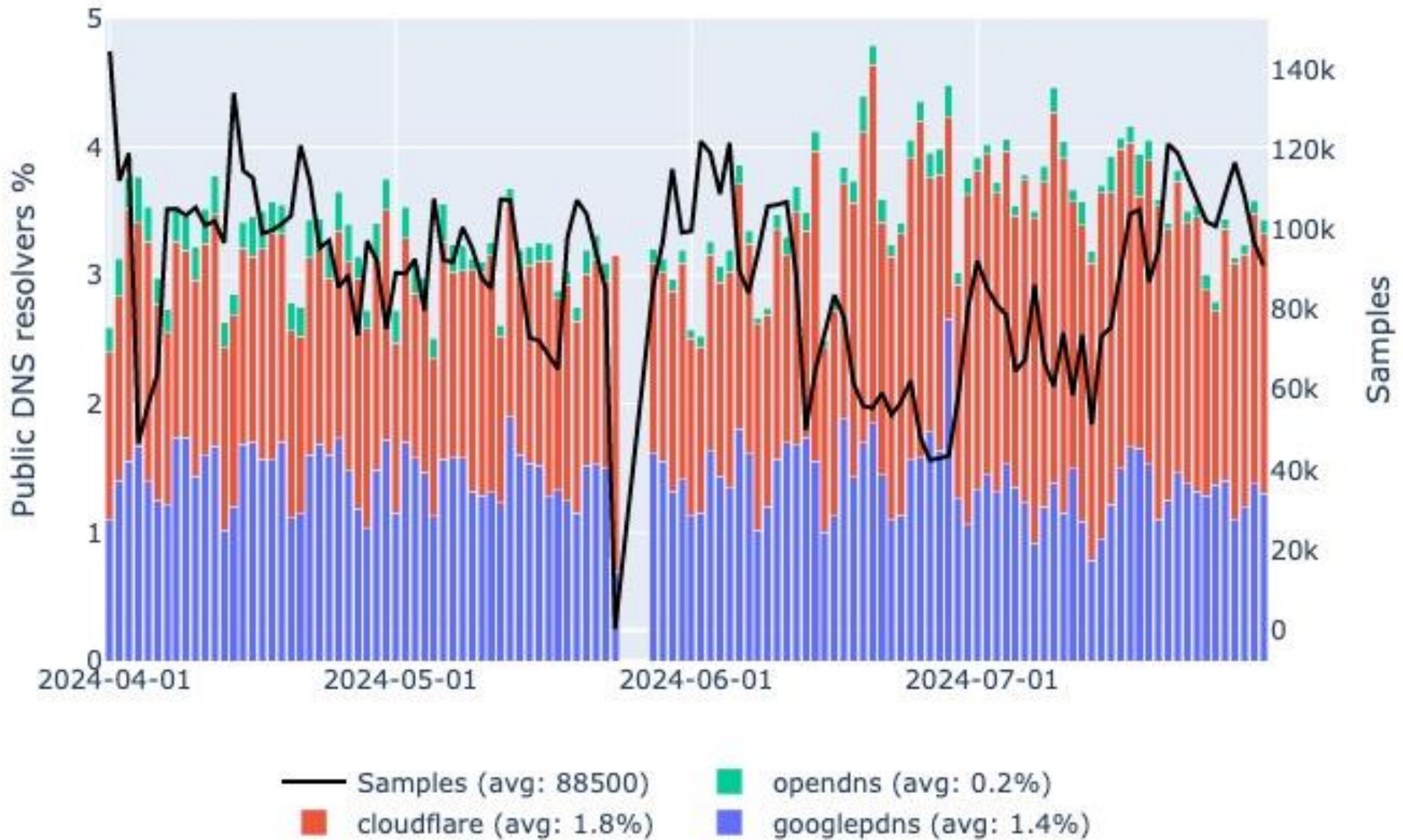
---

# European Operators

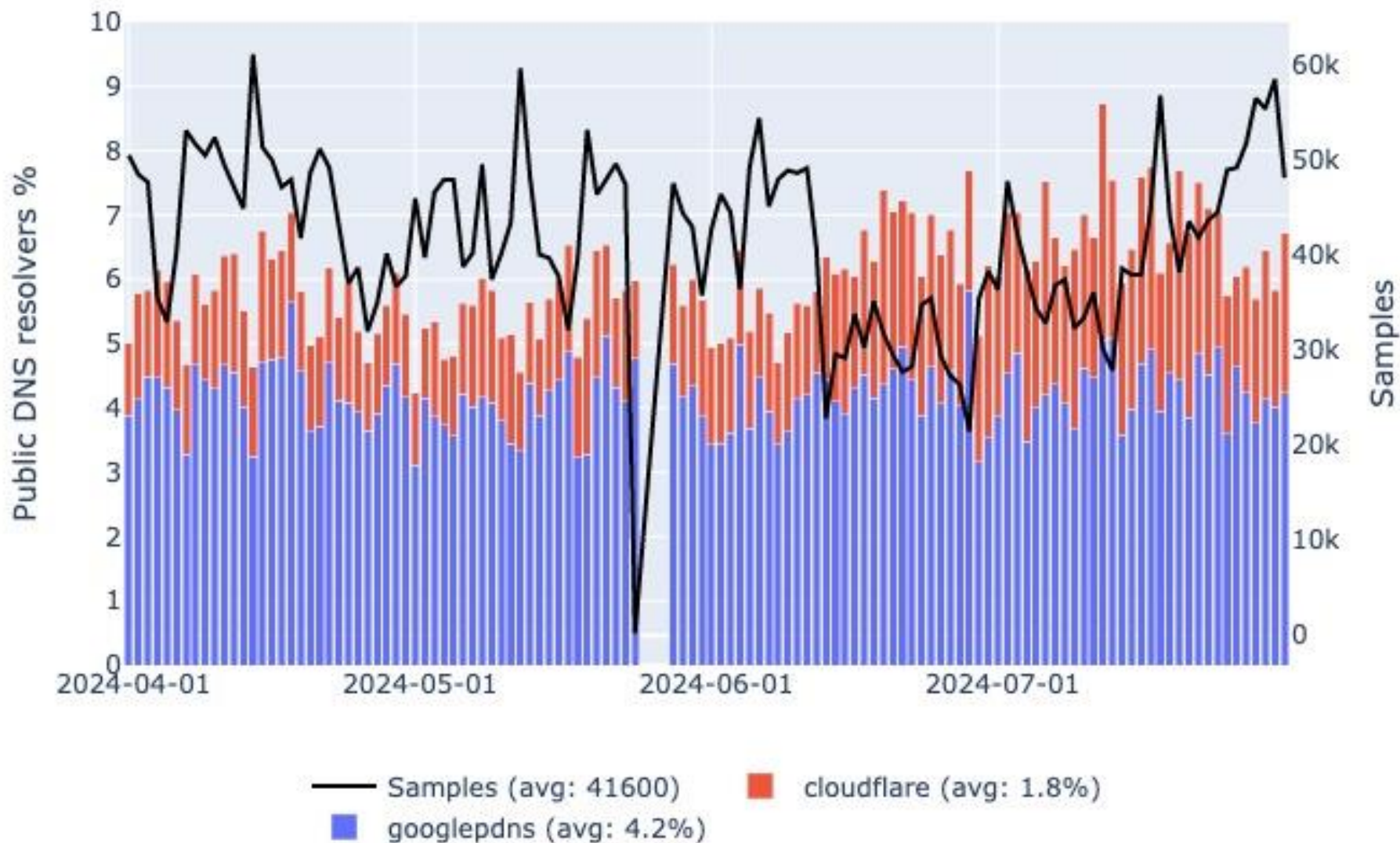
# Orange (AS3215): 2.5%



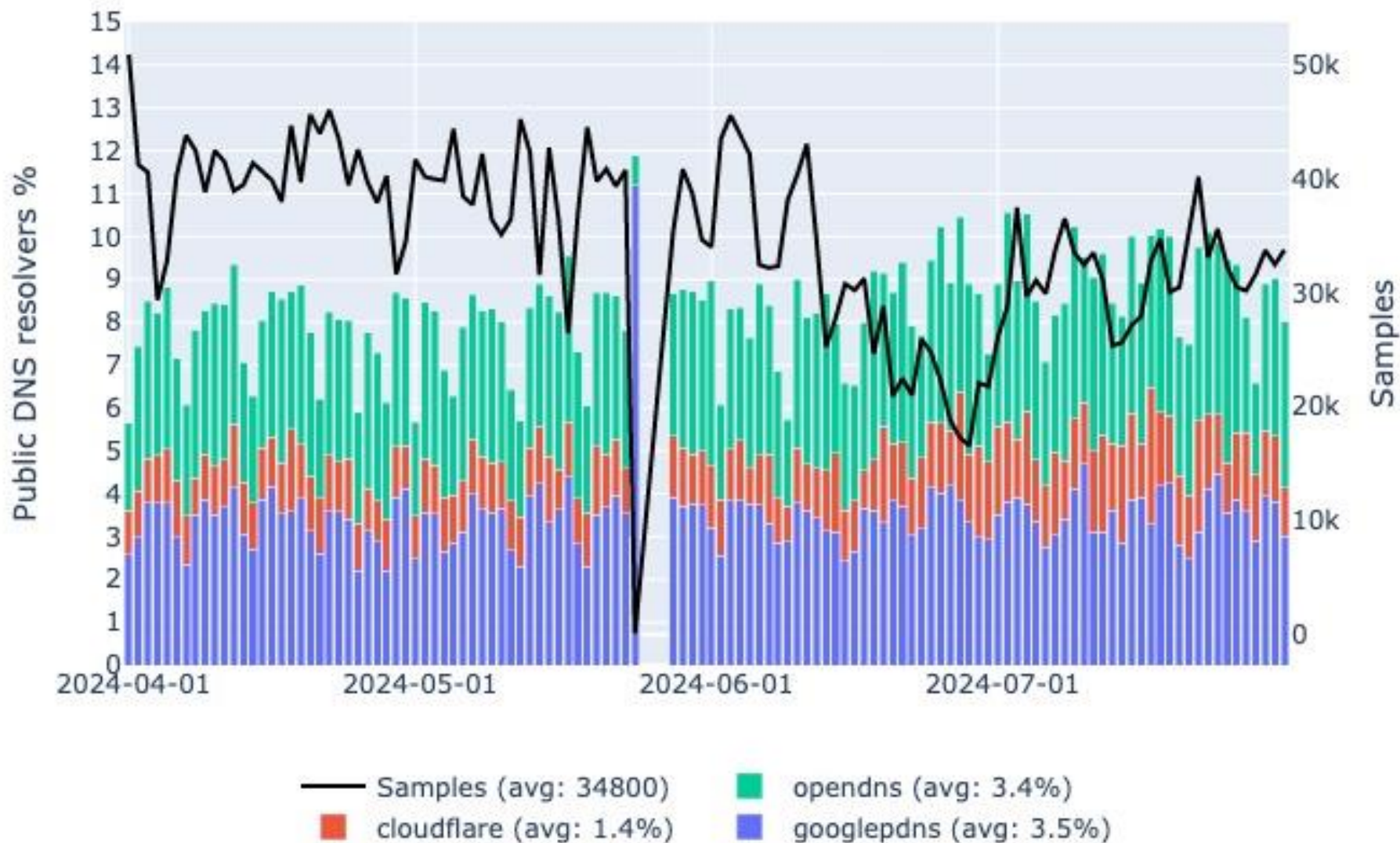
# Deutsche Telekom (AS3320): 3.4%



# Telefonica (AS3352): 6.0%



# Telecom Italia (AS3269): 8.3%



# Takeaways

---

- ⦿ Overall 2 to 10%
- ⦿ Different profile for the US than for the whole world.
- ⦿ Great variation from operator to operator, even within the same category
  - We made a sensitivity analysis to see if variation was due to NAT usage or mix traffic Consumer/Business with the same AS. No significant differences in the results were observed.
- ⦿ Cloudflares has gain significant market shares since 2022 when we made a similar study for EU. New Cloudlare app (WARP).

# Engage with ICANN



## Thank You and Questions

Visit us at [icann.org](https://icann.org)

Email: [email](mailto:email)



[@icann](https://twitter.com/icann)



[facebook.com/icannorg](https://facebook.com/icannorg)



[youtube.com/icannnews](https://youtube.com/icannnews)



[flickr.com/icann](https://flickr.com/icann)



[linkedin.com/company/icann](https://linkedin.com/company/icann)



[soundcloud.com/icann](https://soundcloud.com/icann)



[instagram.com/icannorg](https://instagram.com/icannorg)