



Measuring Internet Censorship with OONI

The OONI Measurement Aggregation Toolkit (MAT) meets the
Measurement, Analysis and Tools (MAT) Working Group

28th Nov 2023, Rome, Italy

Internet censorship

is the intentional control or suppression of what can be accessed, published, or viewed on the internet.



- Provide **evidence to support advocacy efforts fighting internet censorship** worldwide
 - ISPs or governments cannot claim plausible deniability of blocking events
- Provide a **public archive with longitudinal open data on internet censorship** worldwide
- **Oversight and transparency** into what is blocked and how it's blocked around the world
- Support researchers that study internet censorship with technical data
- Support developers that need technical data to improve their tools

Why measure Internet censorship?



Zambia: Social media blocked amid 2021 general elections

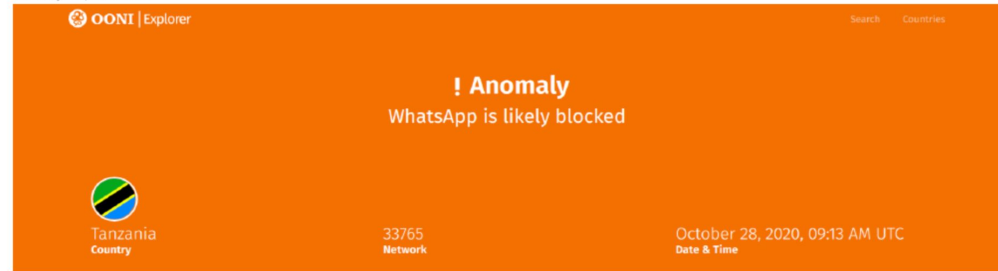
Maria Xynou, Arturo Filastò, 2021-08-24



Recently, on 12th August 2021, [general elections](#) were held in Zambia, during which access to popular online social media platforms was [reportedly](#)

Tanzania blocks social media (and Tor?) on election day

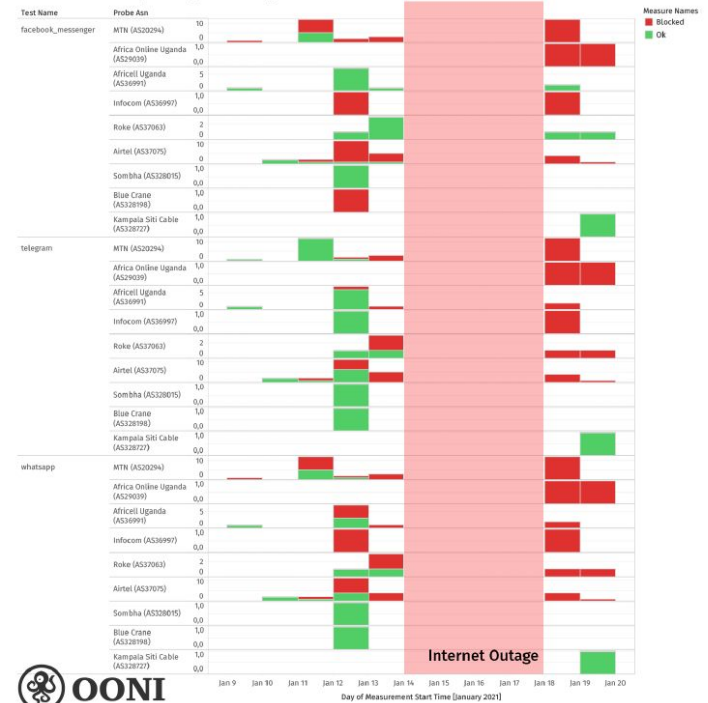
Maria Xynou, 2020-10-28



Starting from yesterday (27th October 2020) – on the eve of *Tanzania's 2020 general election* – OONI measurements continue to [show](#) the ongoing blocking of social media (and of the [Tor](#) circumvention tool) in Tanzania.

In this report, we share OONI data collected from [Tanzania](#) on these blocks, as well as relevant instructions for further OONI Probe testing.

Social media blocking amid Uganda's 2021 general election



Censorship during elections



Censorship during political transitions

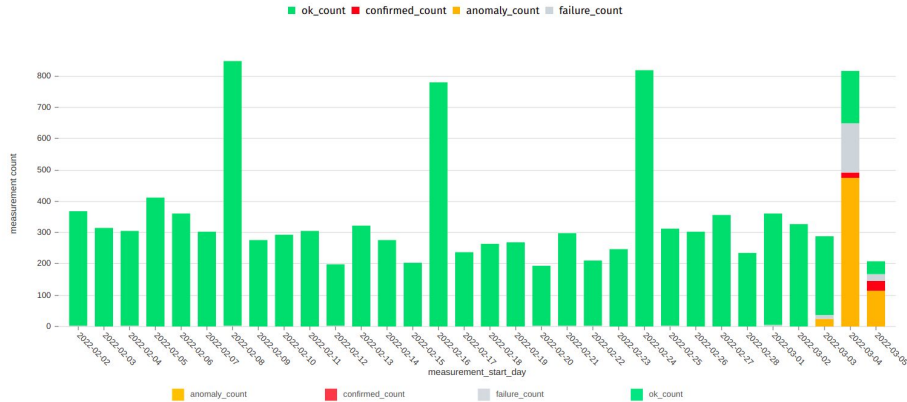
Azerbaijan and Armenia block TikTok amid border clashes

Arturo Filastò (OONI), Arzu Geybullayeva (Azerbaijan Internet Watch), Maria Xynou (OONI), 2022-09-16

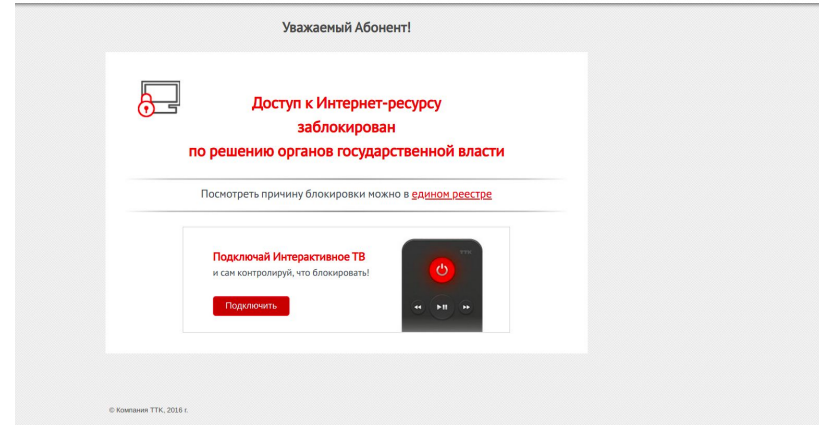
Earlier this week, on 12th September 2022, fighting **erupted** between Azerbaijani and Armenian troops along their border. Over the next few days, community members in Azerbaijan reported that the TikTok app was blocked locally.

Russia

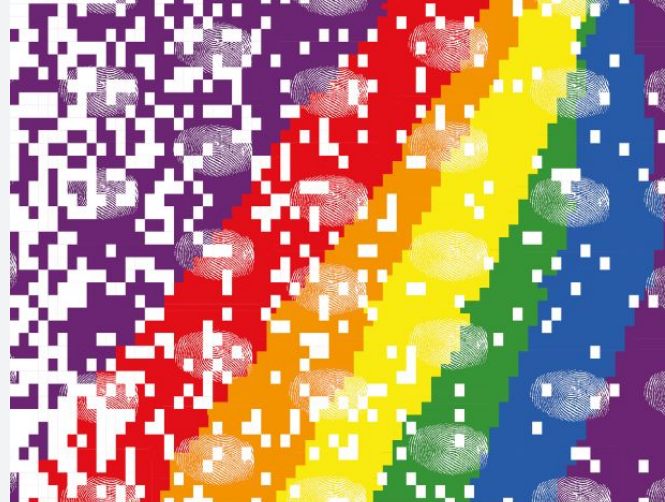
web_connectivity, www.bbc.com



as been blocked in



Censorship during conflicts



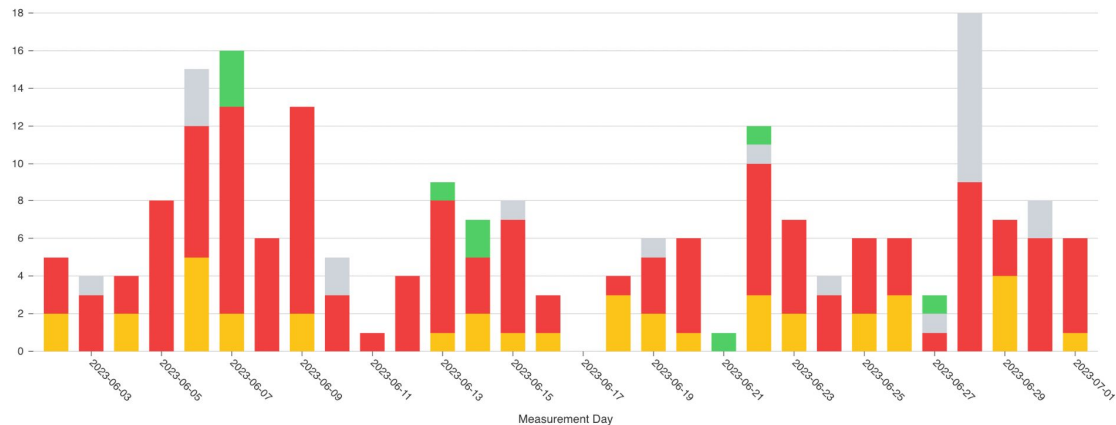
NO ACCESS

LGBTIQ Website Censorship in Six Countries



Web Connectivity Test, www.bahai.org in Iran

OK Confirmed Anomaly Failure



Censorship impacting marginalized communities

Iran blocks social media, app stores and encrypted DNS amid Mahsa Amini protests

Simone Basso (OONI), Maria Xynou (OONI), Arturo Filastò (OONI), Amanda Meng (IODA - Georgia Tech), 2022-09-25

Protests **erupted** in Iran over the last week following the death of Mahsa Amini, a 22-year-old Kurdish woman who was reportedly beaten to death by Iran's morality police for allegedly violating strict hijab rules. Amid the **ongoing protests**, which have **reportedly** resulted in at least 31 civilian deaths, Iranian authorities **cracked down on the internet** in an attempt to curb dissent.

Over this Sky data



Blocking of IM Apps in Zimbabwe January 2019

Source: OONI Measurements
 OONI

Protesters' access to social media and messaging apps (e.g., WhatsApp, Instagram, LinkedIn, and Telegram). We also share [IODA](#) and [Cloudflare Radar](#).

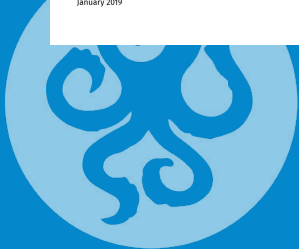
Senegal: Social media blocks and network outages amid political unrest

Laura Schwartz-Henderson (Independent Consultant), David Belson (Cloudflare), Zach Rosson (Access Now), Felicia Anthonio (Access Now), Maria Xynou (OONI), Arturo Filastò (OONI), 2023-08-01

Violent protests **erupted** in Senegal on 1st June 2023 over the sentencing of opposition leader Ousmane Sonko. On the same day, **OONI data** collected from Senegal showed that ISPs started blocking access to several instant messaging apps and social media platforms (which were also **reported** by several news outlets). Those blocks appear to have been in place for a week (until 7th June 2023). Meanwhile, Cloudflare observed **three disruptions** to traffic from AS37649 (Free/Tigo), and two disruptions at Sudatel Senegal during this period. Following the **arrest** of Ousmane Sonko on 28th July 2023, the Senegalese Ministry of Communication, Telecommunications and the Digital Economy issued another shutdown order on 31st July 2023 to cut off mobile internet access.

The government of Senegal was responsible for the shutdowns which it **claimed** were necessary to prevent the spread of "hateful and violent" messages online.

Censorship during protests



Technical multi-stakeholder report on Internet shutdowns: The case of Iran amid autumn 2022 protests

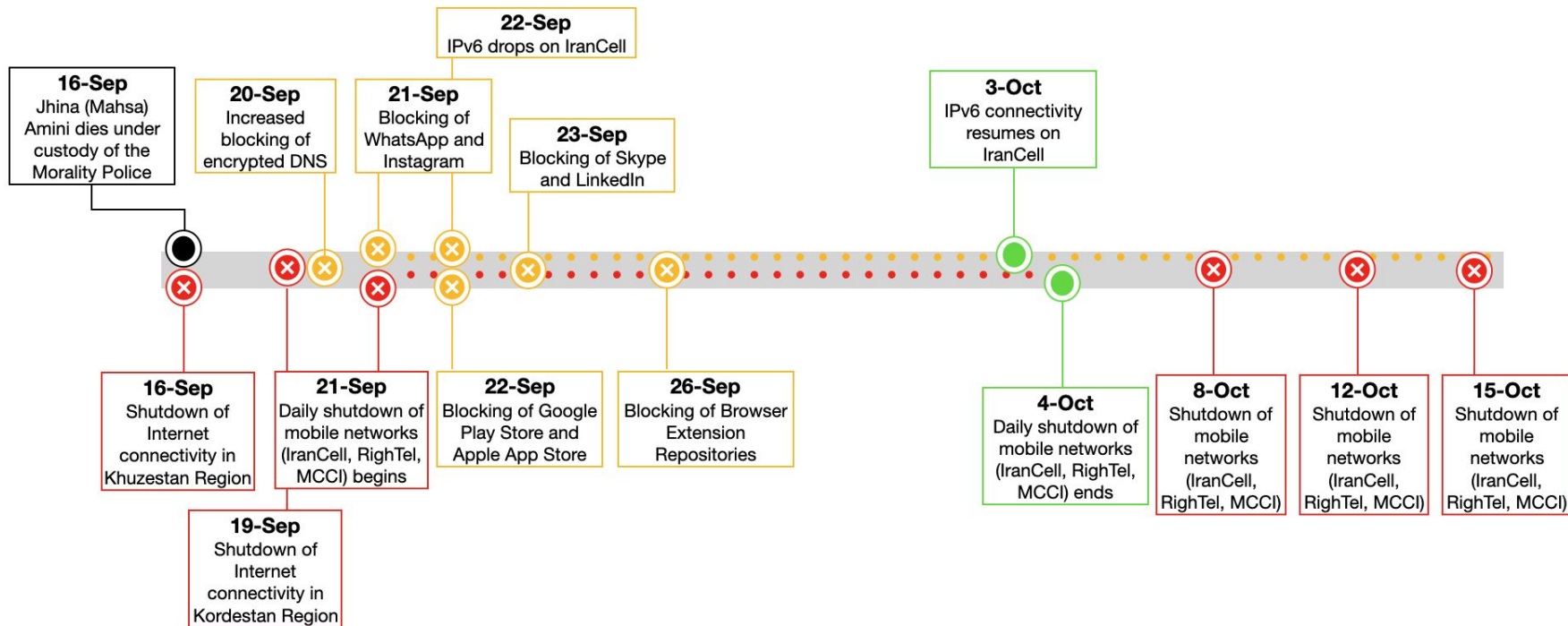
OONI, IODA, M-Lab, Cloudflare, Kentik, Censored Planet, ISOC, Article19, 2022-11-29

- **Coordinators:** OONI, ISOC
- **Contributors:** [OONI](#), [IODA](#), [Measurement Lab \(M-Lab\)](#), [Cloudflare](#), [Kentik](#), [Censored Planet](#), [ISOC](#), [Article19](#)
- **Facilitators:** European Commission, United States

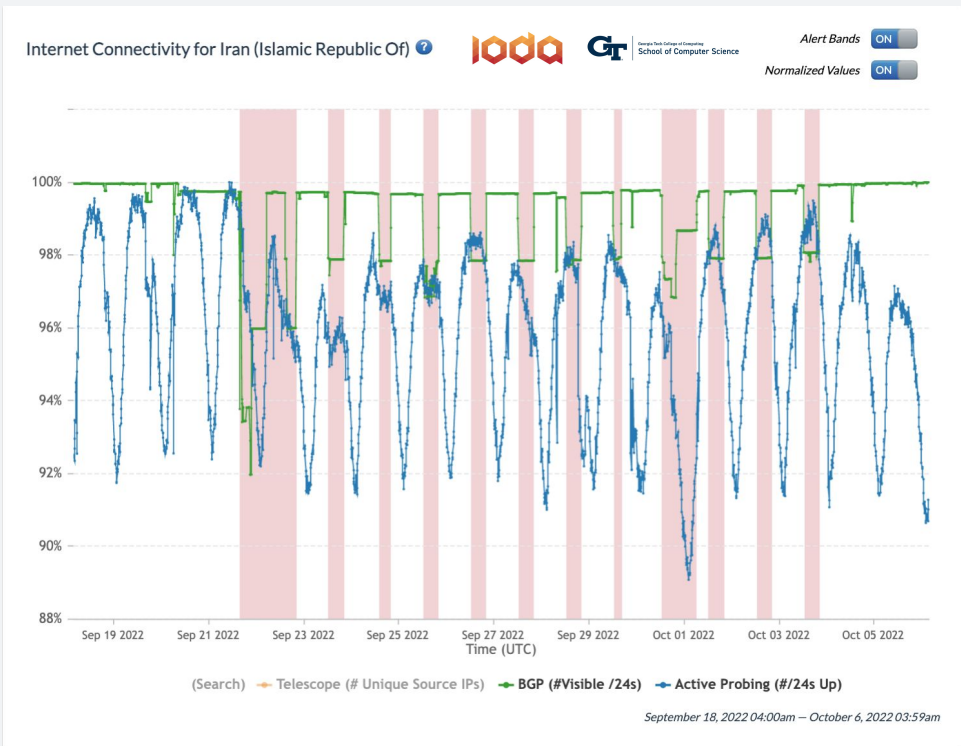
This report shares empirical technical findings on the recent Internet shutdown events that emerged in Iran following the death of Jhina (Mahsa) Amini in September 2022. The report is intended to be the first among a series of multi-stakeholder reports aimed at shedding light on what is becoming a widespread and increasingly sophisticated practice of certain governments around the world. The stakeholders participating in the report share a concern about the global trend in Internet shutdowns, but are contributing to the analysis only on the basis of their technical expertise.

Over the years, Iranian authorities have followed a pattern of [blocking social media apps](#), [numerous websites](#) and even resorting to [shutting networks entirely](#), implementing overall pervasive [levels of Internet control](#). The latest shutdown events that emerged in Iran in September 2022 amid [ongoing protests](#) follow the same pattern, but show a wider range of technical strategies to prevent censorship circumvention.

- [Summary of Key Findings](#)



Iran Censorship Timeline of Events: 16 Sep - 16 Oct 2022



Internet Outage Detection and Analysis (IODA) is an open-source project at Georgia Tech that provides measurements of the connectivity of Internet infrastructure at the country, subnational and Internet operator level that is available via a public, online dashboard (<https://ioda.live>).



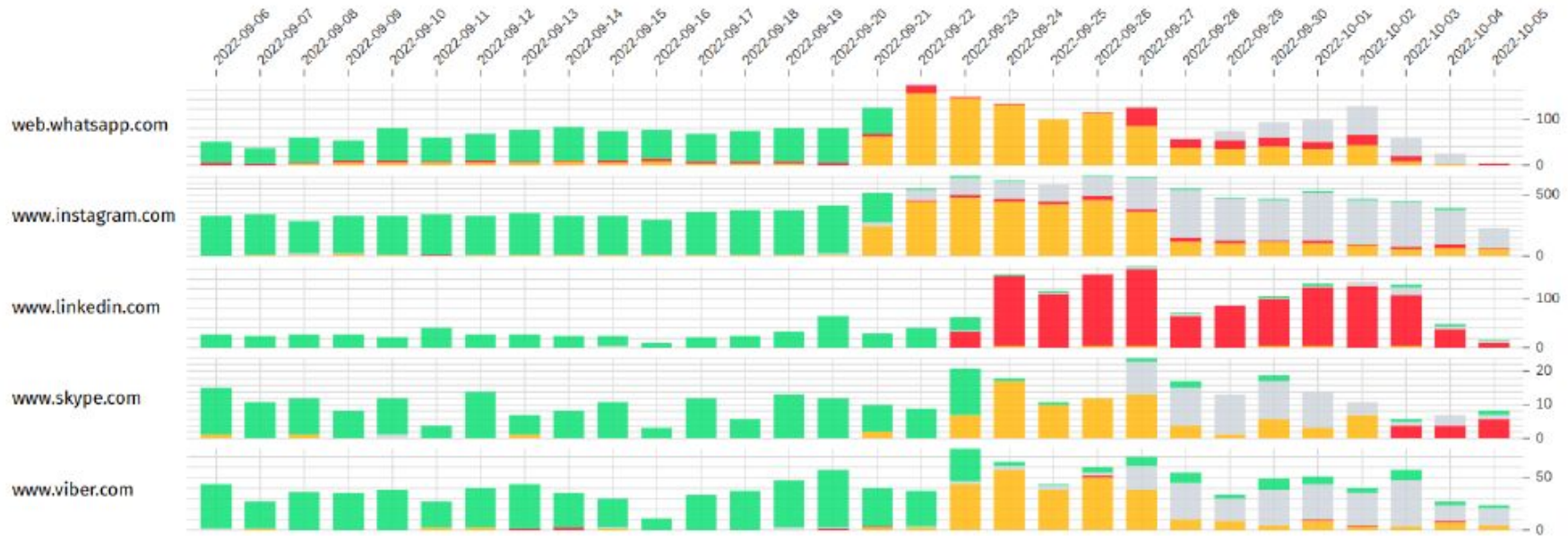
A digital “curfew” blocked all mobile Internet use for 13 consecutive evenings.



Iran

Web Connectivity Test

■ ok_count ■ confirmed_count ■ anomaly_count ■ failure_count



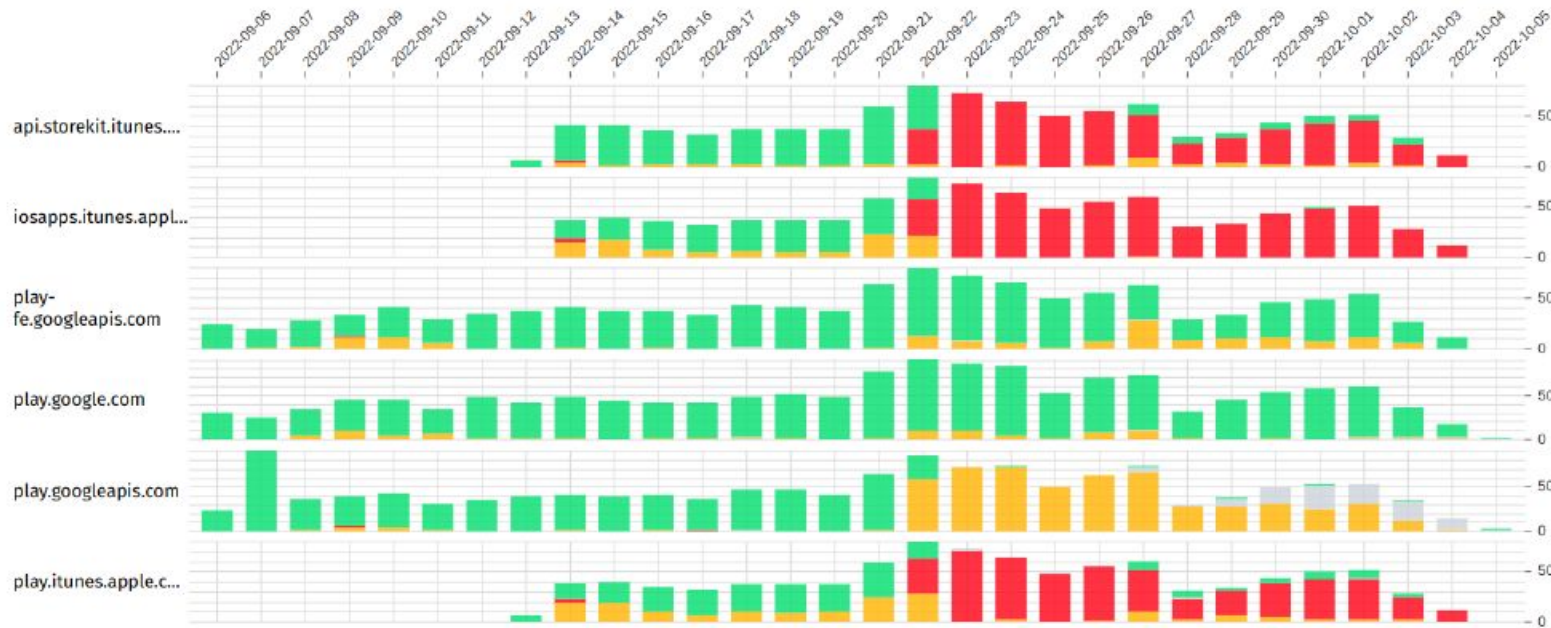
Several social media platforms were newly blocked



Iran

Web Connectivity Test

ok_count confirmed_count anomaly_count failure_count



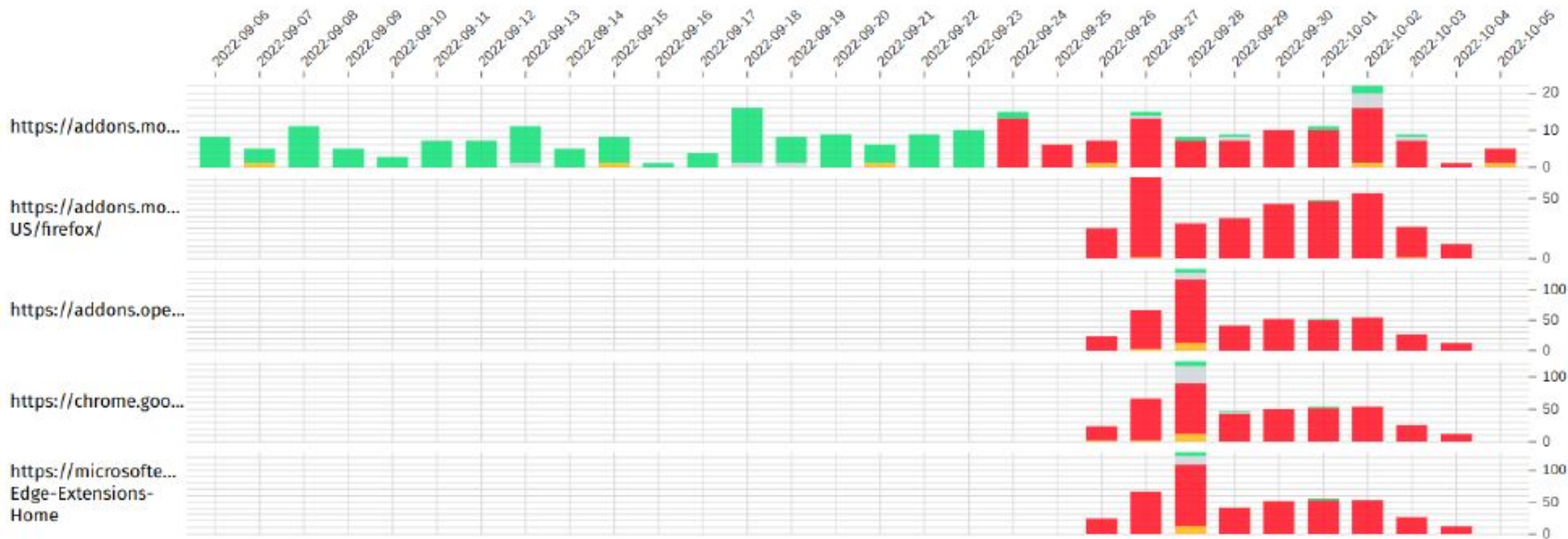
App stores were blocked



Iran

Web Connectivity Test

■ ok_count
 ■ confirmed_count
 ■ anomaly_count
 ■ failure_count



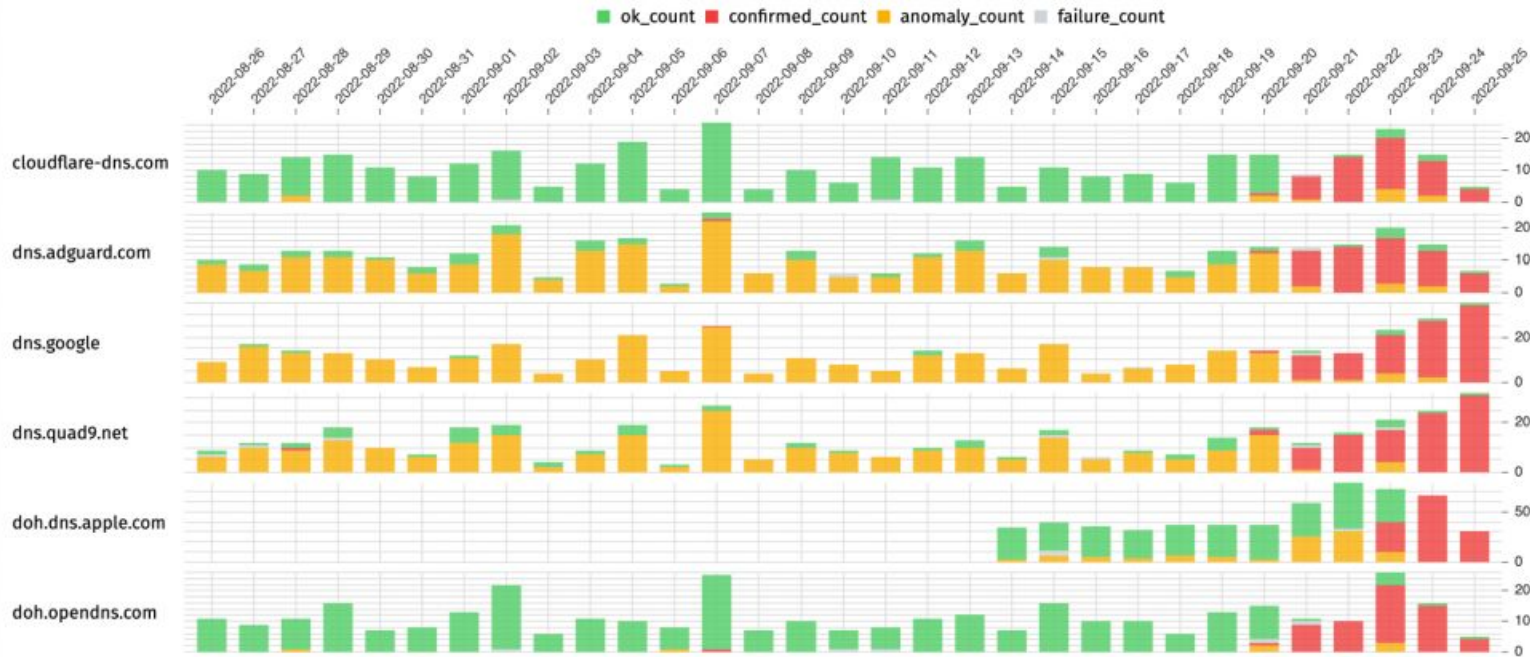
...and browser extension repositories





Iran

Web Connectivity Test

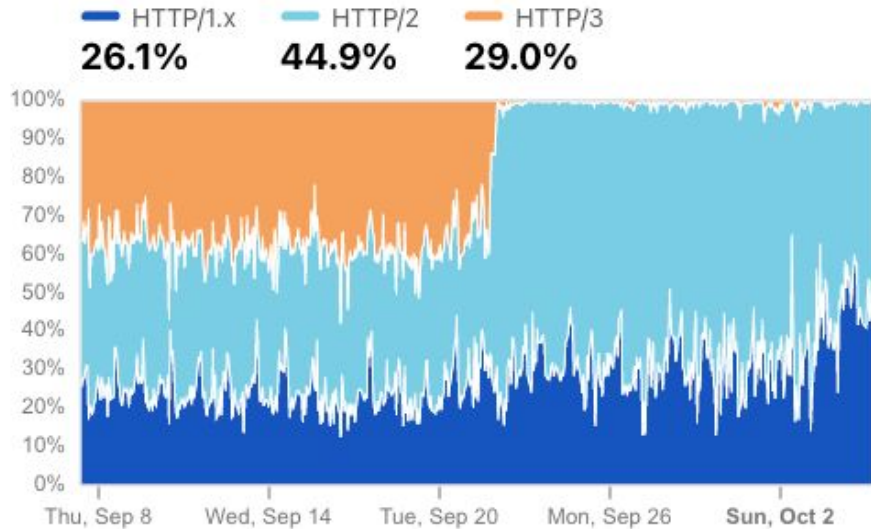


Encrypted DNS started to be blocked



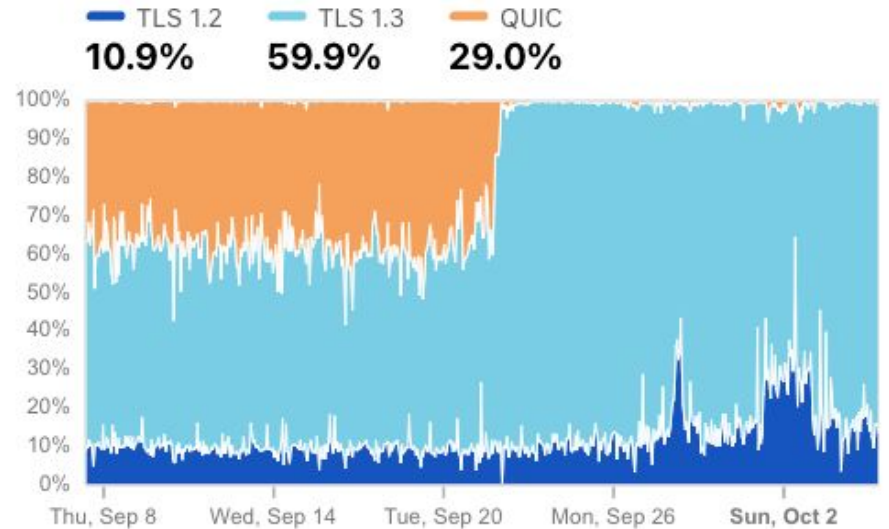
HTTP/1x vs HTTP/2 vs HTTP/3

Distribution of traffic by HTTP version [?](#)



TLS 1.2 vs TLS 1.3 vs QUIC

Distribution of secure traffic by protocol [?](#)

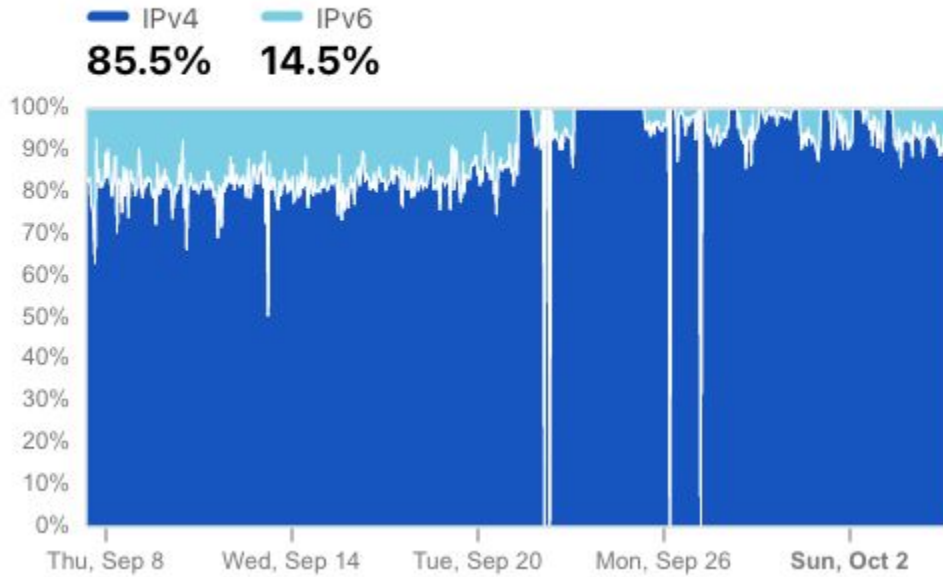


HTTP/3 and QUIC were blocked



IPv4 vs IPv6

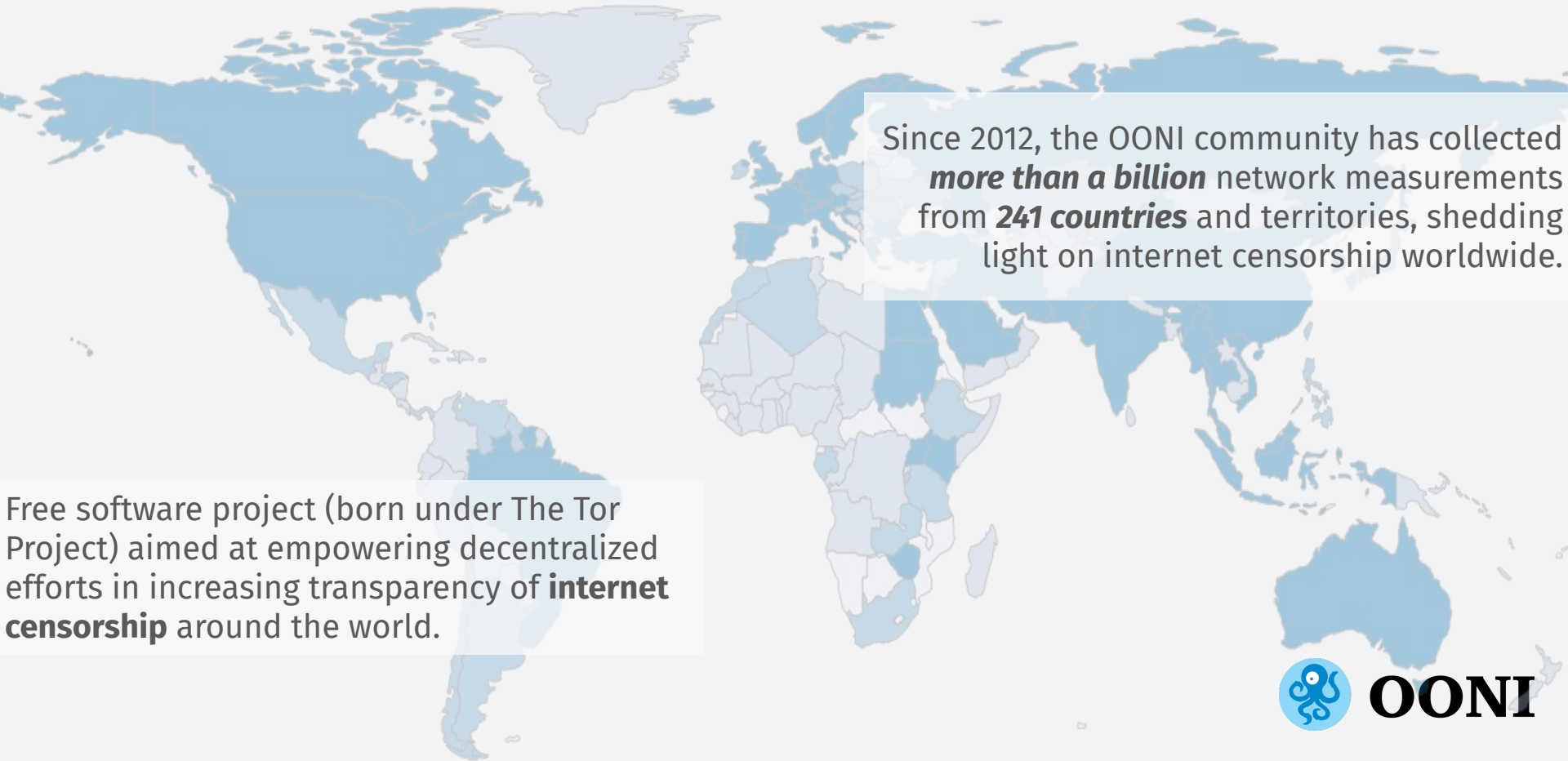
Distribution of traffic by IP version [?](#)



IPv6 was blocked on Irancell



**How can you do this research
on your own?**

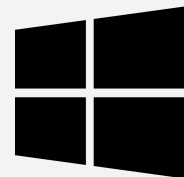
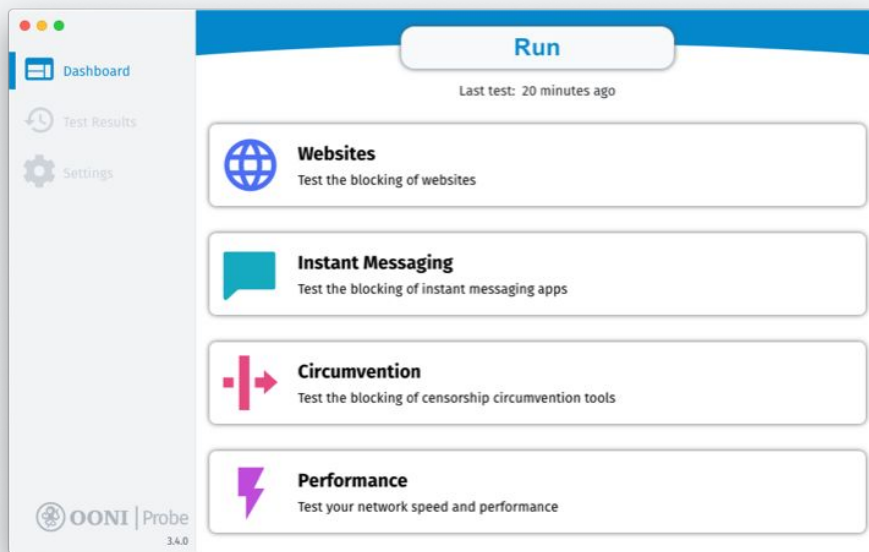
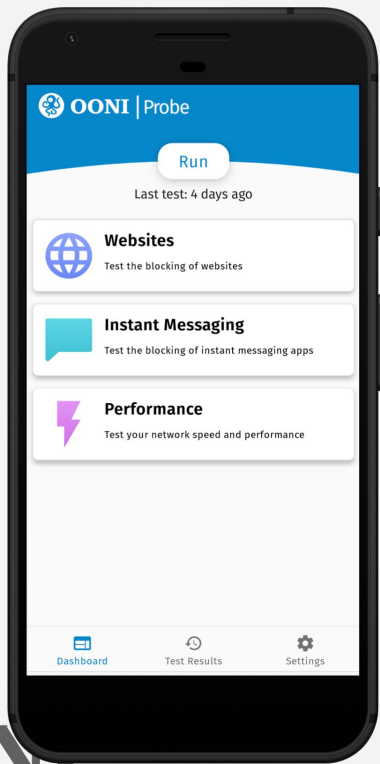


Since 2012, the OONI community has collected **more than a billion** network measurements from **241 countries** and territories, shedding light on internet censorship worldwide.

Free software project (born under The Tor Project) aimed at empowering decentralized efforts in increasing transparency of **internet censorship** around the world.



OONI



OOONI

<https://ooni.org/install/>

OOONI Probe

OOONI Measurement Aggregation Toolkit (MAT)

Create charts based on aggregate views of real-time OONI data from around the world

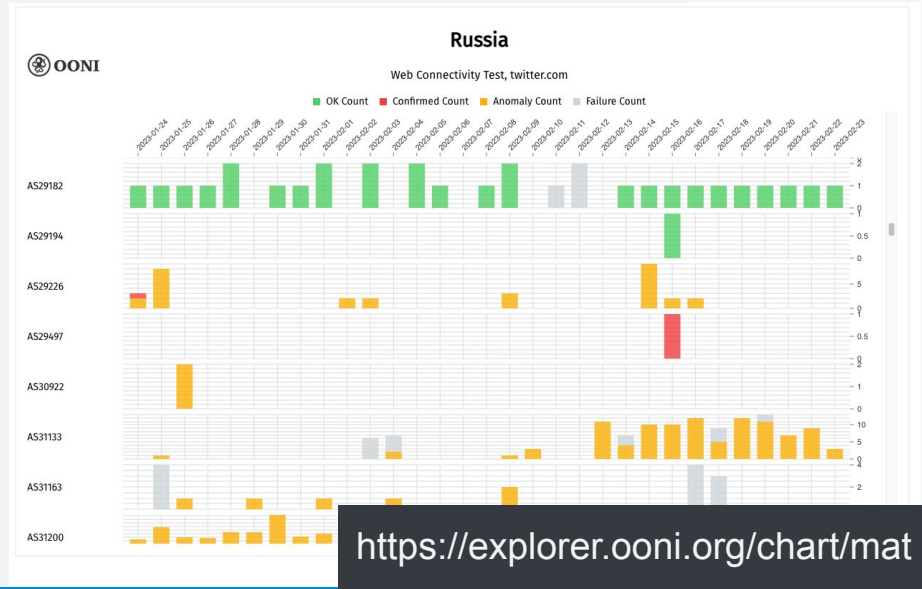
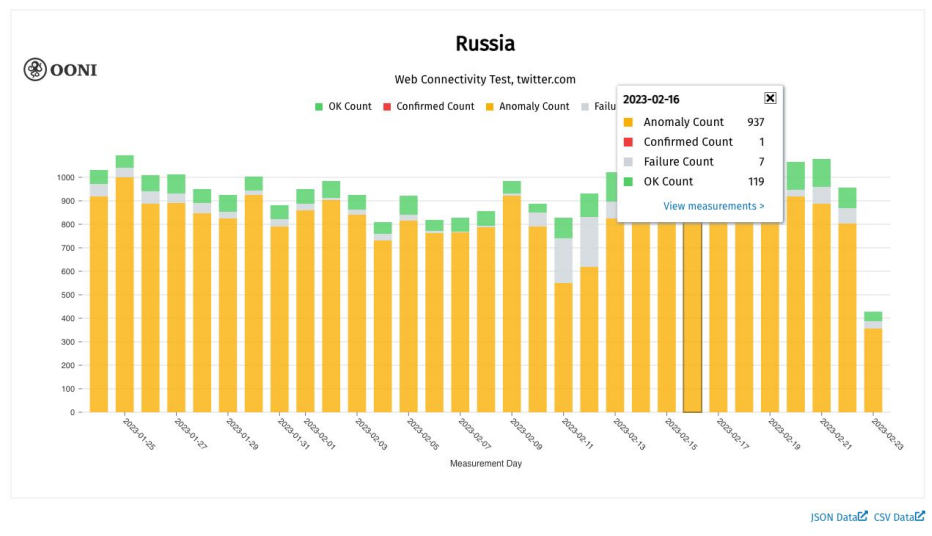
Country: Russia ASN: AS1234 From: 2023-01-24 Until: 2023-02-24 Time Granularity: Day Columns: Measurement Day Rows: []

Test Name: Domain Input Website Categories: All

Web Connectivity Test: twitter.com https://fbcdn.net/robots.txt All

Show Chart

1.8 Billion measurements
241 countries and territories
26.6k networks



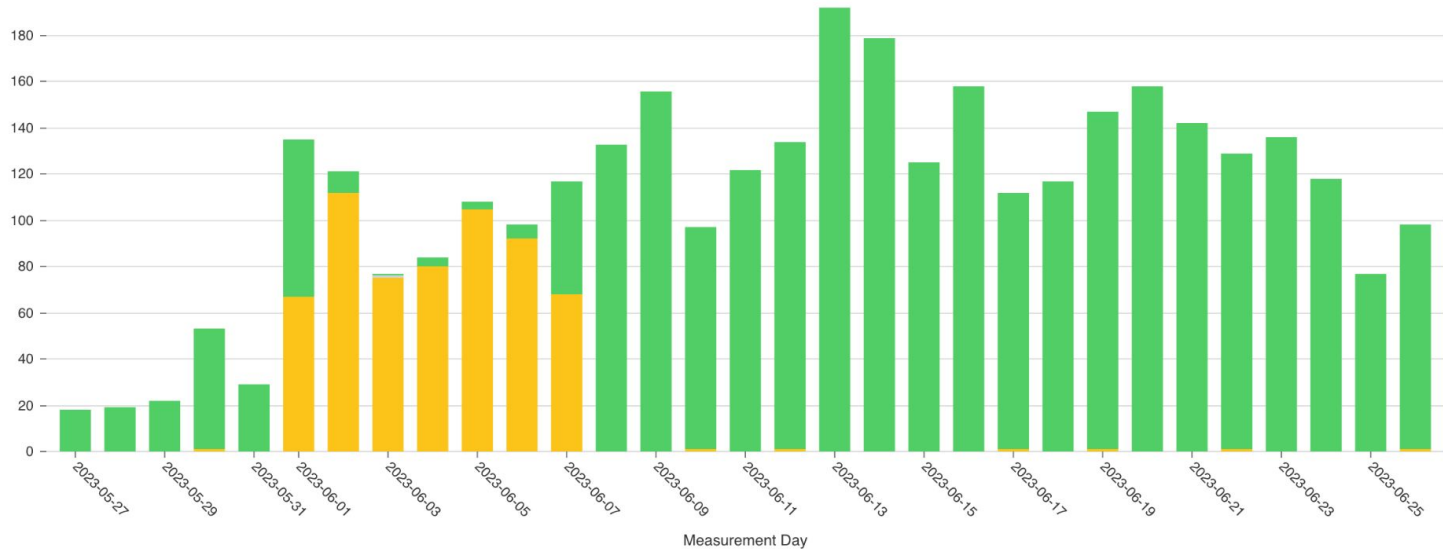
<https://explorer.ooni.org/chart/mat>

Measurement Aggregation Toolkit (MAT): Accessing OONI Data

WhatsApp Test

Senegal

OK Confirmed Anomaly Failure



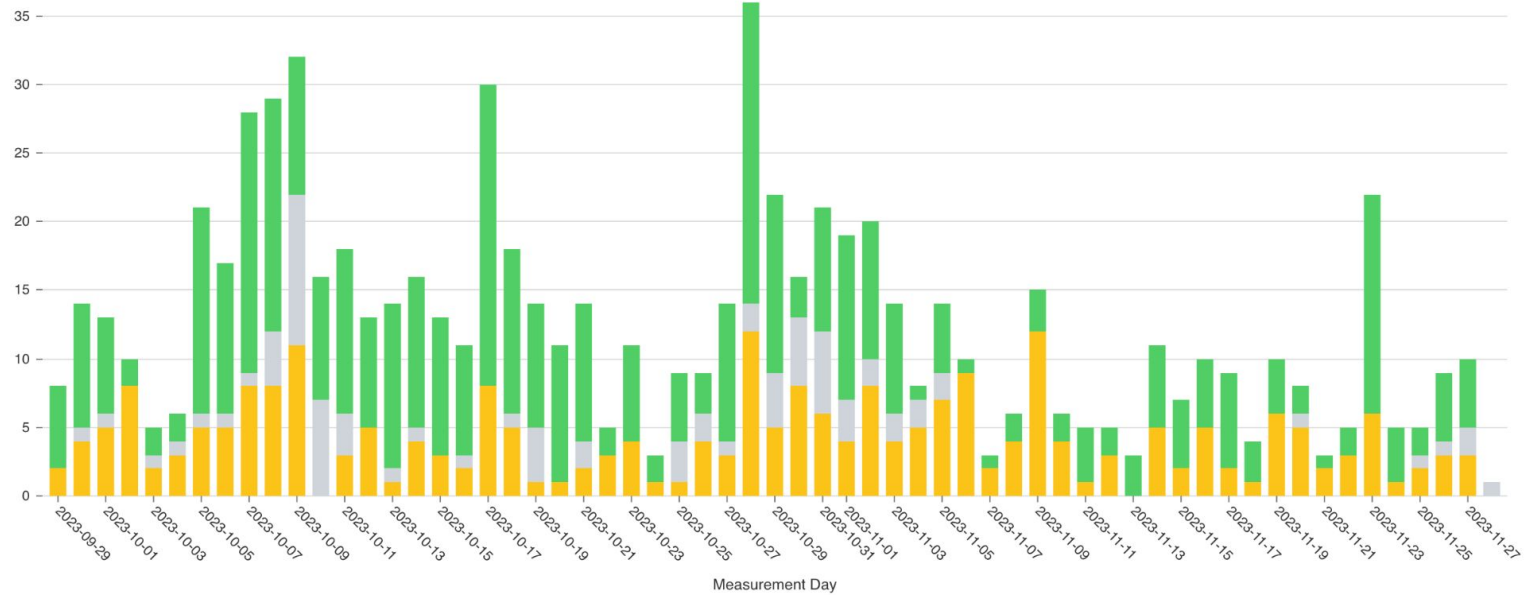
Sometimes the signal is clear..



Web Connectivity Test, www.rt.com

Italy

OK Confirmed Anomaly Failure



JSON Data CSV Data

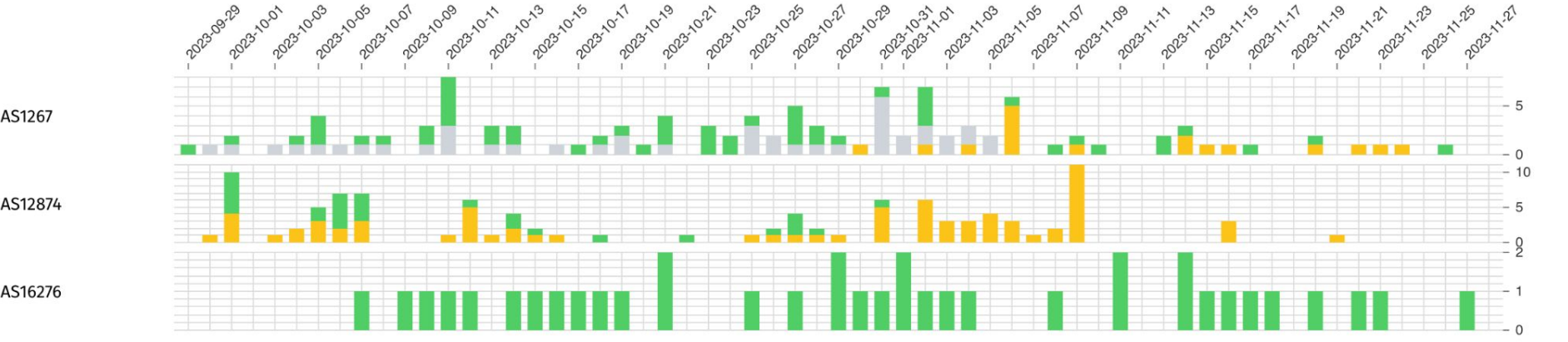
less clear, but still easy



Web Connectivity Test, www.rt.com

Italy

OK Confirmed Anomaly Failure



[JSON Data](#) [CSV Data](#)

<https://explorer.ooni.org/chart/mat>

breaking down by network, helps

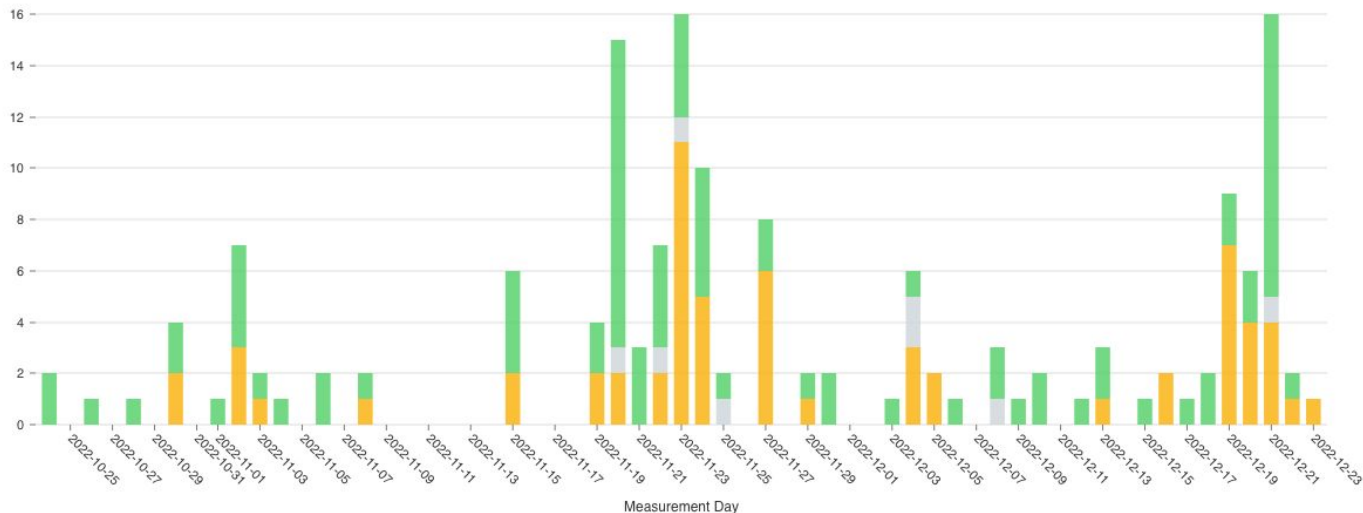




Kazakhstan

Web Connectivity Test, www.azattyq.org

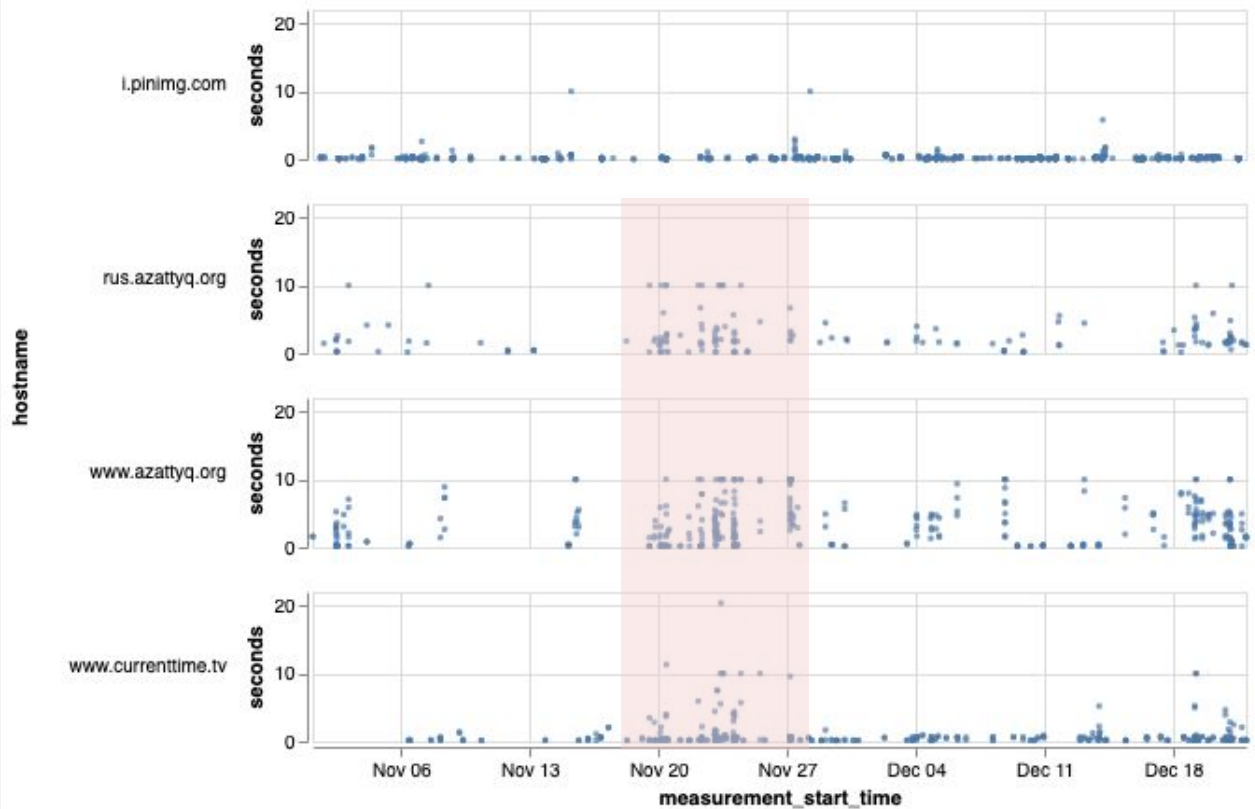
OK Count Confirmed Count Anomaly Count Failure Count



[JSON Data](#) [CSV Data](#)

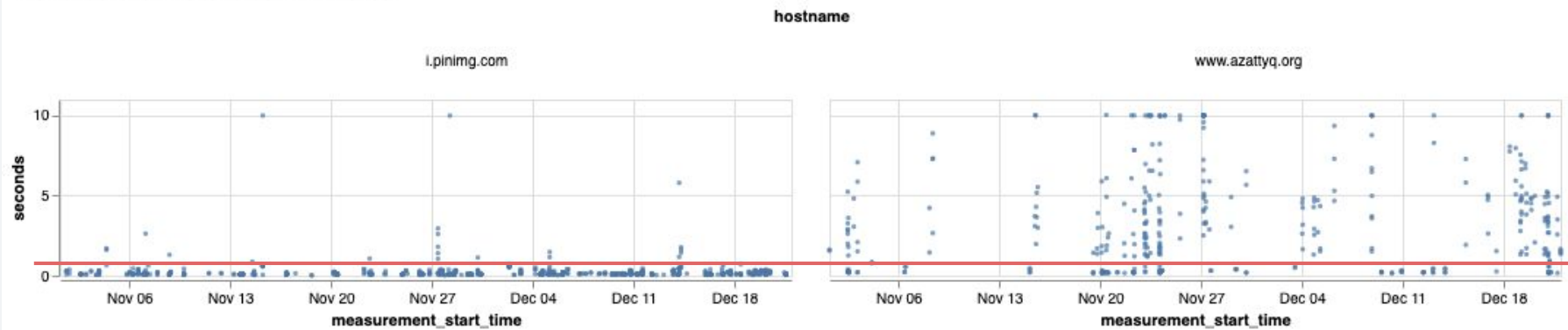
Blocking of RFERL sites during KZ elections?

TLS handshake time towards RFERL sites



Throttling of RFERL sites

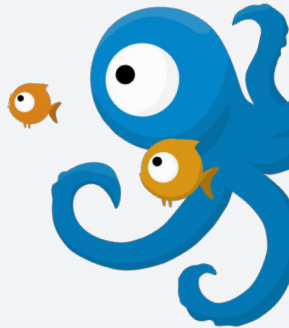
TLS handshake time towards RFERL sites



Throttling of RFERL sites

Get Involved

- **Join community discussions:**
<https://slack.ooni.org>
- **Run OONI Probe:**
<https://ooni.org/install/>
- **Analyze OONI data:**
<https://ooni.org/data/>





contact@ooni.org



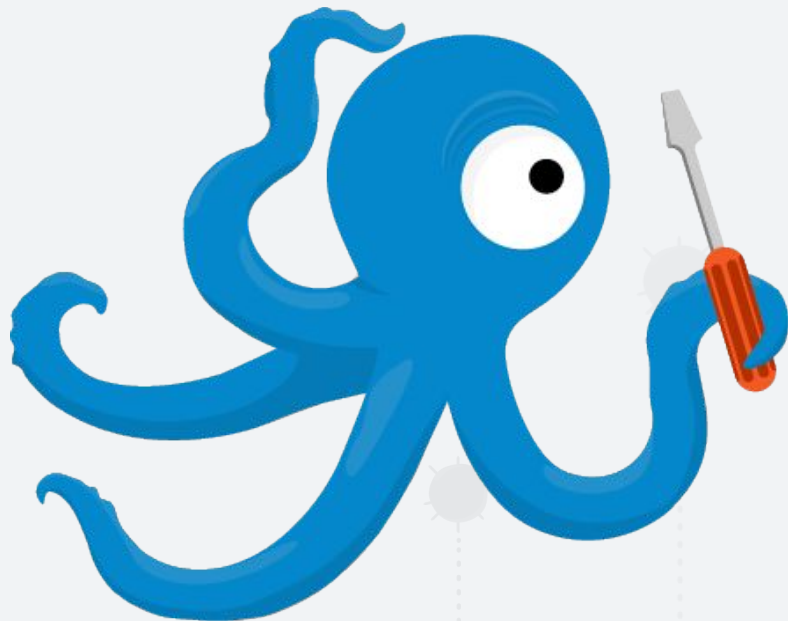
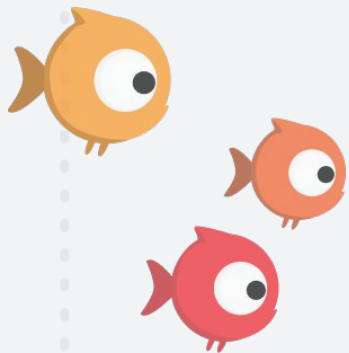
github.com/ooni



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



<https://slack.ooni.org/>



Questions?



OONI