The Internet Outage Detection and Analysis (IODA) Project

The IODA Project is a public dashboard that measures Internet connectivity and detects Internet outages worldwide in near realtime.

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How to monitor Internet connectivity

and

track shutdowns

with **IODA**

IODA | GT **Georgia Tech**

What is Internet connectivity?

Internet connectivity refers to the connectivity of the Internet's infrastructure.

If a network is having trouble connecting to the global Internet, its connectivity signals will show a disruption or irregular behavior. This may indicate an outage.

Outages can be caused by:

government shutdowns   fiber cuts   power outages   misconfiguration

What is an Internet Shutdown?

Also referred to as: blackouts   kill switches   network disruptions

AccessNow defines government-ordered shutdowns as: "intentional disruption of the Internet or electronic communications, rendering them inaccessible or effectively unusable, for a specific population or within a location, often to exert control over the flow of information."

Types of shutdowns include:
- Blocking communications platforms like messaging apps
- Slowing access, also known as "throttling"
- **Complete network outages, also known as blanket shutdowns, are when access to the Internet (mobile and/or fixed line) is entirely cut off. This is the type of shutdown that IODA shows!**

Understanding Signals
What each signal means and how to spot a disruption!

✅ BGP   ✅ Active Probing   ✅ Telescope   ✅ Google

IODA has three main signals: BGP, Active Probing, and Telescope, as well as signals for Google products.

Routing Announcements (BGP)

Regional routers direct data between networks, using Border Gateway Protocol (BGP) to announce which networks they direct traffic to. BGP ensures that Internet data goes to the right place.

BGP is a pretty stable signal, so even a small drop can indicate a disruption.
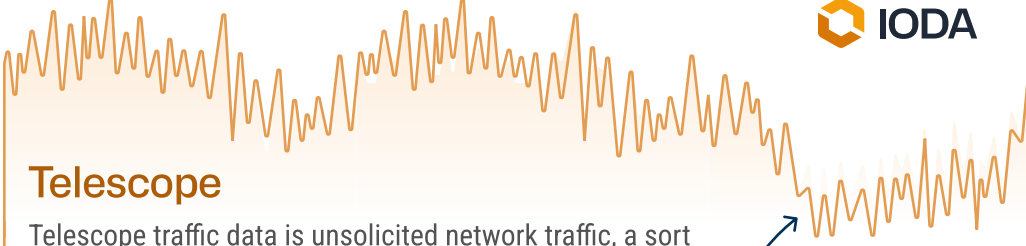
Active Probing

IODA generates the Active Probing signal by regularly sending pings to networks located in specific geographic areas. These networks typically automatically echo back the ping signals they receive.

If networks stop responding to pings, the Active Probing signal will drop, indicating a potential disruption.

Telescope

Telescope traffic data is unsolicited network traffic, a sort of internet pollution. It is made up of traffic caused by:

- misconfiguration
- network scanning
- malware
- infected computers
- other unexpected phenomena
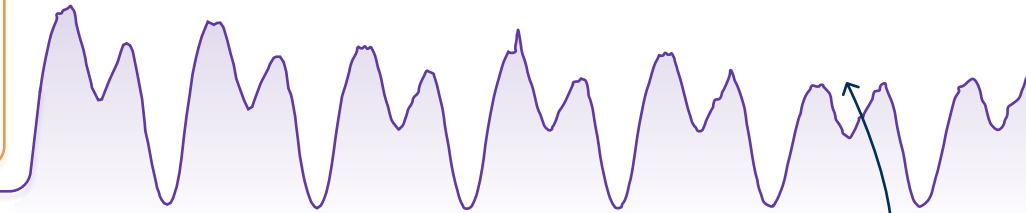- misconfigured peer-to-peer file sharing

If the Telescope signal suddenly drops below what is normally observed may indicate an outage.

Additional Signals

More signals will be added to IODA. Currently, IODA has integrated Google product traffic data at the country level.

- Search
- YouTube
- Maps
- Gmail
- Images
- Spreadsheet
- Sites

In general, you can tell if a signal is experiencing a disruption if it is breaking its standard daily pattern.

*This Google signal goes up and down each day, but here it doesn't reach it's **typical, maximum value**, indicating a potential disruption.*

Potential Shutdown

An outage has likely occurred if you see a simultaneous, abnormal drop in **two or more IODA signals**.

This outage could be a government-ordered shutdown or could be due to power outage, accidental cable cut, or bad weather. The cause must be further investigated.

Lets look at the internet shutdown protocol on the next page!

Internet Shutdown Protocol

1. Preliminary Shutdown Evidence

An outage alert is triggered on a measurement dashboard

IODA Cloudflare

OR A censorship event is identified by a partner organization

AccessNow civil society organizations

OR A censorship event is expected due to a political event

mobilization election coup

2. Gather Details

The measurement team investigates their data for the scope* of the outage

★ duration — geography — networks

If measurement data indicates disruption:

3. Validate with Partners

Share data with partner organizations* for validation via Signal, Slack, Email

★ CSOs — measurement groups

If disruption is validated by partners:

4. Share Confirmed Info

If validated, gather socio-political and measurement details for confirmed disruption details

protest civil unrest exam-related

Share with Internet Freedom Community and broader public via social media, secure messaging, Slack, KIO listserv

5. Circumvention Analysis

Identify networks unaffected by shutdowns that would allow circumvention.

Repeat analysis as necessary based on evolving censorship practices