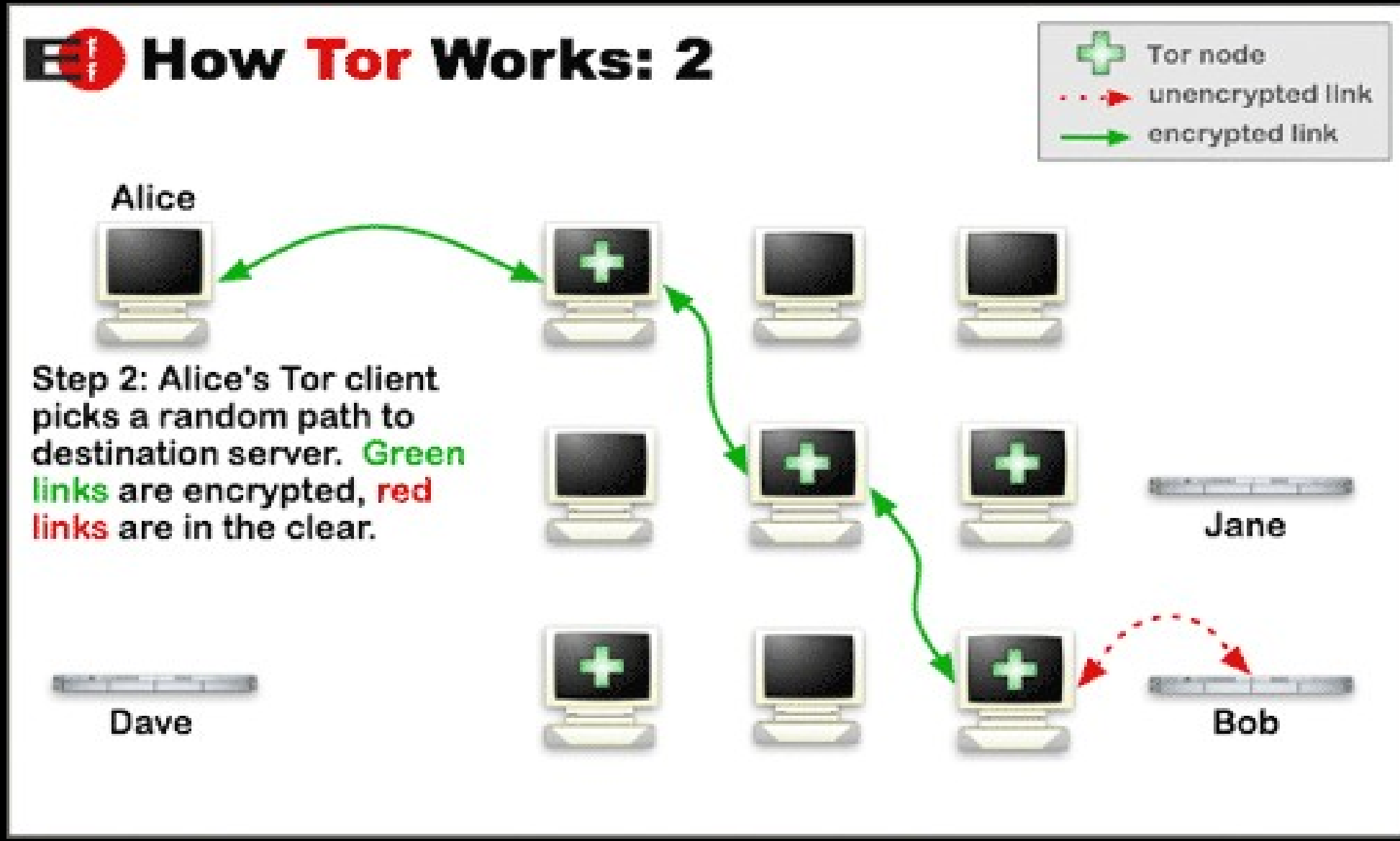
Tor Ecosystem: A Developer's Guide to Contributing to the Tor Project

Damian Johnson
The Tor Project
https://torproject.org/

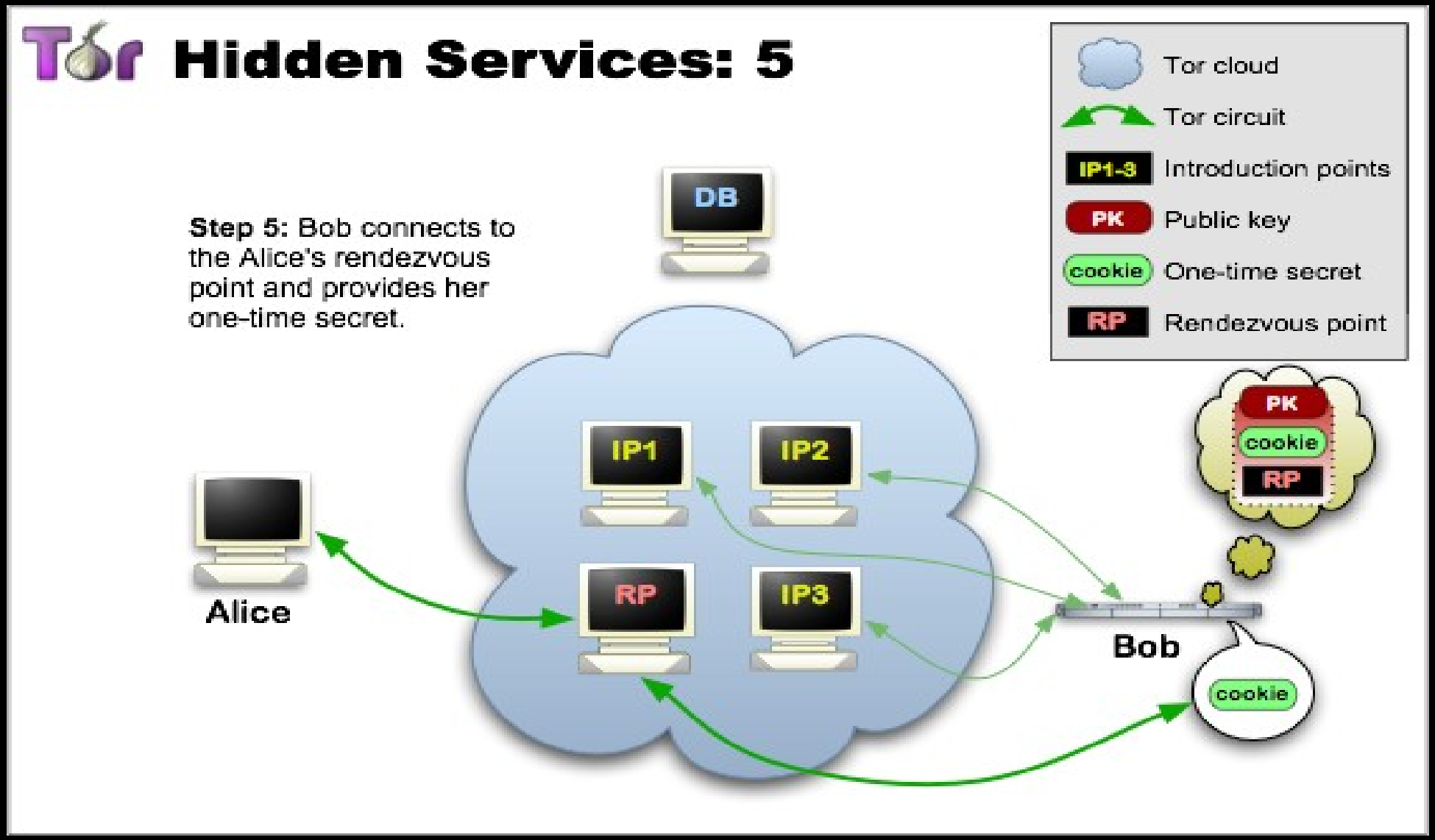
Full presentation given during 29c3

https://media.torproject.org/video/

Tor: Client, Relay/Bridge, Authority



Tor: Hidden Services



User Interfaces

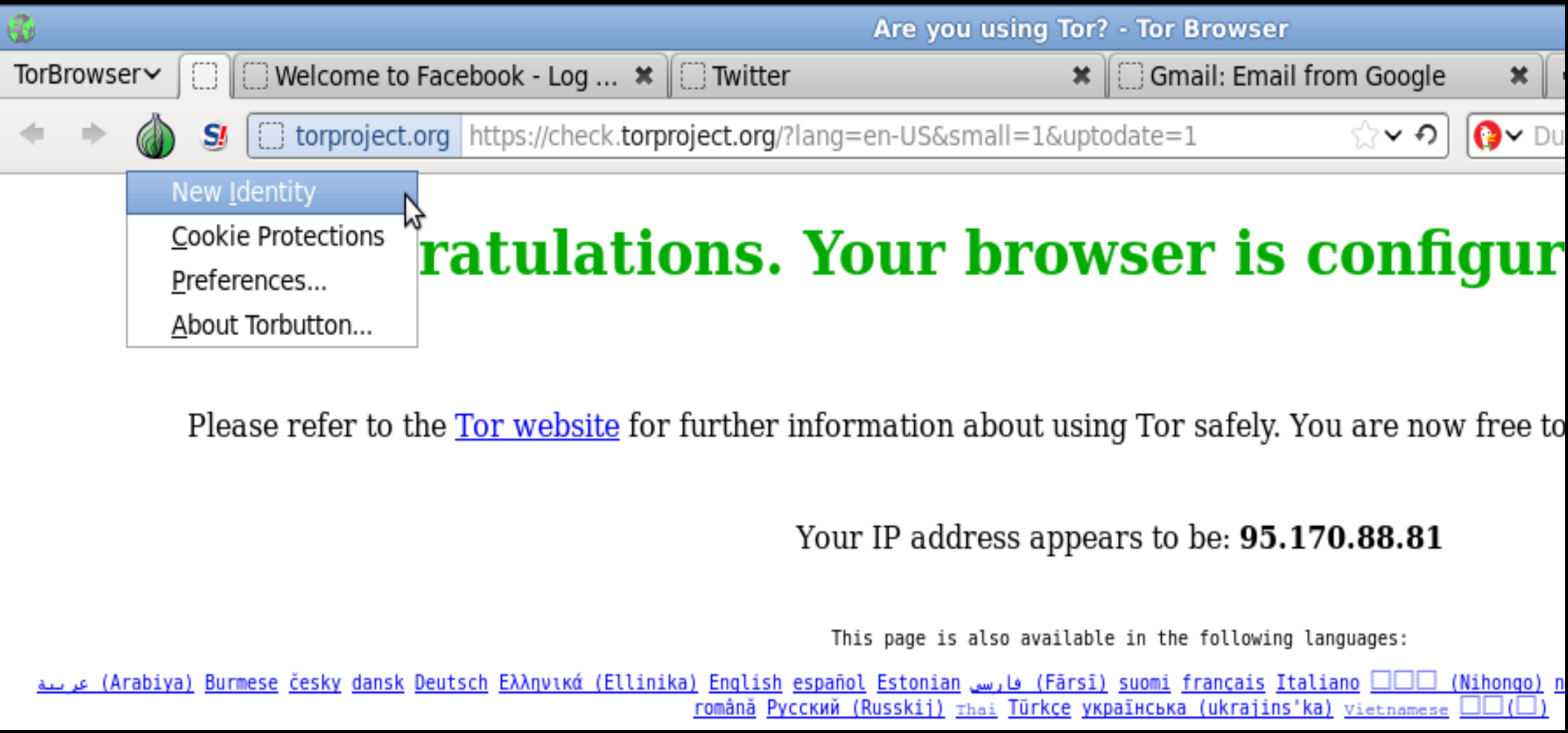
- Vidalia (2006 – 2013)
- Tor Browser (2007 - Present)
- Arm (2009 - Present)
- TorK (2006 - 2010)

Vidalia

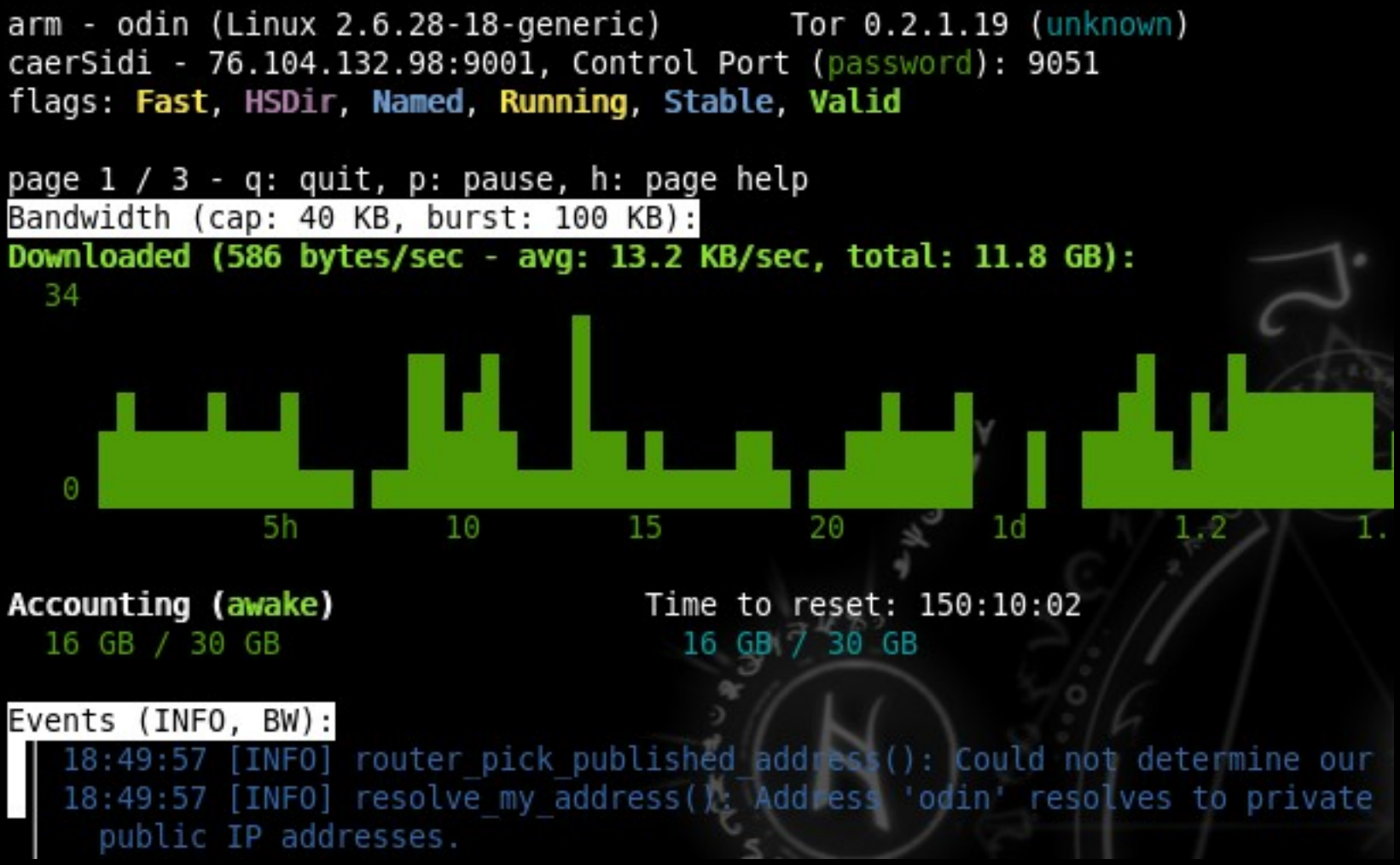
Status
Connected to the Tor network!
Vidalia Shortcuts
Stop Tor
Setup Relaying
View the Network
Use a New Identity
Bandwidth Graph
Help
About
Message Log
Settings
Exit
Show this window on startup
Hide

Tor Network Map
Refresh
Zoom In
Zoom Out
Zoom To Fit
Help
Close
Relay
Connection
Status

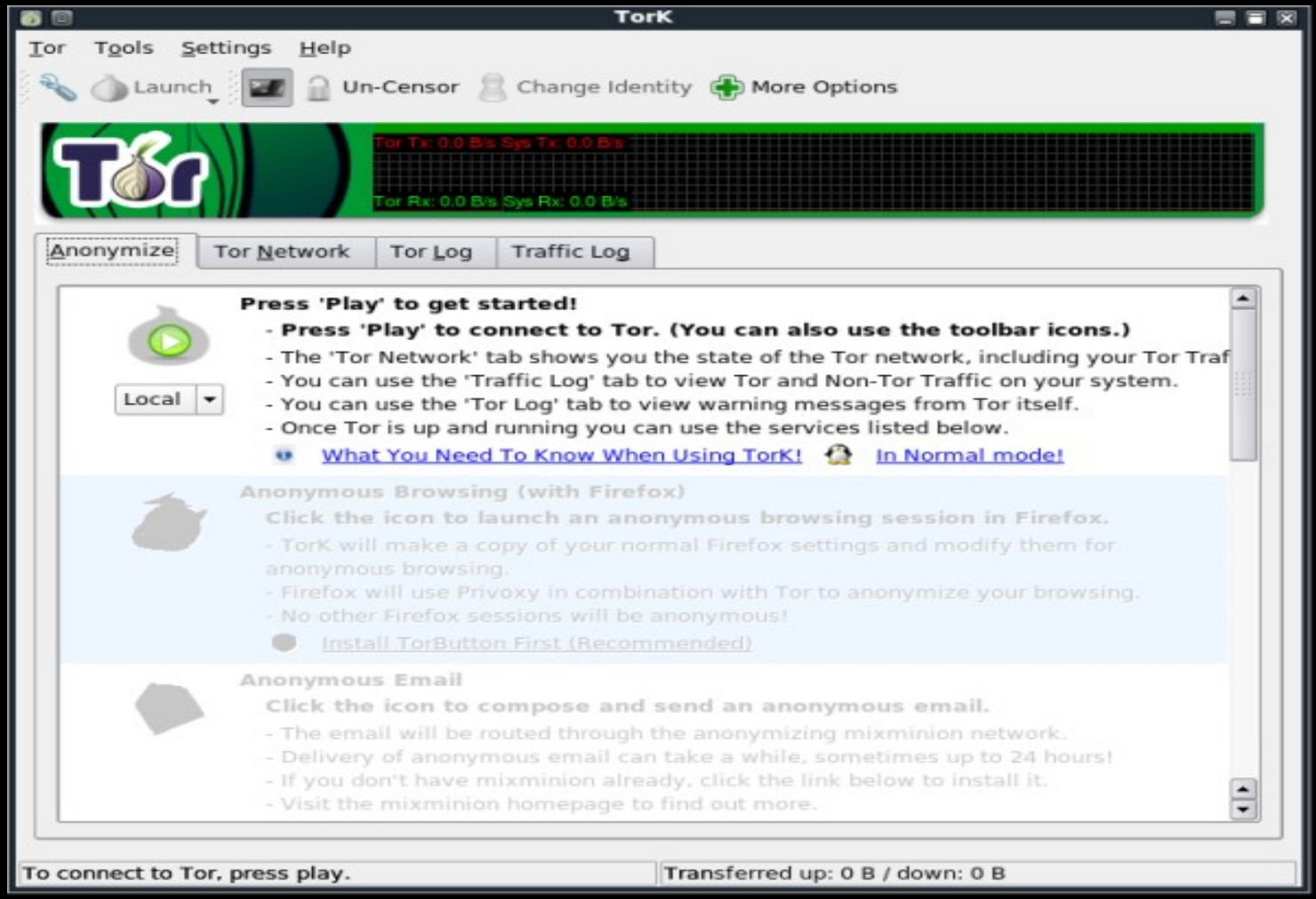
Tor Browser


Are you using Tor? - Tor Browser
TorBrowser
Welcome to Facebook - Log ...
Twitter
Gmail: Email from Google
torproject.org
https://check.torproject.org/?lang=en-US&small=1&uptodate=1
New Identity
Cookie Protections
Preferences...
About Torbutton...
ratulations. Your browser is configur
Please refer to the Tor website for further information about using Tor safely. You are now free to
Your IP address appears to be: 95.170.88.81
This page is also available in the following languages:
عربية (Arabiya) Burmese česky dansk Deutsch Ελληνικά (Ellinika) English español Estonian فارسی (Fārsī) suomi français Italiano □□□ (Nihongo)
română Русский (Russkij) Thai Türkçe українська (ukrajins'ka) Vietnamese □□(□)

Arm


arm - odin (Linux 2.6.28-18-generic) Tor 0.2.1.19 (unknown)
caerSidi - 76.104.132.98:9001, Control Port (password): 9051
flags: Fast, HSDir, Named, Running, Stable, Valid
page 1 / 3 - q: quit, p: pause, h: page help
Bandwidth (cap: 40 KB, burst: 100 KB):
Downloaded (586 bytes/sec - avg: 13.2 KB/sec, total: 11.8 GB):
34
0
5h
10
15
20
1d
1.2
1.
Accounting (awake)
16 GB / 30 GB
Time to reset: 150:10:02
16 GB / 30 GB
Events (INFO, BW):
18:49:57 [INFO] router_pick_published_address(): Could not determine our
18:49:57 [INFO] resolve_my_address(): Address 'odin' resolves to private
public IP addresses.

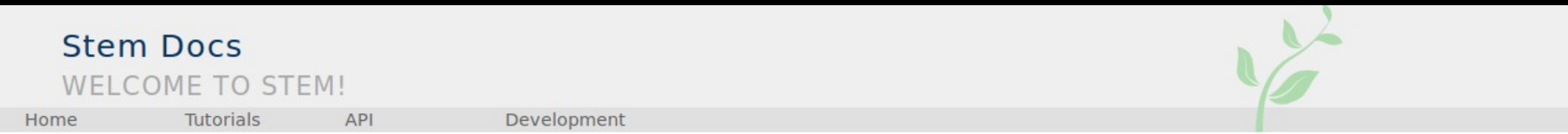
TorK


TorK
Tor Tools Settings Help
Launch
Un-Censor
Change Identity
More Options
Tor Tx: 0.0 B/s Sys Tx: 0.0 B/s
Tor Rx: 0.0 B/s Sys Rx: 0.0 B/s
Anonymize
Tor Network
Tor Log
Traffic Log
Press 'Play' to get started!
- Press 'Play' to connect to Tor. (You can also use the toolbar icons.)
- The 'Tor Network' tab shows you the state of the Tor network, including your Tor Traf
- You can use the 'Traffic Log' tab to view Tor and Non-Tor Traffic on your system.
- You can use the 'Tor Log' tab to view warning messages from Tor itself.
- Once Tor is up and running you can use the services listed below.
Local
What You Need To Know When Using TorK!
In Normal mode!
Anonymous Browsing (with Firefox)
Click the icon to launch an anonymous browsing session in Firefox.
- TorK will make a copy of your normal Firefox settings and modify them for anonymous browsing.
- Firefox will use Privoxy in combination with Tor to anonymize your browsing.
- No other Firefox sessions will be anonymous!
Install TorButton First (Recommended)
Anonymous Email
Click the icon to compose and send an anonymous email.
- The email will be routed through the anonymizing mixminion network.
- Delivery of anonymous email can take a while, sometimes up to 24 hours!
- If you don't have mixminion already, click the link below to install it.
- Visit the mixminion homepage to find out more.
To connect to Tor, press play.
Transferred up: 0 B / down: 0 B

Controller Libraries

- **Stem (October 2011 - Present)**
- **Txtorcon (February 2012 - Present)**
- TorCtl (July 2008 - November 2011)
- JTorCtl (June 2005 - May 2009)

Stem (https://stem.torproject.org/)



Welcome to Stem!

Stem is a python controller library for **Tor**. Like its predecessor, **TorCtl**, it uses Tor's **control protocol** to help developers program against the Tor process, enabling them to build things similar to **Vidalia** and **arm**.

Subsections

- **Development Wiki**
- **Contact**
- ***Index***
- ***Module Index***
- ***Search Page***
- **Automated Testing**

- **Contents**

Txtorcon
(https://txtorcon.readthedocs.org/)

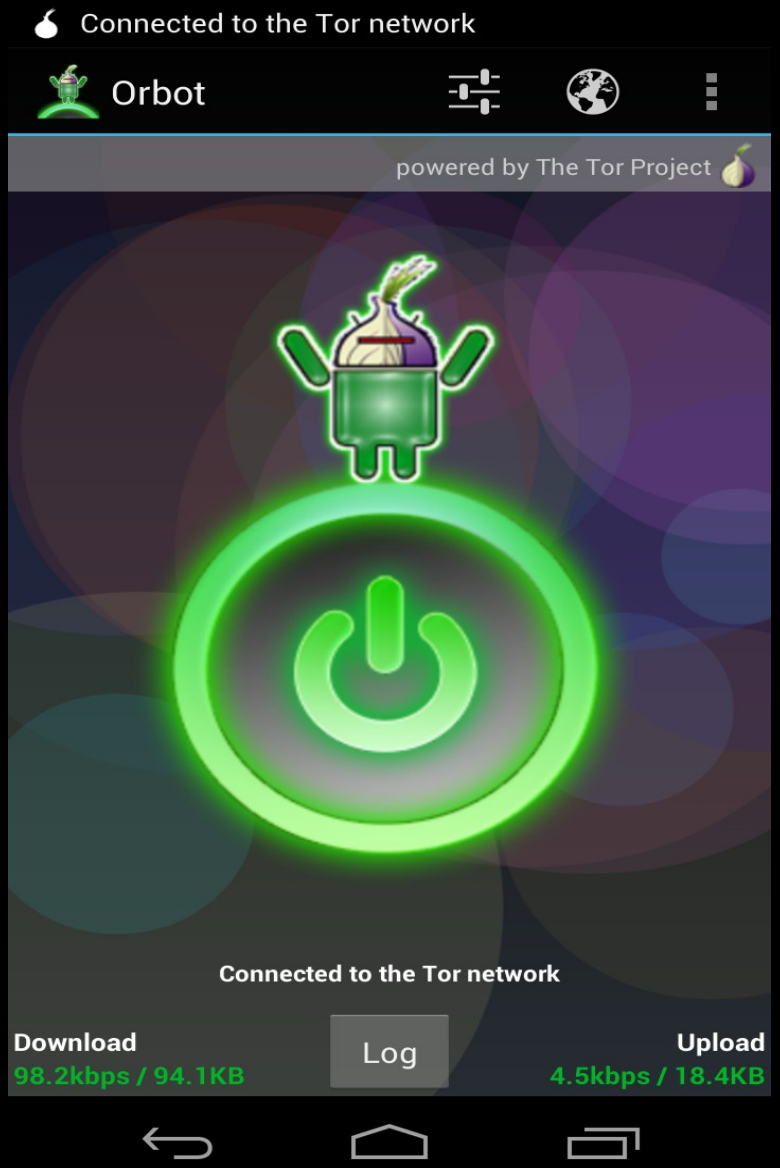
```
meejah@pretend:~/src/txtorcon-github$ make
trial --reporter=text txtorcon.test
.....................................................................
.....................................................................
..............................
..............................
---------------------------------------------------------------------
Ran 229 tests in 1.140s

PASSED (successes=229)
meejah@pretend:~/src/txtorcon-github$ python examples/launch_tor_endpoint.py
10%: Finishing handshake with directory server
15%: Establishing an encrypted directory connection
20%: Asking for networkstatus consensus
25%: Loading networkstatus consensus
40%: Loading authority key certs
45%: Asking for relay descriptors
80%: Connecting to the Tor network
85%: Finishing handshake with first hop
90%: Establishing a Tor circuit
100%: Done
I have set up a hidden service, advertised at:
http://567zt26xqpvmdwcs.onion:80
locally listening on IPv4Address(TCP, '0.0.0.0', 31855)
```

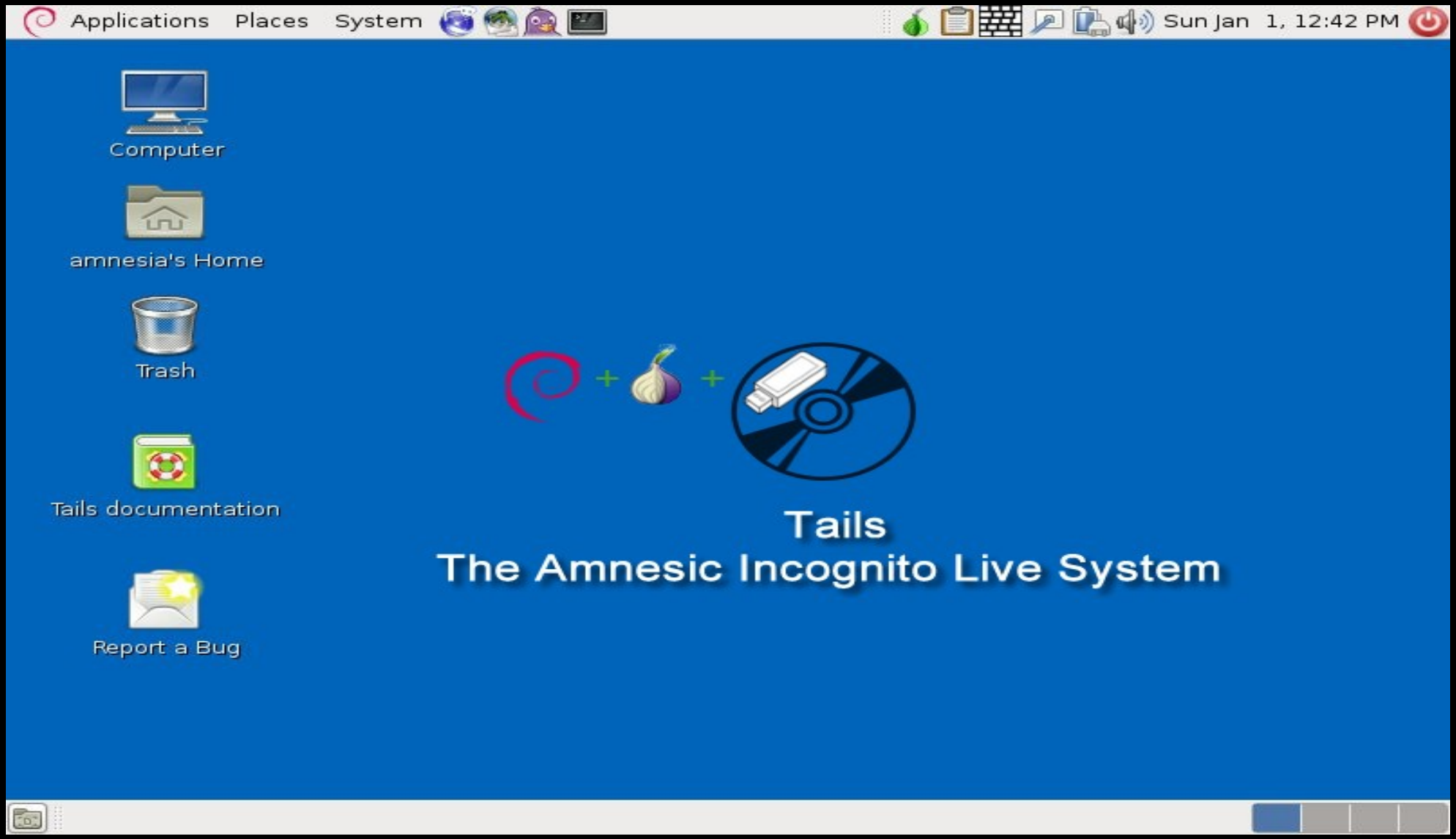
Ecosystems

- Guardian Project
- Tails
- OONI Probe

The Guardian Project (https://guardianproject.info/)



Tails (https://tails.boum.org/)



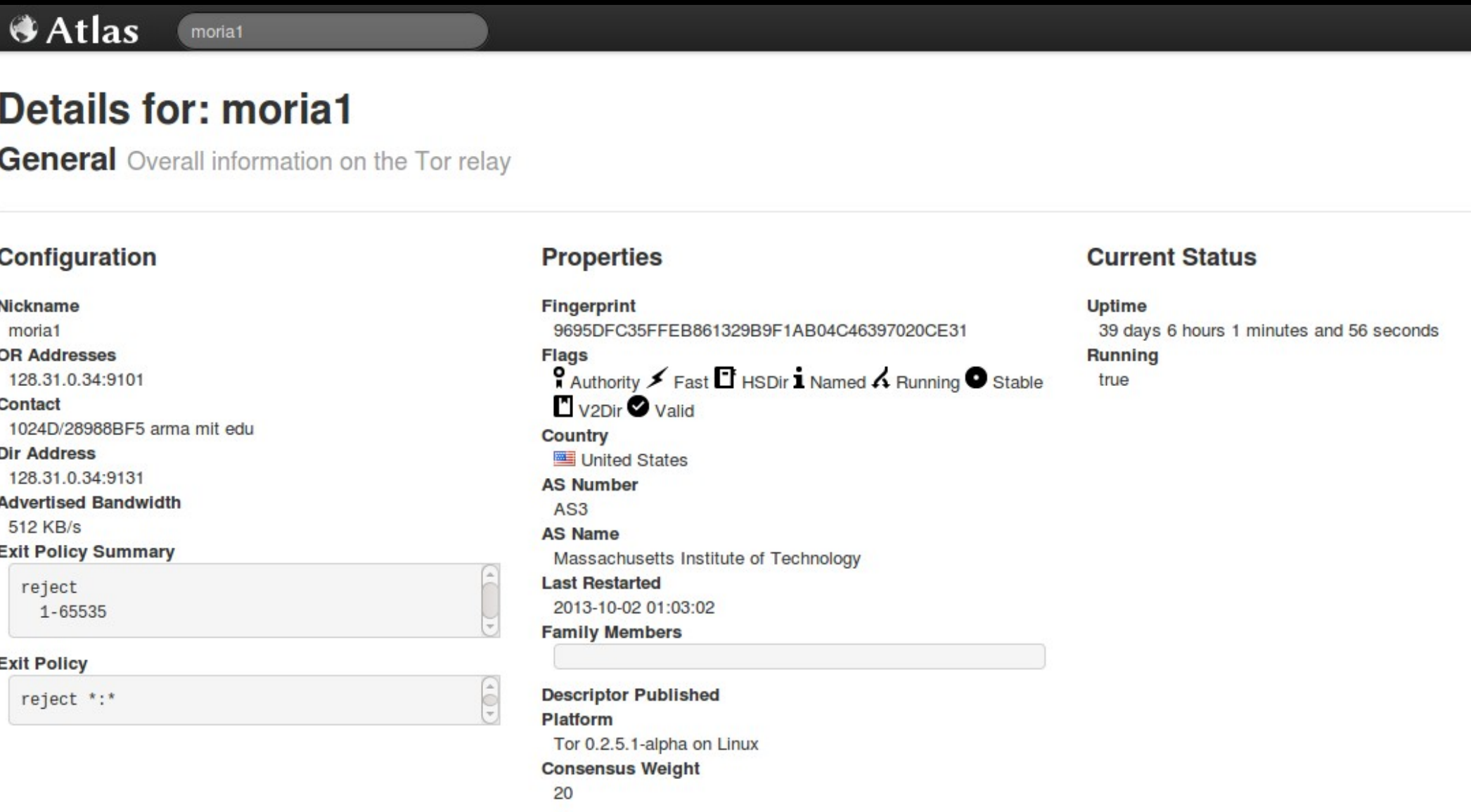
OONI Probe
(https://ooni.torproject.org/)

```
(ooni)~/c/n/ooni-probe ››› ./bin/ooniprobe nettests/blocking/http_requests.py -f inputs
/ooni-inputs/processed/alexa-top-1k.txt
Log opened.
Starting Tor...
Successfully bootstrapped Tor
We will include some geo data in the report
Your AS number is: AS36692
Reporting to file report_http_requests_2012-12-27T134858Z.yamloo
Performing GET request to http://google.com/
Performing GET request to http://google.com/ via Tor
Performing GET request to http://facebook.com/
Performing GET request to http://facebook.com/ via Tor
Performing GET request to http://youtube.com/
Performing GET request to http://youtube.com/ via Tor
Performing GET request to http://yahoo.com/
Performing GET request to http://yahoo.com/ via Tor
Performing GET request to http://baidu.com/
Performing GET request to http://baidu.com/ via Tor
```

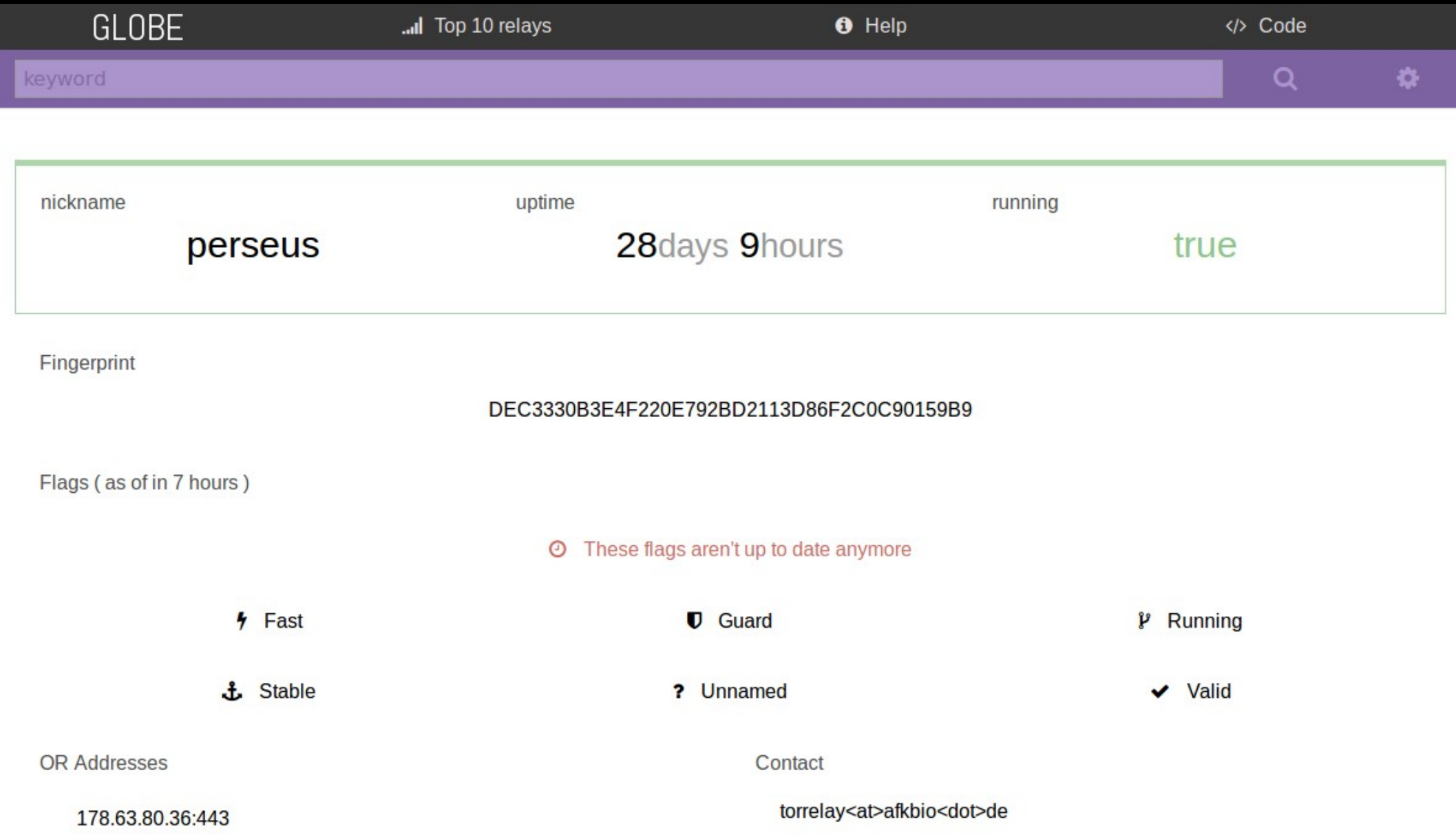
Network Visualization

- **Atlas (2012 - Present)**
- **Globe (2013 - Present)**
- **Compass (2012 – 2013)**
- **Metrics (2010 - Present)**
- TorStatus (2011)
- Onionoo (2011 - Present)

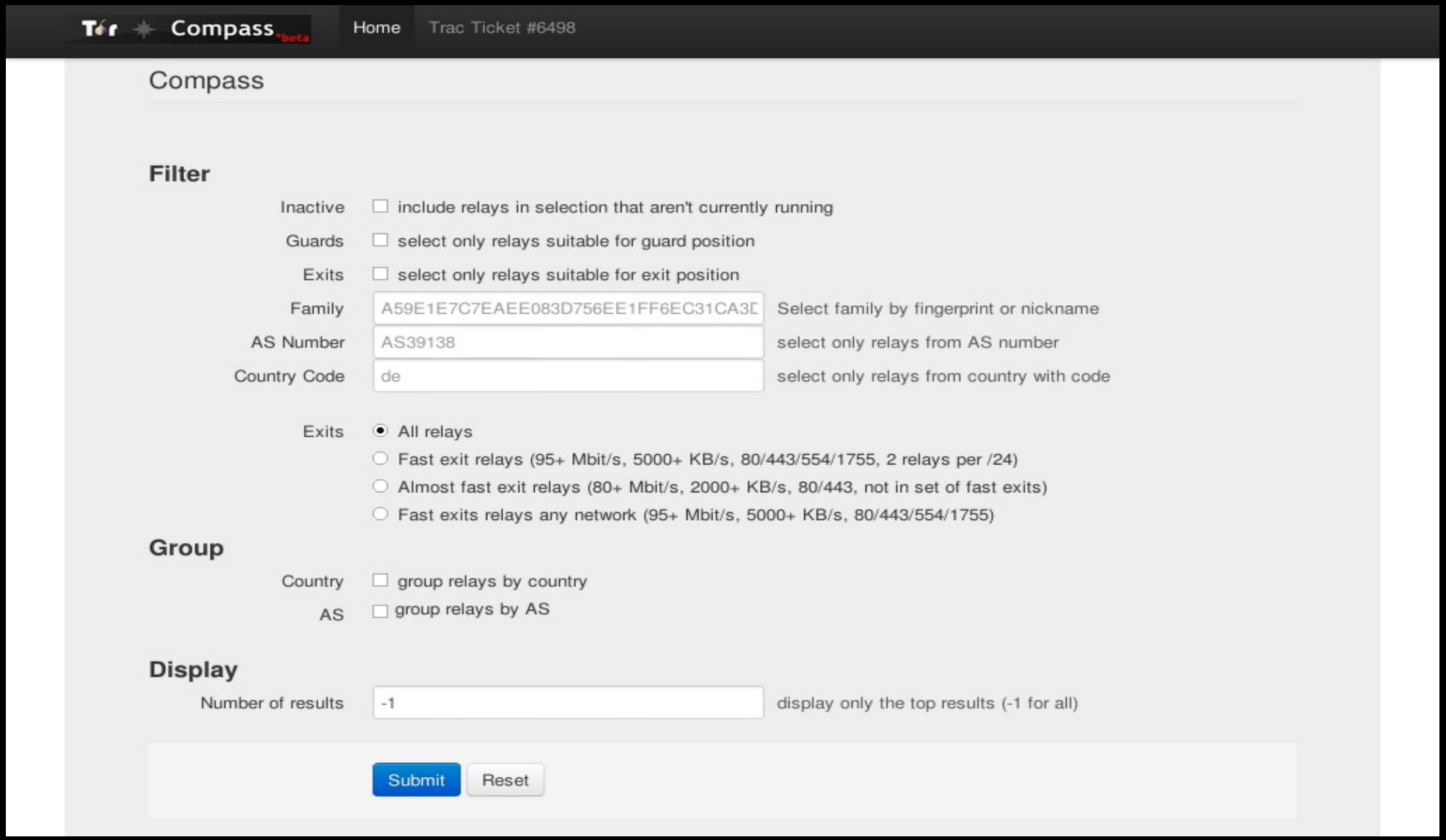
Atlas (https://atlas.torproject.org/)



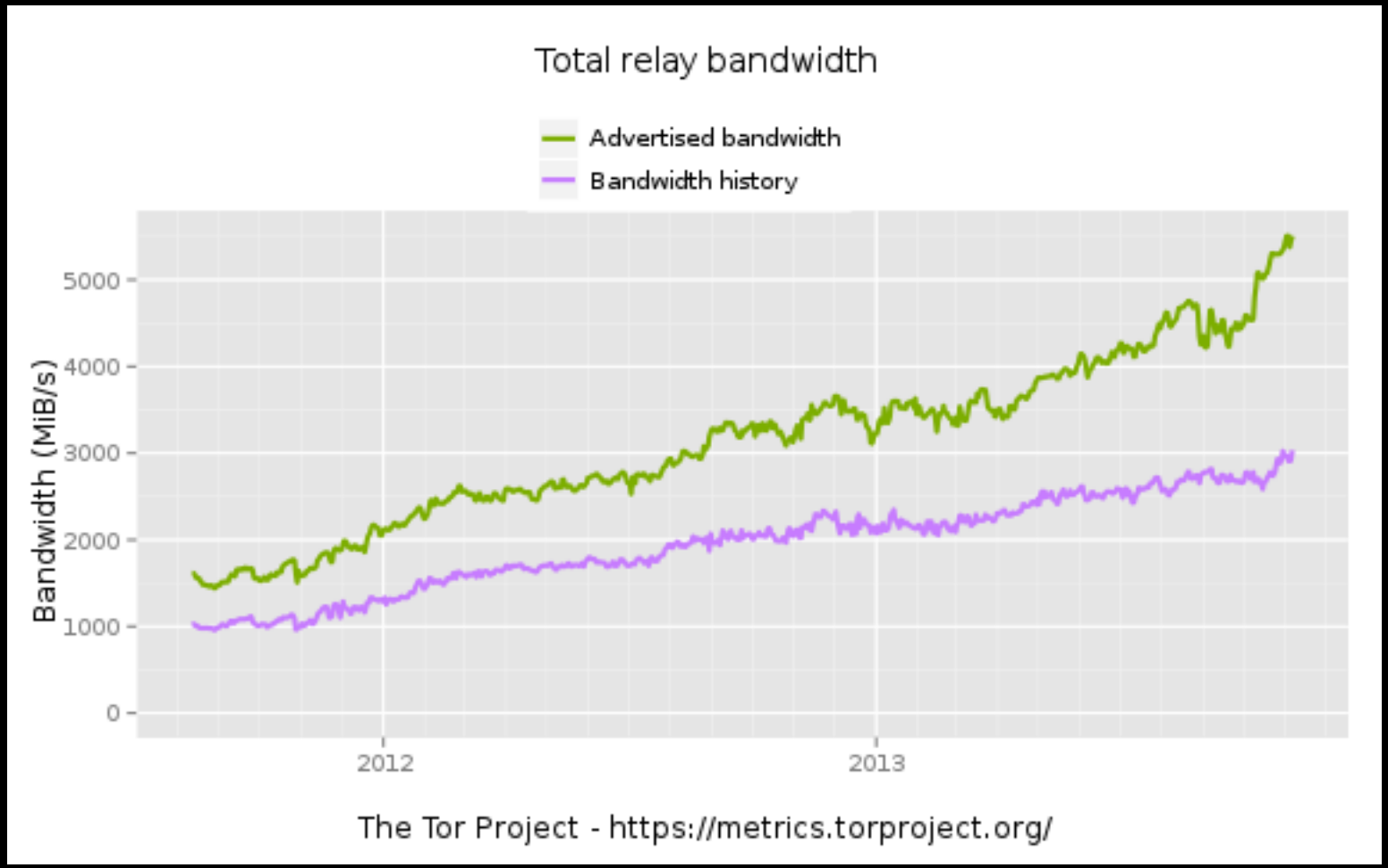
Globe (http://globe.rndm.de/)



Compass (https://compass.torproject.org/)

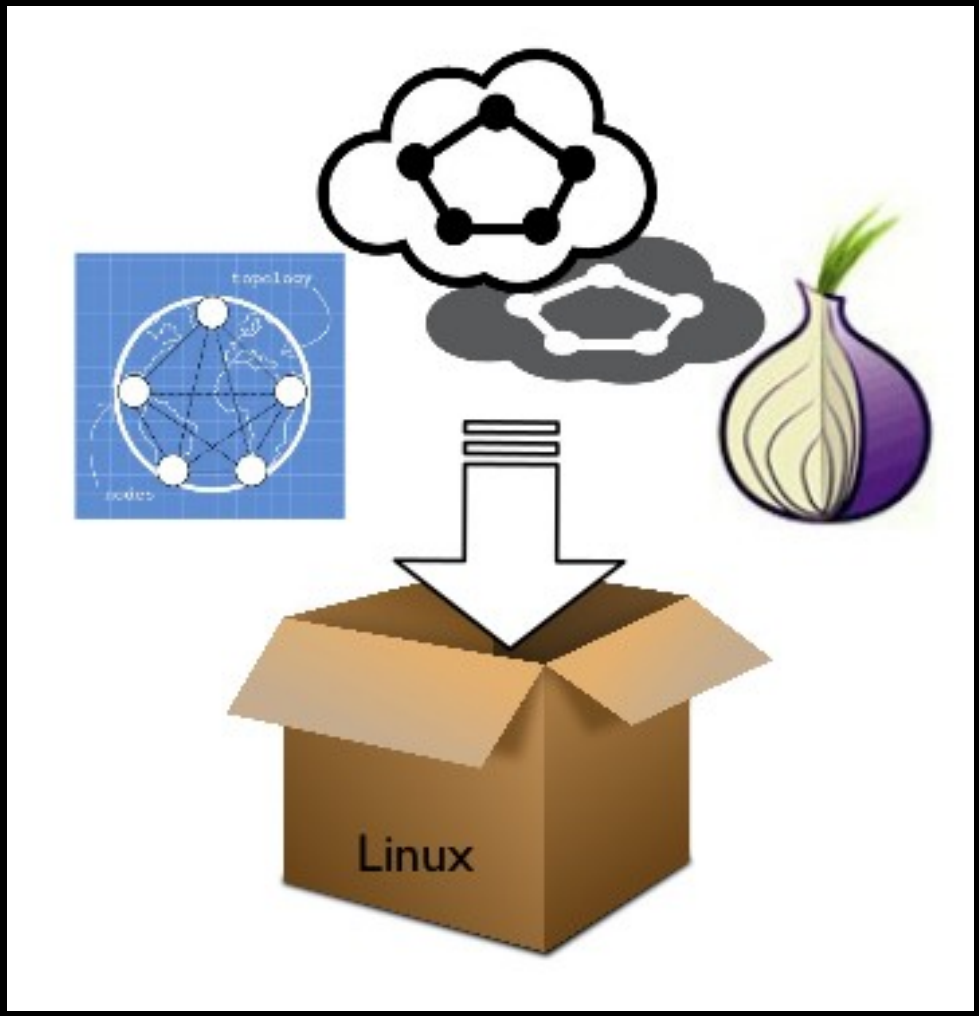


Metrics (https://metrics.torproject.org/)



Tor Network Simulators

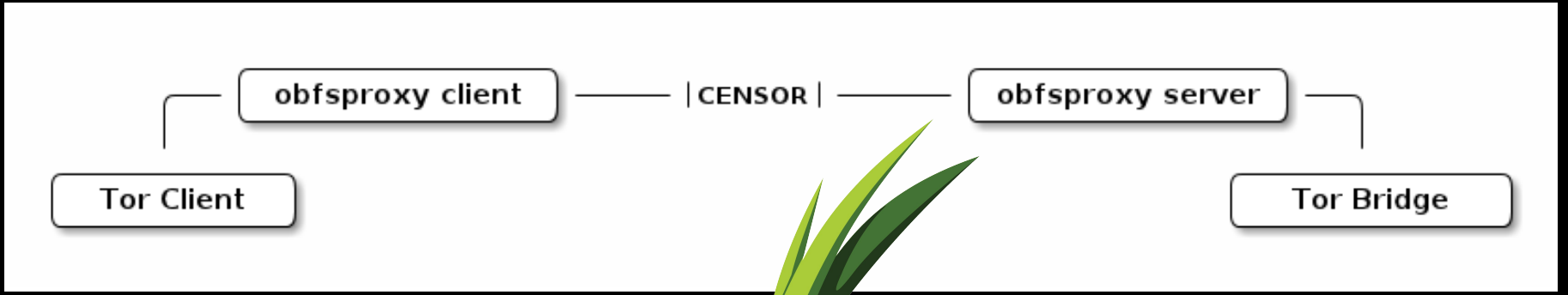
- Shadow
- ExperimenTor
- Chutney
- Puppetor

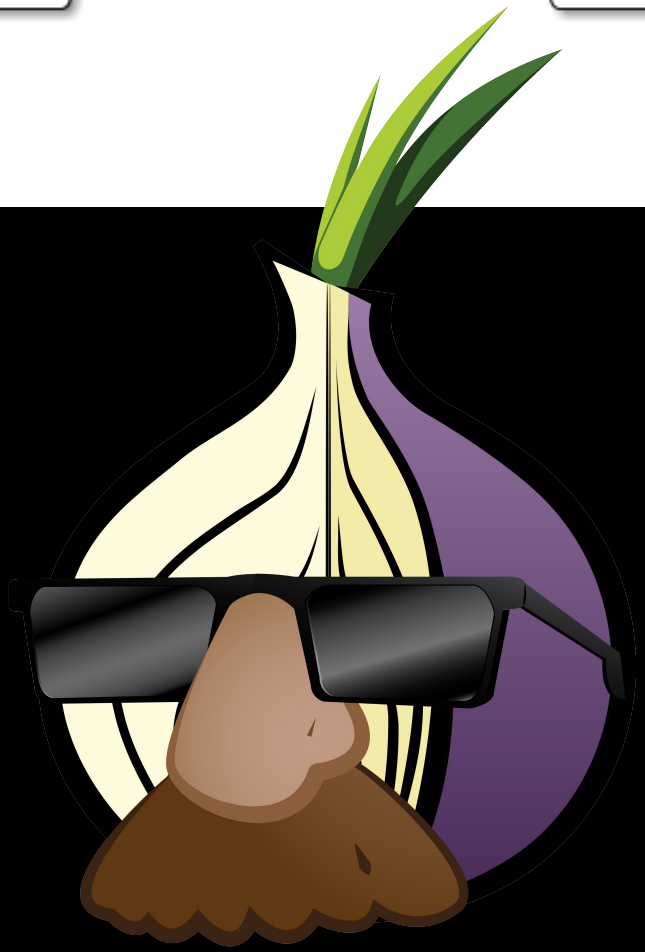


… and many more...

- **Obfsproxy (2011 – Present)**
- **FlashProxy (2011 - Present)**
- **Torbirdy (2012 - Present)**
- **Tor Cloud (2011 - 2013)**
- **Tor-ramdisk (2010 - Present)**
- **Tor2Web (2011 - Present)**
- **HTTPS Everywhere (2010 - Present)**
- TorFlow (BWAuths, SoaT)
- TorDNSEL / TorBEL
- TorCheck, GetTor, BridgeDB...

Obfsproxy


obfsproxy client
CENSOR
obfsproxy server
Tor Client
Tor Bridge



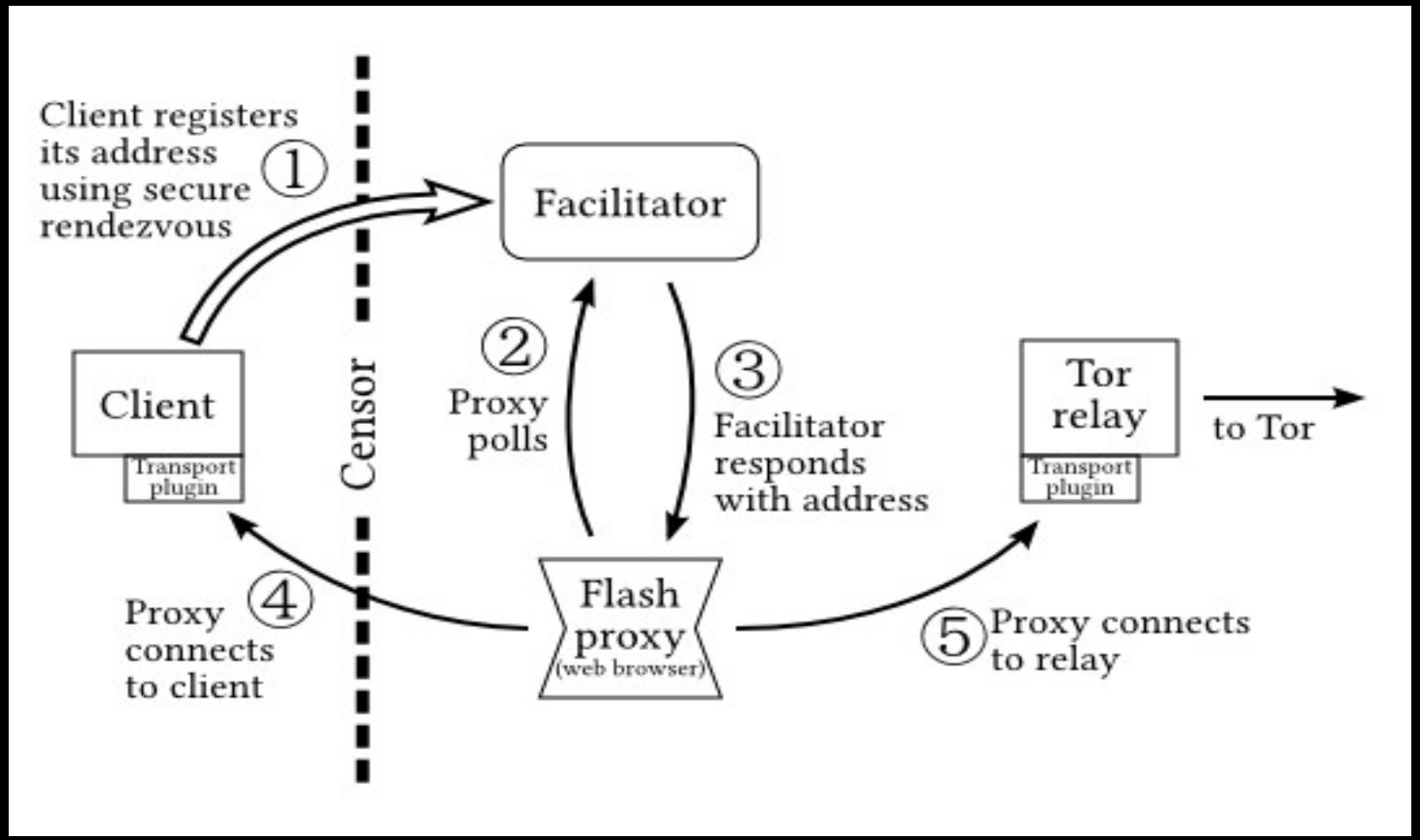
Flashproxy

INTERNET FREEDOM Dark blue means the proxy is running but no client is being served.

INTERNET FREEDOM Light blue means a client is currently being served.

INTERNET FREEDOM Gray means that the badge has disabled itself. This can be because it has detected it is running on a mobile device, or the browser doesn't support WebSocket (this happens on Internet Explorer 9).

INTERNET FREEDOM Black means that there was an internal error and the proxy is no longer running.



Torbirdy

Tor Cloud

Tor Cloud

Tor bridges in the Amazon cloud

The Tor Cloud project gives you a user-friendly way of deploying bridges to help users access an uncensored Internet. By setting up a bridge, you donate bandwidth to the Tor network and help improve the safety and speed at which users can access the Internet. Learn more about Tor and bridges ».

This project runs on the Amazon EC2 cloud computing platform, which powers Amazon.com and other major websites. Amazon EC2 allows users to launch their own virtual machines and computing resources with flexible and cost-effective terms. Learn more about Amazon EC2 »

Setting up a Tor bridge on Amazon EC2 is simple and will only take you a couple of minutes. The images have been configured with automatic package updates and port forwarding, so you do not have to worry about Tor not working or the server not getting security updates. Get started with Tor Cloud »

Tor-ramdisk

```
NOTE: Only ftp supported at present

Enter IMPORT or GENERATE (all upper case): GENERATE
A new secret key will be generated when tor is started ...

<Tor is configured (but not started yet)>

Hit enter to continue:


* Enter "netstart" to (re)configure the network
* Enter "netstatus" to see the network status
* Enter "nettest" to test network connectivity
* Enter "listening" to see sockets listeing on the network
* Enter "established" to see sockets established on the network
* Enter "torconf" to (re)import/generate the secret_id_key/torrc
* Enter "torstart" to (re)start tor.
* Enter "torreload" to reload torrc.
* Enter "torstop" stop the tor server.
* Enter "torexport" to export the secret_id_key/torrc and NOT halt the system.
* Enter "processes" to see all the running processes
* Enter "resources" to see ram usage
* Enter "shutdown" to export the secret_id_key/torrc AND halt the system.

* torstart_
```

Tor2Web

HTTPS Everywhere

Non-Development Tasks

- **Run a Relay!**
- **Translation**
- **Outreach**
- **Design**
- **Research**

All of these projects are listed at https://www.torproject.org/volunteer

Name	Category	Language	Activity	Contributors
Tor	Core	C	Heavy	nickm, athena, arma
*JTor	Core	Java	Moderate	bleidl
Tor Browser	Bundle	C, Scripting	Moderate	mikeperry, Erinn
Torbutton	Browser Add-on	Javascript	Moderate	mikeperry
HTTPS Everywhere	Browser Add-on	Javascript	Heavy	pde, mikeperry
Vidalia	User Interface	C++, Qt	None	chiiph
Arm	User Interface	Python, Curses	Light	atagar
Orbot	User Interface	Java	Light	n8fr8
Tails	OS image	Sys Admin	Heavy	#tails
tor-ramdisk	OS image	Sys Admin	None	blueness
*Torouter	OS image	Sys Admin	None	ioerror
Torsocks	Usability	C	Light	ioerror, nickm
TorBirdy	Browser Add-on	JavaScript	Heavy	Sukhbir (sukhe)
Obfsproxy	Client Add-on	Python	Moderate	asn
Flash Proxy	Client Add-on	Python	Heavy	dcf, aallai, ist