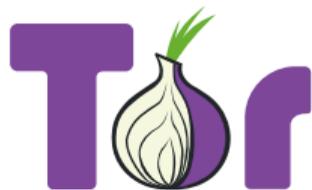


State of the Onion

Alexander Færøy

November 28, 2021

Cryptohagen



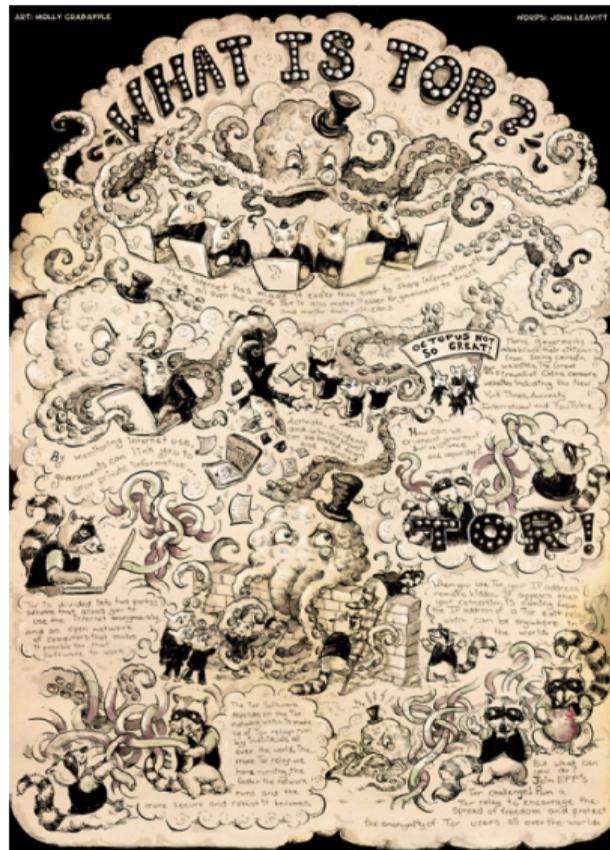
About Me

- Core Developer at The Tor Project since early 2017. Team Lead of the Network Team since late 2019.
- Free Software developer since 2006.
- Worked with distributed systems in the Erlang programming language, WebKit-based mobile browsers, embedded development, and software development consulting.
- Co-organizing the annual Danish hacker festival **BornHack** on Funen.



What is Tor?

- Online anonymity, and censorship circumvention.
 - Free software.
 - Open network.
- Community of researchers, developers, users, and relay operators.
- U.S. 501(c)(3) non-profit organization.



History

- Early 2000s** Working with the U.S. Naval Research Laboratory.
- 2004** Sponsorship by the Electronic Frontier Foundation.
- 2006** The Tor Project, Inc. became a non-profit.
- 2007** Expansion to anti-censorship.
- 2008** Tor Browser development.
- 2010** The Arab spring.
- 2013** The summer of Snowden.
- 2018** Anti-censorship team created.
- 2020** Network Health team created.

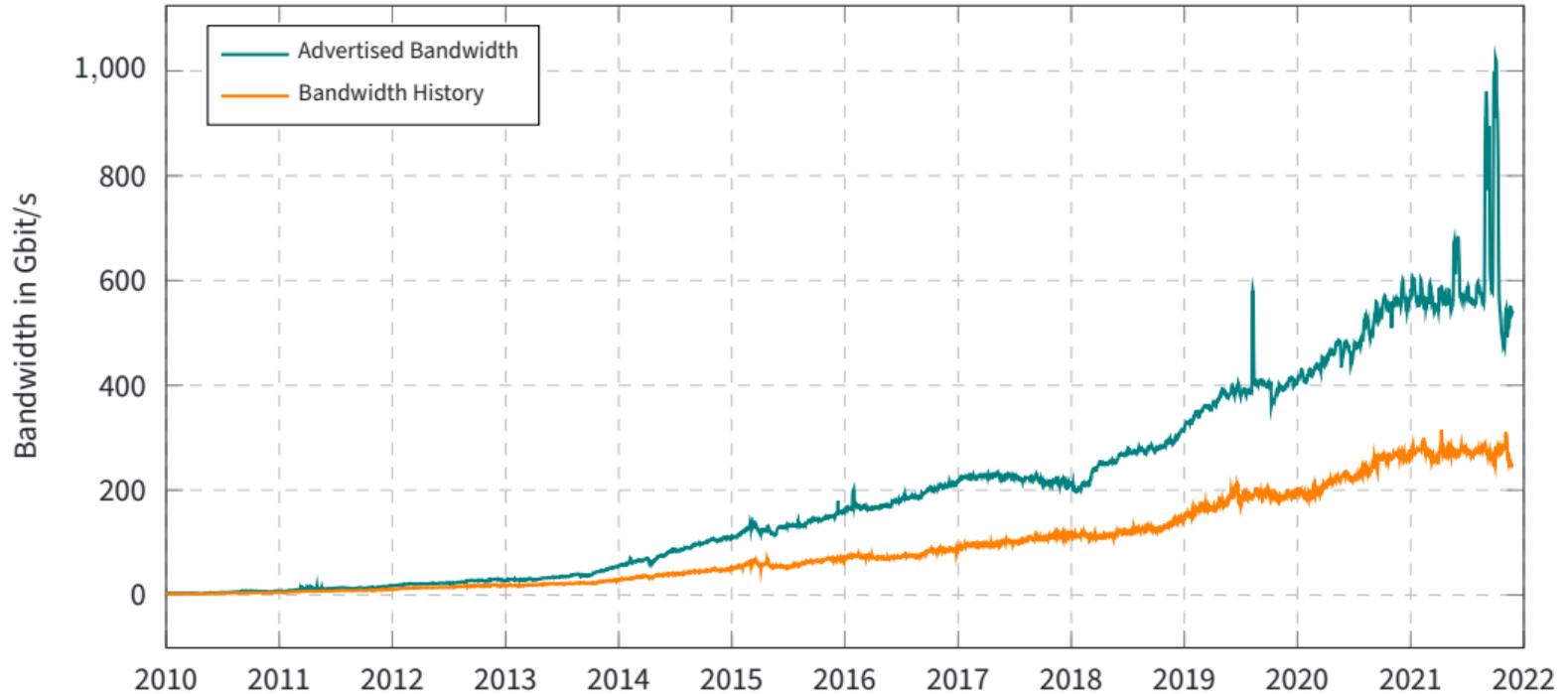
Miscellaneous

- We killed v2 Onions. Finally.
- New community forum.
- Matrix bridge for our IRC communications.
- v3 Onion stats on metrics.torproject.org.
- MetricsPort in Tor.
- Middle-only relays specified.
- Vanguard Lite in Tor.

Speed > Blocking > Privacy > Security > UI

The Tor Network

Total Relay Bandwidth



Source: metrics.torproject.org

Network Experiments

Experiments running on the Tor network.

4 entries, newest to oldest

Relay speed test

SEPTEMBER 23, 2021 AT 8:00 AM

Relay speed test

AUGUST 26, 2021 AT 8:00 AM

Tor network latency measurements

This experiment is still running

JUNE 11, 2021 AT 8:00 AM

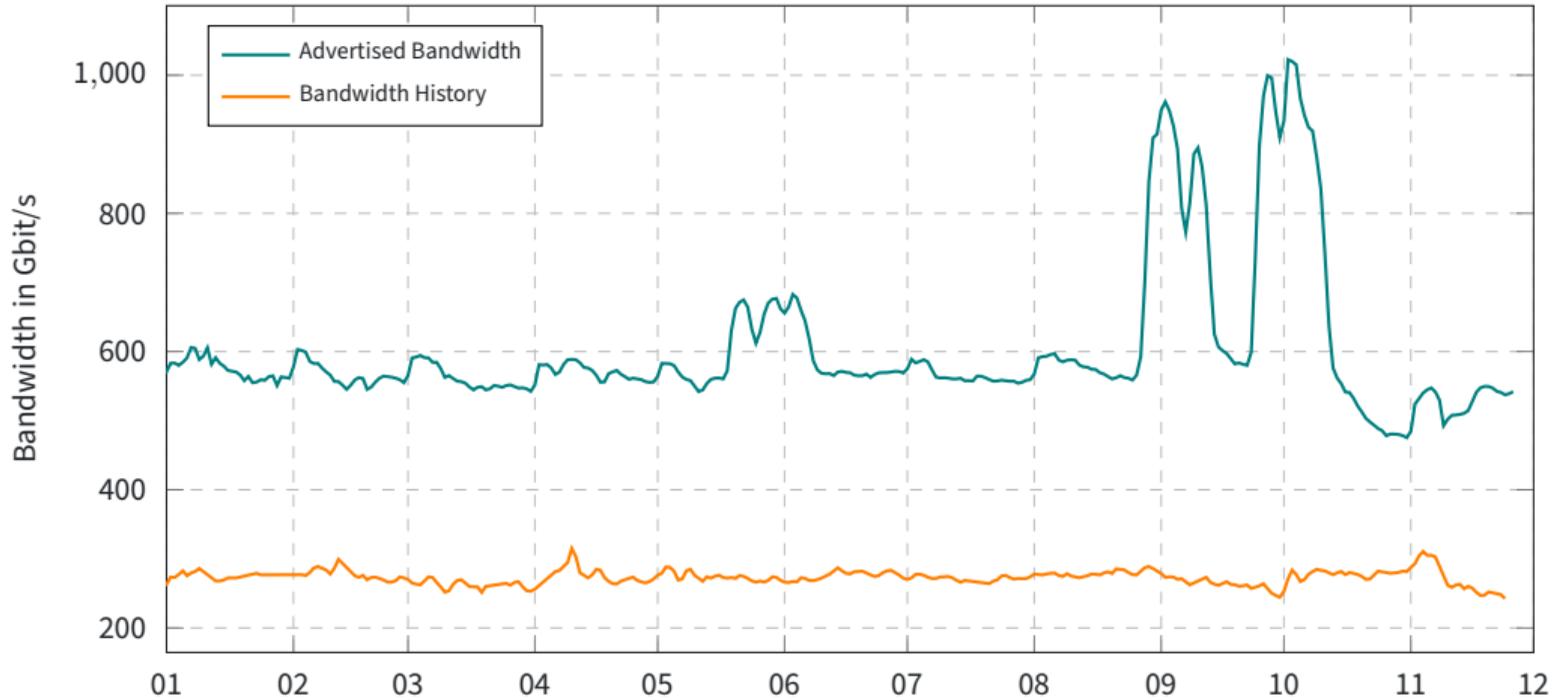
Relay speed test

MAY 28, 2021 AT 4:00 PM

status.torproject.org

The Tor Network

Total Relay Bandwidth in 2021



Source: metrics.torproject.org

The Tor Network

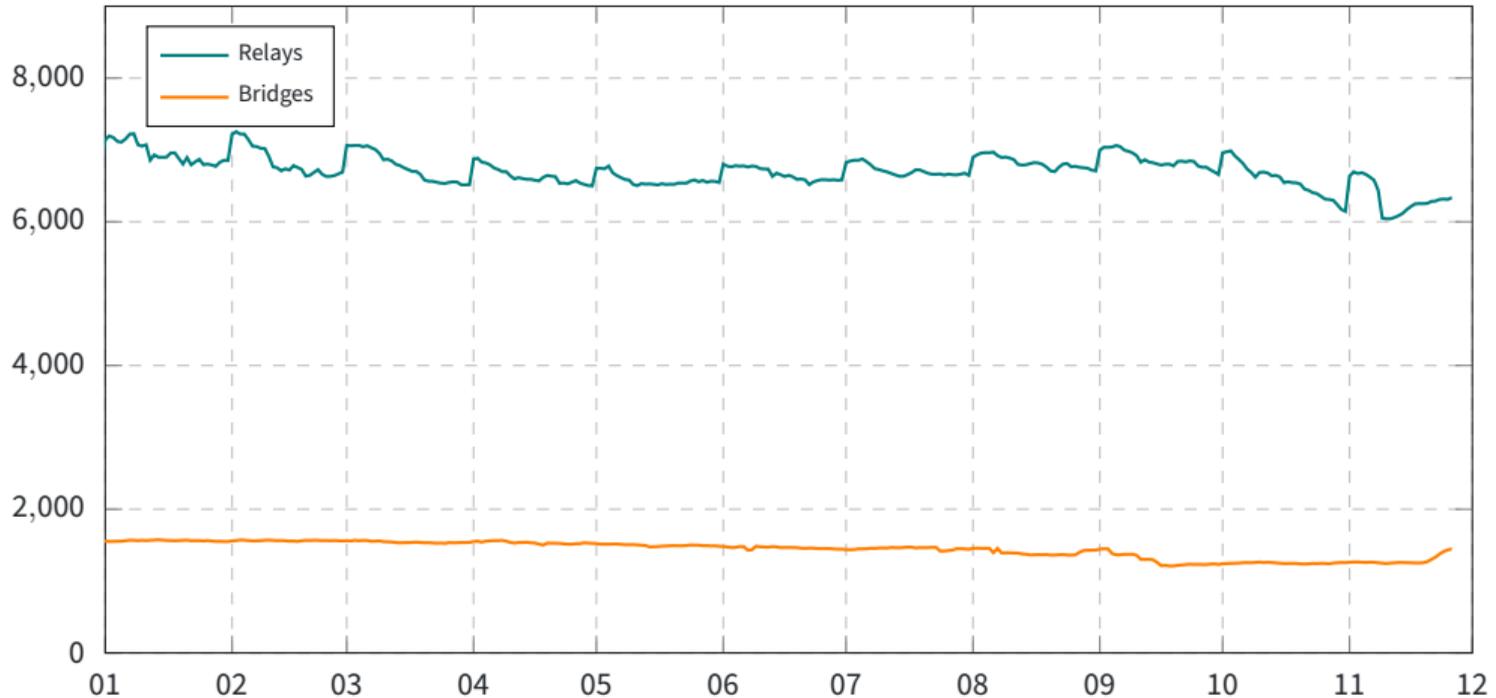
Number of Relays



Source: metrics.torproject.org

The Tor Network

Number of Relays in 2021



Bad Relays and Bandwidth Scanning

Arti is our new Tor client implementation in the Rust programming language.

Focus on building libraries to work with the entire Tor ecosystem.

Why rewrite though?

21 out of 34 of Tor's TROVE's was related to memory issues allowed by the C programming language.

- 0.1.0** API stability.
- 1.0.0** Usability, performance, and stability.
- 1.1.0** Anti-censorship.
- 1.2.0** Onion services.
- 2.0.0** Ready to replace the C client.
- ???** Relay support?

VPN-mode

- Build on top of Arti.
- Collaboration with Guardian Project and LEAP Encryption Access Project.
- A ton of anonymity and privacy challenges.
- TCP and UDP support.
- Android is the first target platform and we aim for releasing in 2023.

UDP Support in the Tor Network

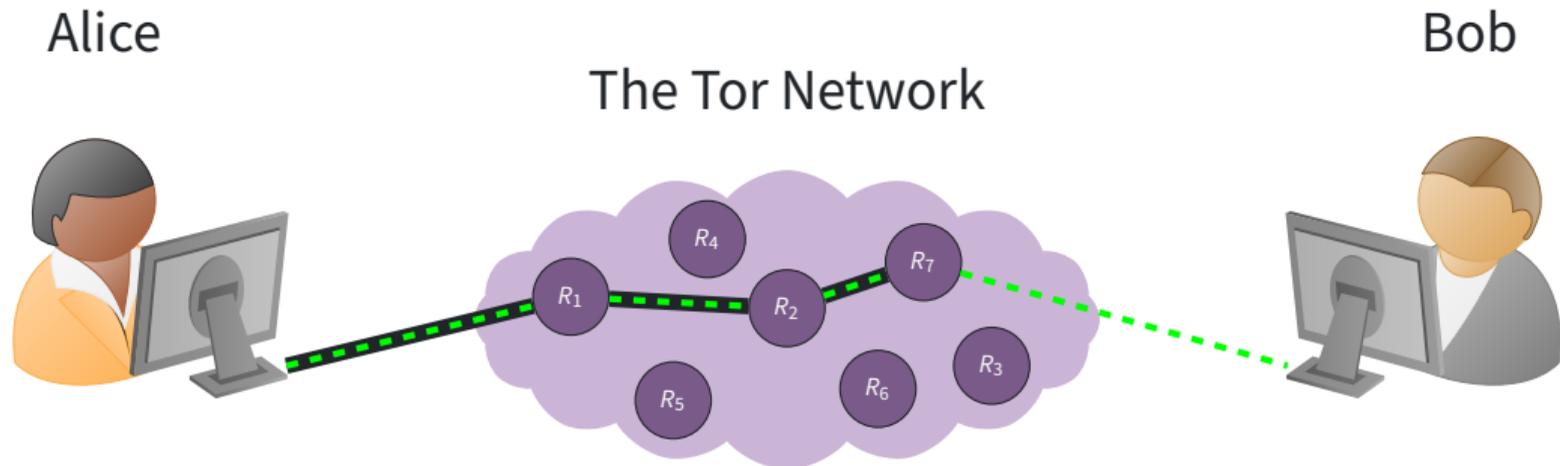
Support UDP for Tor clients and Exit nodes to allow support for modern internet applications such as: Crypto wallets, streaming, VoIP, and *hopefully* WebRTC-based applications.

Client and Exit nodes will require upgrades for deployment.

Use Tor's Congestion Control system to decide when to drop packets at the edges.

Specification work being tracked in [torspec#73](#) on [Tor's Gitlab](#).

UDP Support in the Tor Network



New Congestion Control

- Goal is to target 0.4.7 (release early 2022).
- End-point upgrades only.
- Should get rid of the ~500 kb/sec “barrier”.
- Parameter tuning with Shadow is ongoing right now with the Network and Metrics team.
- Many people has been involved in this and much research was made.

Tokens

- Reducing exit traffic blocking?
- DoS prevention?
- Later: Bridge distribution?

Chaum Tokens and PrivacyPass seems to be where the interest is right now.

The goal is to overcome Tor's network performance bottlenecks using **Traffic Splitting**.

Current work specified by David Goulet and Mike Perry in Tor's [Proposal #329](#).

Based on work by Mashaal AlSabah, Kevin Bauer, Tariq Elahi, and Ian Goldberg in the paper [The Path Less Travelled: Overcoming Tor's Bottlenecks with Traffic Splitting](#).

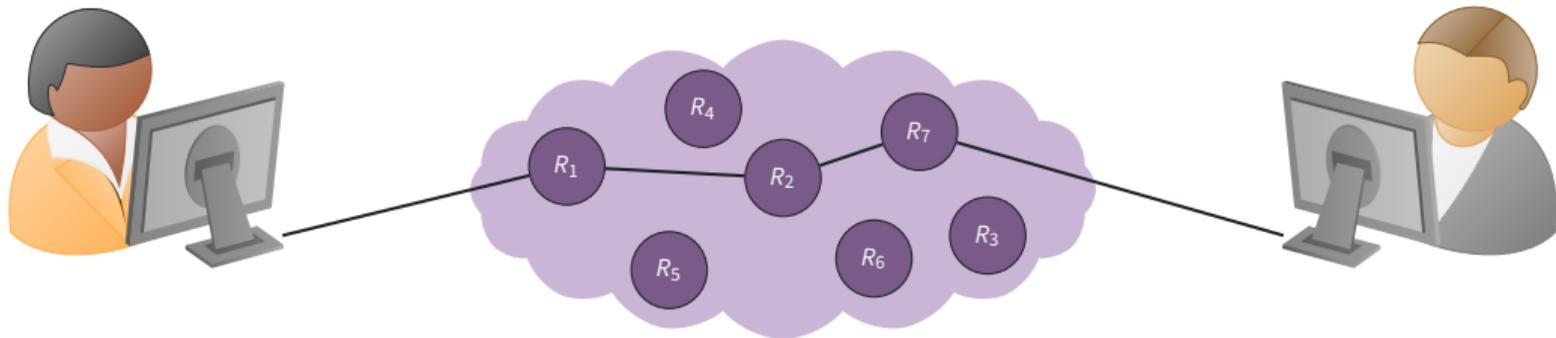
Prototyping and Shadow experimentation will begin in **early 2022**.

Conflux

Alice

Bob

The Tor Network

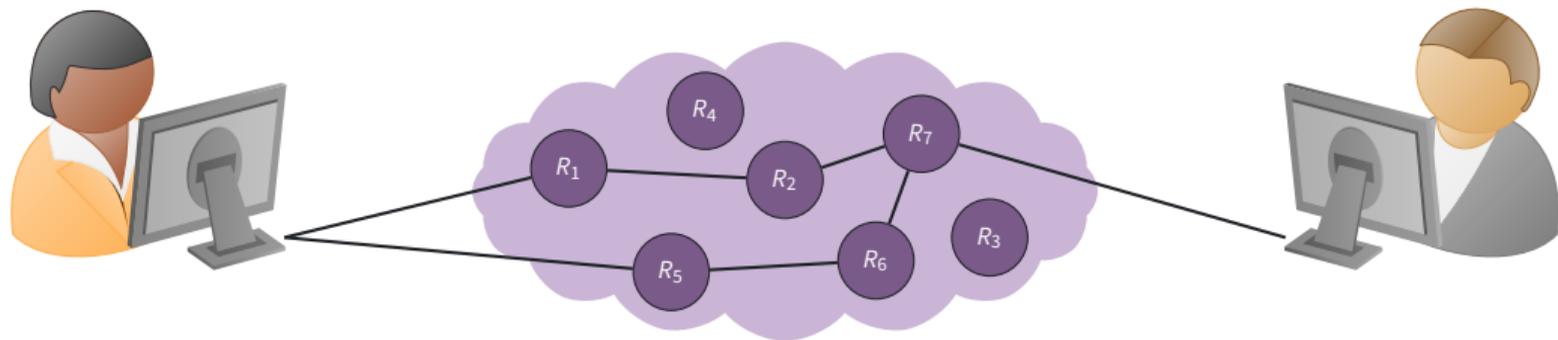


Conflux

Alice

Bob

The Tor Network



Run a Tor Bridge

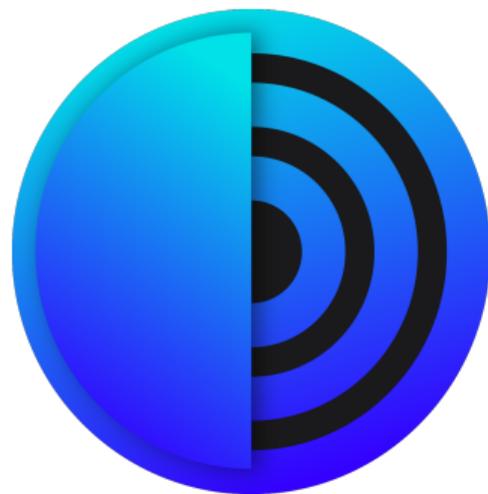
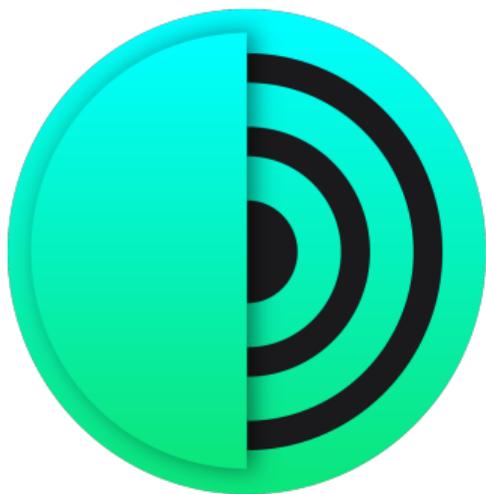


Run a Tor bridge

- We have ~900 obfs4 bridges for ~60.000 users.
- Goal is **200 new obfs4 bridges!**
- Start 10 new bridges, get a hoodie :-)

How can you help?

Help test our Alpha releases



torproject.org/download/alpha/

How can you help?

- Run a Tor relay or **a bridge!**
- Teach others about Tor and privacy in general.
- Find, and maybe fix, bugs in Tor.
- Test Tor on your platform of choice.
- Work on some of the many open research projects.
- Donate at donate.torproject.org



Questions?

 @ahfaeroey

 ahf@torproject.org

 OpenPGP:
1C1B C007 A9F6 07AA 8152
C040 BEA7 B180 B149 1921



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