

State of the Onion

The Road to Mainstream Adoption and Improved Censorship Circumvention

The Tor Project

About Us: Gaba

Project Manager at
The Tor Project
for
**Anti-Censorship,
Metrics, Network and
Network Health Teams**



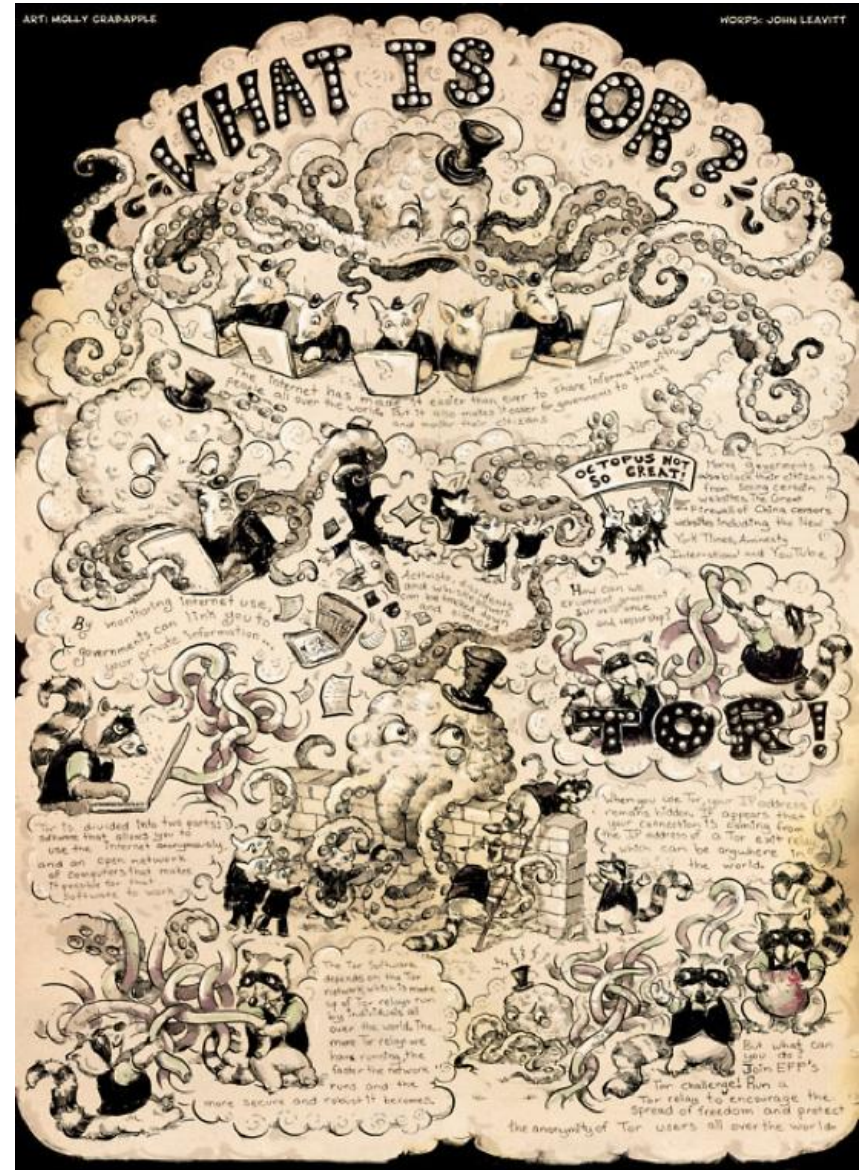
About Us: Pili



Project Manager at The
Tor Project
for
**Tor Browser,
Community, UX and
Website Teams**

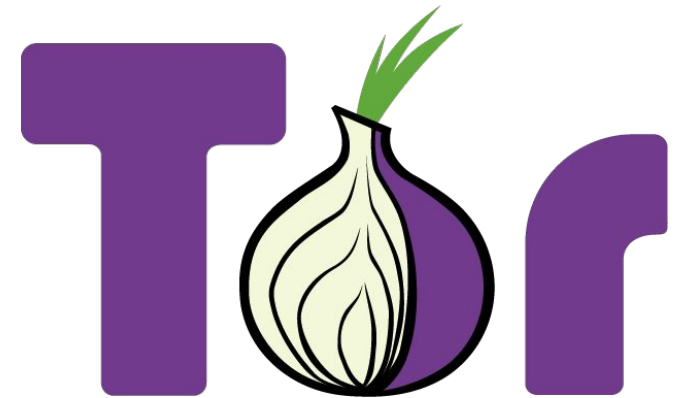
What is Tor?

- Free and Open Source Software
- Network of servers run by volunteers
- Community of researchers, developers, users and relay operators
- U.S. 501(c)(3) non-profit organization



Tor: Open Source Software

- Free and Open Source Software
- Developed and discussed in the open (irc, mailing lists, trac)
- 3-clause BSD license
- Designed with privacy by design



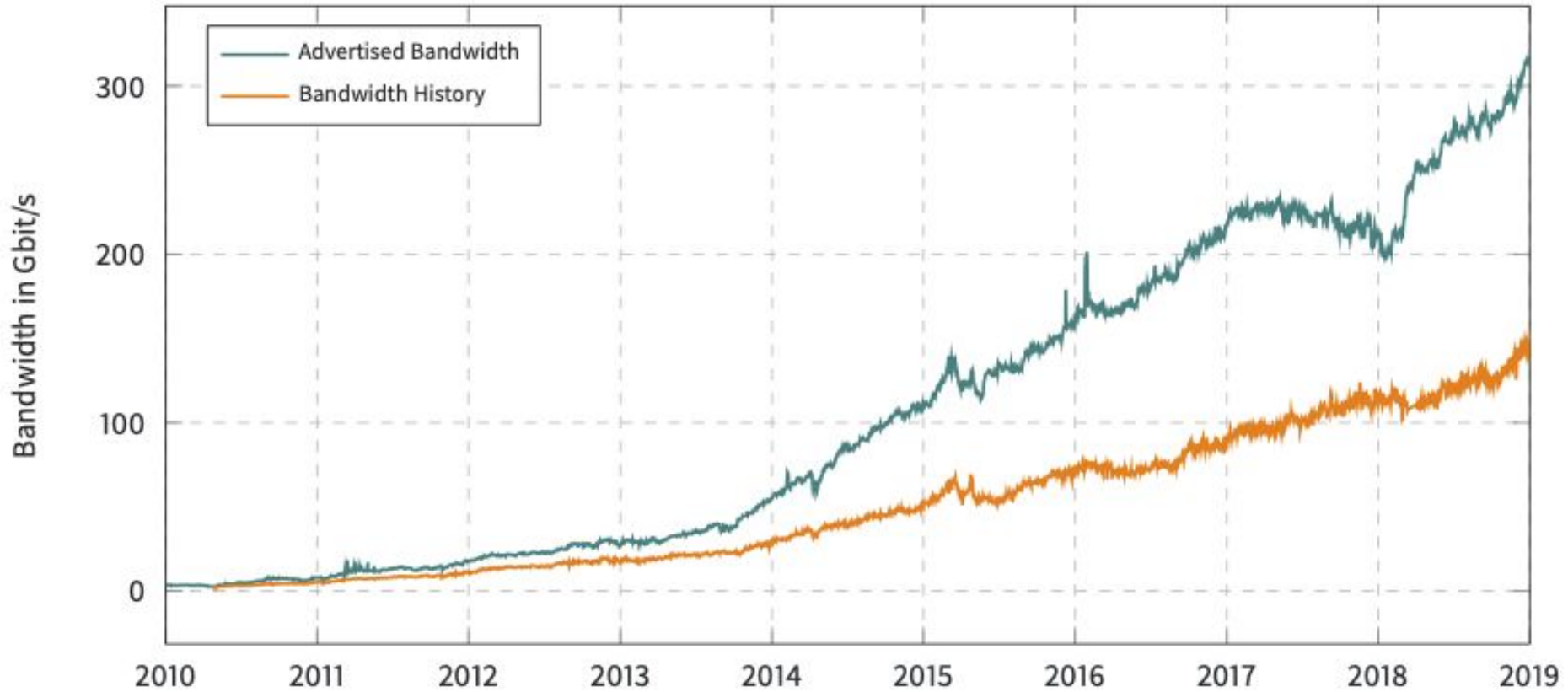
Tor: Network

- An open network
- Around 6,500 volunteer nodes
- Hosted by various individuals, companies, and non-profit organisations.
- Between 2M and 8M daily users



Tor: Network

Total Relay Bandwidth



Source: metrics.torproject.org

Tor: Network

Number of Relays



Source: metrics.torproject.org

Tor: Network

- Traffic is bounced between relays
- First node knows who is using the Tor network
- Middle node does not know who is connected to the network or where is connecting with
- Last node knows “someone” is visiting a particular website

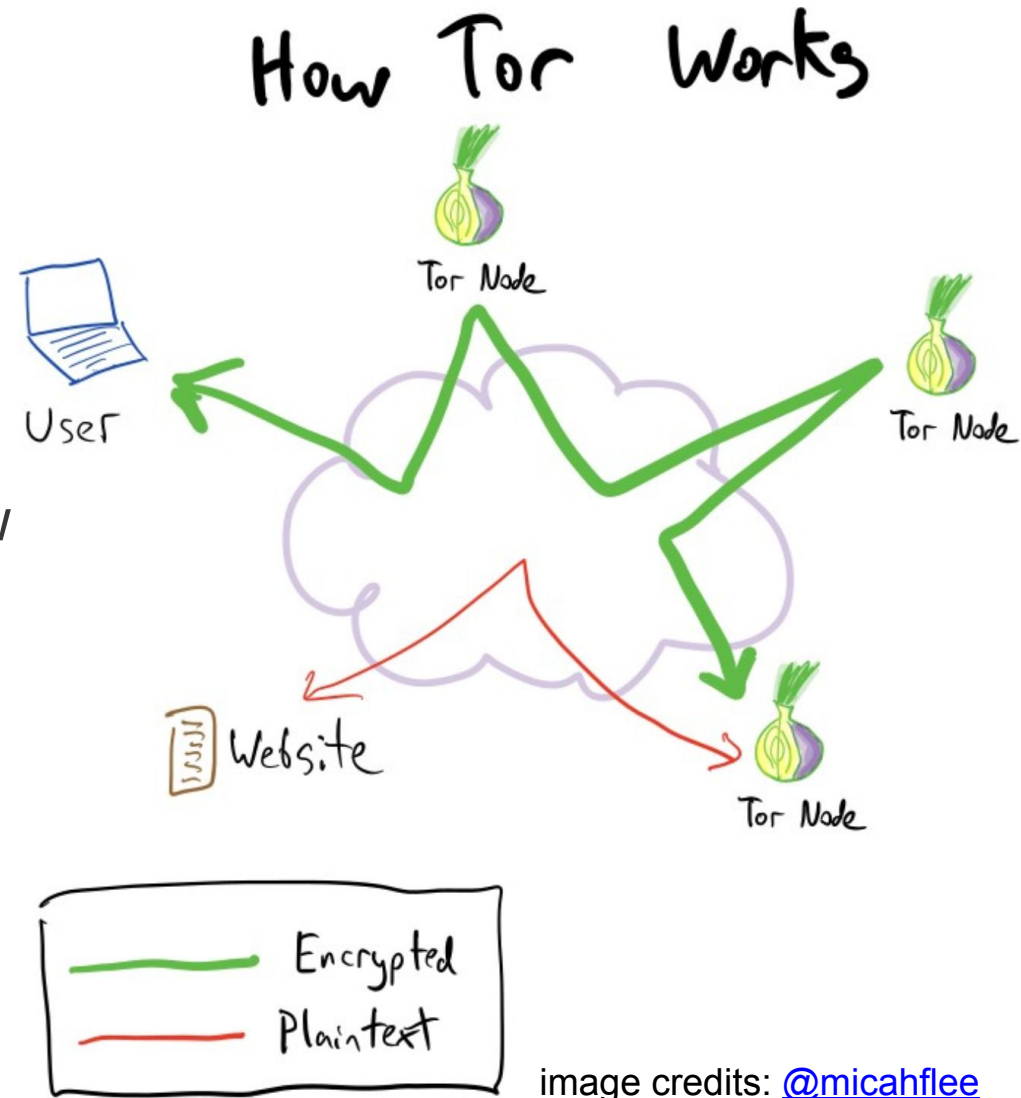
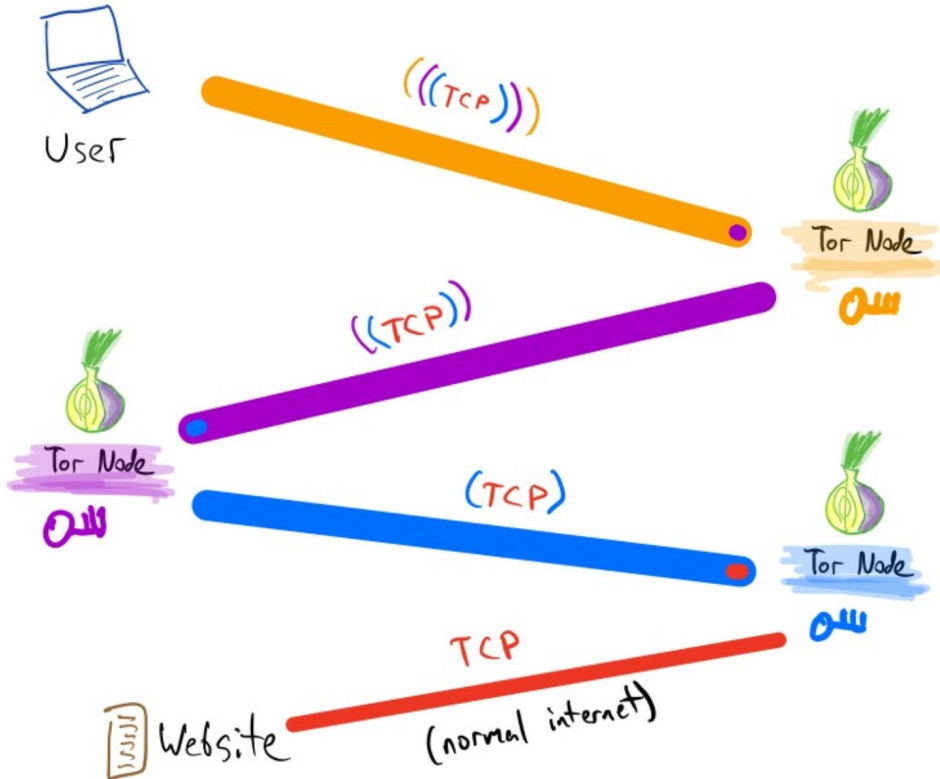


image credits: [@micahflee](#)

Tor: Network

Layers of Encryption



- All traffic is encrypted end to end within the Tor network
- Traffic is encrypted 3 times with each relay's public key
- Each relay “peels off” one layer of encryption with its private key

image credits: [@micahflee](#)

Tor: Community

- Activists & Journalists
- Digital Security Trainers
- Software Developers
- Relay Operators
- Researchers
- Translators
- Users



community.torproject.org

Tor Project, Inc



- US Non-Profit
- International and distributed team
- Dedicated to Privacy online
- Advocating for private access to the uncensored web
- www.torproject.org

Our mission:

To advance human rights and freedoms by creating and deploying free and open source anonymity and privacy technologies, supporting their unrestricted availability and use, and furthering their scientific and popular understanding.

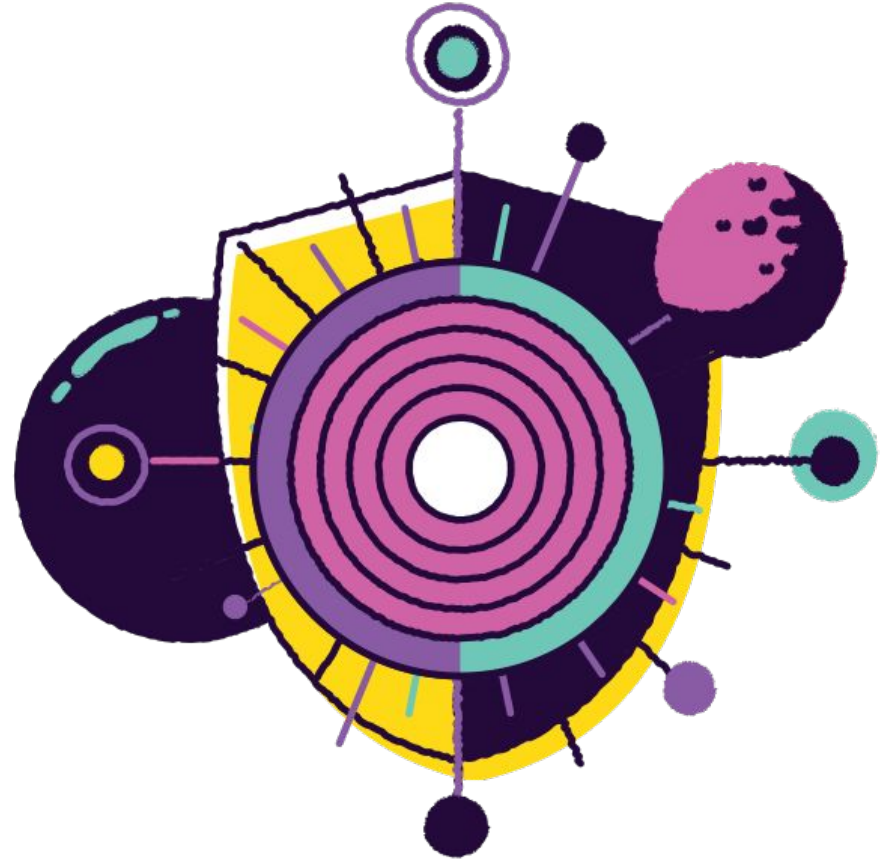


**State of the Onion:
What we've been up to in
2019... and what's coming in
2020**

Network Team

Network Team: 2019 Highlights

- Modularization and refactoring of little-t tor
- Onion Service Improvements
- Deployed defenses against Website Fingerprinting in Tor
- Move forward on implementation of PrivCount



ROADMAP 2020: Network Team

- **Goal: Scaling the Tor Network**
- Deploy smarter load balancing, bootstrapping and circuit building mechanisms
- Improving the Tor network's IPv6 support
- Get sbws ready for deployment
- Improve ability for bridgedb/authority to test bridges that only expose a pluggable transport.
- Implement Walking Onions proposal for scaling the network and saving bandwidth

Applications Team

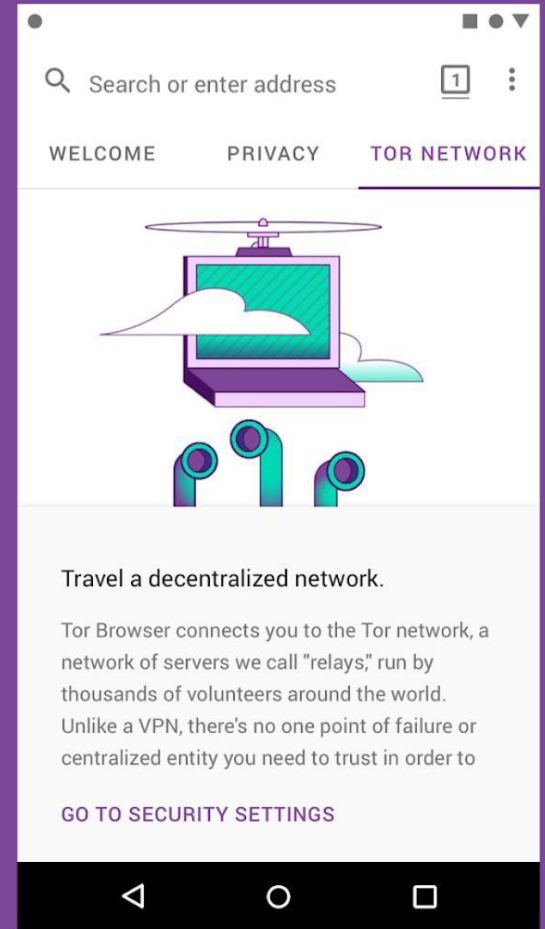
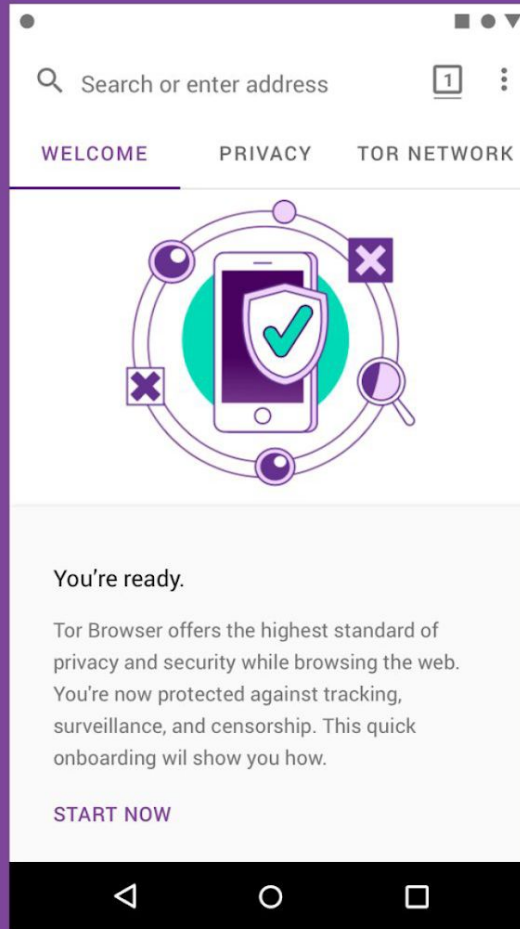
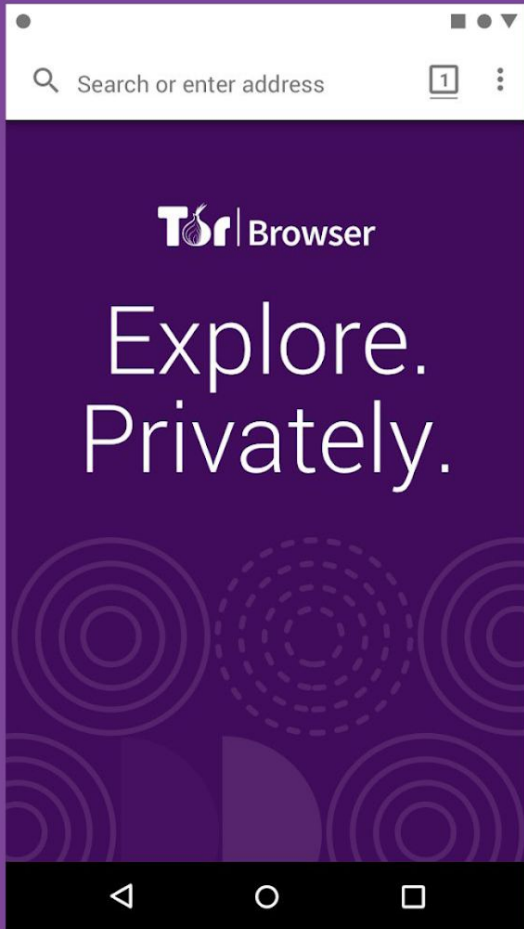


Applications Team: 2019 Highlights



- Tor Browser on Android Stable
- New Visual Identity
- Integrated Tor Button functionality
 - New Identity
 - Network Settings
- Improved User Experience
 - Security Settings Improvements

Tor Browser 8.5

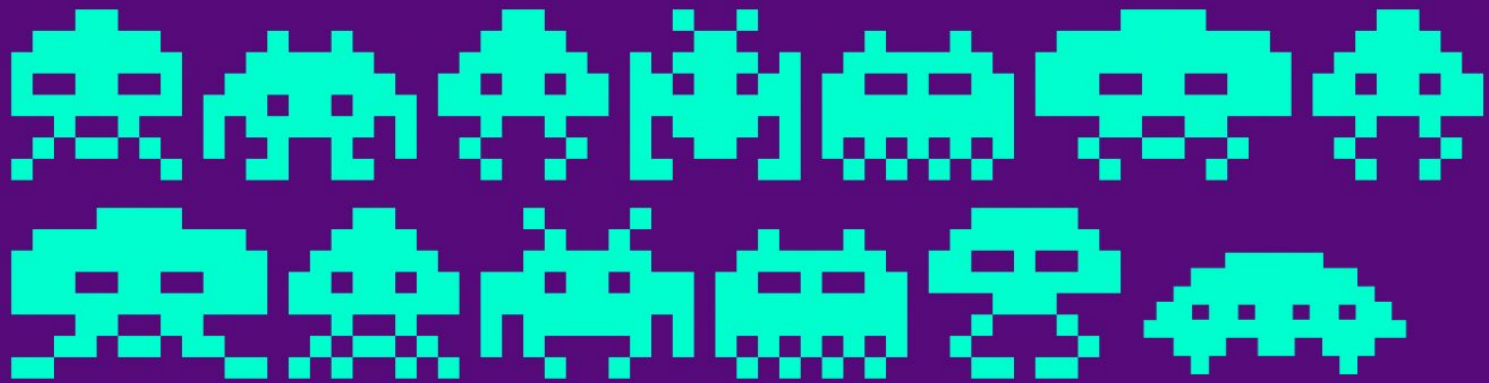


2020 ROADMAP: Applications Team

Goal: Mainstream Adoption

- Automatic nightly updates
- Switching from ESR to rapid release cycles
- Migration to Firefox Fenix
- Onion Services Usability Improvements
- Improved Censorship Circumvention

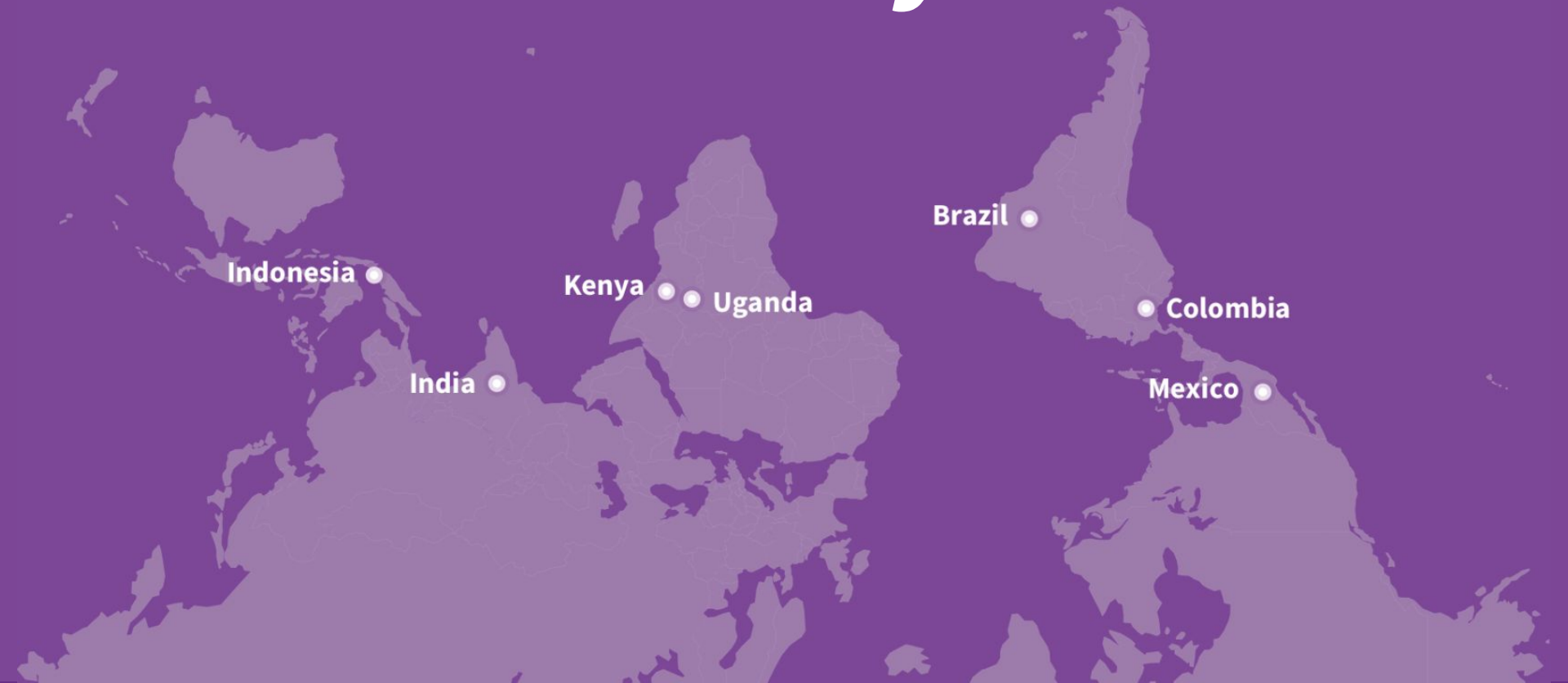
Network Health Team



ROADMAP 2020: Network Health Team

- ***New* Team formed!**
- **Goal: Keep the Tor Network healthy**
- Track community standards about what makes a good relay
- Anomaly analysis / network health
- Relay advocacy
- Collection of accurate usage/growth stats
- Maintain the components of the network
- Tune the Tor network to improve user-facing performance
- Evaluate and implement research proposals on congestion control, load balancing or scalability.
- Improve our ability to proactively detect, diagnose and resolve user-facing performance issues.

Community Team



Community Team: 2019 Highlights



- Tor Trainings in Global South:
 - Over 1000 people trained
 - 68 events
 - 23 cities
 - 7 countries
 - 3 continents
- New website and portals
- #DocsHackathon

2020 ROADMAP: Community Team

Goal: Reaching Users Where they Are

Goal: Mainstream Adoption

- Partnering with organisations to run digital security trainings
- Testing our products with users on the ground
- Events
 - Internet Freedom Festival, Valencia, Spain
 - Cryptorave, São Paulo, Brazil
 - RightsCon, San Jose, Costa Rica
 - DEF CON, Las Vegas, US
 - And more...

Anti-Censorship Team

Anti-Censorship Team: 2019 Highlights

- ***New* Team formed!**
- Censorship Detection and Circumvention
- Got ownership of BridgeDB
- Got ownership of GetTor
- Pluggable Transports
 - Deployed Snowflake
 - Obfs4



2020 ROADMAP: Anti-Censorship Team

- **Goal: Empower communities to bypass censorship**
- GetTor must be reliable and must work for people in all censored regions.
- Snowflake must be reliable and work on all platforms.
- To keep close relationship with bridge operators and get new bridges running.
- To have more comprehensive BridgeDB metrics.
- Improve BridgeDB's broken CAPTCHA system.
- Research and implement technology to combat bridge enumeration attacks
- Monitor all critical components of the team's infrastructure.

UX Team



UX Team: 2019 Highlights

- User research and feedback collection in the Global South
- Tor User Personas
- User Research Portal
- New Tor Browser icon
- New website and portals





Personal pronouns

 She/her

Role

 Women's rights activist

Location

 Bogotá, Colombia

Languages

 Spanish & English


Fernanda

The feminist activist



Fernanda runs a women's collective focused on reproductive rights in Colombia, where abortion is illegal except in extreme circumstances. Fernanda and her colleagues want to build a website with information about abortion access, birth control, and other resources for people seeking reproductive information. However if this website were linked back to them they may be arrested – or worse.

Fernanda has heard that a Tor onion service will not only protect them from being discovered on the server, but will help protect visitors to their website too by requiring that they use the Tor Browser. In fact, Fernanda plans on using Tor Browser for all her web browsing, just to be on the safe side.

Motivation

-  Fernanda wants to be able to access and publish outreach material on proscribed topics without fear of surveillance and arrest.

PAIN POINTS

-  Setting up an onion service is an intimidating task, and looks complex.
-  Fernanda is at risk of arrest if her online activism is discovered.

Risk level

   MODERATE

Trust level

   MODERATE

Technical proficiency

   ADVANCED

Income

   MODERATE

Bandwidth

     AVERAGE

Censorship

 Tor unrestricted

Devices

 PC & Android

2020 ROADMAP: UX Team

- **Goal: Mainstream Adoption**
- Feature Parity for Tor Browser for Android
- Onion Services Improvements in Tor Browser
- Improve Tor Browser availability and connectivity for censored users
- Release new developer portal

Metrics Team

Metrics Team: 2019 Highlights

- Started performing analysis on OnionPerf measurements with special focus on slow runs, timeouts, failures
- Drafted guidelines for adding data to Tor metrics
- Took ownership of OnionPerf
- Improve metrics data website
- Added metrics related to snowflake proxies and bridgeDB requests to CollecTor

ROADMAP 2020: Metrics Team

- **Goal: Scaling the Tor Network**
- Improve metrics related to IPv6 relays
- Improve metrics related to BridgeDB and distribution methods
- Rewrite Exit Scanner to support IPv6 and new exit list format.
- Make operational improvements to existing OnionPerf deployments and make it easier to deploy new OnionPerf instances;
- Expand the kinds of measurements OnionPerf can take by making improvements to its codebase;
- Make improvements to the way we analyze performance metrics.

Get Involved

- Run a Tor relay or a bridge
- Teach others about Tor and privacy
- Find and maybe fix bugs in Tor
- Help with translations
- Get involved in development
 - Sunday 13:30 - “An introduction to the core ecosystem for developers”
- Donate at donate.torproject.org



Contact Us

- Send us a mail: <https://www.torproject.org/contact/>
- Chat with us: #tor or #tor-project or #tor-dev in irc.oftc.net
- Interact with us on twitter or [mastodon](https://twitter.com/torproject/):
<https://twitter.com/torproject/>
- Join our discussions:
<https://lists.torproject.org/cgi-bin/mailman/listinfo>

Questions?

gaba@torproject.org
pili@torproject.org

