

Tor: Internet privacy in the age of big surveillance

Roger Dingledine, The Tor Project



Program - Australian Cyber Conference 2024 - Canberra — Tor Browser

Ola Bini declared innocent: " ×

Program - Australian Cyber ×

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https://canberra2024.cyberconference.com.au/program

Nitesh Patel & Benjamin Di Marco

Kyle Waters

Ryan Sherstobitoff

government to continue leading the...

Julie Gleeson & Michael Puckridge

Ken Fitzpatrick & Deepayan Chandra

Think Tank 1

Unlocking the mystery of zeroknowledge proofs to ensure the security of eGovernment

Sameer Ali

Think Tank 2

Think Tank 3

15:20 - 15:50

Afternoon tea break

15:50 - 17:00

Keynote TBC with Roger Dingledine

Royal Theatre

2



Sorry, you have been blocked

You are unable to access asidevops.com



Tor Overview

Online anonymity: open source, open network

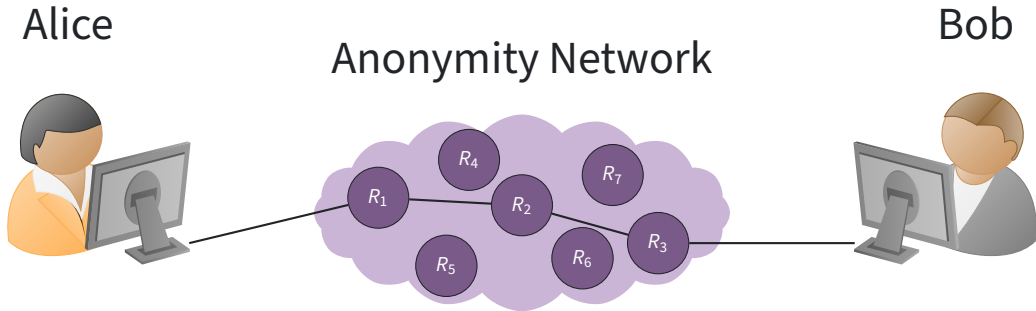
Community of devs, researchers, users, relay operators

US 501(c)(3) non-profit organization with 50ish staff

Estimated 2,000,000 to 8,000,000 daily users

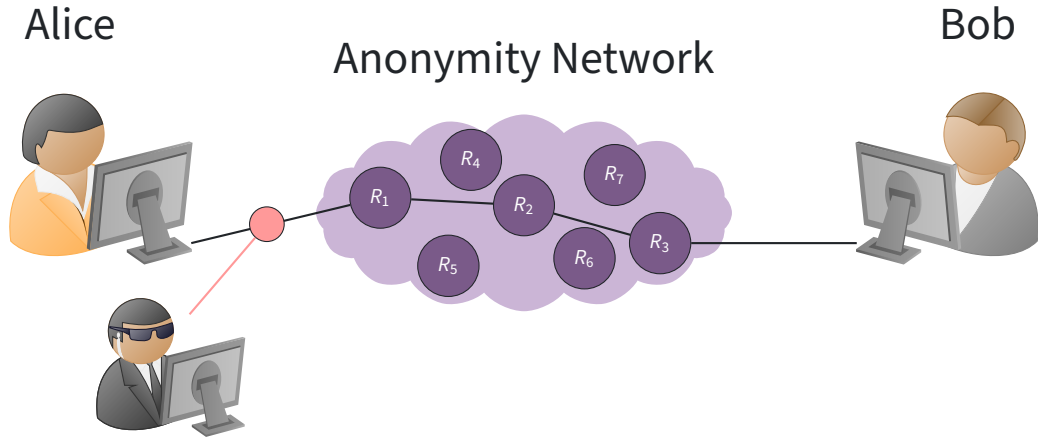
Part of larger ecosystems: internet freedom, free software, censorship resistance, anonymity research

Threat Model

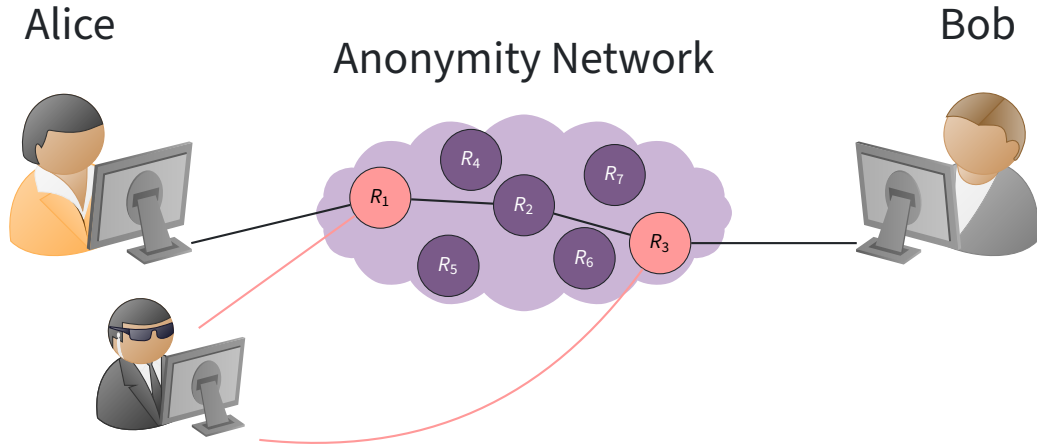


{What can the attacker do?}

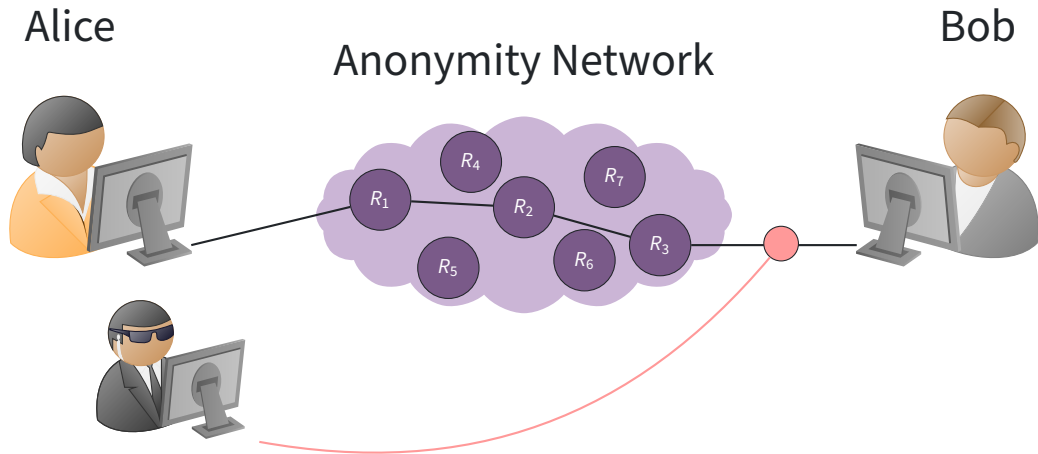
Threat Model



Threat Model



Threat Model

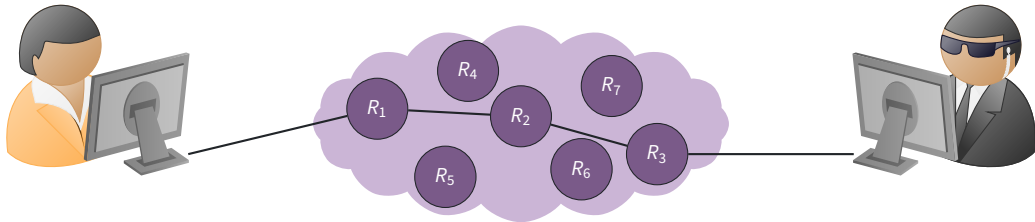


Threat Model

Alice

Anonymity Network

Bob



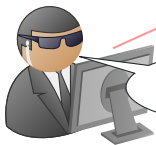
Anonymity isn't Encryption

Alice

Bob



...RG9uJ3QgdXNlIGJhc2U2NCBmb3IgZW5jcnlwdGlvbi4...



Gibberish!

Encryption just protects contents.

Communications Metadata



"We Kill People Based on Metadata."

—Michael Hayden, former director, NSA.

Attorney General Bill Barr Will Ask Zuckerberg To Halt Plans For End-To-End Encryption Across Facebook's Apps - Tor Browser

Attorney General Bill Barr W X +

https://www.buzzfeednews.com/article/ryanmac/bill-barr-facebook-letter-halt-encryption 110%

TECH

Attorney General Bill Barr Will Ask Zuckerberg To Halt Plans For End-To-End Encryption Across Facebook's Apps

"We are writing to request that Facebook does not proceed with its plan to implement end-to-end encryption across its messaging services without ensuring that there is no reduction to user safety."

 **Ryan Mac**
BuzzFeed News Reporter

 **Joseph Bernstein**
BuzzFeed News Reporter

Last updated on October 3, 2019, at 3:28 p.m. ET
Posted on October 3, 2019, at 1:36 p.m. ET

Twitter Tweet Facebook Share Copy Copy

UK urges Meta not to roll out end-to-end encryption on Messenger and Instagram | Reuters — Tor Browser

Ola Bini declared innocent: " X UK urges Meta not to roll out X +

https://www.reuters.com/technology/uk-urges-meta-not-roll-out-end-to-end-encryption-messenger-instagram-2023-09-19/

Exclusive news, data and analytics for financial market professionals **LSEG**

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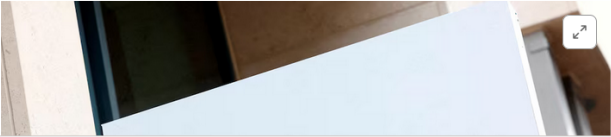
Disrupted

UK urges Meta not to roll out end-to-end encryption on Messenger and Instagram

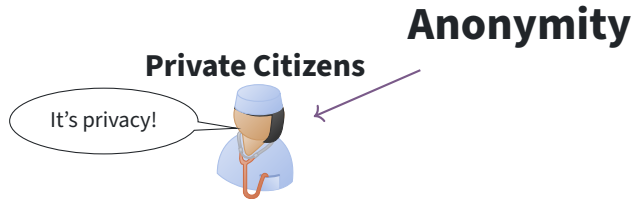
By Paul Sandle

September 19, 2023 11:09 PM UTC · Updated 6 months ago

Feedback



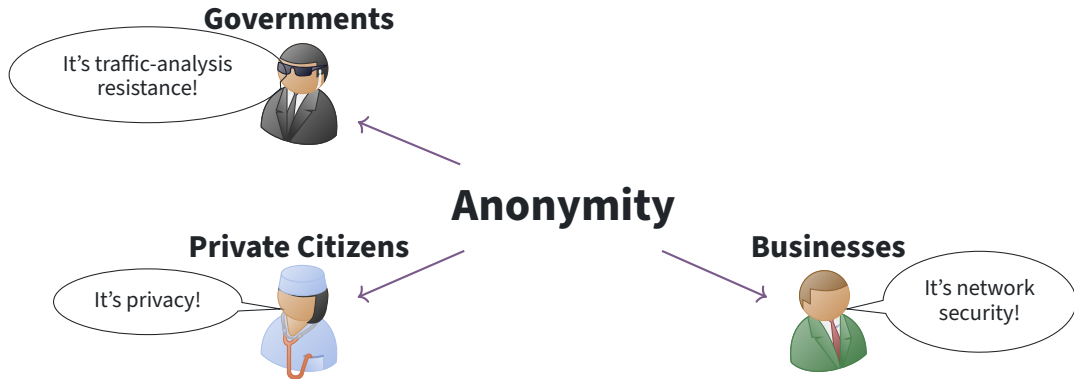
Anonymity is different for each use case



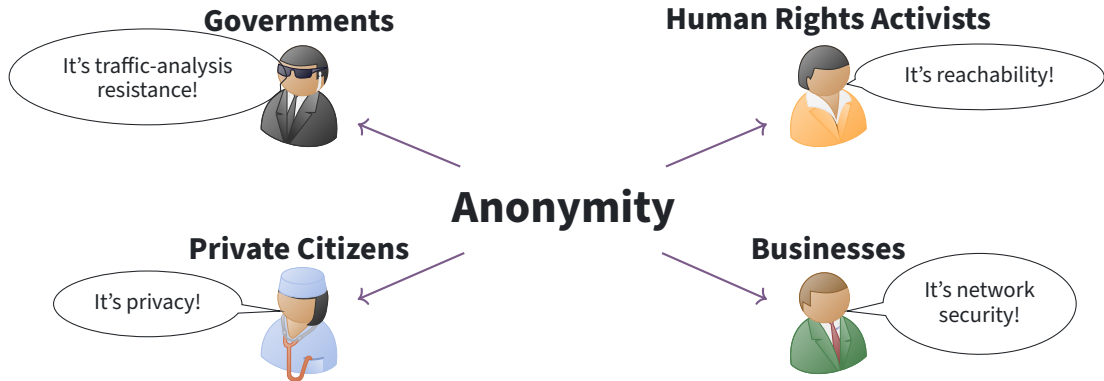
Anonymity is different for each use case



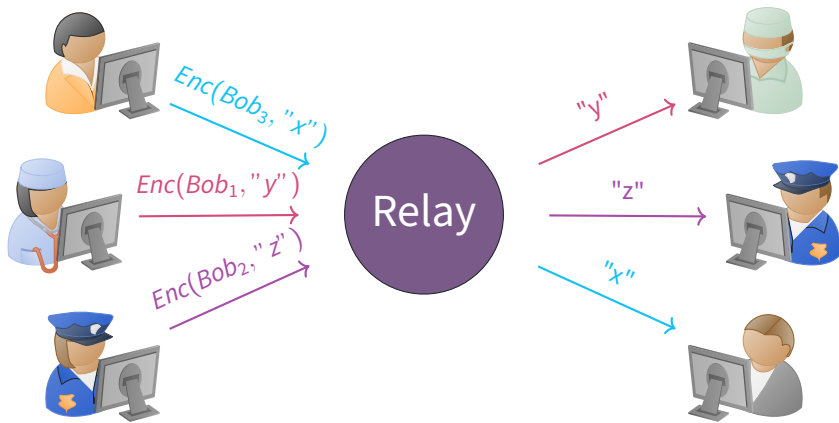
Anonymity is different for each use case



Anonymity is different for each use case

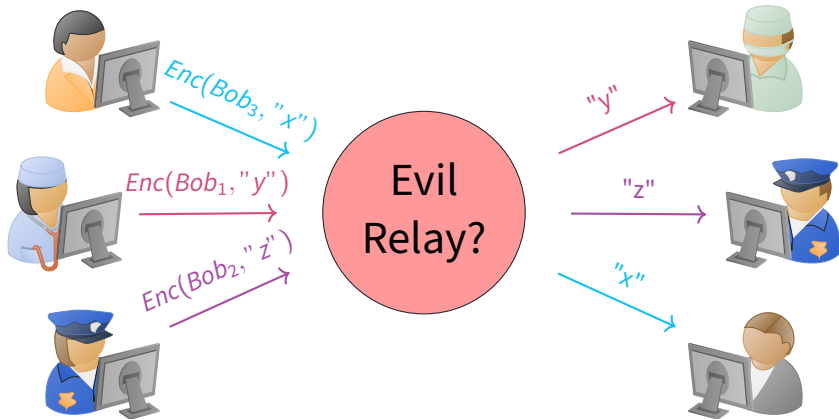


A Simple Design

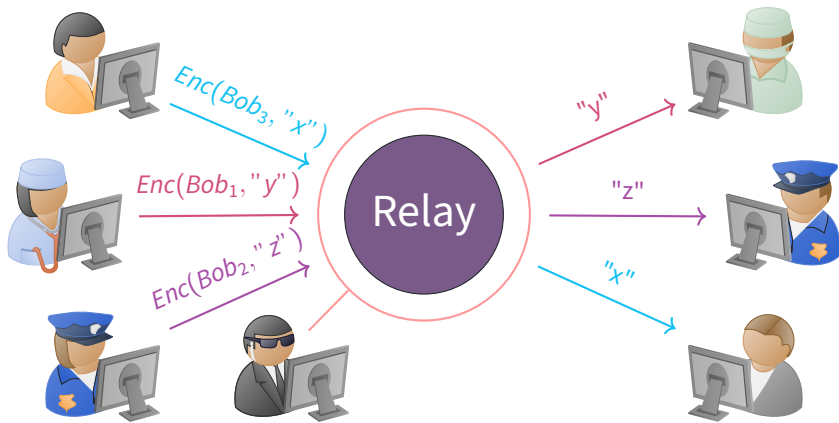


Equivalent to most commercial proxy/VPN providers.

A Simple Design

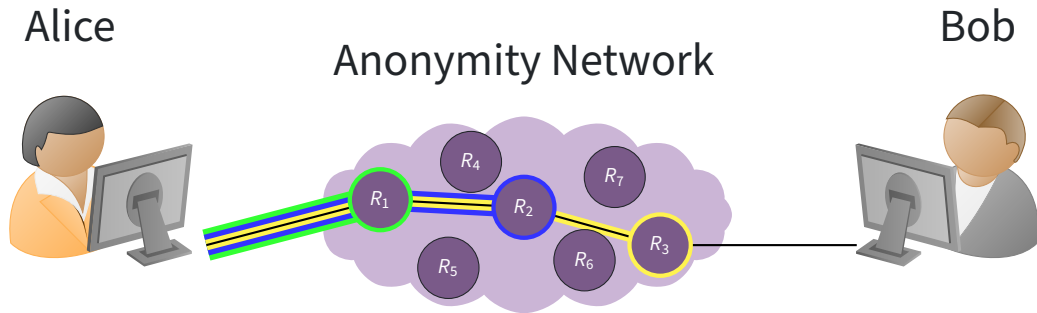


A Simple Design



Timing analysis lets an observer match up connections.

The Tor Design



Multiple relays so no single relay can link Alice to Bob.

I'm a political activist, part of a semi-criminalized minority.

In my younger years I entered the public debate openly, and as a result got harassed by government agencies. I later tried to obfuscate my identity, but I found that my government has surprisingly broad powers to track down dissidents.

Only by using anonymizing means, among which Tor is key, can I get my message out without having police come to "check my papers" in the middle of the night. **Tor allows me freedom to publish my message to the world without being personally persecuted for it.**

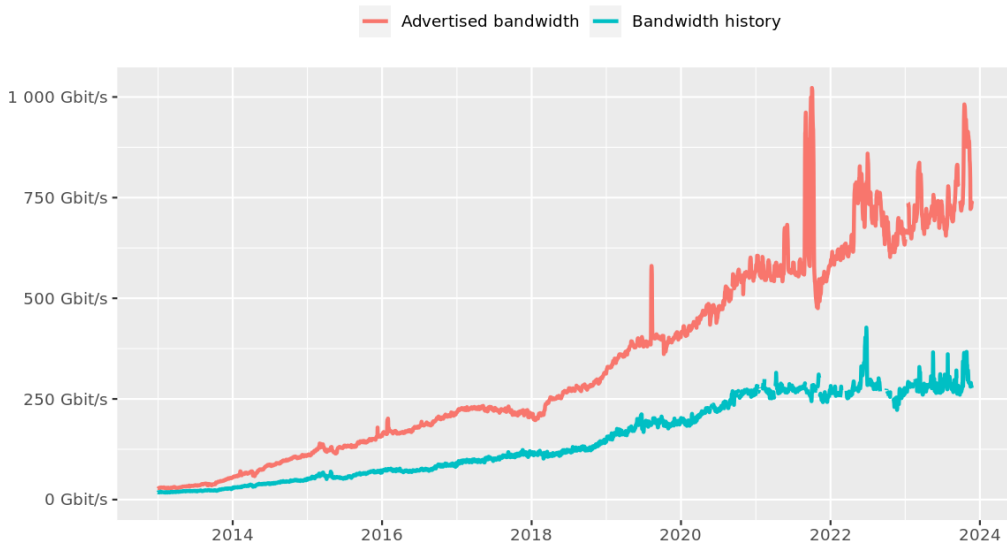
—Anonymous Tor User

I'm a doctor in a very political town. I have patients who work on legislation that can mean billions of dollars to major telecom, social media, and search concerns.

When I have to do research on diseases and treatment or look into aspects of my patients' histories, I am well aware that my search histories might be correlated to patient visits and leak information about their health, families, and personal lives. **I use Tor to do much of my research when I think there is a risk of correlating it to patient visits.**

—Anonymous Tor User

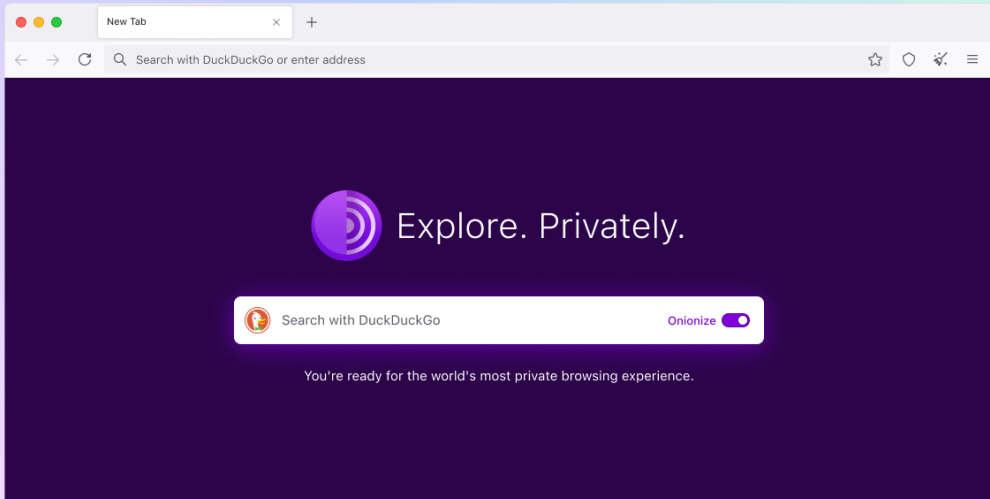
Total relay bandwidth

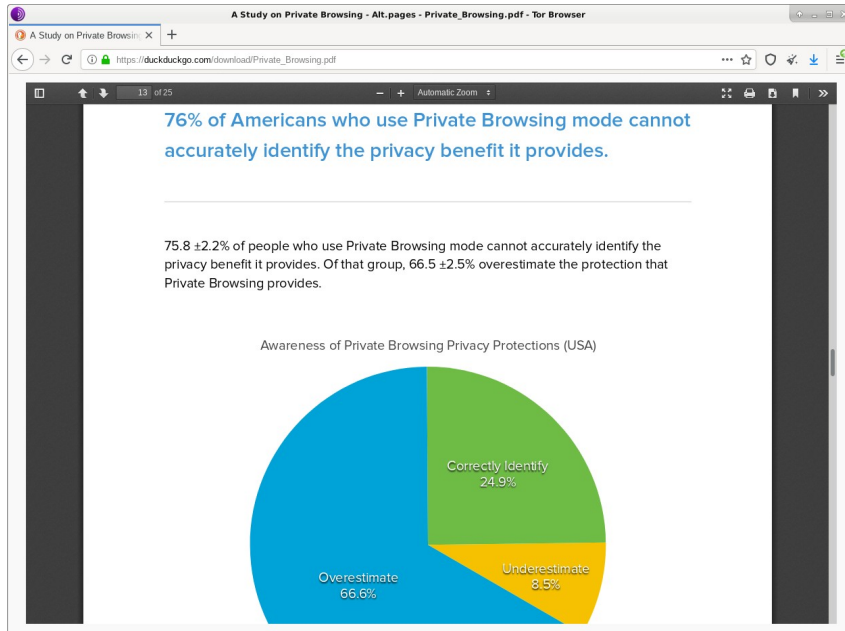


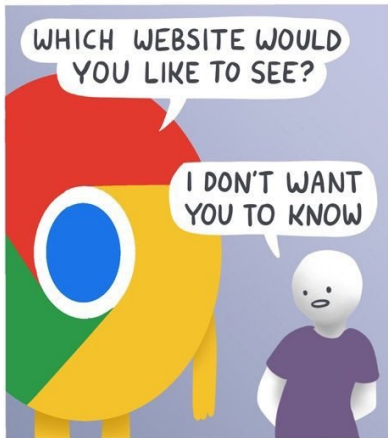
Tor's **safety** comes from **diversity**

1. Diversity of relays. The more relays we have and the more diverse they are, the fewer attackers are in a position to do traffic confirmation. Research problem: How do we measure diversity over time?
2. Diversity of users and reasons to use it. 50000 users in Iran means almost all of them are normal citizens.

Tor Browser







@SKELETON_CLAW



SKELETONCLAW.COM

Transparency for Tor is key

- Open source / free software
- Public design documents and specifications
- Publicly identified developers

Transparency for Tor is key

- Open source / free software
- Public design documents and specifications
- Publicly identified developers
- Not a contradiction: privacy is about choice!

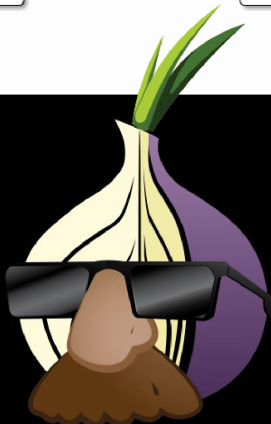
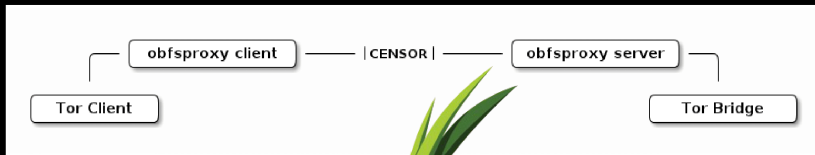


Technology is not neutral

Power imbalances are central to Tor: it's more useful to vulnerable people than those who already have power.

Technology is inherently political!

Pluggable transports



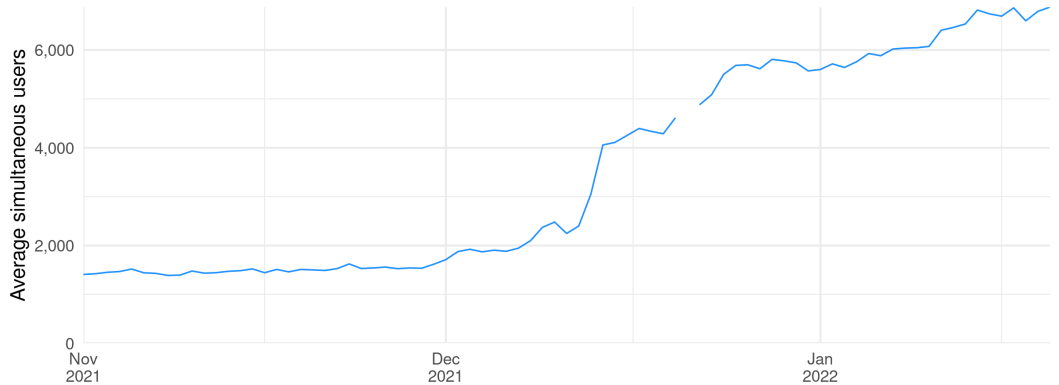
Snowflake pluggable transport

Snowflake makes your traffic look like a WebRTC (zoom, jitsi, skype, signal, etc) call, and those are allowed in many parts of the world.

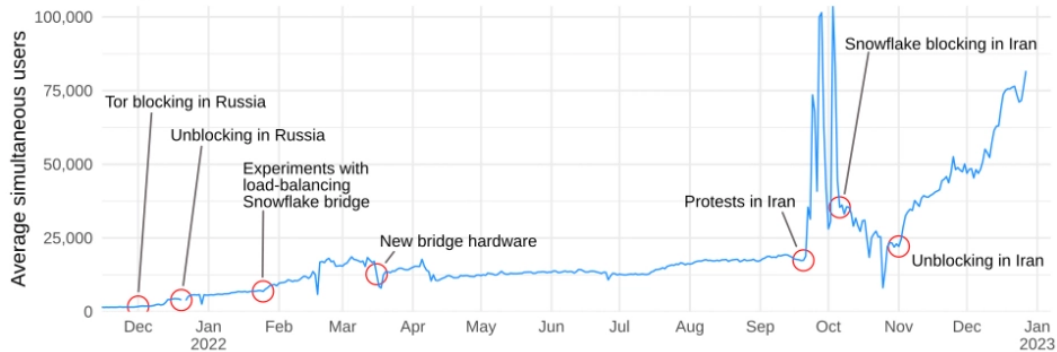
People can volunteer as Snowflake proxies simply by installing an extension in their browser.

The resulting volume and variety of volunteers gives us more options on how to distribute them to users.

Daily snowflake users



Daily Snowflake users in 2022



Arms races

Censorship arms race is bad

Surveillance arms race is worse

...and centralization of the internet makes it worse still





Censorship implies surveillance

Recurring theme where western companies build the oppression tools

Censorship becoming more widespread in the west
(e.g. RT.com in europe)

over-there-istan

Tunisia: A chance to get things right? · Global Voices Advox — Tor Browser

Ola Bini declared innocent: " x Tunisia: A chance to get thin x +

← → ↻   https://advox.globalvoices.org/2011/10/20/tunisia-internet-elections/# 140% ☆ 🔍 ☰

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Tunisia: A chance to get things right?



Written by
Rebecca MacKinnon

Posted 20 October 2011 17:27 GMT



This coming Sunday (October 23rd, 2011), Tunisia will **hold elections** for the constituent assembly that will be tasked with re-writing the country's constitution. While this election is **only the first step** in a long and winding path that may or may not succeed in establishing a vibrant Arab democracy in North Africa, **reports are quoting** election observers and human rights groups who are optimistic that people are serious about the process of holding a real election.

Censorship is a major topic in the Tunisian political discourse. There have recently been **protests by conservatives** demanding censorship of all media including TV, film, and Internet and



Russia-Ukraine War >

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Ukraine's War Dead

Maps

Photos

Documenting Atrocities

Russia, Blocked From the Global Internet, Plunges Into Digital Isolation

Russian authorities and multinational companies have erected a digital barricade between the country and the West, erasing the last remnants of independent information online.





Our Issues

Perspectives

Policy Recommendations

Explore the Map

Donate



FREEDOM ON THE NET 2023

Australia

FREE

76
/100

A. Obstacles to Access

23 /25

B. Limits on Content

28 /35

C. Violations of User Rights

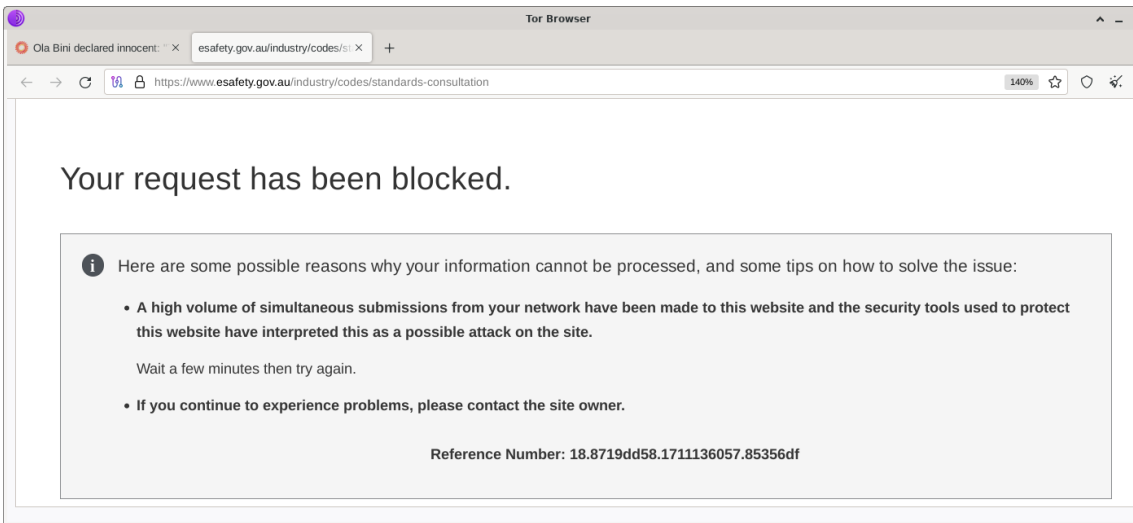
25 /40

LAST YEAR'S SCORE & STATUS

76 /100 ● Free

Scores are based on a scale of 0 (least free) to 100 (most free). See the





engadget

Sections ▾

Login



Authorities reportedly ordered Google to reveal the identities of some YouTube videos' viewers

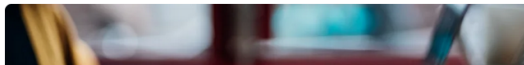
You apparently don't have to do anything illegal for law enforcement to ask for your Google data.



Mariella Moon

Contributing Reporter

Sat, Mar 23, 2024, 8:00 AM MDT · 2 min read



MORNING
NEWS AND

the yodel

Analysis

Facebook gave police their private data. Now, this duo face abortion charges

Johana Bhuiyan

Experts say it underscores the importance of encryption and minimizing the amount of user data tech companies can store

Wed 10 Aug 2022 12.00
CEST

Share

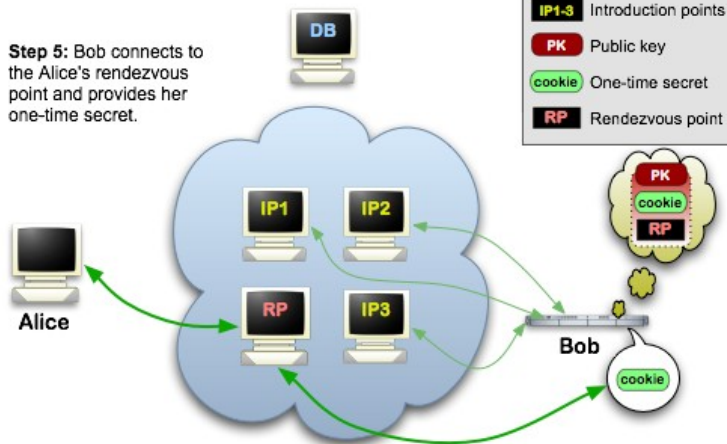


Court documents revealed how tech companies contribute to criminal prosecution of abortions.

Photograph: Olivier Douliery/AEP/Getty Images

Tor Hidden Services: 5

Step 5: Bob connects to the Alice's rendezvous point and provides her one-time secret.



Onion service properties

- Self authenticated
- End-to-end encrypted
- Built-in NAT punching
- Limit surface area
- No need to “exit” from Tor



CAMADAS DA INTERNET

**SUPERFICIE DA WEB
DEEP WEB
DARKWEB**



RANI PASSOS
INFORMÁTICA PARA CONCURSOS



1 Million People use Facebook over Tor



FACEBOOK OVER TOR · FRIDAY, APRIL 22, 2016

People who choose to communicate over Tor do so for a variety of reasons related to privacy, security and safety. As we've [written previously](#) it's important to us to provide methods for people to use our services securely – particularly if they lack reliable methods to do so.

BBC Blogs - Technology & Creativity Blog - Leveraging the Tor Network to circumvent blocking of BBC News content - Tor Browser

BBC Blogs - Technology & Creativity Blog

https://www.bbc.co.uk/blogs/internet/entries/936e460a-03b3-41db-be96-a6f2f27934e6

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Leveraging the Tor Network to circumvent blocking of BBC News content

Wednesday 30 October 2019, 8:18



Abdallah al-Salmi
Strategy Analyst, BBC News

Tagged with: [BBC News](#), [BBC World Service](#), [Media Distribution](#), [Public Service](#)

COMMENTS

The BBC World Service's news content [became available on the Tor Network last week](#) in a move that attracted wide media attention.

The decision to go ahead with setting this service up came at a time when BBC News is either blocked or restricted in several parts of the world.

For example, in Egypt, Iran and China, our audiences are finding it either impossible or difficult to access our content without the use of a circumvention tool, such as a VPN.

The Tor Network is an overlay network on the internet, which provides increased security and is resistant to blocking.

About this Blog



Staff from the BBC's online and technology teams talk about BBC Online, BBC iPlayer, BBC Red Button and the BBC's digital services. The blog is reactively moderated. Your host is Jonathan Murphy.

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Introducing the Cloudflare Onion Service

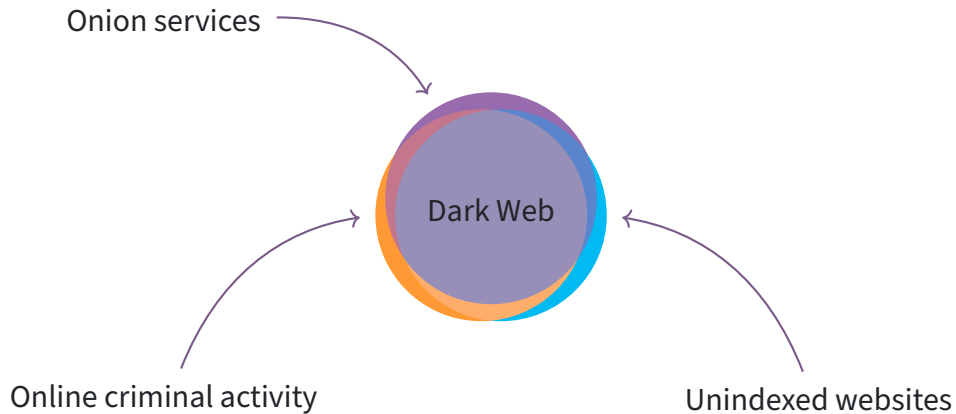
[Tweet](#)



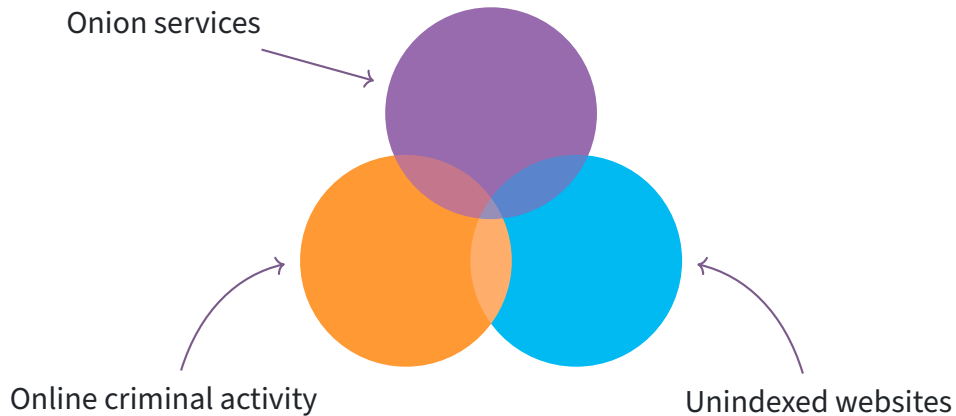
Mahrud Sayrafi

September 20, 2018 12:00PM

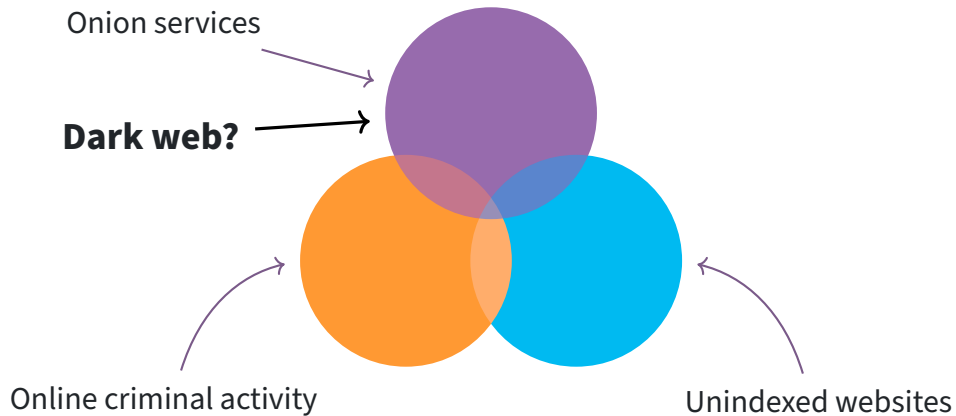




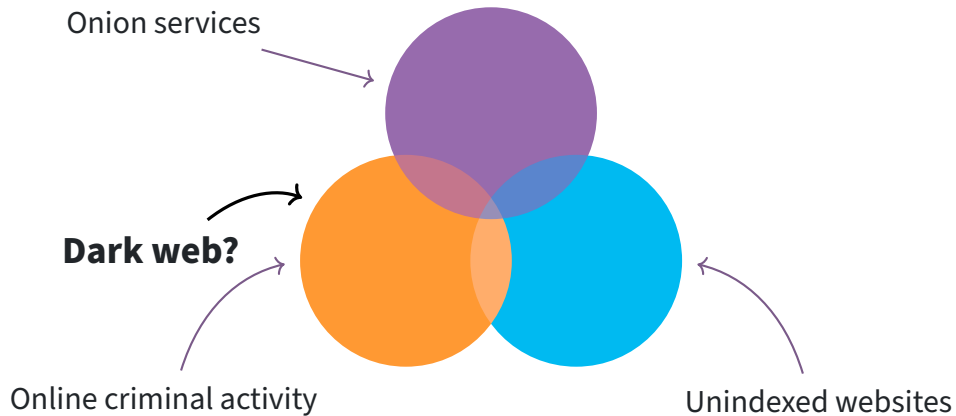
The "Dark Web" as popularly depicted



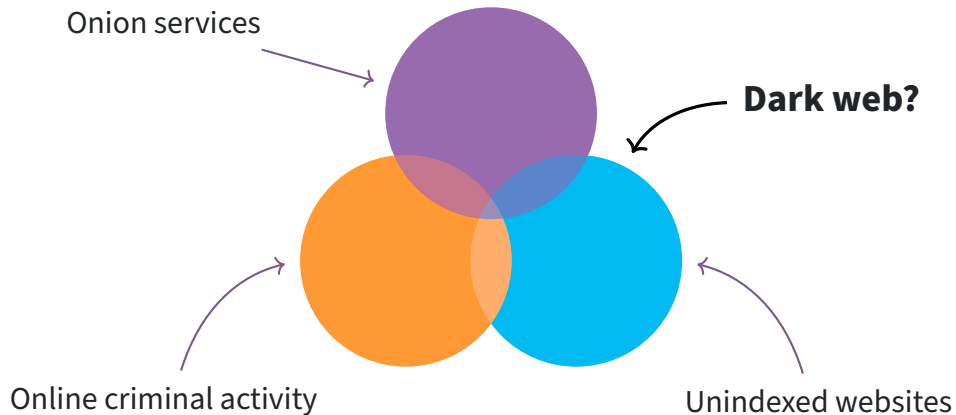
Closer to reality



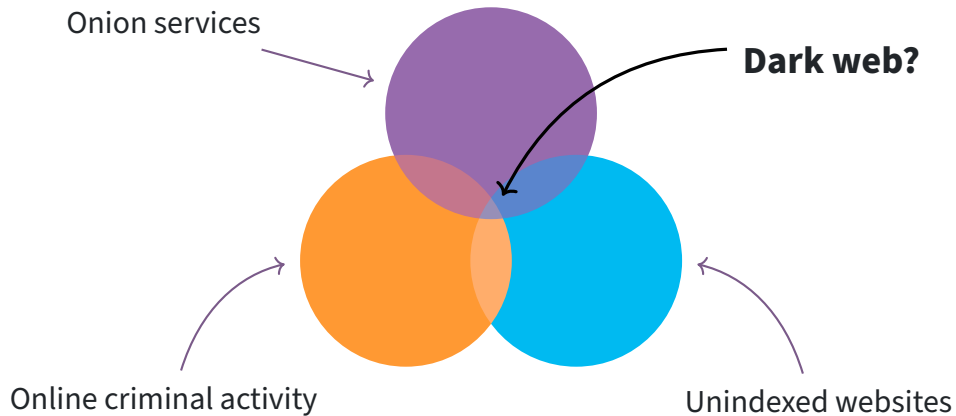
Closer to reality



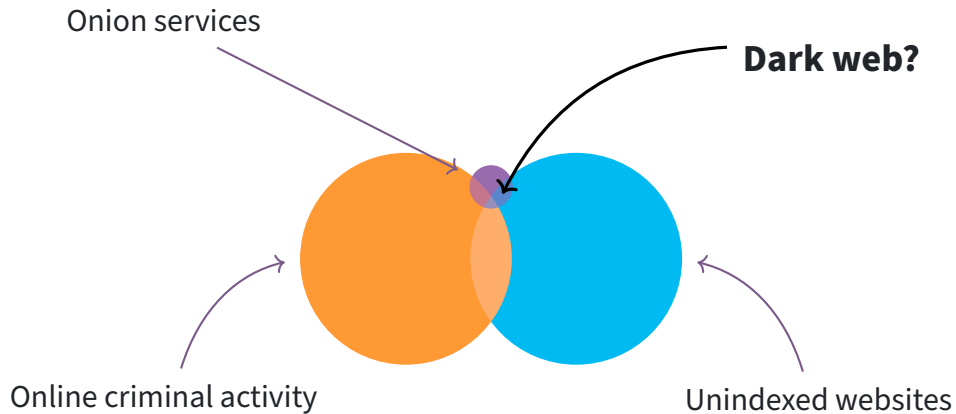
Closer to reality



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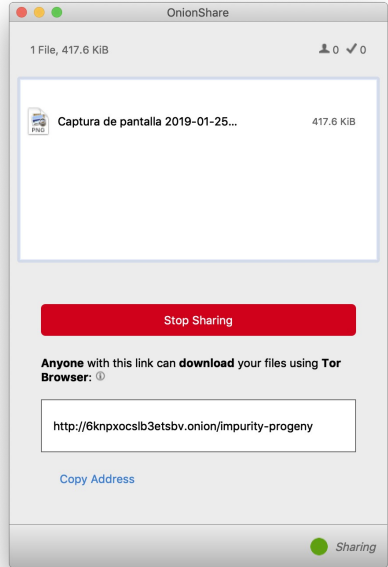
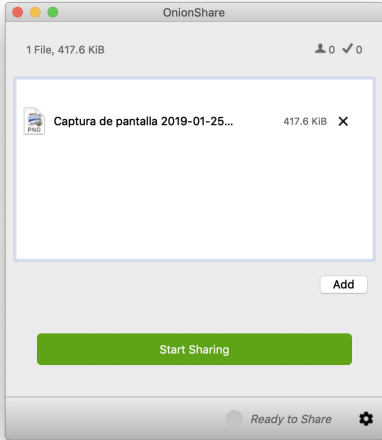


Closer to reality

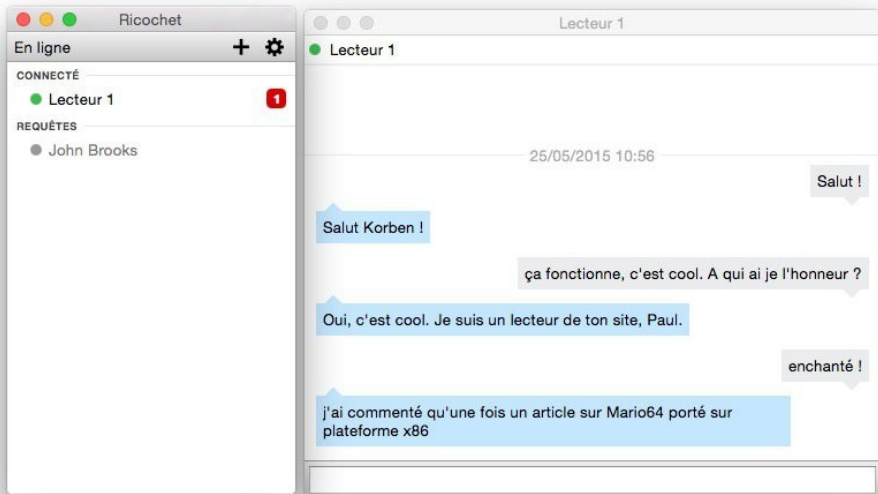


Scale also matters

OnionShare



Ricochet



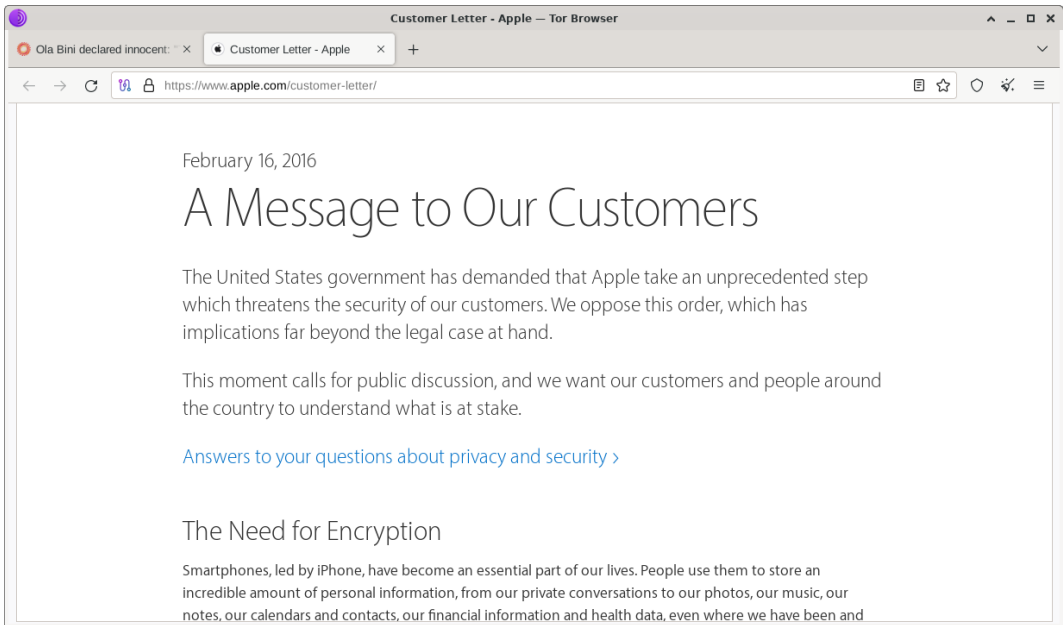
Tor isn't foolproof

- Opsec mistakes
- Browser metadata fingerprints
- Browser exploits
- Traffic analysis

The crypto wars

We should take as many lessons as we can from the https win.

If you hear that the NSA stores encrypted traffic for longer, what do you do?





I WANT TO RUN A RELAY

YOU'LL NEED TO DO THE FOLLOWING

1CHOOSE A RELAY**2**FIND ALLIES**3**GET A PRIZE**1**

CHOOSE YOUR RELAY



Calls to action

Understand the risks of centralized architectures

Recognize the conflict between your foreign policy goals and your domestic censorship hopes

Participate in privacy / censorship research, e.g.

<https://petsymposium.org/>

<https://foci.community/>

Volunteer as a relay, a bridge, or a snowflake!