Understanding, Growing, & Extending Online Anonymity

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Article 19

> *Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers.*

Article 20

> *Everyone has the right to freedom of peaceful assembly and association.*

George Orwell was an optimist

> *Who controls the past, controls the future: who controls the present controls the past*
>
> — George Orwell, Nineteen Eighty Four, 1949

The re-writing of history is now much more efficient than when George Orwell imagined armies of Winston Smiths cutting holes in newspaper archives.

Resisting Internet censorship

> *The Net interprets censorship as damage and routes around it.*

— John Gilmore, 1993

No longer true on a technical level: censorship is in the routers.

Remains true on a social level: when material is censored, people distribute copies and draw attention to them

But what if people are too afraid to do this?

Internet surveillance is pervasive

- Conventional surveillance methods had to be targeted
- Internet censorship is capable of monitoring everyone, all of the time
- Governments are increasing monitoring: SORM (Russia), Golden Shield (China), Data Retention Directive (EU), and Interception Modernisation Programme (UK)
- 1 in 7 East German citizens worked for the Stasi. Today we can achieve the same results with a fraction of the cost

Traffic data surveillance

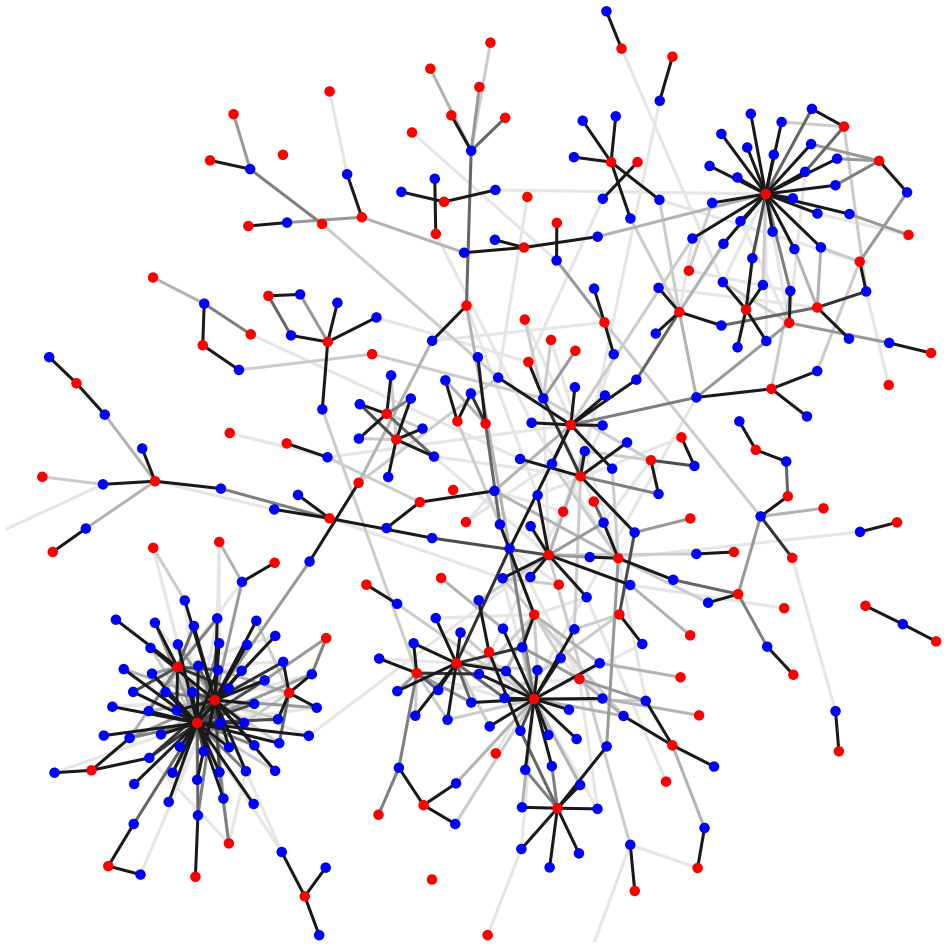
- Traffic data (who talks to whom, how often and for how long) is the core of intelligence capabilities
- This information is cheaper to record and store, compared to full content
- Because it can be easily processed by computer, data mining techniques can be used to understand social structures

> *No government of any colour is to be trusted with such a roadmap to our souls*

— Sir Ken Macdonald, former director of public prosecutions, on the UK Interception Modernisation Program

Importantly, information on social networks can be derived

- Communities
- People



From "The Economics of Mass Surveillance" by George Danezis and Bettina Wittneben

Anonymity isn't cryptography

- Cryptography protects the contents in transit
- You still know who is talking to whom, how often, and how much data is sent.

Anonymity isn't steganography

Attacker can tell Alice is talking to someone, how often, and how much data is sent.

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- *"Isn't the Internet already anonymous?"* Nope!

Who wants privacy online?

- Ordinary people
  - To avoid personal information being sold to marketers
  - Protect themselves when researching sensitive topics
- Militaries and law enforcement
  - To carry out intelligence gathering
  - Protect undercover field agents
  - Offer anonymous tip lines
- Journalists
  - To protect sources, such as whistle blowers
- Human rights workers
  - To publicise abuses and protect themselves from surveillance
  - Blogging about controversial subjects
- Businesses
  - To observe their competition and build anonymous collaborations

Anonymous communication

- People have to hide in a crowd of other people ("anonymity loves company")
- The goal of the system is to make all users look as similar as possible, to give a bigger crowd
- Hide who is communicating with whom
- Layered encryption and random delays hide correlation between input traffic and output traffic

Low versus High-latency anonymous communication systems

- Tor is not the first system; ZKS, mixmaster, single-hope proxies, Crowds, Java Anon Proxy.
- Low-latency systems are vulnerable to end-to-end correlation attacks.
- High-latency systems are more resistant to end-to-end correlation attaks, but by definition, less interactive.

Low-latency systems are generally more attractive to today's user

- Interactive apps: web, instant messaging, VOIP, ssh, x11, cifs/nfs, video streaming (millions of users)
- Multi-hour delays: email, nntp, blog posting? (tens of thousands of users?)

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- Multi-hour delays: email, nntp, blog posting? (tens of thousands of users?)
    - And if anonymity loves company...

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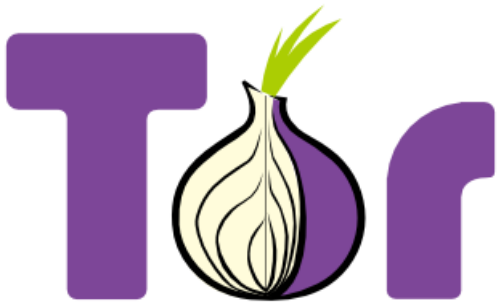
- increasingly diverse toolset:
  Tor, Torbutton, Tor Browser Bundle, TorVM, Incognito LiveCD, Tor Weather, Tor auto-responder, Secure Updater, Orbot, TorFox, Torora, Portable Tor, Tor Check, Arm, Nymble, Tor Control, Tor Wall

Who is The Tor Project, Inc?

The 501(c)(3) non-profit organization dedicated to the research and development of tools for online anonymity and privacy

Tor is a low-latency anonymity system

- Based on technology developed in the Onion Routing project
- Privacy by design, not by policy (no data collected)
- Commonly used for web browsing an instant messaging (works for any TCP traffic)
- Originally built as a pure anonymity system (hides who is talking to whom)
- Now designed to resist censorship too (hides whether someone is using the system at all)
- Centralised directory authorities publish a list of all servers



TorProject.org

Tor hides communication patterns by relaying data through volunteer servers

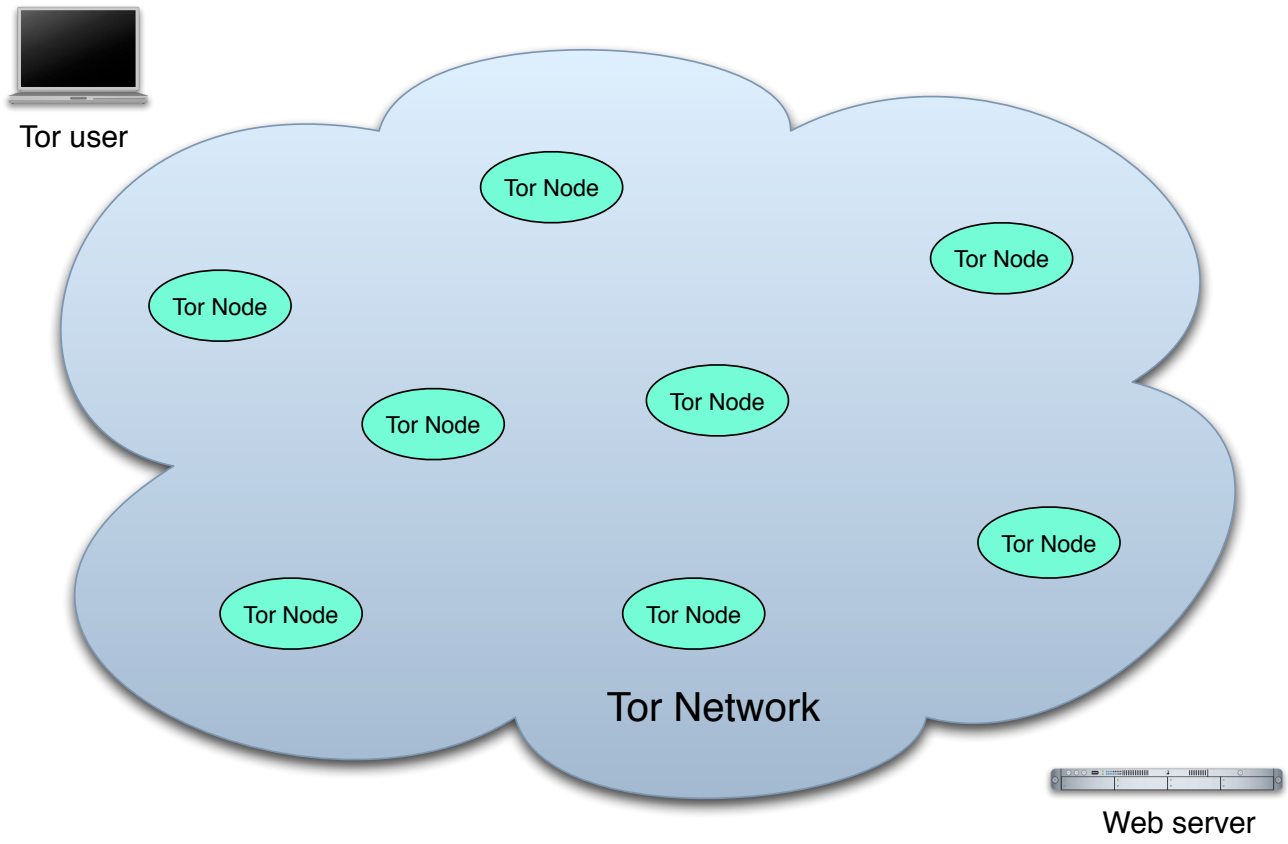


Diagram: Robert Watson

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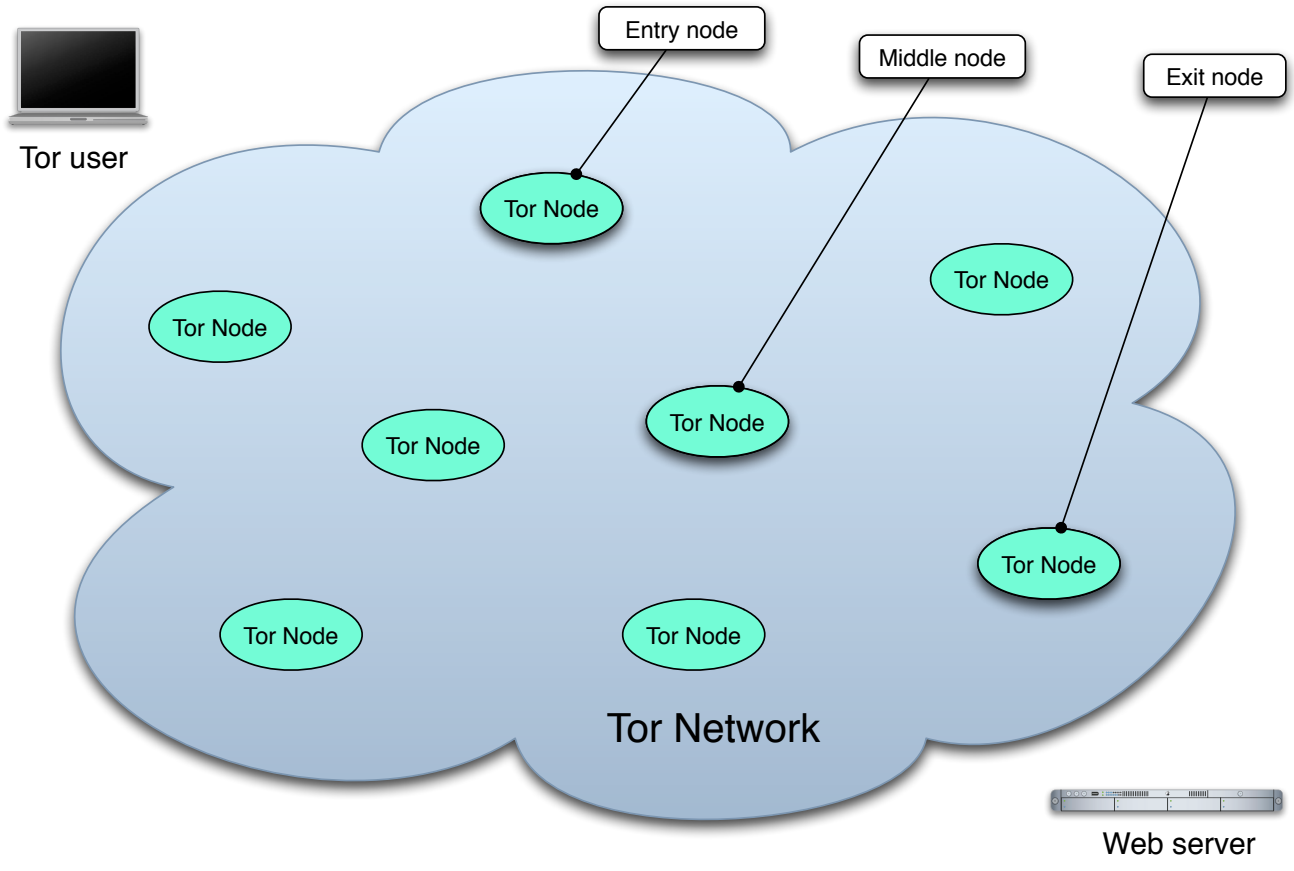

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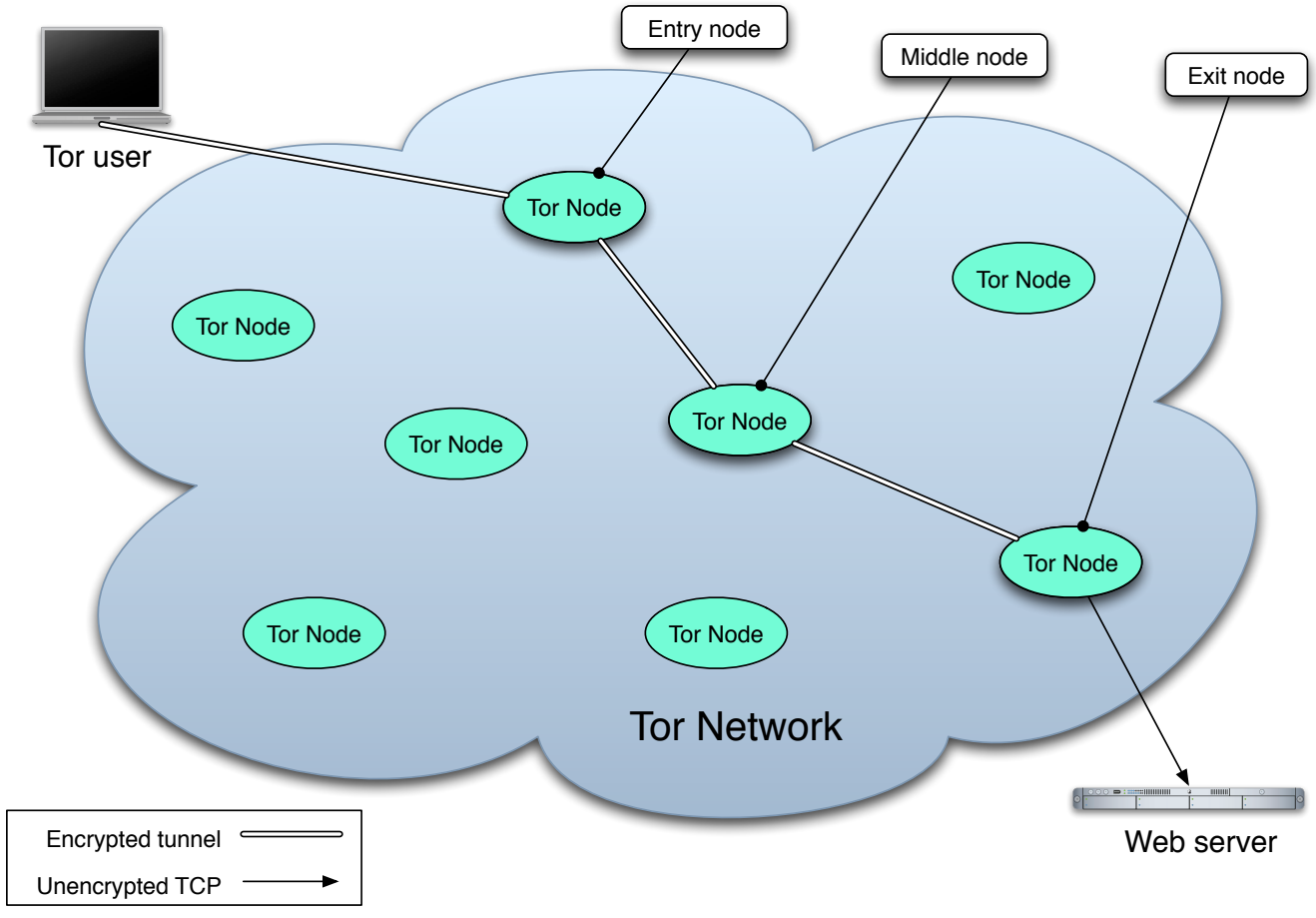

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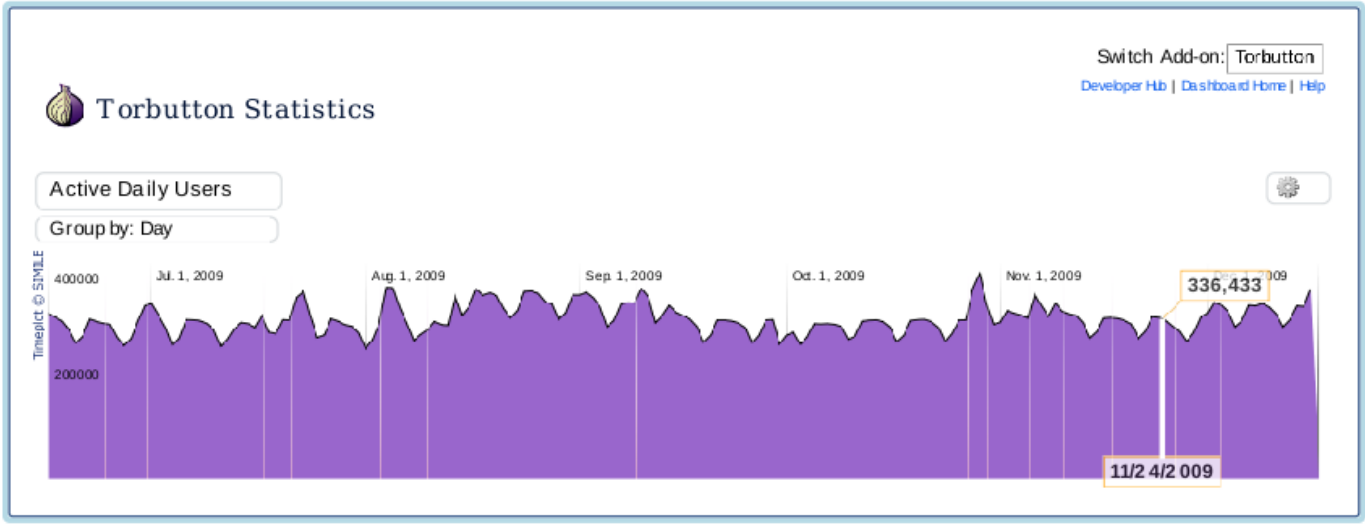

Total Downloads Since Mar. 23, 2006	3,392,240	Active Daily Users On Wednesday, Dec. 16	403,079
Last Day Count Wednesday, Dec. 16	2,720	Change from previous count 365,969 on Dec. 15	+10.14%
Average Daily Downloads	3,765	Average Daily Active Users	298,291
Downloads in the last 7 days	20,508	Average Daily Users this Week +0.63% from last week	360,676

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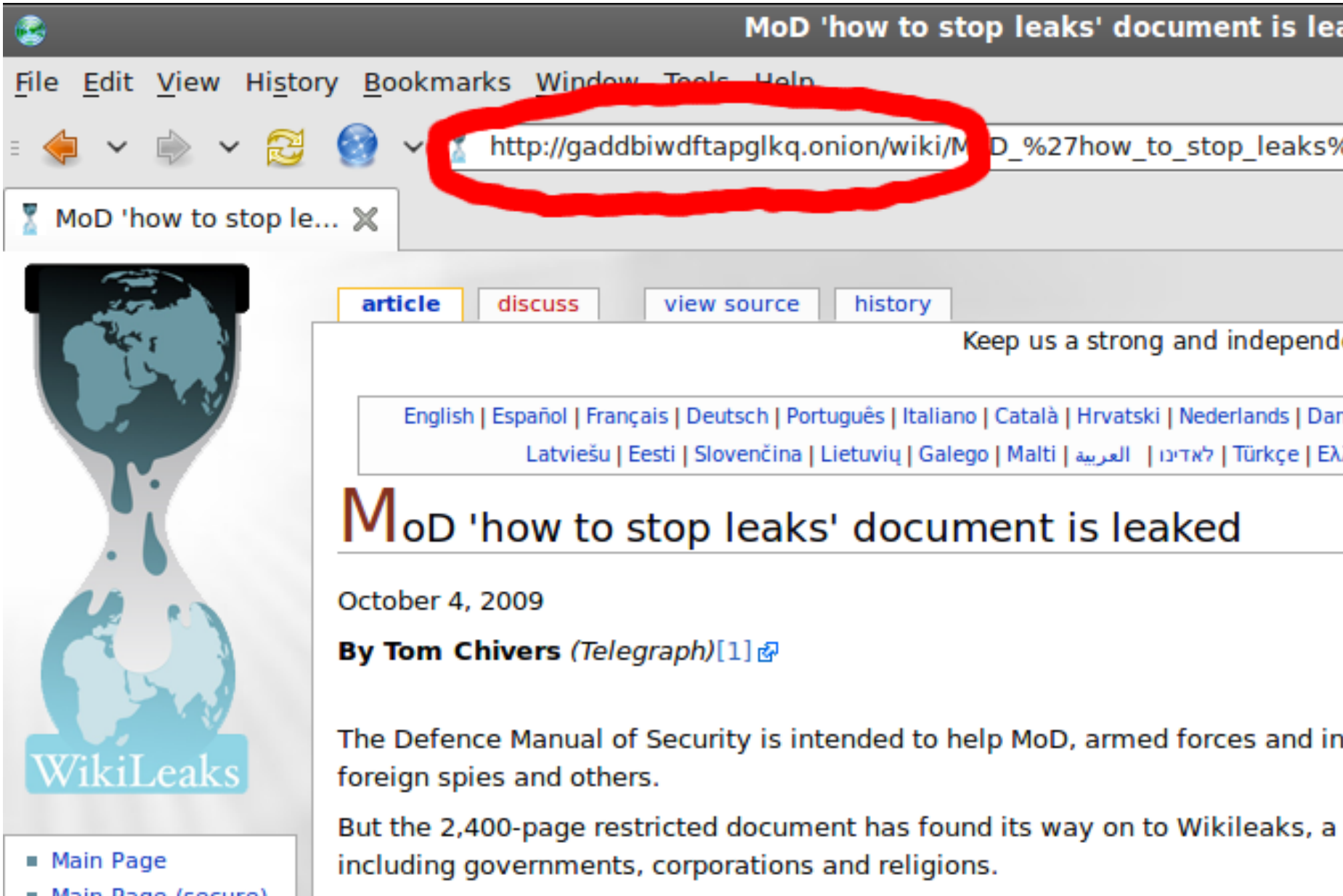
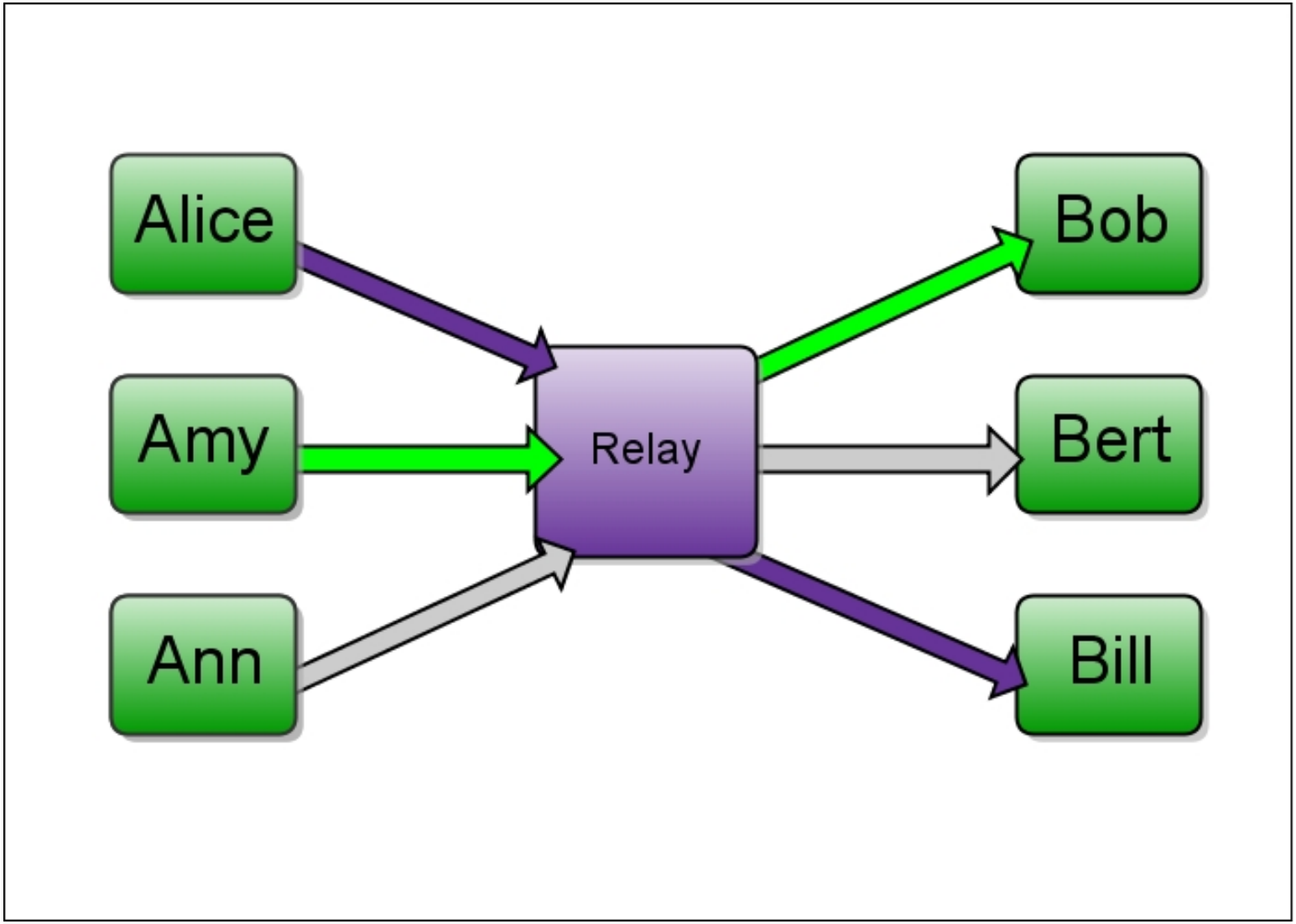
Tor hidden services allow privacy enhanced hosting of services



How is Tor different from other systems?



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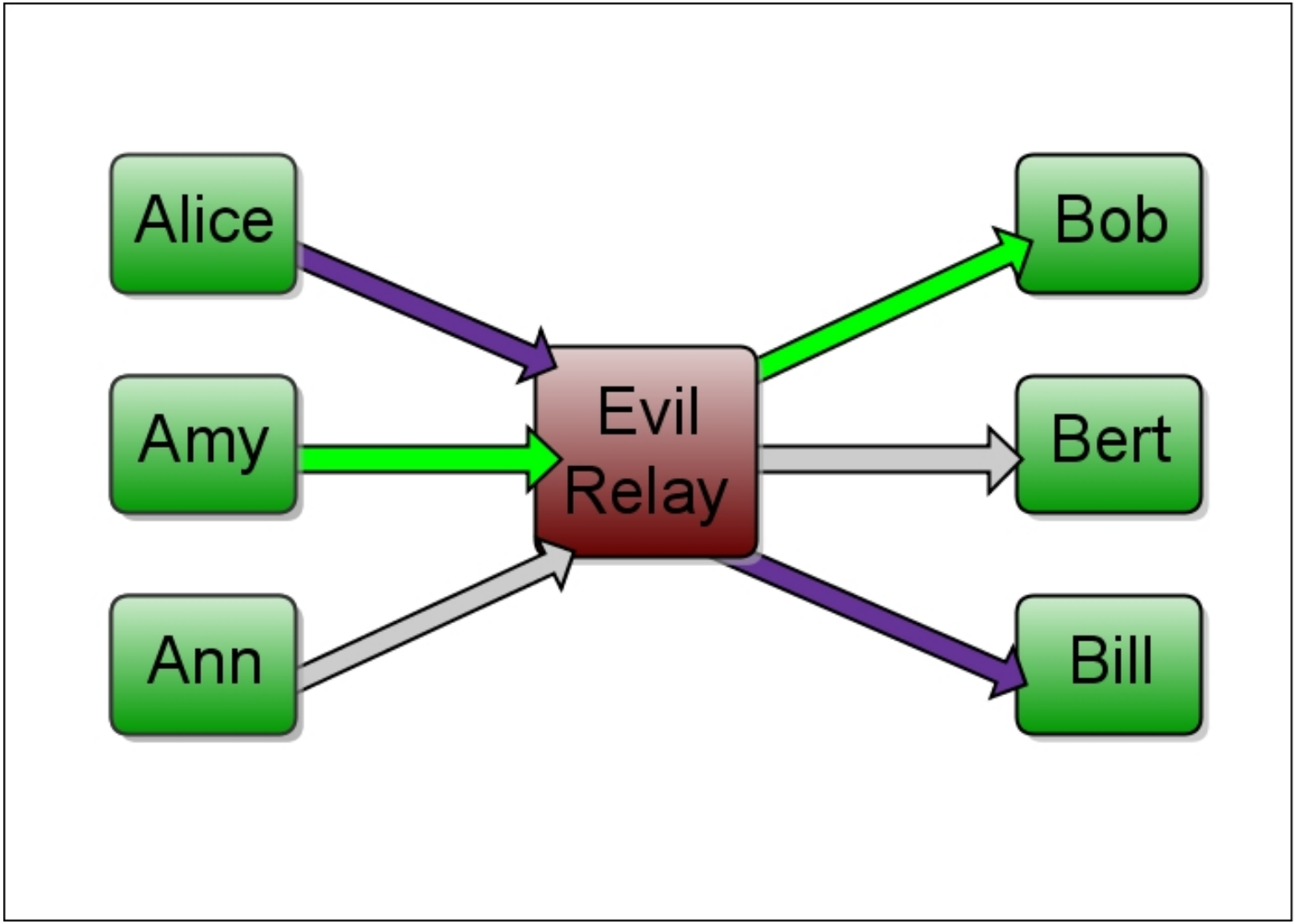

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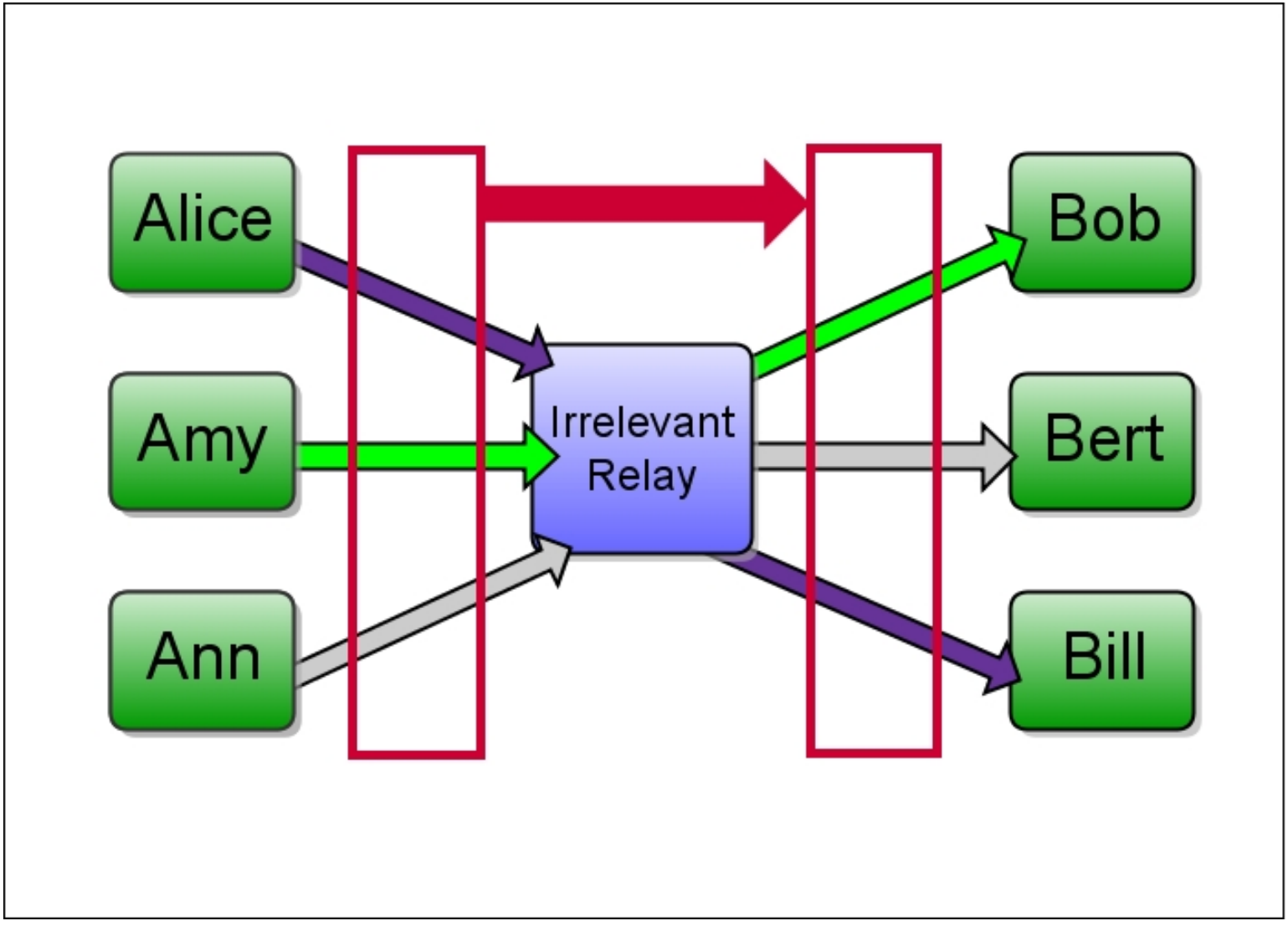

How to get involved

- 3-year Roadmap & Performance Roadmap
- Relays4Tor Campaign: 5000 relays in 2010
- Developer help: Python, c, c++, Qt, java, and packaging for Tor, Torbutton, Tor Browser Bundle, TorVM, Incognito LiveCD, Tor Weather, Tor auto-responder, Secure Updater, Orbot, TorFox, Torora, Portable Tor, Tor Check, Arm, Nymble, Tor Control, Tor Wall
- Research, fuzzing, anonymity/privacy leaks, develop your own apps with anonymous TCP (Tor)
- Mobile devices and Tor

One Version of the Future

> *I'd like to change the design of the Internet by introducing regulation–Internet passports, Internet police and international agreement–about following Internet standards. And if some countries don't agree with or don't pay attention to the agreement, just cut them off.*

— Eugene Kaspersky, Co-Founder & CEO of Kaspersky Labs

Internet Access as a Human Right

> *We think it's something you cannot live without in modern society. Like banking services or water or electricity, you need an Internet connection*
>
> — Laura Vilkkonen, Ministry of Transport and Communications, Finland

Tor Project's Mission

> *We remain committed to defending online privacy and anonymity as a human right.*

Credits

- Thank you to Steven J. Murdoch, `http://www.cl.cam.ac.uk/users/sjm217/`, for the research and basis for this presentation.
- Photographer and Diagram credits as listed throughout the presentation.