Introduction to Tor

Secure Web Browsing and Anonymity

Sukhbir Singh
sukhbir@torproject.org

October 29, 2017

Before We Begin...

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- Understand your threat model

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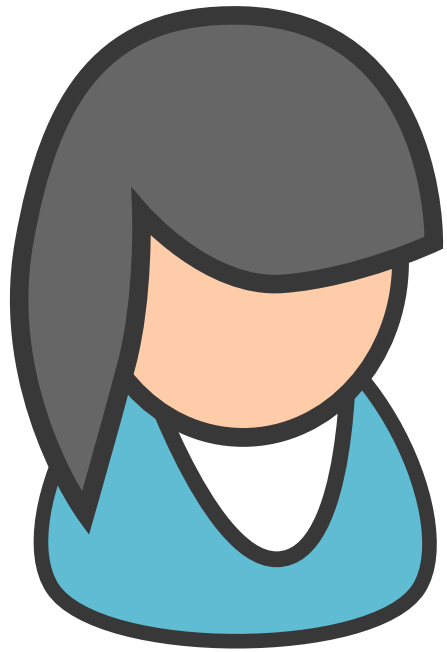
- Respect the group and the discussions
- No photographs please

Anonymity on the Internet



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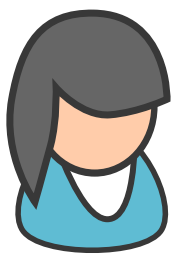

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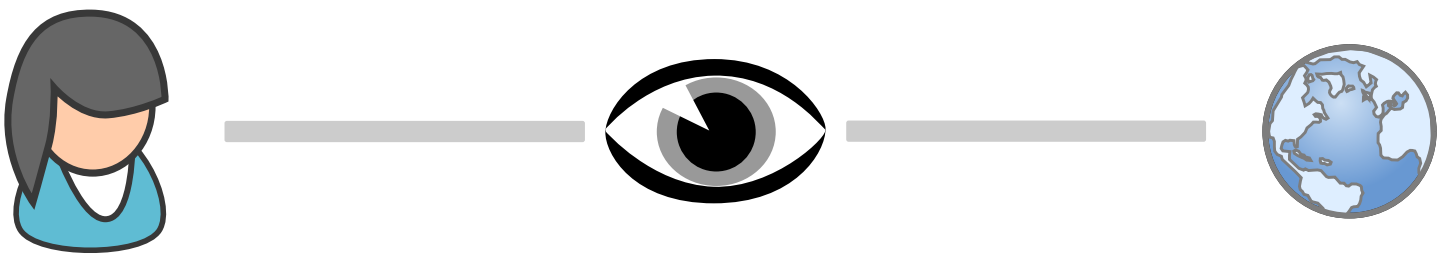

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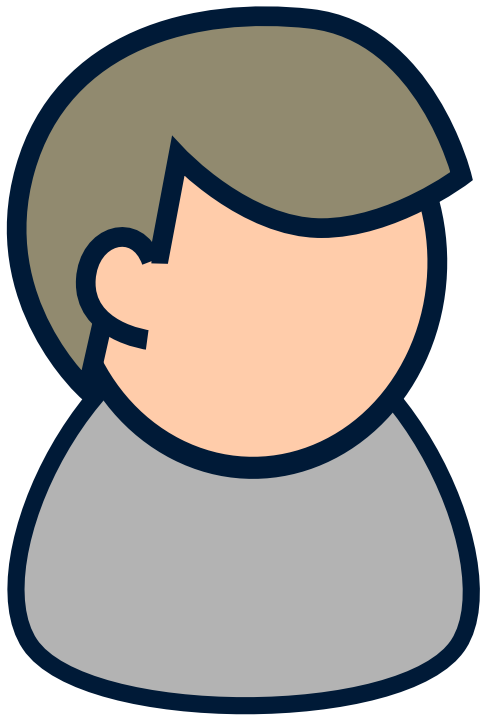

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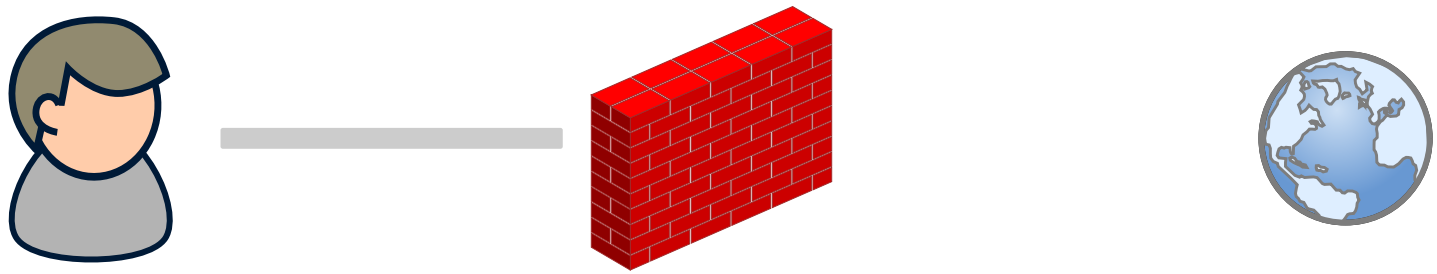

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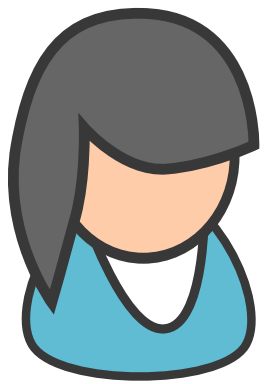
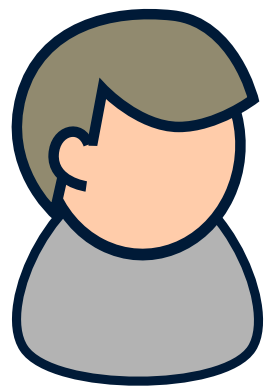




Anonymity on the Internet

“On the Internet, Nobody Knows...”

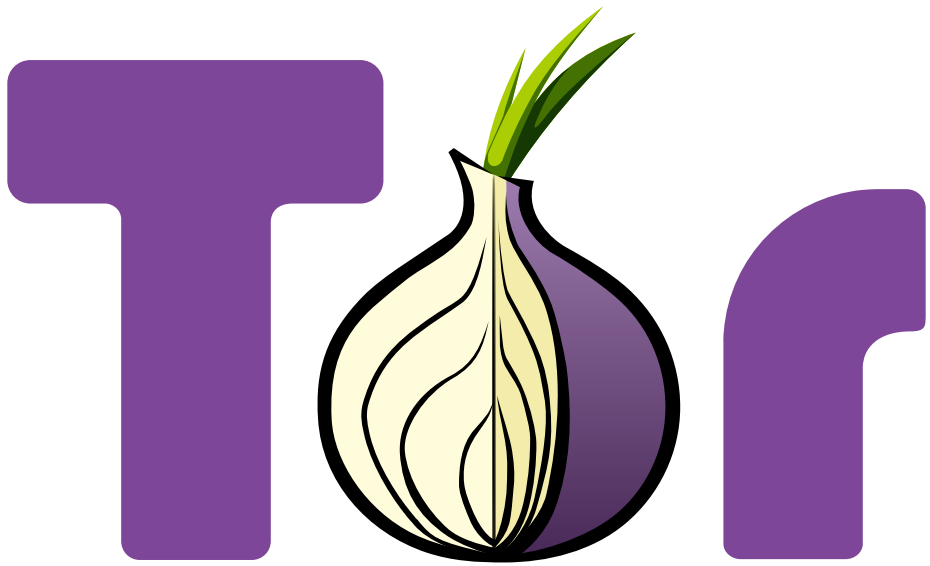
"On the Internet, nobody knows you're a dog."

†

† Image from The New Yorker cartoon by Peter Steiner, 1993

On the Internet, *They* Know...

Tor: The Onion Router



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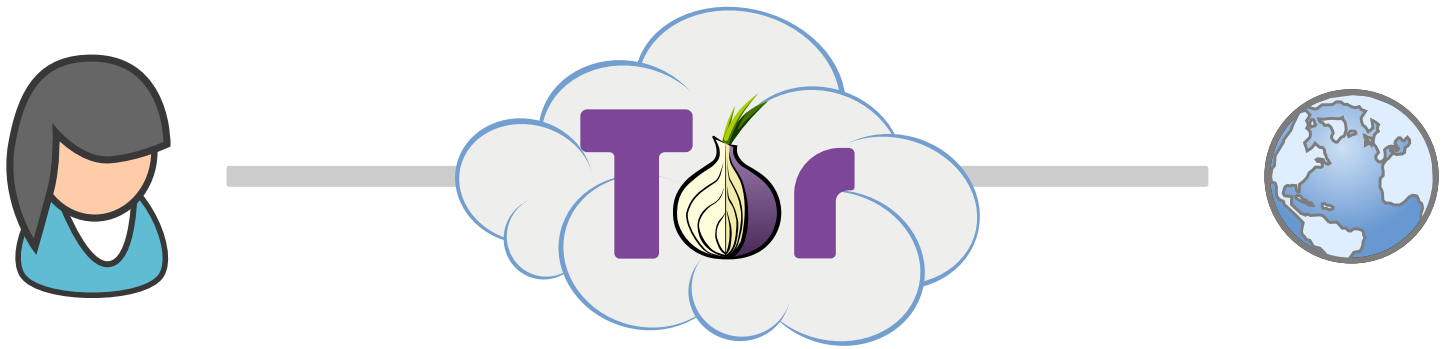

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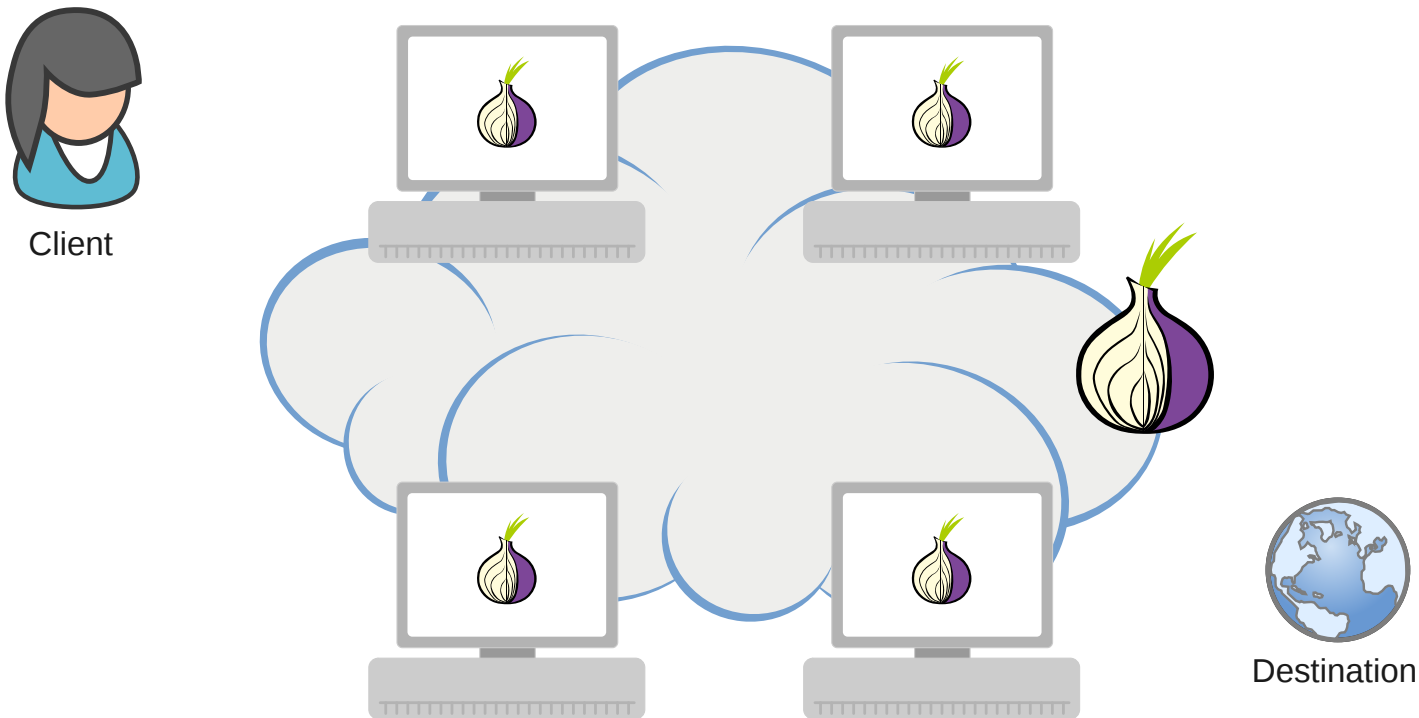

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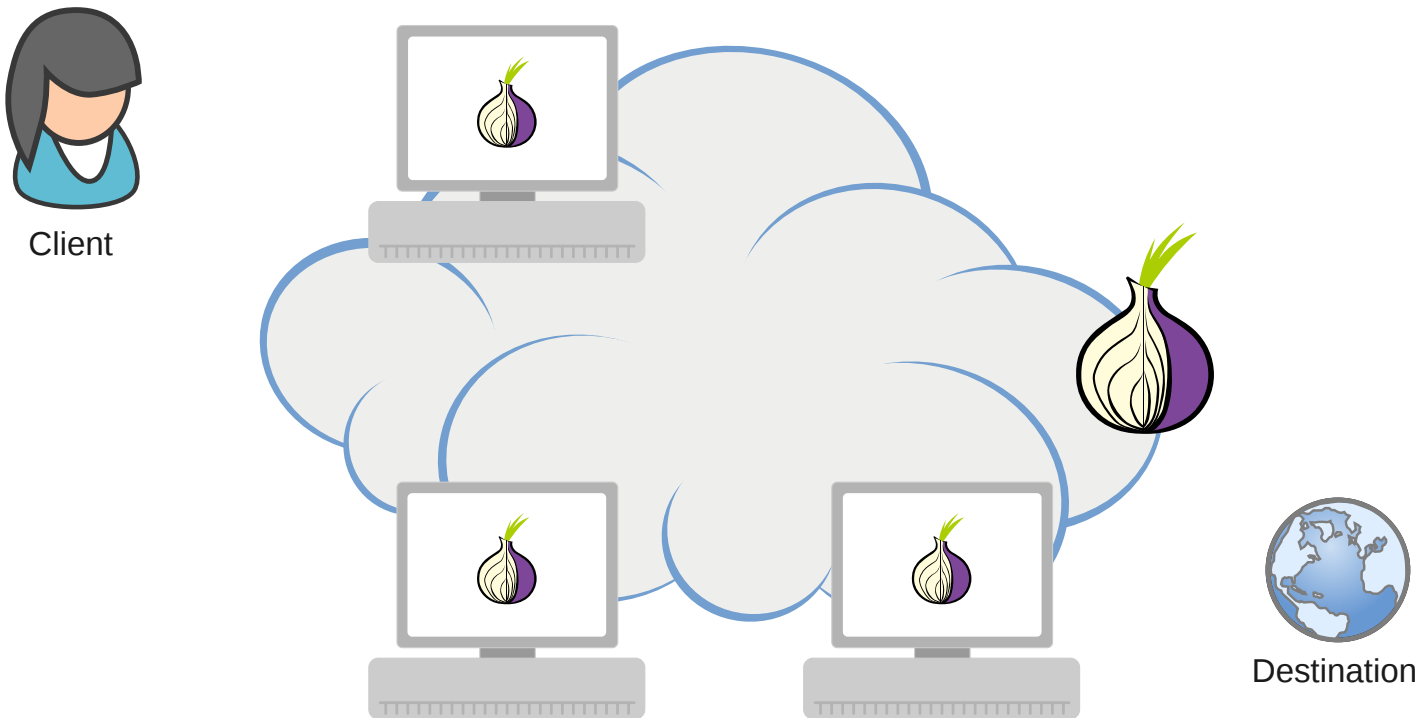

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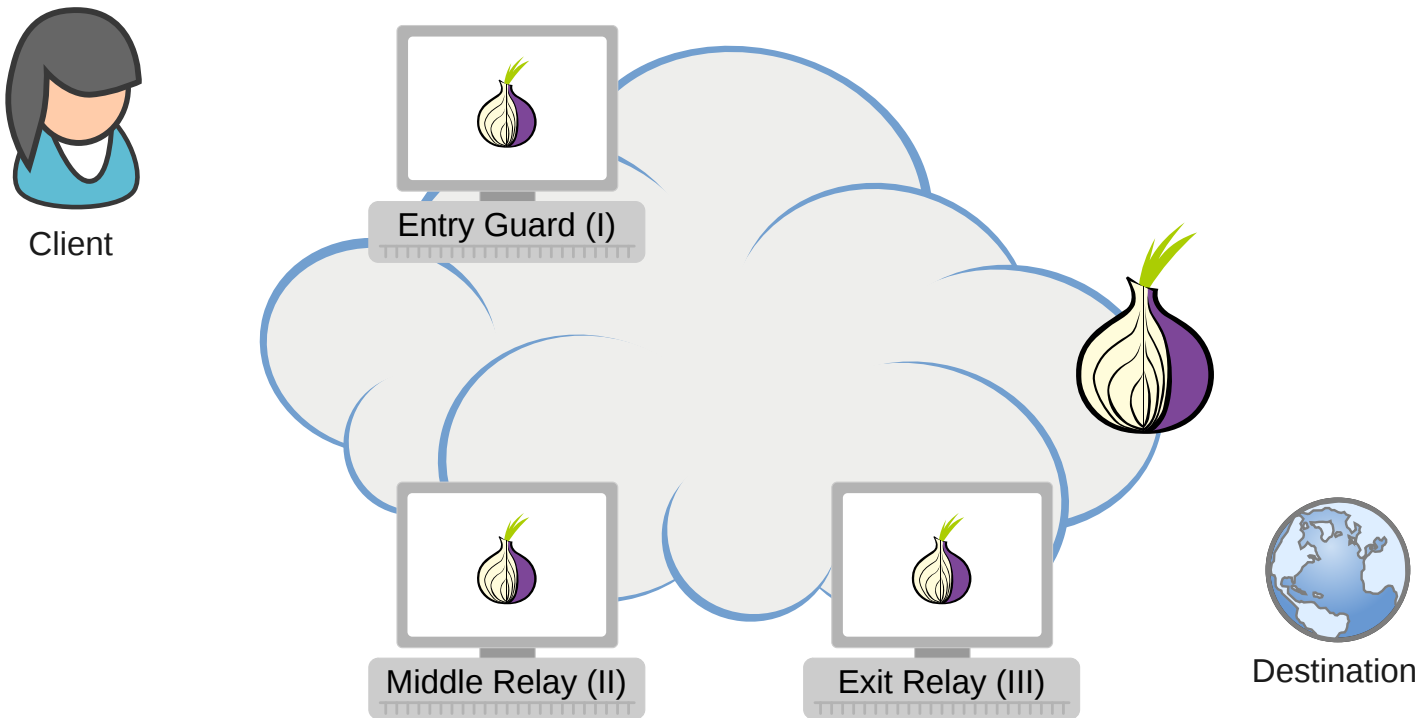

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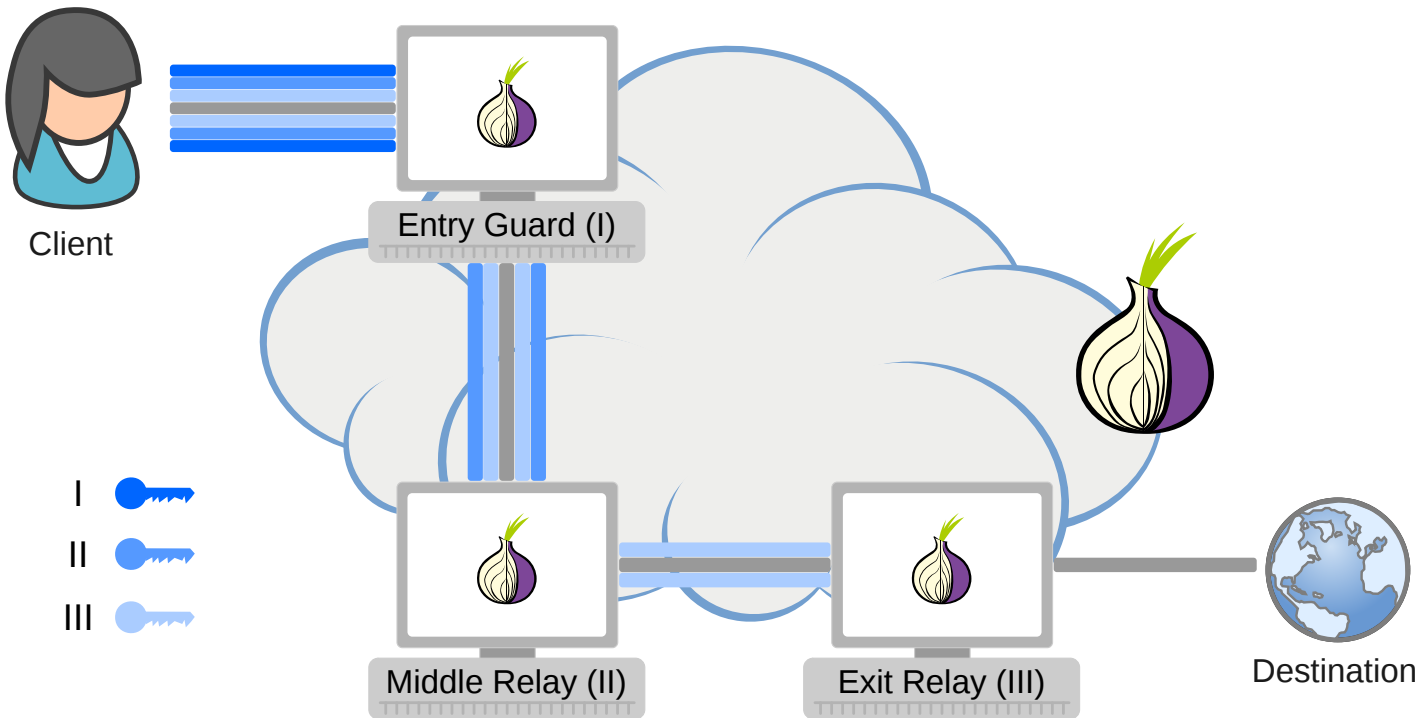

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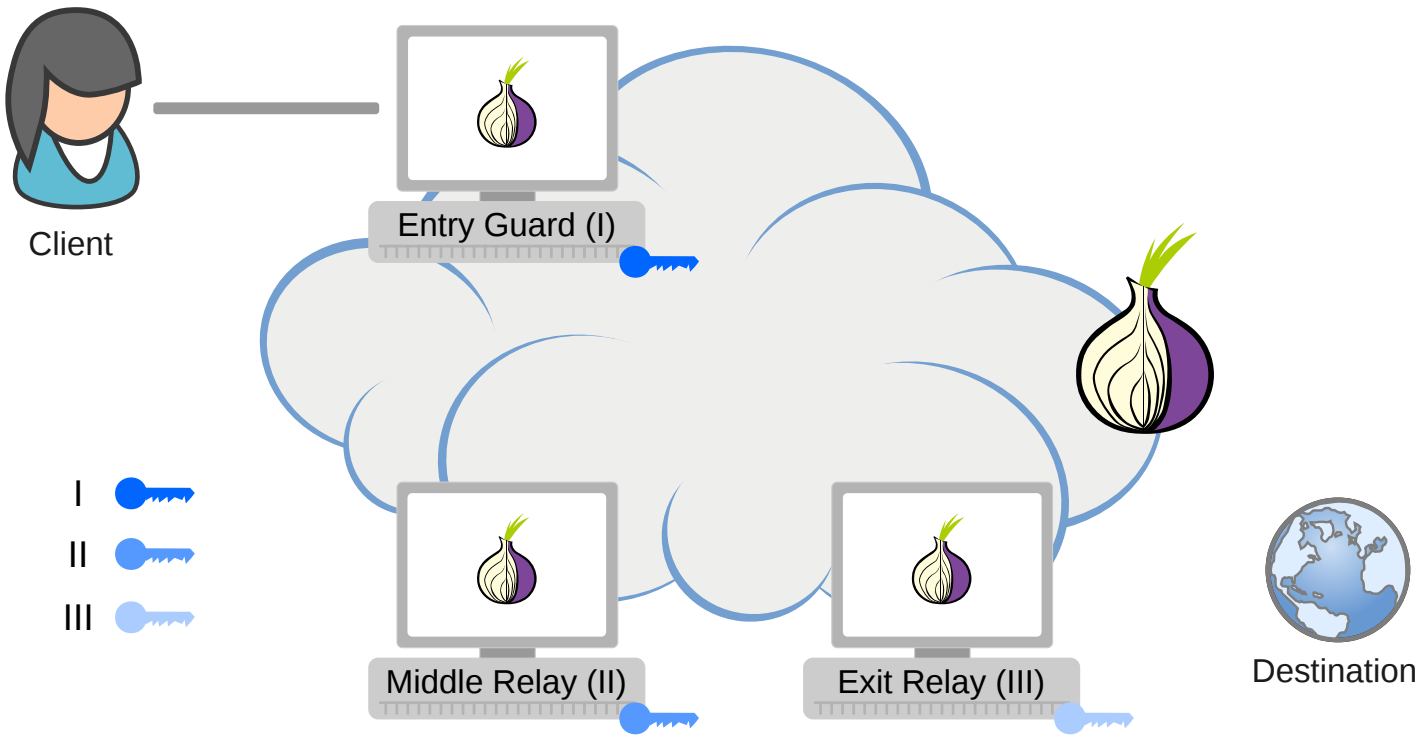

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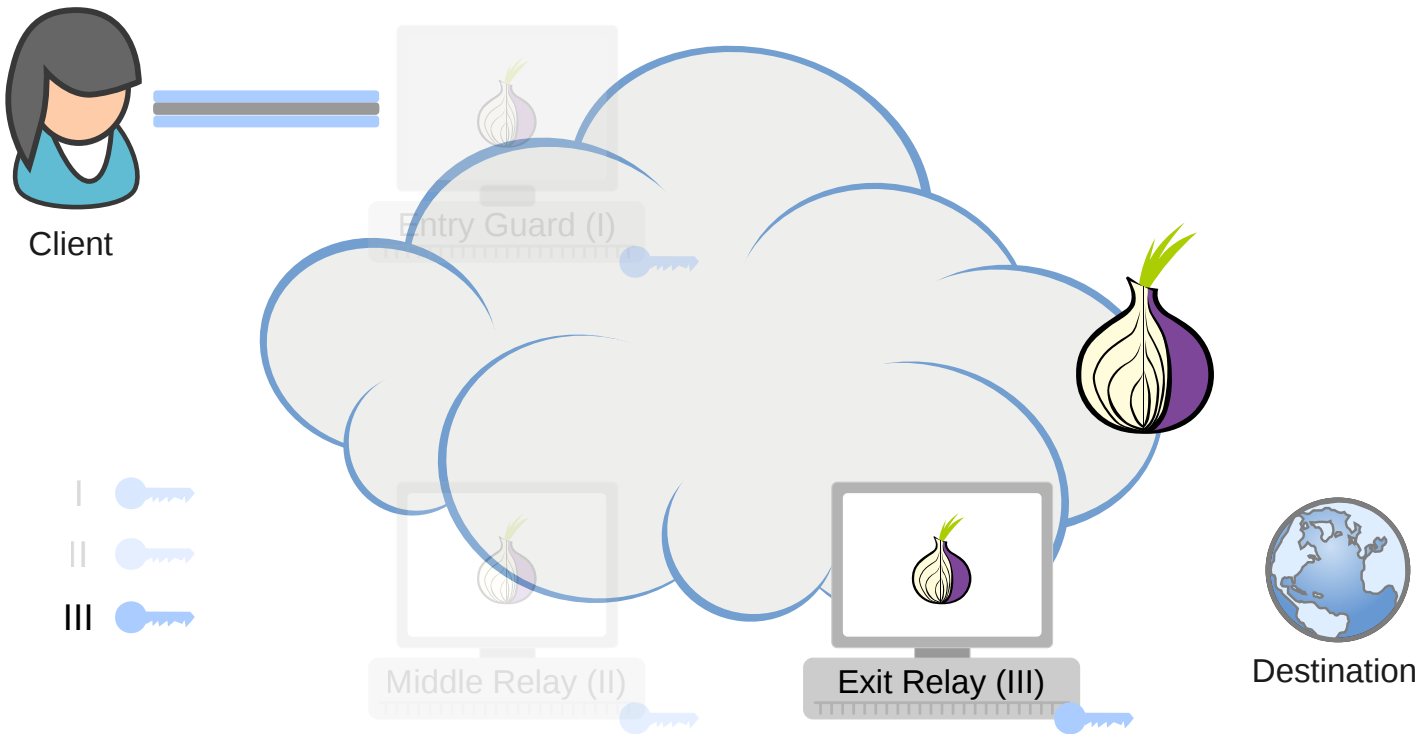

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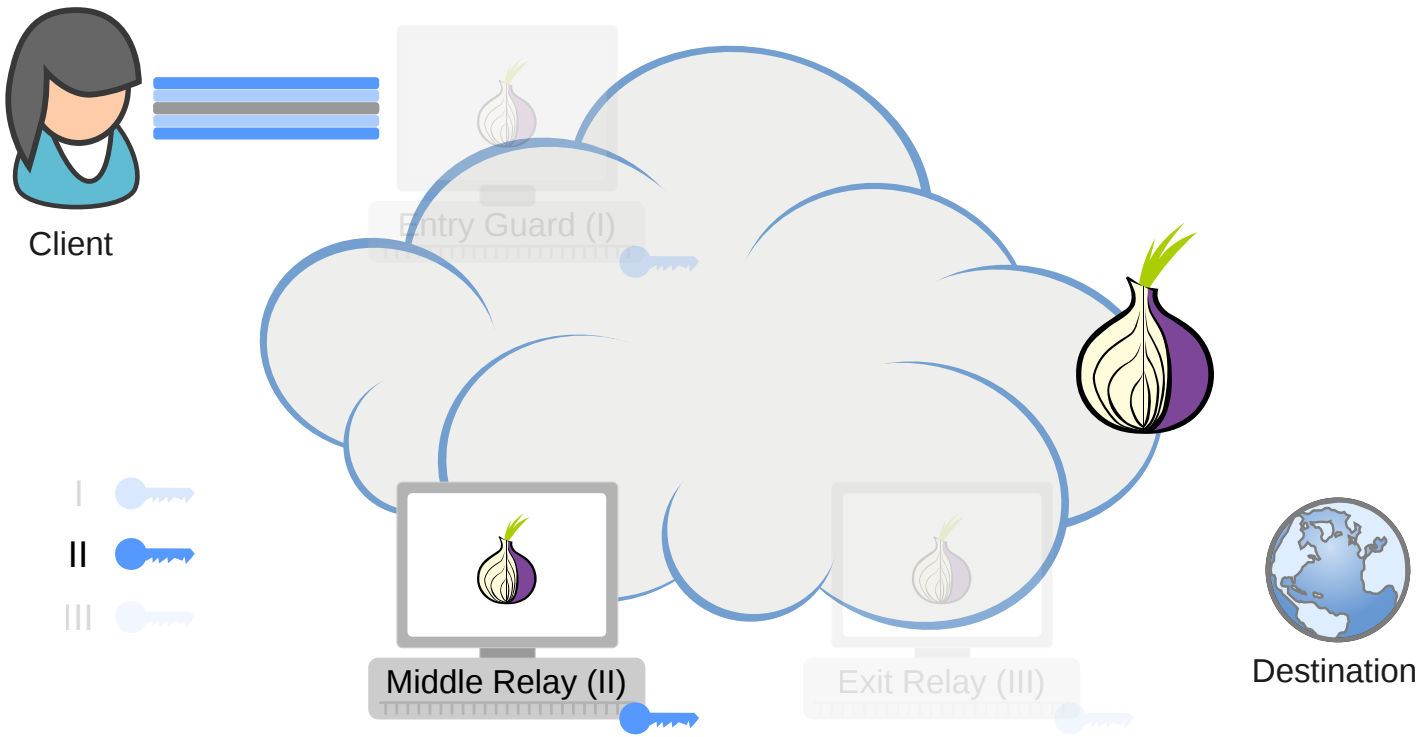

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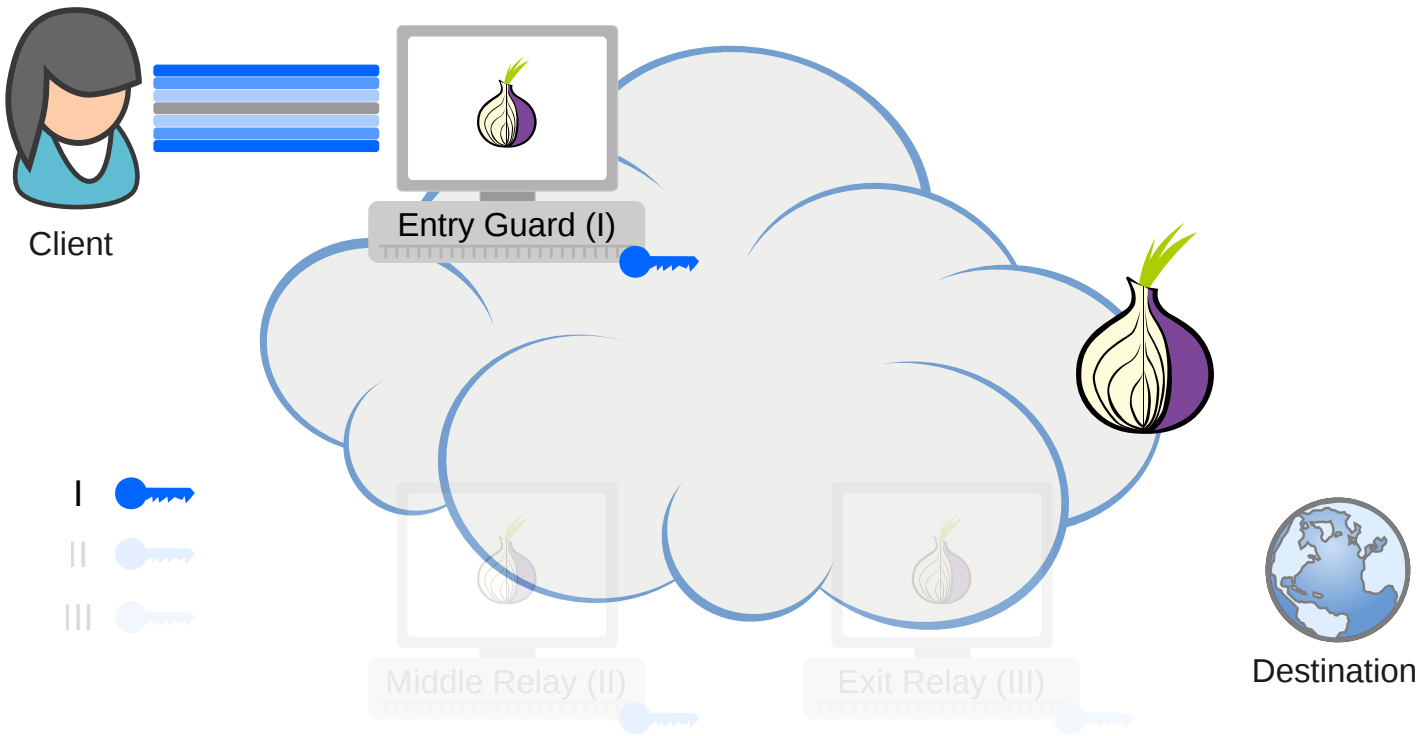

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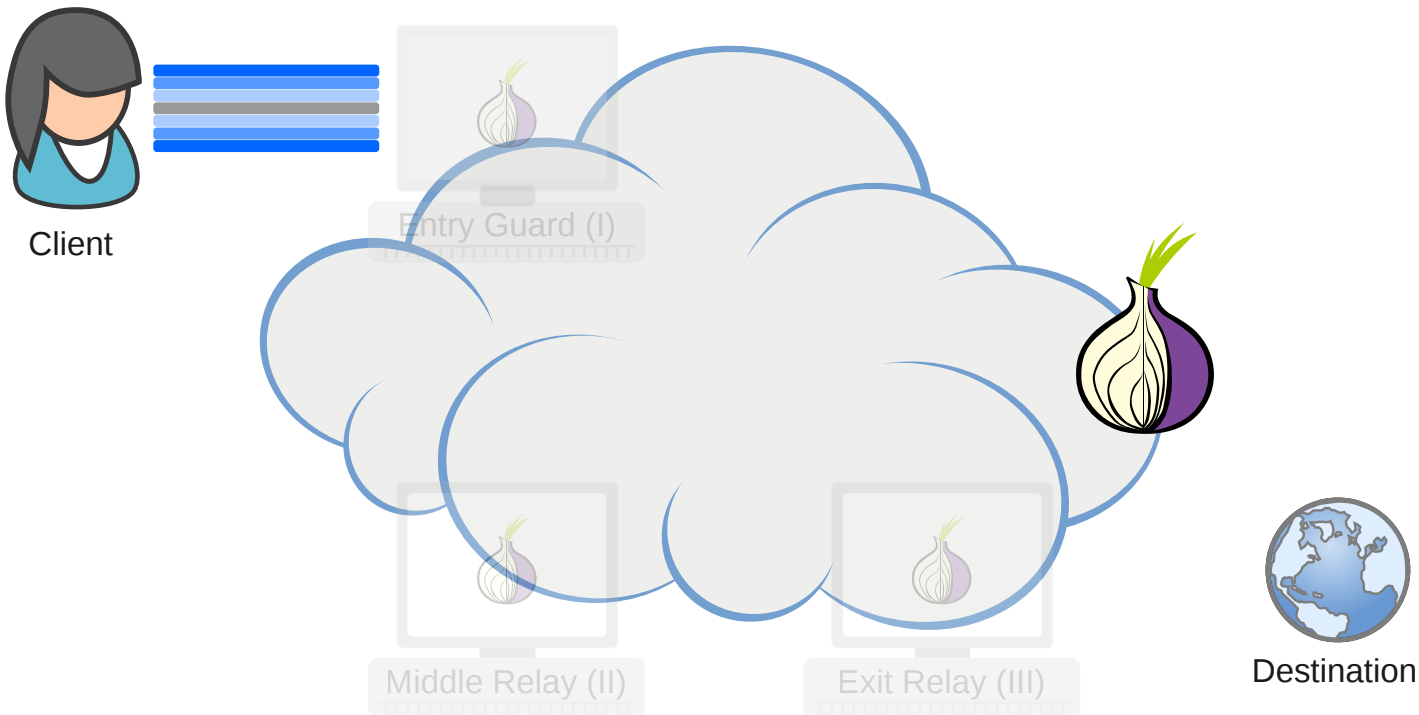

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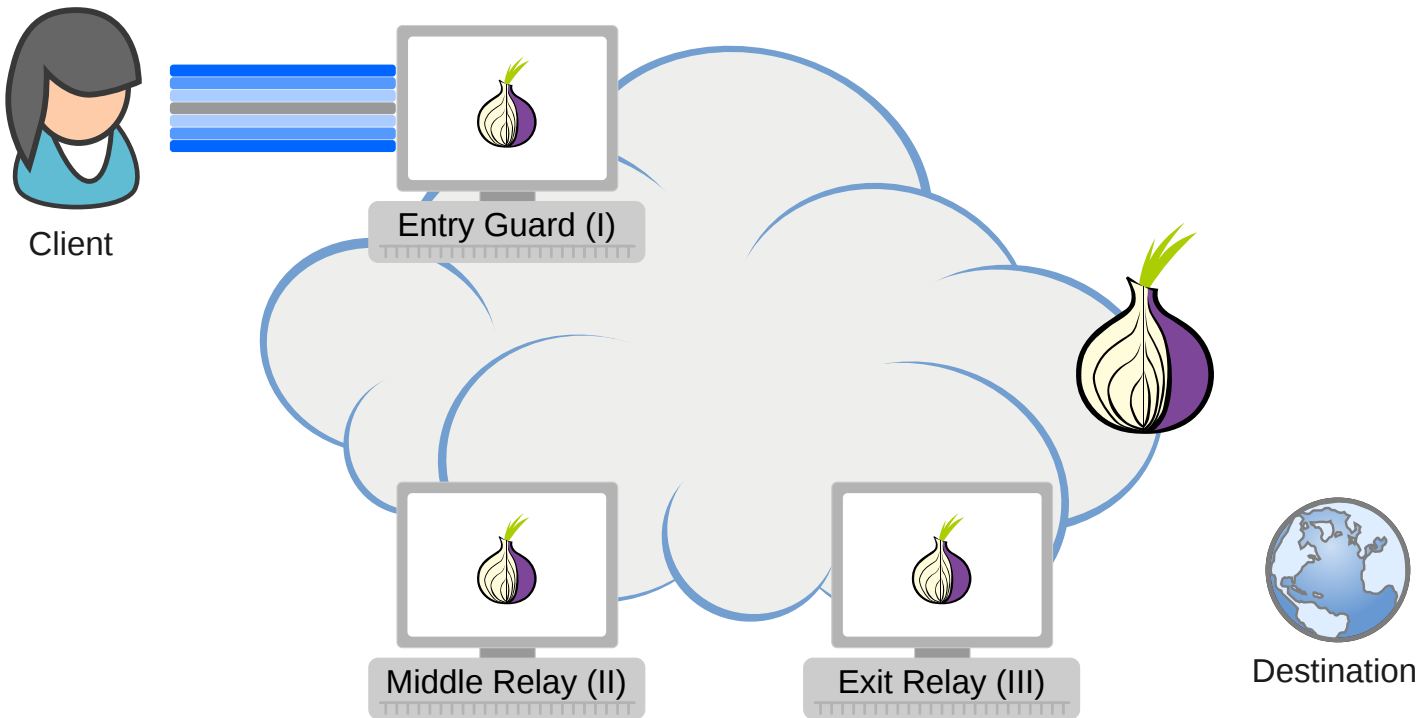

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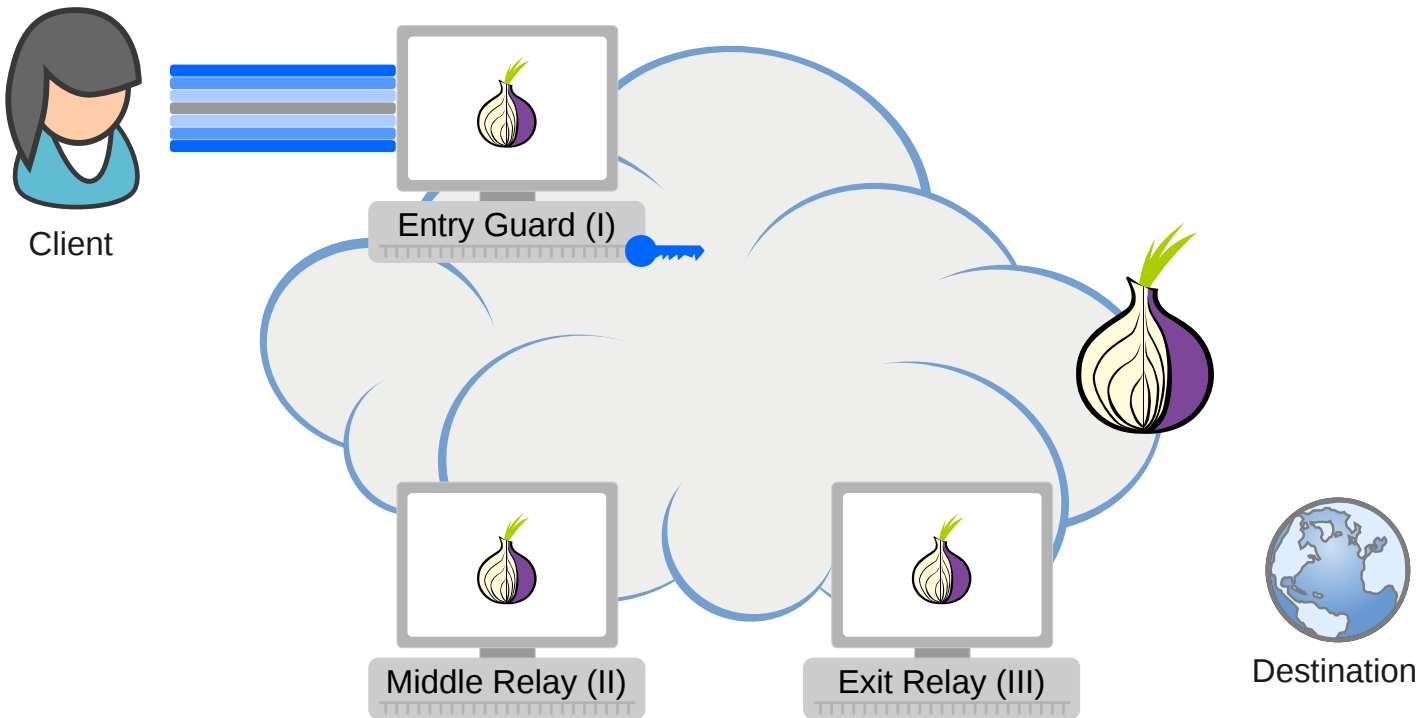

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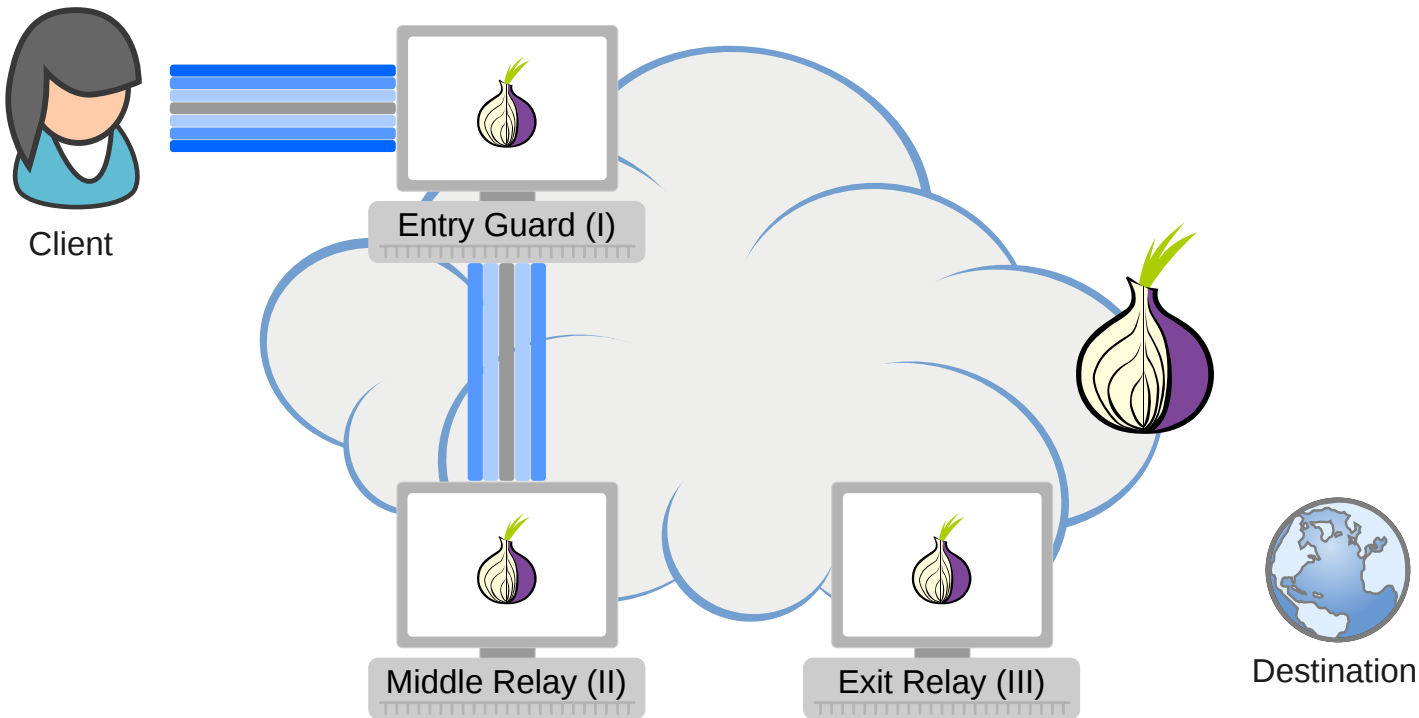

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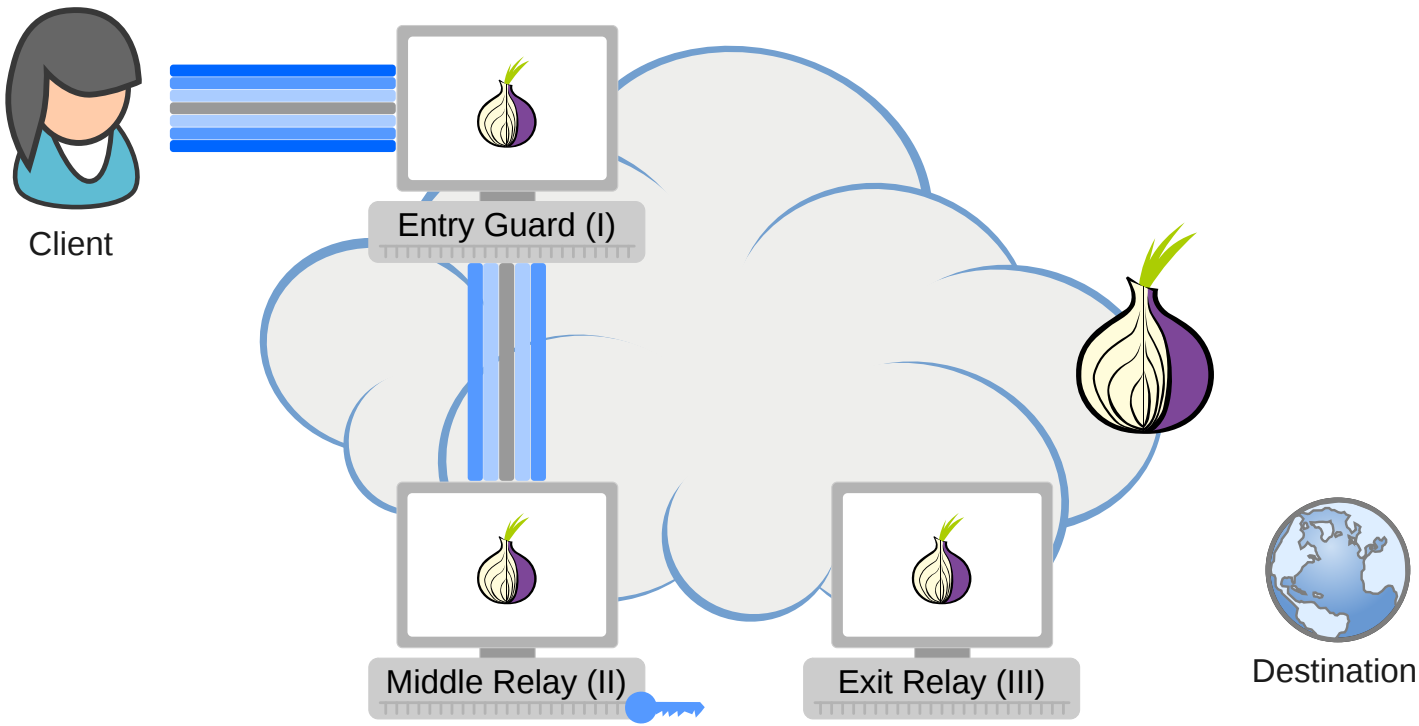

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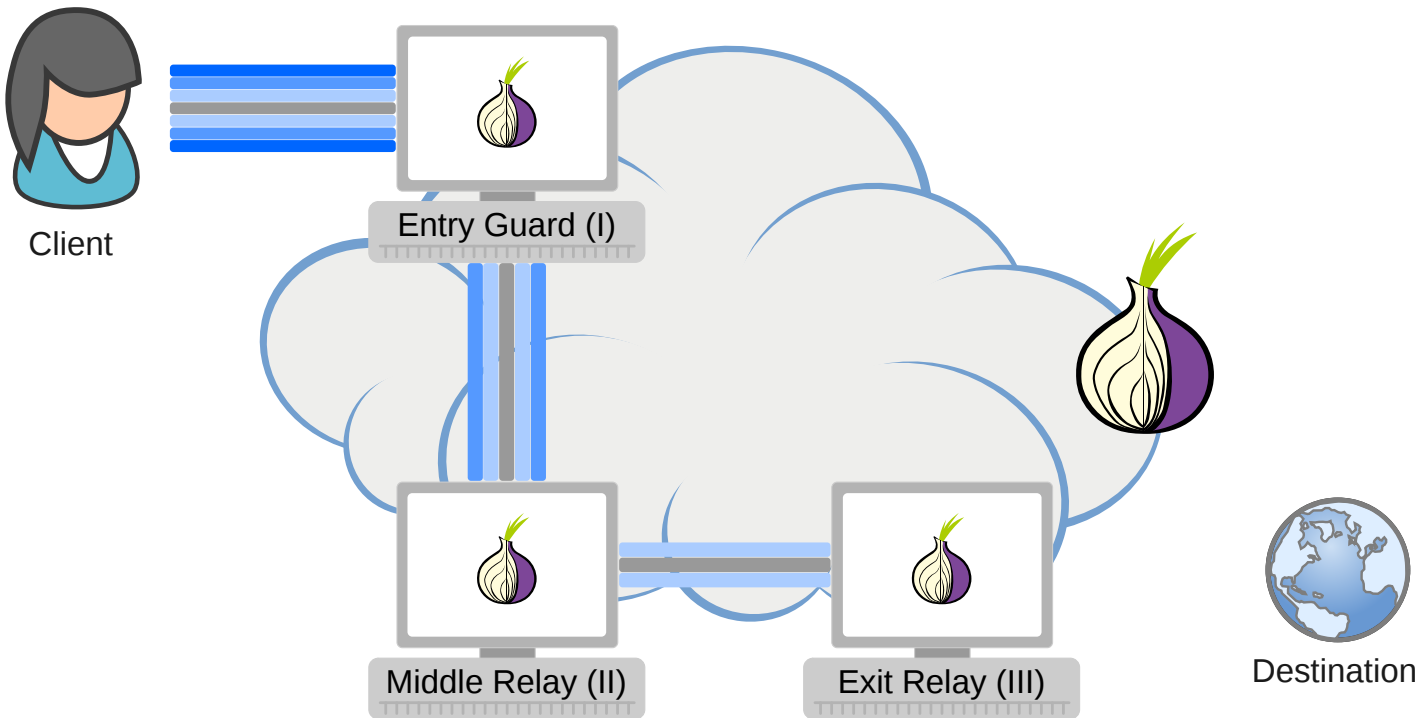

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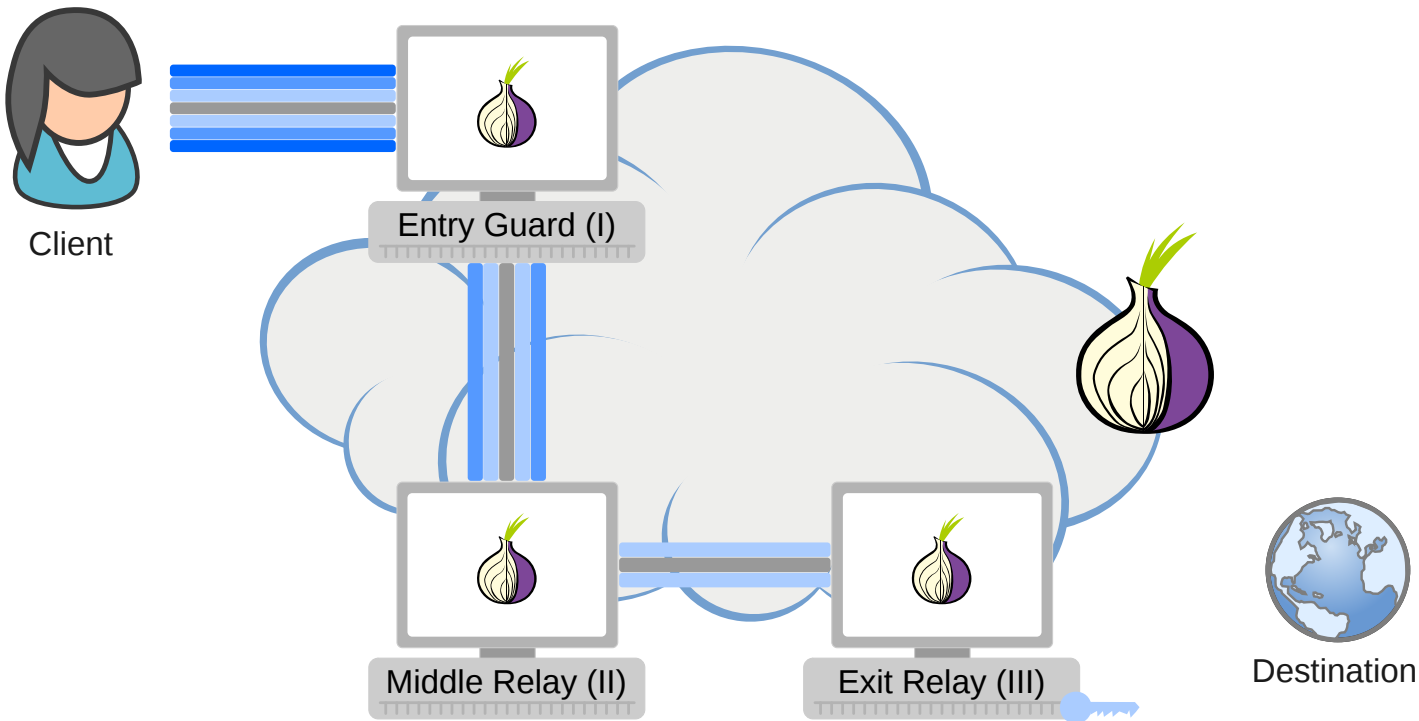

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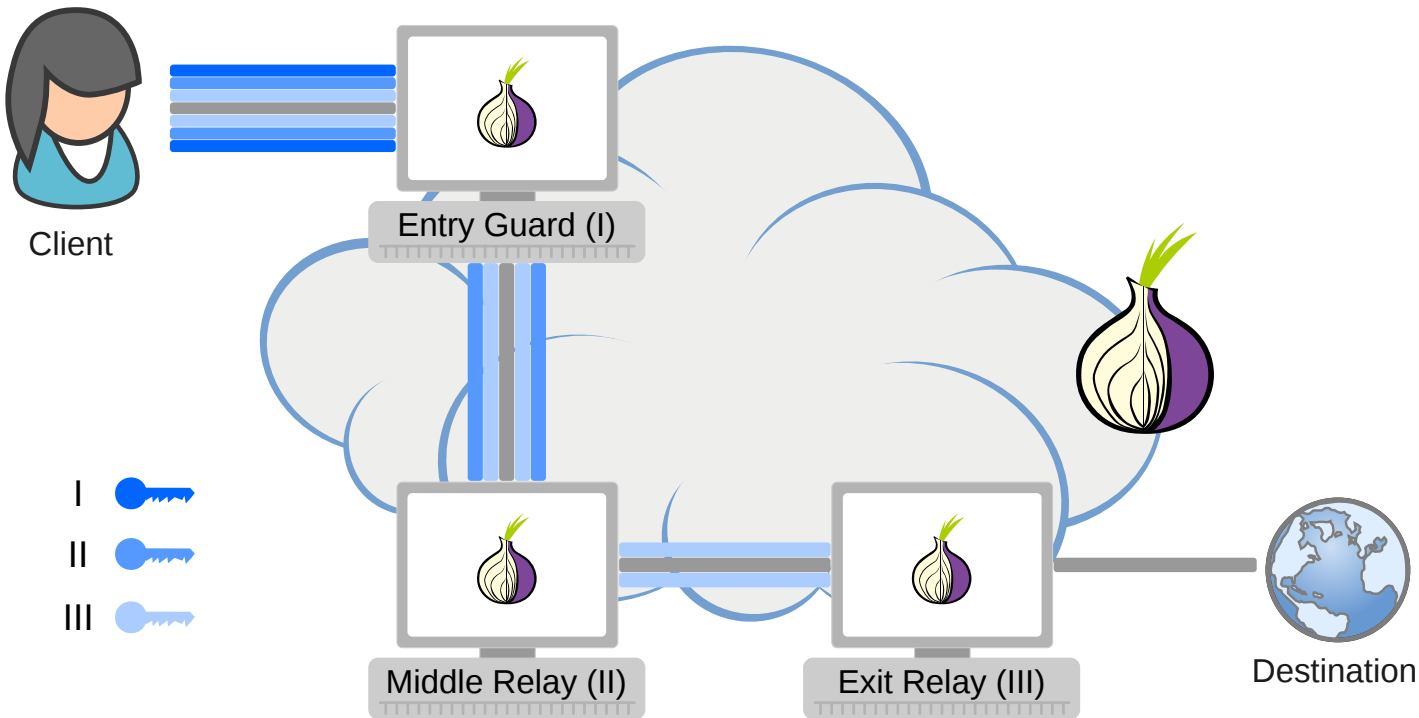

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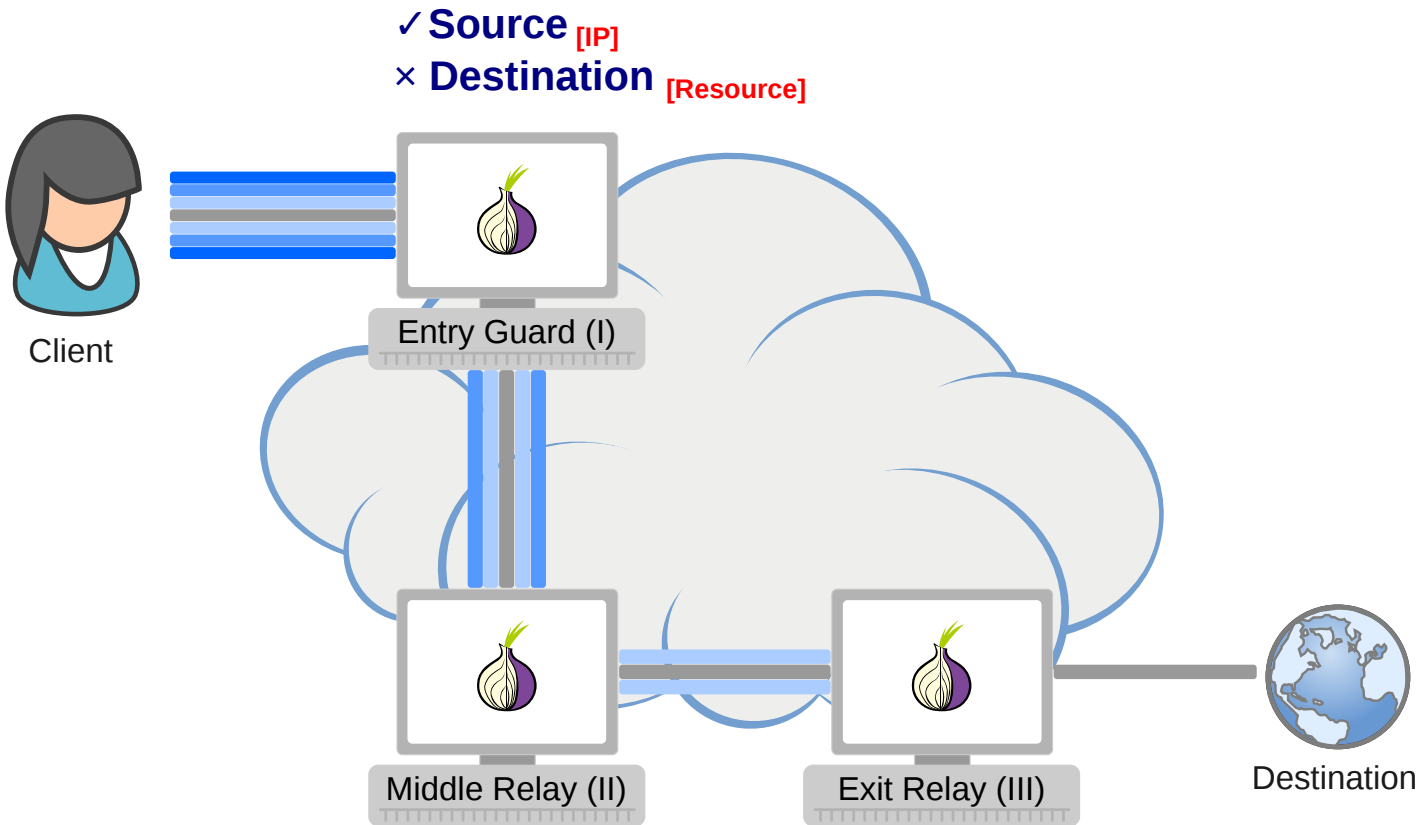

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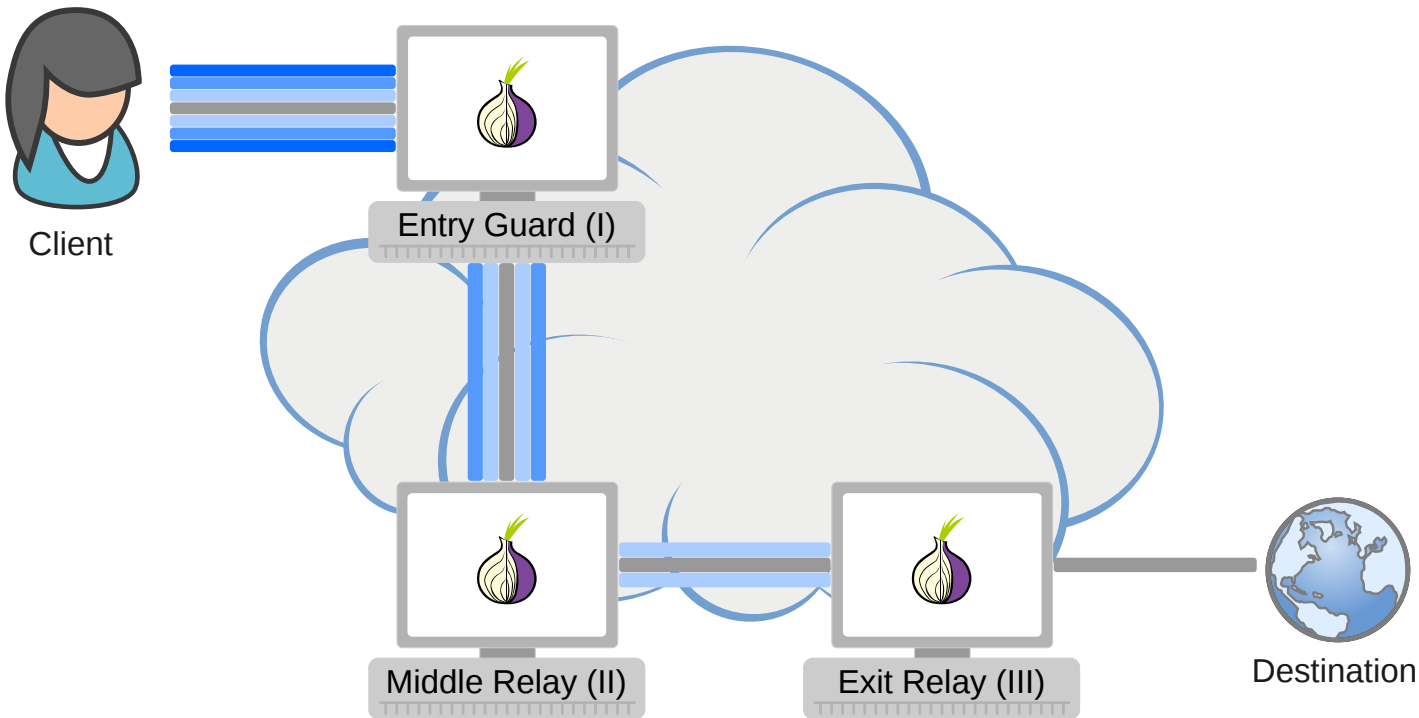

× **Source** [IP]
✓ **Destination** [Resource]

Tor: The Onion Router

- Low-latency anonymity

*https://metrics.torproject.org

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- Distributed design

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Tor: The Onion Router

- Low-latency anonymity
- Distributed design
- 2,000,000 users and 6000 relays
  - 100 Gbit/sec available bandwidth

*https://metrics.torproject.org

Who Uses Tor?

Who Uses Tor?

- Journalists

Who Uses Tor?

- Journalists
- Activists

Who Uses Tor?

- Journalists
- Activists
- You...

little-t-tor

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- Core of the Tor software ecosystem

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- Runs as a daemon and sets up a local SOCKS5 proxy

little-t-tor

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- Runs as a daemon and sets up a local `SOCKS5` proxy
- But there are still application-level concerns. . .

Tor Browser

Tor (`little-t-tor`)

+

Mozilla Firefox (Modified ESR)

Tor Browser: Demo

Download from

https://www.torproject.org/torbrowser

Staying Safe

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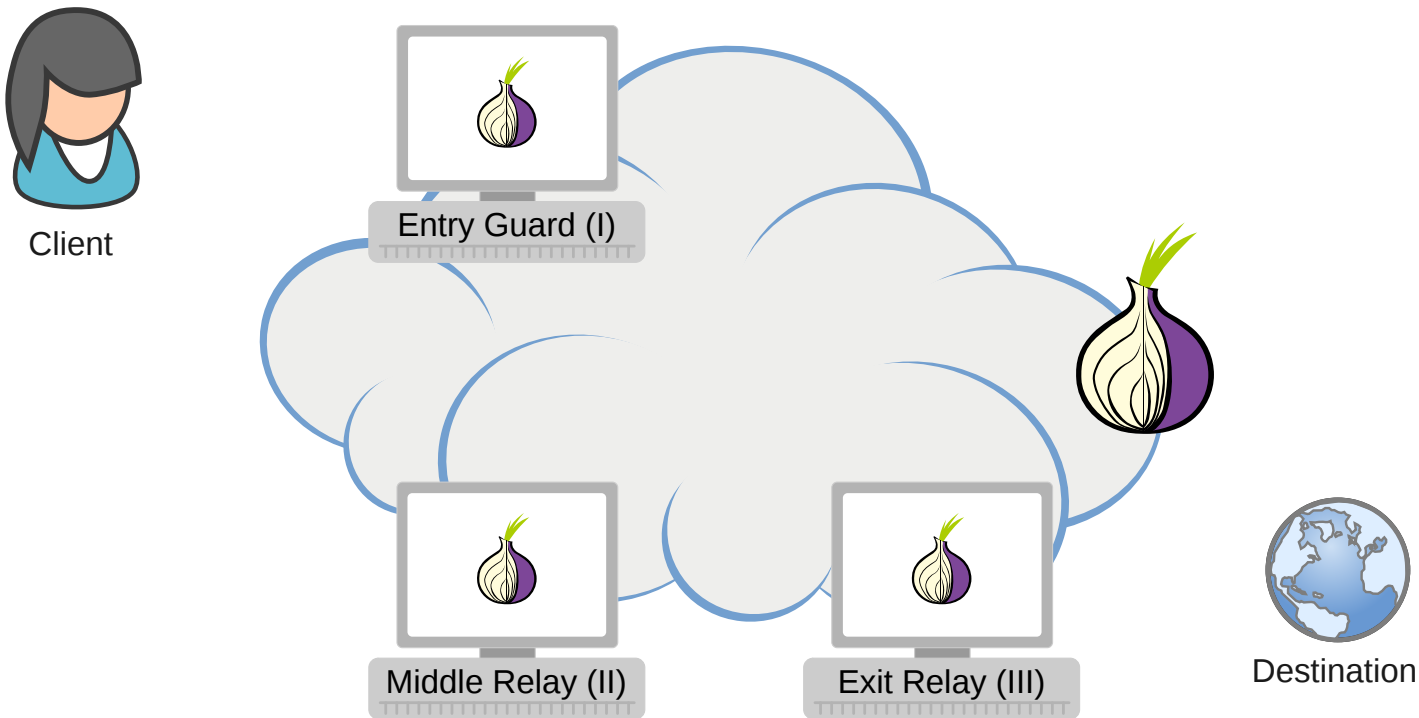
How Governments Censor Tor



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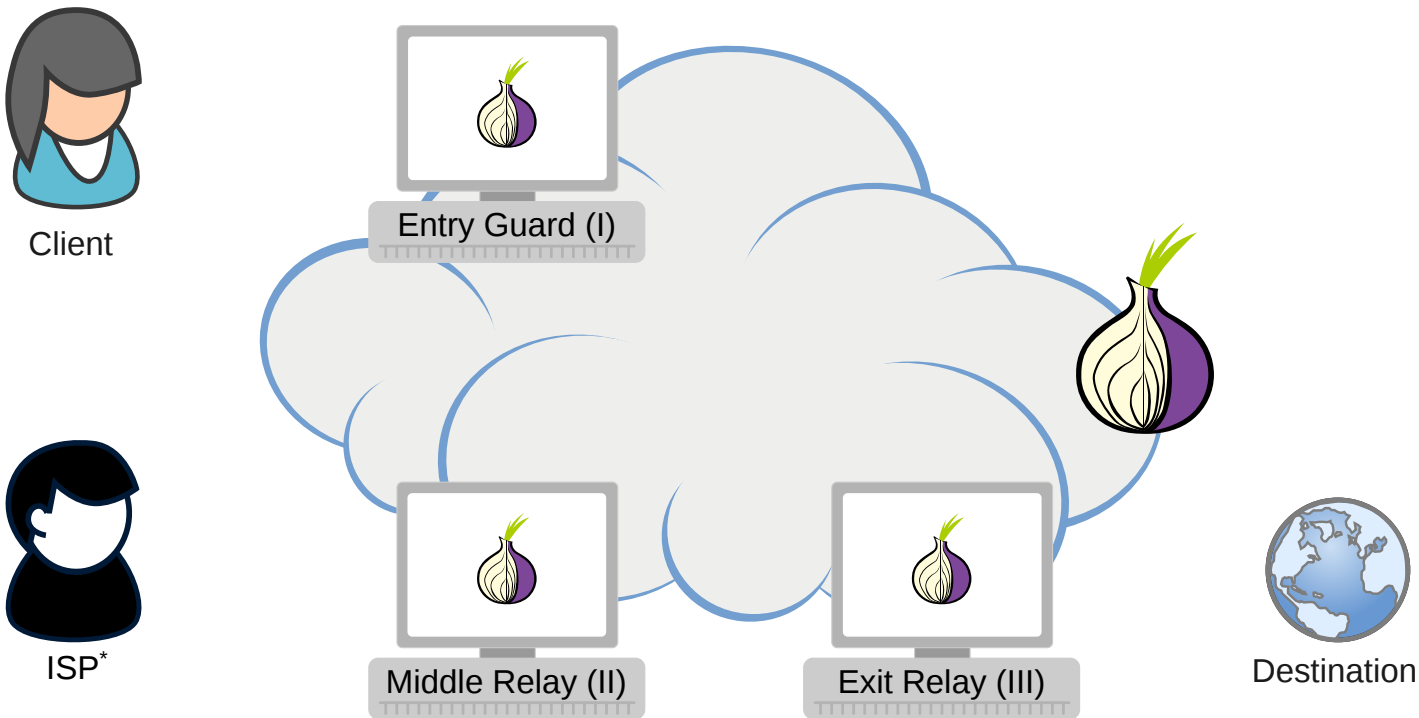
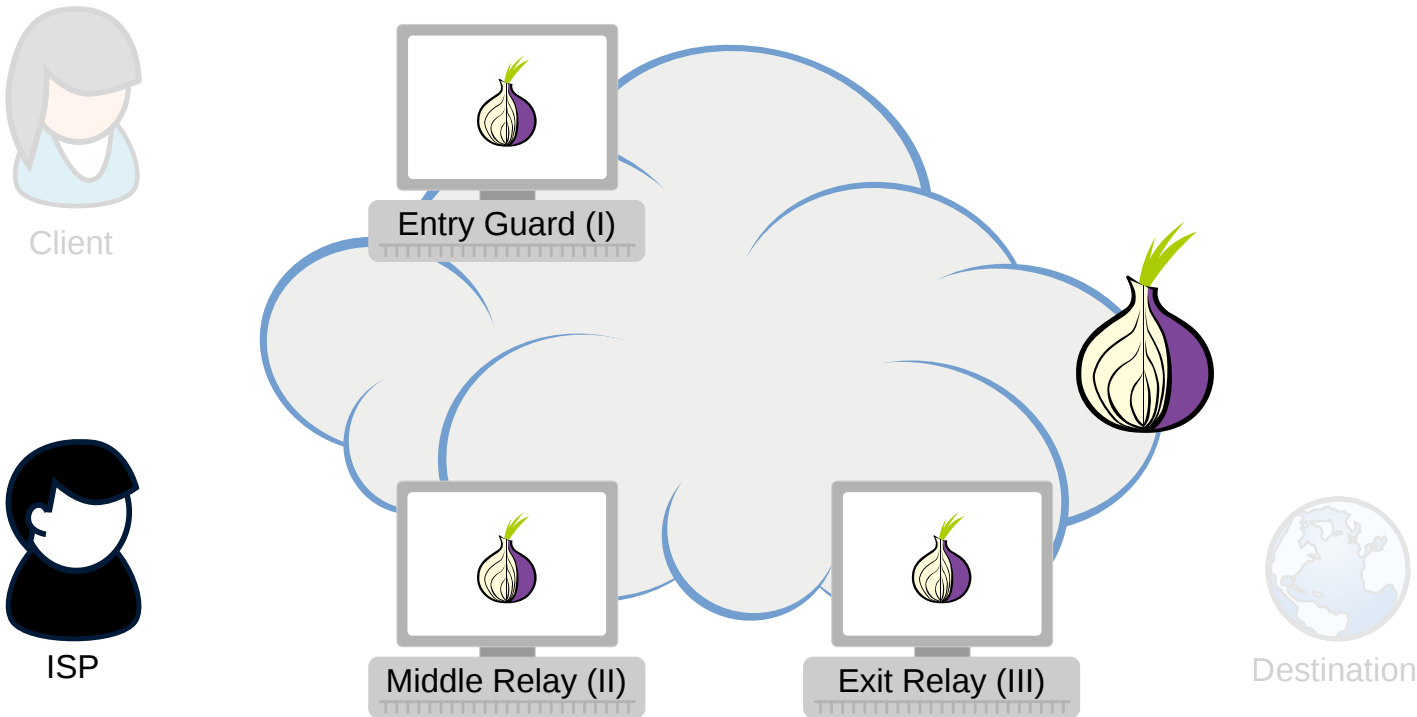


* - government

How Governments Censor Tor



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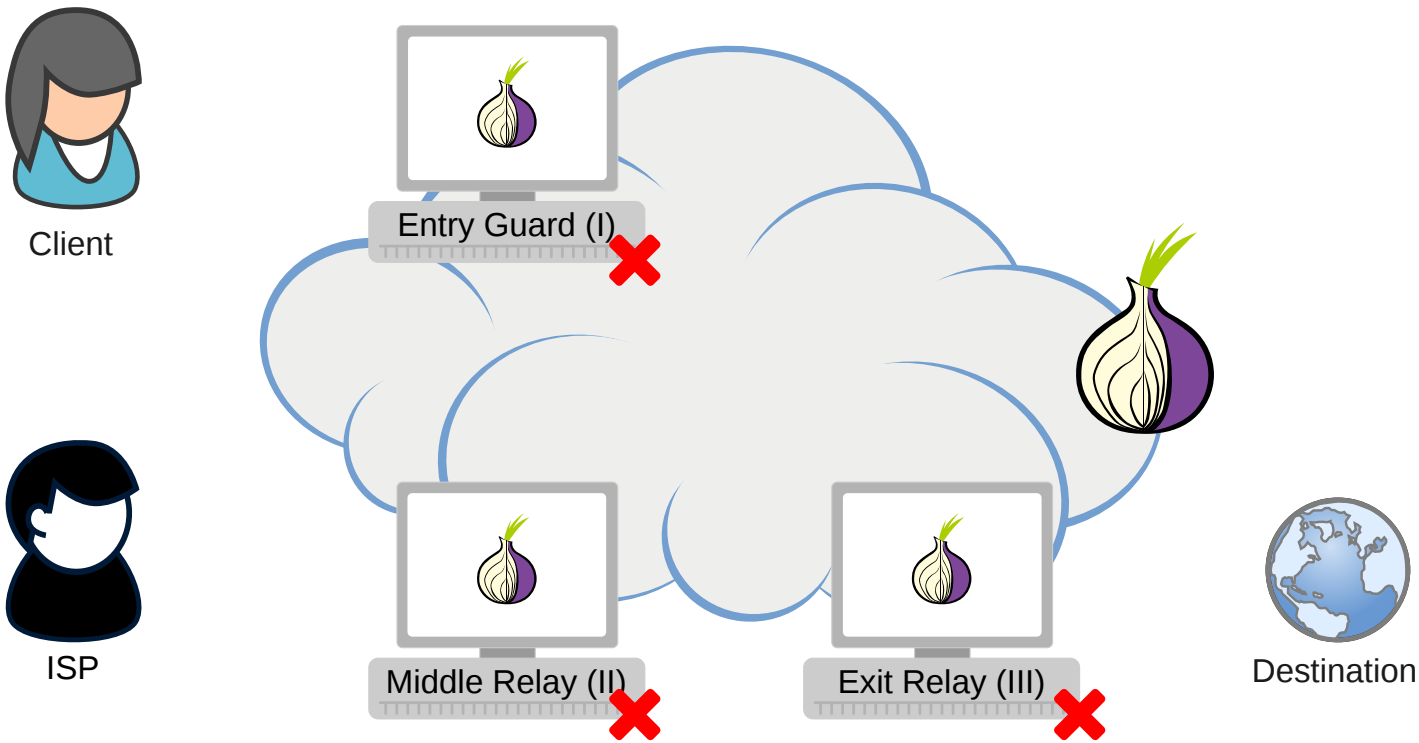

Tor Bridges

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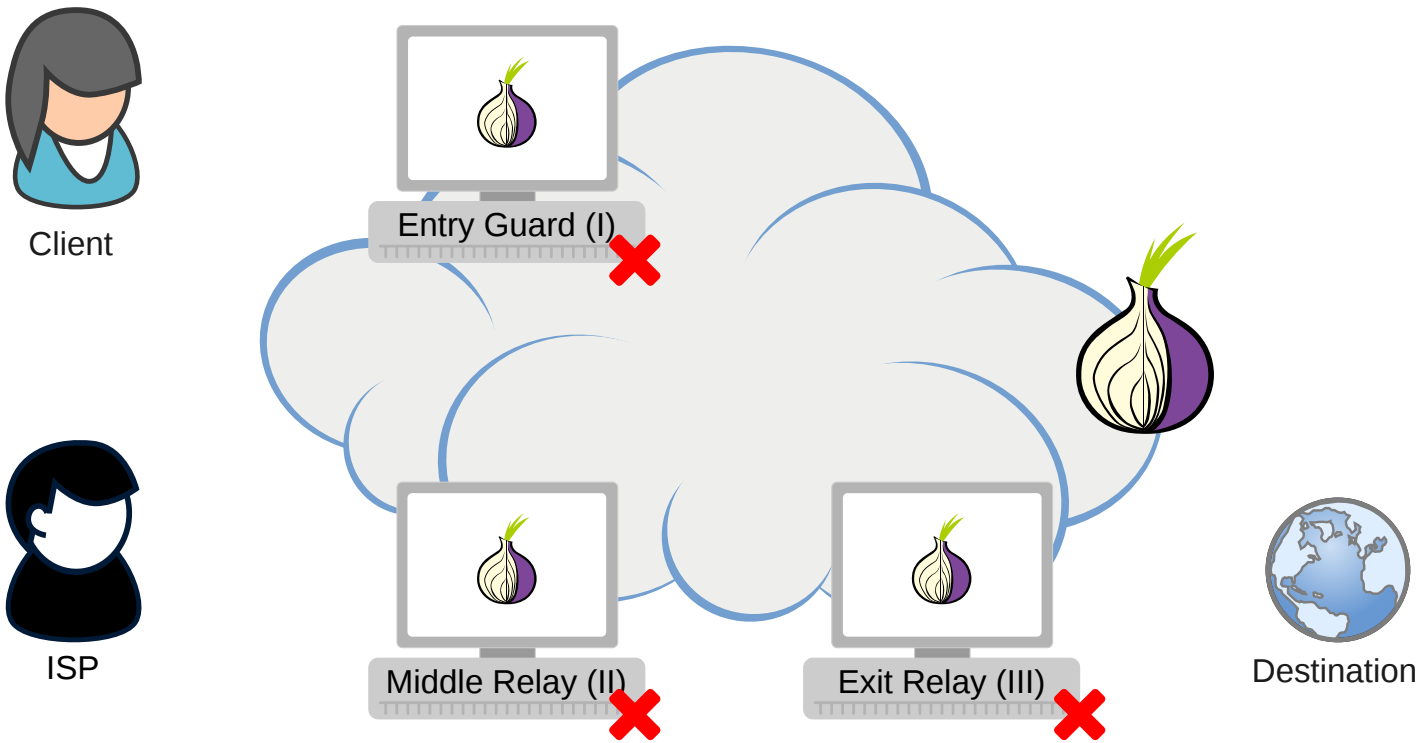
- Get *bridges* from `https://bridges.torproject.org`

Using Tor Bridges



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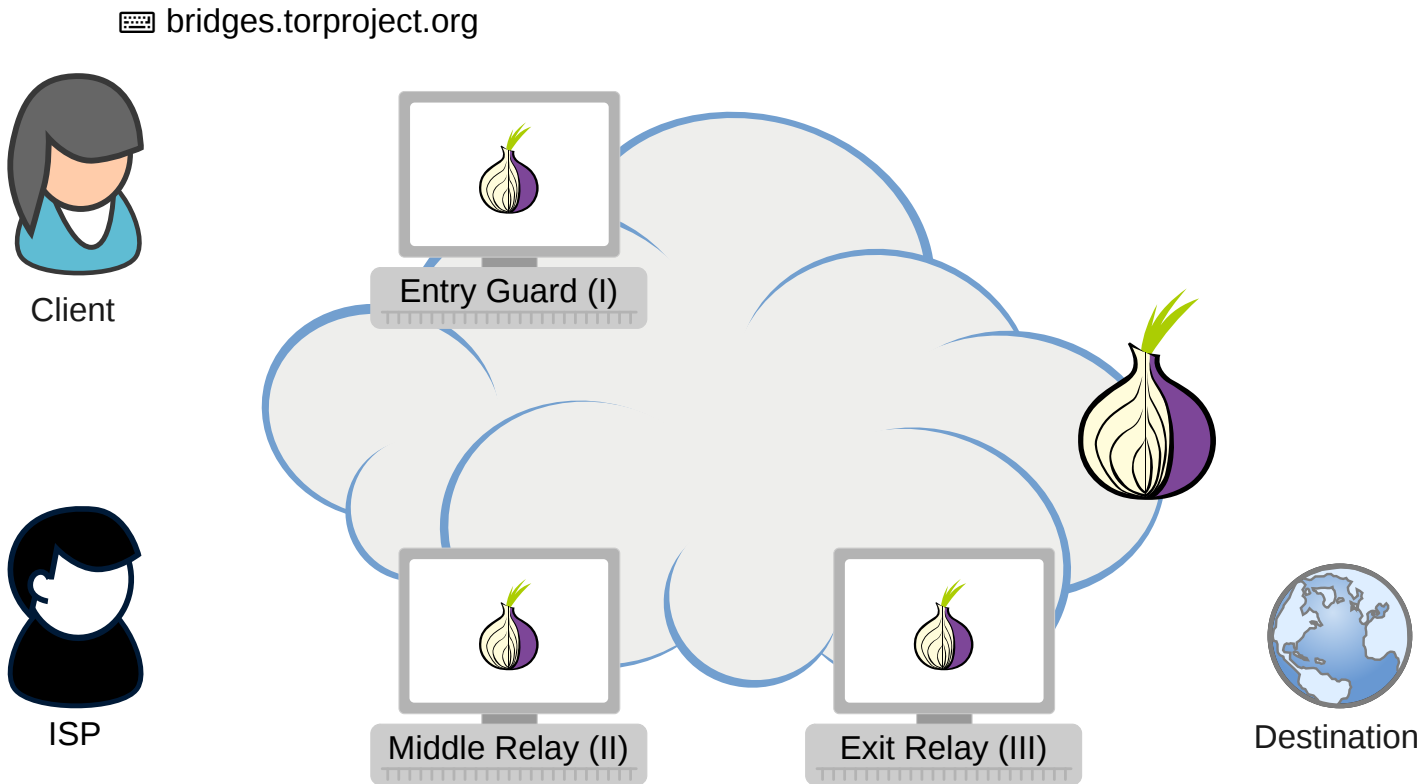

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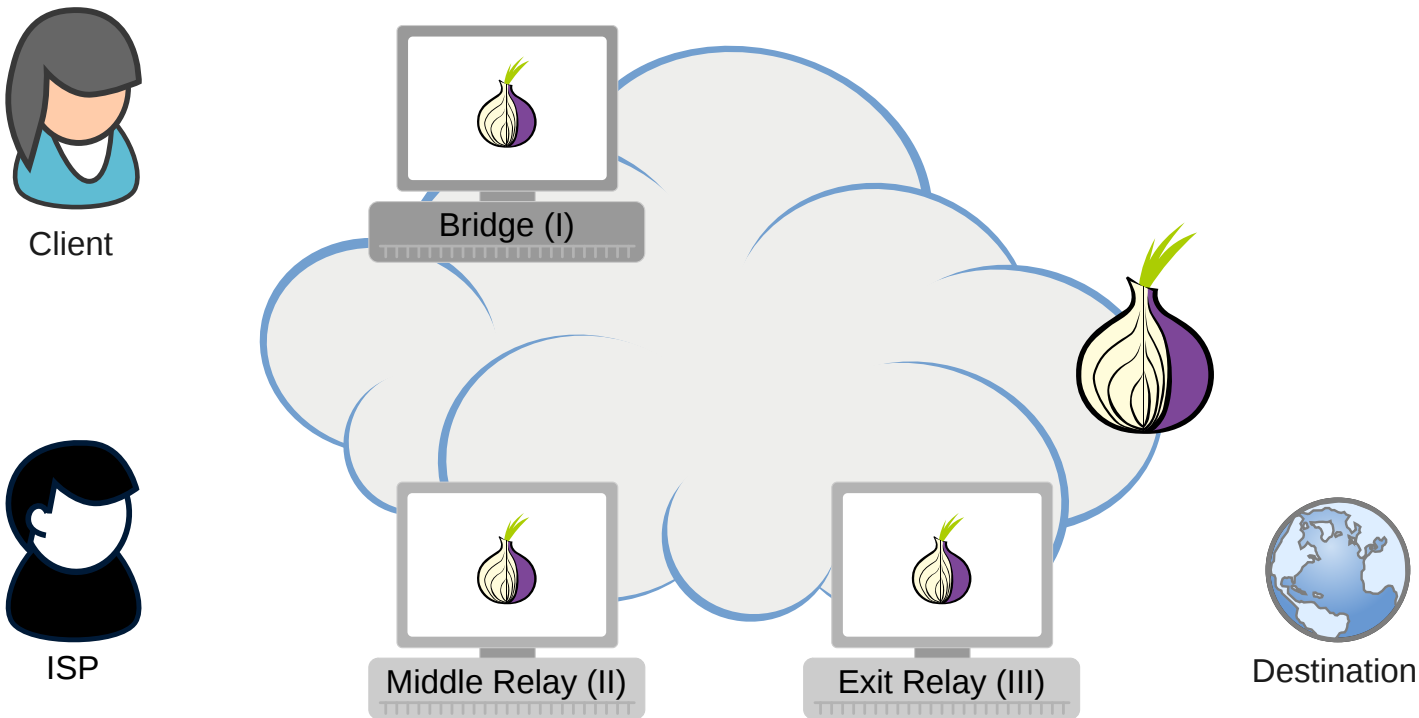

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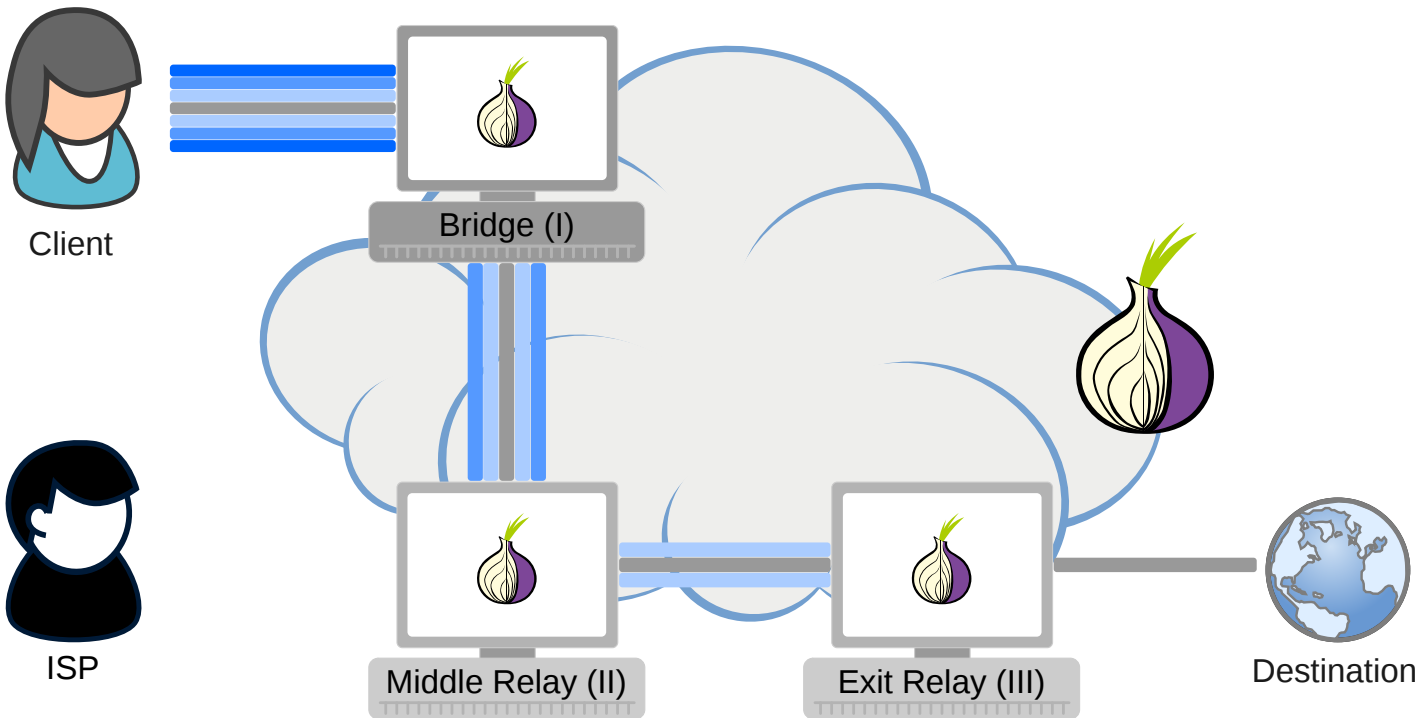
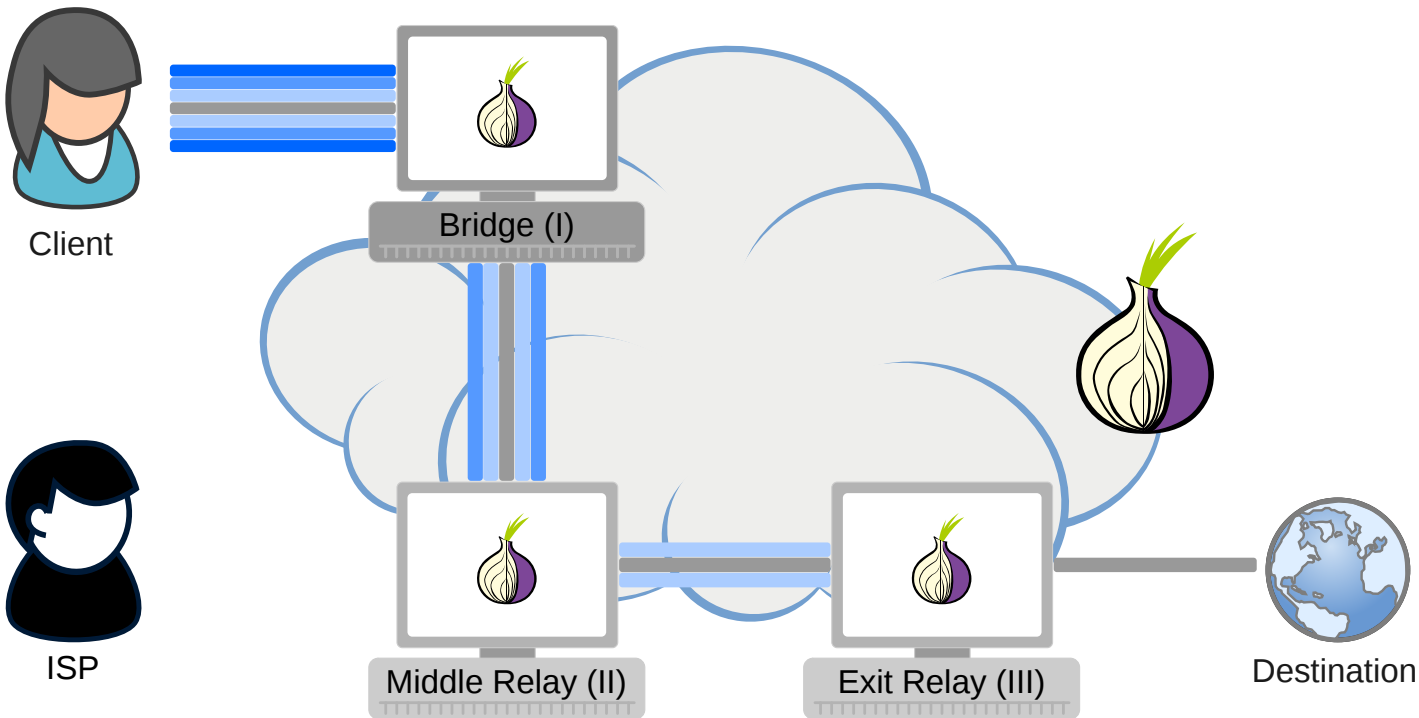


How Governments Censor Tor: Part II



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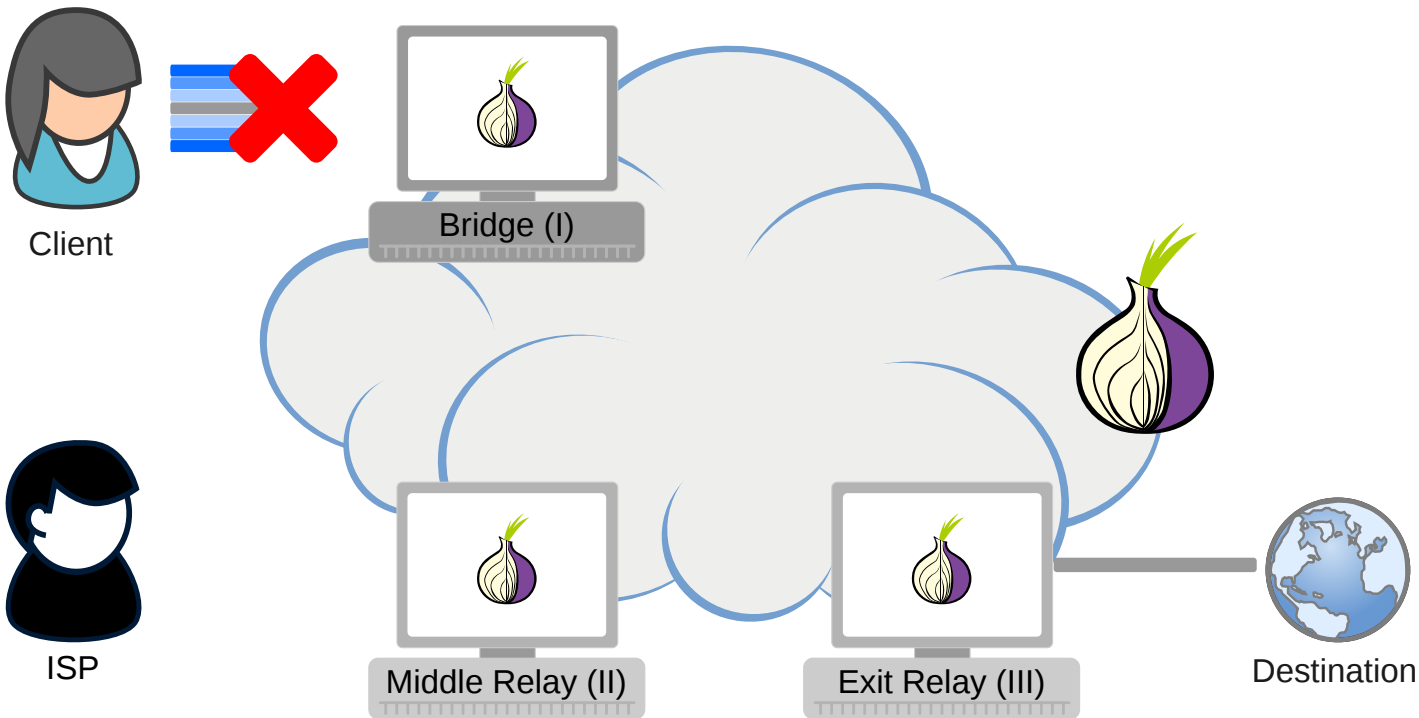

Pluggable Transports (PT)

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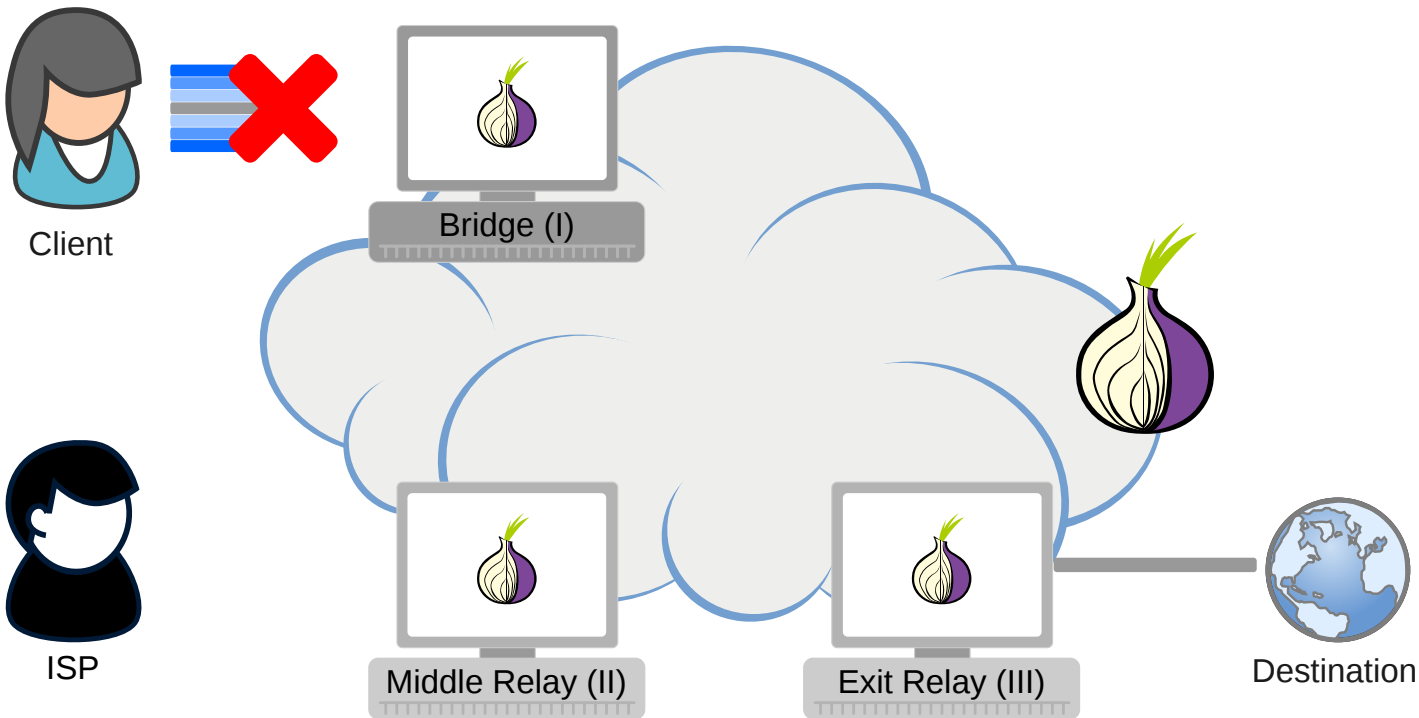
- *PT* transforms Tor traffic between client and the bridge
  - censors see innocent-looking traffic instead of Tor
- Use a *bridge* with a *PT* (obfuscated bridge)

Using Pluggable Transports and Bridges



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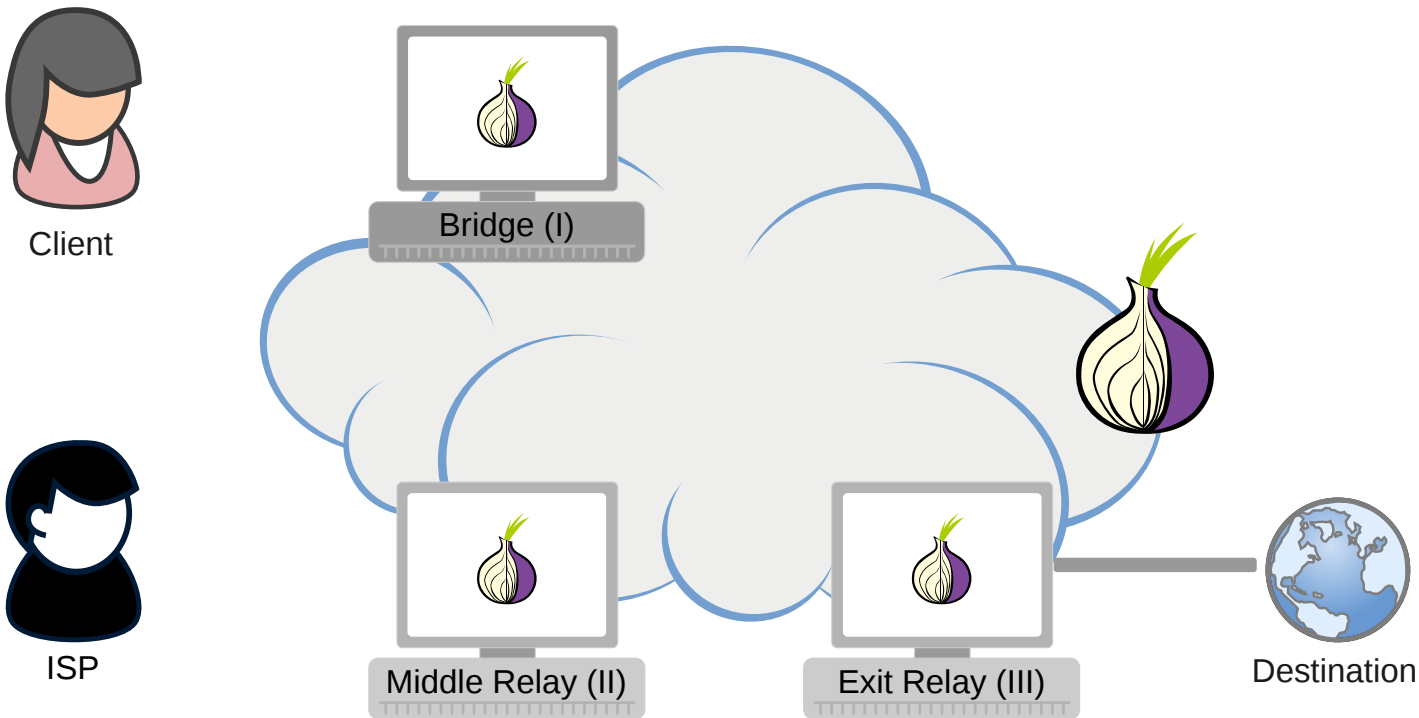

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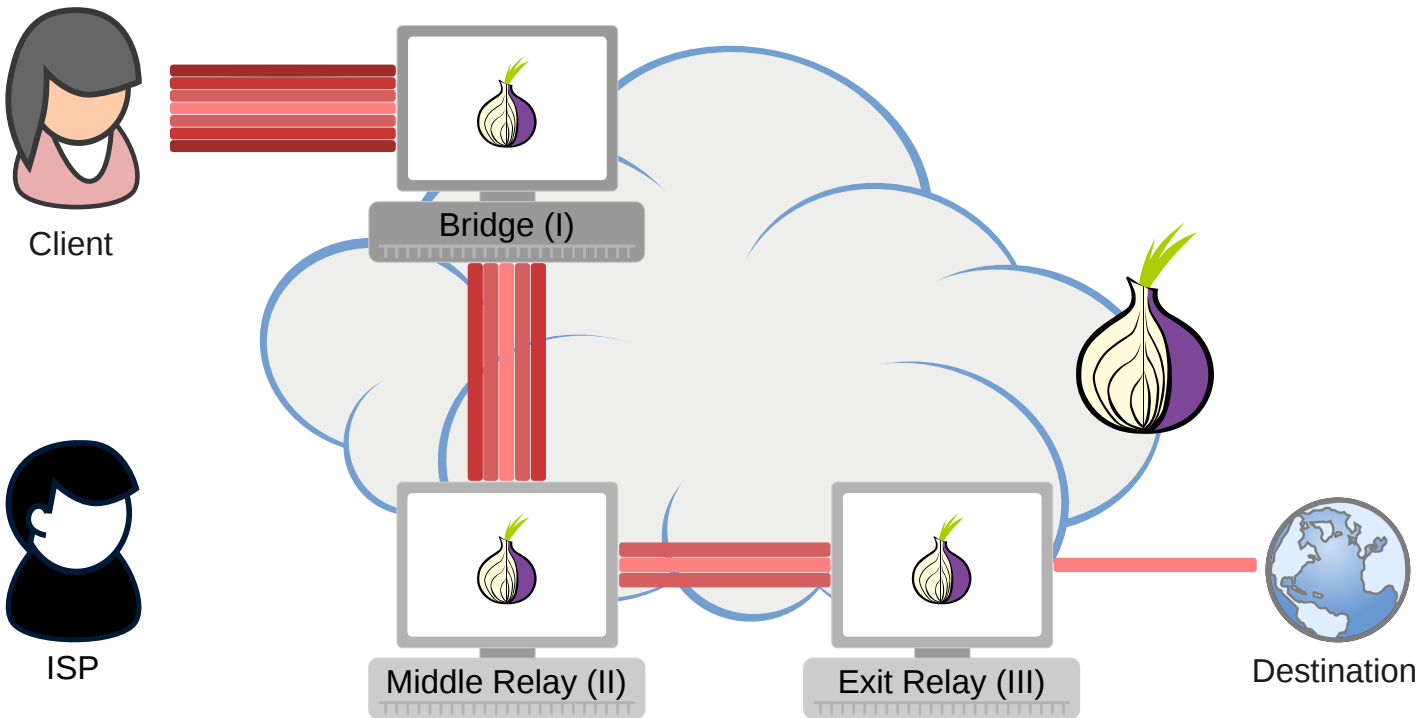
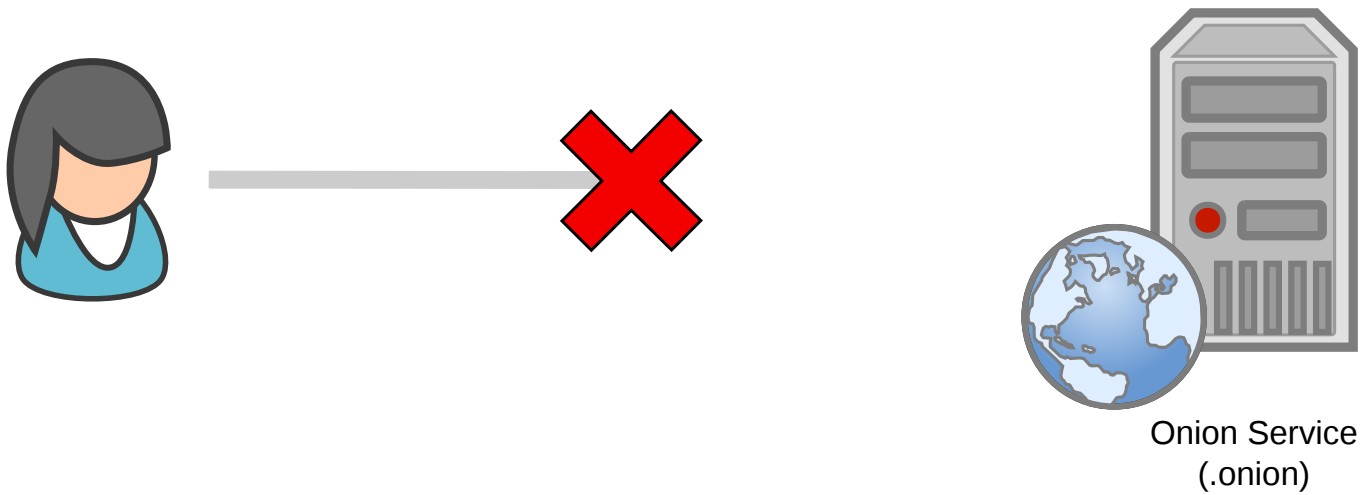


Bridges and Pluggable Transports: Demo

Using Tor Browser

Onion Services

Onion Services



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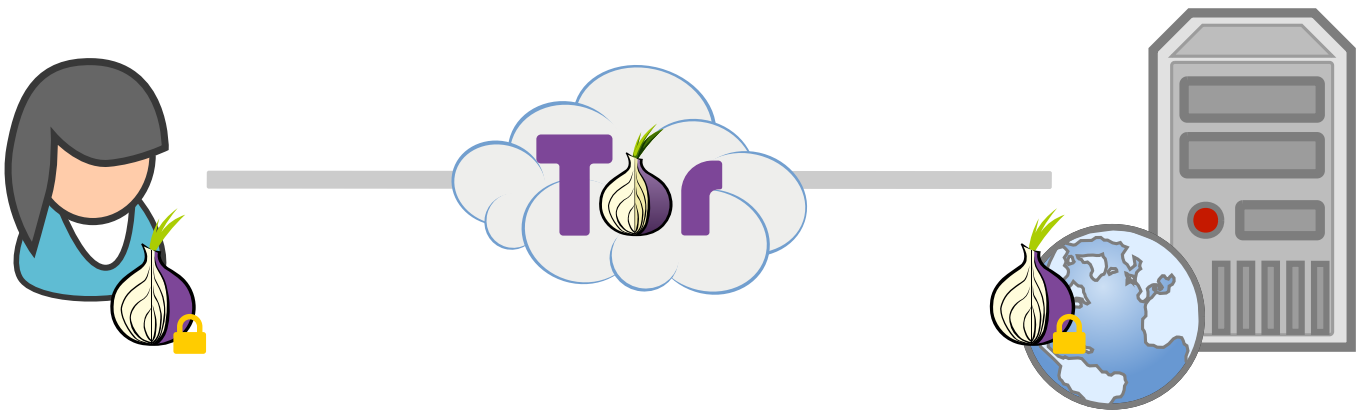

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- Clients can be assured they are talking to the right address
- The location and IP address of the onion service are hidden
  - making them difficult block or censor

Onion Services: Demo

The New York Times *Onion Service*:

`nytimes3xbfgragh.onion`

Tor vs. VPN

†	VPN	Tor	Tor Browser

† Modified under CC BY-SA 4.0. Original work by Tim Sammut from https://teamsammut.com/blog/2015/08/tor-vs-vpn-and-proxies-slides.html

Tor vs. VPN

†	VPN	Tor	Tor Browser
Censorship Evasion	++	+++	+++

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Appear Elsewhere	++	+	+
Anonymity	+	++	+++
Privacy	–	+	+++

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Tor vs. VPN

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Censorship Evasion	++	+++	+++
Appear Elsewhere	++	+	+
Anonymity	+	++	+++
Privacy	−	+	+++
Speed	++	−−	−−

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Appear Elsewhere	++	+	+
Anonymity	+	++	+++
Privacy	−	+	+++
Speed	++	−−	−−
Cost	−−	+++	+++

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Secure Web Browsing: Discussion

EFF Surveillance Self-Defense

https://ssd.eff.org

Thank You

Questions?

https://www.torproject.org/support/

sukhbir@torproject.org

E4AC D397 5427 A5BA 8450 A1BE B01C 8B00 6DA7 7FAA