DHS Tor Overview

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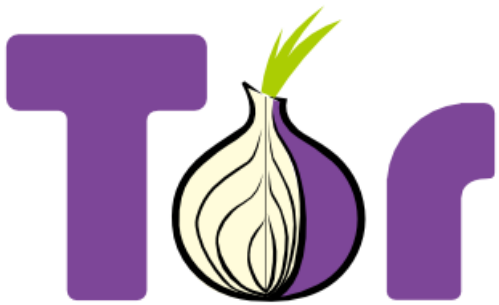


What are we talking about?

- Crash course on anonymous communications
- Quick overview of Tor
- Quick overview of Tor Hidden Services
- Future directions

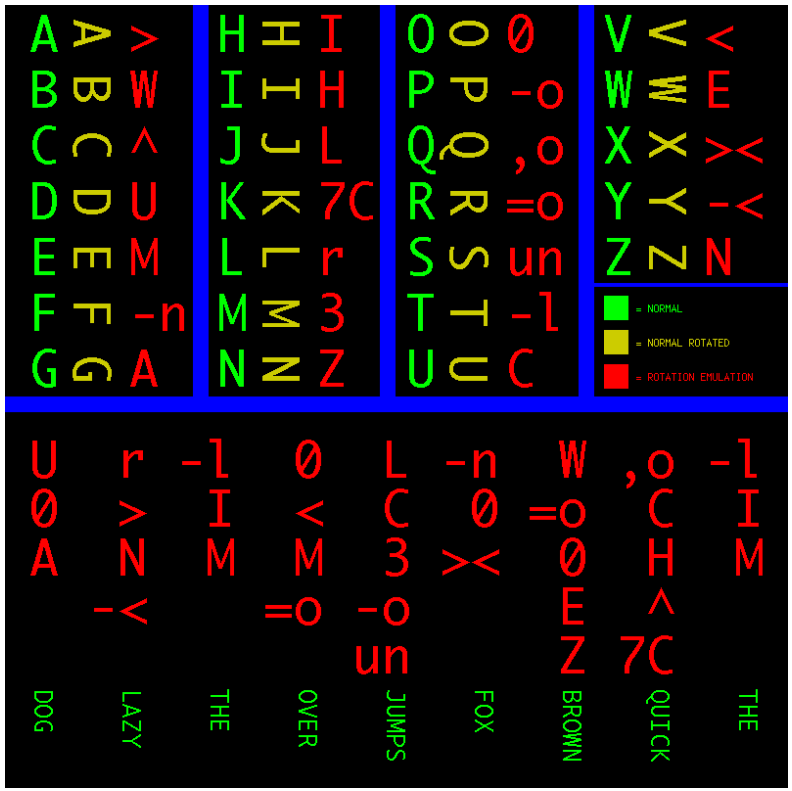
The Tor Project, Inc.

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

What is anonymity?

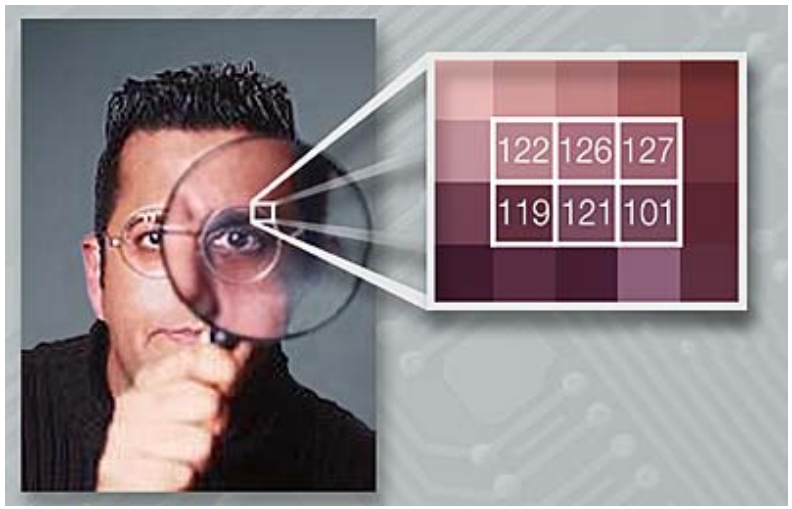
Anonymity isn't cryptography

- 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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- *"I didn't write my name on it!"* Not what we're talking about.
- *"Isn't the Internet already anonymous?"* Nope!

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-hop 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 attacks, 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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- active research environment:
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- increasingly diverse toolset:
  Tor, Tor Browser Bundle, Tails LiveCD, Tor Weather, Tor auto-responder, Secure Updater, Orbot, Torora, Tor Check, Arm, Nymble, Tor Control, and so on.

Other Systems

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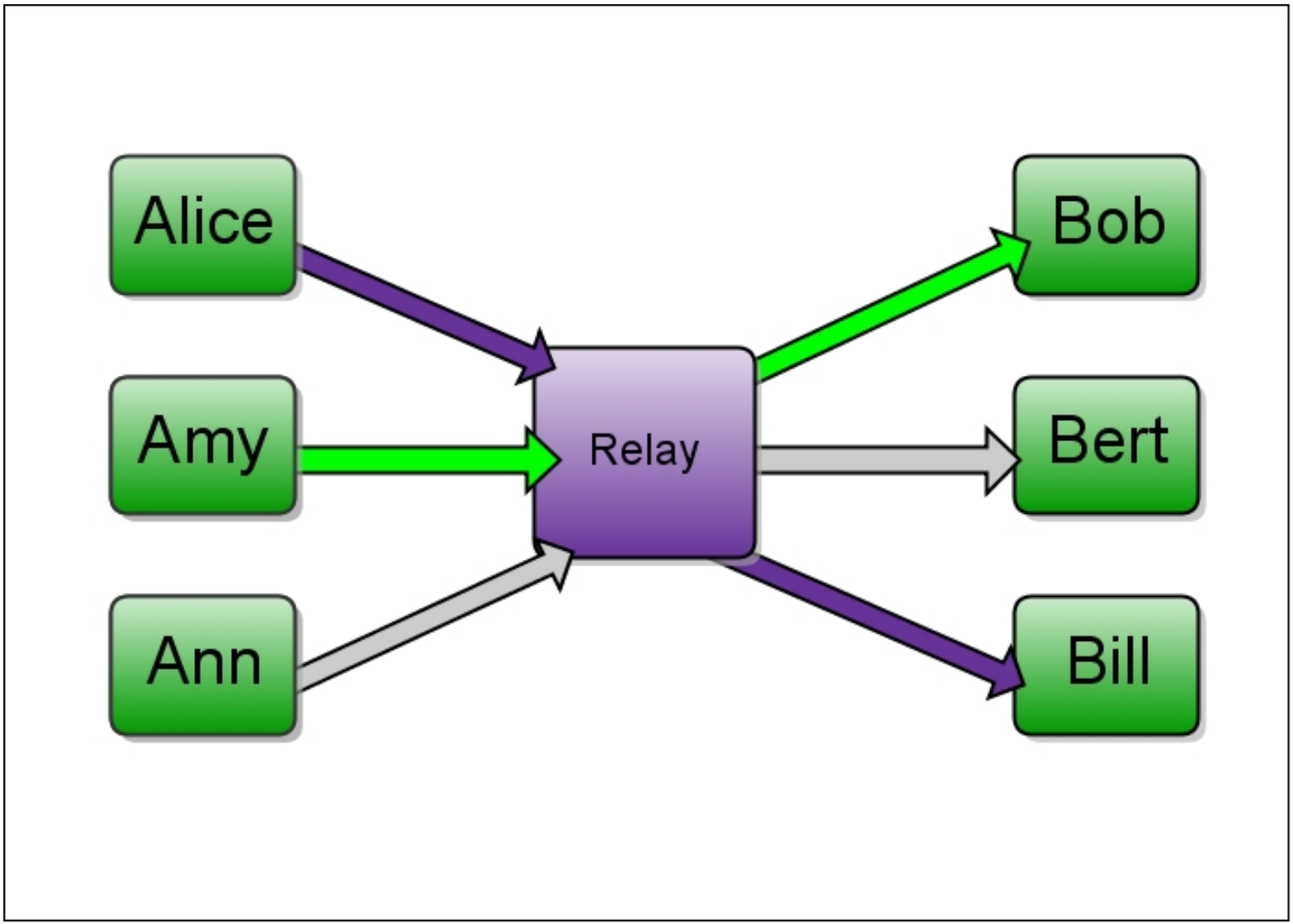
How is Tor different from other systems?



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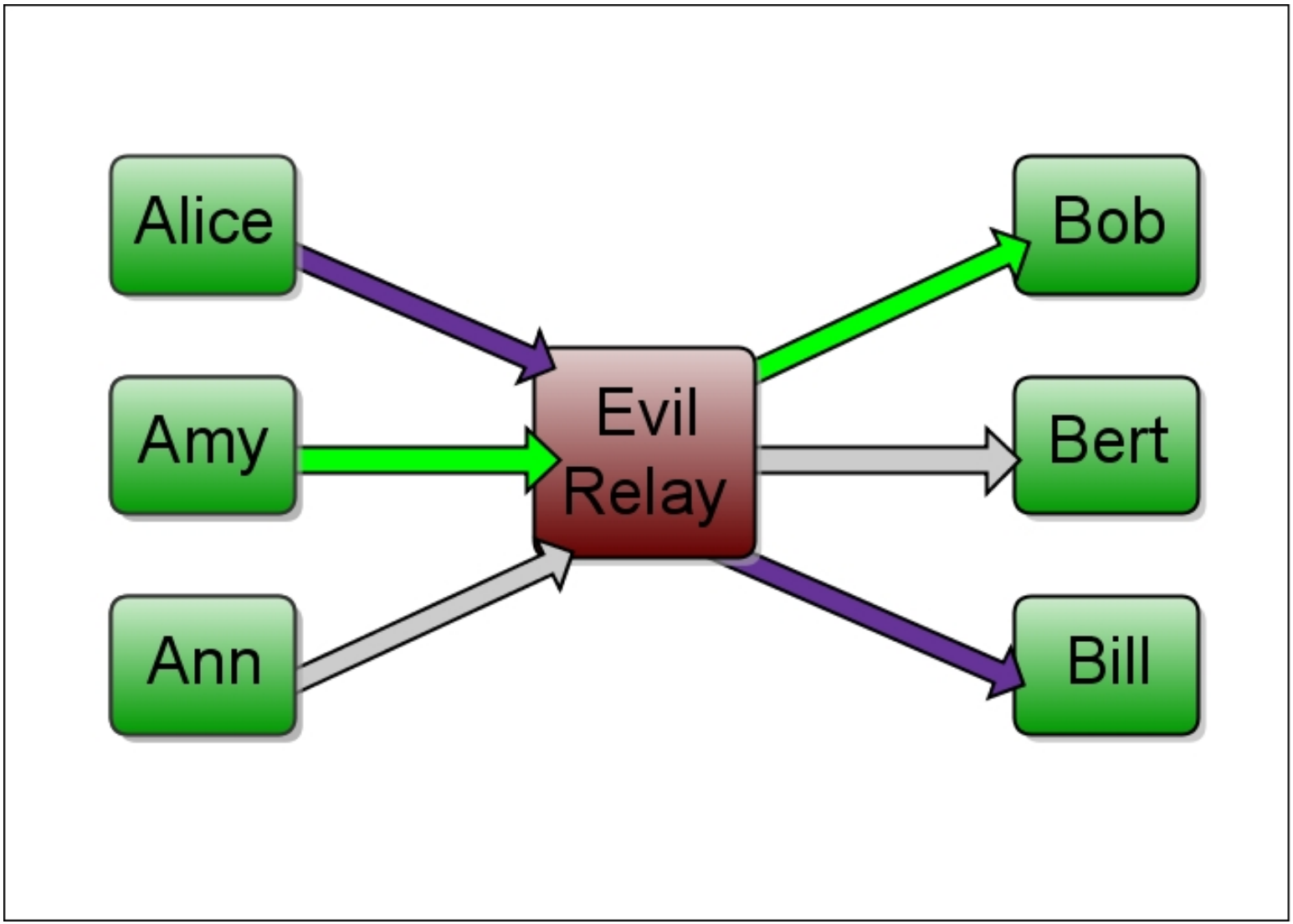

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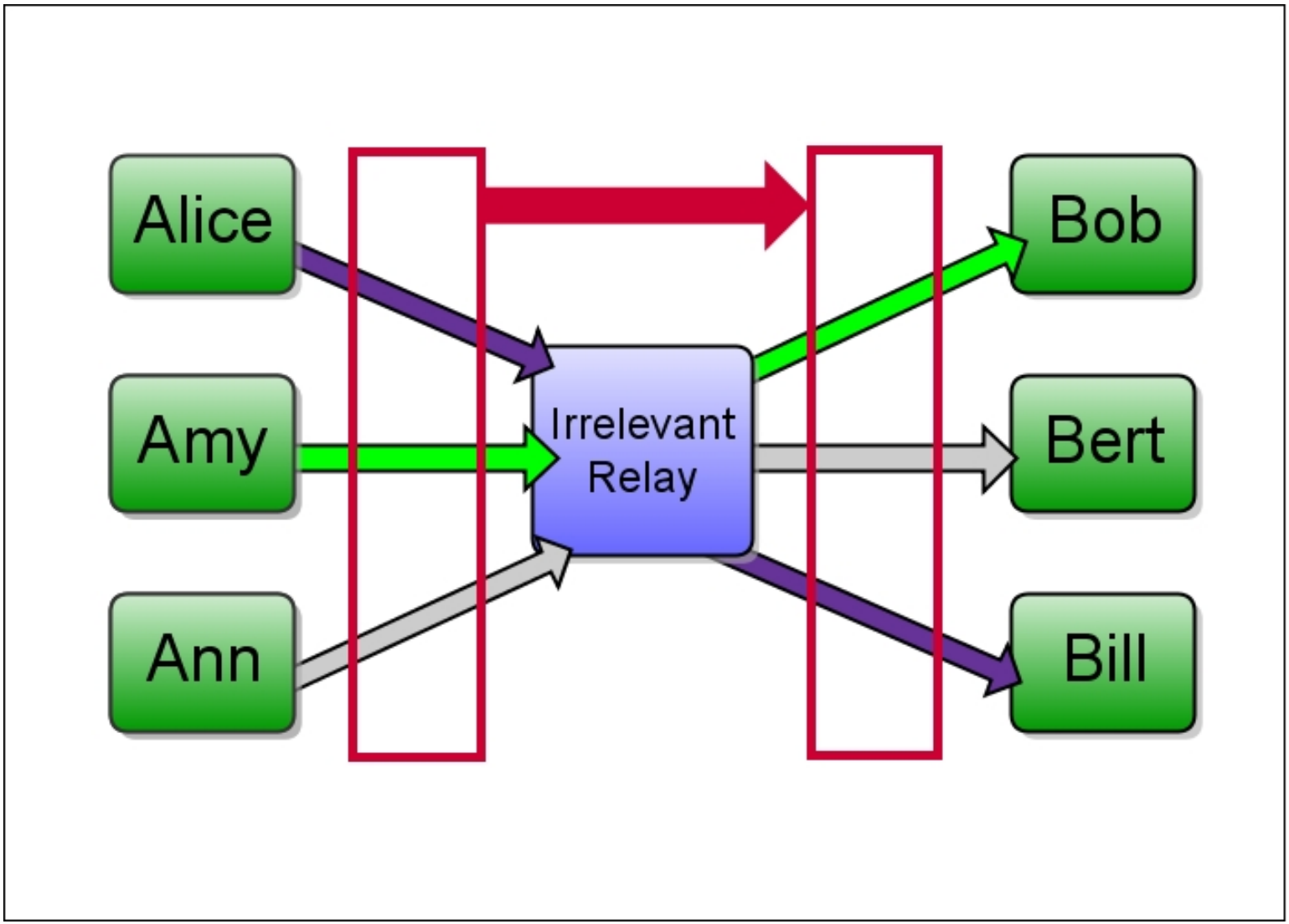
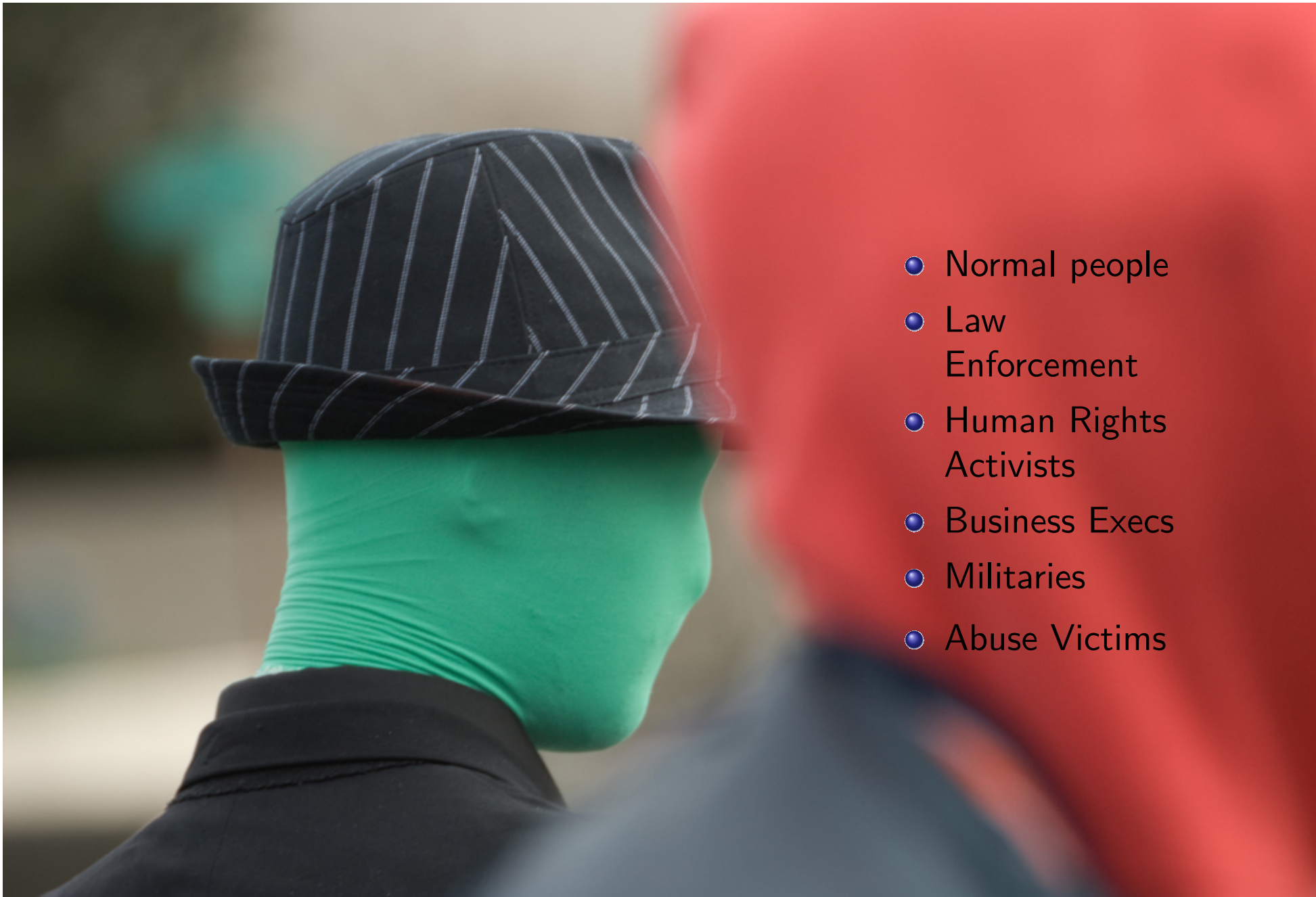


Who uses Tor?



- Normal people
- Law Enforcement
- Human Rights Activists
- Business Execs
- Militaries
- Abuse Victims

Who uses Tor?

- *Normal users*
  linking sensitive information to their current identities, online advertising networks, search engines, censorship circumvention

Who uses Tor?

- *Law enforcement*
  accidental disclosure to targets, family and friend concerns, separating work from home life

Who uses Tor?

- *Rights Activists*
  Personal safety, family safety, narrowly-defined publicity, censorship circumvention

Who uses Tor?

- *Business Execs*
  separating work from home life, competitor research, censorship circumvention

Who uses Tor?

- *Abuse Victims and Survivors*
  complete separation of past abuse and current life, finding help and safety, need to help others anonymously

Who uses Tor?

- *Militaries*
  intelligence gathering, separating work from home life, other activities

Doesn't Tor enable criminals to do bad things?

> *Criminals can already do bad things. Since they're willing to break laws, they already have lots of options available that provide better privacy than Tor provides.*

source:
https://www.torproject.org/docs/faq-abuse.html.en#WhatAboutCriminals

Breakdown of suspect traffic on the Internet

Category	*Percent*
Botnets	79.59
Malicious URLS	14.32
Antivirus	3.40
XSS	1.21
Cookie Stealing	1.07
Phishing	0.20
Browser Exploits	0.10
Adware & Spyware	0.07
WRI	0.02
Anonymizers	0.02

source: http://research.zscaler.com/2011/12/web-threats-trends-and-statistics.html

estimated 500k to 900k daily users

Tor hides communication patterns by relaying data through volunteer servers

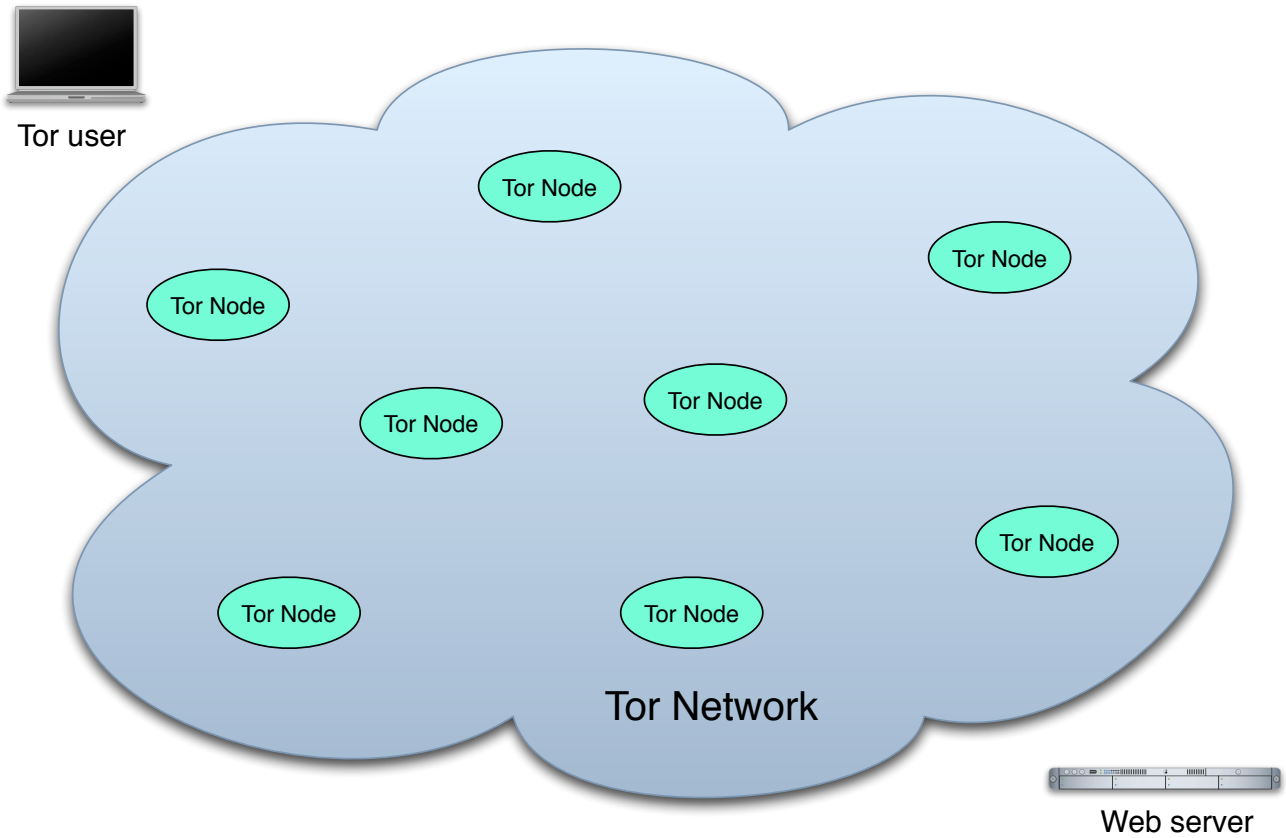


Diagram: Robert Watson

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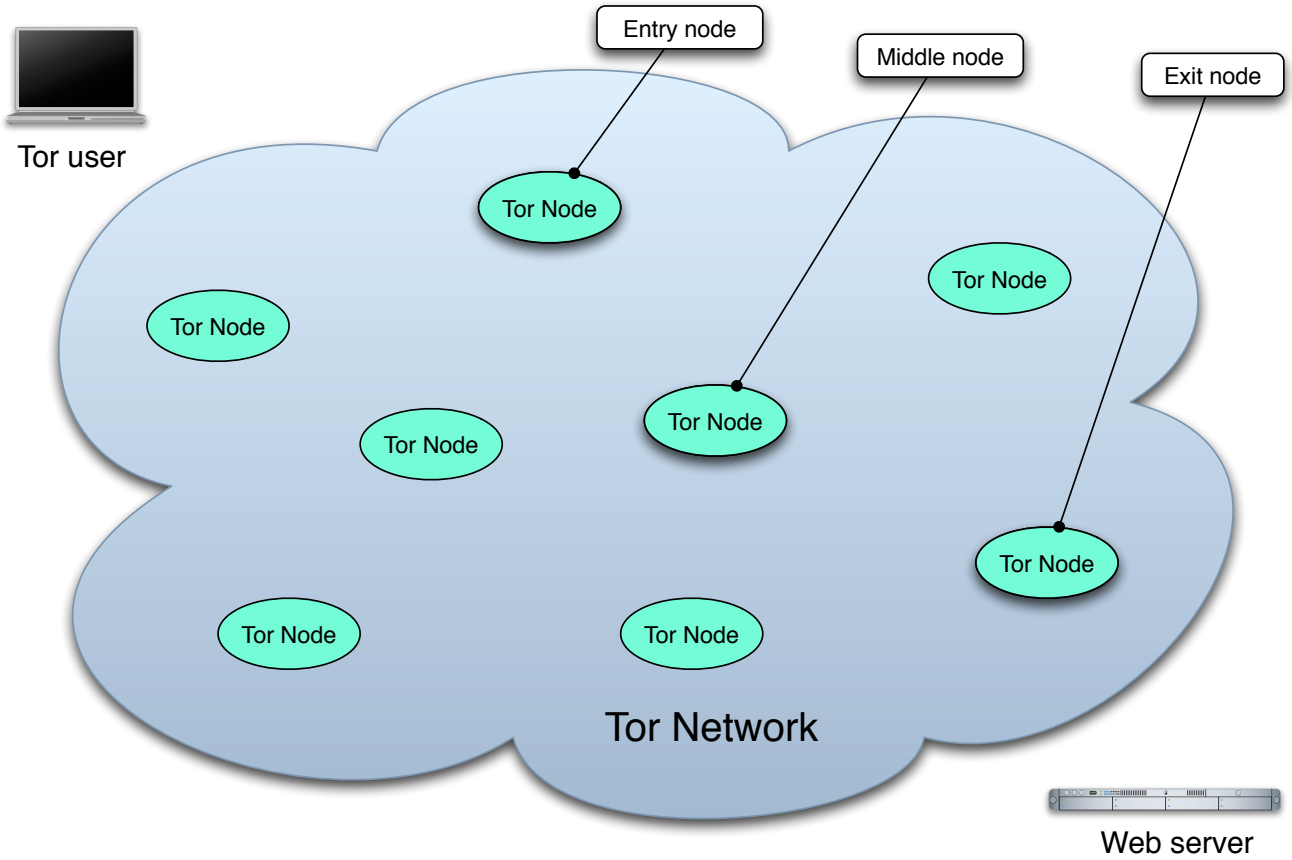

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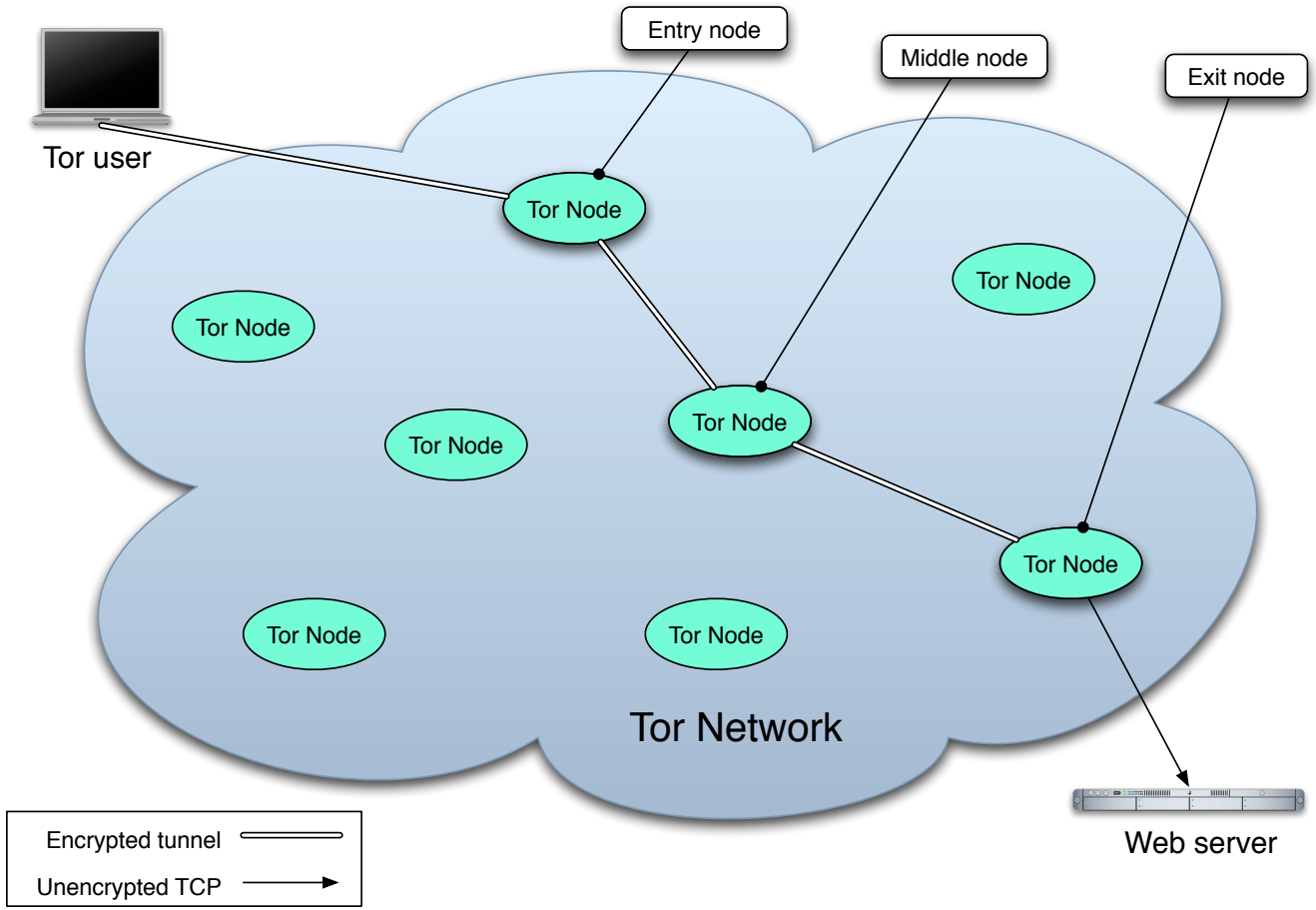

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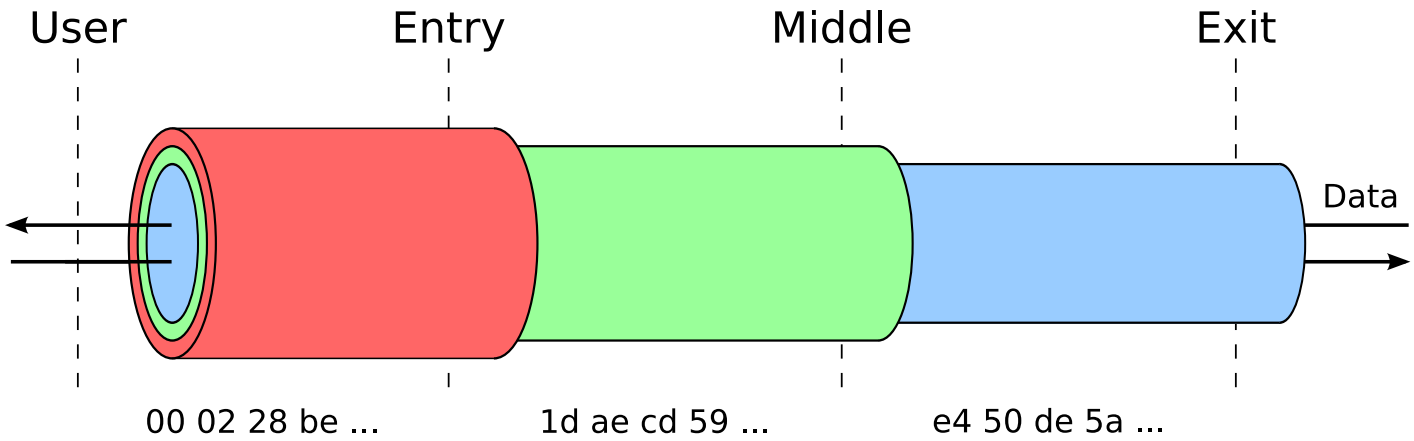

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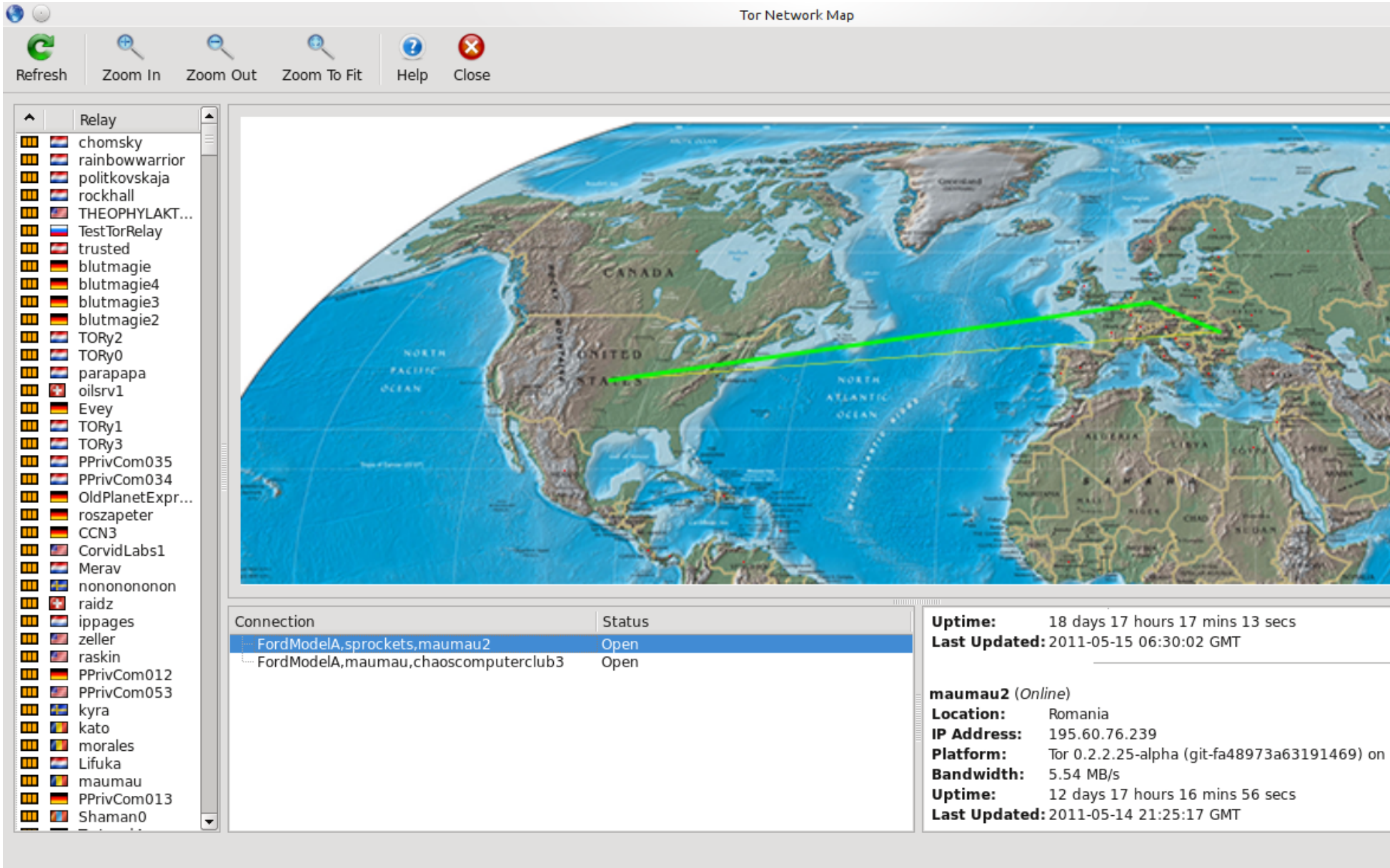
Vidalia Network Map



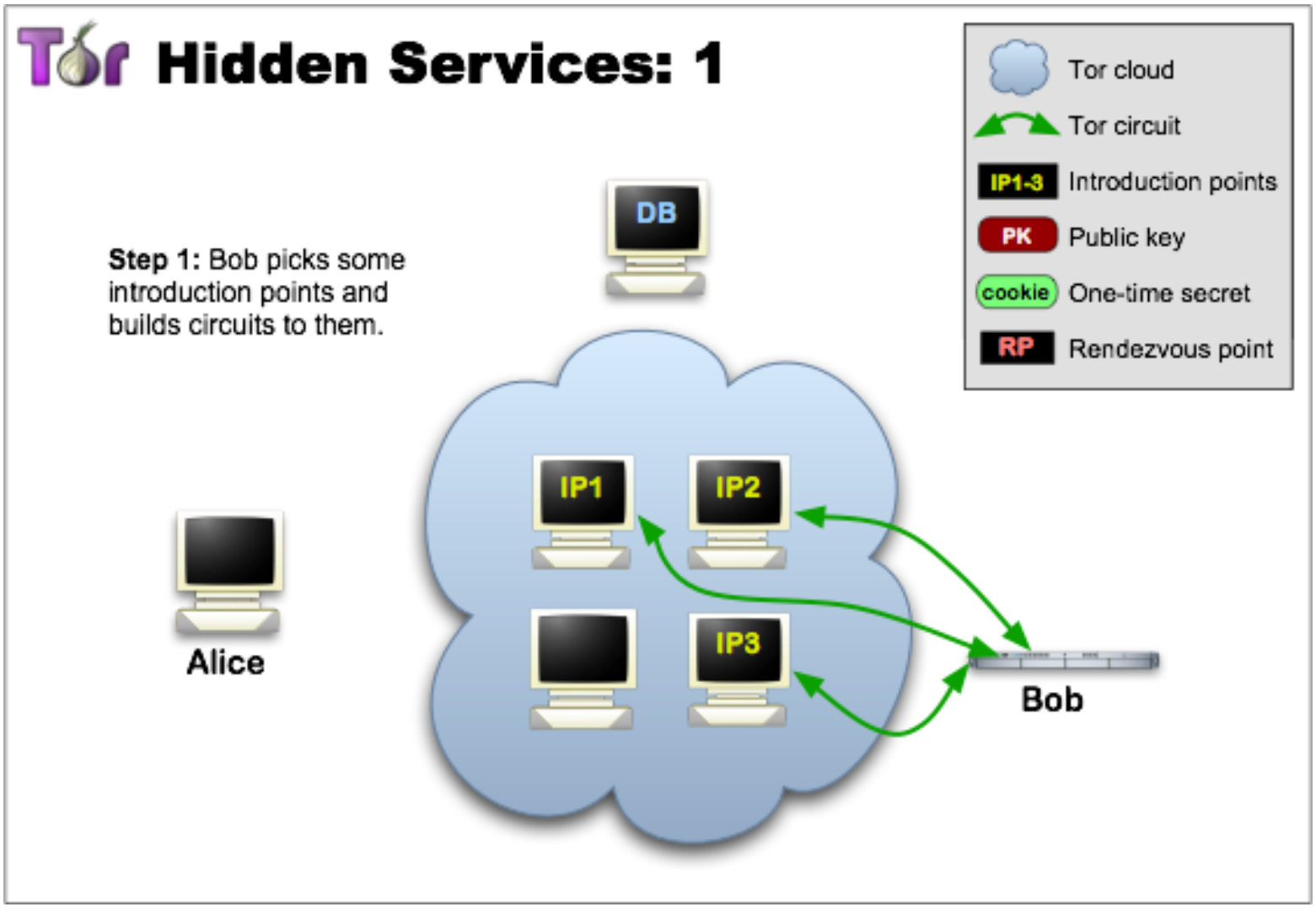
Metrics

- Measuring metrics anonymously
- NSF grant to find out
- Archive of hourly consensus, ExoneraTor, VisiTor
- Metrics portal:
  `https://metrics.torproject.org/`

Tor hidden services allow privacy enhanced hosting of services

dot onion you say?

Hidden Services, in graphics



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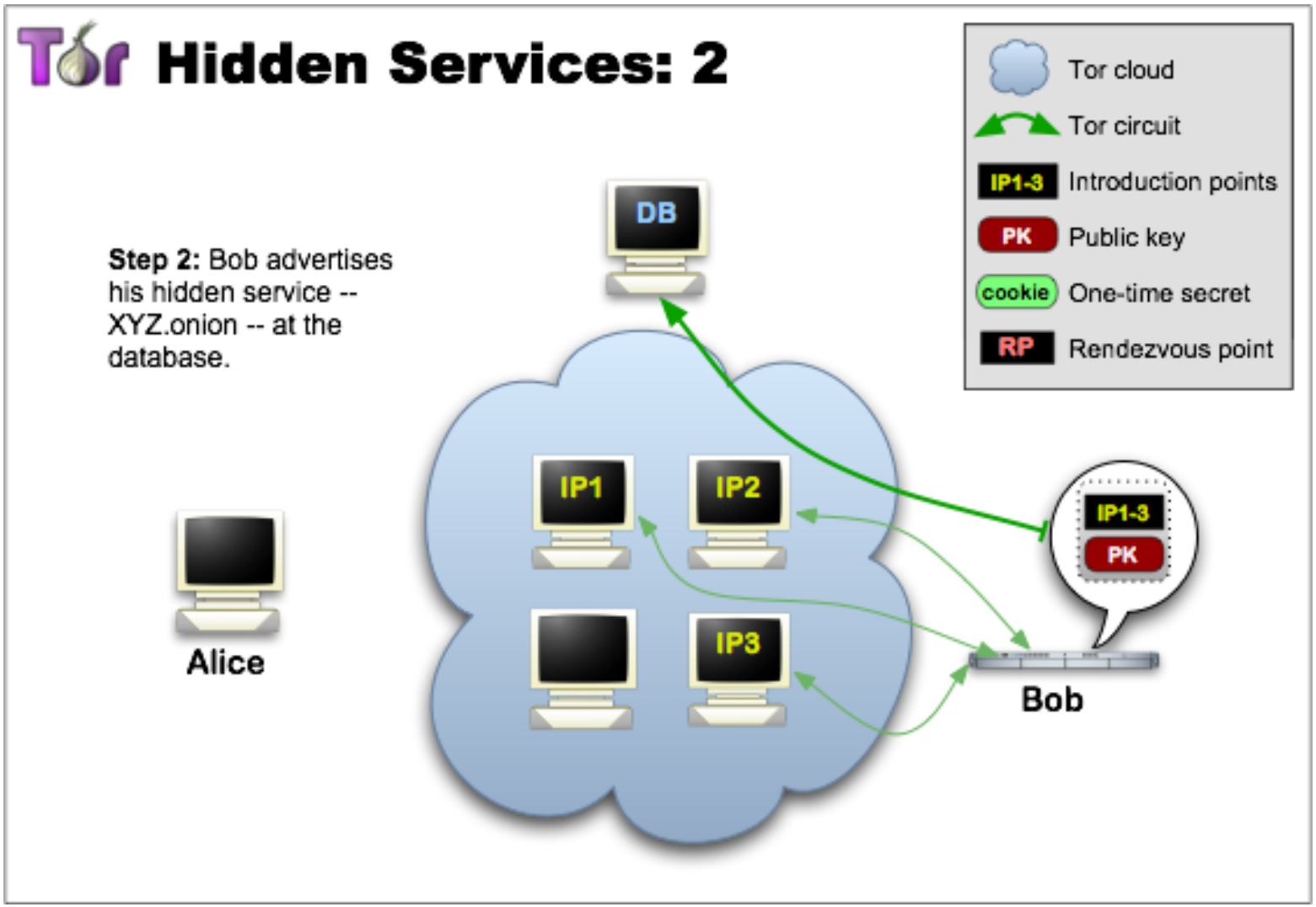

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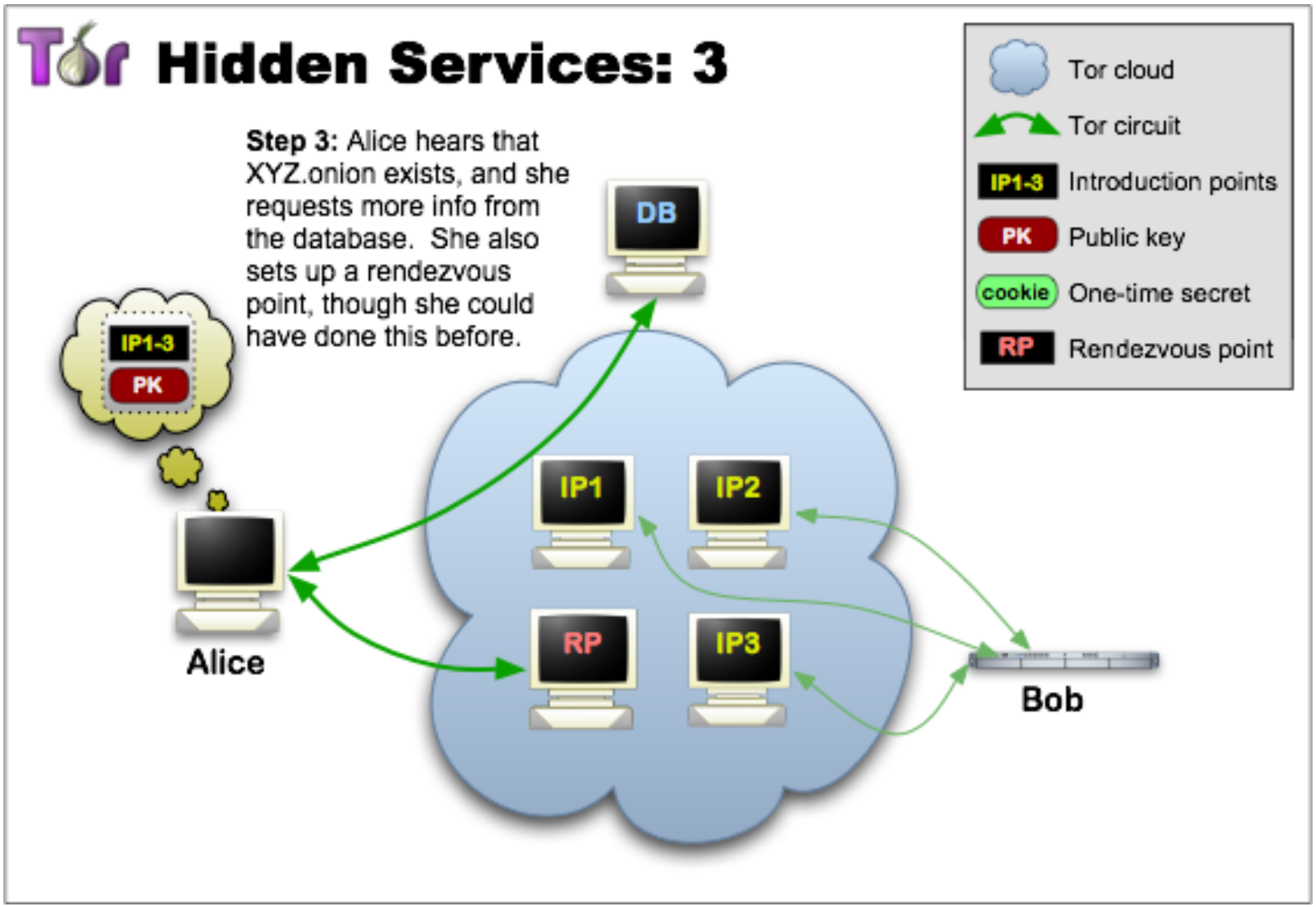

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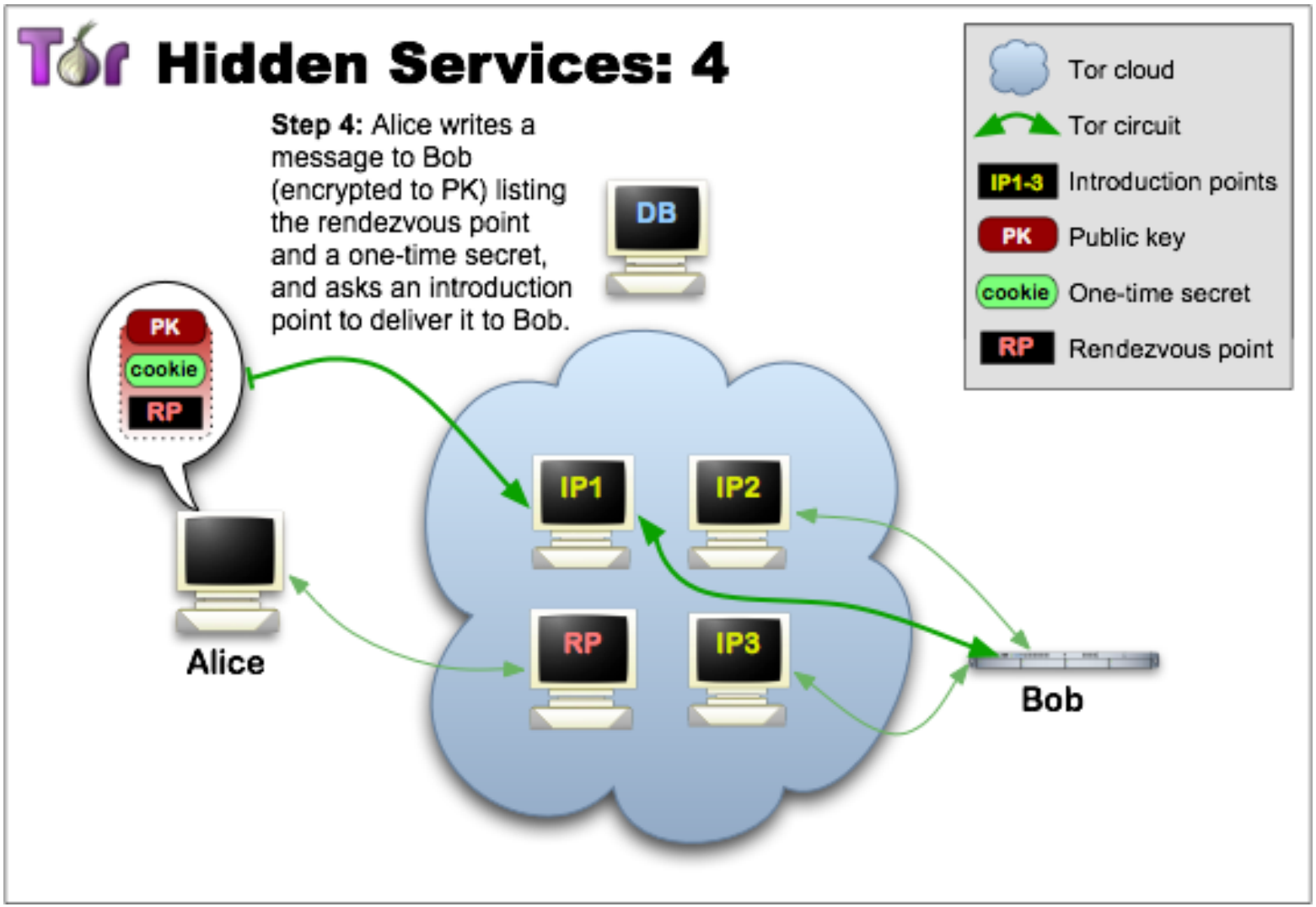

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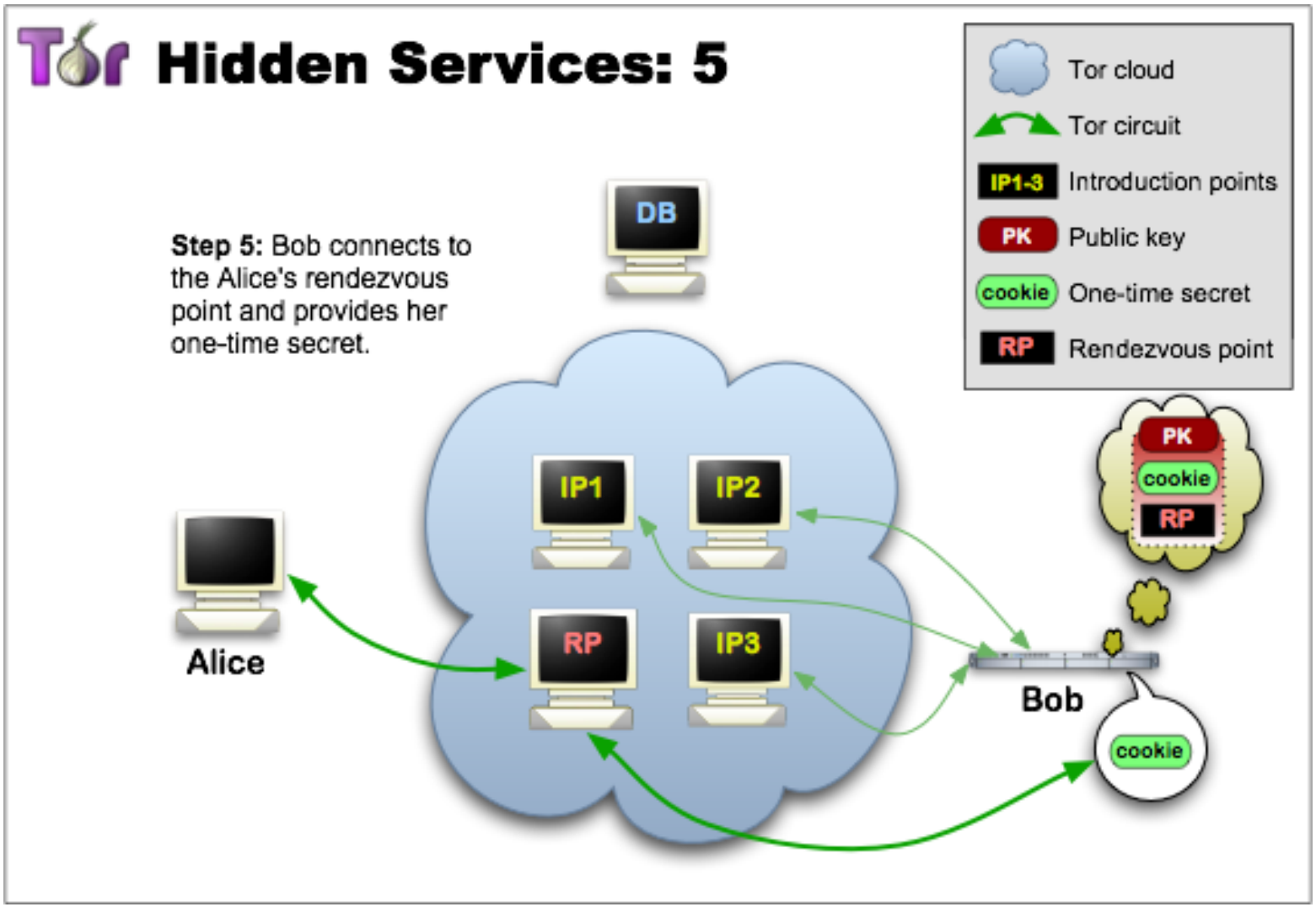

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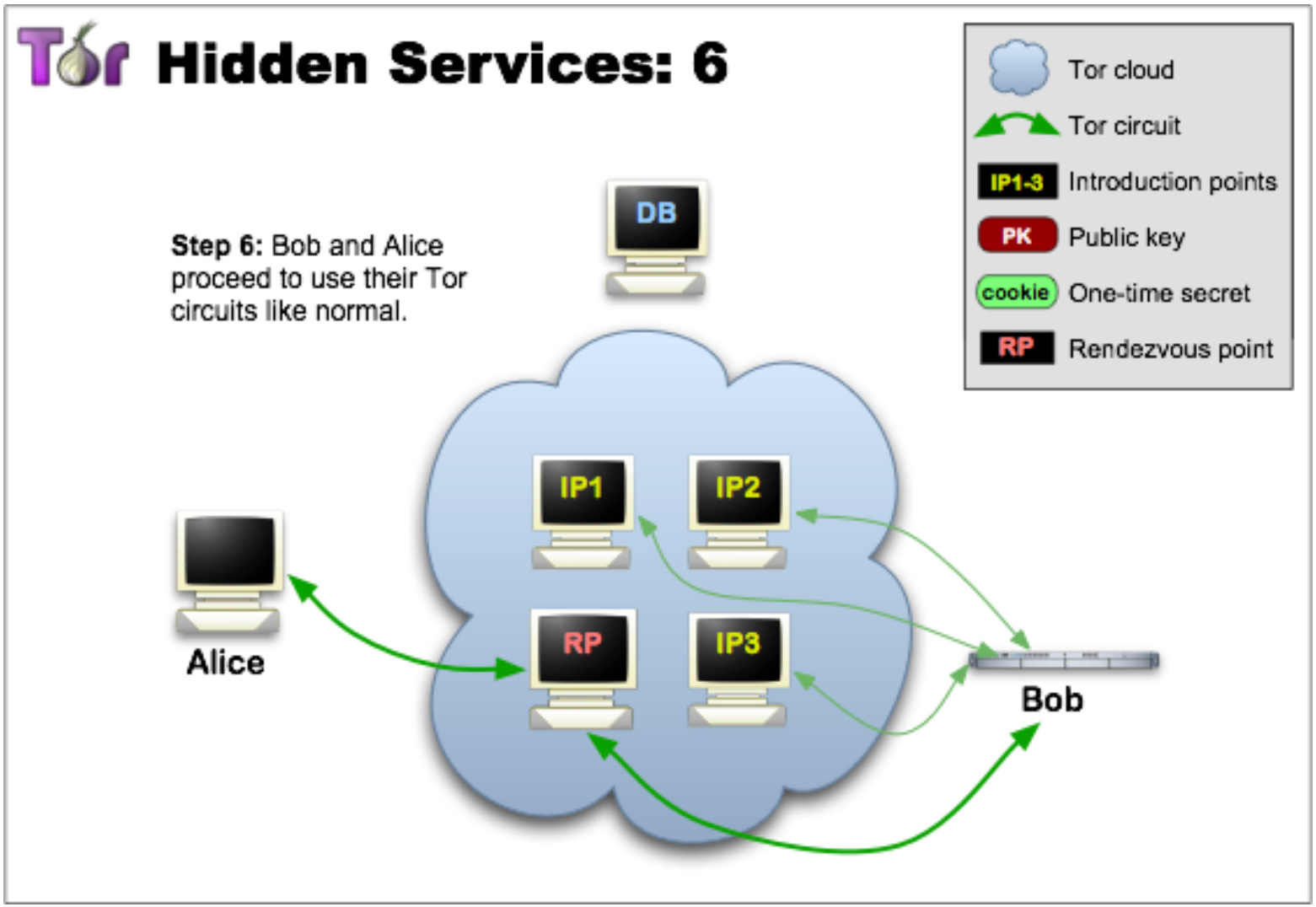

Operating Systems leak info like a sieve

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- Did you know Microsoft Word and OpenOffice Writer are browsers?
- `www.decloak.net` is a fine test

Mobile Operating Systems

- Entirely new set of challenges for something designed to know where you are at all times.
- Orbot: Tor on Android. `https://guardianproject.info/apps/`
- Tor on iphone, maemo/meego, symbian, etc
- Tor on Windows Mobile, `http://www.gsmk.de` as an example.
- Guardian Project, `https://guardianproject.info/`

Thanks!

Visit `https://www.torproject.org/` for more information, links, and ideas.

Credits & Thanks

- who uses tor? `http://www.flickr.com/photos/mattw/2336507468/siz`, Matt Westervelt, CC-BY-SA.
- danger!, `http://flickr.com/photos/hmvh/58185411/sizes/o/`, hmvh, CC-BY-SA.
- 500k, `http://www.flickr.com/photos/lukaskracic/334850378/sizes/l/`, Luka Skracic, used with permission.
- zscaler research, http://research.zscaler.com/2011/12/web-threats-trends-and-statistics.html