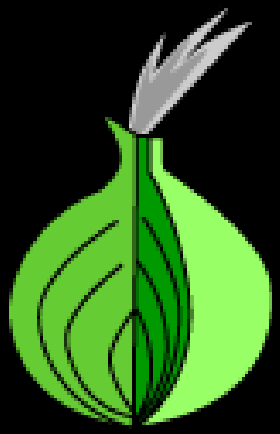
Internet Dagarna 2009:
Allt du gör kan användas mot dig



Jacob Appelbaum
The Tor Project
https://www.torproject.org/

Tor: Big Picture

- Freely available (Open Source), unencumbered.
- Comes with a spec and full documentation: Dresden and Aachen implemented compatible Java Tor clients; researchers use it to study anonymity.
- 1500 active relays, 200000+ active users, >1Gbit/s.
- Official US 501(c)(3) nonprofit. Eight funded developers, dozens more dedicated volunteers.
- Funding from US DoD, Electronic Frontier Foundation, Voice of America, Human Rights Watch, Google, NLnet, ...you?
- Privacy and anonymity by *Design!*

Tor & Sustainability

- Tor has a community of developers and volunteers.
- Commercial anonymity systems have flopped or constantly need more funding for bandwidth.
- Our sustainability is rooted in Tor's open design: clear documentation, modularity, and open source.
- Come join us; we'd love to have you on board.

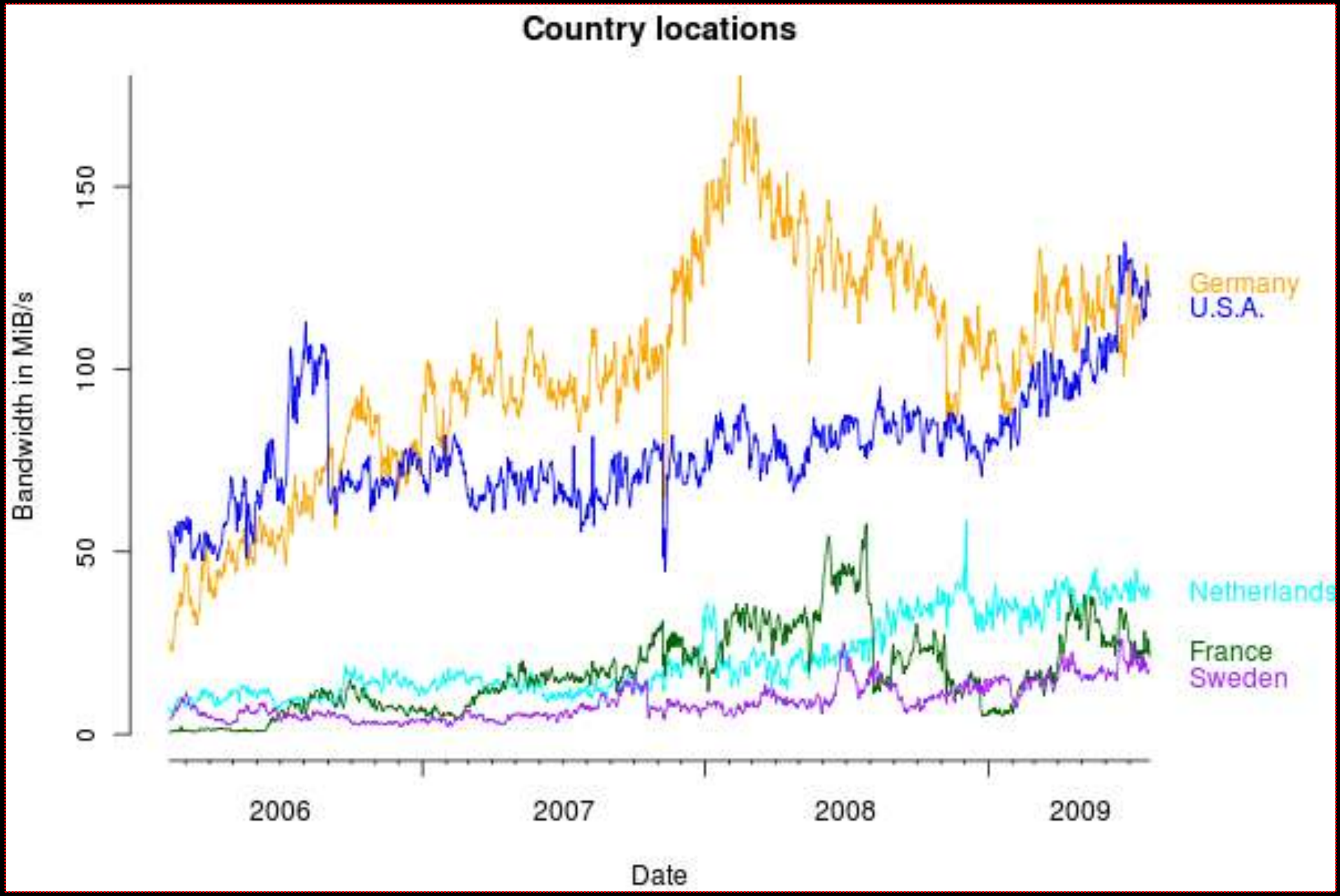
Privacy by Design
(http://www.privacybydesign.ca/)

The philosophical ideas of Privacy by Design:

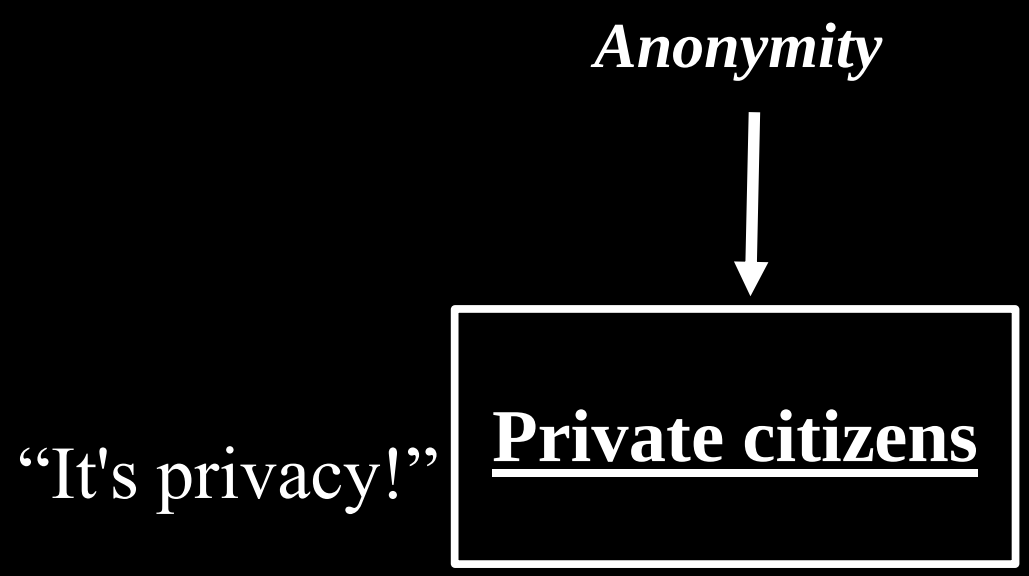
Proactive and Preventative
Privacy is *the* default
Privacy is a *core* component of design
Privacy does not limit functionality
Full protection during a products life cycle
Visibility and Transparency
Respect for a users privacy

Tor: The Swedish Picture

- Sweden has a world wide reputation of respecting, promoting and enhancing human rights.
- As of Nov 4th, 2009 there are currently ~63 *relays* in Sweden.
- These relays account for ~20 - 25Mb/s of advertised bandwidth.
- Support comes from **private individuals**, *educational institutions* and many others; everyone decides their own level of participation.


Country locations
Bandwidth in MiB/s
0
50
100
150
2006
2007
2008
2009
Date
Germany
U.S.A.
Netherlands
France
Sweden

Anonymity serves different interests for different user groups.



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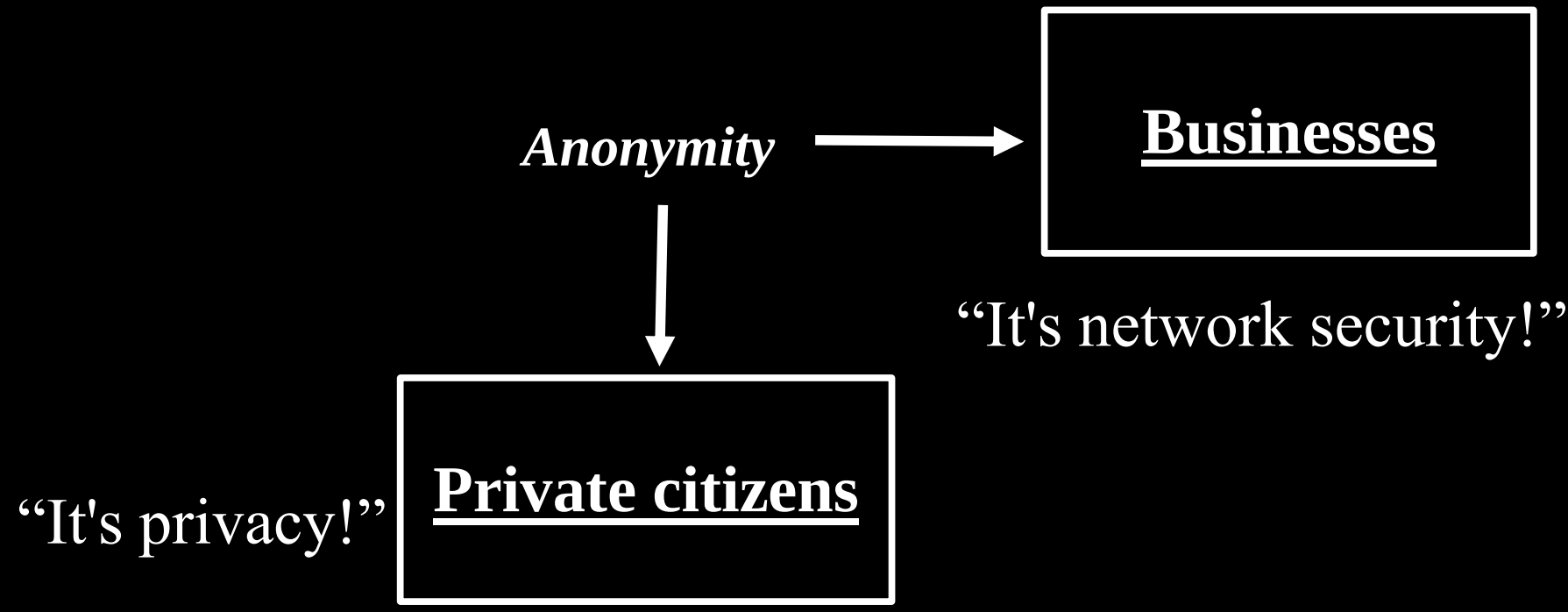

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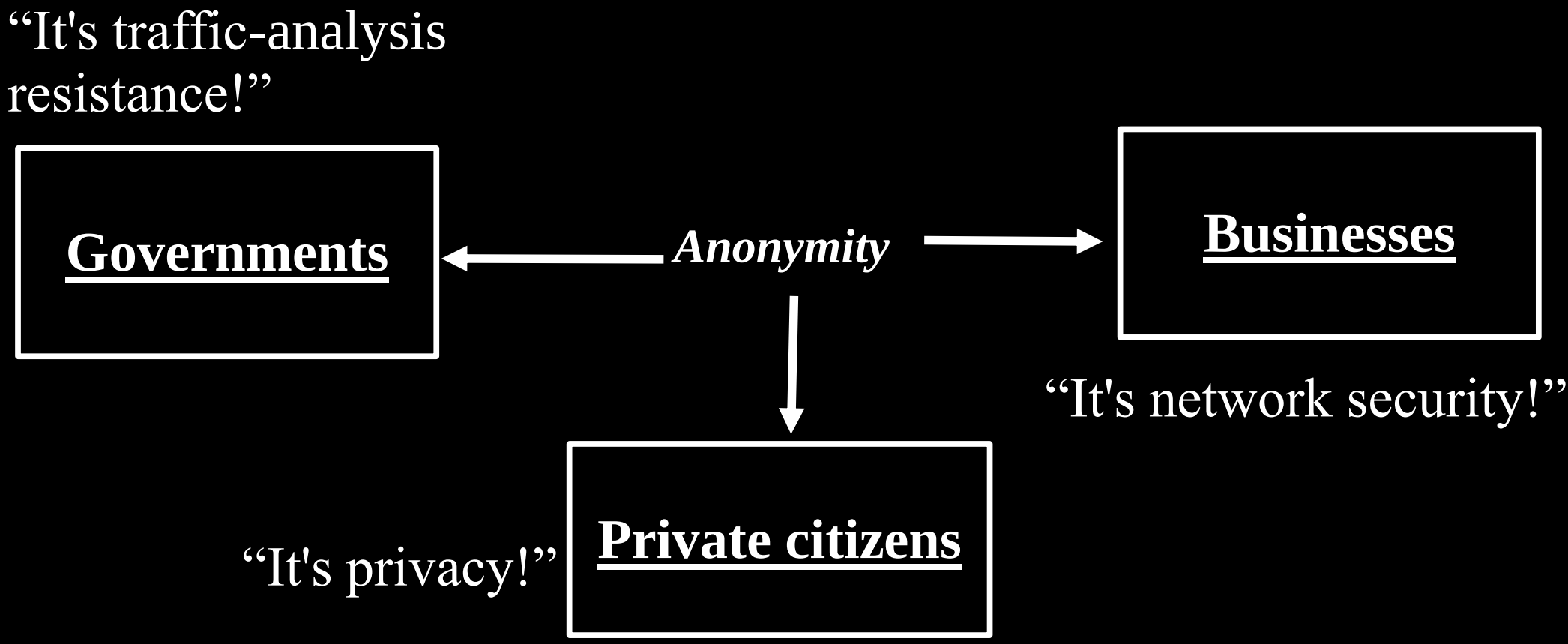

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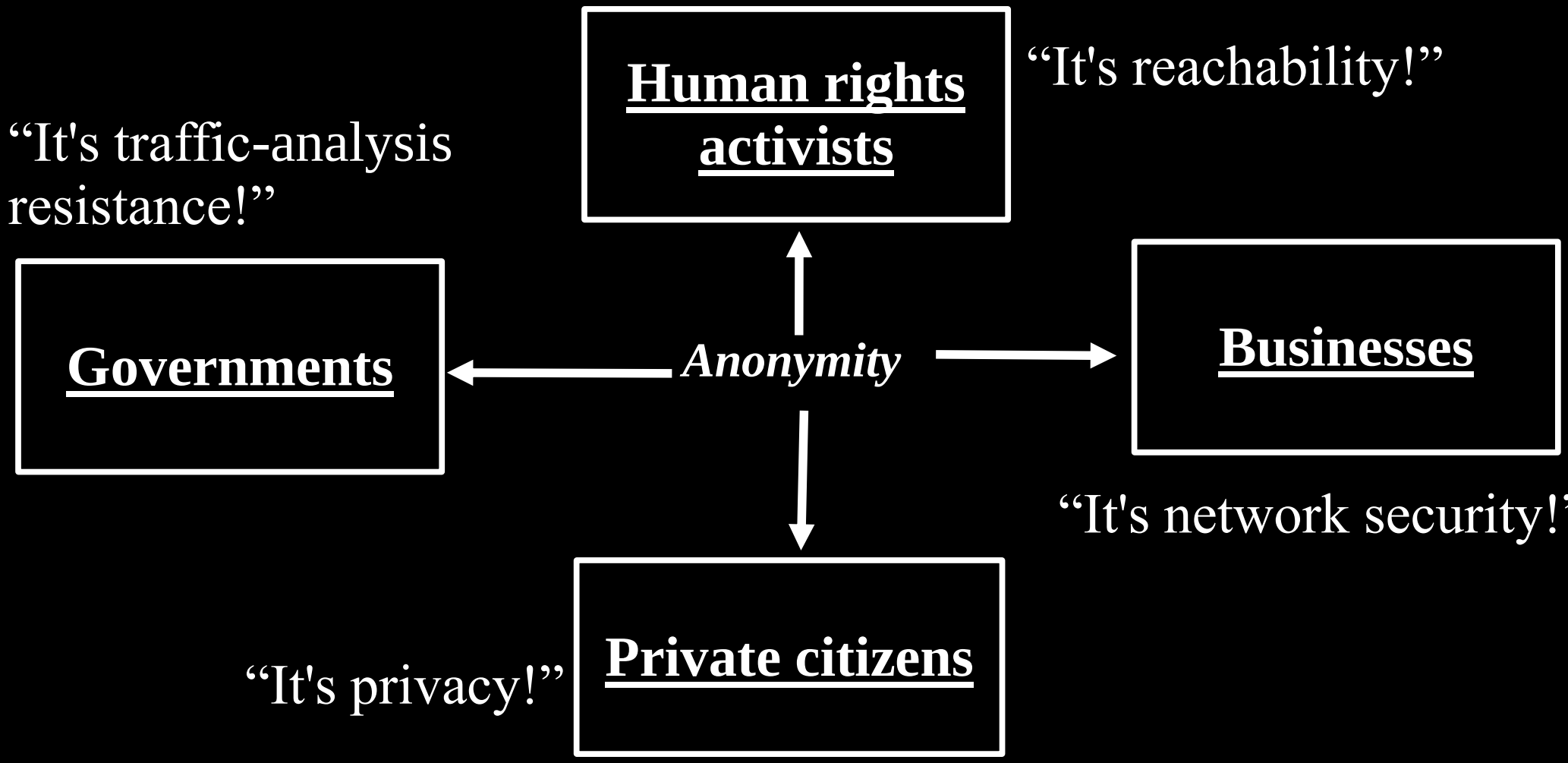


Tor gives three anonymity properties

- **#1**: A local network attacker can't learn, or influence, your destination.
  - Clearly useful for blocking resistance.
- **#2**: No single router can link you to your destination.
  - The attacker can't sign up relays to trace users.
- **#3**: The destination, or somebody watching it, can't learn your location.
  - So they can't reveal you; or treat you differently.

This is Privacy by Design in action!

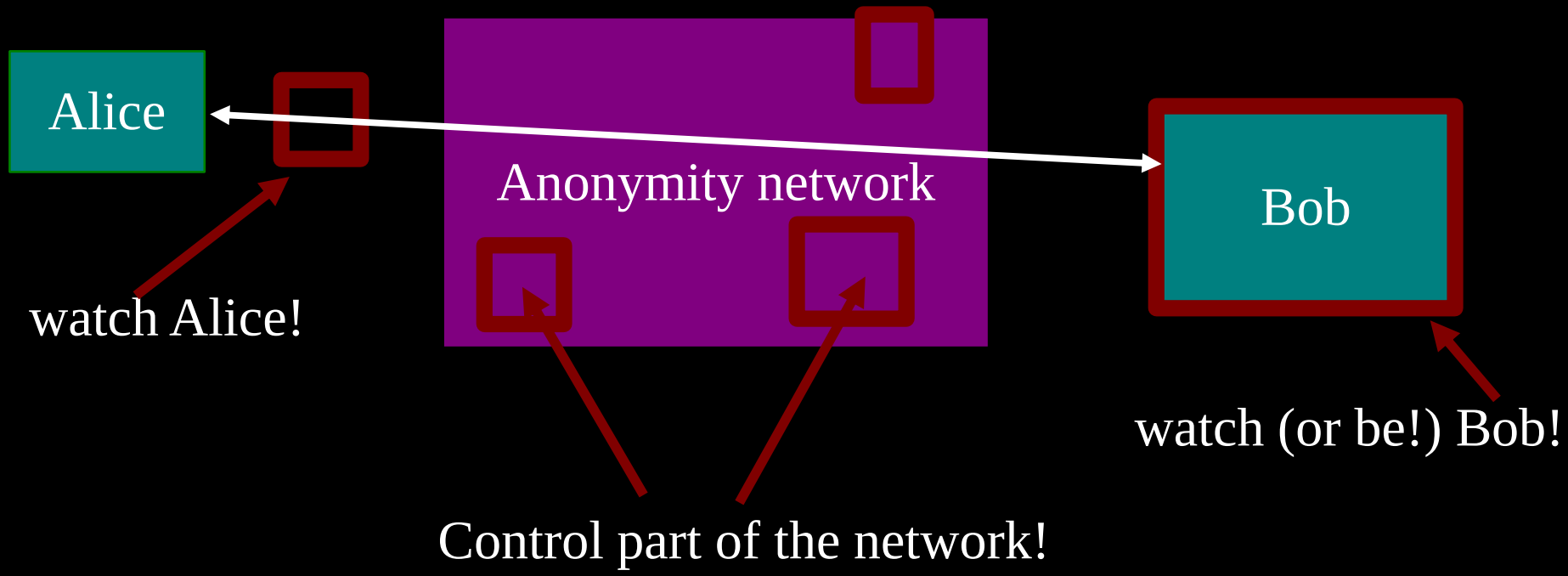
- As a user of Tor:
  - You do not need to trust us; You can verify.
  - You **do not** need a login or password.
  - You **do not** need to pay for this service.
  - You **do not** need to pay for the software.
  - You **help *contribute*** to the network.
    - You help the network by using it.
    - You can share your internet connection.

Who uses Tor?

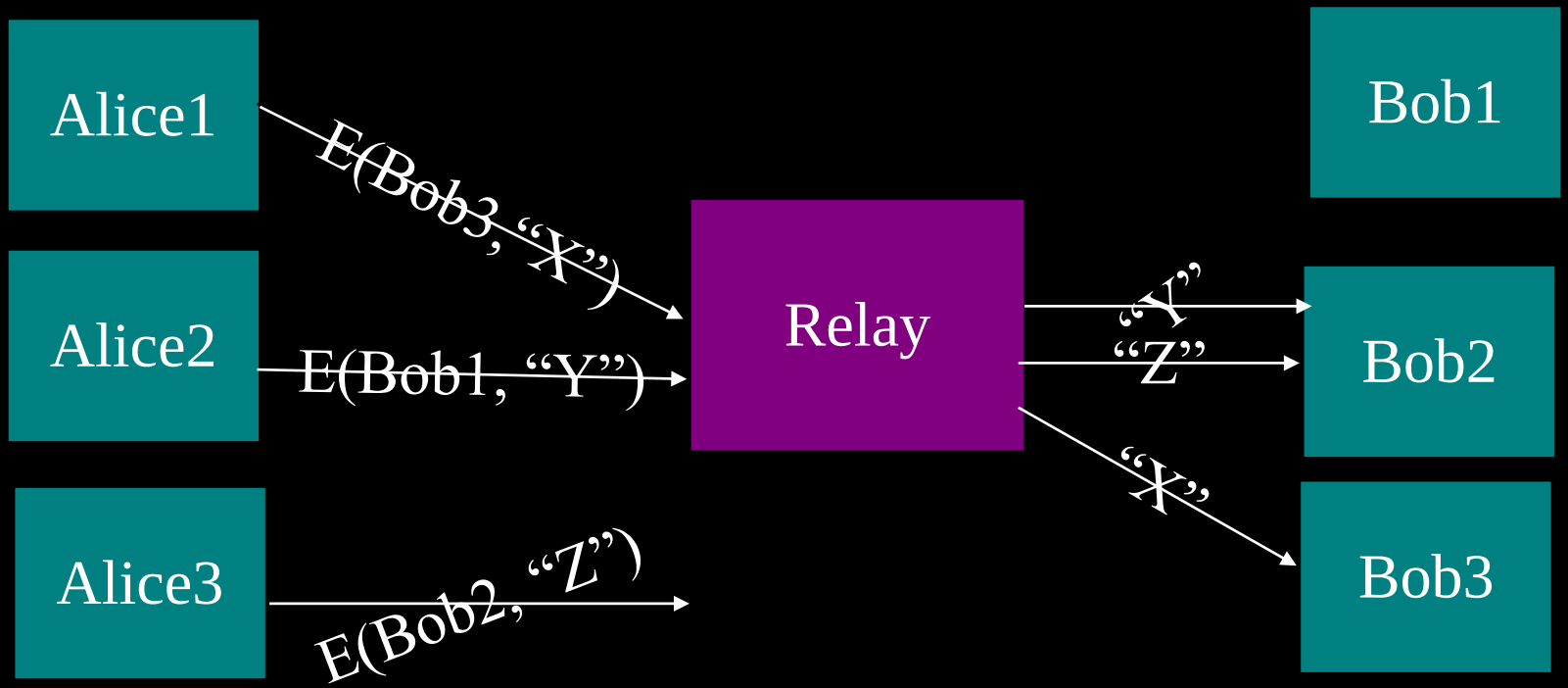
- People from nearly *every country* in the world.
- Normal people use Tor for privacy & security
- Various military forces
- Journalists
- Law enforcement
- Whistleblowers and other activists
- Business executives
- Bloggers
- IT professionals


WikiLeaks

Threat model: what can the attacker do?

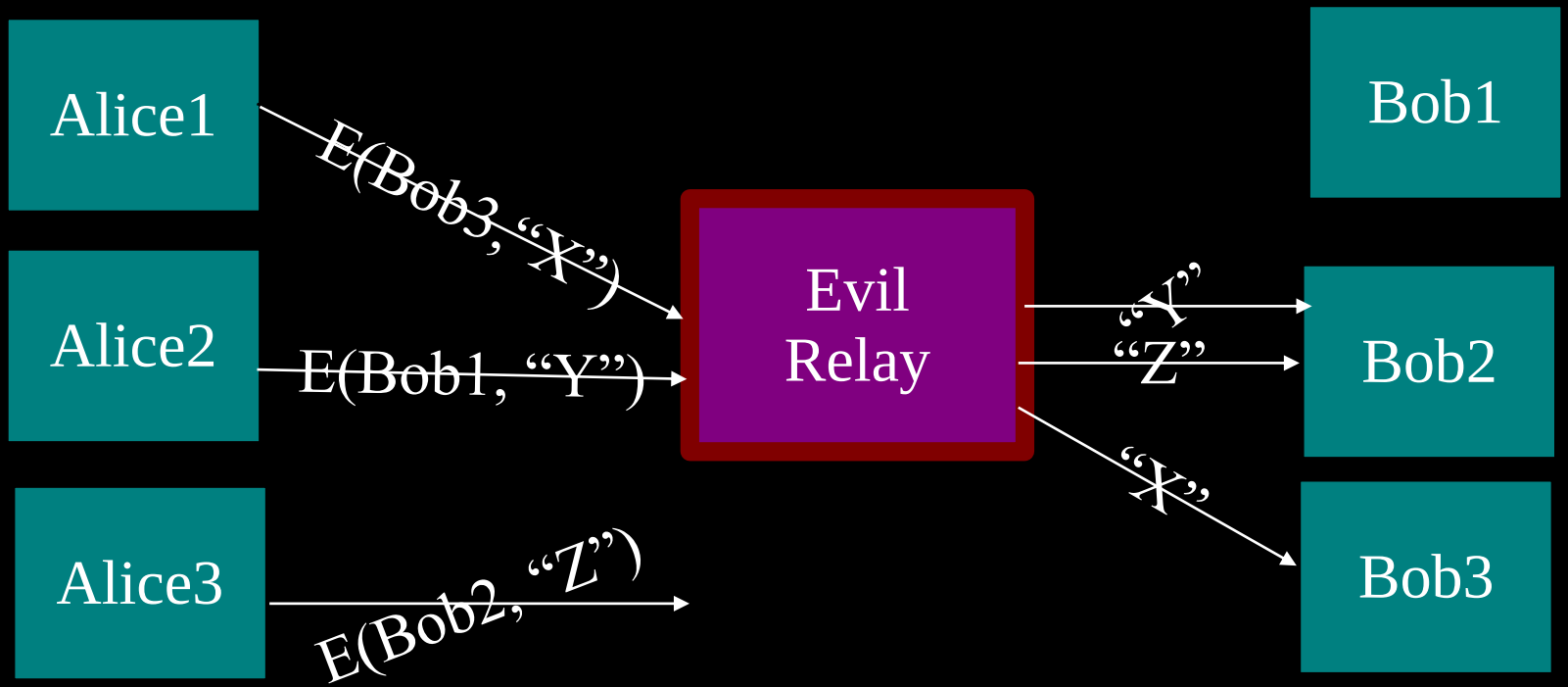


The simplest designs use a single relay to hide connections.

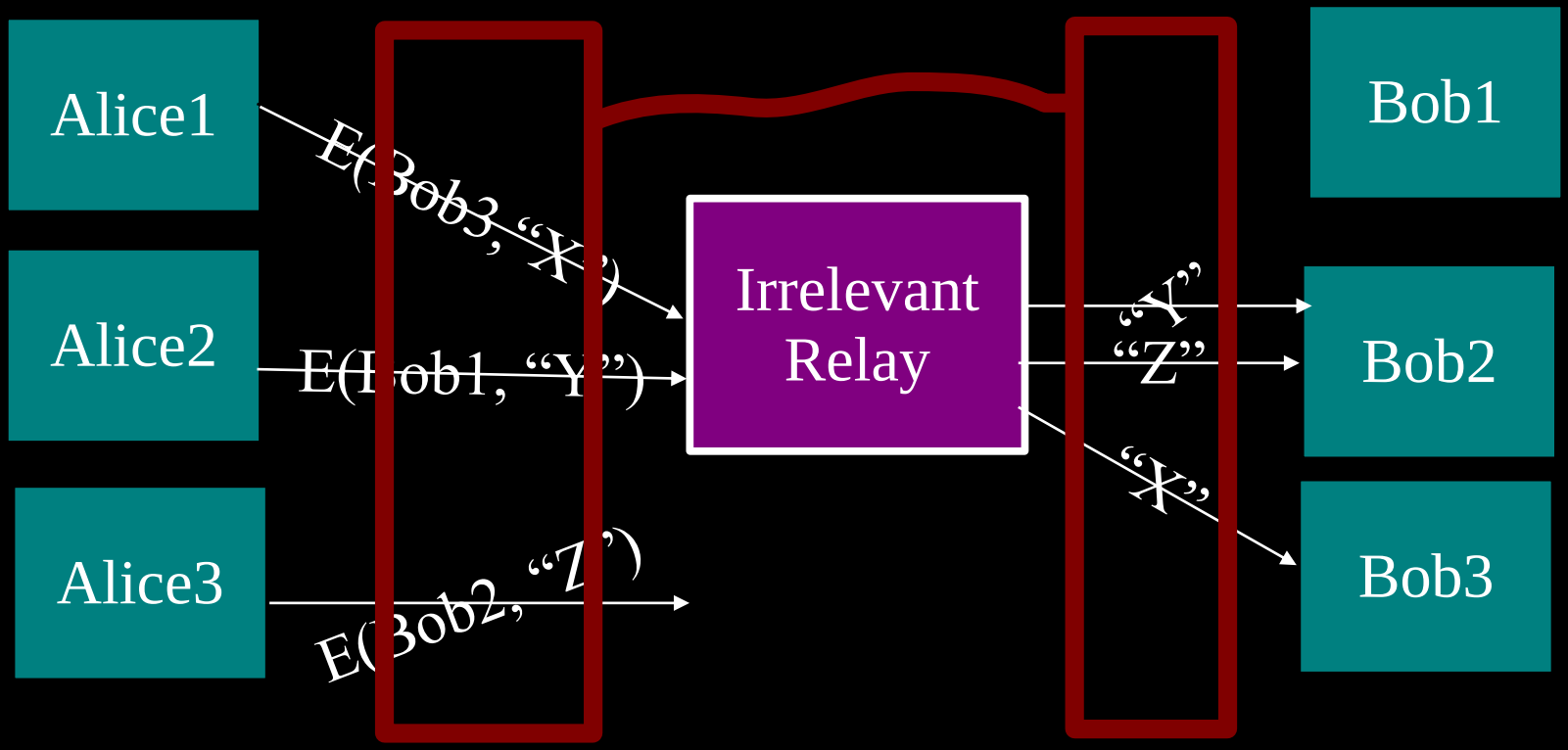


(example: some commercial proxy providers)

But a single relay (or eavesdropper!) is a single point of failure.

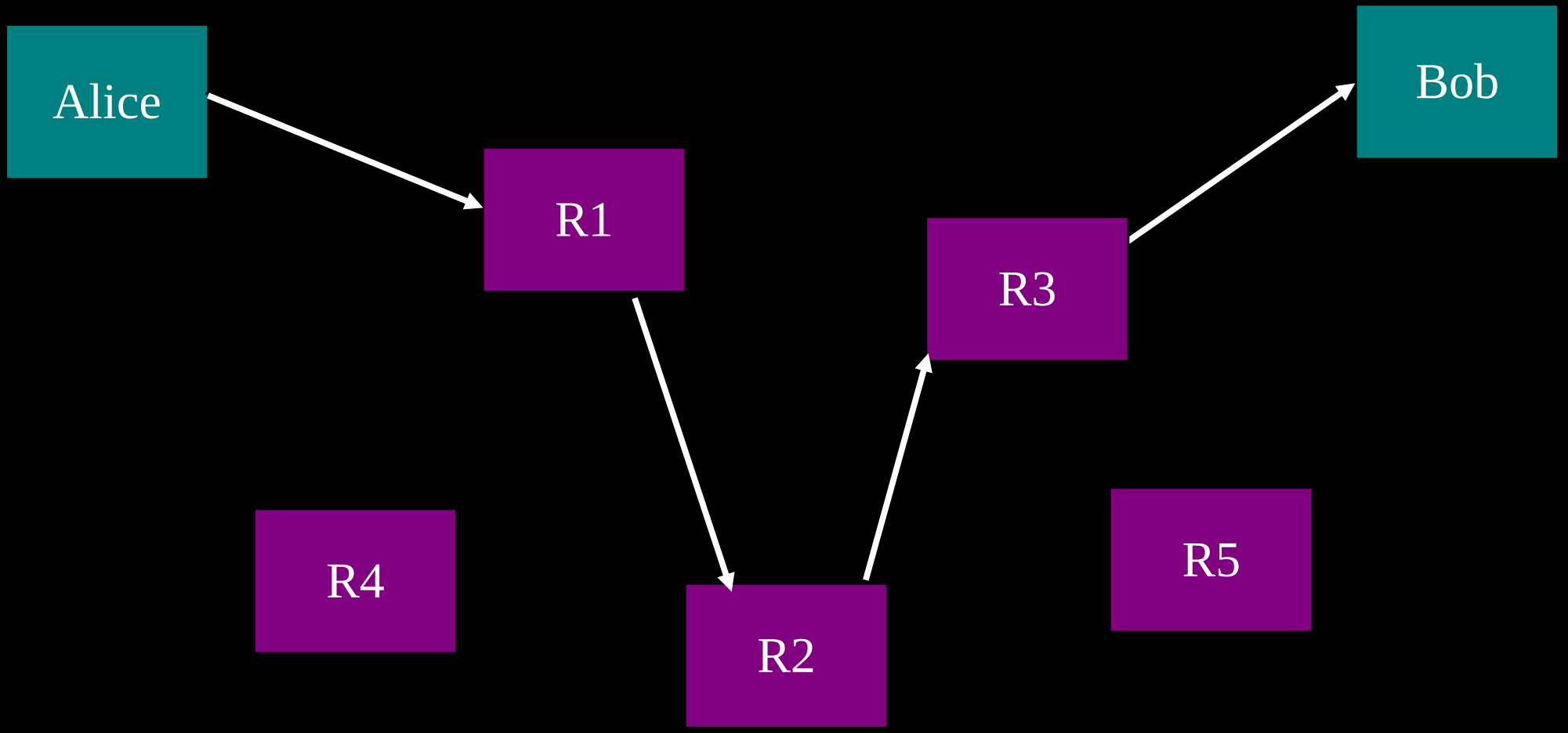


... or a single point of bypass.

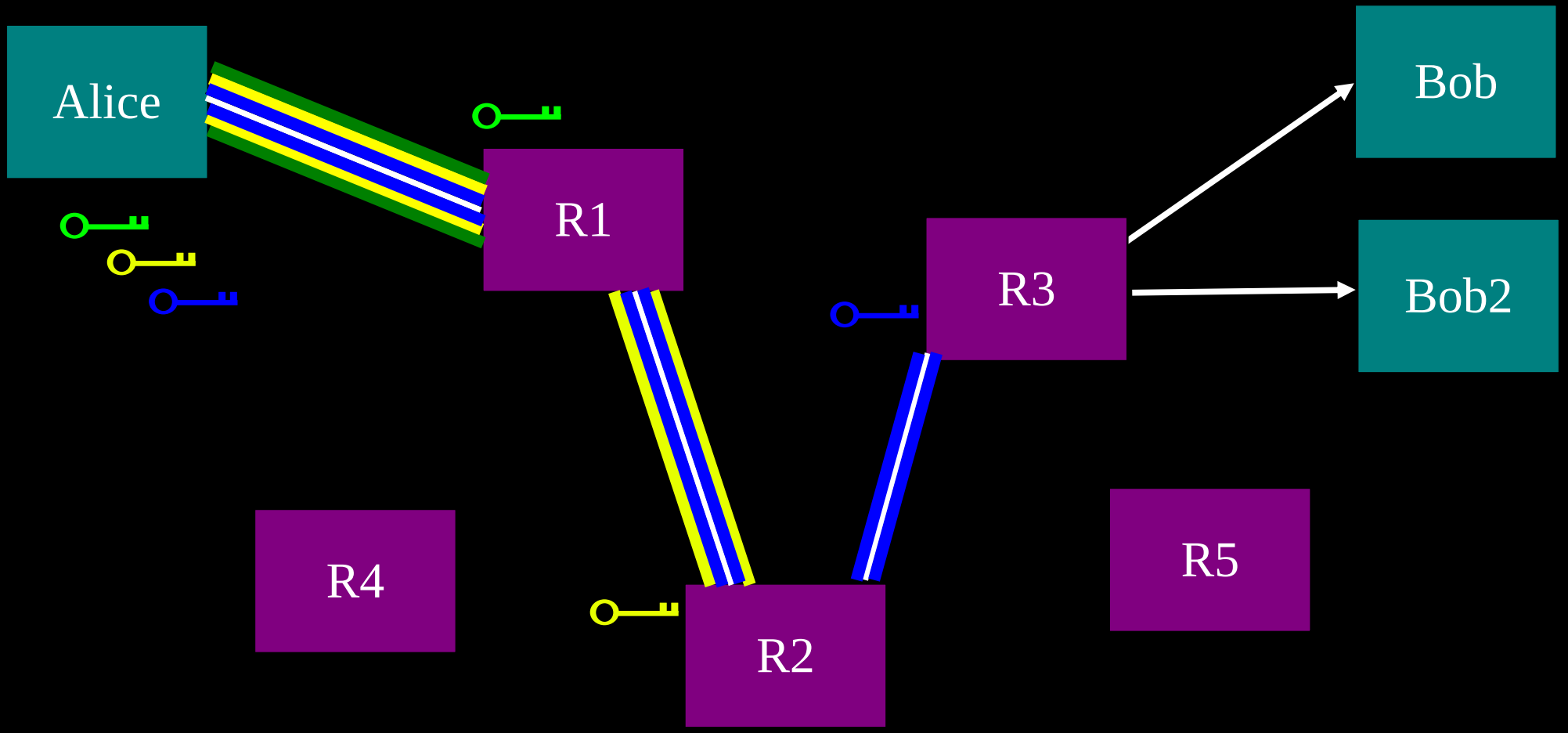


Timing analysis bridges all connections through relay ⇒ An attractive fat target

So, add multiple relays so that no single one can betray Alice.



Alice makes a session key with R1 ...And then tunnels to R2...and to R3

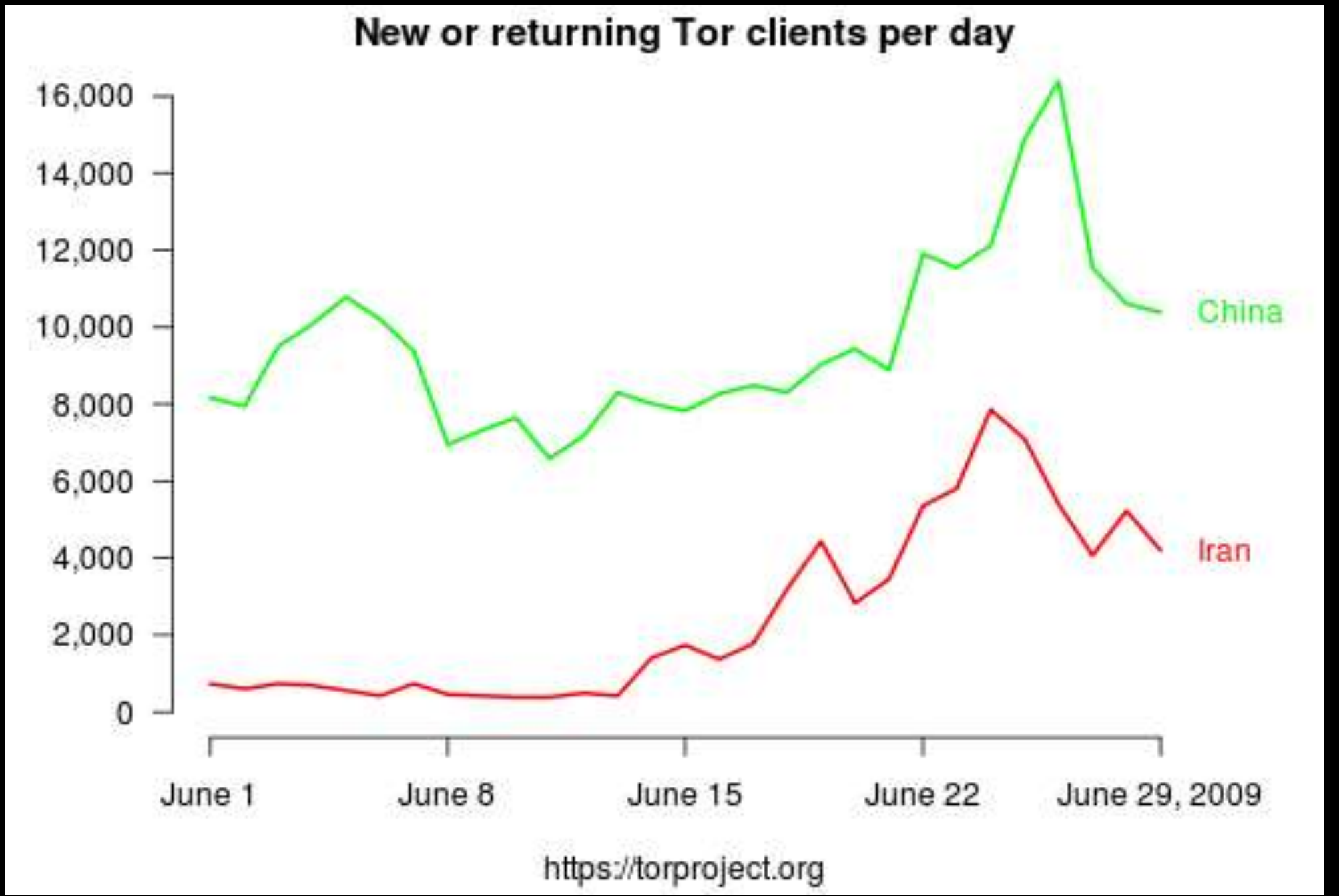


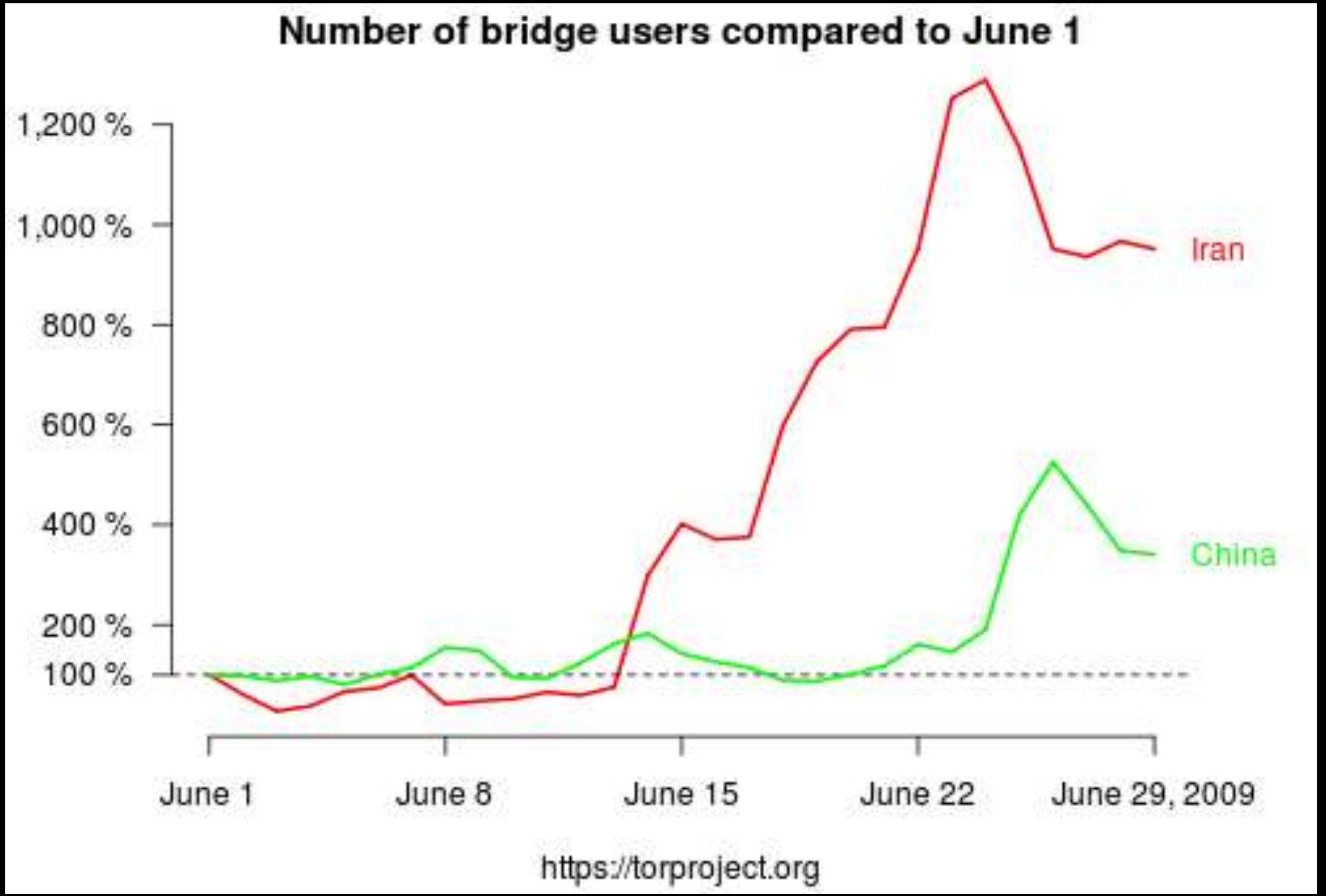
Attackers can block users from connecting to the Tor network

- By blocking the directory authorities.
- By blocking all the relay IP addresses in the directory.
- By filtering based on Tor's network fingerprint.
- By preventing users from finding the Tor software.
- We see this on the internet today.

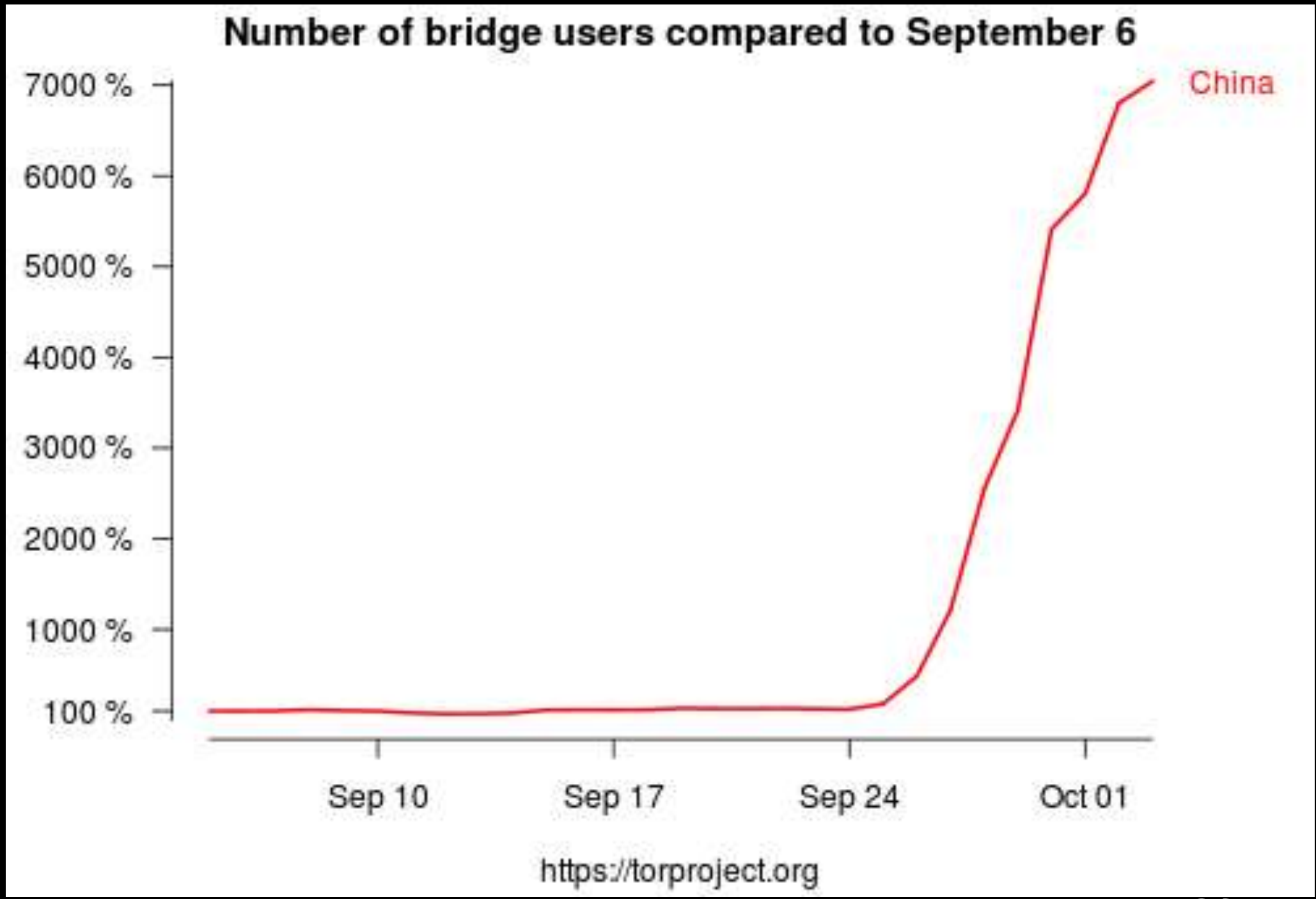
A tale of two countries told in graphs:

Iran & China


New or returning Tor clients per day
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
China
Iran
June 1
June 8
June 15
June 22
June 29, 2009
https://torproject.org


Number of bridge users compared to June 1
1,200 %
1,000 %
800 %
600 %
400 %
200 %
100 %
Iran
China
June 1
June 8
June 15
June 22
June 29, 2009
https://torproject.org


Number of directory requests to directory mirror trusted
10000
8000
6000
4000
2000
0
Sep 10
Sep 17
Sep 24
Oct 01
China
https://torproject.org


Number of bridge users compared to September 6
7000 %
6000 %
5000 %
4000 %
3000 %
2000 %
1000 %
100 %
China
Sep 10
Sep 17
Sep 24
Oct 01
https://torproject.org

Anonymity is useful for censorship-resistance too!

- If a Chinese worker blogs about a problem at her factory, and she routes through her uncle's computer in Ohio to do it, ...?
- If any relay can expose dissident bloggers or compile profiles of user behavior, attacker should attack relays.
- ...Or just spread suspicion that they have, to chill users.

Publicity attracts attention

- Anonymity allows for *circumvention.*
- Many circumvention tools launch with huge media splashes. (The media loves this.)
- But publicity attracts attention of the censors.
- This threatens their *appearance* of control, so they must respond.
- We can control the pace of the arms race.

Responding to China blocks

- In late Sept, conflicting advice from experts:
- “Hit 'em in the nose, show that you care about your users”
- “Lie low and let it pass. You're about more than China.”
- Tor is a new approach in China bloggers: “Find new bridge” rather than “get software update”.

Using Tor in oppressed areas

- Common assumption: risk from using Tor increases as firewall gets more restrictive.
- But as firewall gets more restrictive, more ordinary people use Tor too, for more mainstream activities.
- So the “median” use becomes more acceptable?
- (Of course, that doesn't mean they won't try to block it.)

Lots of misinformation going around

- Many people set up open proxies for Iran. But no encryption means “they” get to learn what you're doing: twitter login, etc
- University student arrested “because of Tor”?
- Money brings the snakeoil vendors
- Best practice in Iran: don't stay in one place for very long

Other Iran user count

- Talked to chief security officer of one of the web 2.0 social networking sites:
  - 10% of their Iranian users were coming through Tor
  - 90% were coming from proxies in the Amazon cloud

But this isn't just about two countries; This is an issue for Sweden as well.

- We can learn from China and Iran
- We should know that censorship can and *may* happen in every country if we are not vigilant.
- The Western world often thinks of itself as above and beyond this kind of censorship, blocking and control. Are we?
  - Who gains when we begin to monitor, block and control content?