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# The Tor Project, Inc.

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

# Topics

- Anonymous Communications
- Tor Overview
- The Future

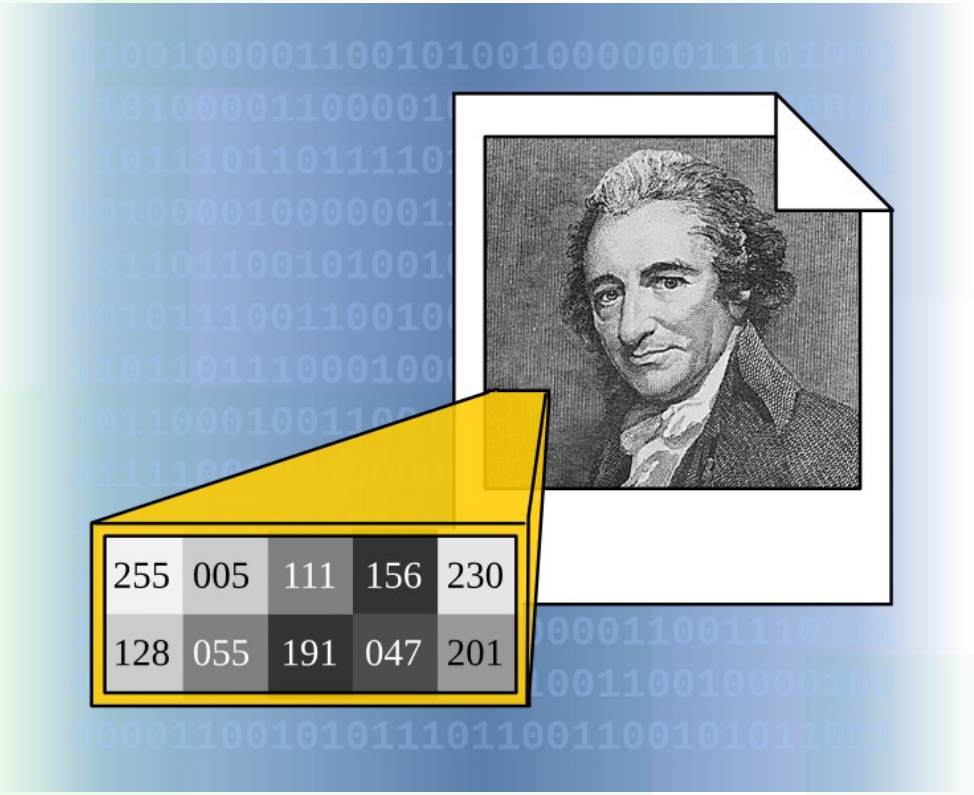
# What is Anonymity?

# *Anonymity isn't:*

- Cryptography

# *Anonymity isn't:*

- Cryptography
- **Stenography**



# *Anonymity isn't:*

- Cryptography
- Stenography
- Wishful Thinking

- “They can't prove it was me.”
- “Promise you won't tell.”
- “Well, I didn't sign it.”
- “The Internet is already anonymous, right?”

# Examples of Wishful Thinking

- *“They can't prove it was me.”*
- “Promise you won't tell.”
- “Well, I didn't sign it.”
- “The Internet is already anonymous, right?”

- *“They can't prove it was me.”*
- “Promise you won't tell.”
- “Well, I didn't sign it.”
- “The Internet is already anonymous, right?”

***Proof is a very strong word. Statistical analysis allows suspicion to become certainty.***

- “They can't prove it was me.”
- *“Promise you won't tell.”*
- “Well, I didn't sign it.”
- “The Internet is already anonymous, right?”

- "They can't prove it was me."
- *"Promise you won't tell."*
- "Well, I didn't sign it."
- "The Internet is already anonymous, right?"

***Will other parties have the abilities and incentives to keep these promises?***

- “They can't prove it was me.”
- “Promise you won't tell.”
- *“Well, I didn't sign it.”*
- “The Internet is already anonymous, right?”

- “They can't prove it was me.”
- “Promise you won't tell.”
- ***“Well, I didn't sign it.”***
- “The Internet is already anonymous, right?”

***Not what we're talking about.***

- “They can't prove it was me.”
- “Promise you won't tell.”
- “Well, I didn't sign it.”
- *“The Internet is already anonymous, right?”*

- “They can't prove it was me.”
- “Promise you won't tell.”
- “Well, I didn't sign it.”
- *“The Internet is already anonymous, right?”*

***Nope!***

# Anonymous Communication

People need to hide in a crowd of other people.

*"Anonymity loves company."*

# Anonymous Communication

The goal of the system is to make all users look as similar as possible.

# Anonymous Communication

Hide who is communicating with whom.

# Anonymous Communication

Layered encryption and random delays hide correlation between input traffic and output traffic.

*Anonymity serves different interests for different user groups:*

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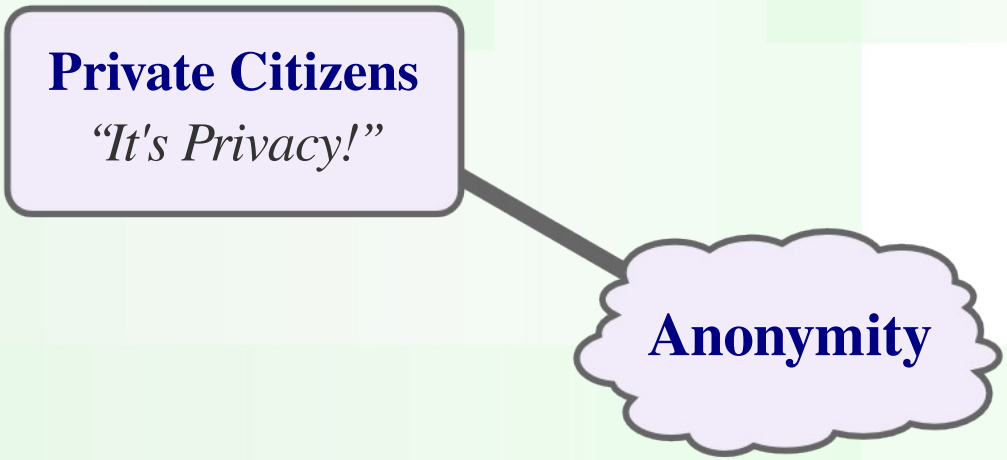

# *Anonymity serves different interests for different user groups:*

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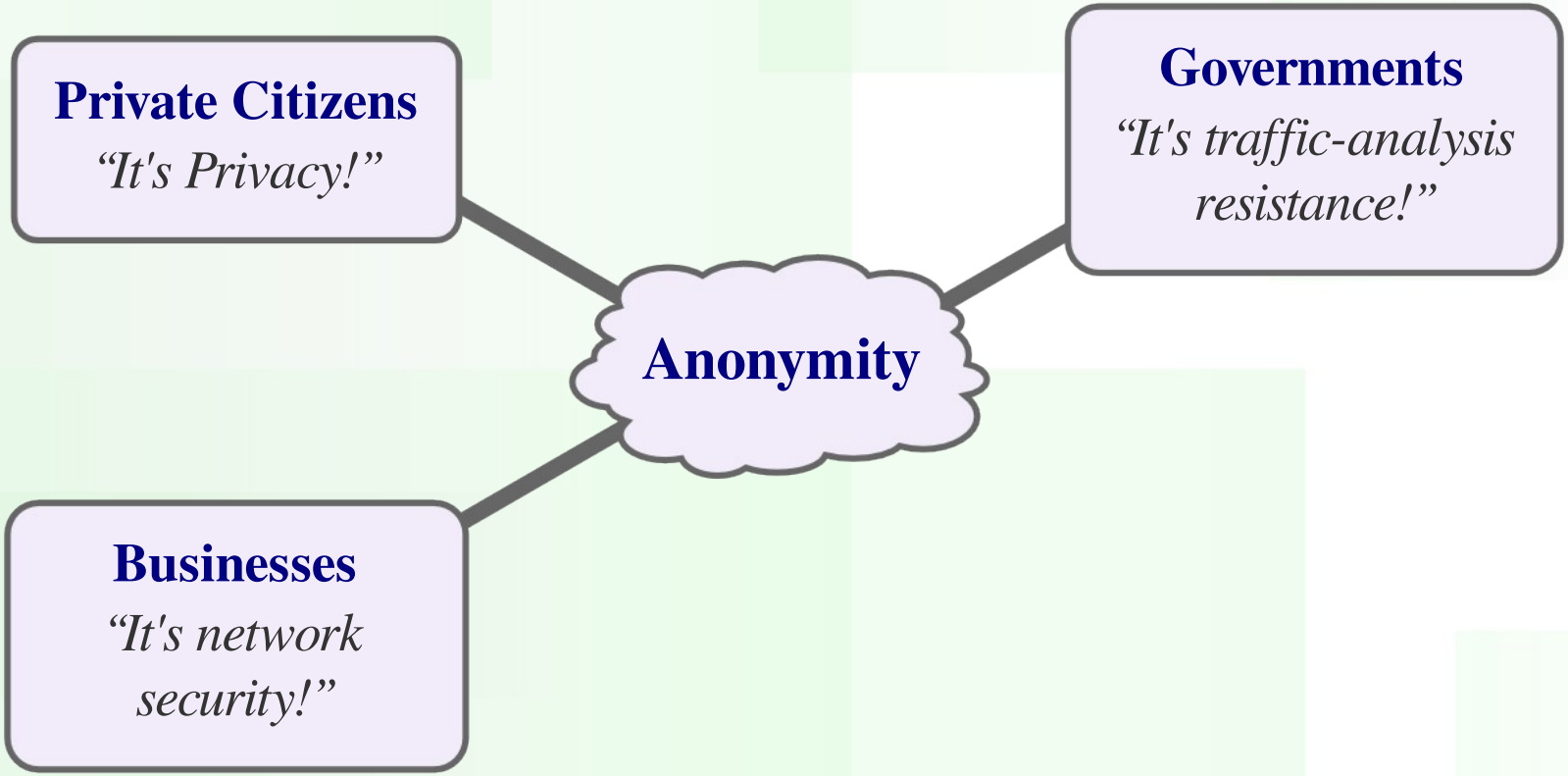
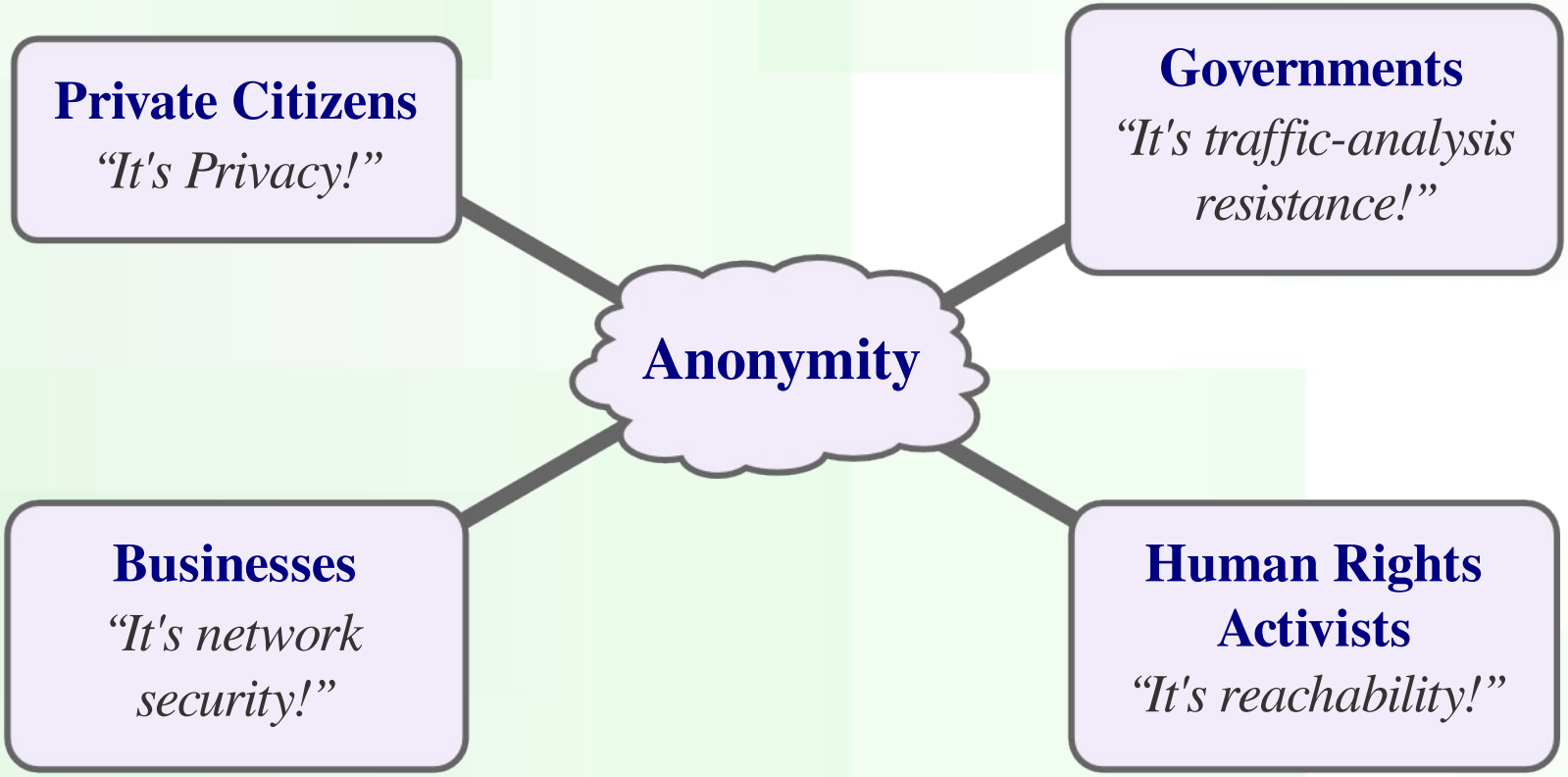


# *Anonymity serves different interests for different user groups:*



Tor is not the first system: ZKS, mixmaster, single-hop proxies, Crowds, JAP/JonDos, I2P, Freenet, Swarm, Retroshare, VPNs.

# *Low Latency Systems*

Low-latency systems are vulnerable to end-to-end correlation attacks.

## *High Latency Systems*

High-latency systems are more resistant to end-to-end correlation attacks, but by definition, are less interactive.

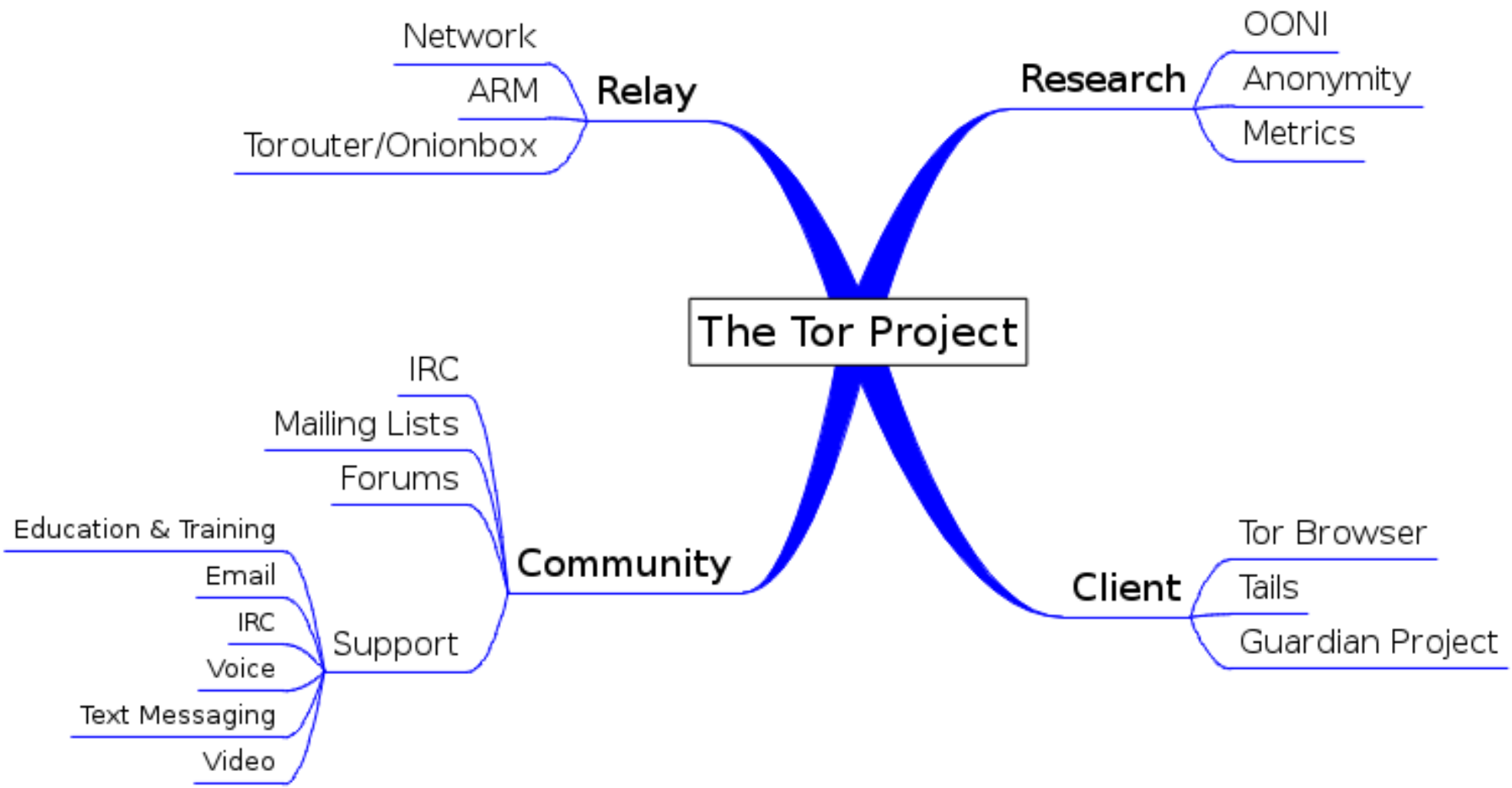
# *Low Latency Systems*

- 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)*

# What is Tor?

- Online anonymity software and network


The Tor Project
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Email
IRC
Voice
Text Messaging
Video
Client
Tor Browser
Tails
Guardian Project

# What is Tor?

Open source,
freely available,
3-clause BSD licensed

# What is Tor?

## Active research environment:

*National Science Foundation, University of Waterloo, UMN, Georgia Tech, Princeton, UIUC, Drexel, Boston Univ, Naval Research Lab, UC-London, Indiana Univ., Univ. of Cambridge*

# What is Tor?

## 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.*

# *Who Uses Tor?*

- Law Enforcement
- Human Rights Activists
- Business Executives
- Abuse Victims
- Militaries
- Normal People


Estimated 500k to 1 million
daily users worldwide

# *Twitter In Iran: Good*

## Iran Protests: Twitter, the Medium of the Movement

By **LEV GROSSMAN** Wednesday, Jun. 17, 2009

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Share The U.S. State Department doesn't usually take an interest in the maintenance schedules of dotcom start-ups. But over the weekend, officials there reached out to Twitter and asked them to delay a network upgrade that was scheduled for Monday night. The reason? To protect the interests of

From http://www.time.com/time/world/article/0,8599,1905125,00.html

# *Twitter In USA: Bad*

## FBI Raids Queens Home in G20 Protest Twitter Crackdown

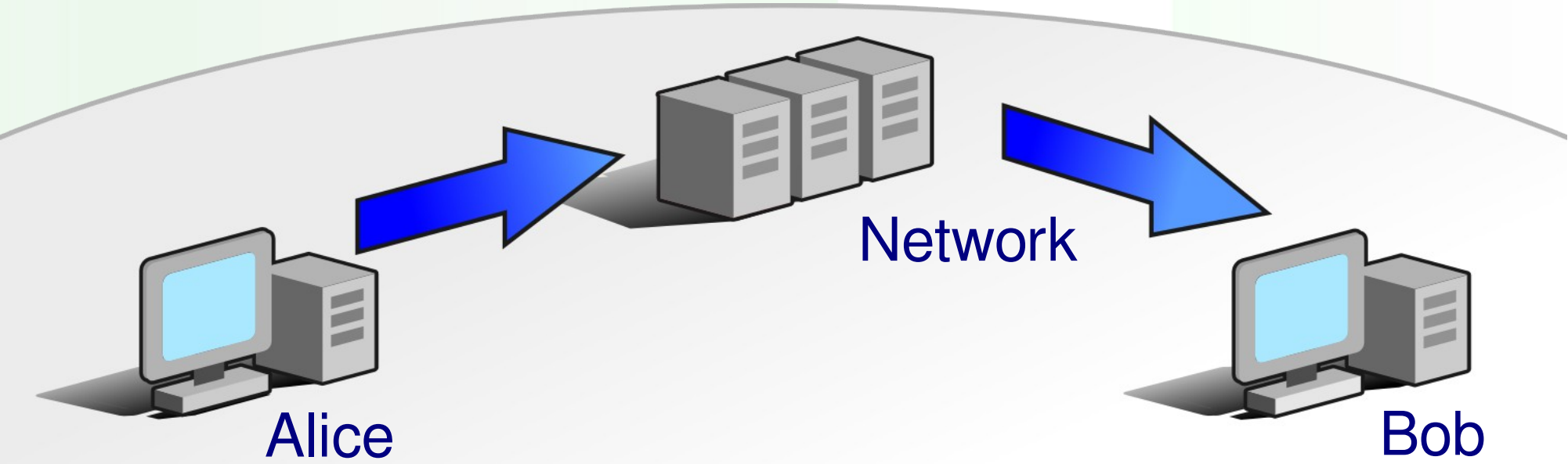

*AP Photo/Matt Rourke*

That's right, a Twitter crackdown. A lawyer for Jackson Heights social worker Elliot Madison, 41, says that the feds searched his client's house for 16 hours on Thursday after Madison was arrested on September 24th at a Pittsburgh hotel room with another man. What were they up to? Sitting at laptops sending Twitter messages advising G20 demonstrators about riot police activity in the streets. And yet *real* Twitter threats like Lindsay Lohan and Courtney Love remain at large.

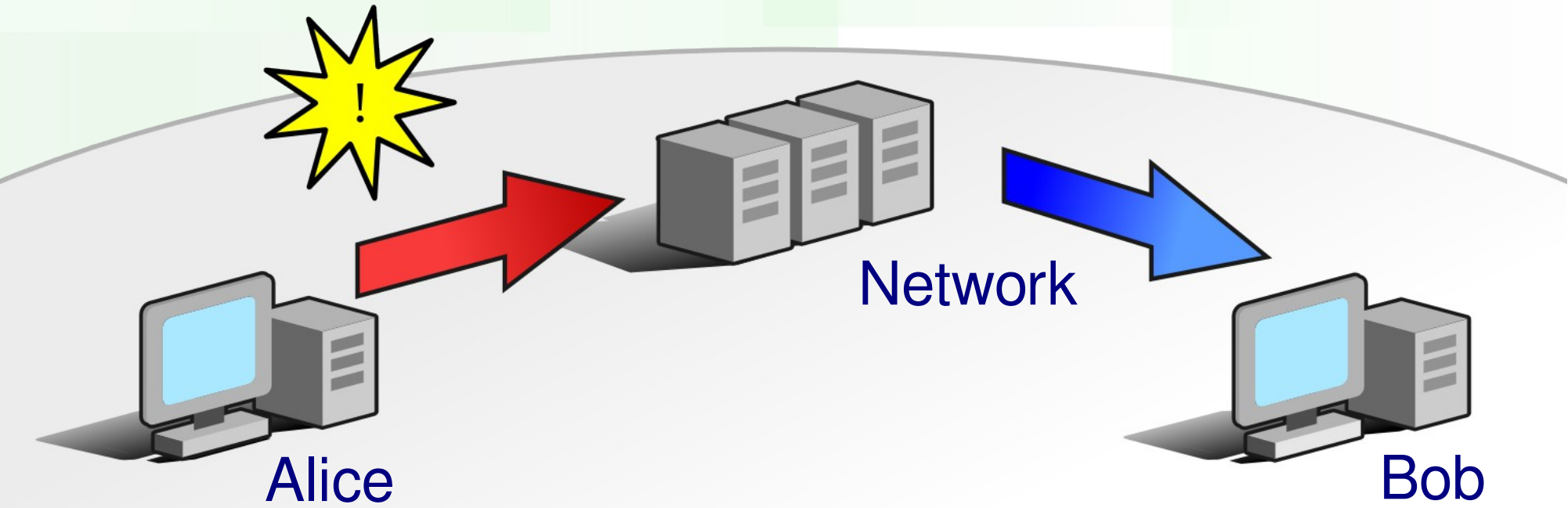
Madison, a self-described anarchist, was in Pittsburgh volunteering for the Tin Can Comms Collective, a group that uses Twitter to send mass text messages during protests describing events observed on the streets or over police scanners; stuff like "SWAT teams rolling down 5th Ave." Tin Can was active during the St. Paul RNC protests, and the authorities are now on to them. Madison was charged with hindering apprehension or prosecution, criminal use of a communication facility and possession of instruments of crime; he's currently out on bail.

From http://gothamist.com/2009/10/05/fbi_raids_queens_home_in_g20_protes.php

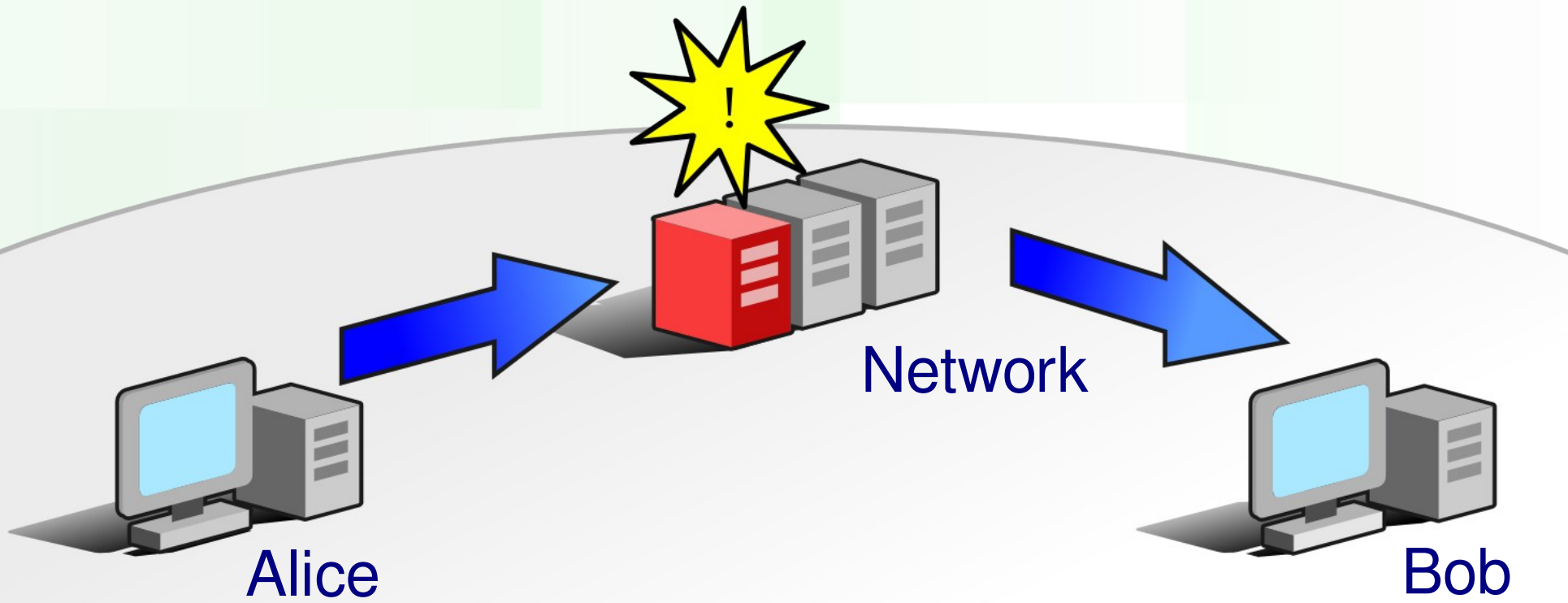
# A Typical Internet Connection



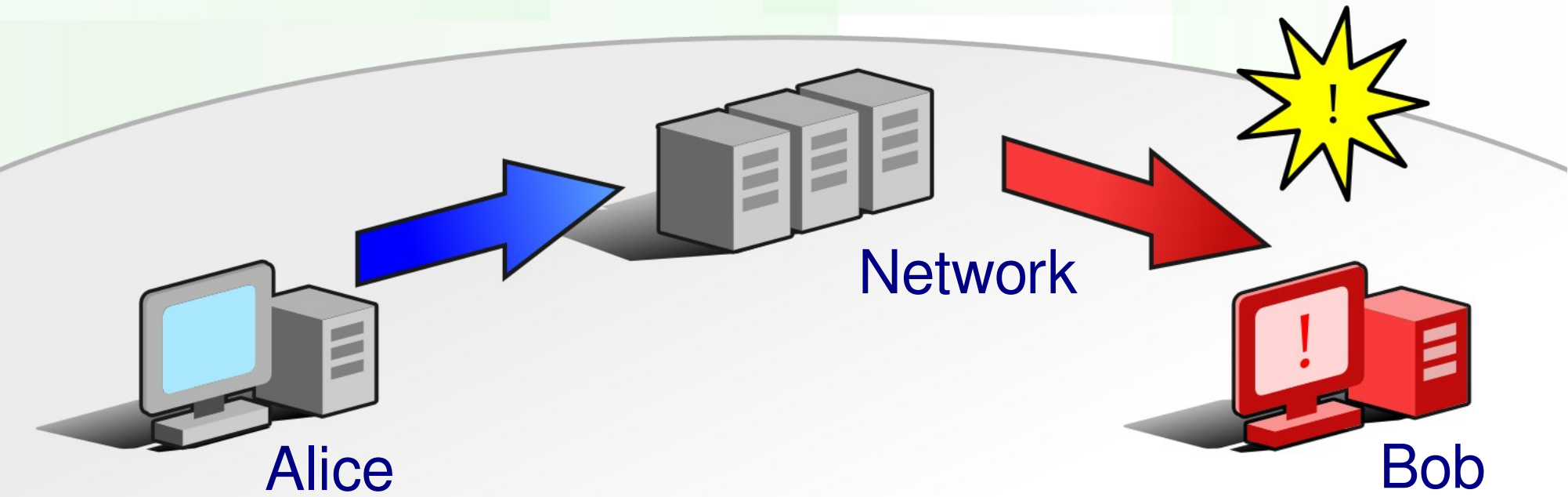
# *Alice might be watched.*



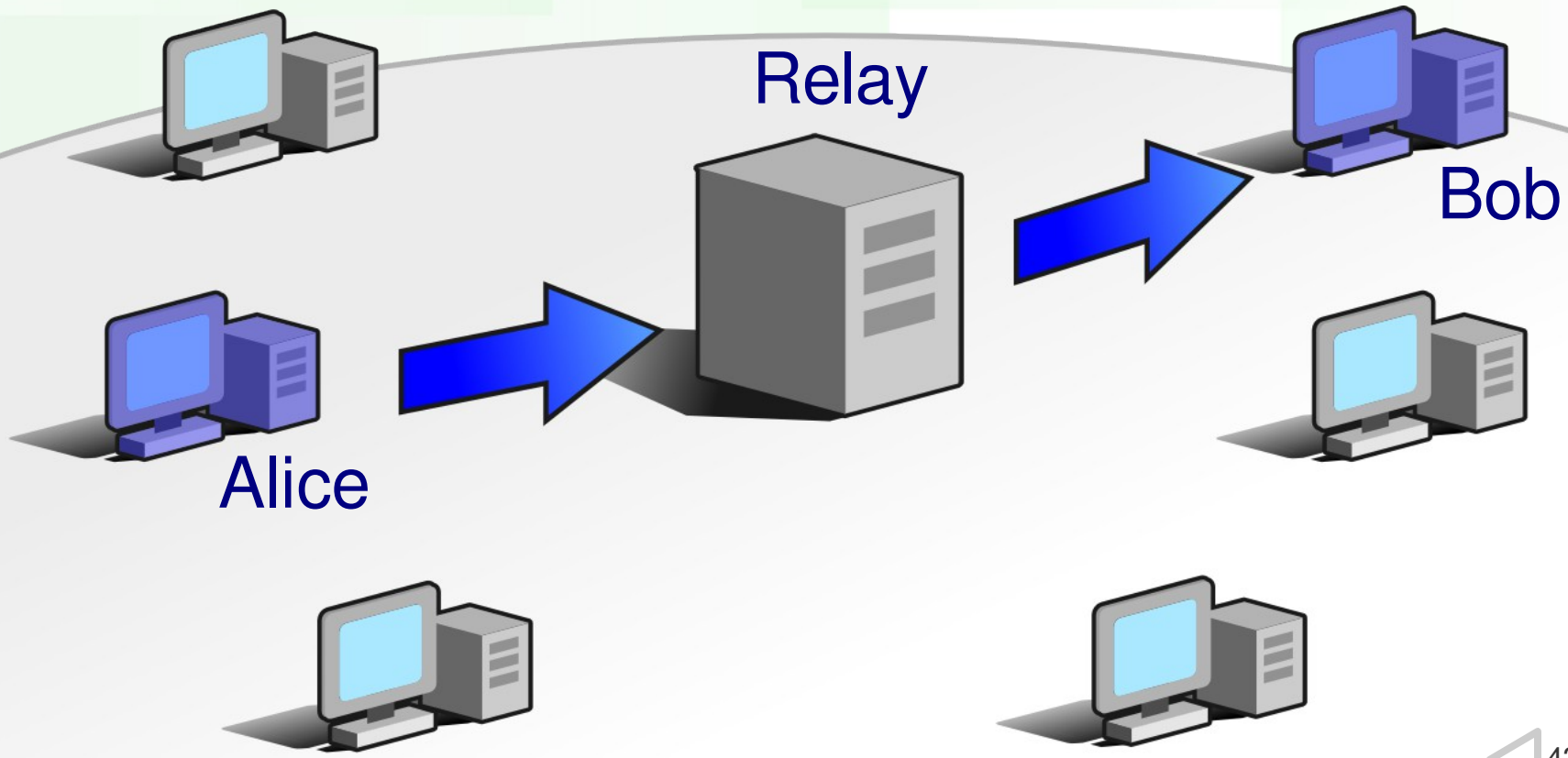
*Parts of the network could be monitored.*



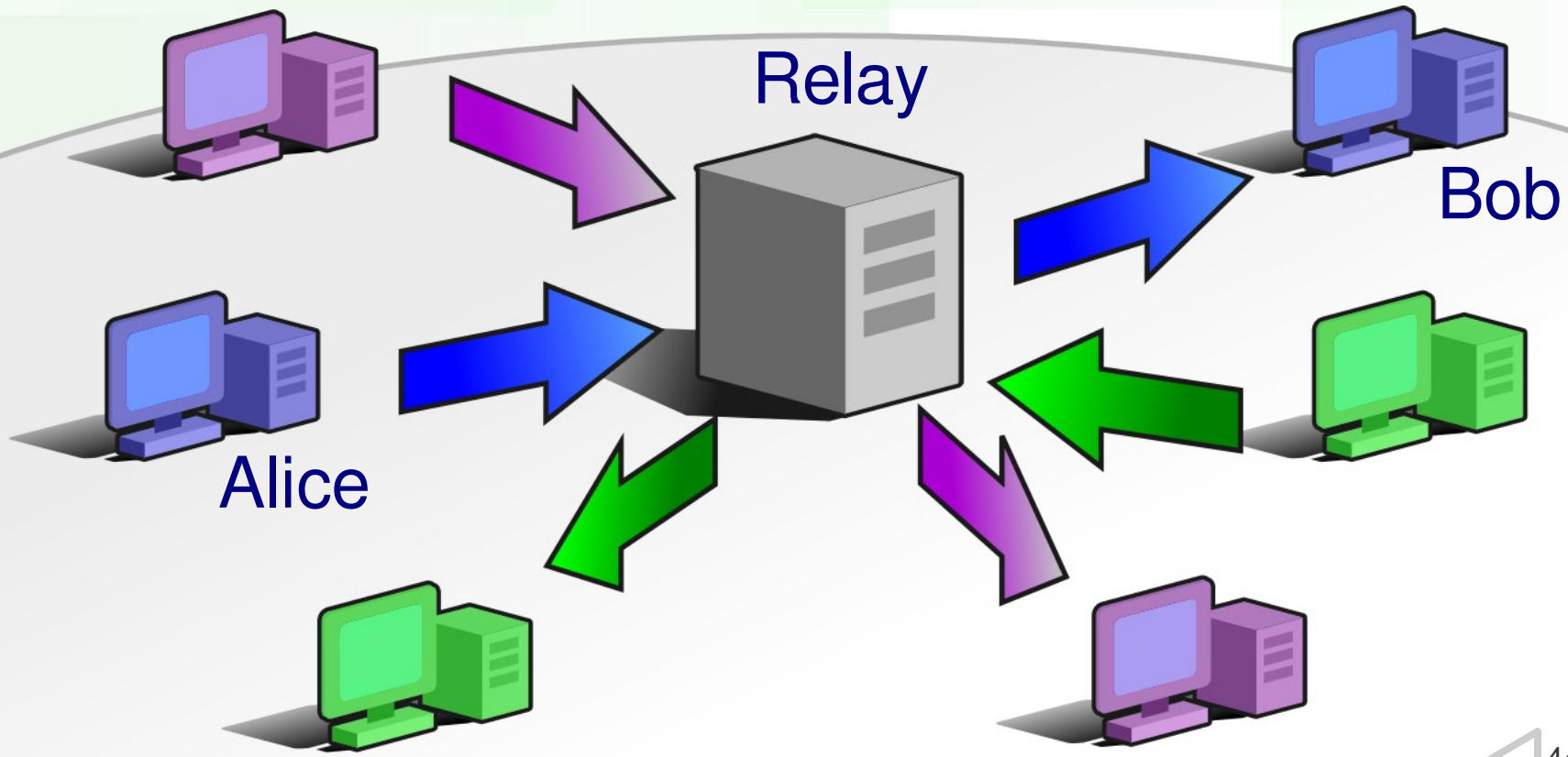
*Bob could be compromised.*



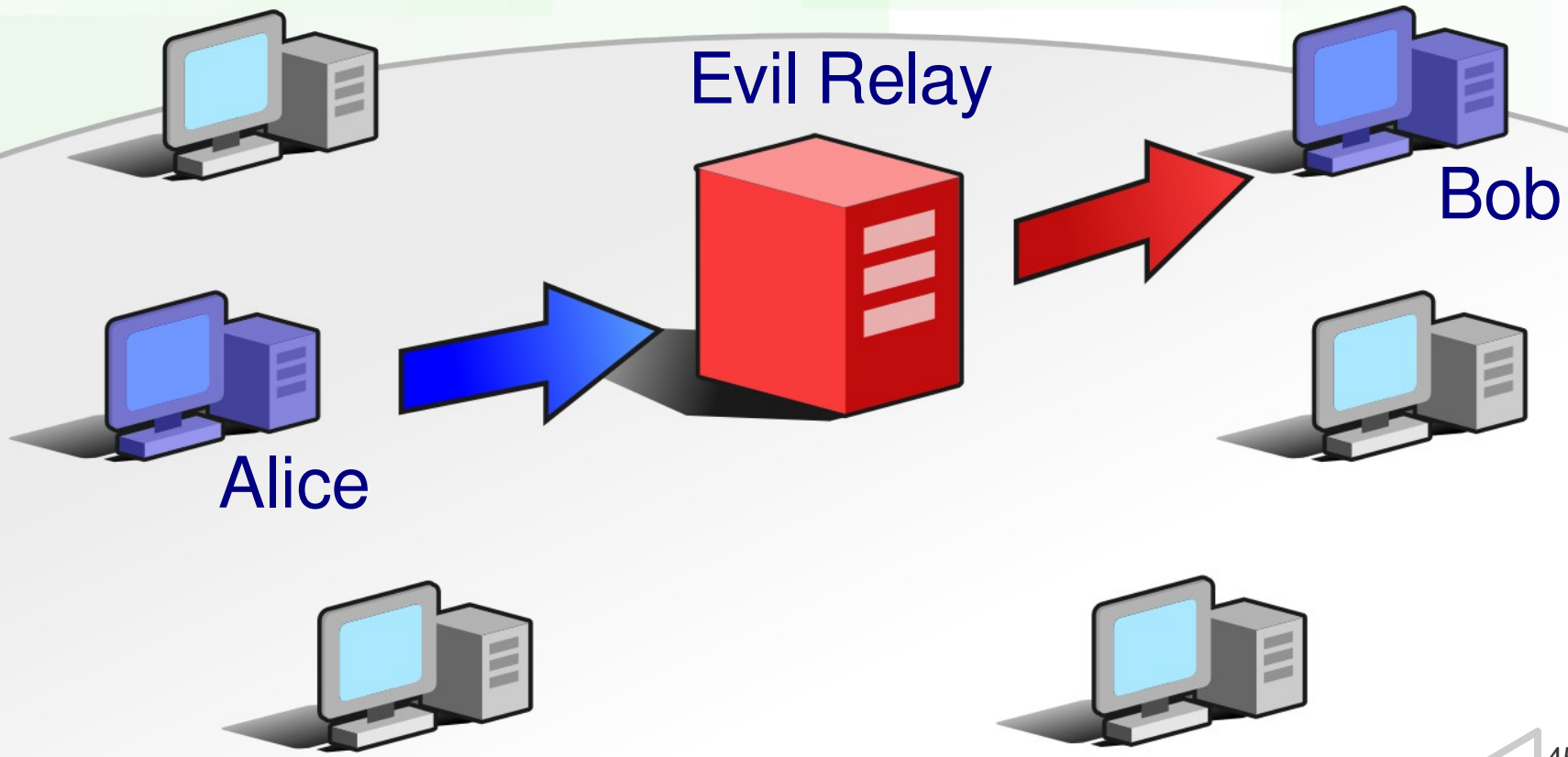
# How is Tor Different?



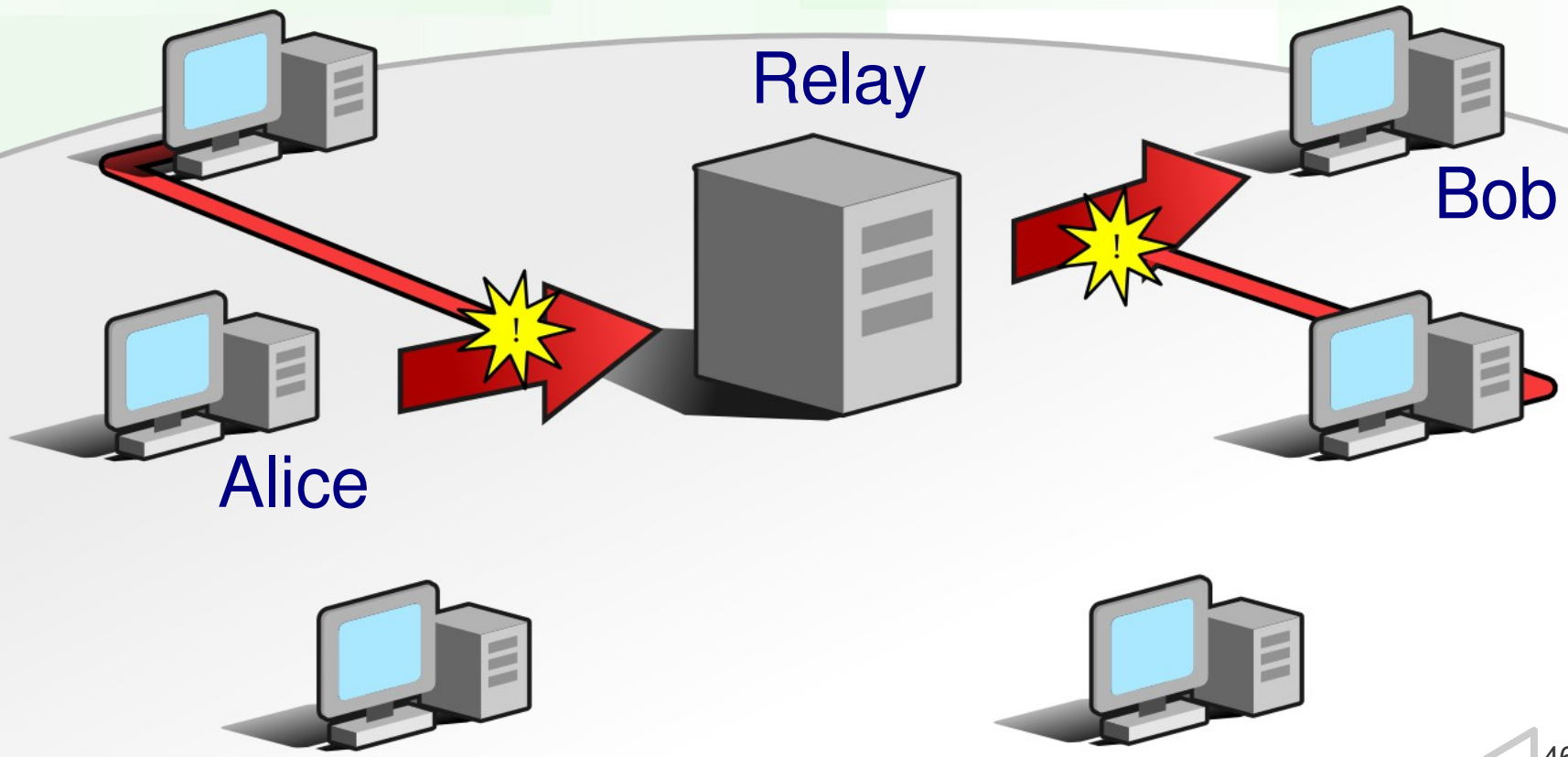
# *A Basic Relay System*



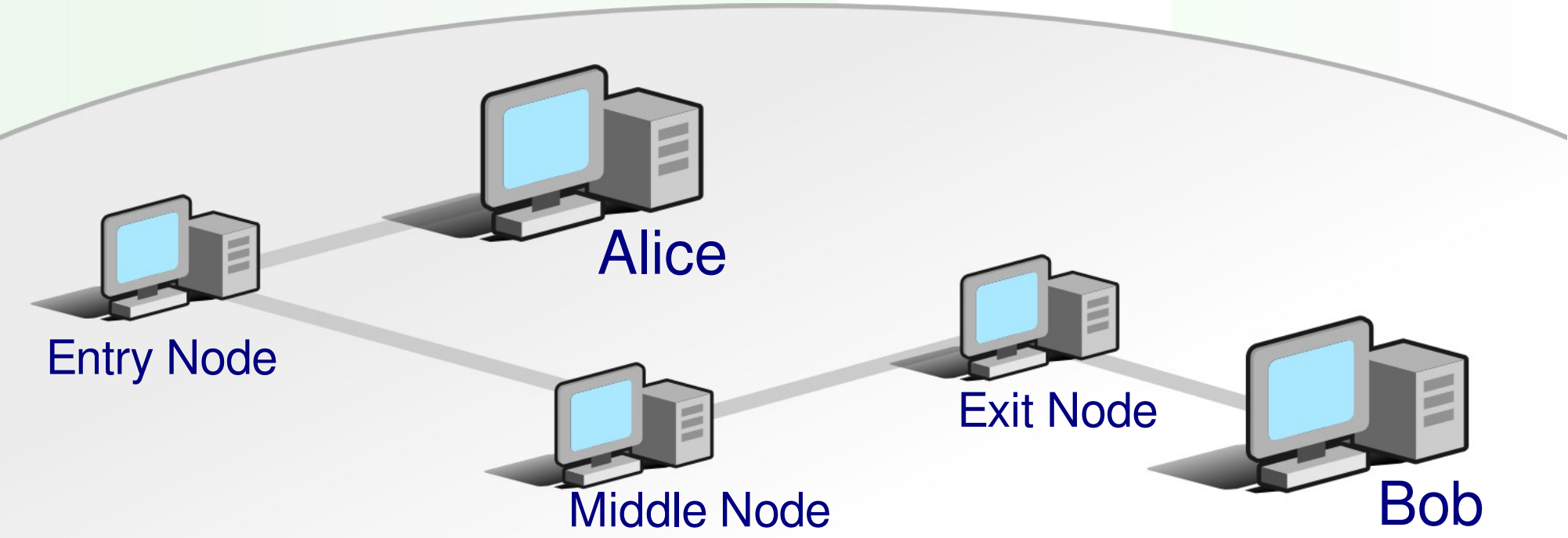
# *An Evil Relay*



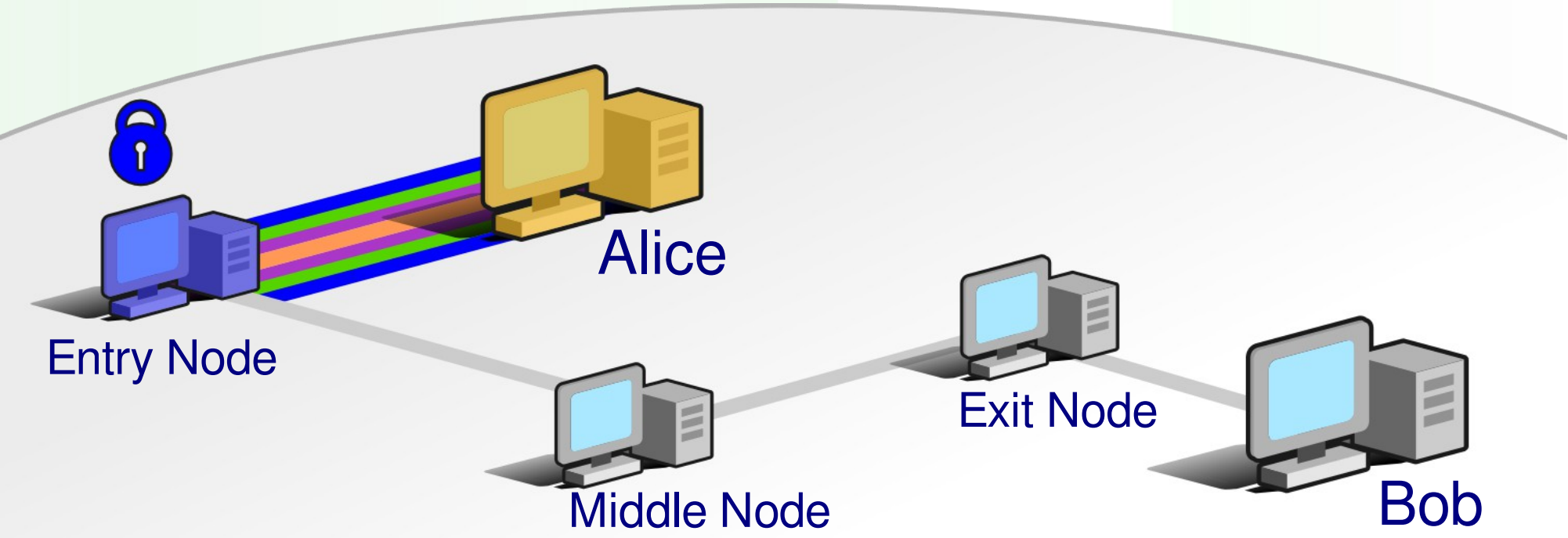
# *An Evil Network*



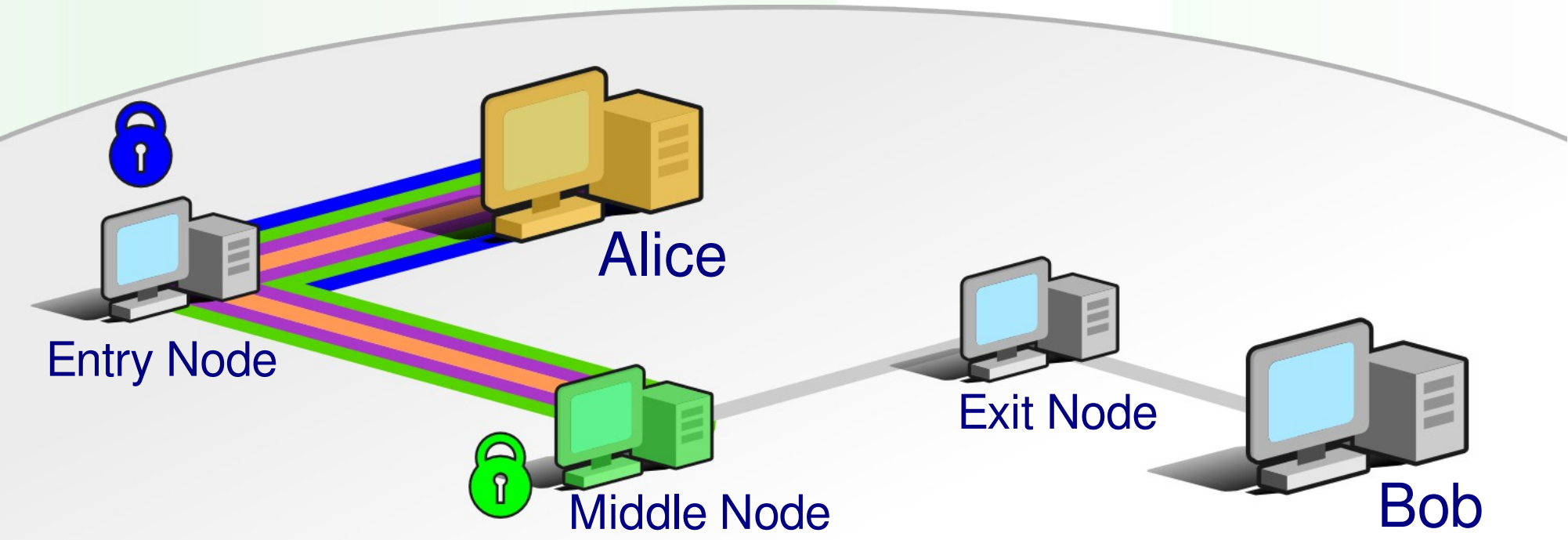
# How Tor Works



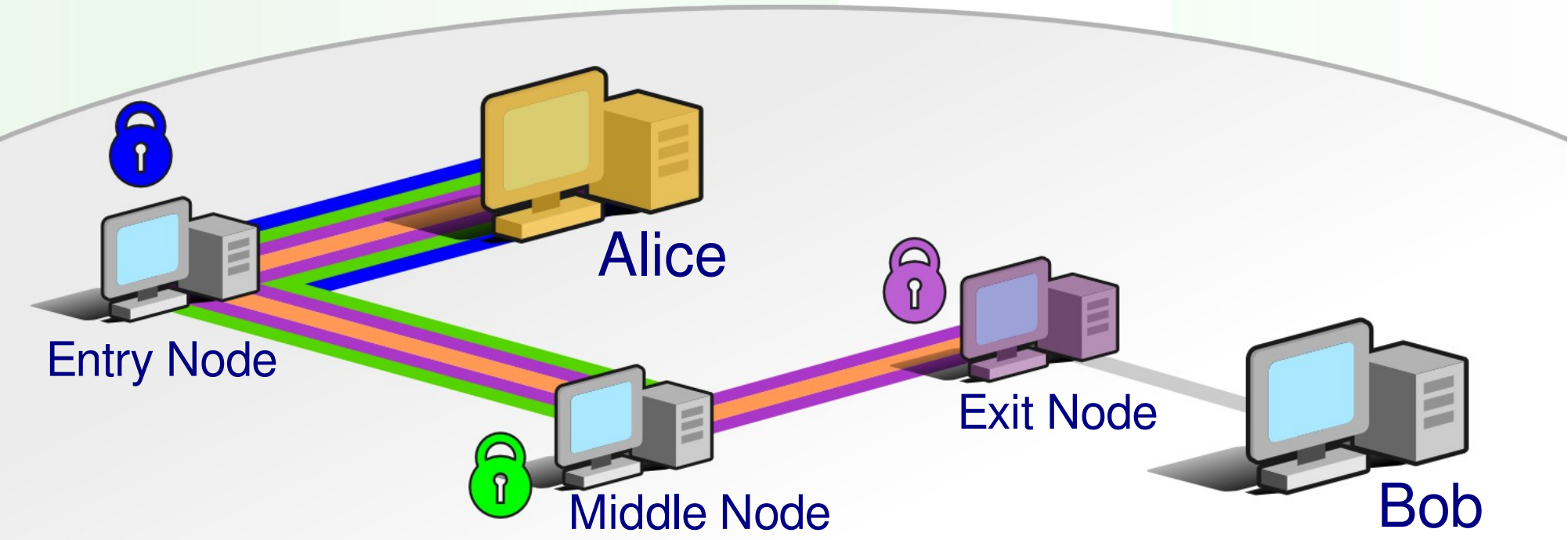
# *Alice connects to an Entry Node.*



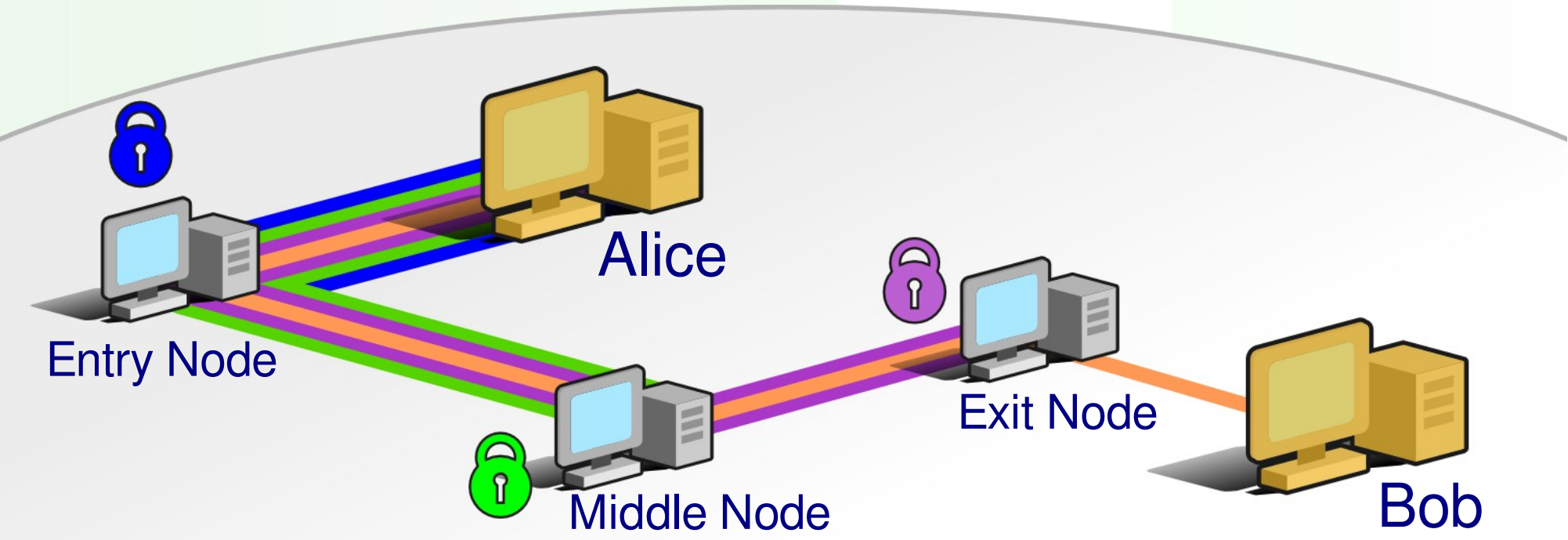
*The data is routed through a Middle Node.*



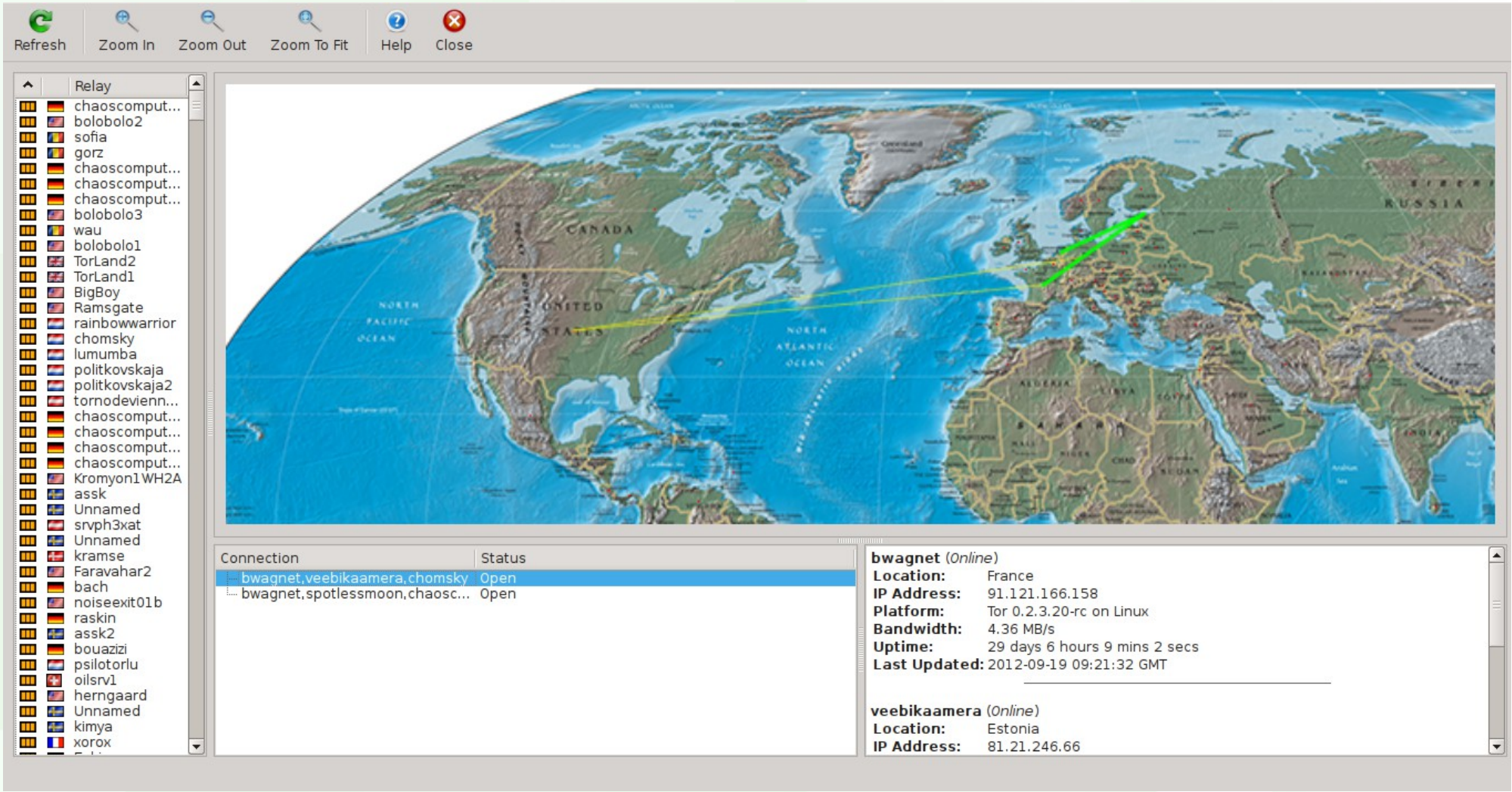
*The data is routed through an Exit Node.*



*Alice's circuit to Bob is established.*



# Network Map



# *Metrics*

- Measuring the Tor Network anonymously
- NSF grant for research
- Archive of hourly consensus, ExoneraTor, VisiTor
- Metrics portal:

**`https://metrics.torproject.org`**

# Future Directions

- Realtime Voice and Video over Tor
- Greatly improving usability, security, and anonymity of Tor Browser and Tails
- Making Tor undetectable on the wire
- IPv6 compatibility
- Crypto upgrade
- Distributed Directory Authorities

# *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 CE. For example:
  **http://www.gsmk.de**
- Guardian Project,
  **https://guardianproject.info/**

# *Next steps:*

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

# *Credits and Thanks*

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