The Onion Router: Understanding a Privacy Enhancing Technology Community

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Background: Online Surveillance, Data Breached and Information Privacy

- Internet technologies have provided us a convenient way to communicate, connect, and share.

- However, the ubiquitous and constant online data processing has made mass surveillance much easier to achieve and personal privacy more difficult to sustain.

- Through online surveillance, some corporations can manipulate the ads and the prices; governments can censor, discriminate, and even stifle free speech worldwide (Schneier, 2015).

- Constant data breached by cybercriminals →Development of Privacy-enhancing Technologies (PETS)

Privacy-enhancing Technologies: The Onion Router

- The ToR, the most used Privacy-enhancing Technologies (PETS), is a free, open network that provides routing services to around 2.5 million daily users (BBC, 2015).

- Users can browse and exchange online information anonymously by deploying transactions through different "relay nodes".

- ToR's goal is to protect users from online surveillance that threatens personal freedom and privacy (Dingledine, Mathewson, & Syverson, 2004).
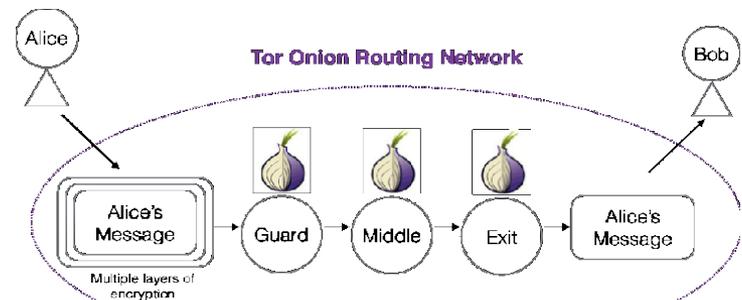
ToR: A Privacy-enhancing Technologies (PETs) Community

ToR Supported by Volunteers

- ToR depends on a group of global volunteers contributing their resources and time to sustain the quality and availability of the service.

- These volunteers are known as 'ToR-relay operators.'

- These operators are involved with different social activism groups (Macrina, 2015).

- Anyone who has technical skills and is willing to contribute to the infrastructure can join the Tor network.

Why ToR is Different?

- Anyone can use ToR, even criminals.

- ToR-relay operators might be investigated or arrested by law enforcement even though they do not know what the contents of their delivery.

- Operators not only need to contribute their own resources but also are willing to take social and, potentially, legal risks, which makes this PET community different from other open-source initiatives.

Adapted Perspectives and Research Questions

Method

- **Theory of motivation**
  - RQ1: What are the motivations of ToR-relay operators to voluntarily participate in the Tor-relay network?

- **Cyberactivism**
  - RQ2: How do Tor-relay operators perceive the attitudes of their social and legal systems towards ToR?

- **Current state of the Tor-relay network**
  - RQ3: What kind of challenges do ToR-relay operators encounter and what compensation do they expect for volunteer participation?

- An online survey was disseminated via the Tor-relay mailing list from April to June in 2015.

- 50 effective samples

- Questionnaire incudes several sections. In this paper, we focus on three aspects:

    1) individual motivation;

    2) perceptions about legal and social systems;

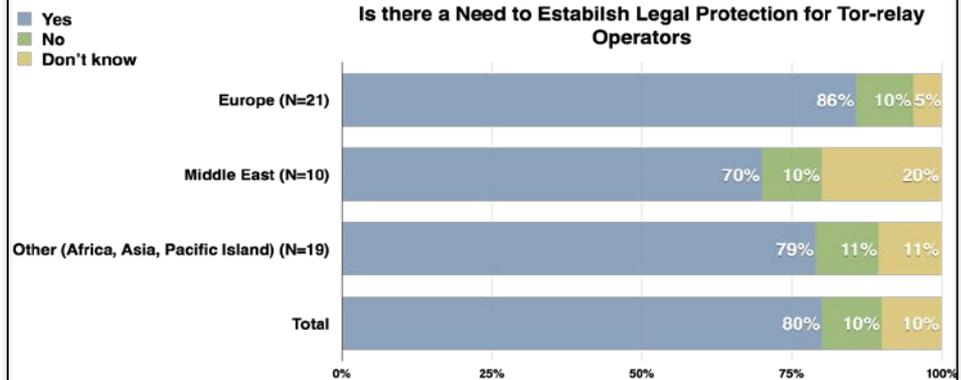   3) individual constraints and expectations for participation

Findings

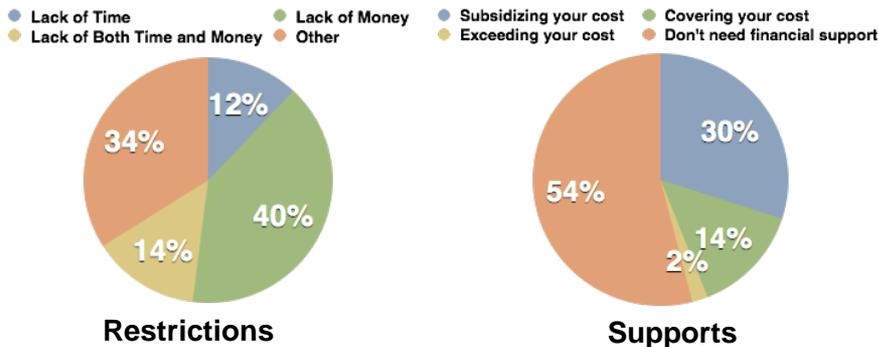## Operatros are motivated by advocating privacy values or resolving privacy problems

Orientation/ Motivation	Extrinsic	Intrinsic
Self-oriented	Gaining personal rewards	Enjoying solving privacy problems
Project-oriented	Enhancing network	Supporting value of information privacy

Table 4. Motivational Factors to Participate in Tor-relay Network

80% of ToR Operators seek for legal protection.

Is there a Need to Estabilsh Legal Protection for Tor-relay Operators

- Yes
- No
- Don't know

Europe (N=21): 86% 10% 5%
Middle East (N=10): 70% 10% 20%
Other (Africa, Asia, Pacific Island) (N=19): 79% 11% 11%
Total: 80% 10% 10%

A contradiction between financial restrictions and financial support.

- Lack of Time
- Lack of Money
- Lack of Both Time and Money
- Other
- Subsidizing your cost
- Covering your cost
- Exceeding your cost
- Don't need financial support

Restrictions: 12%, 40%, 14%, 34%
Supports: 30%, 14%, 2%, 54%

- **No participants identified the United States as their location**

- **Operators were concerned about monetary rewards and whether it would compromise network privacy and security.**

- **Keeping TOR a non-profit to sustain its quality of privacy and security is a priority.**

Limitations

- **Sample size is relatively small**

- **Social desirability bias when asking certain questions (e.g., their motivation to gain financial support)**

- **Large geographic regions may overlook the diversity of social and legal systems within these regions.**

Conclusion

- **The stigma of ToR still hinders the development and adaption of PETs.**

- **Rethink the future of PETs and their influence on society.**

- **More in-depth investigations from the information community's perspective on this important issue!**

Thank you. Questions?

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