

## Investigating Anti-Censorship Technologies

Alexander Master, Purdue University

### 1. Summary

Nation-states impose various levels of censorship on their country's Internet communications. Regardless of socio-political or economic reasons for censorship, the United Nations has declared that freedom of expression is a universal human right, and people should be permitted to freely communicate information through any medium. Given concerns of Internet censorship and surveillance, software developers have created tools designed to circumvent censorship in places where it exists – enabling communications and access to open information. This research is directed to characterize threats to Internet communications, and evaluate effectiveness of available anti-censorship technologies.

### 2. Motivation



[1]



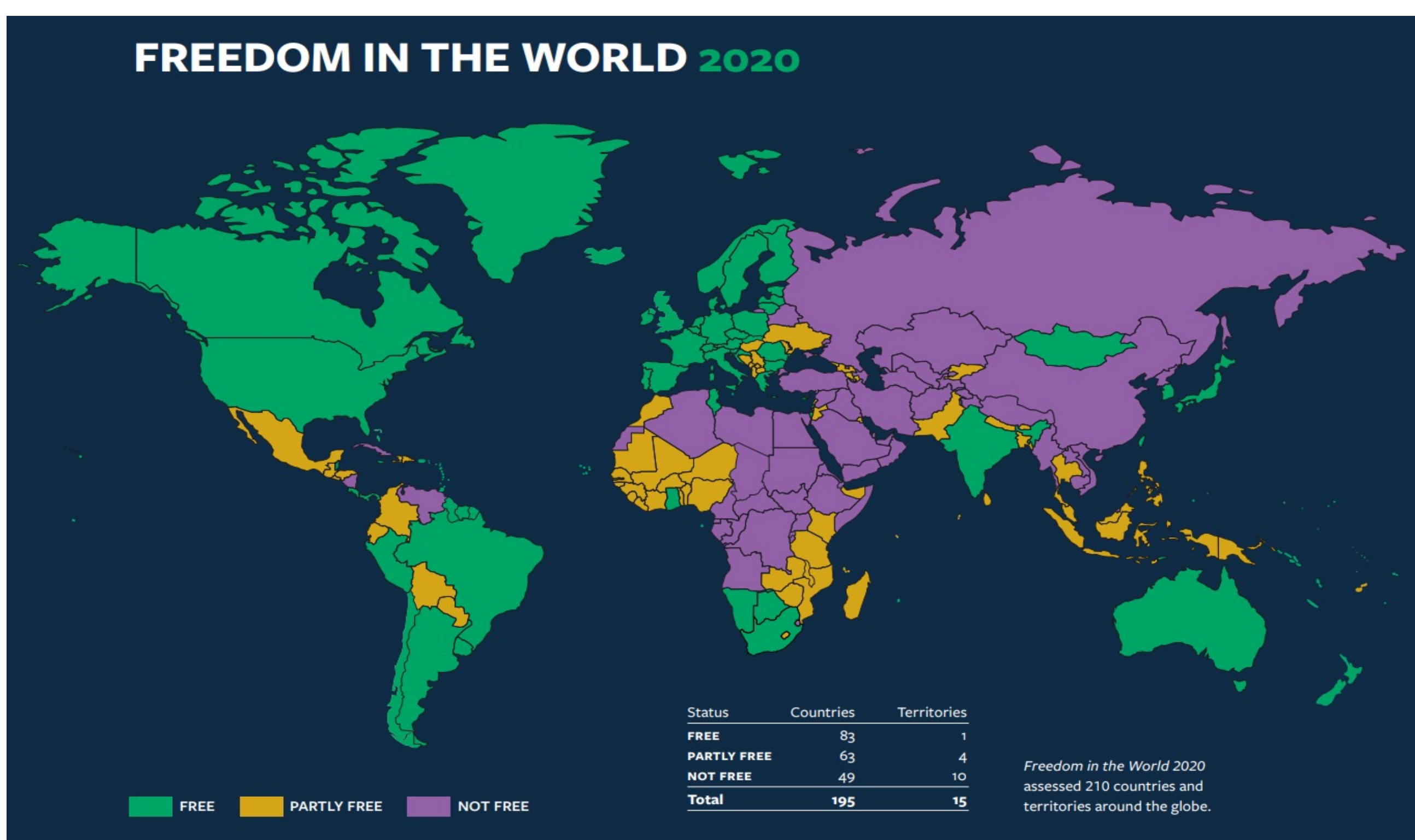
[2]



[3]



[4]



### 3. Threats to Internet Communications

#### Censorship:

- URL filtering
- DNS detection, manipulation, denial
- IP Address / Port Blocking (blocklists, ASs)
- Deep Packet Inspection
  - Several sub-types

#### Surveillance:

- Transparent Proxying
- Traffic Analysis

### 4. Circumvention Approaches

#### Different Threat Models

#### Anti-Censorship (Access Focus)

- Psiphon, Lantern, ...

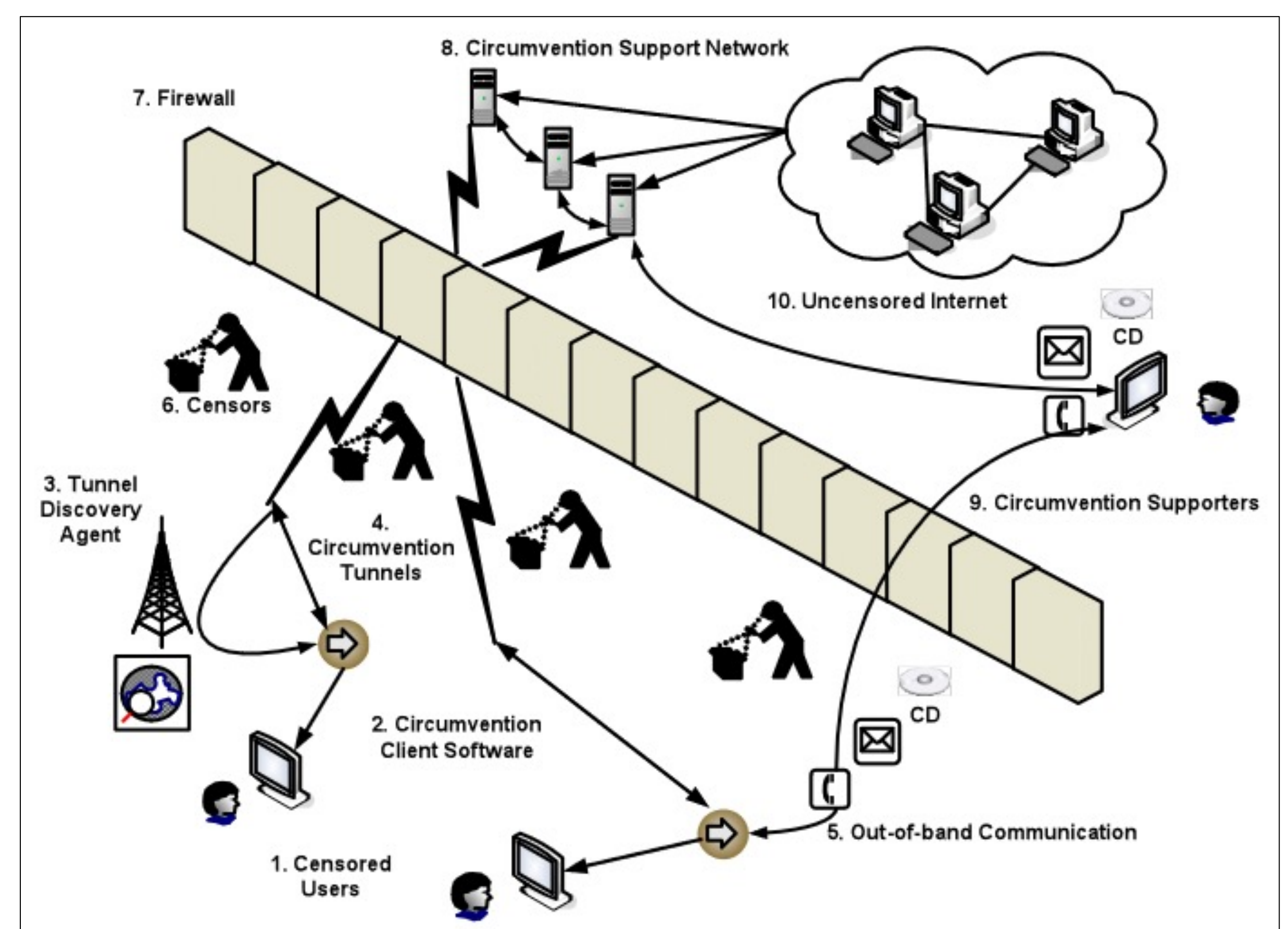
#### Privacy-Enhancing Technologies (Privacy Focus)

- Tor

#### Incidental Approaches

- Virtual Private Networks, Web Proxies, ...

#### Camouflage and Misdirection



Anatomy of an Anti-Censorship System [6]

### 5. Next Steps

#### Classification and taxonomy

#### Investigation of metrics

#### Identification of new approaches

#### Experimentation and data collection

#### References:

- [1] <https://www.usatoday.com/story/news/world/ukraine/2022/03/08/russia-free-speech-press-criminalization-misinformation/9433112002/>
- [2] <https://www.reuters.com/world/americas/censorship-circumvention-tool-helps-14-million-cubans-get-internet-access-2021-07-16/>
- [3] <https://www.zdnet.com/article/china-is-now-blocking-all-encrypted-https-traffic-using-tls-1-3-and-esni/>
- [4] <https://timesofindia.indiatimes.com/india/70-of-global-internet-shutdowns-in-2020-were-in-india-report/articleshow/81321980.cms>
- [5] [https://freedomhouse.org/sites/default/files/2020-03/FINAL\\_FIW\\_2020\\_Abridged.pdf](https://freedomhouse.org/sites/default/files/2020-03/FINAL_FIW_2020_Abridged.pdf)
- [6] [http://www.internetfreedom.org/archive/Defeat\\_Internet\\_Censorship\\_White\\_Paper.pdf](http://www.internetfreedom.org/archive/Defeat_Internet_Censorship_White_Paper.pdf)