Censored Planet: A Global Censorship Observatory

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The Censored Planet System

Censored Planet is a scalable system that uses remote measurement tools to measure network interference safely and continuously.

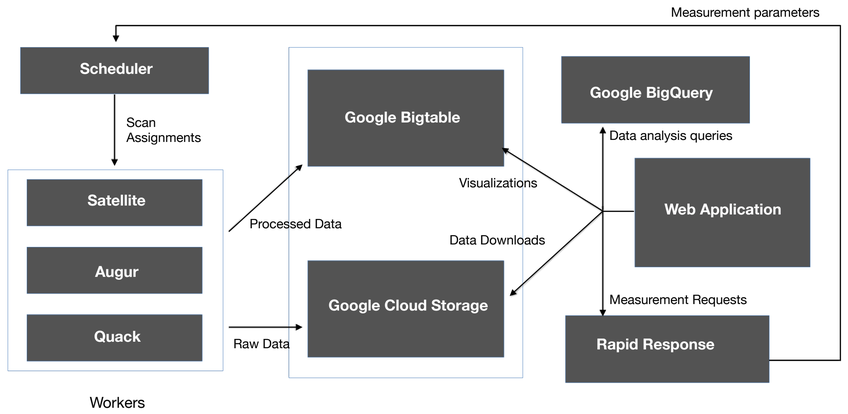

Fig 1: Censored Planet workflow. Satellite [1], Augur [2] and Quack [3] are remote tools that measure interference at different layers in the Internet

Vantage points

Censored Planet has thousands of vantage points in more than 170 countries. Censored Planet scans have been running biweekly from a network of machines at University of Michigan since August 2018, measuring around 2000 domains from the Citizen Lab Global Test List and Alexa list of popular domains.

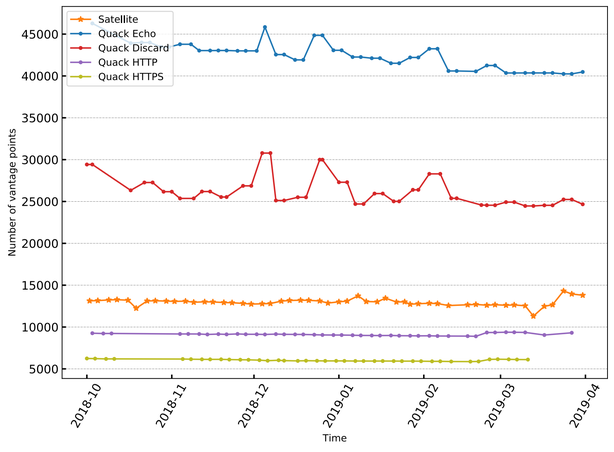

Fig 2: The number of vantage points used by Censored Planet for the last 6 months

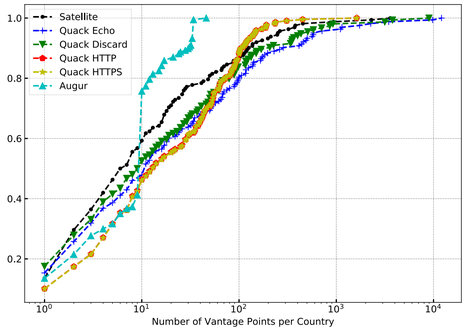

Fig 3: CDF of number of vantage points used by Censored Planet per country in one scan

Importance of scale

#	Run 1	Run 2	Run 3	Run 4	Run 5
1	Iran (0.128)	Mongolia (0.118)	China (0.133)	Iraq (0.117)	Iran (0.114)
2	Mongolia (0.118)	Iraq (0.117)	Thailand (0.125)	Iran (0.109)	Malaysia (0.03)
3	Indonesia (0.09)	Iran (0.106)	Mongolia (0.118)	Nepal (0.057)	Armenia (0.034)
4	Belarus (0.030)	Nepal (0.052)	Romania (0.100)	Brazil (0.05)	Chile (0.029)
5	Sri Lanka (0.027)	Pakistan (0.042)	Russia (0.052)	Argentina (0.036)	Sri Lanka (0.027)

Table 1: The top 5 countries with highest fraction of blocking in Satellite, with each run randomly sampling 10 vantage points from each country. In most cases, the ranking and percentage of blocking change because of the small number of vantage points used each time. Having more vantage points increases the confidence in observations.

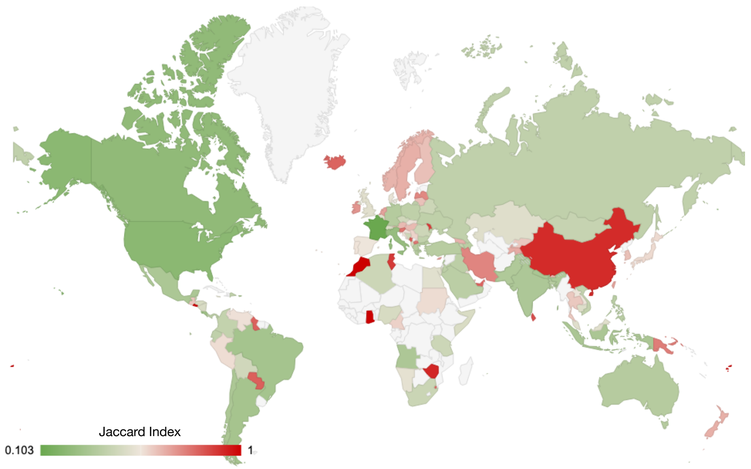

Fig 4: The mean of the pairwise Jaccard Index of domains blocked between vantage points in a country (Satellite data). Some countries like China are highly homogenous in their blocking, while countries without a national firewall like Russia are more heterogenous. Only a large scale measurement can accurately reflect the state of censorship in heterogenous countries.

The censorship trend in Bangladesh

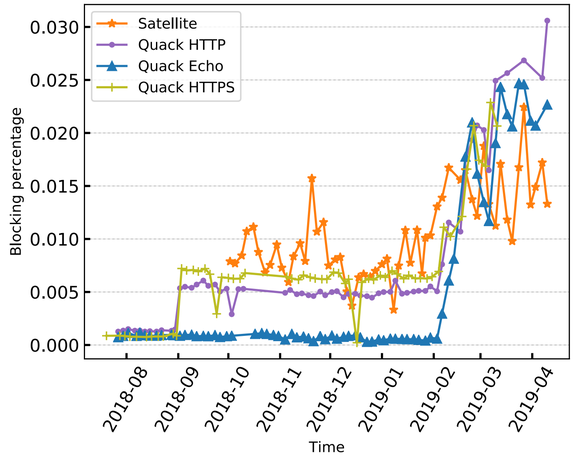

Fig 5: During and after the national elections in December 2018, censorship has been on the rise in Bangladesh. Censored Planet has detected blocking of several news websites [4] as well as blocking of pornography and gambling websites [5]

A holistic view of Internet censorship

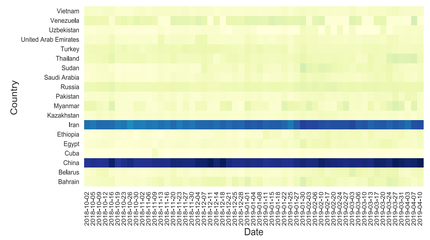

Fig 6(a): Satellite

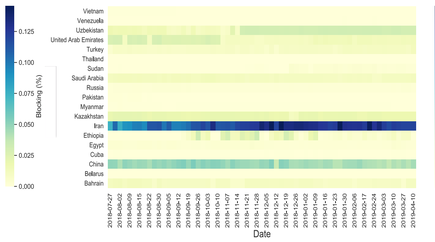

Fig 6(b): Quack HTTP

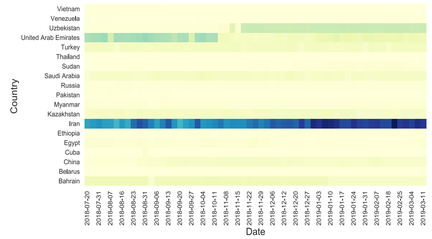

Fig 6(c): Quack HTTPS

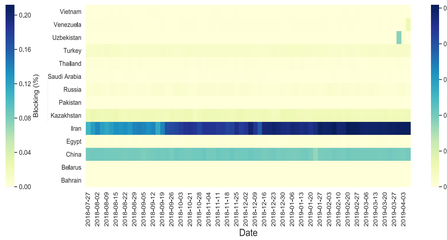

Fig 6(d): Quack Echo

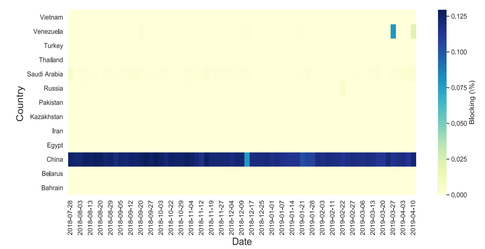

Fig 6(e): Quack Discard

Fig 6: The fraction of blocking observed in the 25 countries labeled as 'Not Free' in the Freedom on the Net report during our period of measurement. Each of our tools help us uncover characteristics of censorship in different countries. For example, Iran's national firewall only blocks outgoing requests as evidenced by Quack Echo detecting Iranian censorship while Quack Discard does not.

References

1. W. Scott, T. Anderson, T. Kohno, and A. Krishnamurthy. Satellite: Joint analysis of CDNs and network-level interference. In 2016 USENIX Annual Technical Conference (USENIX ATC 16), pages 195–208, 2016.
2. P. Pearce, R. Ensafi, F. Li, N. Feamster, and V. Paxson. Augur: Internet-wide detection of connectivity disruptions. In 38th IEEE Symposium on Security and Privacy, May 2017.
3. B. VanderSloot, A. McDonald, W. Scott, J. A. Halderman, and R. Ensafi. Quack: Scalable remote measurement of application-layer censorship. In USENIX Security Symposium, 2018.
4. "RSF decries brazen censorship of Bangladeshi news websites" - https://rsf.org/en/news/rsf-decries-brazen-censorship-bangladeshi-news-websites
5. "Bangladesh 'anti-porn war' bans blogs and Google books" - https://www.dw.com/cda/en/bangladesh-anti-porn-war-bans-blogs-and-google-books/a-47684058