

Great review!

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10/17/2019
Internetworking Protocols
Dr. Bulusu

The Internet Governance Ecosystem Paper Review

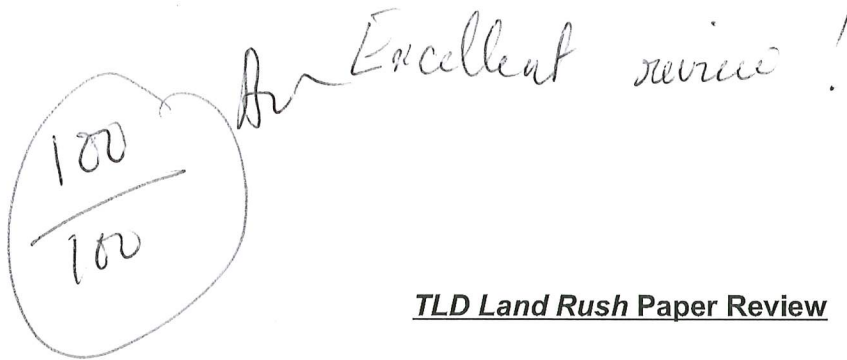
Knowledge is power. – Sir Francis Bacon, philosopher

The internet is a powerful tool that has made our world more interconnected. You can go shopping online, connect with others through social networks, play games, and even commit crimes. The possibilities are endless thanks to this invention. It is a knowledge powerhouse. Certain information is sensitive and should be regulated and protected such as personal data like social security number and location. Other information has been censored by anti-free speech companies and governments. This has led to a discussion of how and who should regulate the Internet.

Currently, there are multiple international organizations having input on this topic. There is the Internet Corporation for Assigned Names and Numbers (ICANN), Internet Governance Forum (IGF), and The World Economic Forum. ICANN is in charge of the Domain Name System (DNS), and the "registration of key parameters of the Internet protocol specified by the [Internet Engineering Task Force (IETF)]." The IGF is a collaborative effort of multi-stakeholders who meet annually to discuss Internet governance and other related issues. The World Economic Forum is an international organization committed to improving the world through business, political, academic and other means. They are currently investigating "the way governments use data, including data found on the Internet, for surveillance purposes." The article did not share more details about these organizations and their effects on the internet. A deeper study would be beneficial for those interested in this topic. Either way how the internet is governed has huge implications.

Internet governance is a much debated, controversial topic that has a wide range of consequences. Currently, the Chinese government censors various mediums that contain messages, not in line with the current regime. For example, when showing Senator Ted Cruz talk about various issues on CNN, they blacked out the portion of his talk on the NBA. (An executive within the NBA tweeted a message in support of the Hong Kong protestors which is a sensitive topic in China right now.) This type of governance violates civic freedom of speech that many other countries possess and protect. Should other international governments interfere and try to remove this restriction on freedom of speech? Should an international governing body dictate what can and cannot be shown? Another form of this on a platform level is YouTube demonetizing conservative host Steven Crowder's videos for not following an ambiguous set of "hate speech" rules within its platform. Critics believe it is a thinly-veiled attack on his political ideology. This raises an important question - should different political ideologies be restricted because they conflict with the controlling group's viewpoints? On the flip side, there have been dangerous consequences for sharing too much information. Recently, the champion of the video game Fortnite Kyle "Bugha" Giersdorf was "swatted" at his home during a live stream. Someone on the internet found his address and called the police about a fake hostage situation. A SWAT team promptly showed up, busted down the doors of Giersdorf home and pointed guns at him and the rest of his

family. Dangerous events such as these should be governed against and protect the user from such threats to their life. Too much governance leads to governments or platforms oppressing their citizens' right to freedom of speech, but too little governance can endanger the lives of others which is why the issue of internet governance is and should continue to be discussed and debated.



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TLD Land Rush Paper Review

Summary:

Top-level domains (TLDs) such as *.com* or *.net* have increased by 579 in two years (2013-2015). It costs a substantial amount to create a new TLD, but you could create a business goldmine. Overall, only a small amount of newly purchased domains are used to produce new content and therefore, new TLDs haven't added much value to the Internet.

What the authors are trying to accomplish:

This fascinating study is done to demonstrate the process of creating a new TLD, how many new domains are used as opposed to being a defensive or speculative domain purchase, and how much money can be made to outweigh the costs of developing the new TLD. Also, the authors are canvassing the Internet to see what type of websites exists on the Internet.

They achieved their goal. They concluded that it takes about \$500,000 to start up a new TLD which accounts for the \$185,000 standard application fee and other administrative costs. Using the \$500,000 number as the baseline, it was found that only 10% of all TLDs registrars are profitable. They also found 15% of all new TLD domains are made to create new brand identities or content. The remaining 85% of new TLD domains are defensive (bought to protect a brand) or speculative (purchased in hopes for reselling for a later profit.) This data shows that although there are many new TLDs, only a few of their domains are used and the value they add to the Internet is minimal. The authors sound and prudential process assures that these numbers are fairly accurate.

Interesting Things I Learned:

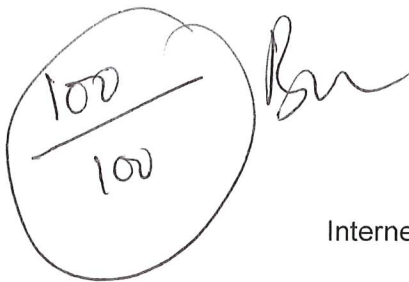
After reading this report, I learned four interesting facts about DNS, TLDs and how much of the internet is used to reach out to others. First, I didn't realize there were over 800 TLDs registered such as *.science*, *.london*, and private TLDs such as *.aramco* and *.realtor*. Second, the TLD creation process is expensive. The minimum entry cost of \$185,000 and the estimated average cost of \$500,000 means only large institutions or investors with deep pockets can create a TLD. Third, I found the sunrise phase of new public TLDs interesting. This period only allows those with trademarks to get first pickings on their domain names in the new TLD. So major companies with popular brands such as Coca Cola or Lays get first dibs on related domain names in the new TLD. Fourth, this paper compelled me to do a couple of Google searches. I first looked up the most expensive domain name sales in the Internet's history and learned that the biggest sale was Cars.com for \$879 million! If any of these TLD registrars have a name as

such, then they'll easily profit from their TLD. I also found *.com* to be shorthand for "commercial" which makes sense since most websites are used for business purposes. The *.com* TLD still rules the day as the largest sales in history are through this TLD and according to Alexa, majority of one million most frequently visited websites are of *.com*. Overall, this paper sheds a lot of light on DNS and the monetary value of maintaining and making new TLDs.

Demo Notes
9-3pm

RFC

Go's implement this
protocol



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11/26/2019

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TCP ex Machina: Computer-Generated Congestion Control Paper Review

Summary:

This academic paper describes the advantages and disadvantages of a program called *Remy* that generates congestion-control algorithms run on the endpoints of the system. These computer-generated algorithms outperformed human-designed ones since they used parameters based on *a priori* ("from before" or before the fact) information such as the type of network and systems used (i.e. data centers, public wifi, etc.)

What the authors are trying to accomplish:

The authors are attempting to solve a deep, fundamental problem of great practical importance - TCP congestion control. Many of today's manually formulated end-to-end congestion controls are inadequate or underperforming. By differentiating the end hosts depending on their needs and size, they can better able to tell computer-generated algorithms the network and host congestion optimal flow. Applying this *a priori* knowledge makes sense. As an analogy, if you are a water provider, you would want to know which locations are a theme park, store, hotel, or home. So by establishing which host is a datacenter as opposed to a regular laptop, you are better able to understand and fulfill their networking needs.

Also, the authors and testers of *Remy* based their results on end-to-end *performance* as opposed to a few common metrics that when manipulated can hamper the lower layers of the protocol as opposed to "adapt to *whatever* the lower levels are doing." Their results demonstrate the importance of adding additional information to the network congestion protocols and using machine-learning techniques to adjust the TCP congestion control levels as performance and the lower levels dictates.

Interesting Things I Learned:

TCP congestion control "optimization" reminds me of language "fluency." Both terms are unclear or ambiguous when you have reached this high state. For example, how do you know when TCP congestion is optimized? Is it a "know it when you see it" state? This paper hones in on the big picture by measuring end-to-end performance through having a specific range of performance for certain metrics for each host. I also learned machine learning can help take the guesswork out of this process. A machine learning algorithm can perform its own scientific study by doing various tests that change variables in the network and monitor the end-to-end performance of congestion. Whichever algorithm for a particular type of host did well in the key

Good
analogy!