More News does not Mean Effective Policy: Perception and Impact of US Cyber Policies

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1 Introduction

Cyber-attack and cyber-defense techniques have been studied extensively, and cyber-policies have received a great deal of attention as well. However, little has been done to examine the relationships between cyber-attacks and cyber-policies. We address this deficit using a two-step strategy. Using GDelt news data, we first understand the trend of news related to cyber-attacks and the sentiment associated with such news. The news corpus provides both insight into media perceptions with respect to cyber attacks, and helps to identify important events or policy changes in the cyberspace. We then look at cyber attacks trend using DDoS attacks data from Arbor Network. We examine the link between attack volume and major events in the United States' cyber policy as a means to assess their effectiveness. This study lays the groundwork for understanding the relationship between cyber policies and the consequent changes in perception and reality of cyber attacks. As such it may be useful in helping to formulate future cyber-policies and to assess their impact.

2 Methodology

We generate our dataset from two sources. The first source is the events data from Gdelt news. We used the everyday-event files shared by GDelt to find the trends in cyber news, and to find the sentiment expressed in those news items. Our second source is the ddos-attacks data from Arbor Networks. We use Arbor Networks data collected from website (www.digitalattackmap.com) to quantify cyber-attacks trend.

We can find important events in the cyber world by observing the significant changes in volume or sentiment with respect to cyber-news. Using this strategy, we found that the top three policy related events and their date of occurrences in July 2013 to March, 2016 time frame are: a) USA Department of Justice indicted five PLA officers on 5/19/2014 (PLA) b) The US president authorizes sanctions against malicious cyber actors on 4/1/2015 (PAS), and c) US China cyber security agreement signed on 9/25/2015 (UCCA).

We use Intervention analysis to understand the impact of an event or a policy change. The general idea behind intervention analysis is to model time series

(cyber-attacks in our case) for a time range before intervention, and develop a model that quantifies uncertainty associated with future time periods. We then use the model to predict the future outcomes. If there is a large deviation in the prediction and the actual trend after the intervention point, we attribute the change in behavior to the intervention (a policy event).

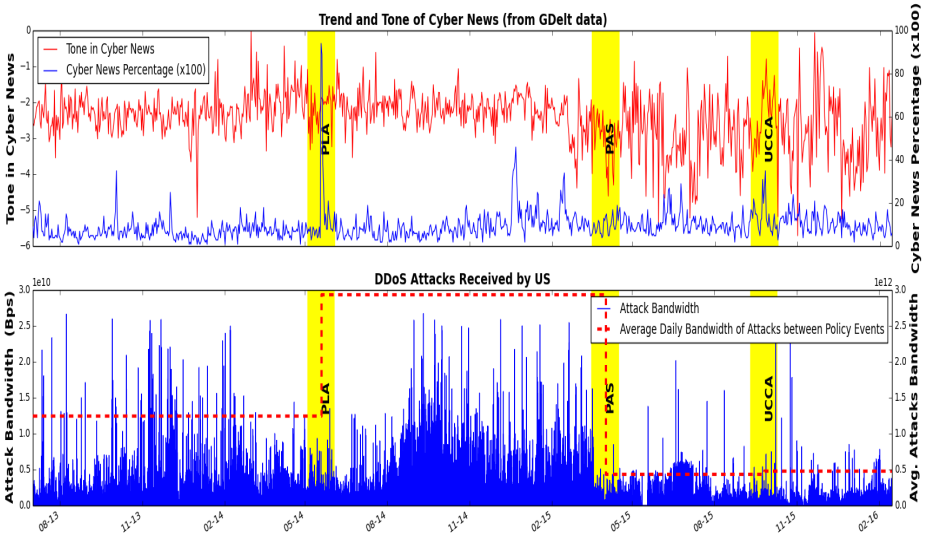

Figure 1. Trend and Tone of Cyber-News Vs DDoS-Attacks Trend. The top plot shows the trend of cyber-news and tone in cyber-news.It is evident that the percentage of cyber-news have increased, whereas the tone has become more negative with time. The bottom plot shows the trend of attacks received by the USA. The important events highlighted in yellow are: a) PLA indicates PLA Officers Indictment b) PAS indicates the US President's Authorizes Sanction c) UCCA indicates US-China Cyber Agreement

3 Results

This research is unique in that it quantitatively analyzes the impact of cyber policies on both the perception and the reality of cyber attacks. By observing the trend of news and attacks, we find that as new policies have been enacted there is a growing discussion of cyber issues in the news, and a growing negative sentiment, yet a decrease in actual attacks. By using intervention analysis for important cyber policy changes, we conclude that the indictment of PLA officers, made the most noise in the news, but lead to an eventual +99% increase (statistically significant with $p = 0.003$) in cyber-attacks. The US-China cyber security agreement, another popular event in news, had slight but not a significant increase in cyber-attacks. In contrast, the US President's sanction, which was least talked in the news, had the largest impact in decreasing the cyber-attacks (-59% with $p = 0.012$).