Internet Wide Events – Extra Credit Project

Contents

Project Support Limited

For this project, we provide limited support. There will not be any chat sessions, and we will only run one office hour to answer questions about the project. There will not be an office hour during the week of Exam 2.

This is consistent with how we have traditionally handled extra credit projects in Computer Networks. You are expected to apply what you learned in the BGPM project in this extra credit assignment.

For this assignment you are expected to work independently, but you can share ideas and charts on Edstem.

Goal

The goal of this project is to identify major events that have large scale impact on Internet connectivity for individual networks or even entire countries. In this project we will learn:

1. How to leverage tools and resources, so that we can understand how a large-scale event is reflected on Internet connectivity data
2. How to perform measurements so we can measure multiple aspects of the event's impact

Task 1

First you will need to find public information about an event that had an impact on Internet connectivity for individual AS or entire countries. Example types of events are DDoS attacks, prefix hijacking, political developments, social unrest, social media censorship, an earthquake, or other physical phenomena.

A specific example event is the development that took place in Myanmar and it was accompanied with Internet disruptions after midnight (UTC) on 1st February 2021. Here is a related news article. We will be using this event as an illustrated example in the project description, but please identify different events to work with.

Where to find events

Below we list resources that can help you find information about similar events. Of course, you are more than welcome to expand your search on the news or on additional tools and resources.

- **Ioda Internet Outage Detection and Analysis** provides multiple events, and a feed as well. We can use the Ioda system to find information specifically for the Myanmar event and impacted ASes MPT (AS9988) and Mytel (AS136255) as shown here.

- **Oracle Internet Intelligence.** Using the Oracle Internet Intelligence to learn about the Myanmar event as shown here.

- **Google traffic disruptions** We can leverage the Google traffic disruptions to find out more about the Myanmar event as shown here.

- Netblocks.org provides reports of disruption events.

Task 1 deliverables

1. Describe in a short essay of 10-15 sentences the event that took place.
2. Identify the time period the event took place.
3. Identify the AS numbers (and associated entities or organization names) of the networks that were involved/impacted.

4. Identify a metric that is associated with the control plane behavior of one impacted AS. Briefly justify why your metric is relevant.

Task 2

Study the control plane behavior of the impacted AS before, during and after the event took place.

Task 2 deliverables

1) Use the PyBGPstream library to study/track this metric. Example metrics are the number of prefixes that are advertised by an origin AS, the duration between Announcement and Withdrawal for a prefix, the AS path and any changes it is associated with, change of origin AS for a prefix, advertisements with conflicting multiple origin AS for a single prefix, etc. Of course, feel free to come up with your own metric that better reflects the behavior of the AS you are studying. We will need to be able to run your code and reproduce your result. Submitting hardcoded values (instead of code that pulls data, processes it, and produces your metric values) is not acceptable and will result in a 0 for the entire project. If you need a code snippet example to get started, the below example code snippet shows how to grab data for a specific time period.

   https://bgpstream.caida.org/docs/tutorials/pybgpstream#moas

2) Show a line graph with the metric of your choice before, during and after the event took place. The goal of this graph is to show that an aspect of the control plane behavior of a network is clearly atypical during the event. So, the x-axis of the line graph will reflect time (in a timescale of your choice), and the y-axis will show your metric.

Resources

- [PyBGPstream](#)
- [Public service](#) for IP to AS mapping.
- [Python library](#) for efficient longest prefix matching if you are given a list of origin AS and prefixes and you want a quick lookup.

What to Submit

To submit this project, submit your Jupyter Notebook file to the Canvas assignment page.

Per the Edstem post on "How to Submit", you will submit your Jupyter Notebook file directly to Canvas as `GTLogin_iweec.ipynb` -- do not zip the file! Tip on Using Python notebook: Opened it in VSCode and install the Jupyter plugin for VSCode.

NOTE: GTLogin should be replaced with your ID you use to log into Canvas (e.g., smith7 as in

`smith7_iweec.ipynb`)

1. Your submission must have all the graphs generated on the page before saving!

2. Make sure your Jupyter Notebook file works in the virtual machine! That is the environment we will use to grade it.

3. When done, submit to Canvas. Then, in the VM, log into Canvas and download your submission and test it out to make sure it works there. Make sure your submission is uploaded correctly. There are no late submissions allowed, per the Syllabus.

Rubric

NOTE: The rubric below reflects a 100-point scale that will be adjusted to be the corresponding X% of potential extra credit.

Task1 -- 40 total points
1.   25 points
2.   5 points
3.   5 points
4.   5 points
Task 2 – 60 total points
1.   50 points
2.   10 points

Honor Code/Academic Integrity/Plagiarism

Please refer to the Georgia Tech Honor Code located here:

https://policylibrary.gatech.edu/student-affairs/academic-honor-code

We strictly enforce Section 3. Student Responsibilities including these prohibited actions:

- Unauthorized Access: Possessing, using, or exchanging improperly acquired written or verbal information in the preparation of a problem set, laboratory report, essay, examination, or other academic assignment.

- Unauthorized Collaboration: Unauthorized interaction with another Student or Students in the fulfillment of academic requirements.

- Plagiarism: Submission of material that is wholly or substantially identical to that created or published by another person or persons, without adequate credit notations indicating the authorship.

- False Claims of Performance: False claims for work that has been submitted by a Student.

What you can and cannot share

1. For this project, you can share graphs generated by the experiments
2. You may share your ideas for which event to study.
3. You are not permitted to share the raw data or code from which these graphs are generated
4. You cannot share your Jupyter Notebook ipynb file!
5. Also, do not share any data you record during experiments