Module : MU5IN066 - NETMET

TP8 : BGP

Etudiants :
Gabriel CAO, N° 3679695

Encadrant :
Matthieu Gouel

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1 Introduction

This lab is a graded lab, it focuses on understanding passive measurement with the protocol BGP. Any piece of code are in the following gist : `https://gist.github.com/cao-gabriel/c78806f1a1a1d38e1021544f0f46ba36`

2 BGP and ASes

2.1 Definition of an AS

an Autonomous System is a set of routers under a single technical administration, using an interior gateway protocol (IGP) and common metrics to determine how to route packets within the AS, and using an inter-AS routing protocol to determine how to route packets to other ASes.

2.2 Prefix advertisement

An AS advertise its prefix to other ASes By using BGP and more specifically using BGP updates messages.

2.3 Rooting loops

Loop detection is done by scanning the full AS path specified in the AS_PATH attribute and checking that the autonomous system number of the local system does not appear in the AS path.

3 Gather data

3.1 Attributes of prefixes

- Prefix : the IPv4 or IPv6 address block being announced and also a path of AS numbers, indicating which ASNs the traffic must pass through to reach the announced address block.
- AS PATH : This attribute dentifies the autonomous systems through which routing information carried in this UPDATE message has passed.
- Next Hop : defines the IP address of the router that SHOULD be used as the next hop to the destinations listed in the UPDATE message.
- Origin : The ORIGIN attribute is generated by the BGP speaker that originates the associated routing information.

3.2 Compute the graph of all connected ASes

By computing all the AS Path of all announced prefixes, and structuring the links between ASes as a graph, we have the AS level topology of the internet.

4 Asynchronous System level topology

1. How many vertices this graph contains ?
   There are 72986 vertices in this graph.
2. How many edges does this graph contain ?
   There are 192637 edges in this graph.
3. List the 5 vertices with the highest degree.
   The 5 vertices with the highest degree are '6939', '174', '3356', '57463', '7018'.
4. What are the organizations behind the ASes with the highest degree ?
   - 6939 Hurricane Electric LLC
   - 174 Cogent Communications
   - 3356 Level 3 Parent, LLC
   - 57463 NetIX Communications Ltd.
   - 7018 AT&T Services, Inc.
5. What is the purpose of these organizations ?
   The largest ASes are maintained by Tier 1 ISPs – ISPs with massive networks. Each Tier 1 ISP maintains its own AS. It owns the network infrastructure and controls traffic flow within that network. Together, these ISPs form the internet backbone. Their AS networks interconnect with each other to create a single internetwork that supports worldwide packet exchanges.