Lab 5: BGP

How to write the report: Each student may work individually or in a group of up to three members. If working in a group, all students must submit the same PDF file that includes all exercises and the names of every group member. You have to run the provided examples and use them to illustrate the underlying concepts. For the exercises, analyze the observed behavior, describe your findings, include relevant images, and document the steps you followed to obtain your results.

Exercise

For this exercise, select a target Autonomous System (AS) and 3 additional ASes, other than your serving AS. They should be geographically dispersed across different countries or continents. Ensure that all chosen ASes provide accessible looking glass services and that the target AS exhibits robust connectivity.

What is a Looking Glass?

A BGP looking glass is a public, read-only interface that lets you see the routing and BGP table view of an ISP or network operator's routers from their point of presence on the Internet. It typically provides commands like BGP route lookup, ping, and traceroute so you can verify how prefixes are advertised and which paths traffic takes across Autonomous Systems, which is very useful for troubleshooting and validation of routing policies.

Resources

These websites provide a list of publicly available looking glasses:

- https://www.bgplookingglass.com/
- https://www.routeservers.org/
- http://www.traceroute.org/

1 Internet Topology Discovery

Using traceroute measurements from both your local network and from the selected ASes, construct an AS-level topology centered on the target AS. Your diagram should include your own AS and the three additional ASes, illustrating their interconnections. Trace routes in both directions, the forward path from source AS to the target AS and vice versa, these paths may differ. Focus on identifying the inter-AS topology rather than intra-AS router-level details. Represent each node as an AS and draw links only where at least one inter-AS connection exists.

2 Measuring internet Distance

When performing a traceroute measurement, you may obtain one or more round-trip time values for each corresponding router. These values represent multiple measurements of the time required to reach that router. In such cases, you shou consider the smallest measured value.

- Using these time values, calculate the approximate distance in kilometers for each link in your topology. For this calculation, assume that all traffic is transmitted over fiber optic cables, with a propagation speed approximately equal to the speed of light, 300,000 km/s.
- While calculating the distance between two nodes, you may find that the resulting distance is significantly larger than the actual physical distance separating them. Apart from propagation delay, what other significant factors could substantially increase the end-to-end delay?

3 Interconnecting the ASes

Without adding new ASes and considering the graph you have constructed, identify any nodes that appear in multiple paths originating from different ASes. Using the available tools, map the neighbors of each selected AS, then connect all the common links shared between them.

4 Possible Paths

If you have accurately mapped the topology surrounding the target AS, you may observe that multiple potential paths exist between the target AS and the source ASes, in both directions. Identify all the possible paths and what conclusions can be drawn from this observation? More broadly, what factors typically influence the selection of one path over others in such scenarios?