

## Reading Report #5

Paper: On inferring autonomous system relationships in the Internet

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In the paper, the author proved that the AS path in any BGP routing table entry is valley-free based on the assumption that all ASs set their export policies according to the selective export rule. But in reality, not all ASs stick to this export policy. Thus, not all AS paths are valley free. Also, as author mentioned in the paper, sometimes the top provider does not have the highest degree. Because of these inaccuracies and also because of BGP data collected by route-view project is only a partial view of the Internet, it is very hard to accurately infer AS relationships.

However, if we took a different view towards the given BGP data, we might get some interesting results back. First, we have the data that reflects the BGP routing of the Internet. Second, we know that in the ideal situation, all inter-domain routing should be valley free. Thus, we can explore the BGP data to identify those non-valley-free BGP paths that violate the agreed upon export policy. In detail, we would like to know to what extent non-valley-free BGP paths exist in current Internet. For example, how many non-valley-free BGP paths were advertised during a fixed time period? What percentage do they take from the total BGP paths? We also want to find out what are the reasons that cause these violations (deliberately or due to misconfigurations)? Is there any common pattern of violations hidden behind the scenes? What are the source ASs of these violations? And further we can evaluate how do these violations impact the Internet routing?

Answering these questions can benefit many parties with different interests.

- Routing policy maker can enforce additional rules to minimize such violations.
- Researchers and organizations can develop better tools for detecting and preventing such violations.
- Researchers and organizations can develop or improve inter-domain routing protocols to prevent producing or propagating such non-valley-free BGP paths.
- ISPs can plan for better future contractual agreements.

To answer these questions, we need to:

- develop techniques to identify those BGP paths that are not valley-free from the collected BGP data.
- classify BGP paths that are not valley-free, that is, is it on a customer-to-provider edge or peer-to-peer edge?
- develop methodology to evaluate the impact of these violations.
- develop methods to prevent such violations.

Another thing worth mentioning is that we should be able to use the inferred AS relationships proposed by the paper to verify our results.