Topological and Security Exploration through Traceroute (LCT3-08)

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Introduction

The Internet's core is a web of interconnected backbone networks of high-speed. It connects individuals, businesses, universities, and agencies over this backbone. Most Internet measurement studies require the availability of a representative Internet map. Nonetheless, no complete Internet maps depicting Internet's router-level structure or topology exist. This is because the real topological distributions are usually either not available to the public, or the Internet Service Providers (ISPs) only issue simplified topologies, which lack router-level connectivity and may be out of date.

An accurate router-level topology of the Internet would benefit many research areas, including network diagnosis, inter-domain traffic engineering, and overlay construction.

Methodology

- BGP Routing Table: BGP routing tables are the basic input for us to analyze the Internet.
- Database: A database stores all information in the BGP routing table, enabling us to run SQL queries for questions and integrate new analysis modules.
- Table-driven Generation and Path Reduction: A BGP routing table maps destination IP addresses to a set of AS paths that were not used to reach that destination. We identify independent profiles which are originated by our targeted AS.
- Traceroute Collection: We use the looking glass to initiate traffic from different vantage points in order to collect a large amount of data from various sources.

Application of Path Traversal: Given a set of path traceroute, the analytical component utilizes the common IP address assignment scheme to infer IP aliases. The probe-based component introduces a minimal probing overhead to improve the accuracy of APNIC.

Application of Alias Resolution: This mechanism applies our or carrier technique to identify pairs of IP addresses, and then the alias resolution is complete when all pairs of IP addresses are resolved either as aliases, not aliases, or unresolvable.

Results

The left two tables display that the combined of AS and APNIC leads to better result in every network property. The combination of AS and APNIC is the current state of the art.

![Network topology map]