Chair of Network Architectures and Services
Department of Informatics
Technical University of Munich

TUM

IPv6 Deployment Analysis using BGP Announcements

Motivation

More than 20 years after the initial standardization of IPv6 in RFC2460 [1] its deployment slowly gains traction. There exist several projects to track the deployment. Google [2] provides data on the usage by clients. This gives insights on users with an IPv6 capable Internet connection. Other projects like the IPv6 hitlist by Gasser et al., [3, 4] track the number of responsive addresses and thus the number of services available through IPv6.

In this topic, we want to analyze the BGP landscape with respect to the IPv6 deployment. A simple analysis is to determine the number of available prefixes and the number of autonomous systems (ASes) announcing such prefixes. Departing from that we want to dig deeper into the structure of IPv6 announcements their origin and their path. Moreover, a comparison to IPv4 announcements is possible. In order to collect and analyze this information, we want to create a Patricia trie based structure. The development of this structure needs to take into account a limited availability of resources and that an IPv6 address is 128 bit long.

Your Task

- Familiarize with the related work on IPv6 deployment and BGP related analysis
- Perform a structured analysis of IPv6 announcements using data provided by the chair
- Develop a trie based data structure
- Perform advanced analysis on this data structured. E.g.:
  - Structural analysis of announcements
  - Temporal evaluation
  - Stability report
  - Comparison to the IPv4 landscape
  - Detect IPv4 sibling prefixes [5]

Requirements

- Basic programming knowledge in ...
- Familiarity with GIYF-Based work approaches
- Send emails to advisors always to all of us (reply all)
- Optionally: Knowledge on BGP and IPv6

Bibliography

[1] RFC2460 Internet Protocol, Version 6 (IPv6) Specification https://rfc-editor.org/rfc/rfc2460.txt
[2] https://www.google.com/intl/en/ipv6/statistics.html [3] Gasser et al., Scanning the IPv6 Internet: Towards a Comprehensive Hitlist, TMA 2016
[4] Gasser et al., Clusters in the Expanse: Understanding and Unbiasing IPv6 Hitlists, IMC 2018
[5] Scheitle et al., Large-Scale Classification of IPv6-IPv4 Siblings with Variable clock Skew, TMA 2017

Contact

Patrick Sattler   sattler@net.in.tum.de
Johannes Zirngibl   zirngibl@net.in.tum.de
Juliane Aulbach   aulbach@net.in.tum.de