Can TCP and Locator/ID Separation get along?
Juhoon Kim, Luigi Iannone, Anja Feldmann

Scalability Problem in the Core Internet

The size of BGP routing table grows at a super-linear rate. This phenomenon causes severe scalability problems on routers in the core Internet [1]. It is commonly believed in the research community that Locator/ID Separation Protocol (LISP) will alleviate the issue.

Locator/ID Separation Protocol

The main idea of the LISP [2] is to split the IP addressing space into two orthogonal spaces, one used to identify the end-hosts (EID), and one used to locate them in the Internet topology (RLOC). Packets are tunneled through the core Internet from the edge border router of the source site to that of the destination site.

Cache-miss Rate

In our previous study [3], it was estimated that the cache-miss rate is not more than 1% of total transmitted packets. Nevertheless, it will cause the performance degradation of Internet services.

Cache Lifetime

Most of the cache entries are short-living. This indicates that a cache-miss will be more critical for the sites contacted by other end-hosts at rare intervals than those contacted at frequent intervals.

TCP over LISP

The first packet for vanilla LISP is dropped in the border router of the source site, as the it does not have the EID-to-RLOC mapping in its local cache. The same happens for symmetric LISP, however, in this case the second packet is again dropped (this time in the destination site), since the border router also needs a mapping.

TCP Setup Delay

Cache-misses cause longer TCP connection establishment due to initial packet drops. Our experiments with FreeBSD 8.0 show 6 seconds latency.

Performance Evaluation

TCP efficiency difference between long flows (1K pkts) and short flows (7 pkts) is much bigger with LISP. Efficiency is defined as the ratio between data transfer time and total connection time (including handshake).

Ongoing Work

Our current research is directed at determining optimal TCP parameters for Locator/ID split technologies. However, the optimization must not hinder the communication between a TCP speaker in a LISP domain and a TCP speaker in a non-LISP domain. We, therefore, take this consideration into account to determine the optimal TCP parameters.

Further Readings