PATHspider: A tool for active measurement of path transparency

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Introduction

PATHspider performs large-scale A/B testing between two different protocols or different protocol extensions to perform controlled experiments of protocol-dependent connectivity problems as well as differential treatment. PATHspider is a framework for performing and analyzing these measurements. The actual A/B test can be easily customized via a plugin framework.

Connectivity problems can arise from the increasing number of middleboxes in the Internet where accidental manipulation causes a connection to fail.

Architecture

The PATHspider architecture has four components, illustrated in the diagram below: the configurator, the workers, the observer and the merger. Each component is implemented as one or more threads, launched when PATHspider starts.

Results

An ECN measurement from one vantage point on a virtual machine from hosting provider Digital Oceans in Netherlands on June 13, 2016 and can report an increase in ECN support on web servers of the Alexa 1 million list (as of June 12, 2016).

<table>
<thead>
<tr>
<th></th>
<th>IPv4</th>
<th>IPv6</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negotiate ECN</td>
<td>432544 of 617873 (70.005%)</td>
<td>20262 of 24472 (82.797%)</td>
<td>452806 of 642345 (70.493%)</td>
</tr>
<tr>
<td>May have ECN</td>
<td>2899 of 628896 (0.447%)</td>
<td>26393 of 26393 (0.114%)</td>
<td>2839 of 655289 (0.433%)</td>
</tr>
</tbody>
</table>

ECN-connection dependency by rank of Alexa list (TCP without ECN connected but TCP with ECN did not):

ECN support by rank of Alexa list (ECN was successfully negotiated):

Next Steps

• New measurements
  • Path transparency for TCP Fast Open
  • Path transparency for UDP-Lite
  • Path transparency for DSCP
  • New vantage points
  • MONROE Testbed (Mobile Broadband)
  • Path Transparency Observatory
  • Public query interface (end 2016) to access path impairment data

Learn more at https://pathspider.mami-project.eu/