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Future Internet Research and Experimentation

PATHspider: A tool for active measurement of path transparency

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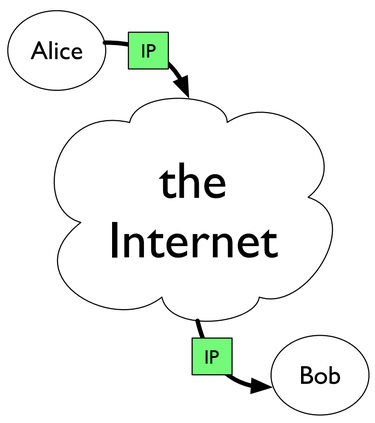
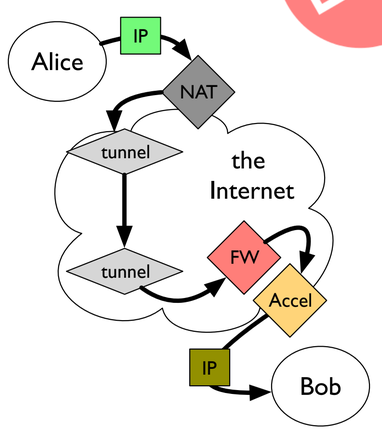
Introduction

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 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 either accidental or intentional manipulation causes a connection to fail.



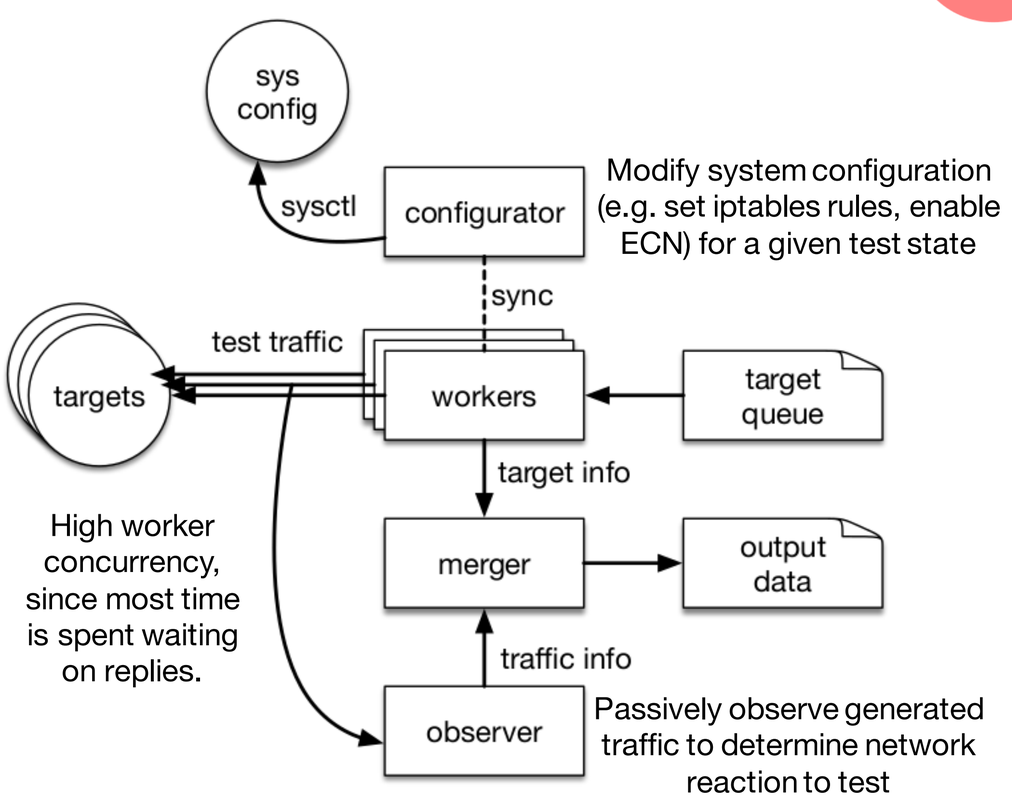
The end-to-end ideal



Today's middleboxed reality

PATHspider

Architecture



Each plugin consists of functions for generating test traffic, observing the resulting packets, and merging data into pre-analyzed observations. Each plugin handles a particular type of impairment (e.g. ECN, TFO, DSCP).

Getting Started

PathSpider is available in debian unstable:

```
$ apt install pathspider
```

0.9.0 alpha was released shortly before ANRW.
Active development on new plugins (e.g. SCTP, UDP-Lite, MPTCP), enhancements, and integration with the MAMI Path Transparency Observatory continues.

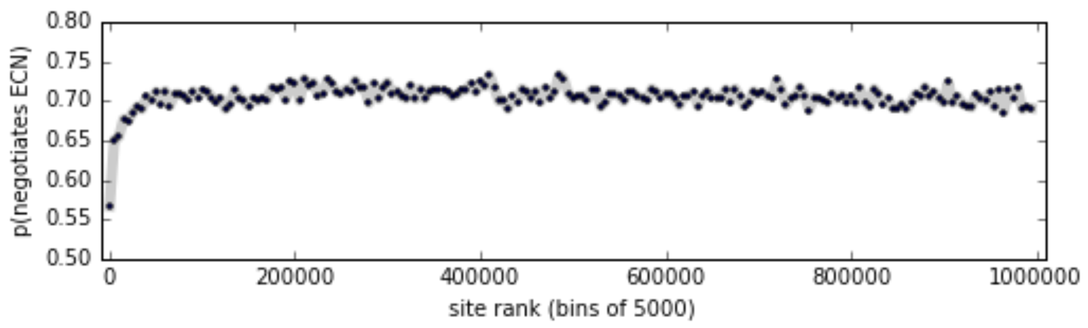
Results

ECN

An ECN measurement from one vantage point at Digital Ocean near AMSIX (Amsterdam NL) on June 13, 2016:

	IPv4	IPv6	all
Connectivity indep. of ECN	**99.5%**	**99.9%**	**99.5%**
ECN successfully negotiated	**70.0%**	**82.8%**	**70.5%**

ECN negotiation by Alexa rank bin: note this is nearly uniform, but higher-ranked servers tend to disable ECN:



DSCP

Initial study: 10006 out of 96978 (10.31%) of Alexa Top 100k websites had unexpected, non-zero DSCP values. More measurement is necessary to better characterize these anomalies.

TFO

Initial study: 330 IPv4 and 32 IPv6 addresses in Alexa Top 1M are TFO-capable (of which 278 and 28 are Google properties). DDoS prevention services, enterprise firewalls, and CPE tend to interfere with TFO. More measurement is necessary to analyze impariments.

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

measurement | architecture | experimentation

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