

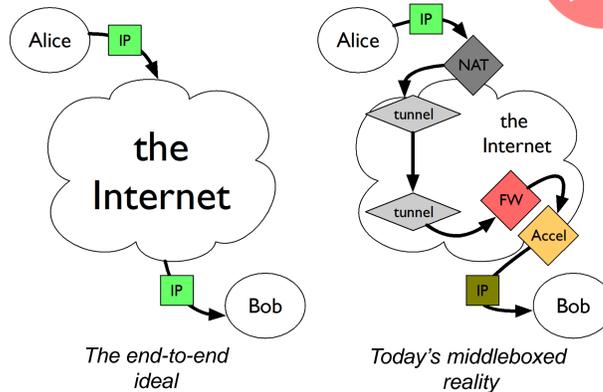
# PATHspider: A tool for active measurement of path transparency

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## Introduction

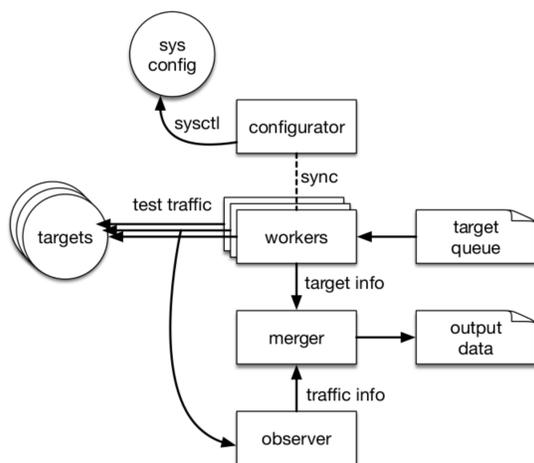
PATHspider performs large-scale A/B testing between two different protocols or different protocol extensions to perform controlled experiments of protocol-dependent connectivity problems as well as differential treatment. PATHspider is a framework for performing and analyzing these measurements. The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



## Next Steps

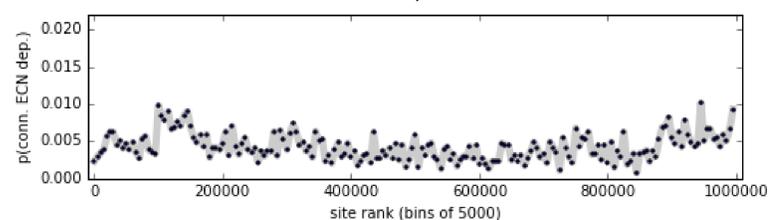
- New measurements
  - Path transparency for TCP Fast Open
  - Path transparency for UDP-Lite
  - Path transparency for DSCP
- New vantage points
  - MONROE Testbed (Mobile Broadband)
- Path Transparency Observatory
  - Public query interface (end 2016) to access path impairment data

## Results

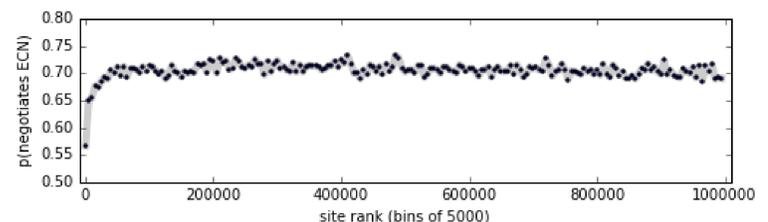
An ECN measurement from one vantage point on a virtual machine from hosting provider Digital Oceans in Netherlands on June 13, 2016 and can report an increase in ECN support on web servers of the Alexa 1 million list (as of June 12, 2016).

432544	of	617873	(70.005%)	of IPv4 addresses negotiate ECN
20262	of	24472	(82.797%)	of IPv6 addresses negotiate ECN
452806	of	642345	(70.493%)	of all addresses negotiate ECN
2809	of	628896	(0.447%)	of IPv4 addresses may have ECN dependency
30	of	26393	(0.114%)	of IPv6 addresses may have ECN dependency
2839	of	655289	(0.433%)	of all addresses may have ECN dependency

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):



In initial studies for path transparency for DSCP, many codepoints have been observed on returning packets that were unexpected and are not recommended codepoints. 10006 out of 96978 (10.31%) of the websites from the Alexa top 100,000 had non-zero DSCP values. Our DSCP measurements are currently still in development.

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