PATHspider

A tool for active measurement of path transparency

Current Status and Future Plans

measurement and architecture for a middleboxed internet

measurement | architecture | experimentatio
n

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688421.The opinions expressed and arguments employed reflect only the authors' view. The European Commission is not responsible for any use that may be made of that information.

Supported by the Swiss State Secretariat for Education, Research and Innovation under contract number 15.0268.
The opinions expressed and arguments employed herein do not necessarily reflect the official views of the Swiss Government.

PATHspider Introduction

- PATHspider performs 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 Introduction

- Written in Python, making use of python-libtrace to observe the raw packets in the experimental flows
- Extensible plugin architecture using twisted.plugin to allow for new experiments to be easily written

Previous Incarnation

ECNSpider

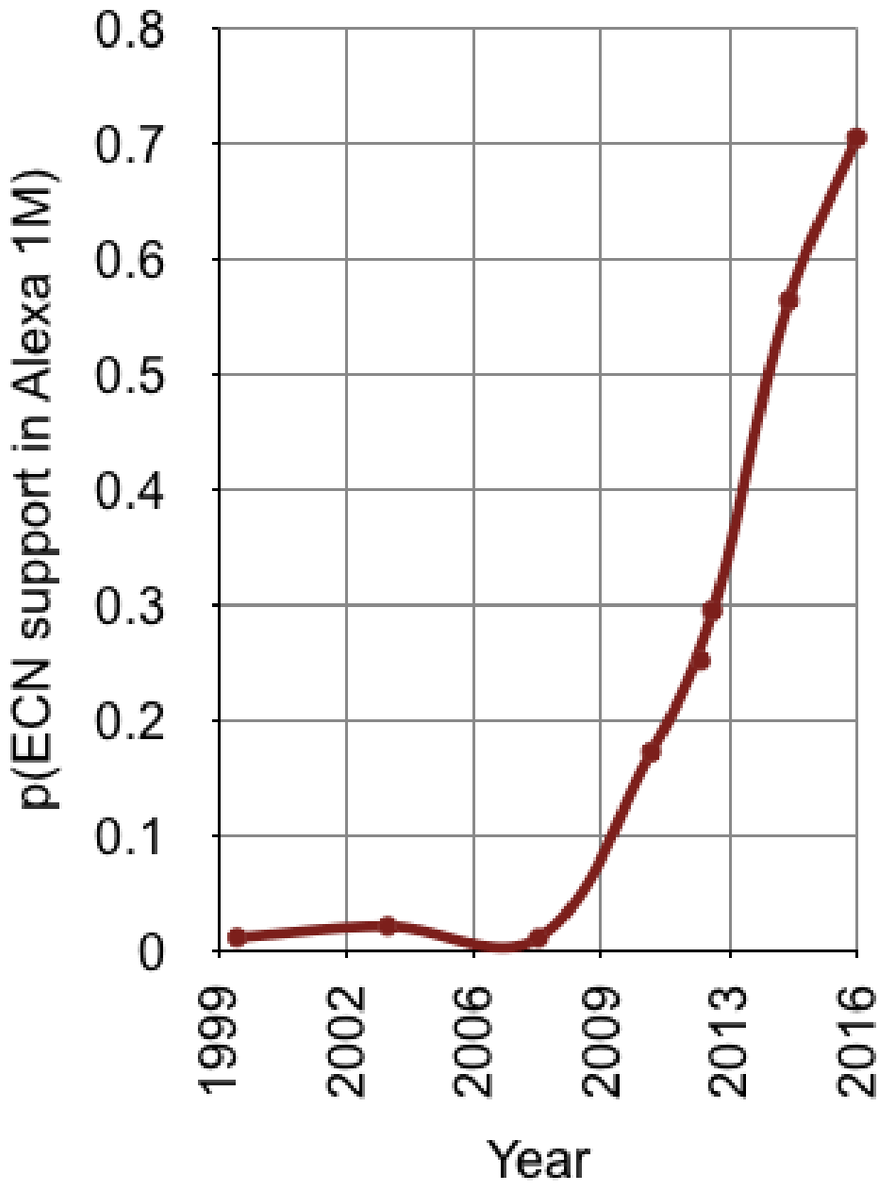
mami measurement

ECNSpider

- Early versions used for multiple measurement campaigns for Explicit Congestion Notification path transparency observation
  - Kühlewind, M., Neuner, S. and Trammell, B., 2013, March. “On the state of ECN and TCP options on the Internet”. In International Conference on Passive and Active Network Measurement (pp. 135-144).
  - Trammell, B., Kühlewind, M., Boppart, D., Learmonth, I., Fairhurst, G. and Scheffenegger, R., 2015, March. “Enabling Internet-wide deployment of explicit congestion notification”. In International Conference on Passive and Active Network Measurement (pp. 193-205).

ECNSpider

- **A measurement run in June 2016 from a single vantage point, a DigitalOcean server in Amsterdam, to the set of unique IPv4 and IPv6 addresses serving the top million websites, and found that 432544 of 617873 (70.005%) of IPv4 addresses and 20262 of 24472 (82.797%) IPv6 addresses will negotiate ECN**
- **This continues a trend ETH started observing in 2013**



Current Status

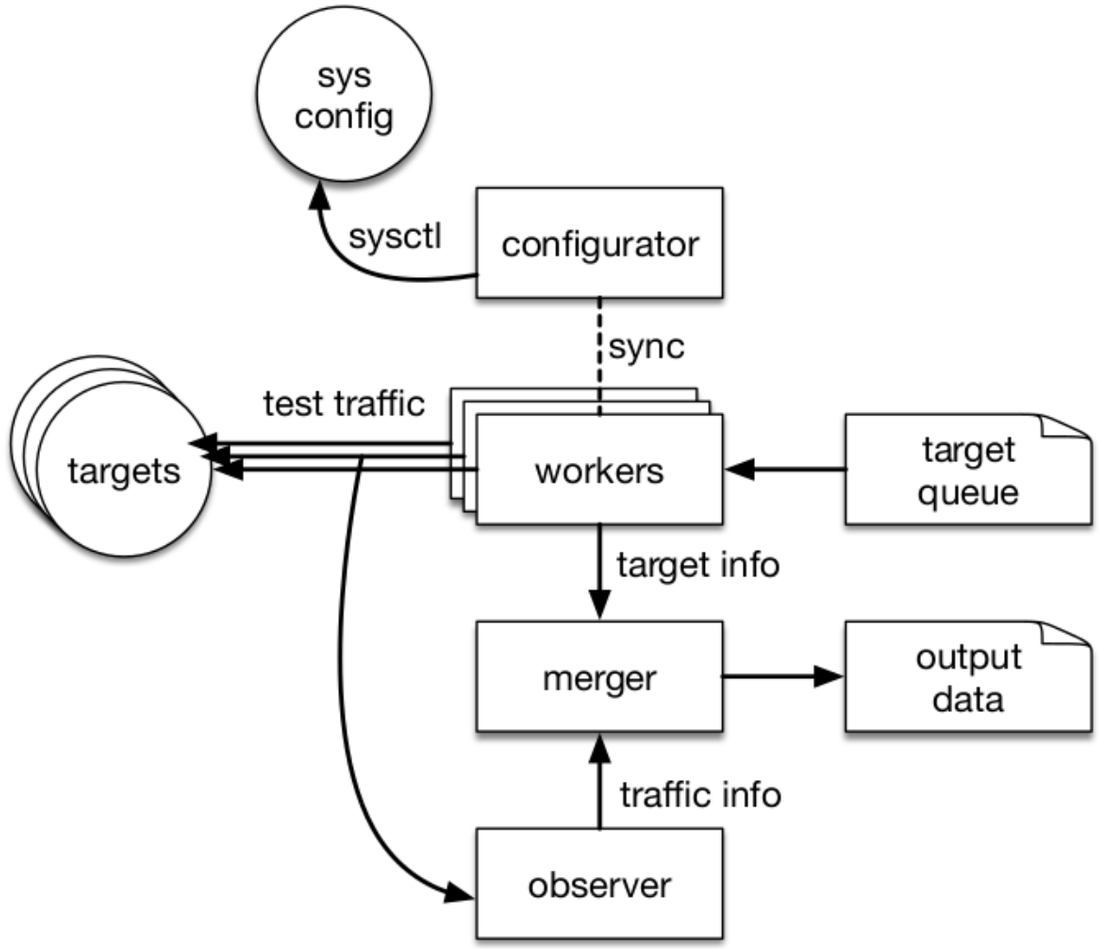
Release 0.9.0 “Phidippus audax”

mami measurement

Current Status

- PATHspider is not just for observing the path transparency for ECN
- It is a generalised framework for path transparency experiments
- Software that exists now and is readily available:

```
apt install pathspider
```



Example Plugin

```
@implementer(ISpider, IPlugin)
class ExampleSpider(Spider):
    def config_zero(self):
        […] # Prepare the system for the A test (sysctl, etc.)
    def config_one(self):
        […] # Prepare the system for the B test (sysctl, etc.)
    def connect(self, job, pcs, config):
        […] # Perform the connection, open a socket
    def post_connect(self, job, conn, pcs, config):
        […] # Perform a post-connection operation, e.g a HTTP
GET
    def create_observer(self):
        […] # Create the observer, with the observer functions
    def merge(self, flow, res):
        […] # Merge connection results with flow results
```

Built-in Flow Meter

- PATHspider's built-in flow meter is extensible via the plugin architecture
- Using *python-libtrace* to dissect packets, any flow property imaginable can be reported based on the raw packets:
  - ECN negotiation (for TCP and IP header fields)
  - Bleaching of bits, dropping of options
  - Checksum recalculations
  - Number of packets containing a prime number of octets

Future Spider

Release 1.0.0 “Heteropoda venatoria”

Scheduled for: October 19th, 2016

mami measurement

Future Spider

- New Measurements
  - DSCP codepoint traversal (working with MONROE/PREC)
  - SCTP and UDP-in-SCTP (working with NEAT)
  - UDP-Lite (working with NEAT)
  - UDP fuzzing (working with NEAT)
- mPlane Support
- Generating observations in the native format for the path transparency observatory

nettests.mami-project.eu

- Formal plain-English specification of the tests
- Provides a URL that can be used in the Observatory
- Option for content negotiation if RDF, JSON, XML, etc. descriptions of the tests would be desirable

nettests.mami-project.eu

- Specification version number
- Specification name
- Test preconditions
- Expected impact
- Expected inputs
- Test description
- Expected output
- Required output data
- Possible conclusions
- Expected post-processing in Observatory
- Privacy considerations
- Example input sample
- Example output sample
- Other notes