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Observing Internet Path Transparency to Support Protocol Engineering

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mainis

Ossification of the Internet due to Middlebox Impairments

Problem: Middleboxes make restrictive assumptions about traffic passing through them

- essential manipulation
- accidental manipulation
- Ossification of the Internet Protocol Stack

Needed:

- More data about the nature and distribution of middlebox impairments
- Guidance to engineer new protocols to fall back and work around impairments
- Common data model for storage and analysis of middlebox impairments

Defining an Middlebox Observatory

Goal: Provide information about the prevalence of certain types of *path impairments*

- What is the likelihood that it will just no work (no modifications/stripping)?
- What is the likelihood of a connectivity failure (dropping/blocking)?
- Is there a measurable performance penalty to the use of an option or protocol (slow-pathing/differential treatment)?

Requirements:

- Data model must be independent of the implementation of the testing tool.
- Representation of the path must account for limitation in the *precision of path*.
- Path impairments must be described such that tests are *repeatable*.

Observatory Data Model

Path Transparency Observation (P,p,t)

- path designator P: identifier for the initiator and target of a measurement (e.g. network-layer addresses, prefixes, or AS numbers)
- packet pattern p: template for sequence of packets sent or received
- temporal scope t: defines when a observation was taken

Packet Pattern Language

- On-going work and implementation effort
 - *Berkeley Packet Filters:* single packets but not iterative filtering (for options)
 - *Snort rules:* makes assumptions about the underlying protocol
 - Scapy: generation of packets for security testing