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## New Approaches to Characterizing Scam-Hosting Connectivity, Poster

Nolan, Le; Beverly, Robert; Young, Joel

Monterey, California: Naval Postgraduate School.

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# New Approaches to Characterizing Scam-Hosting Connectivity

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## Motivation

1. On-line scams (pharmacy sales, phishing sites) continually evolve
2. Most recently, using multiple levels/types of indirection (HTTP, DNS)
3. Existing passive traffic analysis techniques rely on IP addresses, communication structure, redirection patterns, etc – can be evaded
4. Traffic characteristics should be agnostic to evasion



## Facts

1. Prior work finds significant redirection and traffic proxying by botnets
2. Scam content hosted by bot CDNs and by countries with poor connectivity



## Hypothesis

Transport-layer traffic analysis of intermediate and landing pages reveal poor connectivity?

**How connected are scam servers?**

## Scam Connectivity “Quality”

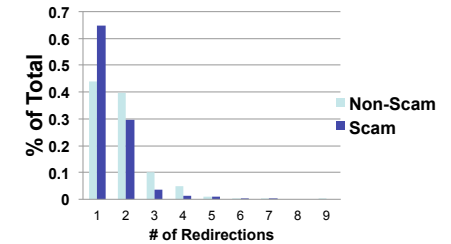
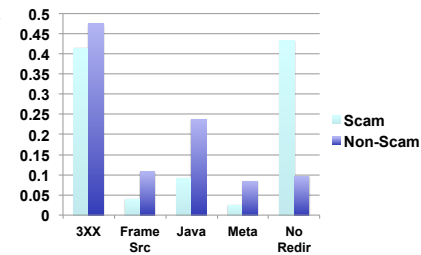
1. We’re agnostic to IP, DNS names, registrars, etc.
2. Collect *Transport-layer* traffic features that reveal:
  - Asymmetric bandwidth
  - Busy bots and/or poorly connected hosts
3. More detailed than NetFlow-style statistics:
  - Retransmits (in/out)
  - RSTs/FINs (in/out)
  - Congestion Window (min, zero)
  - 3WHS and per-segment RTT variance
  - Packet inter-arrival jitter

## Experiment

- Web-crawl: Alexa Top 10K and 35K known-scam URLs from spam sink
- Record transport layer information of each HTTP GET (including redirections):
- Find statistical discriminators between scam and non-scam hosts

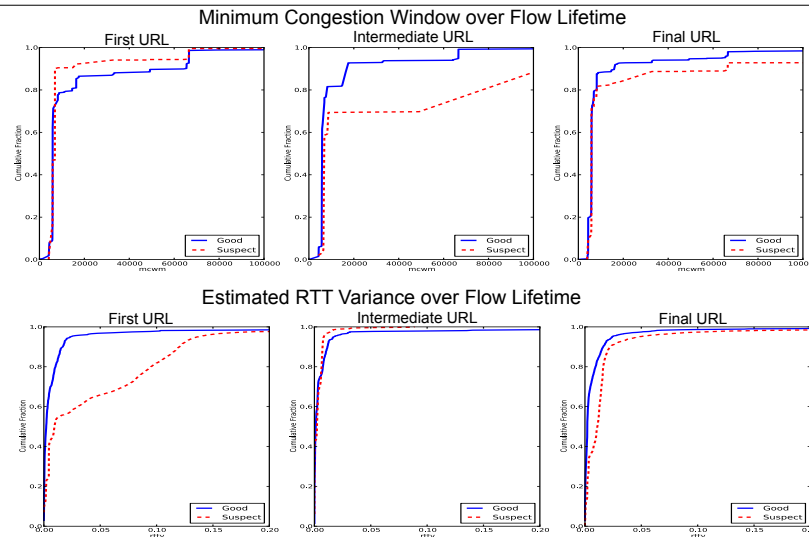
## Redirection Summary

- Scam URLs = 23,762, 1.45 per
- Non-Scam URLs = 3,075, 1.8 per
- Does redirection information still aid in discrimination?



## Transport-Layer Features

- Very different distributions (scam/non-scam) depending on redirection stage (initial, intermediate, terminal)
- Confirms previous observations that bots perform redirection



## Classification

- Using data with 50% “good”, 50% “scam”:

Method	Acc	Sens	Spec	PPV	NPV
Bayes	0.760	0.715	0.808	0.795	0.731
SVM	0.874	0.816	0.935	0.929	0.830
Decision Tree	0.937	0.943	0.931	0.934	0.940

\* Supported by: Cisco Systems Unive