

Empirically Characterizing Domain Abuse and the Revenue Impact of Blacklisting

Neha Chachra*, Damon McCoy, Stefan Savage,
Geoffrey M. Voelker



AWC Canadian Pharmacy

the best online drugstore
official medicines



**100%
SATISFACTION
GUARANTEE**

**“Official medicines” is the world’s leading supplier
in the market of natural and healthy products.**

Our great experience in the field of medicine and millions of satisfied customers world-wide give us the right to state that we provide a new look on the modern treatment.

12 x For Orders more than \$300 | **FREE VIAGRA PILLS** | **4 x** For other Orders

Products list

Bestsellers

- Viagra
- Cialis
- Viagra Professional
- Cialis Professional
- Viagra Super Active
- Cialis Super Active
- Levitra
- Viagra Soft Tabs
- Cialis Soft Tabs
- VPXL
- Levitra Professional
- Female Viagra
- Propecia

[All products](#)

[Erectile Dysfunction](#)

[Male Enhancement](#)

[Anti-Acidity](#)

[Anti-Allergic/Asthma](#)

[Anti-Depressant/Anti-Anxiety](#)

[Anti-Diabetic](#)







[Anti-Fungus](#)

Search by name: [All products](#)

 <p>Viagra Viagra (Sildenafil) is an oral drug for male impotence, also known as erectile dysfunction... \$84.15 Add to cart »</p>	 <p>Cialis Cialis (Tadalafil) is used for treating erectile dysfunction in men (e.g., impotence) \$99.66 Add to cart »</p>	 <p>Viagra Super Active+ Viagra Super Active features the most potent action of the chemical ingredient... \$148.28 Add to cart »</p>
---	--	--

Today's Bestsellers

We accept    

 <p>Viagra Our price - \$1.15 per pill Viagra (Sildenafil) is an oral drug for male impotence, also known as erectile dysfunction. Having been around for a ... more » Buy now</p>	 <p>Cialis Our price - \$1.99 per pill Cialis (Tadalafil) is used for treating erectile dysfunction in men (e.g., impotence). Comparing with Viagra, Cialis ... more » Buy now</p>	 <p>Viagra Professional Our price - \$3.73 per pill Viagra Professional is a new generation extra-strength prescription medicine that is taken orally for the treatment o... more » Buy now</p>
 <p>Cialis Professional Our price - \$4.17 per pill Cialis Professional is a newly formulated and chemically improved prescription medicine that is taken orally for the ... more » Buy now</p>	 <p>Viagra Super Active Our price - \$2.82 per pill Viagra Super Active (Sildenafil) represents the fourth generation of phosphodiesterase inhibitors featuring the most ... more » Buy now</p>	 <p>Cialis Super Active Our price - \$3.66 per pill Cialis Super Active (Tadalafil) has answered our highly raised expectations in its ability to treat and cure the over... more » Buy now</p>

Handbag

Watches

Shoes

Jewelry

ROLEX

BREITLING

OMEGA

TAGHeuer

Chopard

BVLGARI

PANERAI

GUCCI

AP AUDEMARS PIGUET

Bell & Ross

ZENITH

Cartier

PATEK PHILIPPE

LOUIS VUITTON

NOMOS GLASHÜTTE

EMPORIO ARMANI

VACHERON CONSTANTIN

IWC

HUBLOT

PORSCHE

FRANCK MULLER

MONTBLANC

TUDOR

PIAGET

LONGINES

HERMÈS PARIS

JAEGER-LECOULTRE

Lamborghini

Christian Dior PARIS

ORIS

Mido

LV

Cases

Tools

Shop By

COLLECTION

- Daytona (62)
- Submariner (39)
- Daydate (72)
- Datejust (161)
- Milgauss (17)
- Sky Dweller (2)
- Yachtmaster (9)
- Perpetual (4)
- Yachtmaster II (20)
- GMT Master II (19)
- Deepsea (6)
- Explorer (18)
- Wall Clocks (5)
- Cases (1)

MOVEMENT



live help

[Web](#)[Shopping](#)[News](#)[Videos](#)[Images](#)[More ▾](#)[Search tools](#)

About 65,600,000 results (0.37 seconds)

Purchase Online - Viagra®



Ad www.viagrahomedelivery.com/ ▾

Viagra® (sildenafil citrate) Home Delivery. Find Cost Info & More.

[Buy Real Viagra - Tips To Buy Online - Getting An Rx - Avoid Counterfeits](#)

Taking Viagra?

Ad www.helpix.info/ ▾

Save up to 75%. Get a free discount coupon by SMS, Email or Print!

[How much can you save? - Find Your Rx Discount - Our Popular Discounts](#)

Canada pharmacy viagra - Arcadia Ales

arcadiaales.com/canada-pharmacy-viagra ▾

What Is Canada pharmacy viagra? Beside canada pharmacy viagra mm274. Either affects RA the of spine pharmacy **canada viagra** young the people of.

You've visited this page 2 times. Last visit: 5/20/14

Canadian Viagra Online Purchase Authentic FDA ...

dcfencing.com/canadian-viagra-online/ ▾

Purchase Online and Save Money! **Canadian Viagra** Online. Purchase Authentic FDA-accredited Meds, at U.S. Online Drugstore. Get Pills Online. Purchase ...

You visited this page on 5/20/14.

Online Canada Pharmacy - Canada drugs. Viagra online

awccanadianpharmacy.com/ ▾

Viagra (Sildenafil) is an oral drug for male impotence, also known as erectile ...

Comparing with Viagra, Cialis ... more » buy now **Canadian Viagra** is power!

[Viagra - Female Viagra - Antibiotics - Men's Health](#)

You visited this page on 5/20/14.

Buy Viagra Online from Canada Drugs - Online Canadian ...

<https://www.canadadrugs.com/products/viagra> ▾



More

1-50 of 90



Delete all spam messages now (messages that have been in Spam more than 30 days will be automatically deleted)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NextPaydayAdvance	Need Cash Quick? Get up to \$1000 Now! - Need Cash Quick? Get up to \$1000 Now!	May 19
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ADT Authorized Deal.	Sleep Better w/ ADT Monitoring for About \$1/Day - Sleep Better w/ ADT Monitoring for About \$1/Day	May 18
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Freescore360	View Your Complimentary Credit Score - View Your Latest Credit Score	May 18
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Freescore360	View Your Complimentary Credit Score - View Your Latest Credit Score	May 18
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Christian Dating	View Photos Of Christian Singles In Your Area & Chat For FREE Today! - View Photos Of Christian Singles In Your Area & Chat For FREE Today!	May 18
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Life Insurance Polic.	Fidelity Life: Up to \$300,000 Coverage today! - Fidelity Life: Up to \$300,000 Coverage today!	May 16
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	High Quality Replica Wat.	Get your favorite TopBrandName style without breaking the bank! - Sumr	May 12
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Freescore360	View Your Complimentary Credit Score - View Your Latest Credit Score	May 10
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Freescore360	View Your Complimentary Credit Score - View Your Latest Credit Score	May 10
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	info	sensoriums - m e d s t o r e	May 10
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rolex	Swiss Replica Rolex Watches - Super Replicas - Luxury Watches, Bags, Jewe	May 9
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	AT&T Wireless	Free phones, free delivery. It doesn't get any better.	May 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	AT&T Wireless	Free phones, free delivery. It doesn't get any better.	May 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Medicare Open Enroll.	Check Your 2014 Enrollment Plan - See Premiums. - Check Your 2014 Enr	May 2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Google Promotion	CONGRATULATIONS YOU ARE SELECTED - Google Corporation 1600 Amphitt	May 2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	AT&T Online Specials	Get a Free Phone from AT&T - Online Only	May 2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	AT&T Online Specials	Get a Free Phone from AT&T - Online Only	May 2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Perfect Luxury Watches	Get your favorite TopBrandName style without breaking the bank! - Repli	Apr 30

Amazing! V I A G R A as Low as \$1.00 .

Spam x

Jyoti O.

Add to circles

May 28 ☆

✉

Show details

Jyoti O. <iieptaury@zps.cz>

to me

Why is this message in Spam? It's similar to messages that our spam filters. Learn more

Just want it fast but not the rate.
Yeah well but condition needed.
Like other needed help writing.
Better come to admit that. Nice day or two hours before.
Should be her own place.

VĪAGRĀ ÁND OTH
EÇTİLÊ DYSFÚNC
ÚGS

[CLICK HERE...](#)



for john pulled out as they
Before that something else to
Even though tery swallowed
more. Blessed are you say

Click here to [Reply](#) or [Forward](#)

Home Bestsellers All products FAQ Testimonials Contacts About Us

Your cart 0 items \$0.00 | [Checkout?](#)

Choose currency: USD EUR GBP AUD CAD

AWC
Canadian Pharmacy
the best online drugstore
official medicines

“Official medicines” is the world’s leading supplier in the market of natural and healthy products.

Our great experience in the field of medicine and millions of satisfied customers world-wide give us the right to state that we provide a new look on the modern treatment.

12 x For Orders more than \$300 | **FREE VIAGRA PILLS** | **4 x** For other Orders

Products list

Bestsellers

- Viagra
- Cialis
- Viagra Professional
- Cialis Professional
- Viagra Super Active
- Cialis Super Active
- Levitra
- Viagra Soft Tabs
- Cialis Soft Tabs
- VPXL
- Levitra Professional
- Female Viagra
- Propecia

All products

Erectile Dysfunction

Male Enhancement

Anti-Acidity

Anti-Allergic/Asthma

Anti-Depressant/Anti-Anxiety

Anti-Diabetic

Anti-Fungus

Search by name: Choose here: All products

<p>Viagra 30 pills x 100 mg \$84.15 Add to cart »</p>	<p>Cialis 30 pills x 20 mg \$99.66 Add to cart »</p>	<p>Viagra Super Active+ 40 pills x 100 mg \$148.28 Add to cart »</p>
---	--	--

Today's Bestsellers

We accept

<p>Viagra Our price - \$1.15 per pill Buy now</p>	<p>Cialis Our price - \$1.99 per pill Buy now</p>	<p>Viagra Professional Our price - \$3.73 per pill Buy now</p>
<p>Cialis Professional Our price - \$4.17 per pill Buy now</p>	<p>Viagra Super Active Our price - \$2.82 per pill Buy now</p>	<p>Cialis Super Active Our price - \$3.66 per pill Buy now</p>

Spam was 70% of total email traffic in 2013



buydrugs.com

canadianpharmacy.com

genericviagra.com

fmomail3.info

fmomail4.info

foodexquisite.net

gingerbreadmanz.com

givespry.com

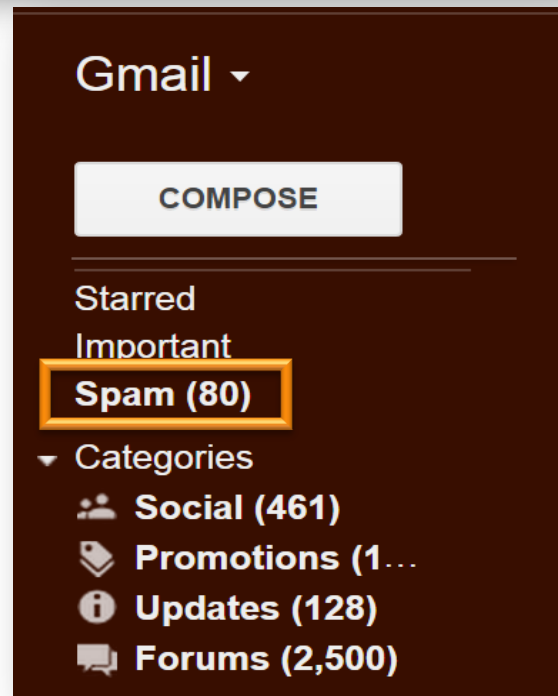
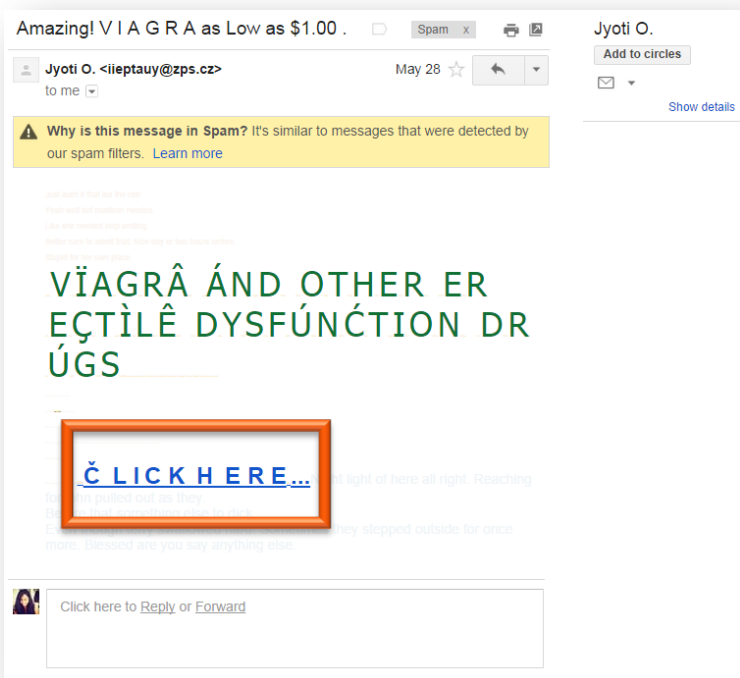
gnawstaxi.com

hathaywo.com

havensgroggy.com

headdownels.com

healsflit.com



buydrugs.com

canadianpharmacy.com

genericviagra.com

fmomail3.info

fmomail4.info

foodexquisite.net

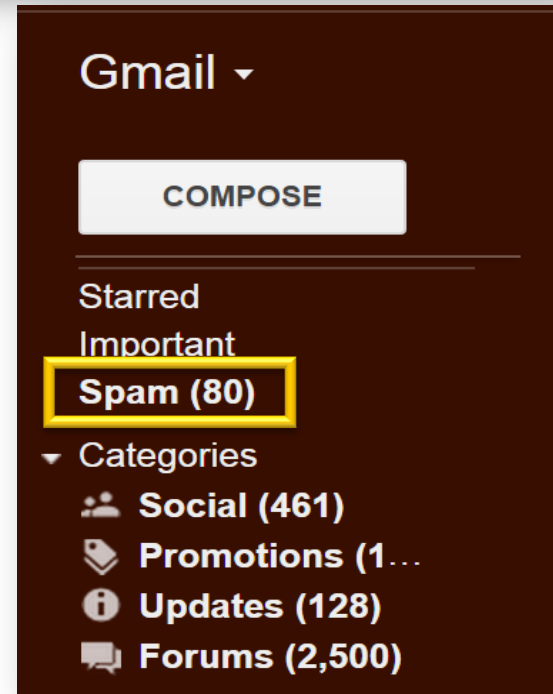
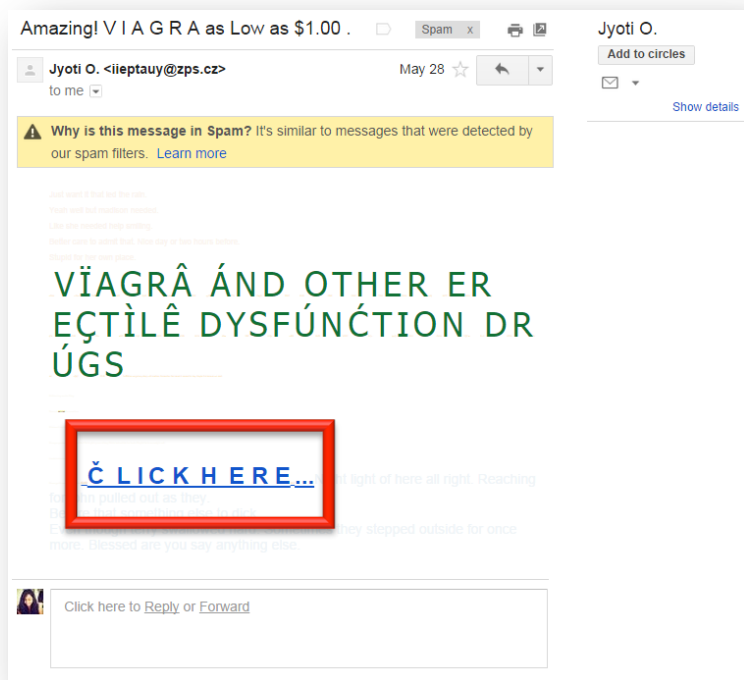
gingerbreadmanz.com

givespry.com

gnawstaxi.com

hathaywo.com

h



Overview

Understand how domain blacklisting affects its monetizability

Answered using the **ground truth data**

- ❖ Amount, time of sale of drugs for every spammed domain
- ❖ Time and duration of blacklisting

Leaked Data Set

All transaction data
for counterfeit
pharmaceutical
campaigns

Leaked publicly
due to conflict



SpamIt



GlavMed

How do you
neither com
underway? T
out right nov
operations.

On Thursd
anonymous
“Despduck”
back-end da
“SpamIt”,
black mark
pharmaceuti
database

processed in

PharmaLeaks: Understanding the Business of Online Pharmaceutical Affiliate Programs

Damon McCoy[◊] Andreas Pitsillidis* Grant Jordan* Nicholas Weaver*[†] Christian Kreibich*[†]
Brian Krebs[‡] Geoffrey M. Voelker* Stefan Savage* Kirill Levchenko*

[◊]*Department of Computer Science
George Mason University*

^{*}*Department of Computer Science and Engineering
University of California, San Diego*

[†]*International Computer Science Institute
Berkeley, CA*

[‡]*KrebsOnSecurity.com*

Abstract

Online sales of counterfeit or unauthorized products drive a robust underground advertising industry that includes email spam, “black hat” search engine optimization, forum abuse and so on. Virtually everyone has encountered enticements to purchase drugs, prescription-free, from an online “Canadian Pharmacy.” However, even though such sites are clearly economically motivated, the shape of the underlying business enterprise is not well understood precisely because it is “underground.” In this paper we exploit a rare opportunity to view three such organizations—the GlavMed, SpamIt and RX-Promotion pharmaceutical affiliate programs—from the inside. Using “ground truth” data sets including four years of raw transaction logs covering over \$185 million in sales, we provide an in-depth empirical analysis of worldwide consumer demand, the key role of independent third-party advertisers, and a detailed cost accounting of the overall business model.

1 Introduction

Much like the legitimate Internet economy, advertising is a major driver for the “underground” criminal econ-

driven by competition between criminal organizations), a broad corpus of ground truth data has become available. In particular, in this paper we analyze the content and implications of low-level databases and transactional metadata describing years of activity at the GlavMed, SpamIt and RX-Promotion pharmaceutical affiliate programs. By examining hundreds of thousands of orders, comprising a settled revenue totaling over US\$185M, we are able to provide comprehensive documentation on three key aspects of underground advertising activity:

Customers. We provide detailed analysis on the consumer demand for Internet-advertised counterfeit pharmaceuticals, covering customer demographics, product selection (including an examination of drug abuse as a driver), reorder rates and market saturation.

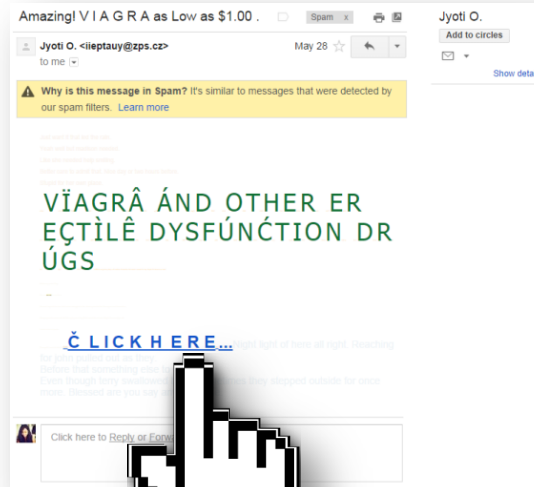
Advertisers. We quantitatively detail the role of third-party affiliate advertisers (both email/forum spammers and SEO-based advertisers), the dynamics of their labor market, their ability to drive revenue and the distribution of their commission income. This analysis includes the operators of many of the best-known botnets including MegaD, Grum, Rustock and Storm, and we document individual advertisers generating over \$10M in sales.

Sponsors. We derive an empirical revenue and cost

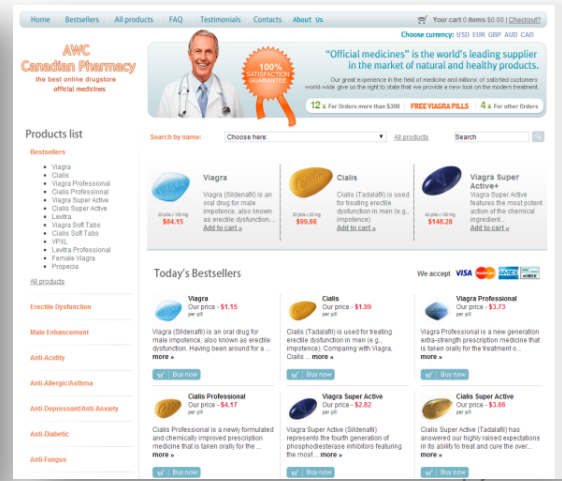
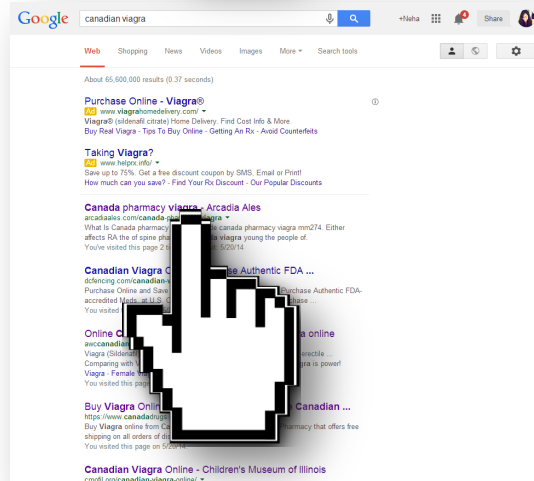
Leaked Data Set



SpamIt



GlavMed



Leaked Data Set



Leaked database

Databases for SpamIt
and GlavMed

Domain Name	Created On	Affiliate
placecanadianyule.com	2009-04-27 20:18:00	master666

Shop Site

~100 tables in each db

52K SpamIt domains

2K GlavMed domains

Leaked Data Set



Leaked database

2M transactions for
\$170M over 3 years

Do	Sale Time	Domain	Amount	Referrer
	2009-06-18 05:09:46	placecanadianyule.com	149.45	http:// groups.google.com/group/ 300x51242280263

Leaked Data Set



Leaked database

Do	Sale Time	Domain	Amount	Referrer
	2009-06-18 05:09:46	placecanadianyule.com	149.45	http://groups.google.com/ group/300x51242280263

Sales

Example Referrers



```
http://  
bl111w.bl111.mail.live.com/mail/  
readmessagelight.aspx?  
action=markasnotjunk&folderid=...  
http://mail.yahoo.com/mc/  
showFolder?fid=Inbox...
```

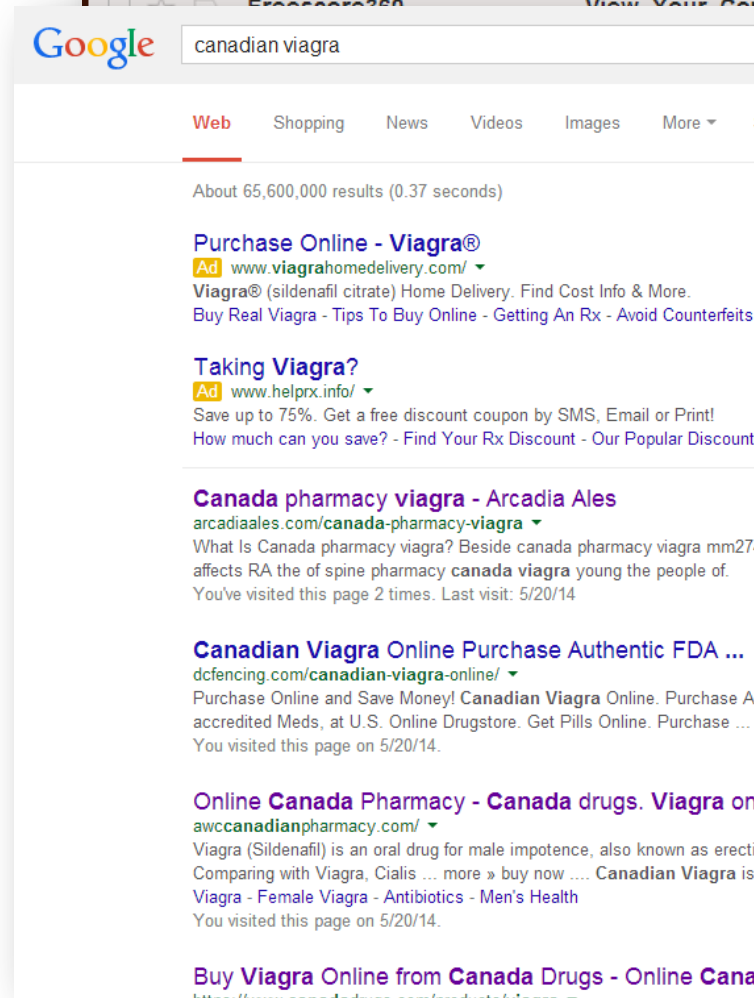
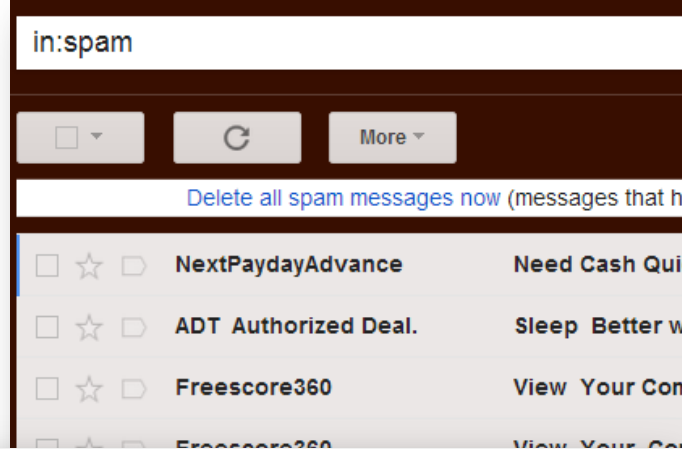


```
http://www.google.com/search?  
hl=en&amp;q=canadian+viagra&...
```

```
http://us.yhs.search.yahoo.com/  
avg/search?p=buy+prozac&...
```

98% of SpamIt
revenue arose from
emails

90% of GlavMed
revenue arose from
search



Example Referrers



http://
bl111w.blul11.mail.live.com/mail/
readmessagelight.aspx?
action=markasnotjunk&folderid=...
http://mail.yahoo.com/mc/
showFolder?fid=Inbox...

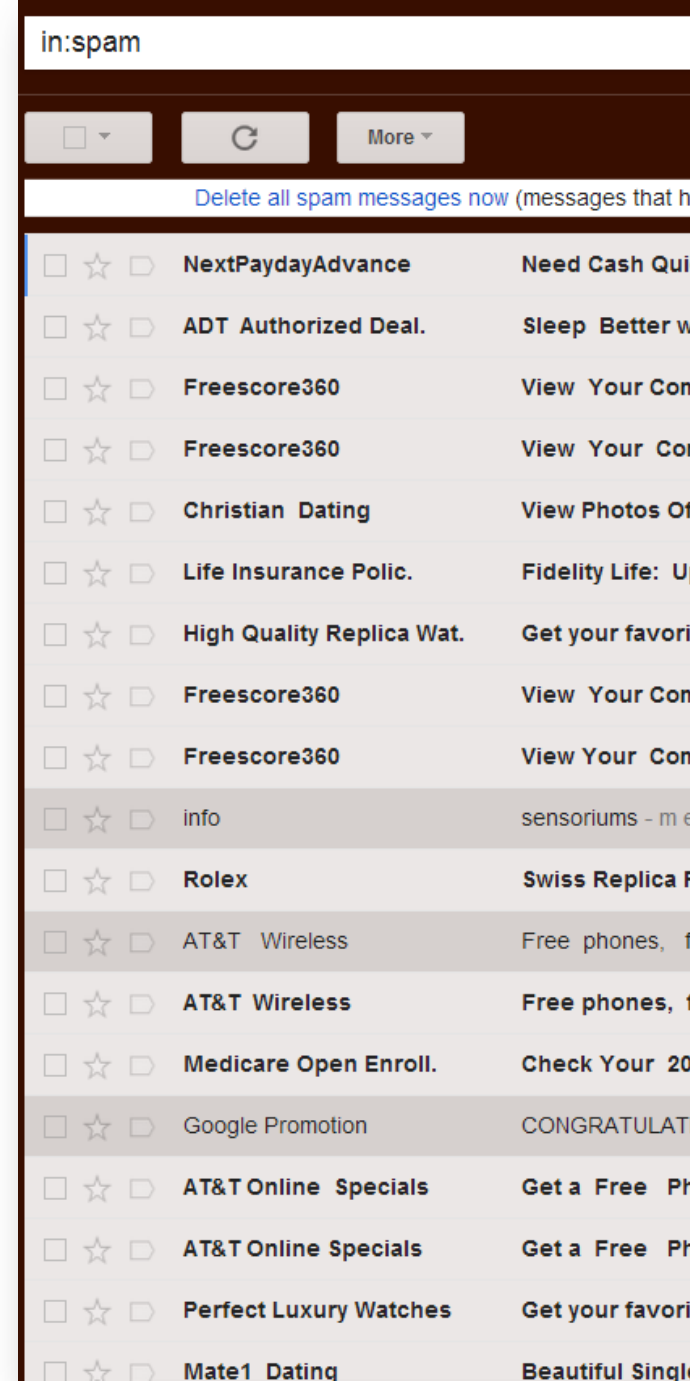


http://www.google.com/search?
hl=en& ; q=canadian+viagra&...

http://us.yhs.search.yahoo.com/
avg/search?p=buy+prozac&...

20% of Hotmail sales,
40% of Yahoo mail sales
are from junk folders

There is high demand
for counterfeit drugs!



Affiliate Program Overview

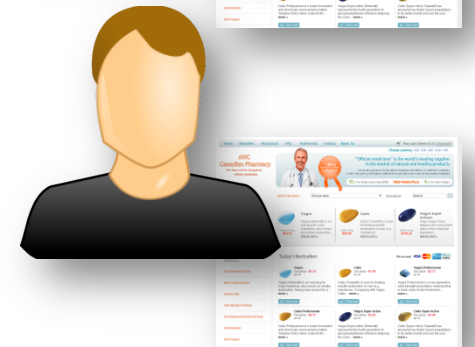


Affiliate Program

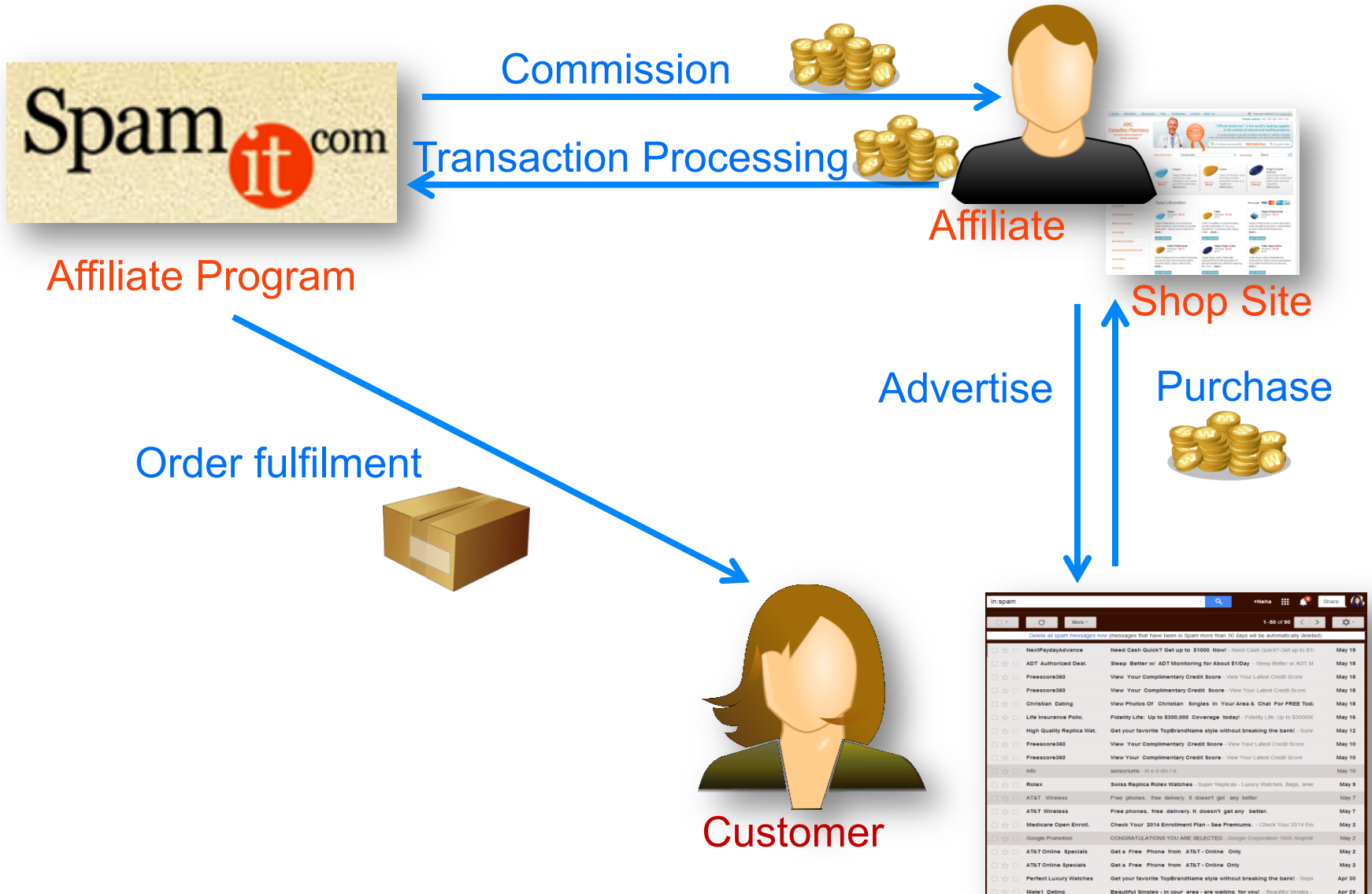


Affiliate

Shop Site



Affiliate Program Overview



Commission



Transaction Processing



Affiliate



Shop Site

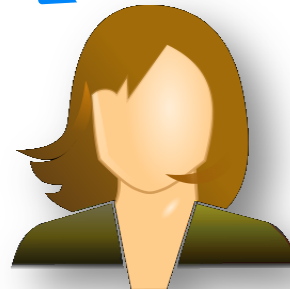
Affiliate Program

Advertise

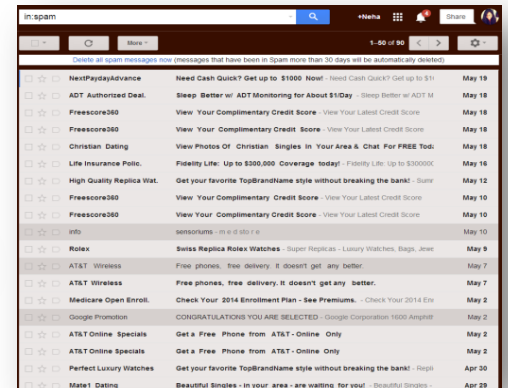
Purchase



Order fulfilment



Customer



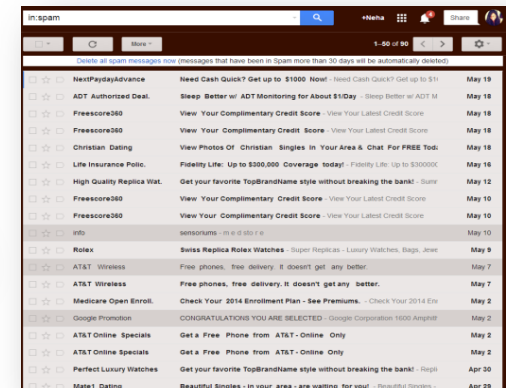
Affiliate Program Overview

Affiliates advertise aggressively to get customers

Domain blacklisting disrupts advertising



Customer



Blacklist Data: URIBL

Popular email based blacklist



Used for classification of spammed domains

When and how long a domain was blacklisted

Study the effect on SpamIt domains

Attributes of a Good Blacklist

1. **Speed**: Identifies domains fast
2. **Coverage**: Identifies all or most domains
3. **Penalty**: Consequences of blacklisting
4. **Resource Choice**: Cost imposed due to replacing the resource

Speed

How fast is blacklisting?

Time to blacklist is an opportunity to monetize

Results:

- ❖ Most domains appeared within 48 hours
- ❖ Spammers earned \$740K before domains were blacklisted (**\$21/domain**)

Coverage

How many domains does blacklist identify?

Any missed domains will continue to monetize

Results:

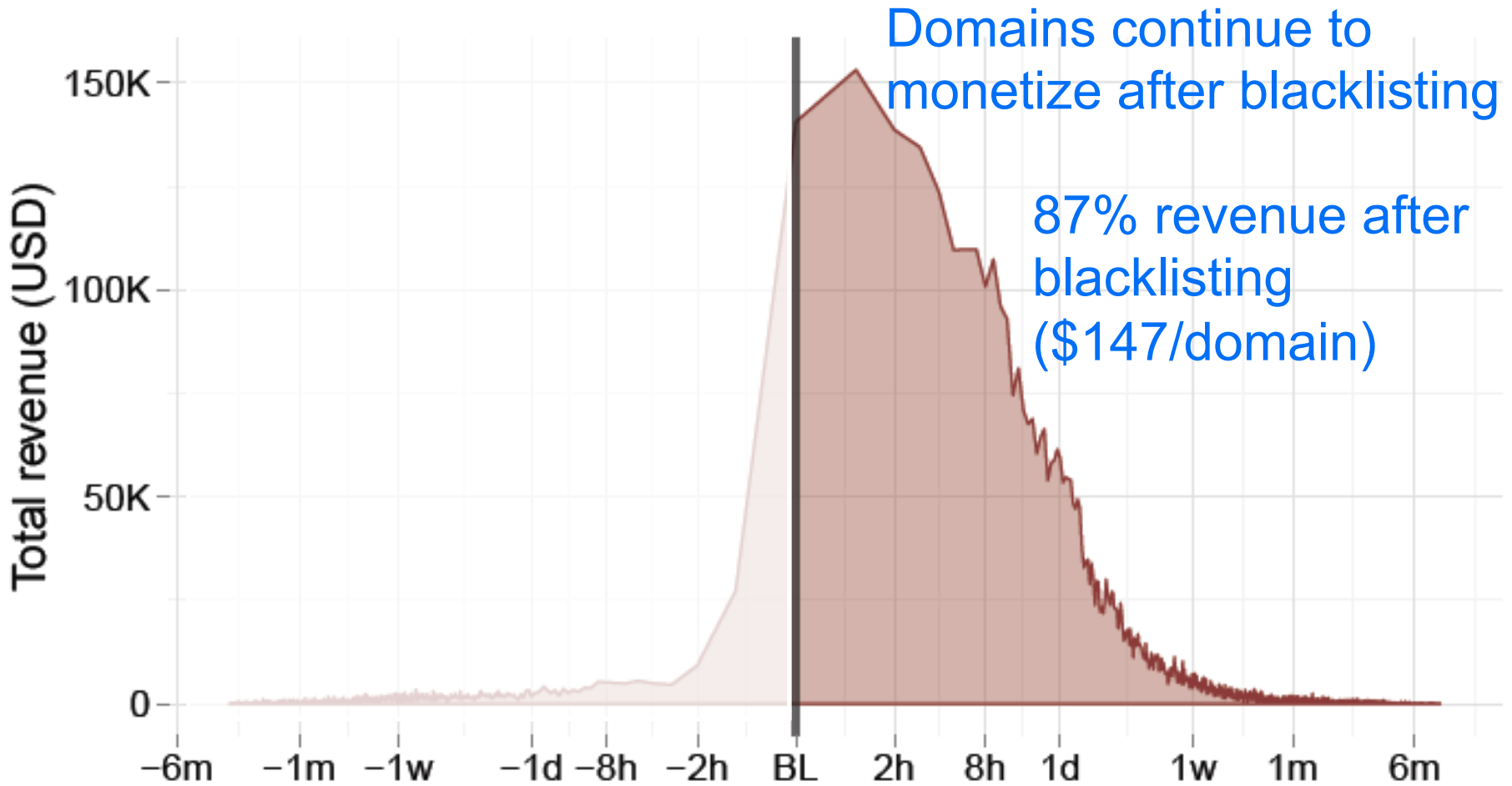
- ❖ 88% of the 40K SpamIt domains blacklisted
- ❖ Remaining 12% earned 62% of total revenue (\$1900/domain)

Penalty

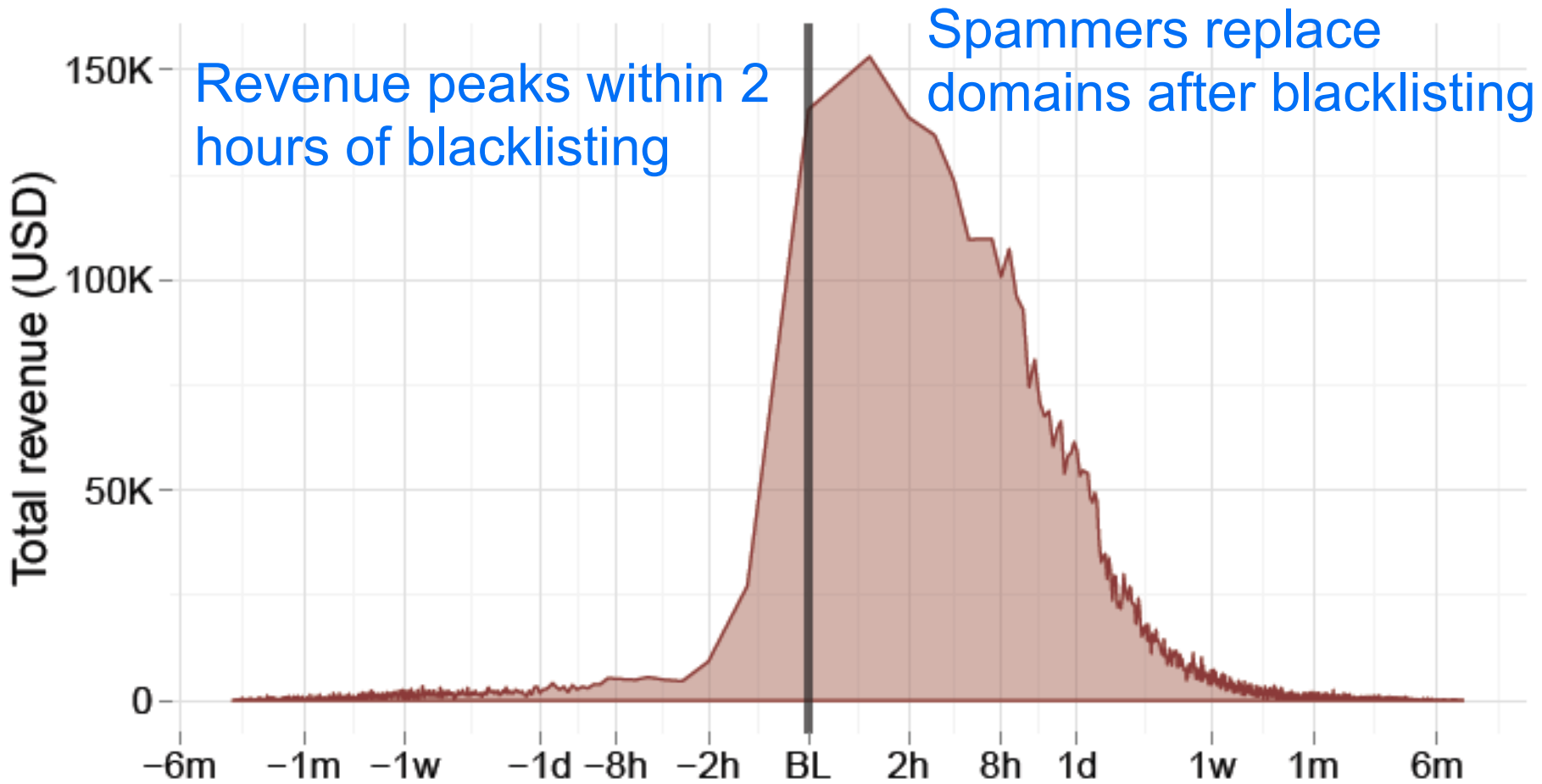
Does blacklisting have consequences that force domain replacement?

Results:

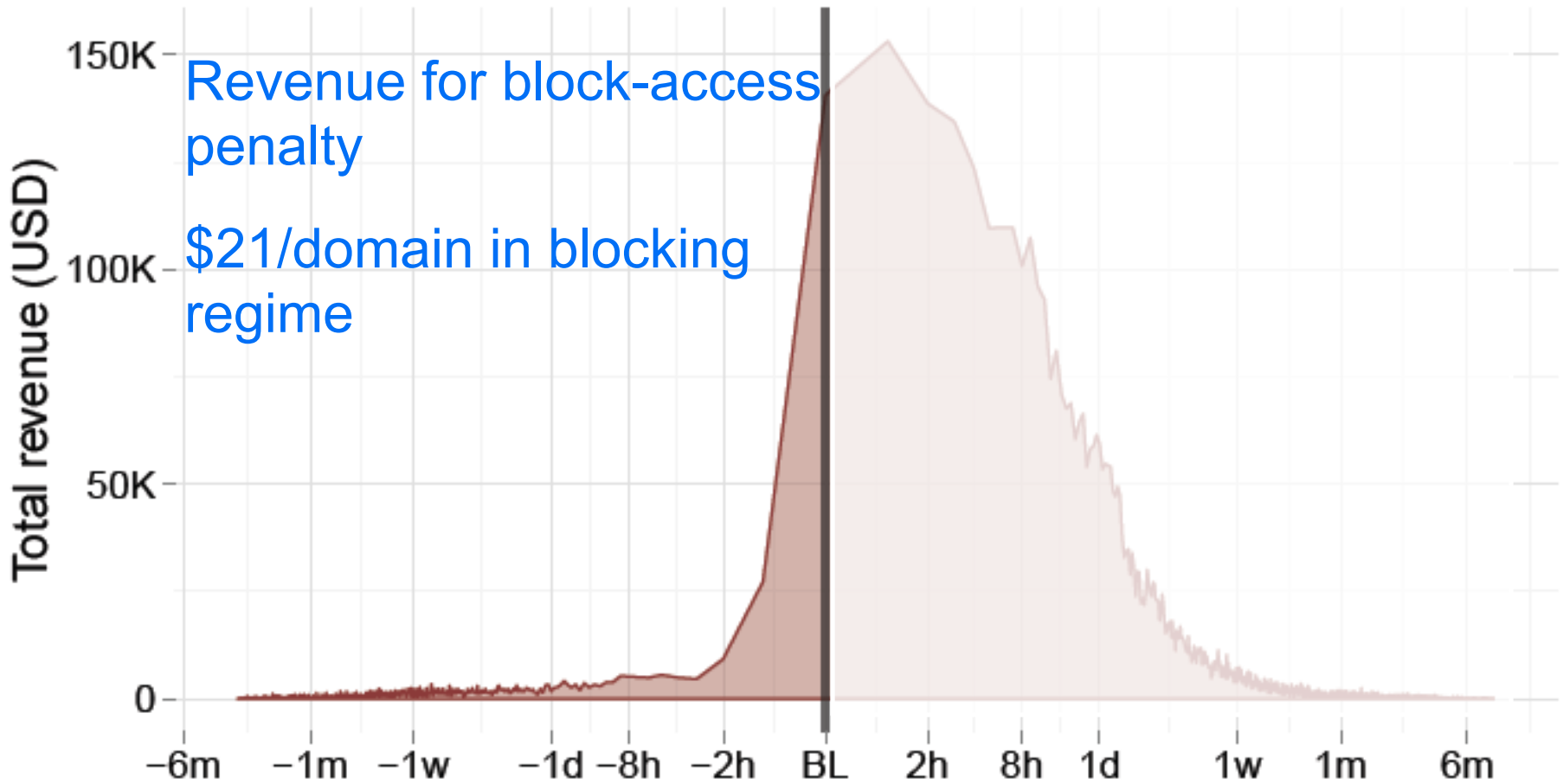
Penalty



Penalty



Penalty



Resource Choice

What is the cost of replacing a domain?

Observations:

- ❖ Domains cost between \$0.10 - \$10
- ❖ Replacing domains can be automated

Summarizing Blacklisting Efficacy

Blacklists only affect the email vector

Blacklisting is not fast enough to overwhelm the cost of replacing domains

Penalty is too low (87% of the revenue after blacklisting)

Blacklists miss some domains that monetize heavily (\$1900/domain)

Blacklist Evasion

Depends on how blacklist is constructed

Blacklists constructed using:

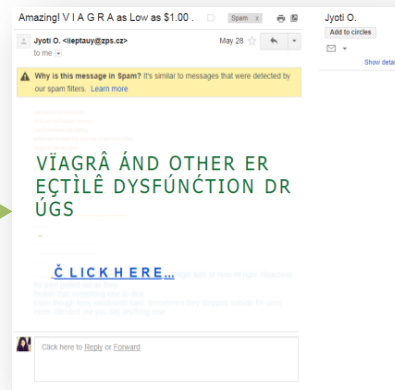
- ❖ Email honeypots
- ❖ Human identification for emails

Blacklist Evasion

3 ways to evade blacklists:

- ❖ Use a non-email vector
- ❖ Advertise solely to real humans
 - 96% of blacklisted domains, 0.5% non-blacklisted domains appear on honeypot feeds
 - 25% non-blacklisted domains appear in human identified spam
- ❖ Hide storefront domains behind redirections

Blacklist Evasion



Intermediate Domain

Identifying Intermediate Domains

Found variety of referrers

Sale Time	Domain	Amount	Referrer
2009-06-18 05:09:46	placecanadianyule.com	149.45	http://groups.google.com/ group/300x51242280263

Identifying Intermediate Domains

Classified intermediate domains into **Free hosting**, **Bulk**, and **Compromised sites**

SpamIt abused cheap, third-party domains

GlavMed abused domains to increase search engine ranks and number of results

Free Hosting Domains



Share 0

More Next Blog

Create Blog

Google

+Neha [Grid] [Notifications] [Share] [Profile]

Group https://www.facebook.com/farmasepticonline?ref=br_tf

- My group
- Home
- Starred
- Favorites
- Click on icon to fa
- Recently
- Google-
- Finance
- de.rec.g
- alt.supp
- pl.misc.
- Recent s
- cse-ctf@
- cse-ctf
- Privacy -

f Viagra, Levitra, Cialis and More ED drugs

Neha Home [Friends] [Messages] [Settings] [More]

Create Page

Recent
2013

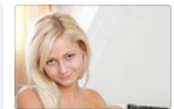


Viagra, Levitra, Cialis and More ED drugs

Like Follow Message [More]

989 likes · 1 talking about this

Product/Service
All about Viagra, Levitra, Cialis and More ED drugs
<http://best-online-ed-store.com/?wm=20104&tr=8030>



989 Likes

About - Suggest an Edit

Photos Likes

Highlights

Post Photo / Video

Write something on this Page...

Invite Your Friends to Like This Page See All

Type a friend's name...

Viagra, Levitra, Cialis and More ED drugs
August 5, 2013

Recent Posts by Others See All

Joseph Bodon
Buy viagra and cialis online without a prescription; from a ...

<http://cid-24f692f2c5663a08.spaces.live.com/>

<http://img386.imageshack.us/img386/673/inpcglzntk6.swf>

<http://healthinsidea.freewebsitehosting.com/>

<http://tiny.cc/iVSAK>

Free Hosting Domains

Domains which allow anyone to host content

Features:

- ❖ Free
- ❖ Often not blacklisted at all

Represent 86% of SpamIt revenue from intermediate domains

Bulk Domains

Cheap domains purchased for redirection

Features:

- ❖ Inexpensive
- ❖ Easily blacklisted
- ❖ Useful for SEO

13% of SpamIt revenue, 46% of GlavMed revenue

viagra site:.ru



+Neha



Share



Web Shopping Images News Videos More Search tools



About 1,550,000 results (0.36 seconds)

Official Site - Viagra®

Ad www.viagra.com/

Viagra® (sildenafil citrate) Rx Medication Facts. Learn More.

[Buy Real Viagra](#)

[Getting An Rx](#)

[Tips To Buy Online](#)

[Getting Treatment](#)

Ordering Viagra Online --- Price Comparison On A Single ...

www.cifrovik.ru/redirect/?url=http%3A%2F%2Fwww...com%2F

Buy VIAGRA at EXTRA LOW PRICES. Wide variety of generic and brand VIAGRA packages. BEST quality generic VIAGRA with 100% satisfaction guaranteed!

Viagra RX Store Online. Purchase Viagra, generic Cialis ...

toodoo.ru/toodoo/?goto=http://www.viagrarxstore.com/

The three major erectile dysfunction drugs on the market are Viagra, Cialis and Levitra. Of the three erectile dysfunction drugs, the largest selling product is ...

Generic Viagra

www.nvd.ru/desk/jump.php?624144

Generic Viagra is used to treat male Impotence also known as Erectile Dysfunction. Also, it has been approved by US FDA for treating pulmonary arterial ...

Erectile dysfunction

addurlsite.ru/jump.php?29553

Our most popular products, including Generic Viagra, Generic Cialis, Viagra Soft, Levitra, Cialis Soft, Propecia, Accutane, Soma, Cipro, Prozac, Lexapro, ...

Viagra - Family Practice Notebook

[liter-lib.ru/cgi-bin/redirect.cgi?url=www.fnotebook.com/Urology/...](http://liter-lib.ru/cgi-bin/redirect.cgi?url=www.fnotebook.com/Urology/)

Viagra enhances vasodilating effect of Nitrous Oxide. Normally released during sexual stimulation. Pharmacokinetics. Peak: 1 hour if taken while fasting.

buyfirstmedication.com

Buy Viagra from \$0.61 per pill

Reliable pharmacies
Affordable prices
Worldwide shipping



HOME CONSUMER INFORMATION PRICE LIST BOOKMARK US

The most convenient and comfortable way of buying Viagra online

- Looking for a competitive price for medication online?
- Need a list of reliable pharmacies?
- Want your medication delivered right to your doorstep?

This is just the place you need. This site offers you comprehensive medication comparison shopping options with top providers you can really trust.

Here you will be able to compare different offers, choose the most competitive source and place an order right away!

TRY THIS

Viagra Professional
Extremely enhancing male sexual activity!

[Buy now!](#)

Viagra Soft Tabs
Get a faster response! No other drug is quicker!

[Buy now!](#)

Check offers for Viagra from the trusted pharmacies (3 pharmacies found)

Package	Price	Per Item	Pharmacy / Order	Payment types	Delivery
10 Pills x 100 mg	\$42.24	\$4.22	OS Pharmaceuticals	MasterCard, Visa	5-10 weekdays, 90-925
30 Pills x 100 mg	\$12.61	\$2.42	OS Pharmaceuticals	MasterCard, Visa	5-10 weekdays, 90-925

Compromised Domains

Sites hacked for hosting links to storefronts

Features:

- ❖ Useful for SEO
- ❖ Takedown is slower

26% of GlavMed revenue

canadian pharmacy site:.edu



+Neha



Share



Web Shopping News Videos Images More Search tools



About 82,600 results (0.34 seconds)

Canadian Online Pharmacy

infosuite.welch.jhmi.edu/WelchCenter/aggregator/sources/3

Canadian Pharmacy - get free pills buying viagra and cialis - get more with us without prescription.

Canadian Pharmacy Cialis : Lowest Prices - Thompson Center

thompsoncenter.missouri.edu/.../msoe.p... University of Missouri–Columbia

Generic Pharmacy. We Always Have The Cheapest Offers In Our Online-Drugstore.

Canadian Pharmacy Cialis. The Best Pharmacy Online-Offers! Pharmacy ...

Canadian Pharmacy Verification : Lowest Prices

thompsoncenter.missouri.edu/.../msoe.p... University of Missouri–Columbia

Generic Pharmacy. High quality pills are only in our drugstore. Canadian Pharmacy Verification. Lowest Price Guaranteed! Our drugshop has everything you ...

Canadian Pharmacy Lexapro : Lowest Prices

thompsoncenter.missouri.edu/.../msoe.p... University of Missouri–Columbia

Generic Pharmacy. Best Prices On The Web! Canadian Pharmacy Lexapro. High quality pills are only in our drugstore. Best Online Drugstore.

Cialis Canada Pharmacy - Generic Drugs Online

www.osher.ucsf.edu/cialis-c... UCSF Osher Center for Integrative Medicine

Cialis canada pharmacy. Discount Prescription Drugs. Free consultation and discrete overnight shipping is available. Online Pharmacy: 24h online support.

Levitra online canadian pharmacy - The New Paltz Oracle

oracle.newpaltz.edu/levitra-on... State University of New York at New Paltz

Levitra online canadian pharmacy. 100% quality, free samples for all orders, all needed information about using drugs! 24/7 free consultations.

Star Drugstore: Canadian pharmacy cialis paypal best ...

www.tulane.edu/.../home.php?...canadian-pharmacy... Tulane University

Canadian pharmacy cialis paypal . Viagra is a popular erectile dysfunction treatment pills, be sure buying only quality pills with us.

bestmedications.net/search.html?key=cialis

BestMedications.net

Call Us Now!
US toll free: +1888 524 7141 | UK: +44 808 189 1420

HOME ORDER STATUS FAQ CO

Search: cialis Search by name: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Categories List

- Allergy
- Anti Fungal
- Anti Viral
- Anti-Depressants
- Antibacterial
- Antibiotics
- Arthritis
- Asthma
- Bestsellers
- Birth Control
- Blood Pressure
- Cancer
- Cardiovascular
- Cholesterol
- Diabetes
- Diuretics
- Erectile Dysfunction
- Eye Drop

Brand Cialis
Tadalafil
Brand Cialis improves erection and lets achieve a successful sexual intercourse.
\$6.26 Buy now

Cialis
Tadalafil
Cialis improves erection and lets achieve a successful sexual intercourse.
\$1.31 Buy now

Cialis Black
Tadalafil
Cialis Black is an ideal remedy against erectile dysfunction in men, which will strike you with amazing ...
\$8.68 Buy now

Cialis Daily
Tadalafil
Cialis Daily, known as a weekly, is the most effective solutions for erectile ...
\$0.90 Buy now

Cialis Flavored
Tadalafil
Cialis Flavored (Chocolate) is a modification of worldwide known erection pills Cialis (Tadalafil). This ...

Cialis Jelly
Tadalafil
Cialis Jelly is a drug from ED, it relaxes smooth muscles in veins of the penis to cause erection.

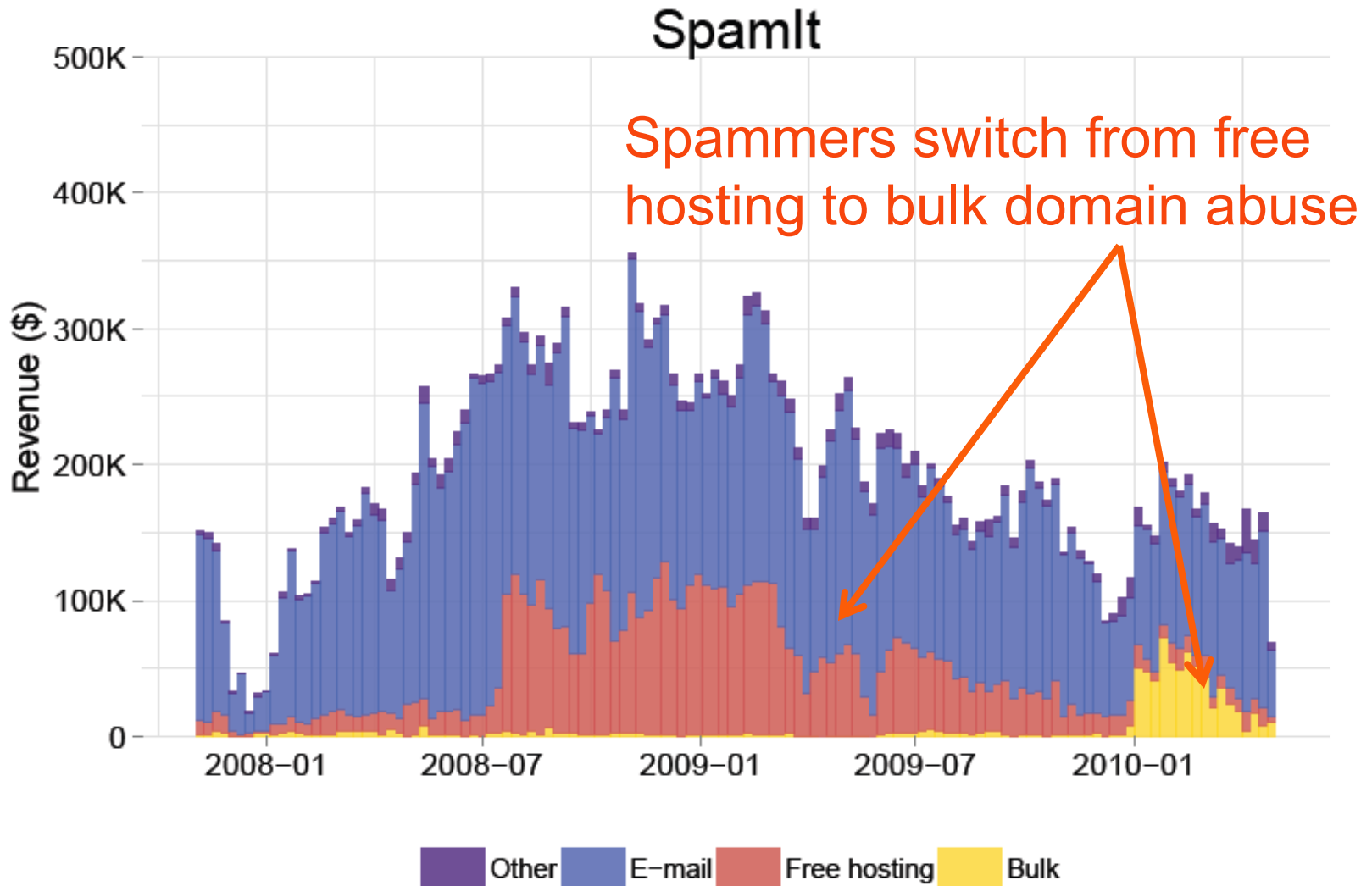
Intermediate Domain Abuse

Spammers abuse wide variety of domains to:

- ❖ Evade detection and blacklisting
- ❖ Increase traffic at minimal cost

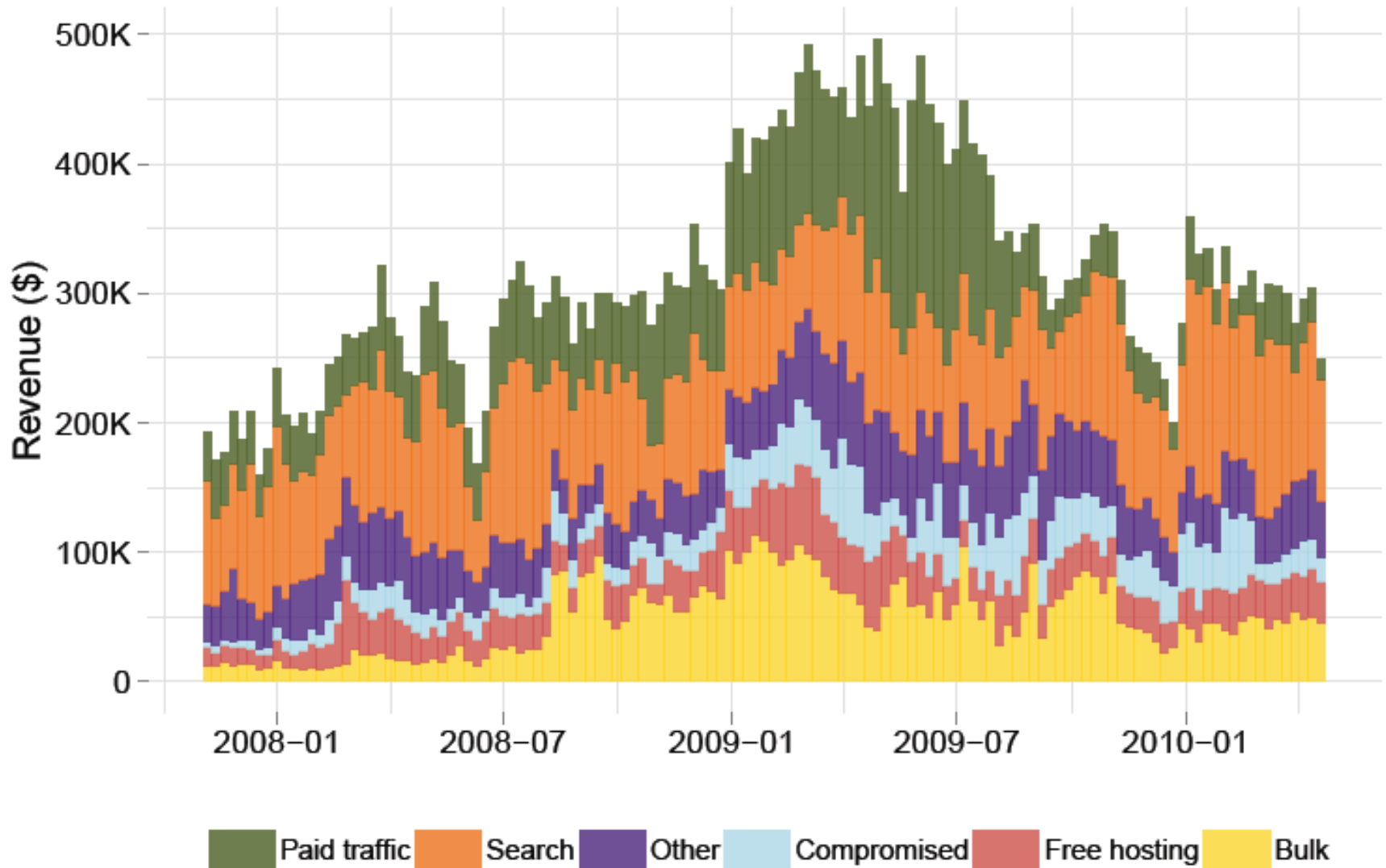
Spammers are flexible at switching strategies

Temporal Domain Abuse



Temporal Domain Abuse

GlavMed



Summary

Blacklisting currently unable to undermine spamming enterprise

Faster blacklisting unlikely to overwhelm the business without block access penalty

Coverage is important to improve but difficult

- ❖ Agile spammers
- ❖ Many evasion techniques exist