RSA®Conference2019

San Francisco | March 4 – 8 | Moscone Center

BETTER.

SESSION ID: SBX4-R3

Hunt Advanced Attackers on a Budget Less than the GDP of a Small Country

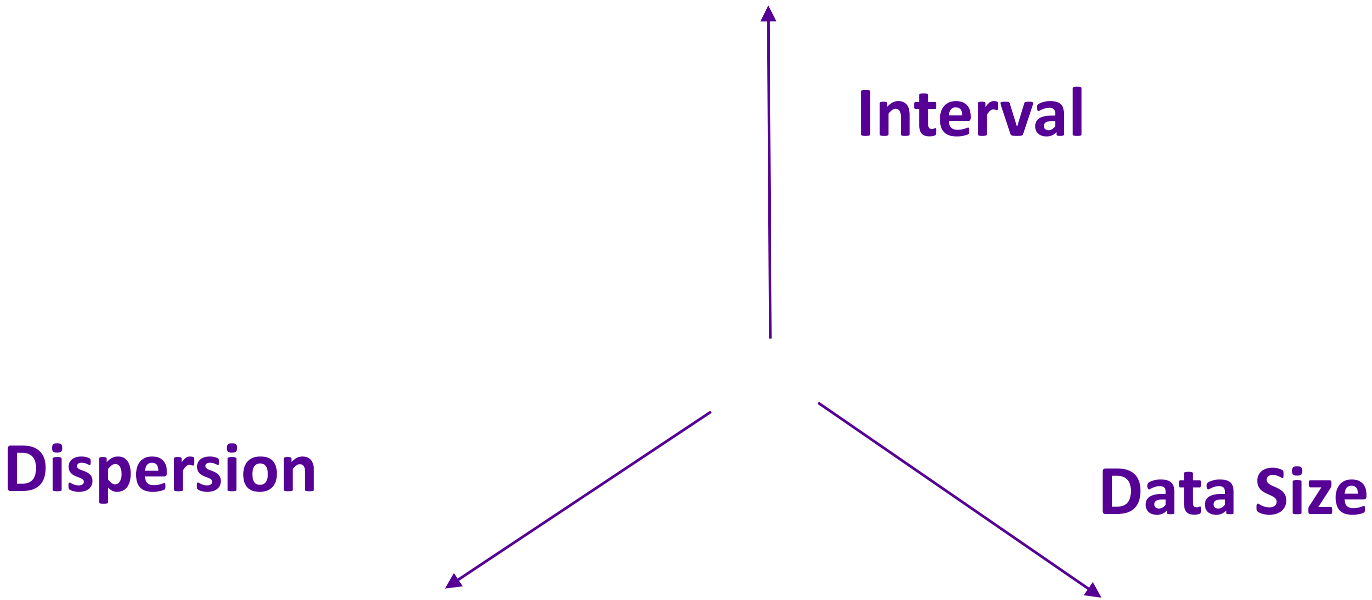
John Strand

Owner
Black Hills Information Security

Problem: Detecting Command and Control is getting hard

- There are a number of backdoors that use a wide variety of different ways to communicate with the bad guys' Command and Control (C2) servers
  - HTTP Beaconing
  - Social Media
  - DNS
  - QUICK
  - SCTP
- PenTesting firms use these tricks all of the time
- As do the bad guys
- How can we detect these backdoors if the data is encrypted, obfuscated or hidden?
- We can use AI
  - Please.. Don't stop watching just yet...

Let's think about consistencies.

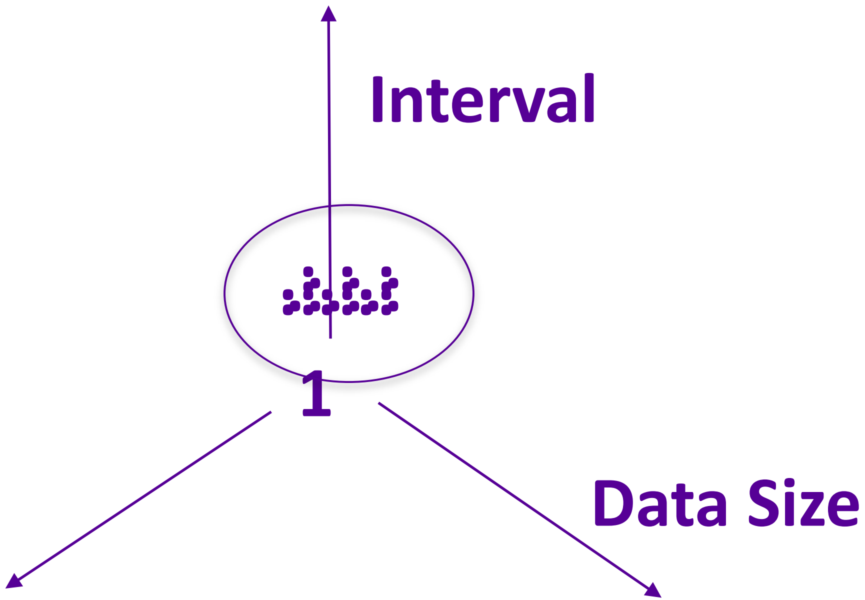


Interval

Dispersion

Data Size

Let's think about consistencies.



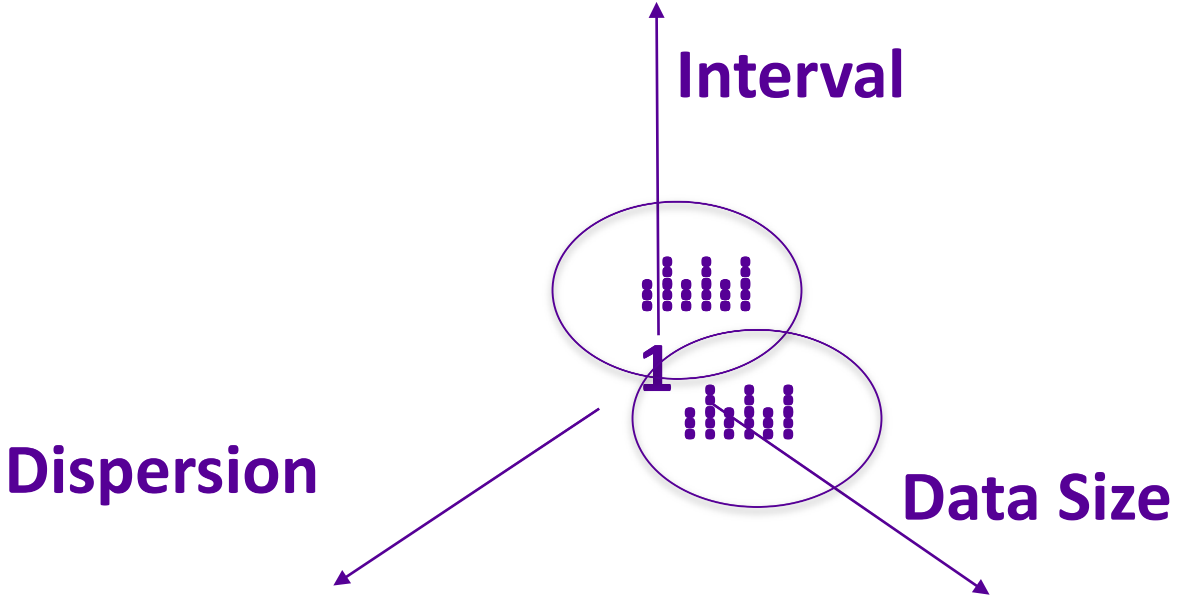
Interval

1

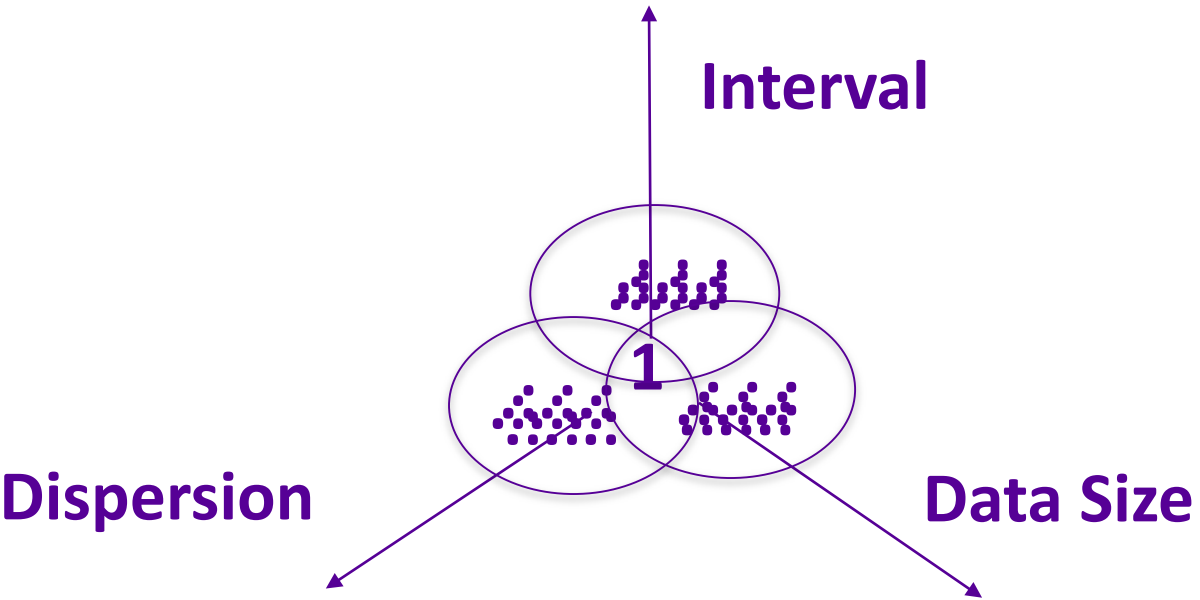
Dispersion

Data Size

Let's think about consistencies.

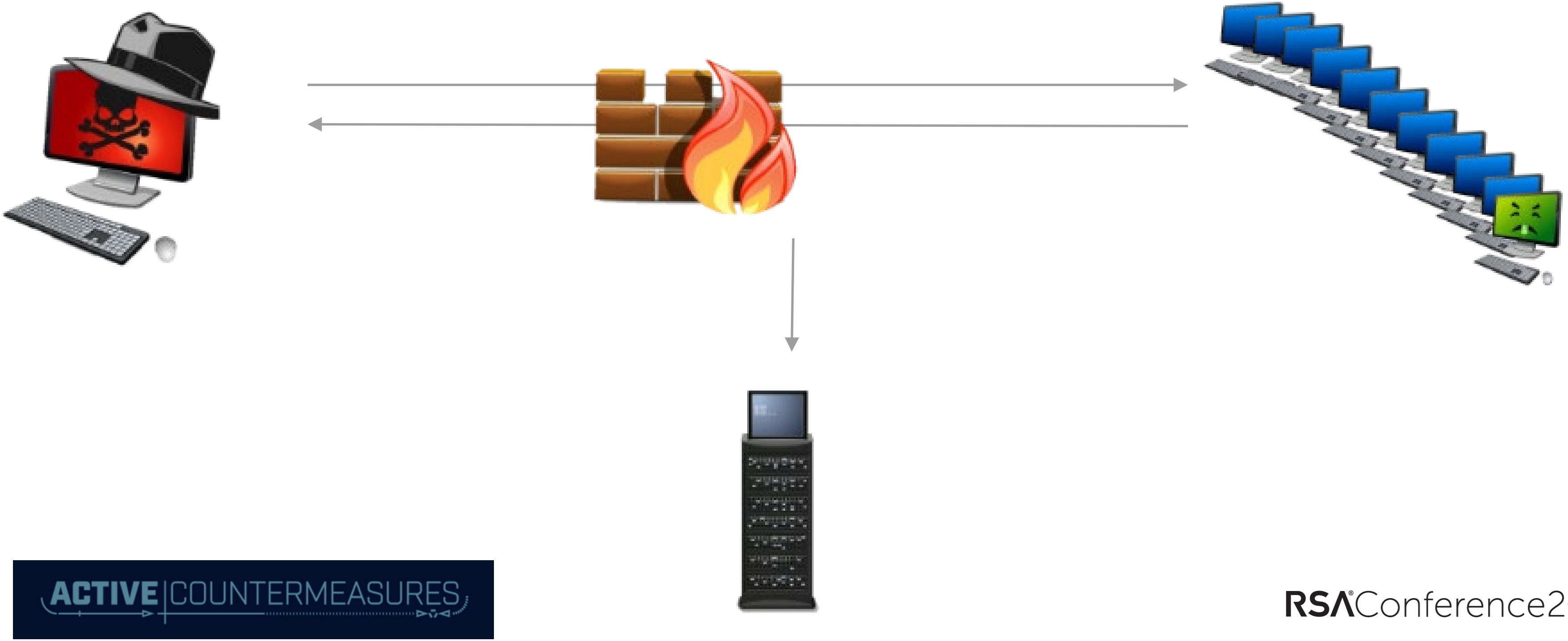


Let's think about consistencies.



Let’s talk about setup

- First, you will need to have a system to capture the traffic
- Second, RITA is free and awesome

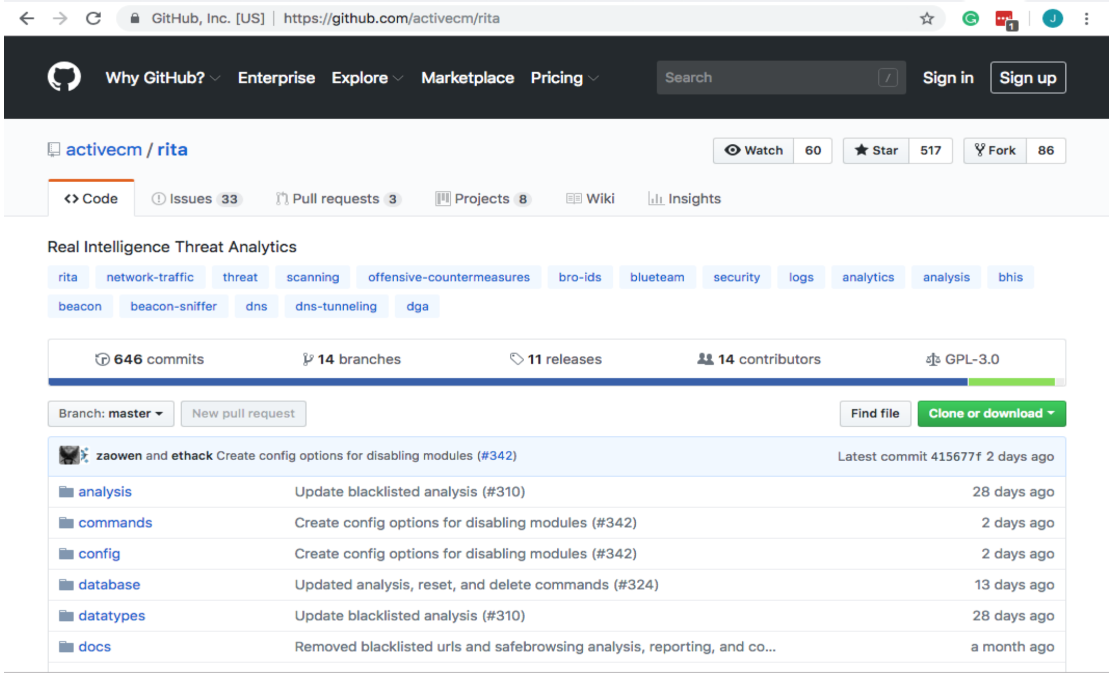


Why Zeek?

- Speed
- Large user base
- Lots of support
- Consistency
  - Timestamps are key
  - Many devices handle timestamps in different/odd ways
  - Generates required log files
- We are moving away from signature-based detection
- Too many ways to obfuscate
  - Encryption, Encoding, use of third-party services like Google DNS

RITA is free… It is also the source of most of the data we will cover:

https://www.activecountermeasures.com/rita/



Real Intelligence Threat Analytics

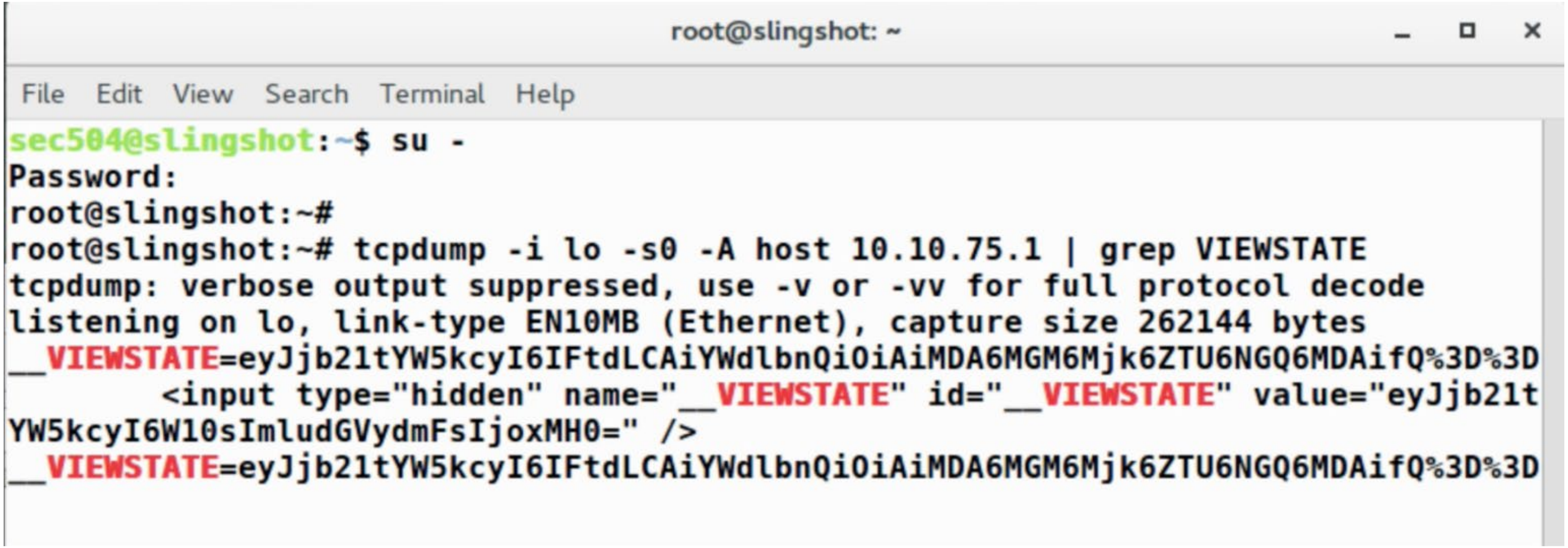
rita network-traffic threat scanning offensive-countermeasures bro-ids blueteam security logs analytics analysis bhis beacon beacon-sniffer dns dns-tunneling dga

646 commits | 14 branches | 11 releases | 14 contributors | GPL-3.0

zaowen and ethack Create config options for disabling modules (#342) — Latest commit 415677f 2 days ago

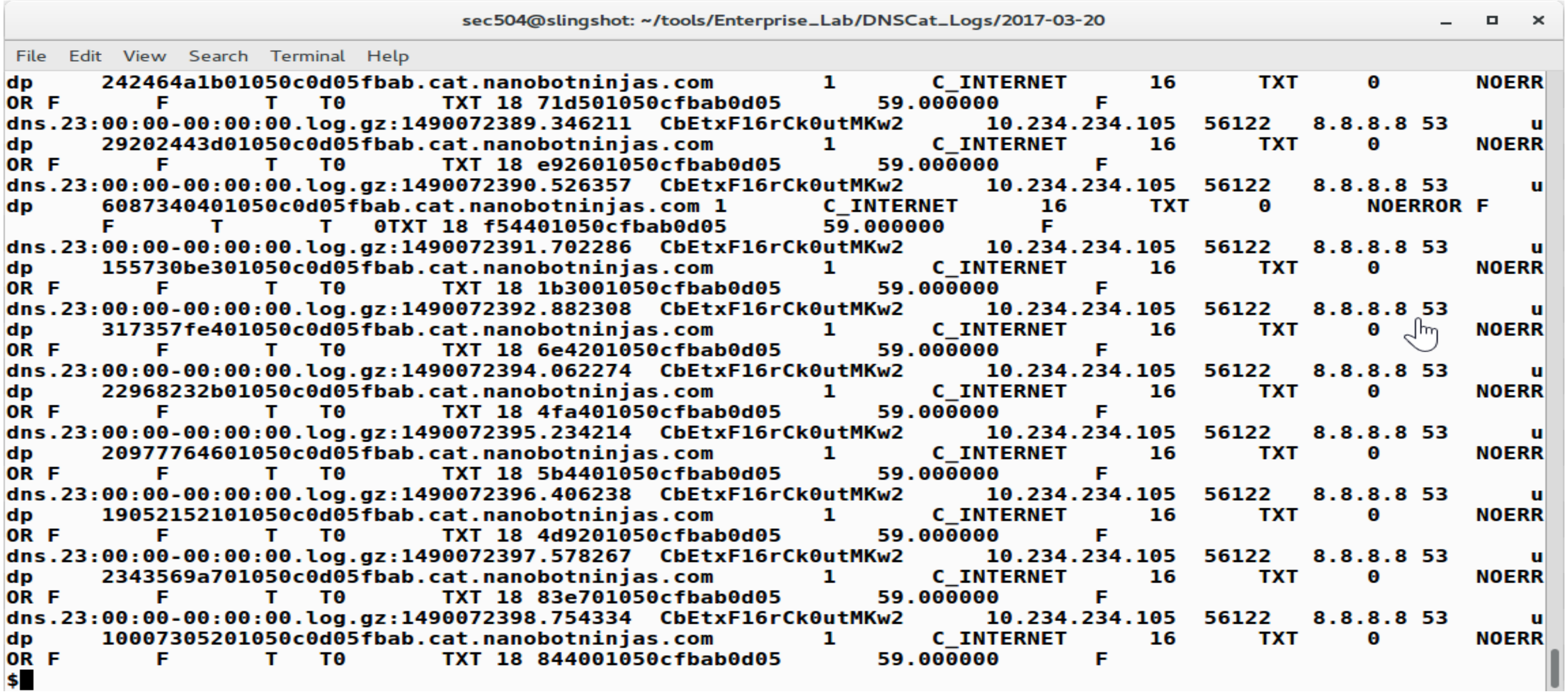
analysis	Update blacklisted analysis (#310)	28 days ago
commands	Create config options for disabling modules (#342)	2 days ago
config	Create config options for disabling modules (#342)	2 days ago
database	Updated analysis, reset, and delete commands (#324)	13 days ago
datatypes	Update blacklisted analysis (#310)	28 days ago
docs	Removed blacklisted urls and safebrowsing analysis, reporting, and co…	a month ago

VSAgent



```
sec504@slingshot:~$ su -
Password:
root@slingshot:~#
root@slingshot:~# tcpdump -i lo -s0 -A host 10.10.75.1 | grep VIEWSTATE
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on lo, link-type EN10MB (Ethernet), capture size 262144 bytes
__VIEWSTATE=eyJjb21tYW5kcyI6IFtdLCAiYWdlbnQiOiAiMDA6MGM6Mjk6ZTU6NGQ6MDAifQ%3D%3D
        <input type="hidden" name="__VIEWSTATE" id="__VIEWSTATE" value="eyJjb21t
YW5kcyI6W10sImludGVydmFsIjoxMH0=" />
__VIEWSTATE=eyJjb21tYW5kcyI6IFtdLCAiYWdlbnQiOiAiMDA6MGM6Mjk6ZTU6NGQ6MDAifQ%3D%3D
```

DNSCat


sec504@slingshot: ~/tools/Enterprise_Lab/DNSCat_Logs/2017-03-20
File Edit View Search Terminal Help

```
dp     242464a1b01050c0d05fbab.cat.nanobotninjas.com        1       C_INTERNET      16      TXT     0       NOERR
OR F       F       T   T0       TXT 18 71d501050cfbab0d05       59.000000       F
dns.23:00:00-00:00:00.log.gz:1490072389.346211  CbEtxF16rCk0utMKw2      10.234.234.105  56122   8.8.8.8 53      u
dp     29202443d01050c0d05fbab.cat.nanobotninjas.com        1       C_INTERNET      16      TXT     0       NOERR
OR F       F       T   T0       TXT 18 e92601050cfbab0d05       59.000000       F
dns.23:00:00-00:00:00.log.gz:1490072390.526357  CbEtxF16rCk0utMKw2      10.234.234.105  56122   8.8.8.8 53      u
dp     6087340401050c0d05fbab.cat.nanobotninjas.com 1       C_INTERNET      16      TXT     0       NOERROR F
       F       T       T   0TXT 18 f54401050cfbab0d05       59.000000       F
dns.23:00:00-00:00:00.log.gz:1490072391.702286  CbEtxF16rCk0utMKw2      10.234.234.105  56122   8.8.8.8 53      u
dp     155730be301050c0d05fbab.cat.nanobotninjas.com        1       C_INTERNET      16      TXT     0       NOERR
OR F       F       T   T0       TXT 18 1b3001050cfbab0d05       59.000000       F
dns.23:00:00-00:00:00.log.gz:1490072392.882308  CbEtxF16rCk0utMKw2      10.234.234.105  56122   8.8.8.8 53      u
dp     317357fe401050c0d05fbab.cat.nanobotninjas.com        1       C_INTERNET      16      TXT     0       NOERR
OR F       F       T   T0       TXT 18 6e4201050cfbab0d05       59.000000       F
dns.23:00:00-00:00:00.log.gz:1490072394.062274  CbEtxF16rCk0utMKw2      10.234.234.105  56122   8.8.8.8 53      u
dp     22968232b01050c0d05fbab.cat.nanobotninjas.com        1       C_INTERNET      16      TXT     0       NOERR
OR F       F       T   T0       TXT 18 4fa401050cfbab0d05       59.000000       F
dns.23:00:00-00:00:00.log.gz:1490072395.234214  CbEtxF16rCk0utMKw2      10.234.234.105  56122   8.8.8.8 53      u
dp     20977764601050c0d05fbab.cat.nanobotninjas.com        1       C_INTERNET      16      TXT     0       NOERR
OR F       F       T   T0       TXT 18 5b4401050cfbab0d05       59.000000       F
dns.23:00:00-00:00:00.log.gz:1490072396.406238  CbEtxF16rCk0utMKw2      10.234.234.105  56122   8.8.8.8 53      u
dp     19052152101050c0d05fbab.cat.nanobotninjas.com        1       C_INTERNET      16      TXT     0       NOERR
OR F       F       T   T0       TXT 18 4d9201050cfbab0d05       59.000000       F
dns.23:00:00-00:00:00.log.gz:1490072397.578267  CbEtxF16rCk0utMKw2      10.234.234.105  56122   8.8.8.8 53      u
dp     2343569a701050c0d05fbab.cat.nanobotninjas.com        1       C_INTERNET      16      TXT     0       NOERR
OR F       F       T   T0       TXT 18 83e701050cfbab0d05       59.000000       F
dns.23:00:00-00:00:00.log.gz:1490072398.754334  CbEtxF16rCk0utMKw2      10.234.234.105  56122   8.8.8.8 53      u
dp     10007305201050c0d05fbab.cat.nanobotninjas.com        1       C_INTERNET      16      TXT     0       NOERR
OR F       F       T   T0       TXT 18 844001050cfbab0d05       59.000000       F
$
```

Housekeeping: Ads

- Ads… Oh my… Ads
- You need to block them
- They bring malware
- They pollute the data

OpenX

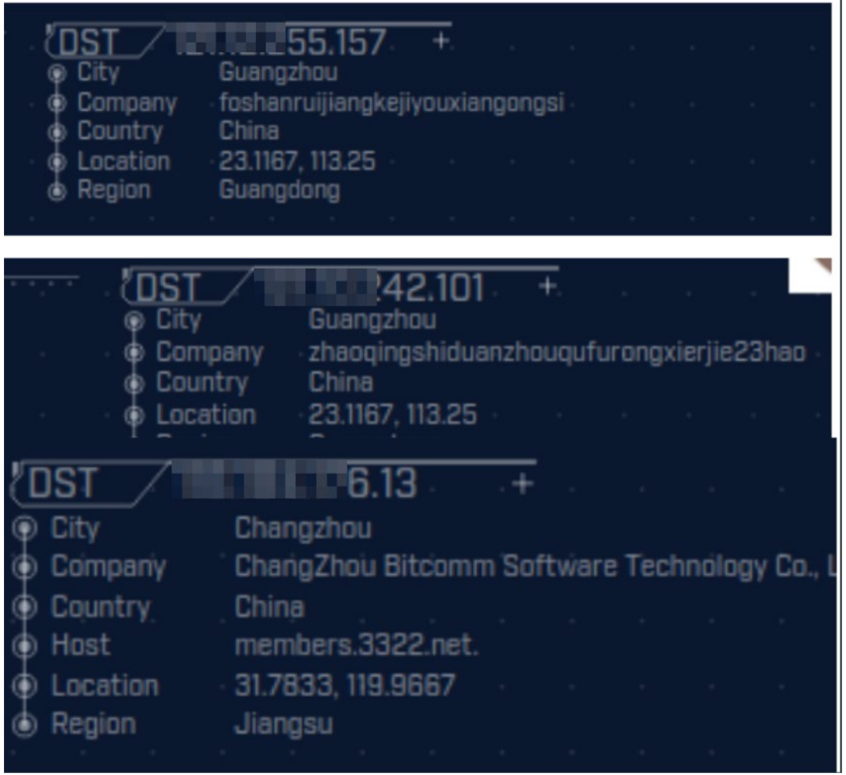
Google Ads

marketing 360®
Fuel Your Brand®

Taboola

Round Robin Malware Beaconing

- We have been seeing malware that connects to multiple different IP addresses
  - QUIC
  - SCTP
- One giveaway is the datasize
- The IPs may shift, but the dispersion and the data size are still consistent
- Look for an internal system making connections to multiple external systems with the same attributes



DST [redacted]55.157

City	Guangzhou
Company	foshanruijiangkejiyouxiangongsi
Country	China
Location	23.1167, 113.25
Region	Guangdong

DST [redacted]42.101

City	Guangzhou
Company	zhaoqingshiduanzhouqufurongxierjie23hao
Country	China
Location	23.1167, 113.25

DST [redacted]6.13

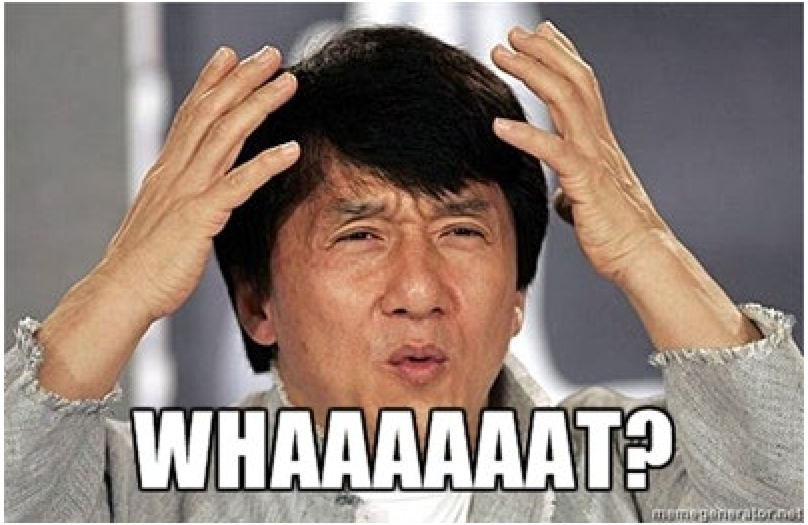
City	Changzhou
Company	ChangZhou Bitcomm Software Technology Co., L
Country	China
Host	members.3322.net.
Location	31.7833, 119.9667
Region	Jiangsu

What happens when your entire network is connecting to DoD?

- We had a customer who had a large (think thousands) of systems connecting to a DoD IP address on the Internet
- Very strong and consistent beacon
  - Datasize
  - Dispersion
  - Interval
- Time to panic?
- Is the NSA hacking them?
- Was it a Vault or ShadowBroker exploit?
- Made no sense at all…..

Quote from a developer…

“Wait… That IP address is odd.. It is the current version of product X.”



Lesson

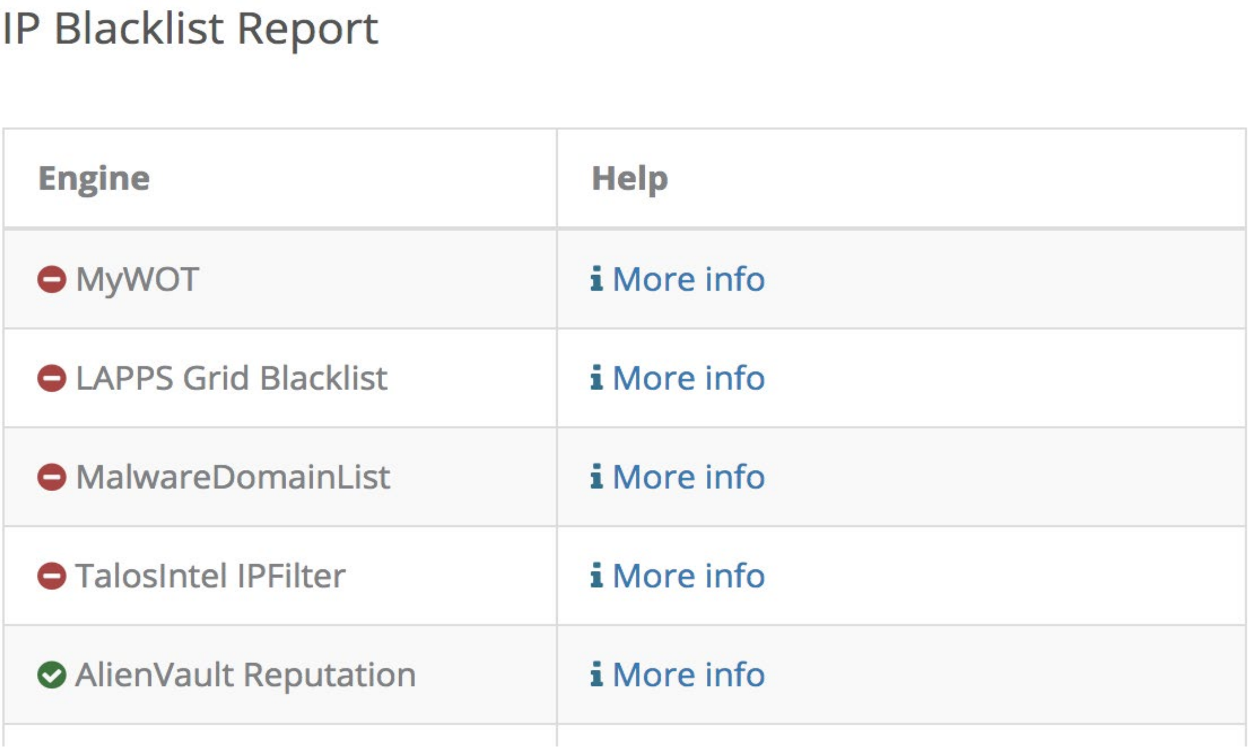
- Sometimes “beaconing” data is not evil
- Sometimes it is just a mistake
- Trust me, there are lots of mistakes on networks….
  - Syslog from products
  - “Customer experience data”
  - Direct Software updates trying to get to the Internet
- There is a lot of filtering and research when you first do this
- But, it gets easier
- Think Vulnerability Assessments

Did someone say a “Touch of Evil?”

On the topic of blacklisting...

- There are multiple different sources of blacklisted IP/DNS information
- Most of them feed of each other
- Having a hit on a blacklist does not mean the connection is immediately evil
  - Virtual hosting
  - Old entries
- So, simply because a connection is made to an IP address does not mean the system is compromised

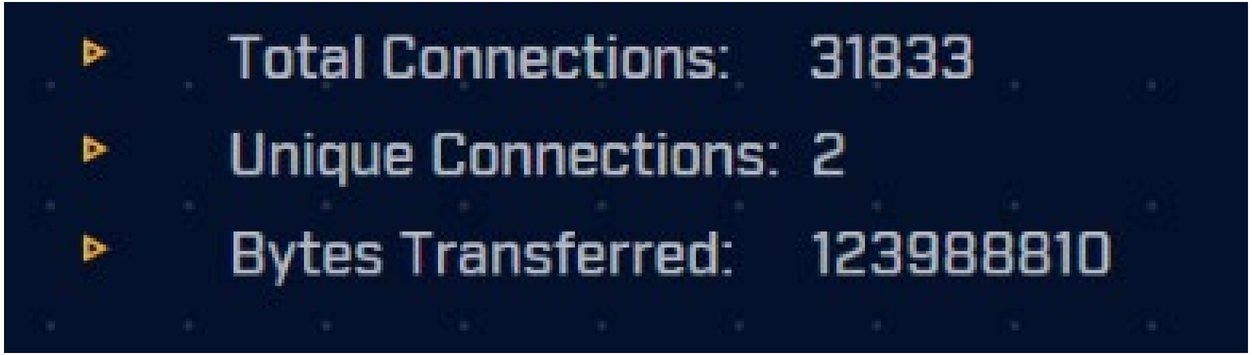
What to look for: Numerous hits



IP Blacklist Report

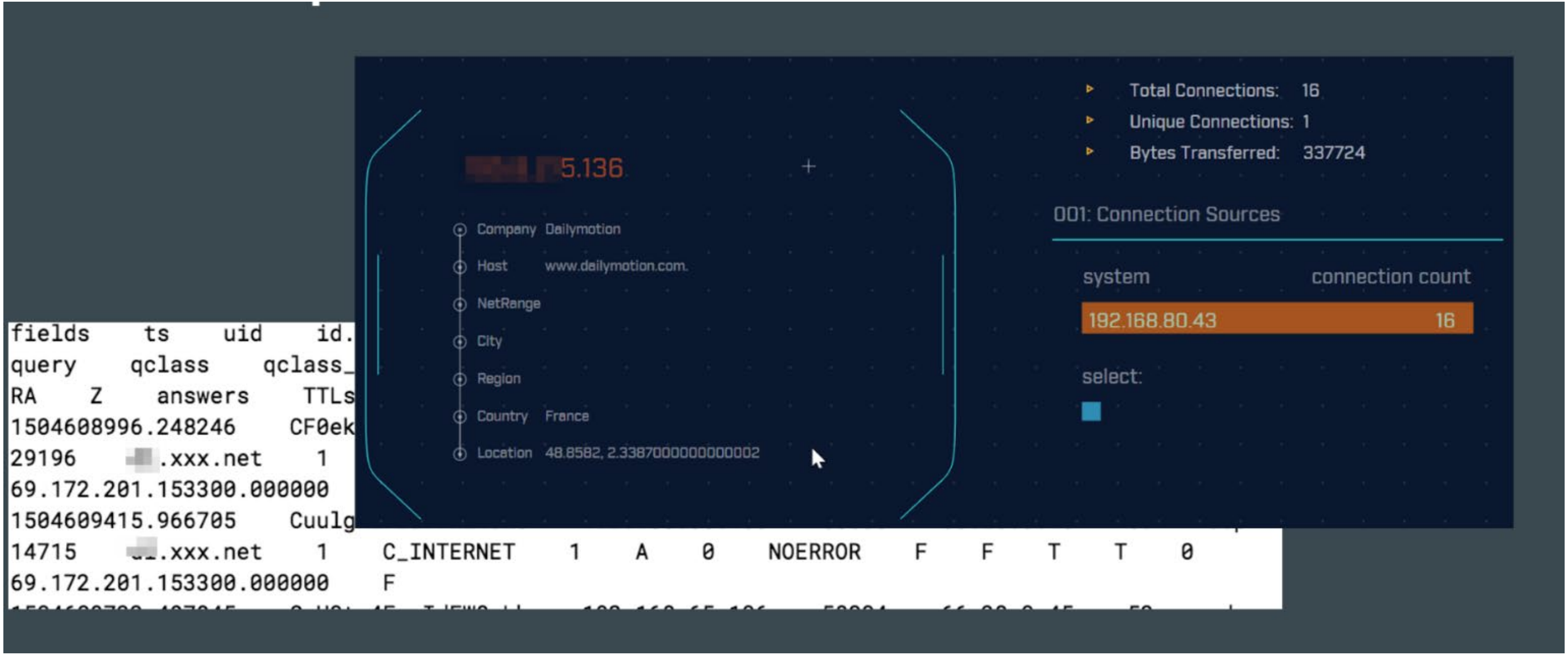
Engine	Help
⊖ MyWOT	i More info
⊖ LAPPS Grid Blacklist	i More info
⊖ MalwareDomainList	i More info
⊖ TalosIntel IPFilter	i More info
✓ AlienVault Reputation	i More info

What to look for: Amount of data transferred



▶	Total Connections:	31833
▶	Unique Connections:	2
▶	Bytes Transferred:	123988810

A note on porn



```
fields     ts     uid     id.
query     qclass     qclass_
RA     Z     answers     TTLs
1504608996.248246     CF0ek
29196     [redacted].xxx.net     1
69.172.201.153300.000000
1504609415.966705     Cuulg
14715     [redacted].xxx.net     1     C_INTERNET     1     A     0     NOERROR     F     F     T     T     0
69.172.201.153300.000000     F
```

[redacted]5.136

- Company Dailymotion
- Host www.dailymotion.com.
- NetRange
- City
- Region
- Country France
- Location 48.8582, 2.3387000000000002

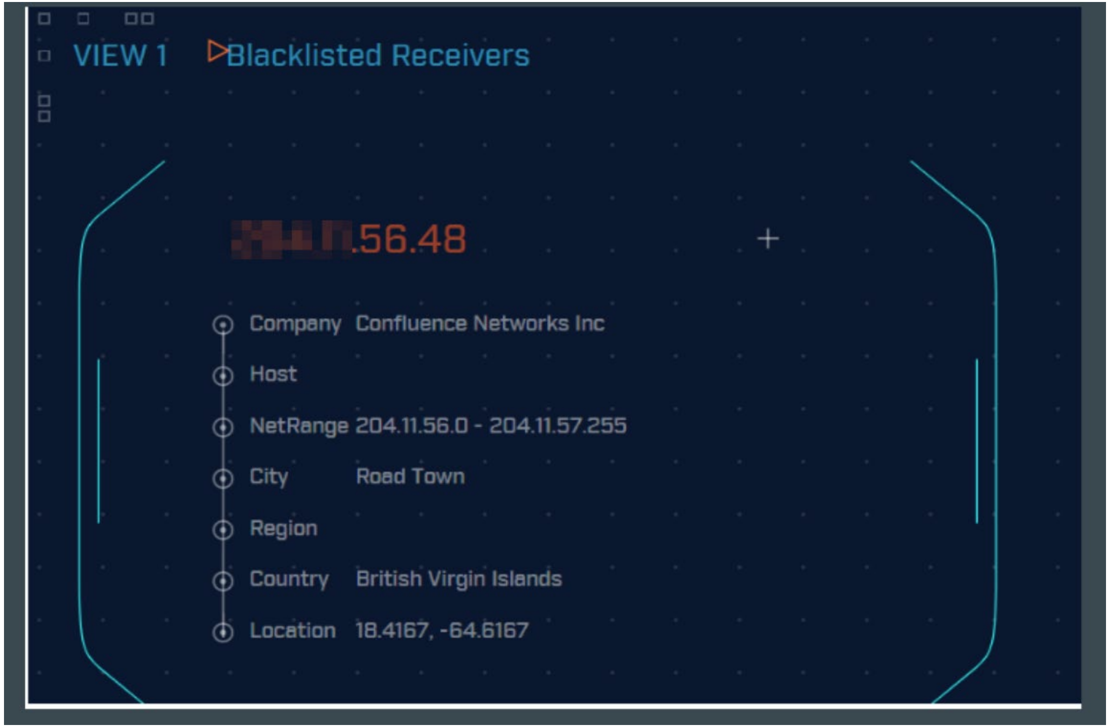
- Total Connections: 16
- Unique Connections: 1
- Bytes Transferred: 337724

001: Connection Sources

system	connection count
192.168.80.43	16

select:

When good sites go bad…

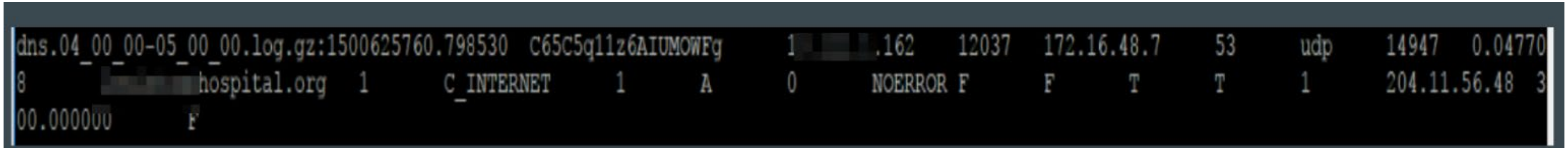


VIEW 1 ▷Blacklisted Receivers

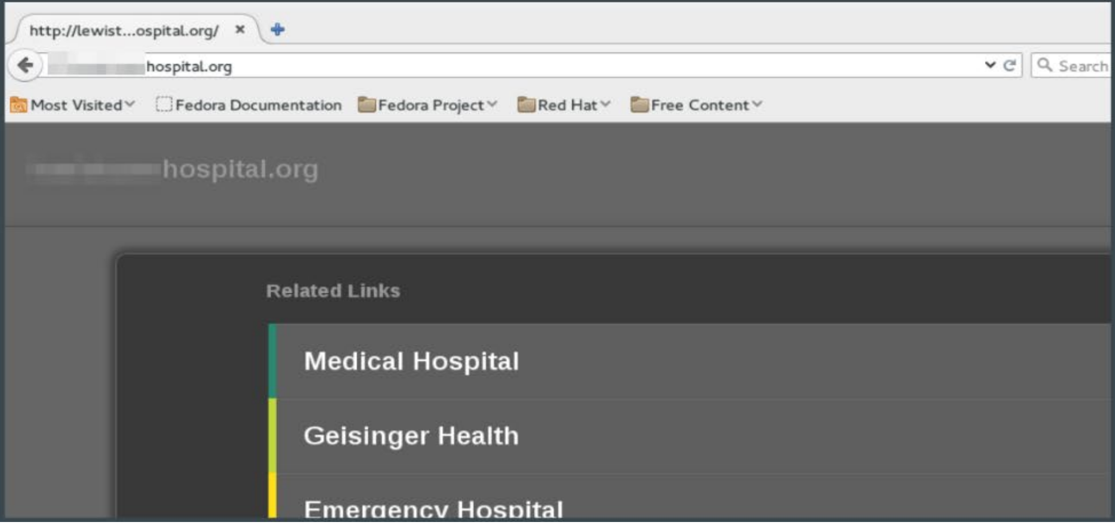
[redacted].56.48

Company	Confluence Networks Inc
Host	
NetRange	204.11.56.0 - 204.11.57.255
City	Road Town
Region	
Country	British Virgin Islands
Location	18.4167, -64.6167

Seems legit..



```
dns.04_00_00-05_00_00.log.gz:1500625760.798530   C65C5q11z6AIUMOWFg      1[redacted].162    12037   172.16.48.7    53      udp     14947   0.04770
8       [redacted]hospital.org   1       C_INTERNET      1       A       0       NOERROR F       F       T       T       1       204.11.56.48    3
00.000000       F
```



[redacted]hospital.org

[redacted]hospital.org

Related Links

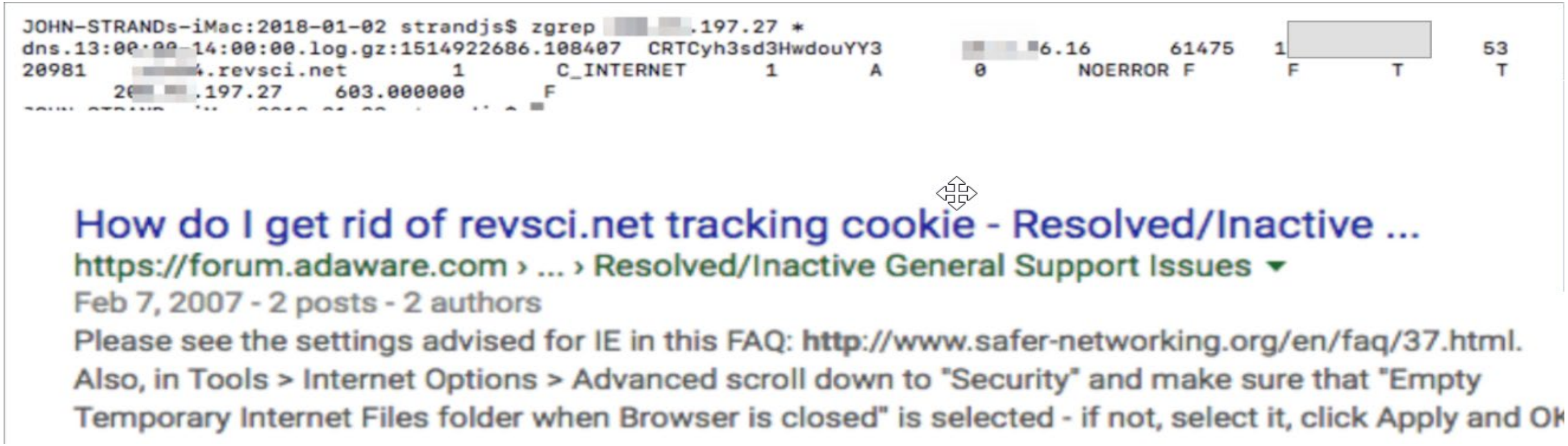
Medical Hospital

Geisinger Health

Emergency Hospital

Spyware is.... Weird

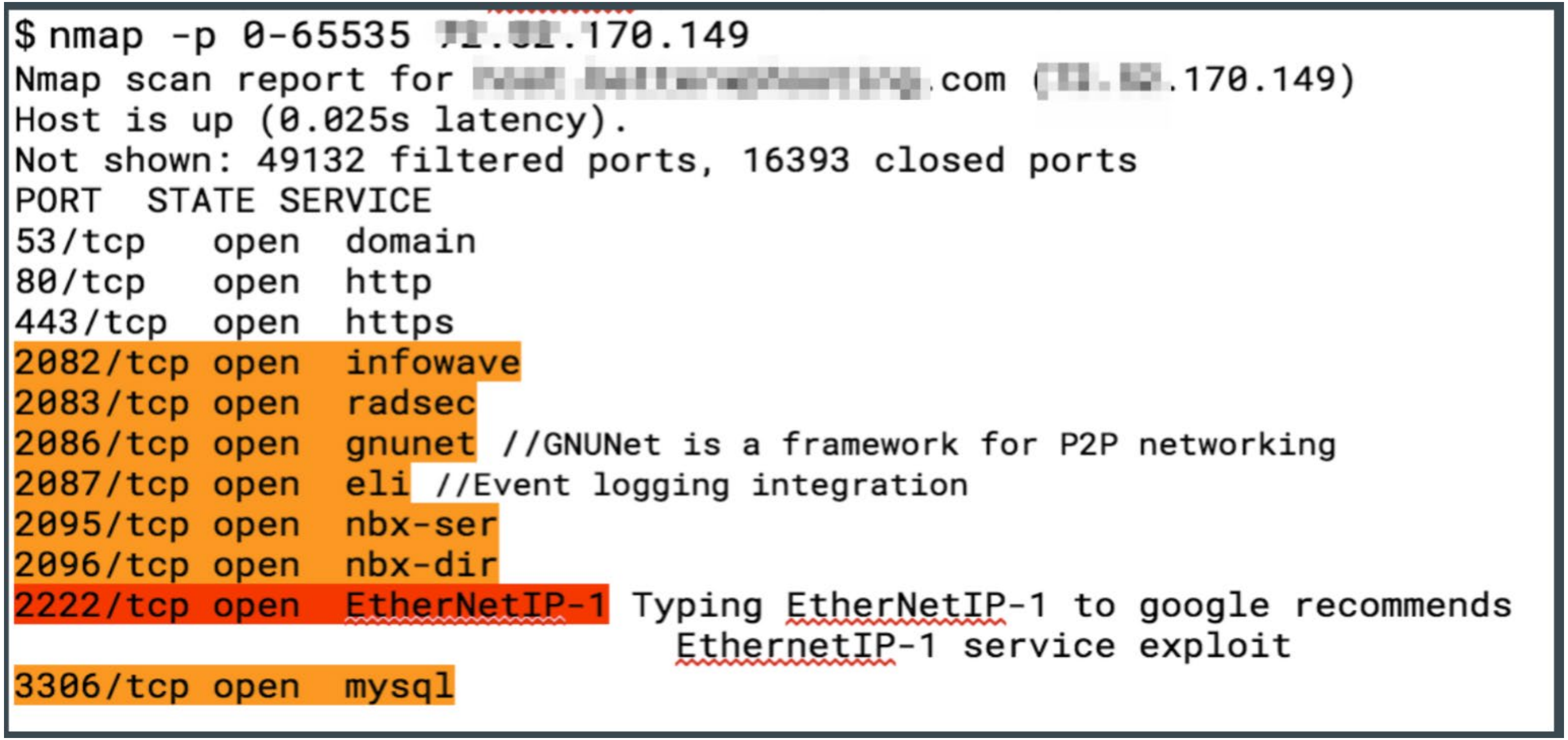
- Not quite ad... Not quite malware...
- Usually used for tracking a user
- All advertisers do this



```
JOHN-STRANDs-iMac:2018-01-02 strandjs$ zgrep [redacted].197.27 *
dns.13:00:00-14:00:00.log.gz:1514922686.108407   CRTCyh3sd3HwdouYY3        [redacted]6.16        61475    1[redacted]          53
20981     [redacted].revsci.net          1          C_INTERNET       1          A          0          NOERROR F          F          T          T
        2[redacted].197.27      603.000000        F
```

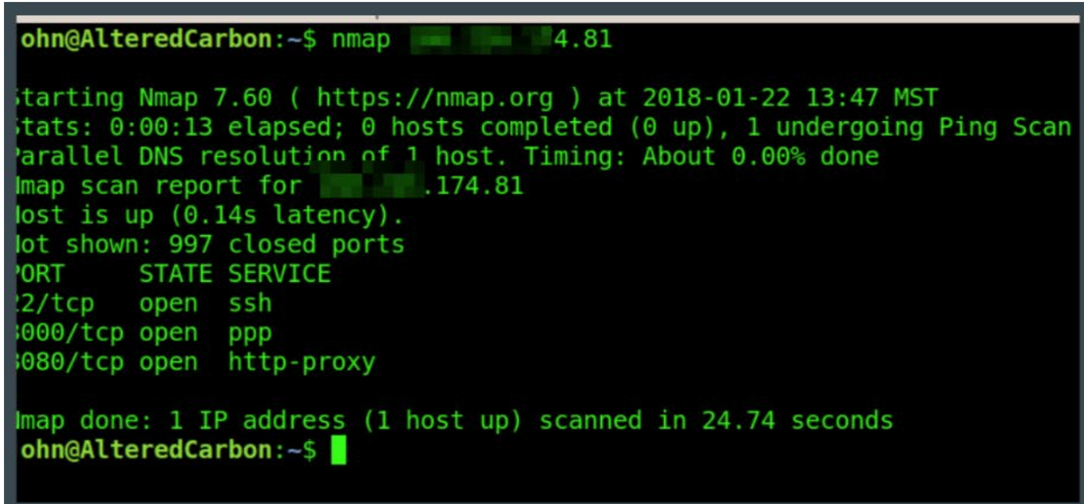
How do I get rid of revsci.net tracking cookie - Resolved/Inactive ...
https://forum.adaware.com › ... › Resolved/Inactive General Support Issues ▾
Feb 7, 2007 - 2 posts - 2 authors
Please see the settings advised for IE in this FAQ: http://www.safer-networking.org/en/faq/37.html. Also, in Tools > Internet Options > Advanced scroll down to "Security" and make sure that "Empty Temporary Internet Files folder when Browser is closed" is selected - if not, select it, click Apply and Ok

Compromised Servers

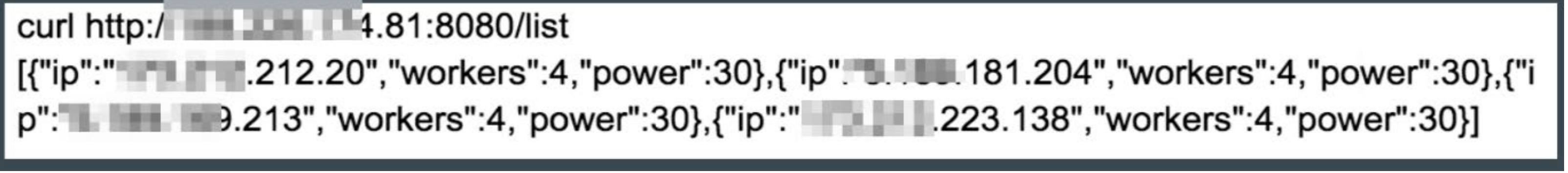


```
$ nmap -p 0-65535 [redacted].170.149
Nmap scan report for [redacted].com ([redacted].170.149)
Host is up (0.025s latency).
Not shown: 49132 filtered ports, 16393 closed ports
PORT   STATE SERVICE
53/tcp    open   domain
80/tcp    open   http
443/tcp   open   https
2082/tcp open   infowave
2083/tcp open   radsec
2086/tcp open   gnunet  //GNUNet is a framework for P2P networking
2087/tcp open   eli  //Event logging integration
2095/tcp open   nbx-ser
2096/tcp open   nbx-dir
2222/tcp open   EtherNetIP-1 Typing EtherNetIP-1 to google recommends
                                   EthernetIP-1 service exploit
3306/tcp open   mysql
```

Crypto mining is the new hotness

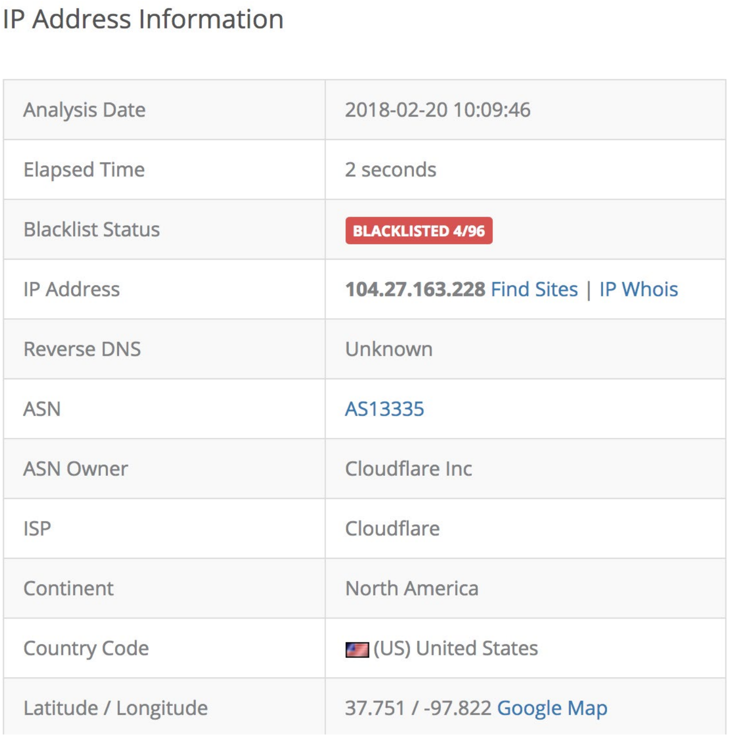


```
ohn@AlteredCarbon:~$ nmap [redacted]4.81

tarting Nmap 7.60 ( https://nmap.org ) at 2018-01-22 13:47 MST
tats: 0:00:13 elapsed; 0 hosts completed (0 up), 1 undergoing Ping Scan
arallel DNS resolution of 1 host. Timing: About 0.00% done
Imap scan report for [redacted].174.81
Iost is up (0.14s latency).
Iot shown: 997 closed ports
ORT      STATE SERVICE
2/tcp    open  ssh
000/tcp open  ppp
080/tcp open  http-proxy

Imap done: 1 IP address (1 host up) scanned in 24.74 seconds
ohn@AlteredCarbon:~$
```



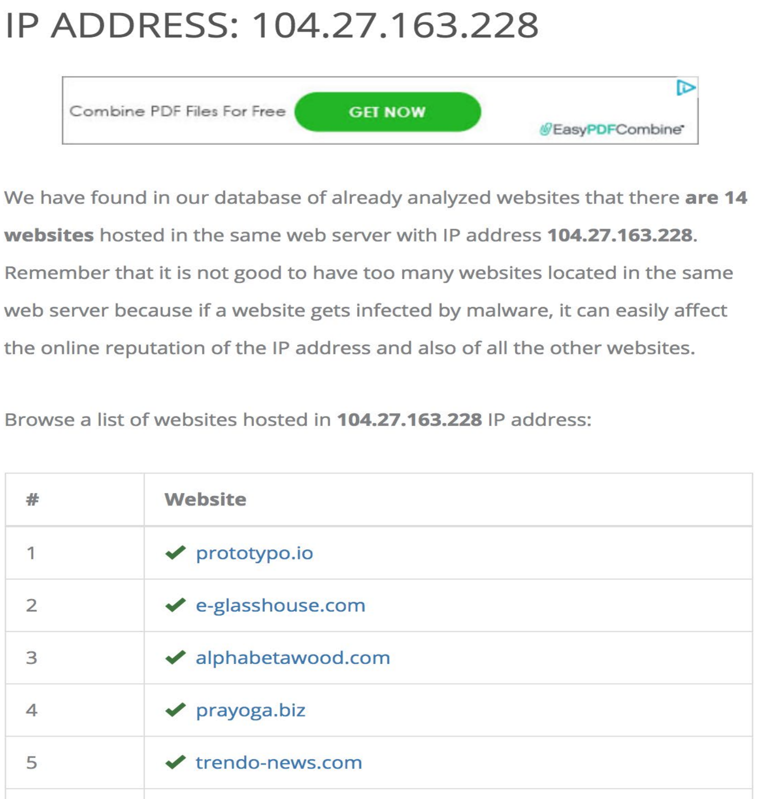
```
curl http:/[redacted]4.81:8080/list
[{"ip":"[redacted].212.20","workers":4,"power":30},{"ip"[redacted].181.204","workers":4,"power":30},{"i
p":"[redacted]9.213","workers":4,"power":30},{"ip":"[redacted].223.138","workers":4,"power":30}]
```

Online Resource: IP/URL Void



IP Address Information

Analysis Date	2018-02-20 10:09:46
Elapsed Time	2 seconds
Blacklist Status	BLACKLISTED 4/96
IP Address	**104.27.163.228** Find Sites | IP Whois
Reverse DNS	Unknown
ASN	AS13335
ASN Owner	Cloudflare Inc
ISP	Cloudflare
Continent	North America
Country Code	(US) United States
Latitude / Longitude	37.751 / -97.822 Google Map



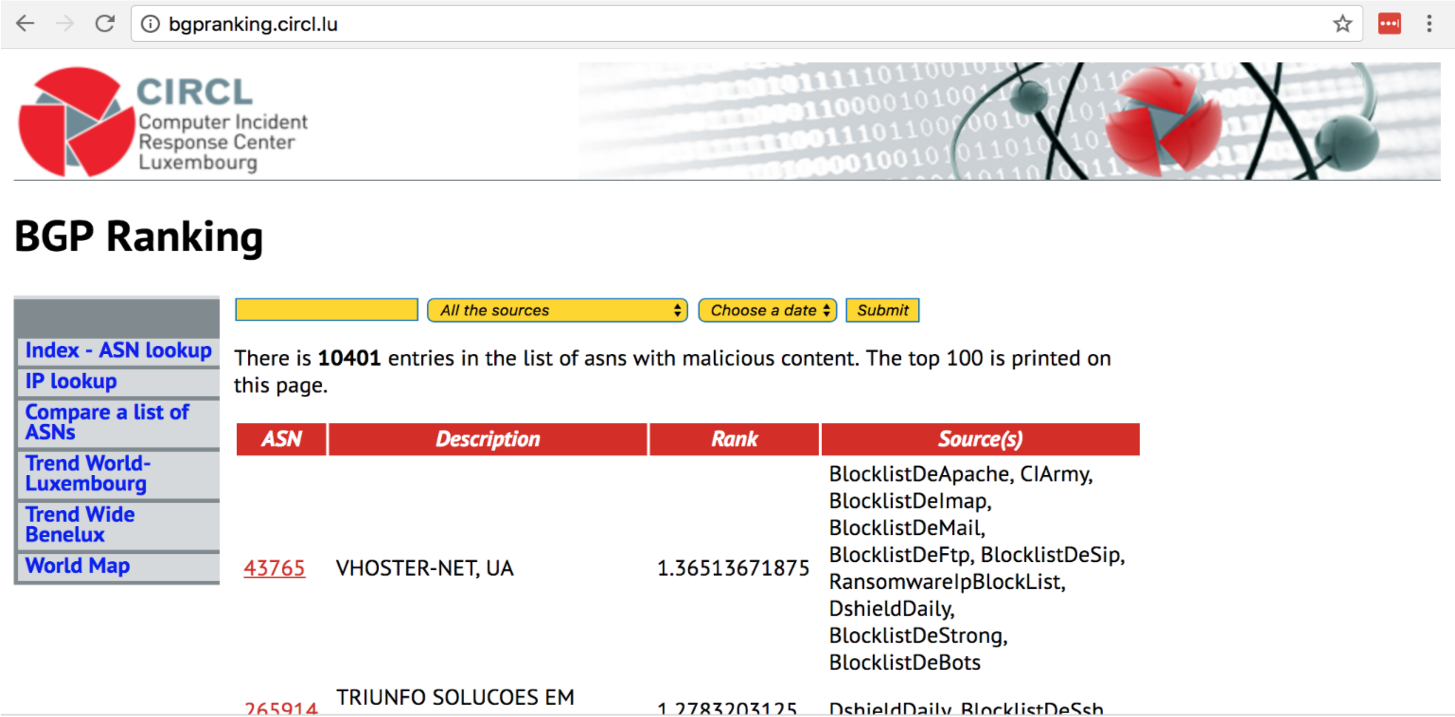
IP ADDRESS: 104.27.163.228

We have found in our database of already analyzed websites that there **are 14 websites** hosted in the same web server with IP address **104.27.163.228**. Remember that it is not good to have too many websites located in the same web server because if a website gets infected by malware, it can easily affect the online reputation of the IP address and also of all the other websites.

Browse a list of websites hosted in **104.27.163.228** IP address:

#	Website
1	✓ prototypo.io
2	✓ e-glasshouse.com
3	✓ alphabetawood.com
4	✓ prayoga.biz
5	✓ trendo-news.com

BGP/ASN Ranking

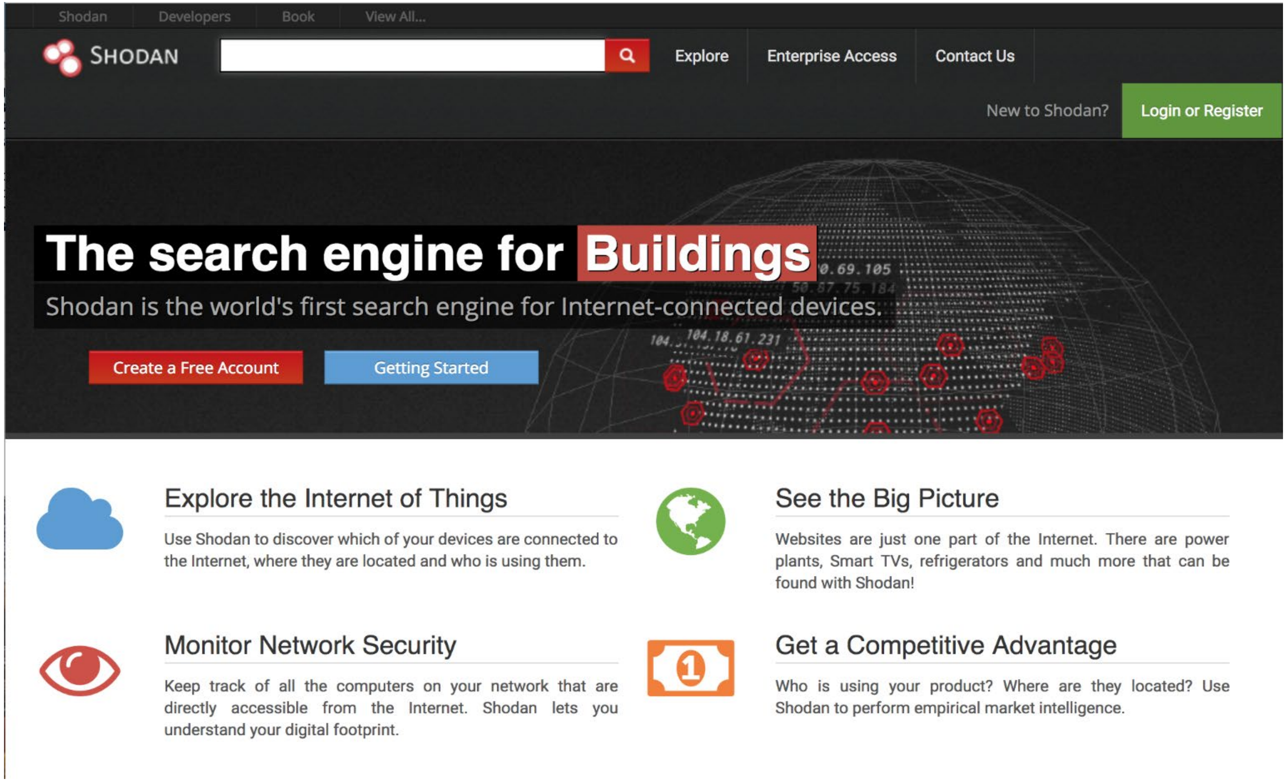


BGP Ranking

There is **10401** entries in the list of asns with malicious content. The top 100 is printed on this page.

ASN	Description	Rank	Source(s)
43765	VHOSTER-NET, UA	1.36513671875	BlocklistDeApache, CIArmy, BlocklistDeImap, BlocklistDeMail, BlocklistDeFtp, BlocklistDeSip, RansomwareIpBlockList, DshieldDaily, BlocklistDeStrong, BlocklistDeBots
265914	TRIUNFO SOLUCOES EM	1.2783203125	DshieldDaily, BlocklistDeSsh

Shodan… Not just for pentesters…



The search engine for Buildings

Shodan is the world's first search engine for Internet-connected devices.

Explore the Internet of Things

Use Shodan to discover which of your devices are connected to the Internet, where they are located and who is using them.

See the Big Picture

Websites are just one part of the Internet. There are power plants, Smart TVs, refrigerators and much more that can be found with Shodan!

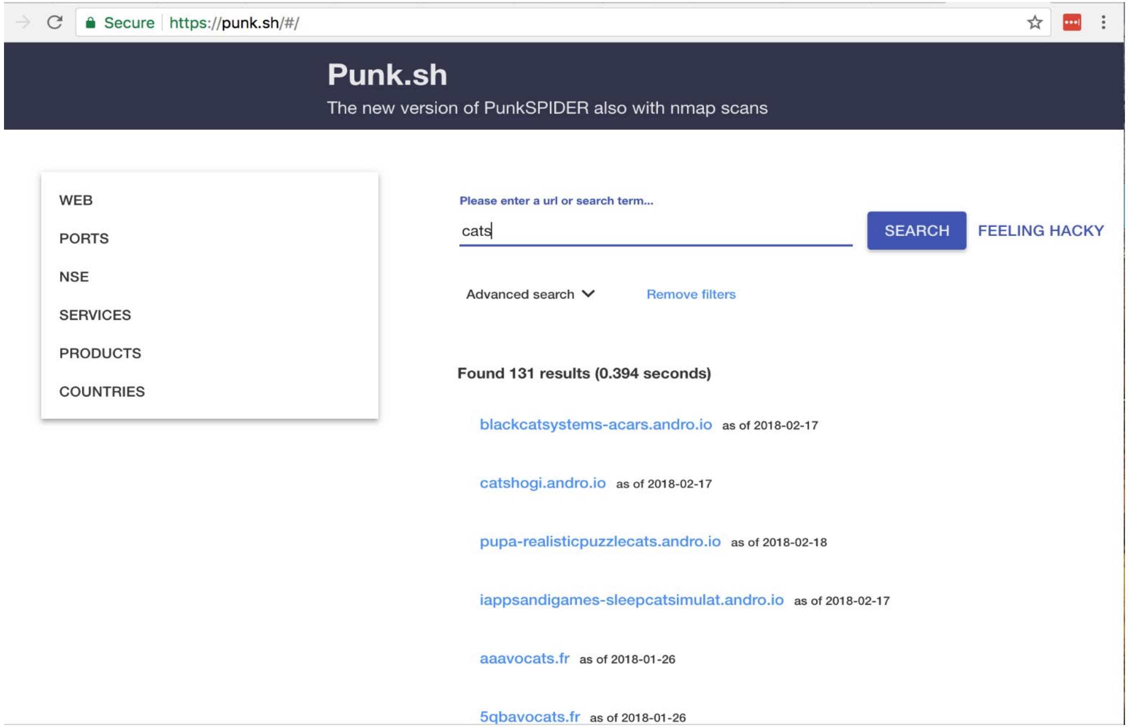
Monitor Network Security

Keep track of all the computers on your network that are directly accessible from the Internet. Shodan lets you understand your digital footprint.

Get a Competitive Advantage

Who is using your product? Where are they located? Use Shodan to perform empirical market intelligence.

PunkSPIDER is back!



Secure https://punk.sh/#/

Punk.sh

The new version of PunkSPIDER also with nmap scans

cats

Found 131 results (0.394 seconds)

blackcatsystems-acars.andro.io as of 2018-02-17

catshogi.andro.io as of 2018-02-17

pupa-realisticpuzzlecats.andro.io as of 2018-02-18

iappsandigames-sleepcatsimulat.andro.io as of 2018-02-17

aaavocats.fr as of 2018-01-26

5qbavocats.fr as of 2018-01-26

Conclusions

- Detecting Command and Control traffic is getting harder and harder
- We released RITA to help detect some of the backdoors we use everyday
- GO GET IT!!!
- There are also a lot of free resources available to research network oddities
- Does require a bit of digging
- Odd != Evil
- Housekeeping is often required!
- Thanks!

BLACK HILLS
Information Security
CELEBRATING 10 YEARS
•2008-2018•

ACTIVE | COUNTERMEASURES

ACTIVE | COUNTERMEASURES