

**DNS** and Flow

**Bulk DNS Analysis** 

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## **DNS** and Flow

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## **Summary**

There is a wealth of information in DNS traffic that can add another dimension to flow analysis. We will explore different techniques to analyze DNS traffic and combine that analysis with flow analysis.

# **DNS** packet format

#### Message Format

Header Question Answer Authority Additional

Header

ID QR OPCODE AAI **TC|RD|RA RCODE QDCOUNT ANCOUNT NSCOUNT ARCOUNT** 

Question

**QNAME QTYPE QCLASS**  Answer, Authority, and Additional

**NAME TYPE CLASS** TTL **RDLENGTH RDATA** 

## **Passive DNS**

Why we want to:

- No additional queries for someone to see

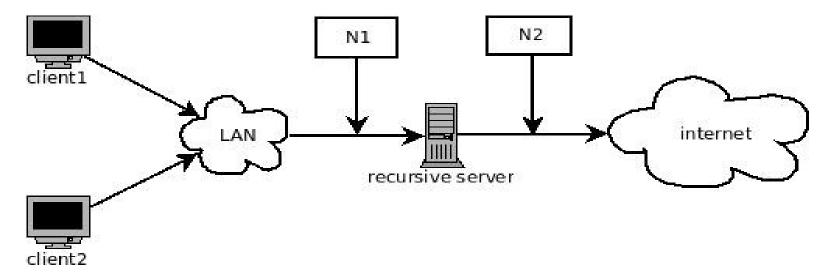
- You see more than you otherwise would

- Can detect things you otherwise couldn't

- You see what machines actually used ...

## **Passive DNS**

#### Why we need to:



Client1: www.goodsite.com, 10.1.2.3 Client 2: www.badsite.com, 10.1.2.3

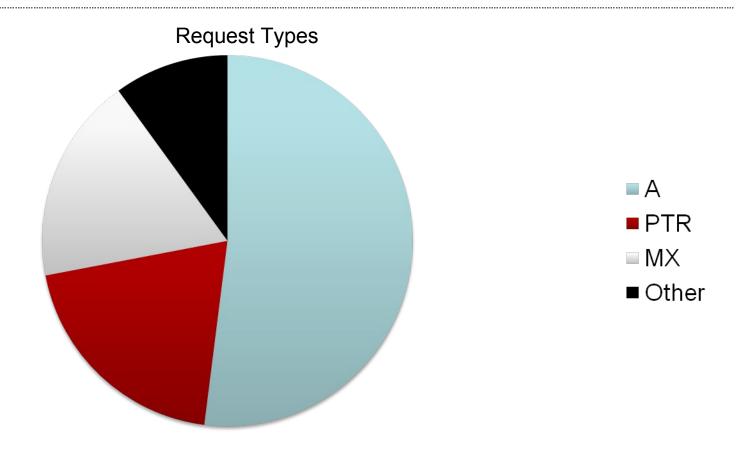
N1: one to one mapping

N2: one to one, one to many, no mapping

## **Our Setup**

- SIE channel 5
  - ~ 260 million packets/day (3100 packets/sec)
  - Represents ~ 370 million packets (de-dup over 4 hours)
  - ~ 200 Bytes/packet
  - ~ 56 GB day raw / ~ 17 GB day with gzip
  - 200,000 msgs per file, ~ 1200 files per day
  - Typical query time between 30 min and 2 hours

# **Traffic Summary**



RBLs account for many millions of A record request per day For certain networks, up to 80% of lookups are to RBLs common RBLs seen: ciphertrust.net, vcxde.com, borderware.com, sonicwall.com, fzrbl.org

## **Fast Flux**

- Lots of IP addresses per one domain name
- Provides better uptime for bad sites
  - Load distribution
  - Hard to trace
  - Hard to takedown
- How to find
  - Iterate over message with
    - Low ttl (less than 2000 seconds)
    - Lots of A records per message (10 or more)
  - Iterate by qname of possible messages
    - Total number of uniq A records/IP addresses (25 or more)
    - Total number of ASNS (20 or more)



## Fast Flux found (10/20/2009,10/23/2009)

brewers-ca.com.til1tlli.net. brewers-ca.com.tll1tlii.com. brewers-ca.com.tll1tlli.net. cadtrans net til 1tlli com cpan.cpanel.net. csajn.com. dessaxzaa.co.uk. diff.cpanel.net. doubleclickr.ru. ffffefvl.co.uk. heiiikuv eu httpupdate.cpanel.net. layer1.cpanel.net. layer2.cpanel.net. mgpra.com. okkkikla.eu. okkkikll.eu. rdate.cpanel.net. rdate.darkorb.net. rrref1aaz.eu. sclrz.com. til1tlli.com. til1tlli.net. tll1tlii.com. tll1tlli.com. tll1tlli.net. ttl1lil.com.

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ttl1lil.net.

ttl1lll.com.

ttl1lll.net.



## **Malicious Domains**

- Registered by bad actor not compromised
- How to find
  - Cheat by starting with list
    - APWG
    - Maybe won't have to
  - Name has large amount of unique characters (over 20)
  - Name has tld in middle (www.yourbank.com.imbad.com)

## **Other**

- DNS exfiltration/tunneling
  - Over 40 uniq chars in qname
- DNS amplification
  - For DDOS participation
- Outbound connections with no previous resolution
- DNS rebinding
  - www.attacker.com -> some.public.ip, ttl = 2
  - www.attacker.com -> 10.1.mydatabase.ip
- Just plain out of the ordinary
  - ns1.ziyouforever.com (zi you men "door to freedom")
    - 784bc3c09961b67b5f3f6f6783a54881b59f5e53680937d7ce281407.6.bnhyj.com
    - 08f0b06a25a5cf1f9df501bc39306fbc6ff7875646817b4845c17da0.6.ewsxz.com



## On with the flow

- How to use results with flow
- Pysilk

```
import ncap
import sdnslib
import silk
ips = silk.IPSet()
f = ncap.ncapfile('/path/to/my/file')
for msq in f:
    dnsmsg = sdnslib.message(msg.payload)
    for rr in dnsmsg.answers:
        ips.add(rr['address'])
ips.save('/path/to/my/ip.set')
```

## IPs to names

```
import ncap
import sdnslib
import silk
lookup = {}
for msg in ncap.ncapfile('/path/to/my/file.ncap')
    dnsmsg = sdnslib.message(msg.payload)
    for rr in dnsmsg.answers:
        lookup[rr['name']] = rr['address']
for rec in silk.SilkFile('/path/to/my/file.rw')
    print lookup[rec.dip]
```