DNS and Flow

Bulk DNS Analysis

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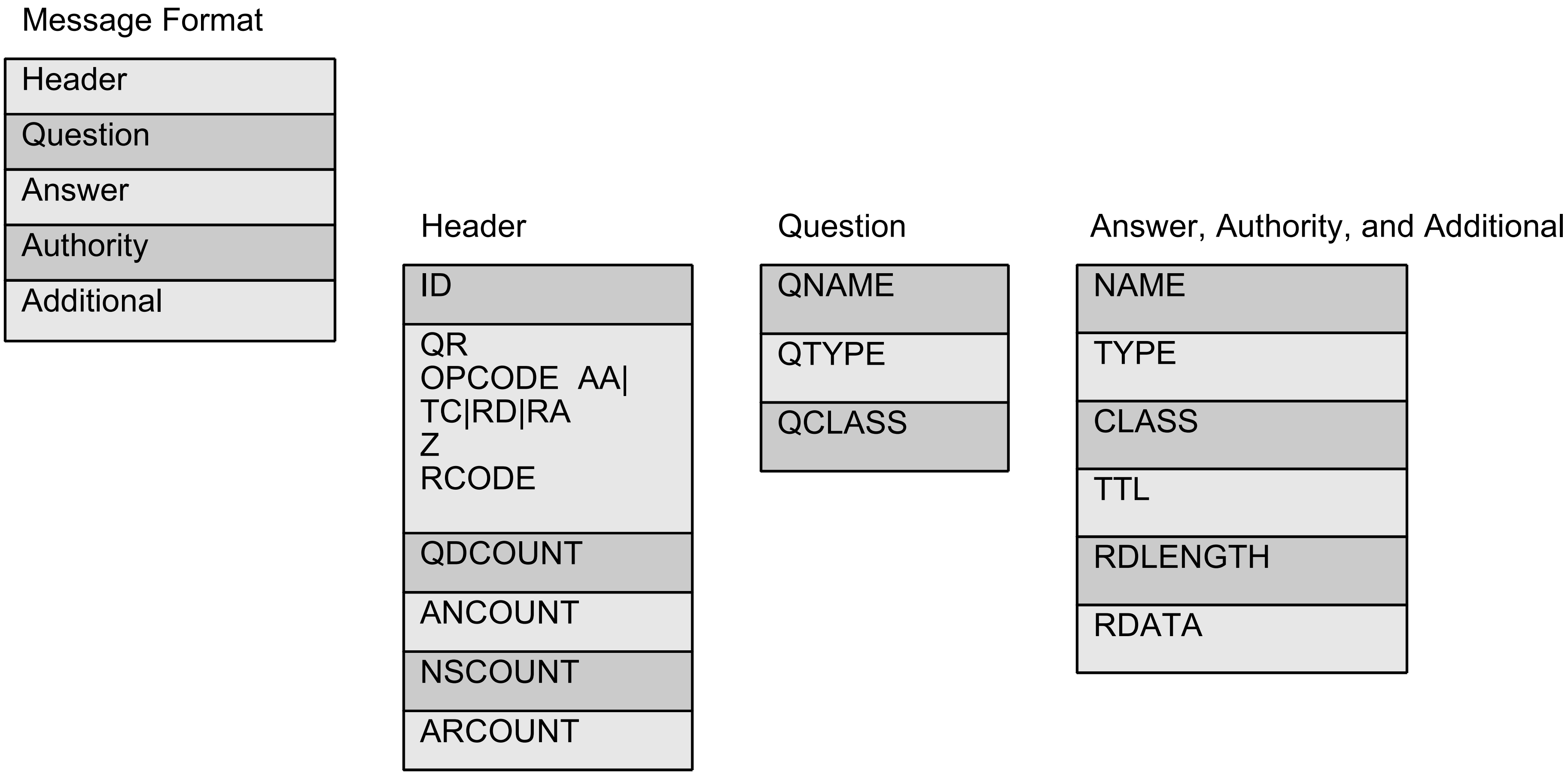
DNS and Flow

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 AA| TC|RD|RA Z RCODE
QDCOUNT
ANCOUNT
NSCOUNT
ARCOUNT

Question
QNAME
QTYPE
QCLASS

Answer, Authority, and Additional
NAME
TYPE
CLASS
TTL
RDLENGTH
RDATA

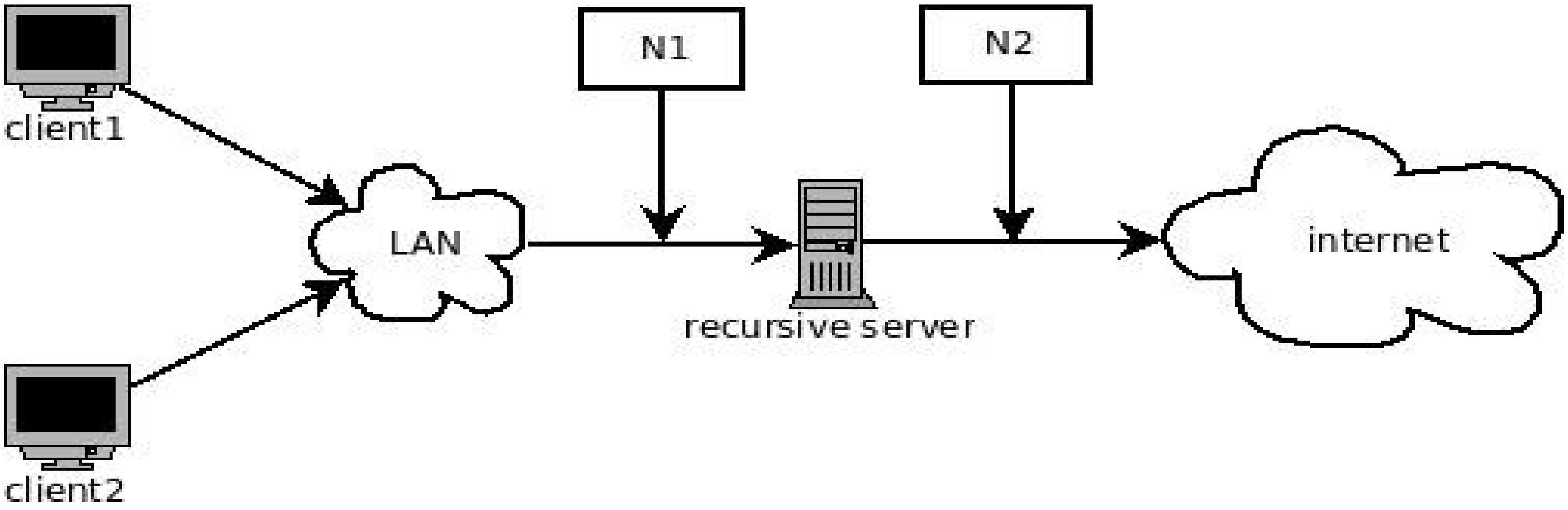
Passive DNS

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

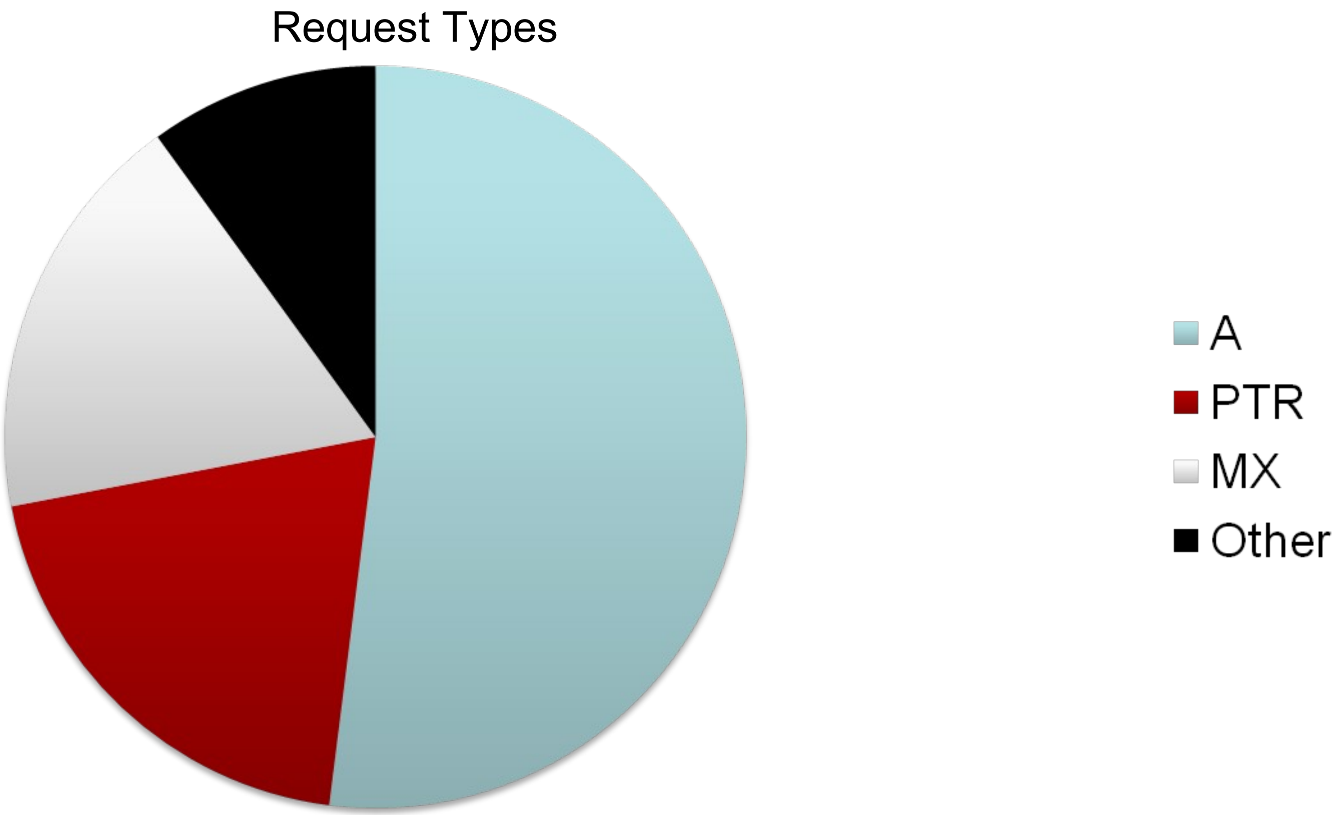
N1: one to one mapping

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.til1tlli.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.
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update.microsoft.com.ujihkoi.eu.
update.microsoft.com.ujihkui.eu.
updates.cpanel.net.
www.adbnr.ru.
www.ads-t.ru.
www.adsyndication.ru.
www.adtcp.ru.
www.bannerdriven.ru.
www.bannert.ru.
www.clickmeter.ru.
www.doublebanner.ru.
www.doubleclickr.ru.
www.htmlads.ru.
www.posteonline.it.sclrz.com.
www.yahoosite.ru.
yahoosite.ru.
ztrblg.com.

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 msg 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]
```