

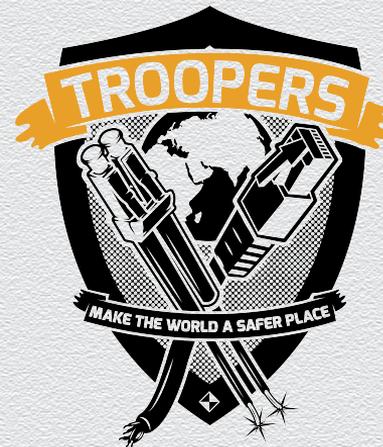
Managing Security Incidents in an IPv6 World

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Topics For Today

- ◆ Introduction and Background
- ◆ Anatomy of Security Incident
- ◆ How Does IPv6 Impact Incident Handling
- ◆ Lets Take a Look at Passive DNS
- ◆ Where Do We Go From Here



Introduction and Background

A Little Background – Merike Kaeo

- ◆ Work History

- ◆ National Institute of Health (1988-1993)
- ◆ Cisco (1993-2000)
- ◆ Double Shot Security (2000-2012)

- ◆ Industry Recognition

- ◆ Authored “Designing Network Security” by Cisco Press (1999 / 2003)
- ◆ Active Contributor to IETF Standards
- ◆ IPv6 Forum Fellow since 2007
- ◆ Member of FCC CSRIC III (Botnet Remediation) and FCC CSRIC IV (DNS/Routing)





Anatomy of Security Incidents

Incident Response

- ◆ It is always best to have a plan in place before something bad happens
- ◆ DO NOT PANIC!
- ◆ If you set appropriate guidelines now, it will make things a lot easier when a security incident happens



Create a checklist that can be followed when a significant security incident does occur!!

Security Incident Lifecycle

POST MORTEM

- What was done?
- Can anything be done to prevent it?
- How can it be less painful in the future?

PREPARATION

- Prepare the network
- Create tools
- Test tools
- Prepare procedures
- Train team
- Practice

IDENTIFICATION

- How do you know about the attack?
- What tools can you use?
- What's your process for communication?

RECOVERY

- What options do you have to remedy?
- Which option is the best under the circumstances?

ERADICATION

- Where is the attack coming from?
- Where and how is it affecting the network?

CONTAINMENT

- What kind of attack is it?

Most Common Threats and Attacks

- ◆ Unauthorized access – insecure hosts, cracking
- ◆ Eavesdropping a transmission – access to the medium
 - ◆ Looking for passwords, credit card numbers, or business secrets
- ◆ Hijacking, or taking over a communication
 - ◆ Inspect and modify any data being transmitted
- ◆ IP spoofing, or faking network addresses
 - ◆ Impersonate to fool access control mechanisms
 - ◆ Redirect connections to a fake server
- ◆ DOS attacks
 - ◆ Interruption of service due to system destruction or using up all available system resources for the service (CPU, memory, bandwidth)

Examples of Sophisticated Attacks

- ◆ DNS Changer
 - ◆ Install malware on PCs and MACs, changes the DNS, and tries to reconfigure the home gateway's DNS.
 - ◆ Point the DNS configurations to DNS resolvers in specific address blocks and use it for their criminal enterprise.
- ◆ BroBot DDoS
 - ◆ Computers linked to high-bandwidth websites and web-hosting data centers compromised mostly thru outdated versions of Joomla, WordPress and cPanel applications.
 - ◆ Then near-invisible code is embedded onto these hosts into the extensions' HTML
- ◆ DNS Amplification DDoS
 - ◆ Utilize forged (spoofed) traffic and unmanaged open recursive resolvers to launch large bandwidth attacks



How does IPv6 Impact Incident Handling?

Does Operations Understand IPv6?

- ◆ It **is** similar to IPv4.....but NOT 😊 [Training is Important!!]
- ◆ IPv4 and IPv6 interface addressing nuances
 - ◆ Which IPv6 address used to source traffic?
 - ◆ When is IPv4 address used vs IPv6 address for a dual-stacked host?
 - ◆ Where are special transition addresses used?
- ◆ More IPv6 nuances
 - ◆ Every mobile device is a /64
 - ◆ Extension headers
 - ◆ Path MTU Discovery
 - ◆ Fragmentation

Required Host IPv6 Addresses

- ◆ Each host must assign the following addresses to identify itself:
 - ◆ Its link-local address for each interface
 - ◆ Any assigned unicast addresses
 - ◆ The loopback address
 - ◆ The all-nodes multicast address
 - ◆ Solicited-node multicast address for each assigned unicast or anycast address
 - ◆ Multicast addresses for all other group memberships

Sample MacOS Interface

Tidal-Wave:~ merike\$ ifconfig

lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384

inet 127.0.0.1 netmask 0xff000000

inet6 ::1 prefixlen 128

inet6 fe80::1%lo0 prefixlen 64 scopeid 0x1

gif0: flags=8010<POINTOPOINT,MULTICAST> mtu 1280

stf0: flags=0<> mtu 1280

en0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500

inet 71.39.132.244 netmask 0xfffffff8 broadcast 71.39.132.247

inet6 fe80::20d:93ff:fe2f:554c%en0 prefixlen 64 scopeid 0x4

inet6 2001:440:1880:5001:20d:93ff:fe2f:554c prefixlen 64 autoconf

ether 00:0d:93:2f:55:4c

media: autoselect (10baseT/UTP <half-duplex>) status: active

Mac OSX Interface Today.....

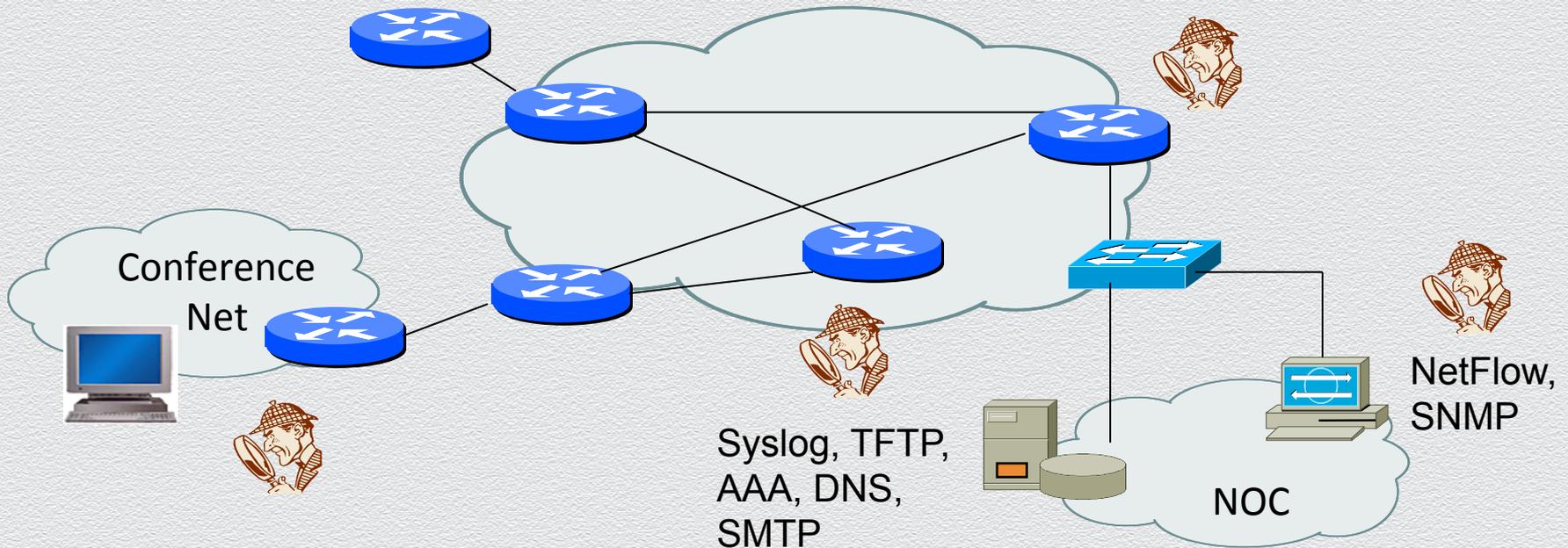
```
Merikes-MacBook-Air:~ merike$ ifconfig
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
    options=3<RXCSUM,TXCSUM>
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x1
    inet 127.0.0.1 netmask 0xff000000
    inet6 ::1 prefixlen 128
gif0: flags=8010<POINTOPOINT,MULTICAST> mtu 1280
stf0: flags=0<> mtu 1280
en0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    ether 94:94:26:04:cc:f2
    inet6 fe80::9694:26ff:fe04:ccf2%en0 prefixlen 64 scopeid 0x4
    inet6 2a02:8071:f00:64:9694:26ff:fe04:ccf2 prefixlen 64 autoconf
    inet6 2a02:8071:f00:64:14f3:a9a6:60d5:a7d4 prefixlen 64 autoconf temporary
    inet 169.254.25.203 netmask 0xffff0000 broadcast 169.254.255.255
    media: autoselect
    status: active
p2p0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 2304
    ether 06:94:26:04:cc:f2
    media: autoselect
    status: inactive
Merikes-MacBook-Air:~ merike$ □
```

IPv6 Reserved Addresses (RFC 6890)

Description	Network
unspecified	:: /128
loopback	::1 /128
IPv4-IPv6 Translation address	64::ff9b::/96
IPv4-compatible IPv6 address	::/96
IPv4-mapped IPv6 address	::ffff:0:0/96
discard-only prefix	100::/64
TEREDO	2001::/32
benchmarking	2001:2::/48
ORCHID	2001:10::/28
6to4	2002::/16
reserved	::/8
unique-local address	fc00::/7
multicast address	ff00::/8
documentation addresses	2001:db8::/32

Can You Listen to the Network using IPv4 / IPv6 ?

- ◆ Sources (data collection points)
- ◆ Protocols to use for data collection
- ◆ Tools used to collect data



Fundamental Applications and Tools

- ◆ Preparation / Identification
 - ◆ SNMP
 - ◆ Netflow / sFlow / IPFIX
 - ◆ Syslog or other application based logs
 - ◆ TACACS / RADIUS
- ◆ Investigation
 - ◆ Ping / Traceroute / DIG / WHOIS / pDNS
- ◆ Containment / Eradication
 - ◆ Route and Packet Filtering
 - ◆ Blacklists (i.e. SPAM or Domains)

SNMP

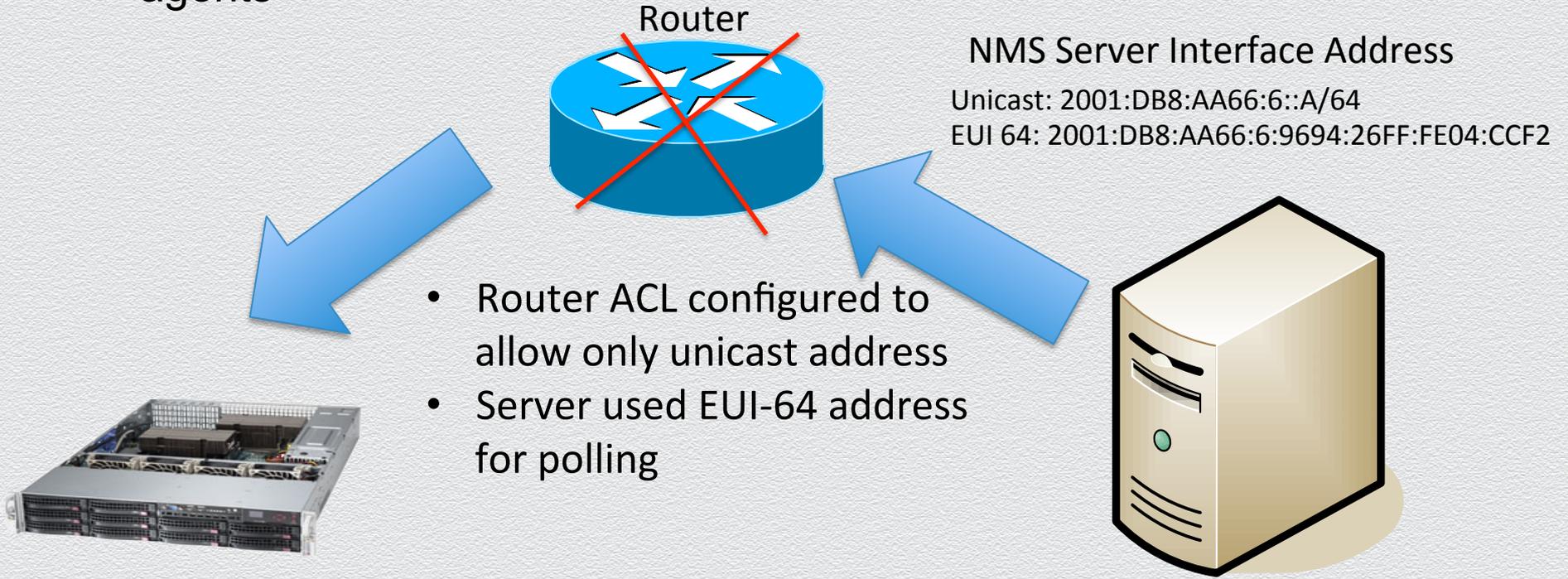
- ◆ Status of MIBs (are IPv6 MIBs implemented?)
 - ◆ IP Protocol Version Independent MIBs make IPv6-specific MIBs obsolete
 - ◆ RFC 4292 (IP Forwarding Table MIB) / RFC 4293 (MIB for the IP)
- ◆ Transport Issue (can communication use IPv6?)
 - ◆ Agent to Collector
 - ◆ Collector to Viewer
- ◆ Viewers / Tools (do they support IPv6?)

SNMP Walk Syntax

- ◆ It is different from IPv4
 - ◆ For IPv4 you only use the IP address of device
 - ◆ For IPv6 you need to enter “udp6:[<IPv6 Address>]”
 - ◆ In some cases you also need to specify the port number
 - ◆ You may also need to configure transport specific variables
 - ◆ (i.e. Rcommunity6 public)
- ◆ Examples:
 - ◆ `snmpset -v 1 -c private "udp6:[<ipv6 address here>]:161" 1.3.6.1.4.1.318.1.1.26.4.4.1.4.1 i 7`
 - ◆ `snmpwalk -v 2c -c public udp6:[fe80::10] iso.org.dod.internet.2.1.1.5.0 SNMPv2-MIB::sysName.0 = STRING: CiscoRouter`

SNMP and Addressing

- ◆ Know what IP address is being used by an SNMP server to poll the agents



NetFlow

- ◆ Must use Netflow-v9 to get IPv6 information
- ◆ Does netflow collect both IPv4 and IPv6 traffic?
 - ◆ Might depend on specific implementation
 - ◆ *NetFlow Analyzer by default give priority to ipv4 information. NetFlow Analyzer do not support flow export with both ipv4 and ipv6 data exported at the same time from an source device. (<https://forums.manageengine.com/topic/problems-with-flexible-netflow-ipv6-and-qos>)*
- ◆ Do netflow tools correlate between IPv4 and IPv6 traffic?
 - ◆ Are separate tables created for the different transports?

What Are Transition Mechanism Implications?



Client

Request IP address for a domain name



Does it return IPv4 or IPv6 ?

- Happy Eyeballs
- DNS64



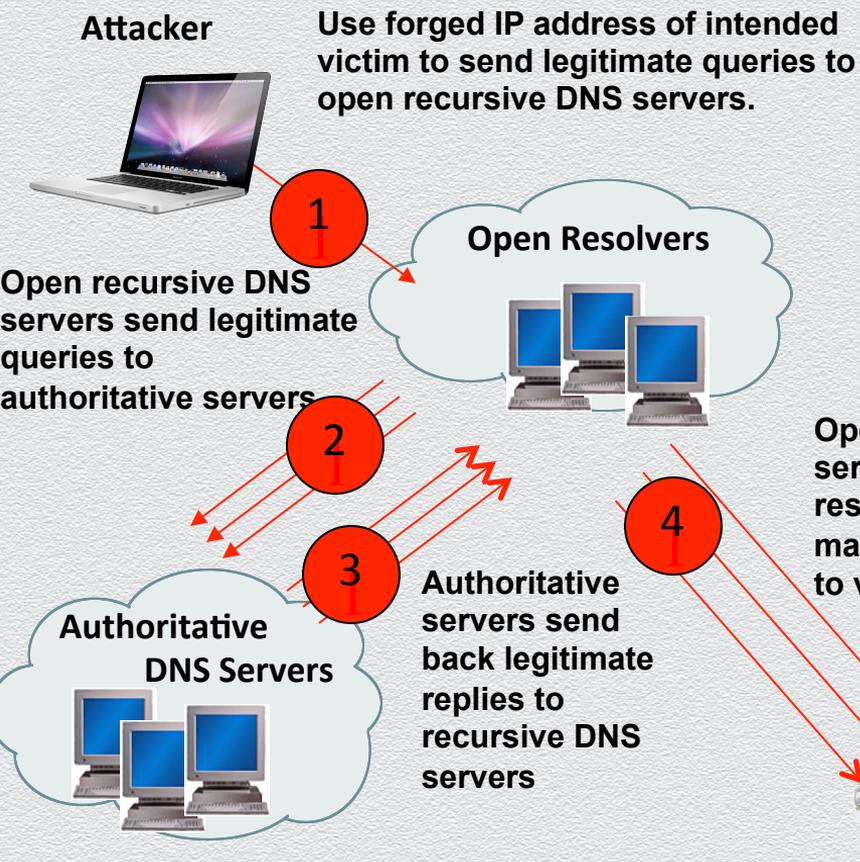
DNS Server

Growing Trends in DDoS

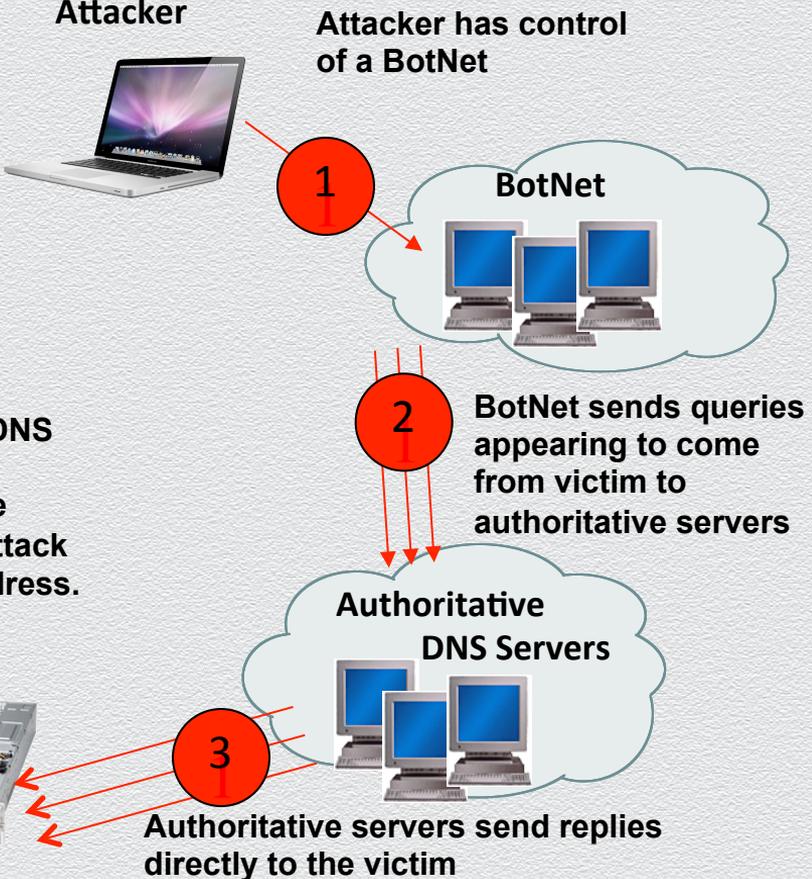
- ◆ Reflective DDoS attacks use *spoofed IP addresses* of legitimate users
- ◆ Combining spoofed addresses with legitimate protocol use makes mitigation extremely difficult – what do you block and where?
- ◆ Recent trends have been utilizing DNS as attack vector since it is a fundamentally used Internet technology
- ◆ Utilize resources of large hosting providers for added attack bandwidth
- ◆ Many other Internet protocols also susceptible

DNS Amplification Attacks Utilizing Forged (Spoofed) IP Addresses

Abusing Open Recursive DNS Servers

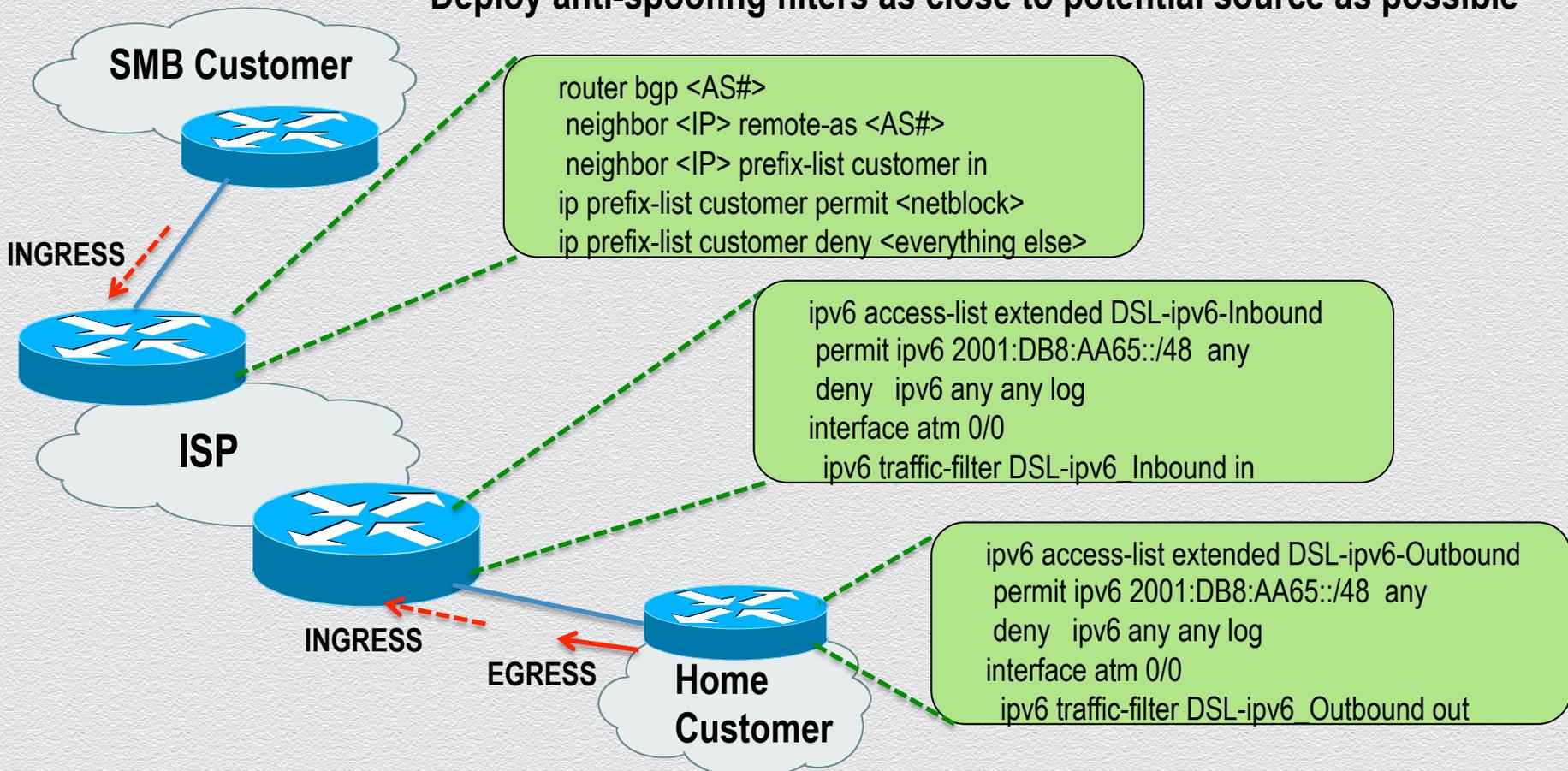


Abusing Authoritative DNS Servers



Help Mitigate DDoS: Ingress/Egress Filters

Deploy anti-spoofing filters as close to potential source as possible





**Let's Take A Look At
Passive DNS**

What is Passive DNS

- ◆ Passive DNS replication is a technology invented in 2004 by Florian Weimer
 - ◆ Many uses!
 - ◆ Malware, e-crime, legitimate Internet services all use the DNS
- ◆ Inter-server DNS messages are captured by sensors and forwarded to a collection point for analysis.
- ◆ After being processed, individual DNS records are stored in a database

Passive DNS and Privacy



Client 1

DNS Resolver

Q1: what is IP address of www.nsrc.org ?

Q2: what is IP address of authoritative server for .org?

Authoritative ROOT

R2: IP address of authoritative server for .org

Q3: what is IP address for authoritative server for .nsrc

Authoritative ORG

R3: IP address of authoritative server for nsrc.org

Q4: what is IP address for authoritative server for www

Authoritative NSRC

R4: IP address of authoritative server for www.nsrc.org

R1: IP address of www.nsrc.org



Client 2

Q5: what is IP address of www.nsrc.org ?

R5: IP address of www.nsrc.org



Passive DNS Sensor

Q2, R2, Q3, R3, Q4, R4



Collector

Questions that can be answered using pDNS

- ◆ Where did this domain name point to in the past?
- ◆ What domain names are hosted by a given nameserver?
- ◆ What domain names point into a given IP network?
- ◆ What subdomains exist below a certain domain name?
- ◆ What new names are hosted in ccTLDs?

Passive DNS – Tool to Find the Badness

[<https://www.dnsdb.info/>]

balliwick	oquclyedi.com.
first seen	2010-11-24 18:09:45 -0000
last seen	2010-11-25 09:52:03 -0000
oquclyedi.com.	A 213.55.114.132
balliwick	com.
first seen	2010-11-15 02:47:01 -0000
last seen	2010-11-26 02:07:10 -0000
first seen in zone file	2010-11-15 17:09:22 -0000
last seen in zone file	2010-11-24 17:09:28 -0000
oquclyedi.com.	NS ns1.gvghi.ru.
oquclyedi.com.	NS ns2.justecosy.com.
balliwick	com.
first seen in zone file	2010-11-14 17:09:22 -0000
last seen in zone file	2010-11-14 17:09:22 -0000
oquclyedi.com.	NS ns3.lerelaisinternet.com.
oquclyedi.com.	NS ns4.lerelaisinternet.com.
balliwick	oquclyedi.com.
first seen	2010-11-16 02:24:21 -0000
last seen	2010-11-25 12:16:08 -0000
oquclyedi.com.	NS ns1.oquclyedi.com.
oquclyedi.com.	NS ns2.oquclyedi.com.

balliwick	gvghi.ru.
first seen	2010-11-22 03:43:04 -0000
last seen	2010-11-23 13:44:15 -0000
ns1.gvghi.ru.	A 60.191.103.66
balliwick	gvghi.ru.
first seen	2010-11-18 15:54:49 -0000
last seen	2010-11-22 03:31:24 -0000
ns1.gvghi.ru.	A 190.86.101.171
balliwick	gvghi.ru.
first seen	2010-11-11 03:12:45 -0000
last seen	2010-11-18 15:42:32 -0000
ns1.gvghi.ru.	A 201.147.145.254
balliwick	gvghi.ru.
first seen	2010-11-23 13:53:07 -0000
last seen	2010-11-25 11:12:16 -0000
ns1.gvghi.ru.	A 218.67.78.181

Rdata results for ANY/218.67.78.181

Found 4700 RRs in 1.12 seconds.

ns2.tabletpilldrug.net.	A	218.67.78.181
a9y.ru.	A	218.67.78.181
atlanticmedsrx.net.	A	218.67.78.181
enclavedirect.com.	A	218.67.78.181
grandrxpills.com.	A	218.67.78.181
justecosy.com.	A	218.67.78.181
location-site.com.	A	218.67.78.181
mail.c3o.ru.	A	218.67.78.181
mail.usualworld.com.	A	218.67.78.181
maternitybuydirect.com.	A	218.67.78.181
medrxpills.net.	A	218.67.78.181
ns1.alternativehealthrx.net.	A	218.67.78.181
ns1.badsguide.com.	A	218.67.78.181
ns1.bafac.ru.	A	218.67.78.181
ns1.bafad.ru.	A	218.67.78.181
ns1.bafaf.ru.	A	218.67.78.181
ns1.bafag.ru.	A	218.67.78.181
ns1.bafaj.ru.	A	218.67.78.181
ns1.bafal.ru.	A	218.67.78.181
ns1.bafap.ru.	A	218.67.78.181
ns1.bafar.ru.	A	218.67.78.181
ns1.bafaw.ru.	A	218.67.78.181

Rdata results for ANY/213.55.114.132

Found 10000 RRs in 1.65 seconds.

01jvahvdjz.curibeudo.com.	A	213.55.114.132
0ck37mfnfw.hattytysi.com.	A	213.55.114.132
0dnk1o6x6r.drinekage.com.	A	213.55.114.132
0dzt3uv24r.cyzpcoeko.com.	A	213.55.114.132
0gtnu.mas.bayhealthmedicine.ru.	A	213.55.114.132
0hfvvthw23.curibeudo.com.	A	213.55.114.132
0pt7ydrop.edfaasaven.com.	A	213.55.114.132
0qzufc10tx.curibeudo.com.	A	213.55.114.132
0q1foqngwa.drinekage.com.	A	213.55.114.132
0iffb1kt5.hattytysi.com.	A	213.55.114.132
0xciuej10t.syzpcoeko.com.	A	213.55.114.132
0zu54sln0n.azernauke.com.	A	213.55.114.132
10004.buvaisklo.com.	A	213.55.114.132
10004.lekpoeha.com.	A	213.55.114.132
10005.nrukixbys.com.	A	213.55.114.132
1000shop.myralfiah.com.	A	213.55.114.132
1001shop.myralfiah.com.	A	213.55.114.132
1003shop.myralfiah.com.	A	213.55.114.132
10061.psyatlin.com.	A	213.55.114.132
10064.adevrecos.com.	A	213.55.114.132
100675.drugeshop.com.	A	213.55.114.132
10089.kleobdole.com.	A	213.55.114.132
1009.muyveqval.com.	A	213.55.114.132

Criminal Domain Names found via the bad A Record

Criminal Domain Names found via the bad Name Server

Zeus hunting (fast-flux)

abuse.ch ZeuS Tracker

Home | FAQ | ZeuS Blocklist | ZeuS Tracker | Removals | ZTDNS

Zeus Tracker :: C&C indingo.ru

The list below shows all ZeuS configs, ZeuS binaries, ZeuS dropzones and I

Live Information

ZeuS C&C: **indingo.ru**

Additional Note: Hosted on a FastFlux botnet - ZeuS Tracker provides

A record	TTL	Spamhaus SB
125.88.110.49	300	LISTED
60.19.30.134	300	LISTED
60.19.30.135	300	LISTED
61.197.232.43	300	Not listed
67.209.65.212	300	Not listed

Level: 5 (Hosted on a FastFlux botnet)

Sponsoring registrar: [REGRU-REG-RIPN](#)

Nameserver(s): [ns1.freetqp.net](#) | [ns2.freetqp.net](#)

Date added: 2011-09-04

Last checked: 2011-09-05

Last updated: never

BL status: This host is being published on the [ZeuS Blocklist!](#)

RRset results for **indingo.ru/A**

Found 275 RRsets in 0.05 seconds.

bailiwick	indingo.ru.
count	93
first seen	2011-09-02 01:30:37 -0C
last seen	2011-09-04 03:47:38 -0C
indingo.ru.	A 60.19.30.134
indingo.ru.	A 60.19.30.135
indingo.ru.	A 61.197.232.43
indingo.ru.	A 63.226.215.202
indingo.ru.	A 78.126.200.105

bailiwick **indingo.ru.**

count 15

first seen 2011-09-02 12:26:03 -0C

last seen 2011-09-05 00:03:46 -0C

indingo.ru.	A 60.19.30.134
indingo.ru.	A 60.19.30.135
indingo.ru.	A 61.197.232.43
indingo.ru.	A 63.226.215.202
indingo.ru.	A 113.161.87.176

bailiwick **indingo.ru.**

count 119

first seen 2011-09-02 03:26:53 -0000

last seen 2011-09-05 13:18:36 -0000

indingo.ru.	A 60.19.30.134
indingo.ru.	A 60.19.30.135
indingo.ru.	A 61.197.232.43
indingo.ru.	A 63.226.215.202
indingo.ru.	A 125.88.110.49

Rdata results for **ANY/63.226.215.202**

Found 28 RRs in 0.07 seconds.

asfun.ru.	A 63.226.215.202
coolsofa.ru.	A 63.226.215.202
cutesin.ru.	A 63.226.215.202
earlyship.ru.	A 63.226.215.202
ebaliu.com.	A 63.226.215.202
eepeohe.ru.	A 63.226.215.202
greatjazz.ru.	A 63.226.215.202
indingo.ru.	A 63.226.215.202
itchysauce.ru.	A 63.226.215.202
jupaizeuph.ru.	A 63.226.215.202
krufop.com.	A 63.226.215.202
lamewire.ru.	A 63.226.215.202
munaeghozh.ru.	A 63.226.215.202
nahwisohch.ru.	A 63.226.215.202
one5xz7rf6fb6lafyh.com.	A 63.226.215.202
paperrain.net.	A 63.226.215.202
secondconcert.ru.	A 63.226.215.202
toplake.ru.	A 63.226.215.202

Could have AAAA records but haven't found any (YET!)

... more domains
... more IP resources

Let's look at SPAM

mitarisladjana@sladja.in.rs 

To: undisclosed-recipients;;
Stolen childhood

March 15, 2015 7:10 AM
[Hide Details](#)

49 Attachments, 6.9 MB Save ▾ Quick Look

<http://www.dnevnik.rs/vojvodina/devetnaestogodisnjaku-iz-siriga-za-operaciju-potrebno-2100-evra>

<http://www.srbijadanas.com/clanak/budimo-humani-dajmo-mitru-sansu-za-zivot-18-08-2014>

<http://www.telegraf.rs/vesti/907088-pomozimo-mitru-da-ostvari-svoj-san-da-prohoda-video>

<http://www.nsonline.rs/malom-mitru-potrebno-2-300-evra-za-operaciju/>

Let's see what we can find from one of those domains in a pDNS Database:

www.srbijadanas.com

DNSDB Results:

DNSDB Search

Search mode: RRset Rdata

Record type: ANY

Domain name:

Bailiwick:

Search

Reset

RRset results for [www.srbijadanas.com/ANY](#)

Returned 8 RRsets in 0.04 seconds.

```
bailiwick      srbijadanas.com.
count          4
first seen     2010-09-22 05:04:14 -0000
last seen      2012-10-13 07:07:18 -0000
www.srbijadanas.com. A 74.117.222.24
```

```
bailiwick      srbijadanas.com.
count          7
first seen     2013-02-11 16:16:47 -0000
last seen      2013-04-29 13:19:44 -0000
www.srbijadanas.com. A 107.20.206.69
```

```
bailiwick      srbijadanas.com.
count          3
first seen     2012-03-27 11:42:57 -0000
last seen      2012-05-21 00:38:37 -0000
www.srbijadanas.com. A 173.212.56.174
```

```
bailiwick      srbijadanas.com.
count          1
first seen     2012-07-22 06:18:37 -0000
last seen      2012-07-22 06:18:37 -0000
www.srbijadanas.com. A 173.212.56.221
```

```
bailiwick      srbijadanas.com.
count          6
first seen     2012-01-07 07:34:17 -0
last seen      2012-03-07 19:35:07 -0
www.srbijadanas.com. A 173.212.56.230
```

```
bailiwick      srbijadanas.com.
count          18
first seen     2011-01-10 03:30:46 -0000
last seen      2011-09-06 05:31:46 -0000
www.srbijadanas.com. A 207.44.234.87
```

```
bailiwick      srbijadanas.com.
count          97413
first seen     2014-01-19 18:36:08 -0000
last seen      2015-03-15 21:24:54 -0000
www.srbijadanas.com. CNAME srbijadanas.com.
```

```
bailiwick      srbijadanas.com.
count          2
first seen     2010-09-15 02:58:01 -0000
last seen      2010-09-15 02:58:01 -0000
www.srbijadanas.com. AAAA ::ffff:74.117.222.24
```

This is interesting!!

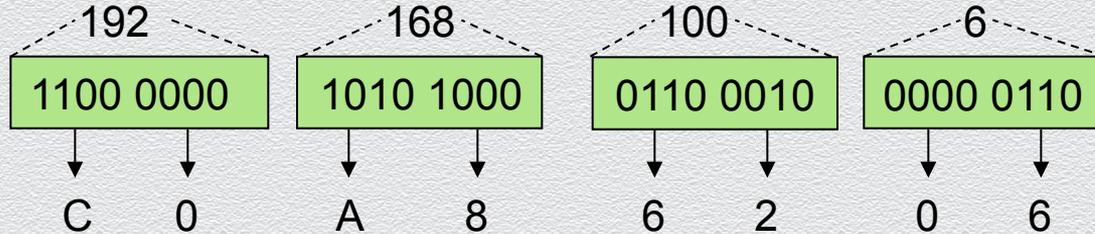


IPv4-Mapped Addresses



0:0:0:0:0:FFFF:192.168.100.6 → ::FFFF:C0A8:6206

XXXX XXXX : XXXX XXXX : XXXX XXXX : XXXX XXXX



An IPv4-mapped address should not be seen on the global Internet!!

Find Associated Domains [IPv4]:

DNSDB Search

Search mode: RRset Rdata

Record type: ANY []

Record data:

Input mode: Name IP or network Raw hex

✖ Rdata results for **ANY/74.117.222.24** [🔗](#)

Returned 10000 RRs in 0.55 seconds.

ftp.aglo.be.	A	74.117.222.24
gftu.be.	A	74.117.222.24
cdn1.gftu.be.	A	74.117.222.24
livetv.be.	A	74.117.222.24
fieldturf.be.	A	74.117.222.24
bizztelecom.be.	A	74.117.222.24
nouslesgens.be.	A	74.117.222.24
www.nouslesgens.be.	A	74.117.222.24
themadhatter.be.	A	74.117.222.24
universalpeace.be.	A	74.117.222.24

TODAY'S TREND

- Most all malicious domains utilize A records although these could be legitimate
- Many AAAA records associated with legitimate domains

Find Associated Domains [IPv6]:

DNSDB Search

Search mode: RRset Rdata

Record type: ANY

Record data:

Input mode: Name IP or network Raw hex

Search

Reset

✓ ✗ Rdata results for **ANY/::FFFF:74.117.222.24**

Returned 10000 RRs in 0.64 seconds.

gftu.be.	AAAA	::ffff:74.117.222.24
cdn1.gftu.be.	AAAA	::ffff:74.117.222.24
bizztelecom.be.	AAAA	::ffff:74.117.222.24
www.d4d.cc.	AAAA	::ffff:74.117.222.24
ota.cc.	AAAA	::ffff:74.117.222.24
cuck.cc.	AAAA	::ffff:74.117.222.24
video.isik.cc.	AAAA	::ffff:74.117.222.24
www.ipad2.cc.	AAAA	::ffff:74.117.222.24
ns1.lanno.cc.	AAAA	::ffff:74.117.222.24
ns2.lanno.cc.	AAAA	::ffff:74.117.222.24
csharp.cc.	AAAA	::ffff:74.117.222.24

✓ ✗ RRset results for **bizztelecom.be/ANY**

Returned 3 RRsets in 0.09 seconds.

bailliwik **bizztelecom.be.**
count 5
first seen 2014-10-30 11:25:52 -0000
last seen 2015-03-13 18:33:14 -0000
bizztelecom.be. A 74.117.222.24

bailliwik **be.**
count 7
first seen 2014-10-30 11:25:51 -0000
last seen 2015-03-13 18:33:13 -0000
bizztelecom.be. NS expired-domain-ns50.directnic.com.
bizztelecom.be. NS expired-domain-ns51.directnic.com.

bailliwik **bizztelecom.be.**
count 2
first seen 2015-03-05 15:14:52 -0000
last seen 2015-03-05 15:14:52 -0000
bizztelecom.be. AAAA ::ffff:74.117.222.24

Further Investigation...

- ◆ Correlate domains seen in IPv4 and in IPv6
 - ◆ IPv4 and IPv4-mapped addresses both associated with > 10,000 domains
 - ◆ Not all domains are same as seen in IPv4 and IPv6
- ◆ Investigate same domains seen in IPv4 and IPv6
- ◆ Investigate domains seen separately from IPv4 vs IPv6 address
- ◆ Might be legitimate hosting company

Passive DNS can be used to correlate some
IPv4 and IPv6 related information



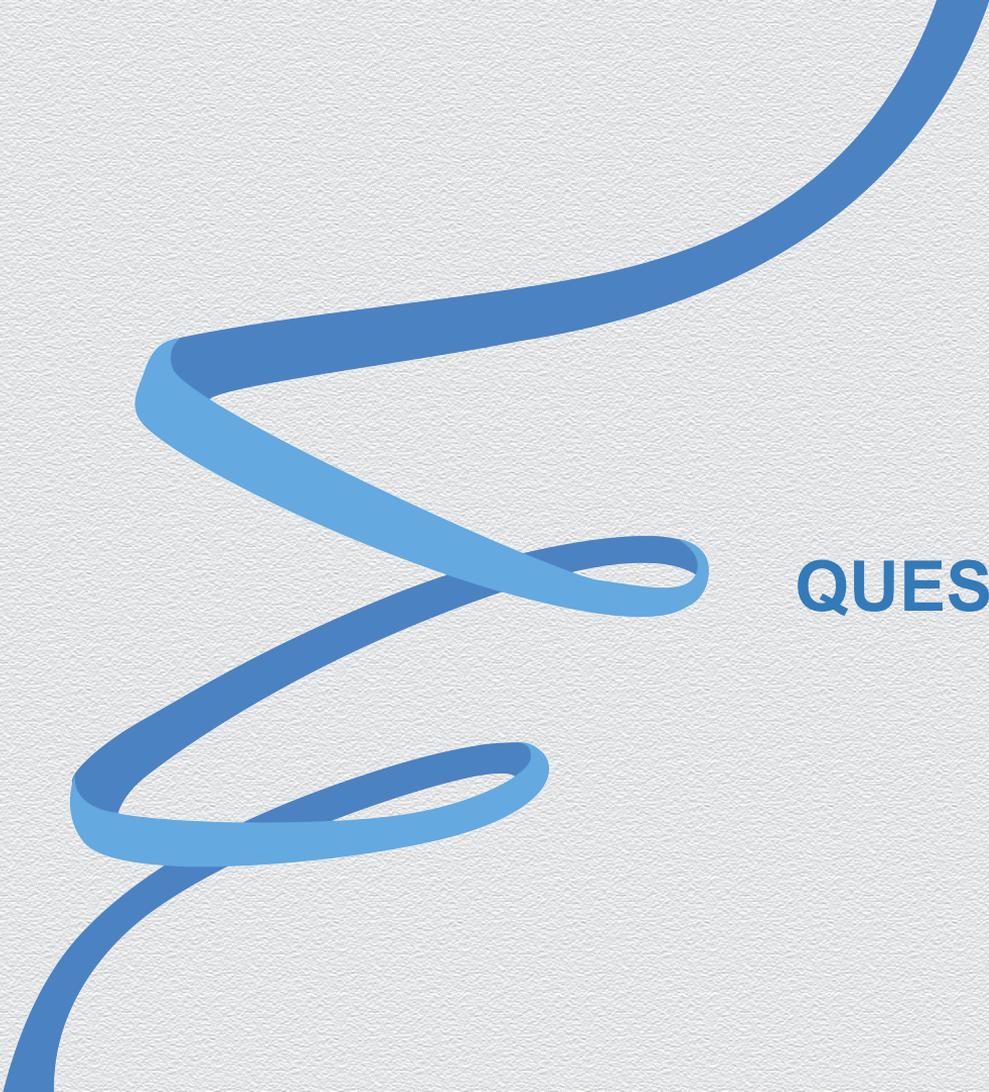
**Where Do We Go
From Here?**

Operational Observations

- ◆ Some IPv6 attacks known but not discussed
- ◆ Recent SMTP over IPv6 discussions where lack of reputation information blocks legitimate traffic that would not be blocked on IPv4
 - ◆ Many folks turn off SMTP use over IPv6 as response
 - ◆ https://www.maawg.com/sites/maawg/files/news/M3AAWG_Inbound_IPv6_Policy_Issues-2014-09.pdf
- ◆ Many IPv6 invalid source addresses observed
 - ◆ https://ripe67.ripe.net/presentations/288-Jen_RIPE67.pdf
 - ◆ How would you tell configuration error from deliberate spoofing?

Trust But Verify....

- ◆ Understand what is able to be monitored for IPv4 and/or IPv6 traffic and know how the traffic patterns can be correlated
- ◆ Test dual-stack and transition technology behavior to know when DNS replies utilize A and/or AAAA records
- ◆ Tools for incident response improving for IPv6 but there is still more improvement needed
 - ◆ Not all management functionality can utilize IPv6 transport
 - ◆ Some networks being built for IPv6 only and are motivating vendors :)
- ◆ Correlation is important!!



QUESTIONS?