Facebook and the GFW of China

Geoff Huston, Byron Ellacott
APNIC

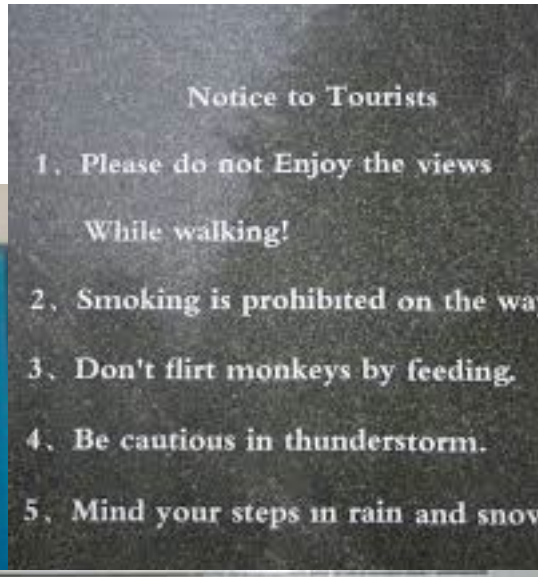
How to get to Facebook…

Step 1. Use the DNS:

```
$ dig +short www.facebook.com
star.c10r.facebook.com.
69.171.229.25
$ dig +short AAAA www.facebook.com
star.c10r.facebook.com.
2a03:2880:10:6f08:face:b00c:0:1
```

Unless, of course, you are in China

Things are different there



Outside

```
$ dig +short www.facebook.com
star.c10r.facebook.com.
69.171.229.25
$ dig +short AAAA www.facebook.com
star.c10r.facebook.com.
2a03:2880:10:6f08:face:b00c:0:1
```

Deep Inside China

```
$ dig +short www.facebook.com
1.1.1.1
$ dig +short AAAA www.facebook.com
2001:da8:112::21ae
```

Outside

```
$ dig +short www.facebook.com
star.c10r.facebook.com.
69.171.229.25
$ dig +short AAAA www.facebook.com
star.c10r.facebook.com.
2a03:2880:10:6f08:face:b00c:0:1
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```

Deep Inside China

```
$ dig +short www.facebook.com
1.1.1.1
$ dig +short AAAA www.facebook.com
2001:da8:112::21ae
```

Who lies behind these addresses?

Lets use whois to find out….

Outside

```
$ whois 69.171.229.25

NetRange:       69.171.224.0 - 69.171.255.255
CIDR:           69.171.224.0/19
OriginAS:       AS32934
NetName:        TFBNET3
NetHandle:      NET-69-171-224-0-1
Parent:         NET-69-0-0-0-0
NetType:        Direct Assignment
RegDate:        2010-08-05
Updated:        2012-02-24
Ref:            http://whois.arin.net/rest/net/
NET-69-171-224-0-1

OrgName:        Facebook, Inc.
OrgId:          THEFA-3
Address:        1601 Willow Rd.
City:           Menlo Park
StateProv:      CA
PostalCode:     94025
Country:        US
RegDate:        2004-08-11
Updated:        2012-04-17
Ref:            http://whois.arin.net/rest/org/THEFA-3

OrgTechHandle: OPERA82-ARIN
OrgTechName:   Operations
OrgTechPhone:  +1-650-543-4800
OrgTechEmail:  noc@fb.com
OrgTechRef:    http://whois.arin.net/rest/poc/OPERA82-ARIN

OrgAbuseHandle: OPERA82-ARIN
OrgAbuseName:   Operations
OrgAbusePhone:  +1-650-543-4800
OrgAbuseEmail:  noc@fb.com
OrgAbuseRef:    http://whois.arin.net/rest/poc/OPERA82-ARIN
```

Deep Inside China

```
$ whois 1.1.1.1

inetnum:        1.1.1.0 - 1.1.1.255
netname:        Debogon-prefix
descr:          APNIC Debogon Project
descr:          APNIC Pty Ltd
country:        AU
admin-c:        AR302-AP
tech-c:         AR302-AP
mnt-by:         APNIC-HM
mnt-routes:     MAINT-AU-APNIC-GM85-AP
mnt-irt:        IRT-APNICRANDNET-AU
status:         ASSIGNED PORTABLE
changed:        hm-changed@apnic.net 20110922
source:         APNIC

irt:            IRT-APNICRANDNET-AU
address:        PO Box 3646
address:        South Brisbane, QLD 4101
address:        Australia
e-mail:         abuse@apnic.net
abuse-mailbox:  abuse@apnic.net
admin-c:        AR302-AP
tech-c:         AR302-AP
mnt-by:         MAINT-AU-APNIC-GM85-AP
changed:        hm-changed@apnic.net 20110922
source:         APNIC

role:           APNIC RESEARCH
```

Outside

```
$ whois 69.171.229.25

NetRange:       69.171.224.0 - 69.171.255.255
CIDR:           69.171.224.0/19
OriginAS:       AS32934
NetName:        TFBNET3
NetHandle:      NET-69-171-224-0-1
Parent:         NET-69-0-0-0-0
Ne
Re
Up
Re                                          est/net/
NET-69-171-224-0-1

OrgName:        Facebook, Inc.
OrgId:          THEFA-3
Address:        1601 Willow Rd.
City:           Menlo Park
StateProv:      CA
PostalCode:     94025
Country:        US
RegDate:        2004-08-11
Updated:        2012-04-17
Ref:            http://whois.arin.net/rest/org/THEFA-3

OrgTechHandle: OPERA82-ARIN
OrgTechName:   Operations
OrgTechPhone:  +1-650-543-4800
OrgTechEmail:  noc@fb.com
OrgTechRef:    http://whois.arin.net/rest/poc/OPERA82-ARIN

OrgAbuseHandle: OPERA82-ARIN
OrgAbuseName:   Operations
OrgAbusePhone:  +1-650-543-4800
OrgAbuseEmail:  noc@fb.com
OrgAbuseRef:    http://whois.arin.net/rest/poc/OPERA82-ARIN
```

Facebook, INC

Deep Inside China

```
$ whois 1.1.1.1

inetnum:        1.1.1.0 - 1.1.1.255
netname:        Debogon-prefix
descr:          APNIC Debogon Project
descr:          APNIC Pty Ltd
country:        AU
admin-c:        AR302-AP
tech-c:         AR302-AP
mn
mn                                          -AP
mn
st
changed:        hm-changed@apnic.net 20110922
source:         APNIC

irt:            IRT-APNICRANDNET-AU
address:        PO Box 3646
address:        South Brisbane, QLD 4101
address:        Australia
e-mail:         abuse@apnic.net
abuse-mailbox:  abuse@apnic.net
admin-c:        AR302-AP
tech-c:         AR302-AP
mnt-by:         MAINT-AU-APNIC-GM85-AP
changed:        hm-changed@apnic.net 20110922
source:         APNIC

role:           APNIC RESEARCH
```

APNIC Labs!

Outside

Inside

So let's focus on that inside address:
1.1.1.1

Outside

Inside

So let's focus on that inside address: 1.1.1.1

is this the "real thing" or just a local route to some local black hole?

Outside

Inside

So let's focus on that inside address: 1.1.1.1

is this the "real thing" or just a local route to some local black hole?

Let's resume the inside/Outside examination, but focus just on the address 1.1.1.1

Outside

```
$ traceroute 1.1.1.1
traceroute to 1.1.1.1 (1.1.1.1), 64 hops max, 52 byte packets
 1  202.158.221.221 (202.158.221.221)  0.266 ms  0.202 ms
0.194 ms
 2  ge-4-0-0.bb1.b.cbr.aarnet.net.au (202.158.208.81)  0.491 ms
0.438 ms  0.424 ms
 3  so-0-1-0.bb1.b.mel.aarnet.net.au (202.158.194.42)  8.001 ms
8.000 ms  7.992 ms
 4  xe-0-0-0.pe1.a.mel.aarnet.net.au (202.158.200.12)  8.110 ms
8.088 ms  8.078 ms
 5  gw1.xe-0-0-2.pe1.a.mel.aarnet.net.au (202.158.210.41)
12.165 ms  12.193 ms  12.159 ms
 6  66.249.95.232 (66.249.95.232)  12.823 ms  13.254 ms
    66.249.95.234 (66.249.95.234)  20.282 ms
 7  209.85.249.52 (209.85.249.52)  134.637 ms  109.393 ms
109.426 ms
 8  64.233.175.3 (64.233.175.3)  128.052 ms  113.782 ms
    64.233.175.1 (64.233.175.1)  113.192 ms
 9  209.85.255.34 (209.85.255.34)  114.562 ms
    209.85.255.36 (209.85.255.36)  118.550 ms  133.640 ms
10  64.233.174.178 (64.233.174.178)  211.021 ms  211.275 ms
211.694 ms
11  72.14.239.82 (72.14.239.82)  263.661 ms  287.038 ms
264.518 ms
12  216.239.48.41 (216.239.48.41)  269.732 ms
    72.14.239.65 (72.14.239.65)  270.545 ms
    216.239.48.41 (216.239.48.41)  270.244 ms
13  72.14.235.11 (72.14.235.11)  279.278 ms  277.787 ms
    66.249.95.230 (66.249.95.230)  277.315 ms
14  72.14.236.99 (72.14.236.99)  415.698 ms
    72.14.236.147 (72.14.236.147)  278.543 ms
    72.14.236.99 (72.14.236.99)  412.531 ms
15  209.85.252.47 (209.85.252.47)  256.836 ms
    209.85.252.81 (209.85.252.81)  253.370 ms
    209.85.252.47 (209.85.252.47)  254.984 ms
16  65.210.126.78 (65.210.126.78)  255.713 ms  253.913 ms
253.865 ms
```

Inside

```
$ traceroute 1.1.1.1
traceroute to 1.1.1.1 (1.1.1.1), 64 hops max, 52 byte packets
 1  254 (220.247.145.254)  6.620 ms  1.774 ms  2.561 ms
 2  * * *
 3  192.168.9.5 (192.168.9.5)  6.718 ms  3.322 ms  5.324 ms
 4  159.226.253.189 (159.226.253.189)  25.557 ms  26.145 ms
27.191 ms
 5  8.130 (159.226.253.57)  26.059 ms  27.225 ms  25.889 ms
 6  8.198 (159.226.253.50)  27.060 ms  29.788 ms  29.476 ms
 7  8.192 (159.226.254.254)  64.767 ms  66.801 ms  66.768 ms
 8  72.14.221.138 (72.14.221.138)  100.753 ms  105.117 ms
99.613 ms
 9  209.85.241.56 (209.85.241.56)  101.914 ms
    209.85.241.58 (209.85.241.58)  105.561 ms  101.748 ms
10  66.249.94.31 (66.249.94.31)  175.902 ms
    66.249.94.123 (66.249.94.123)  149.653 ms
    66.249.94.31 (66.249.94.31)  149.498 ms
11  64.233.175.3 (64.233.175.3)  150.364 ms
    64.233.175.1 (64.233.175.1)  150.610 ms  147.552 ms
12  209.85.255.36 (209.85.255.36)  163.323 ms *
    209.85.255.58 (209.85.255.58)  154.349 ms
13  64.233.174.178 (64.233.174.178)  353.593 ms  286.374 ms
312.122 ms
14  72.14.239.80 (72.14.239.80)  245.300 ms
    72.14.239.82 (72.14.239.82)  325.655 ms  284.123 ms
15  216.239.48.41 (216.239.48.41)  279.139 ms  274.913 ms
276.807 ms
16  66.249.95.230 (66.249.95.230)  274.683 ms  274.613 ms
    66.249.95.228 (66.249.95.228)  273.204 ms
17  72.14.236.147 (72.14.236.147)  313.601 ms
    72.14.236.149 (72.14.236.149)  261.617 ms  305.524 ms
18  209.85.252.47 (209.85.252.47)  306.003 ms
    209.85.252.81 (209.85.252.81)  276.541 ms  363.910 ms
19  65.210.126.78 (65.210.126.78)  398.681 ms  361.306 ms
366.265 ms
```

Outside

```
$ traceroute 1.1.1.1
traceroute to 1.1.1.1 (1.1.1.1), 64 hops max, 52 byte packets
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109.426 ms
 8  64
    64
 9  20
    20
10  64
211.694 ms
11  72.14.239.82 (72.14.239.82)  263.661 ms  287.038 ms
264.518 ms
12  216.239.48.41 (216.239.48.41)  269.732 ms
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 6  8.198 (159.226.253.50)  27.060 ms  29.788 ms  29.476 ms
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 8  72.14.221.138 (72.14.221.138)  100.753 ms  105.117 ms
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 9  209.85.241.56 (209.85.241.56)  101.914 ms
    209.85.241.58 (209.85.241.58)  105.561 ms  101.748 ms
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    66.249.95.228 (66.249.95.228)  273.204 ms
17  72.14.236.147 (72.14.236.147)  313.601 ms
    72.14.236.149 (72.14.236.149)  261.617 ms  305.524 ms
18  209.85.252.47 (209.85.252.47)  306.003 ms
    209.85.252.81 (209.85.252.81)  276.541 ms  363.910 ms
19  65.210.126.78 (65.210.126.78)  398.681 ms  361.306 ms
366.265 ms
```

Hang on… BOTH inside and outside ROUTE the packets addressed to 1.1.1.1 to the same endpoint: **65.210.126.78**

But 65.210.126.78 is Google!

```
$ whois 65.210.126.78

#
# ARIN WHOIS data and services are subject to the Terms of Use
# available at: https://www.arin.net/whois_tou.html
#



#
# The following results may also be obtained via:
# http://whois.arin.net/rest/nets;q=65.210.126.78?
showDetails=true&showARIN=false&ext=netref2
#

MCI Communications Services, Inc. d/b/a Verizon Business UUNET65
(NET-65-192-0-0-1) 65.192.0.0 - 65.223.255.255
GOOGLE INC UU-65-210-126-72 (NET-65-210-126-72-1) 65.210.126.72 -
65.210.126.79
```

So…

Why is 1.1.1.1 being routed into Google?

Asia Pacific Network Information Centre
APNIC Pty Ltd
ABN: 42 081 528 010

6 Cordelia Street
PO Box 3646
South Brisbane
QLD 4101 AUSTRALIA

URL www.apnic.net
Enquiries helpdesk@apnic.net
Accounts billing@apnic.net
Phone +61 7 3858 3100
Fax + 61 7 3858 3199

Letter of Authority

2 May 2013

APNIC and Google Joint Research Activity in Dark Traffic Profile

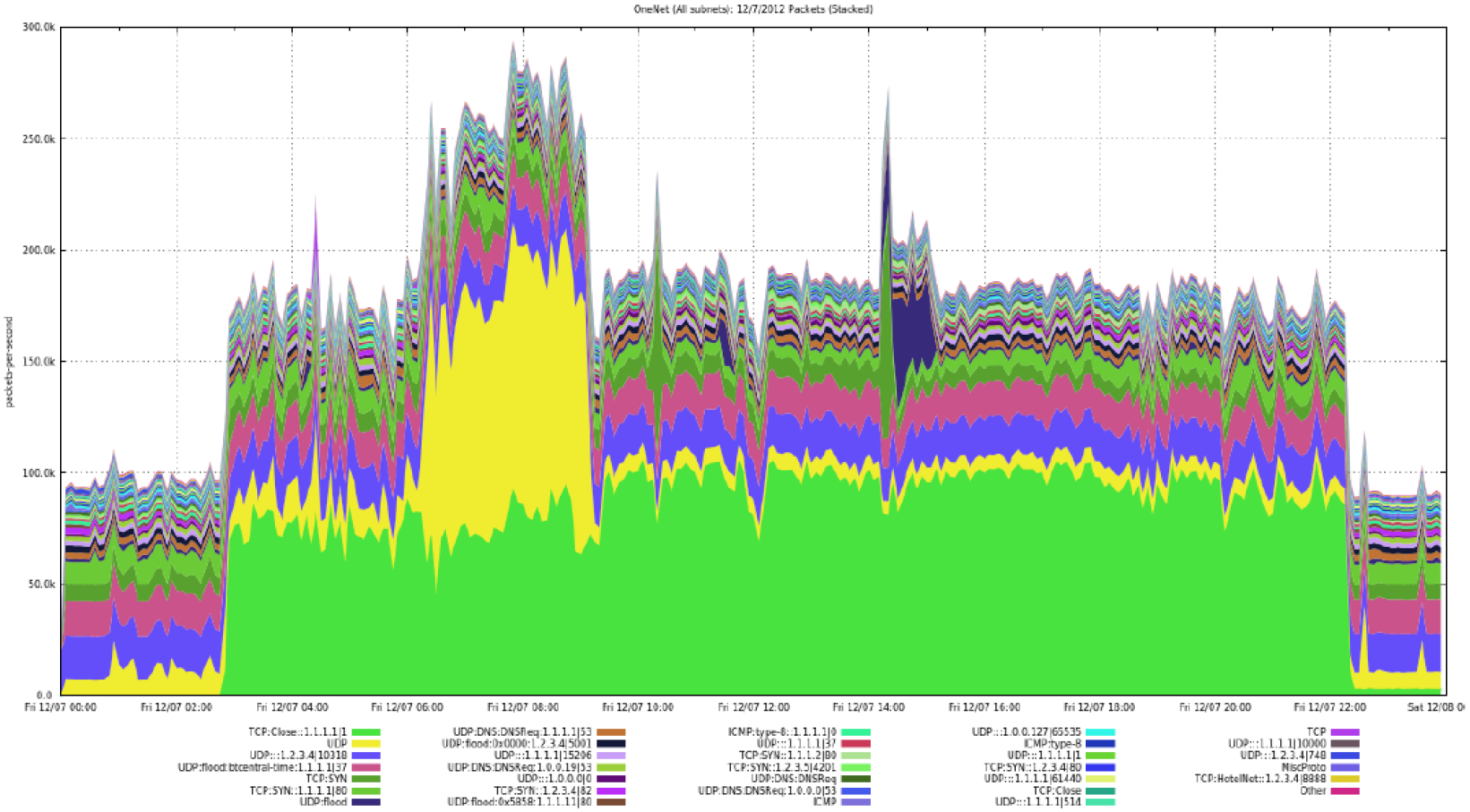
To whom it may concern,

APNIC and Google are cooperating in a project to investigate the properties of unwanted traffic that is being sent to specific destinations in the APNIC-held prefixes 1.0.0.0/24, 1.1.1.0/24 and 1.2.3.0/24. Accordingly, APNIC authorizes Google to periodically advertise a route for these prefixes from AS 15169, and requests that Google's routing peers accept this as a legitimate routing advertisement. This authority is valid for a period of 12 months, until 2 May 2014.

Geoff Huston
Chief Scientist

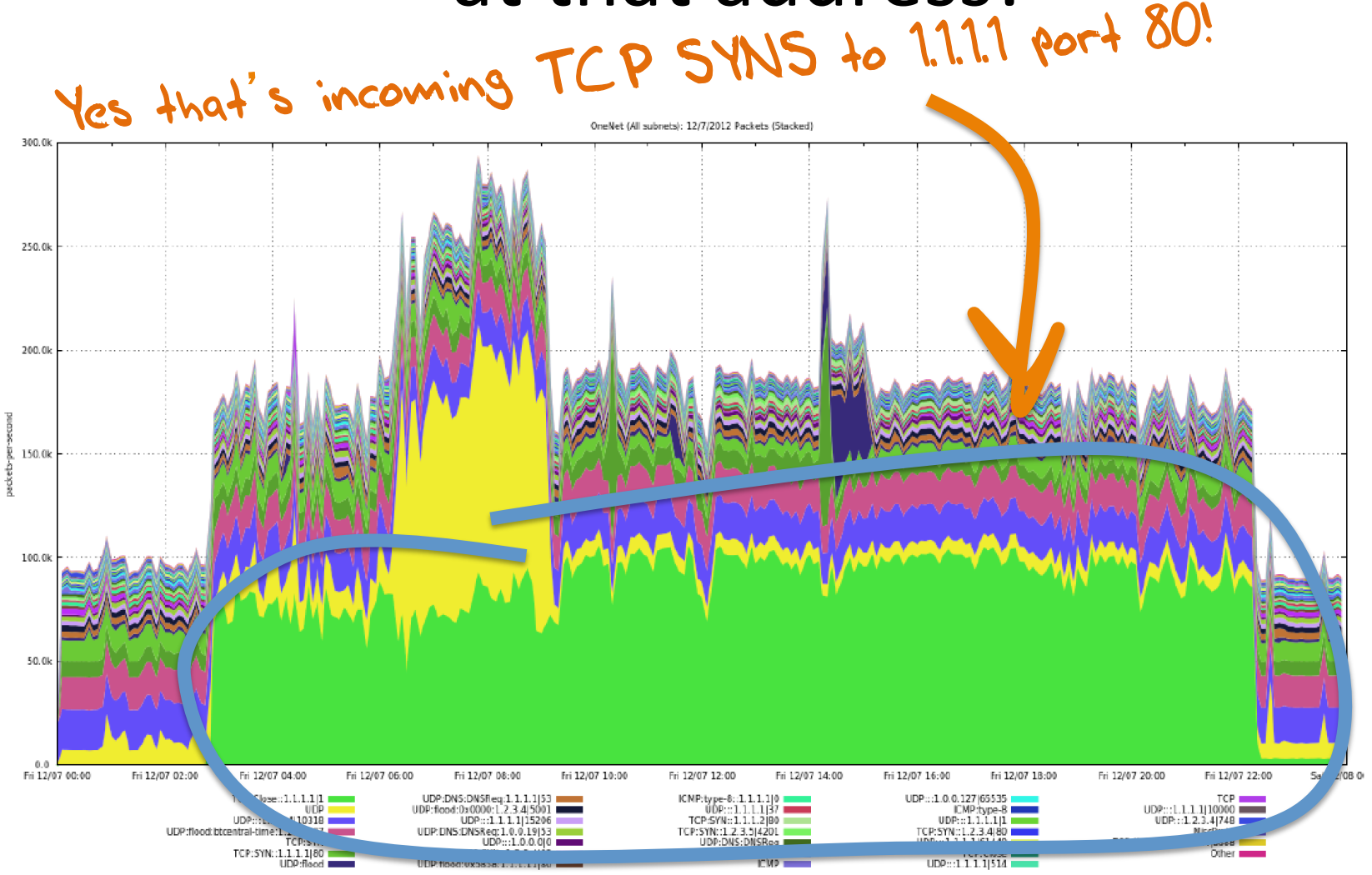
And there's a darknet traffic collector at that address!

And there's a darknet traffic collector at that address!



And here's a small snapshot of what it sees

And there's a darknet traffic collector at that address!



Spy Vs. Spy

So, for Facebook in China, exactly who is watching who here?

But at other times it's even stranger…

```
$ dig @m.root-servers.net www.facebook.com
; <<>> DiG 9.9.3-P1 <<>> @m.root-servers.net.   www.facebook.com
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 3195
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.facebook.com   IN  A

;; ANSWER SECTION:
www.facebook.com.   300 IN  A   255.255.255.255

;; Query time: 38 msec
;; SERVER: 2001:dc3::35#53(2001:dc3::35)
;; WHEN: Tue Aug 27 19:07:12 EST 2013
;; MSG SIZE  rcvd: 50
```

But at other times it's even stranger…

```
$ dig @m.root-servers.net www.facebook.com
; <<>> DiG 9.9.3-P1 <<>> @m.root-servers.net.   www.facebook.com
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 3195
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.facebook.com    IN   A

;; ANSWER SECTION:
www.facebook.com.    300 IN   A    255.255.255.255

;; Query time: 38 msec
;; SERVER: 2001:dc3::35#53(2001:dc3::35)
;; WHEN: Tue Aug 27 19:07:12 EST 2013
;; MSG SIZE  rcvd: 50
```

Really!

The broadcast address!


Thanks!