Multi-Homed Probe
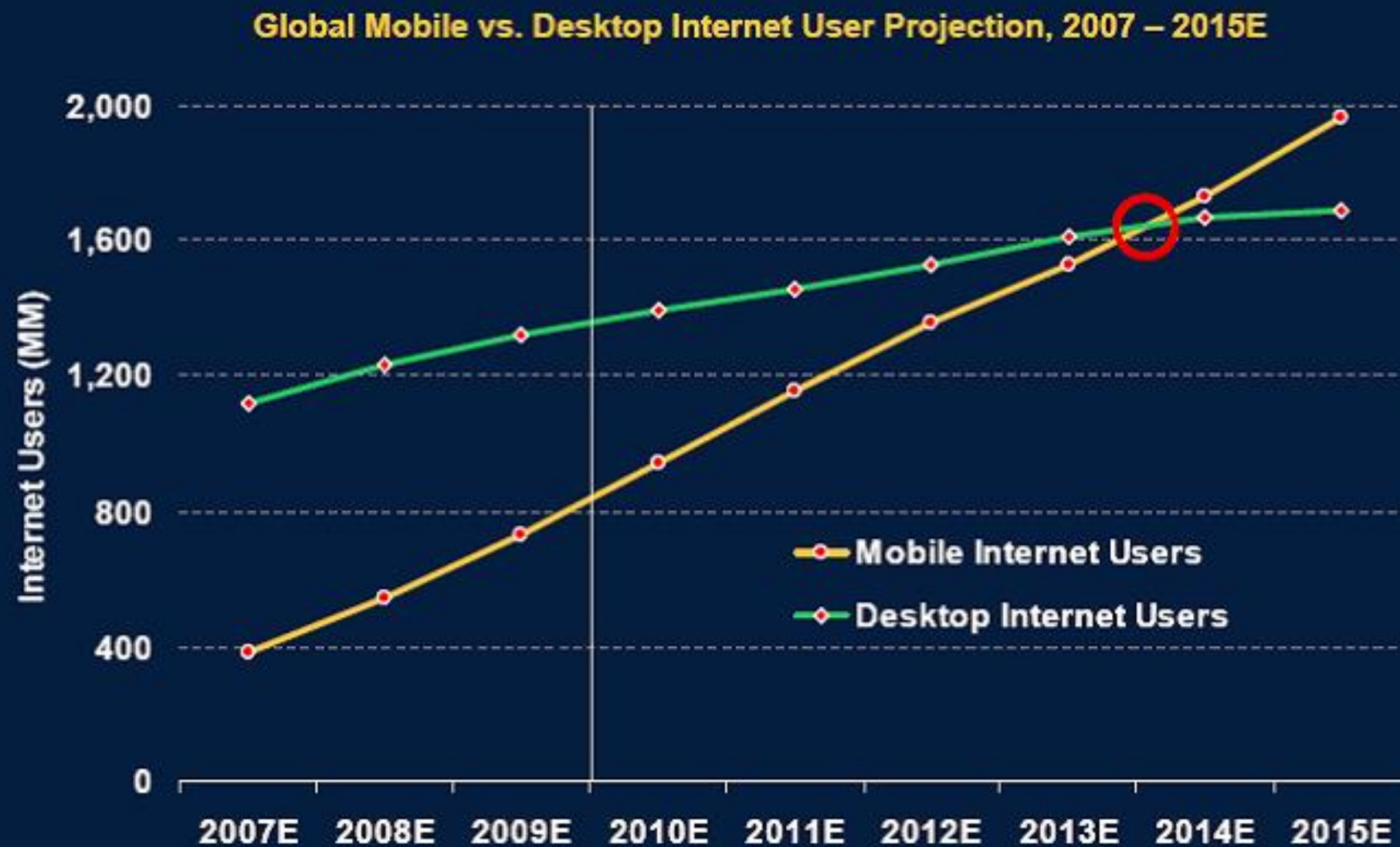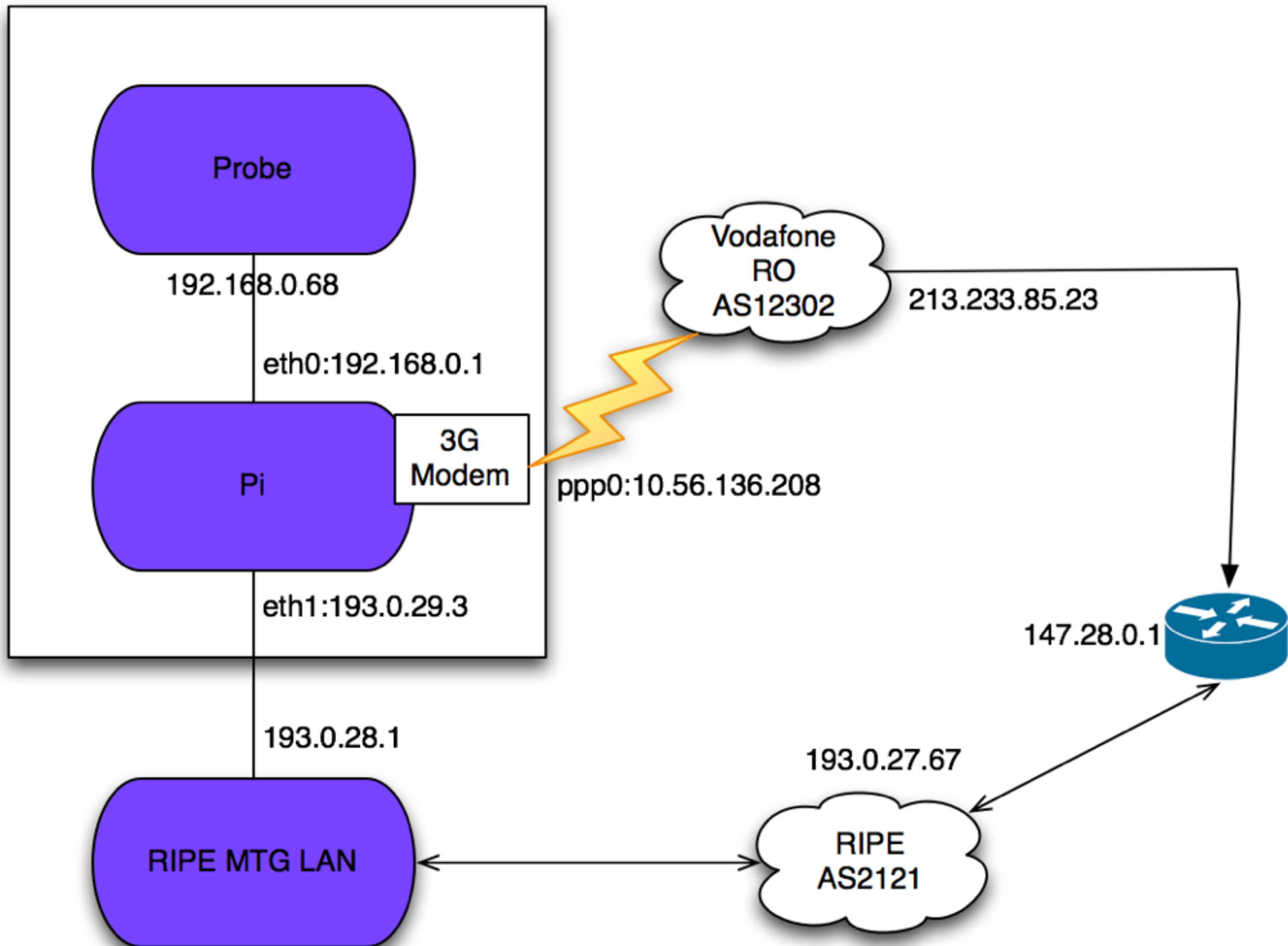
Alexandru Manea, Vladislav Bidikov, Randy Bush, Brendan Cleary

Why?

Mobile Users > Desktop Internet Users Within 5 Years

Global Mobile vs. Desktop Internet User Projection, 2007 – 2015E

Mobile Internet Users
Desktop Internet Users

Morgan Stanley

Source: Morgan Stanley Research.

Probe

192.168.0.68

eth0:192.168.0.1

Pi

3G Modem

ppp0:10.56.136.208

Vodafone RO AS12302

213.233.85.23

147.28.0.1

eth1:193.0.29.3

193.0.28.1

193.0.27.67

RIPE MTG LAN

RIPE AS2121

RIPE Mobile Hack

IPv4   Edit ✎

Internet Address	213.233.85.23
ASN	12302 (VODAFONE_RO Vodafone Romania S.A.,RO)
Local Address	192.168.0.68
Gateway	192.168.0.1
Netmask	255.255.255.0
DNS Resolvers	192.168.0.1

IPv6   Edit ✎

Current Configuration

Automatic	Yes

The Hack

- IPTables rules to forward based on packet size

- Raspberry Pi wvdial config

Routing Policy

- TCP traceroute dst port==1025 >> LAN

- ICMP Packet size==48 >>LAN

```
pi@raspberrypi ~ $ sudo iptables -L -v -n -t mangle
Chain PREROUTING (policy ACCEPT 48564 packets, 6404K bytes)
 pkts bytes target      prot opt in      out      source             destination
 1104 52992 MARK        icmp --  *       *        192.168.0.0/24     0.0.0.0/0         icmptype 8 length 48 MARK set 0x2
 1104 52992 RETURN      icmp --  *       *        192.168.0.0/24     0.0.0.0/0         icmptype 8 length 48
  351 30888 MARK        tcp  --  *       *        192.168.0.0/24     0.0.0.0/0         tcp dpt:1025 MARK set 0x2
  351 30888 RETURN      tcp  --  *       *        192.168.0.0/24     0.0.0.0/0         tcp dpt:1025
 8053  751K MARK        all  --  *       *        192.168.0.0/24     0.0.0.0/0         MARK set 0x1
```

WVDial

```
pi@raspberrypi ~ $ more /etc/wvdial.conf

[Dialer Defaults]
Init1 = ATZ
Init2 = ATQ0 V1 E1 S0=0 &C1 &D2 +FCLASS=0
Init3 = AT+CGDCONT=1,"IP","live.vodafone.com"
Modem Type = USB Modem
ISDN = 0
New PPPD = yes
Phone = *99#
Modem = /dev/ttyACM0
Username = test
Password = test
Baud = 460800

[Dialer pin]
Init1 = AT+CPIN="1590"
pi@raspberrypi ~ $
```

Results

One Probe, two Paths

Traceroute Result for Probe #25760 ✕

2015-11-15 13:44 UTC

Traceroute to 147.28.0.1 (147.28.0.1), 48 byte packets

1	192.168.0.1	0.61ms	0.487ms	0.479ms
2	193.0.24.1 [AS2121]	1.304ms	1.193ms	1.126ms
3	195.95.178.141 [AS39107]	1.905ms	1.665ms	1.635ms
4	195.60.76.93 [AS3223]	1.866ms	1.877ms	4.347ms
5	195.60.77.13 [AS3223]	3.886ms	3.659ms	4.108ms
6	93.186.132.52 [AS6762]	2.198ms	1.774ms	1.741ms
7	195.22.214.77 [AS6762]	28.329ms	28.298ms	28.686ms
8	195.22.214.63 [AS6762]	29.753ms	30.128ms	28.561ms
9	129.250.4.162 [AS2914]	32.581ms	30.596ms	30.48ms
10	129.250.2.4 [AS2914]	114.682ms	*	*
11	129.250.2.166 [AS2914]	133.998ms	132.728ms	131.685ms
12	129.250.3.42 [AS2914]	181.615ms	172.649ms	172.76ms
13	129.250.5.47 [AS2914]	180.307ms	179.527ms	180.056ms
14	147.28.0.1 [AS3130]	178.113ms	*	179.169ms

Traceroute Result for Probe #25760 ✕

2015-11-15 13:53 UTC

Traceroute to 147.28.0.1 (147.28.0.1), 47 byte packets

1	* * *			
2	* * *			
3	10.241.147.213	242.892ms	319.835ms	349.856ms
4	10.241.1.210	359.549ms	479.68ms	369.832ms
5	192.168.159.225	369.618ms	270.222ms	469.701ms
6	192.168.196.201	419.449ms	399.606ms	670.669ms
7	192.168.196.194	339.306ms	359.232ms	259.723ms
8	195.2.28.89 [AS1273]	250.3ms	439.58ms	429.386ms
9	195.2.28.62 [AS1273]	519.665ms	489.825ms	449.643ms
10	195.2.28.77 [AS1273]	389.606ms	469.721ms	439.629ms
11	195.2.31.234 [AS1273]	299.584ms	309.669ms	300.407ms
12	195.2.27.249 [AS1273]	349.184ms	701.325ms	430.088ms
13	144.232.228.185 [AS1239]	479.306ms	349.596ms	430.188ms
14	144.232.5.216 [AS1239]	429.777ms	399.278ms	380.088ms
15	144.232.18.59 [AS1239]	459.691ms	429.393ms	580.113ms
16	144.232.19.98 [AS1239]	429.661ms	479.353ms	510.492ms
17	144.232.8.60 [AS1239]	508.941ms	520.066ms	479.297ms
18	144.232.9.62 [AS1239]	419.652ms	560.035ms	479.426ms
19	147.28.0.1 [AS3130]	499.594ms	509.892ms	489.566ms

Fancy Maps

2944402 **Traceroute measurement to 147.28.0.1-LAN2** 1prbs 2015-11-

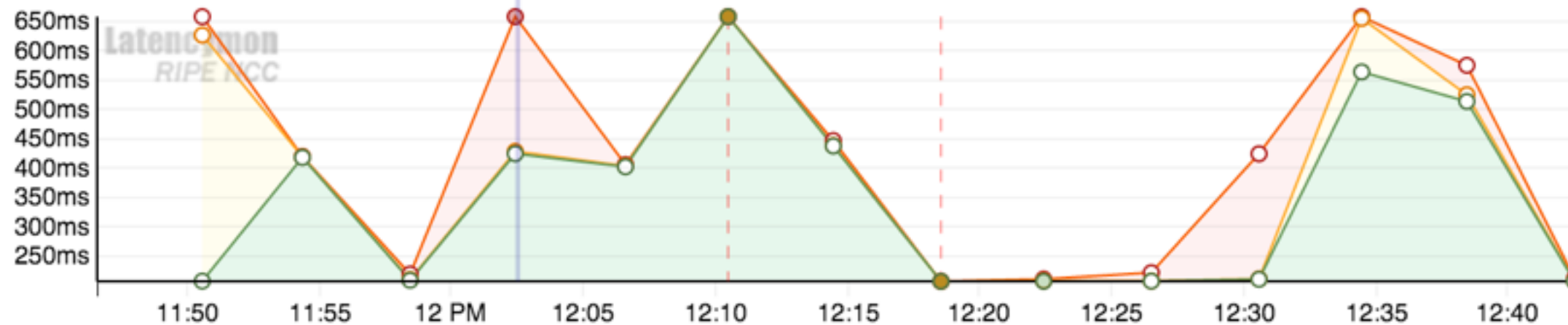2943968 **Traceroute measurement to 147.28.0.1-Mobile** 1prbs 2015-11-
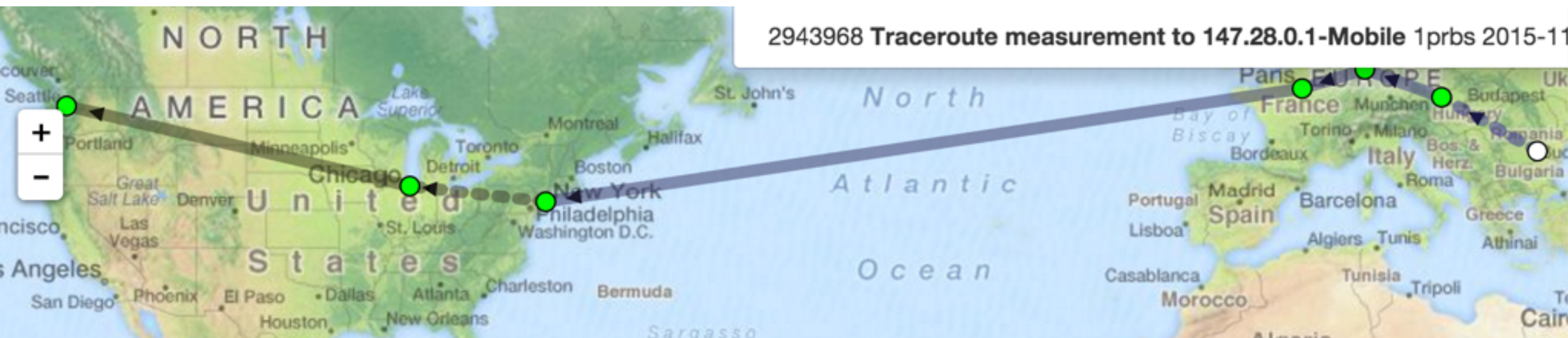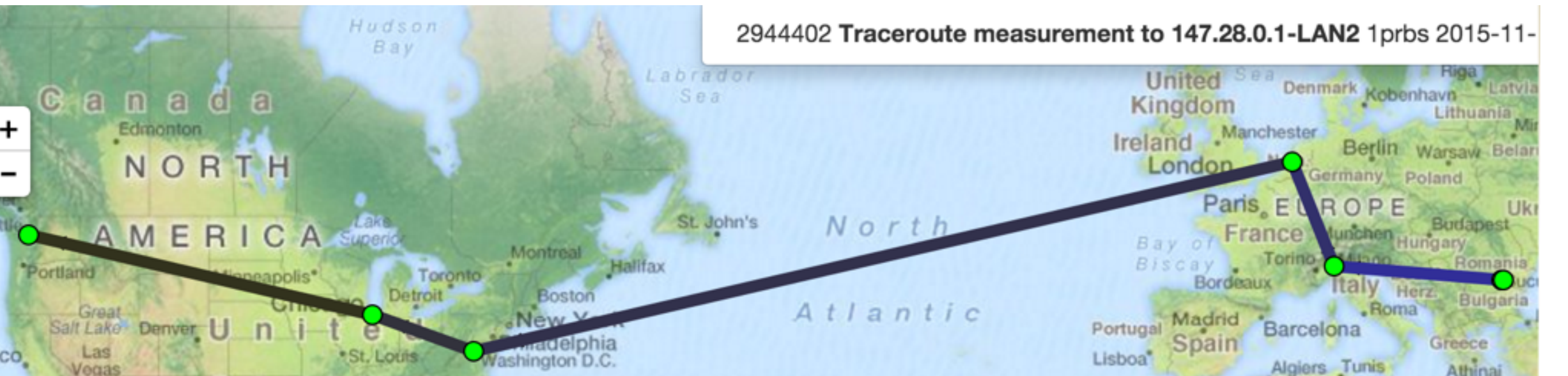
Ping Measurements

RIPE Atlas ping measurement #2942949 to 147.28.0.1 — From 2015-11-15 13:46 to 2015-11-15
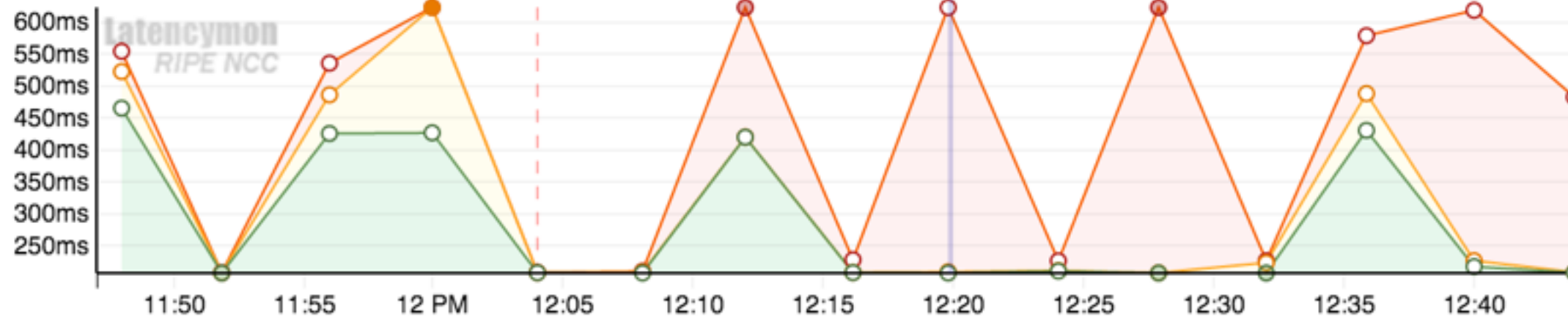
Probe 25760 (RO)
IP v4: 213.233.85.23
AS: 12302
Prefix v4: 213.233.85.0/24
Target: 147.28.0.1

RIPE Atlas ping measurement #2942512 to 147.28.0.1 — From 2015-11-15 13:47 to 2015-11-15
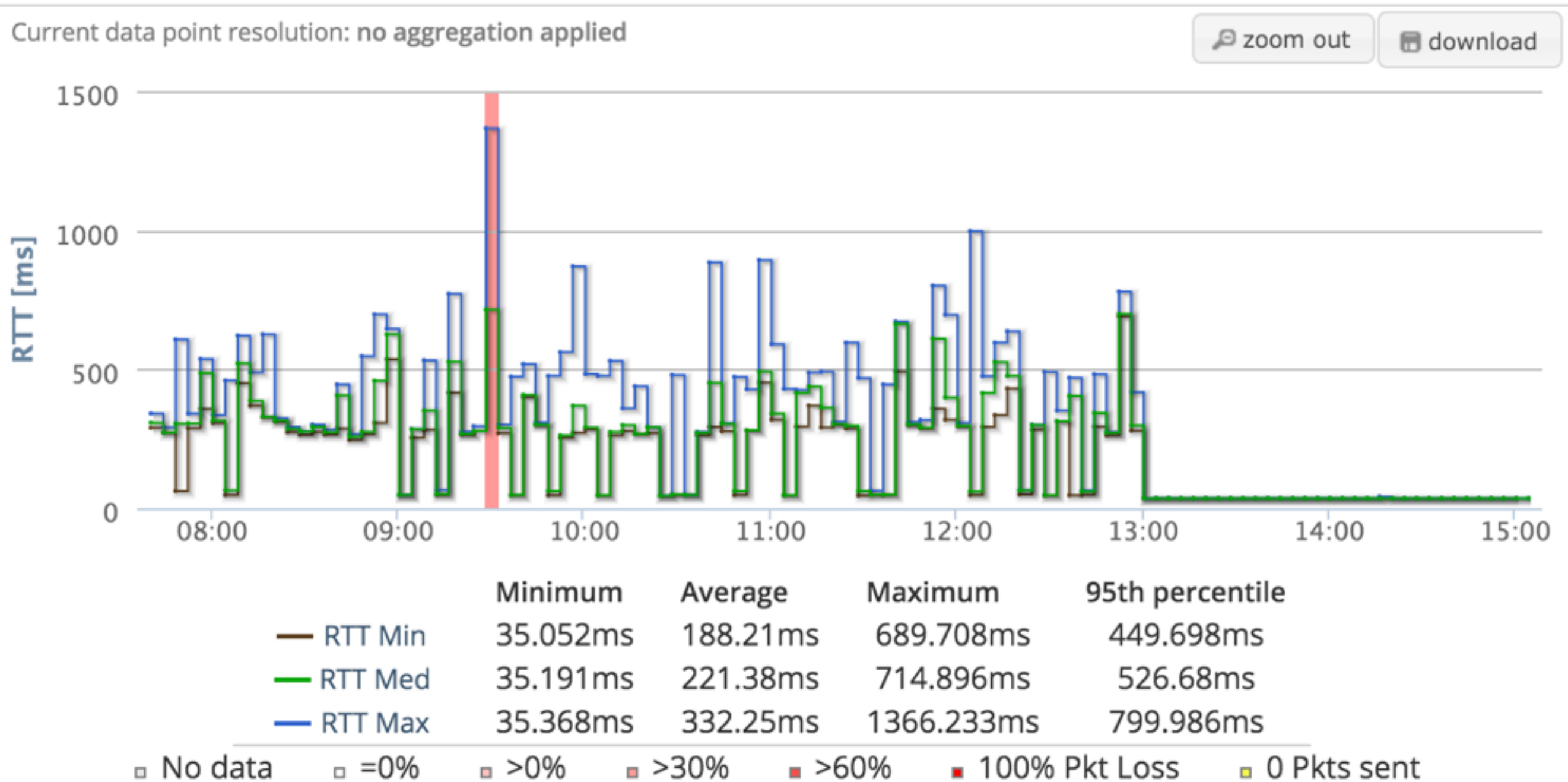
Probe 25760 (RO)
IP v4: 213.233.85.23
AS: 12302
Prefix v4: 213.233.85.0/24
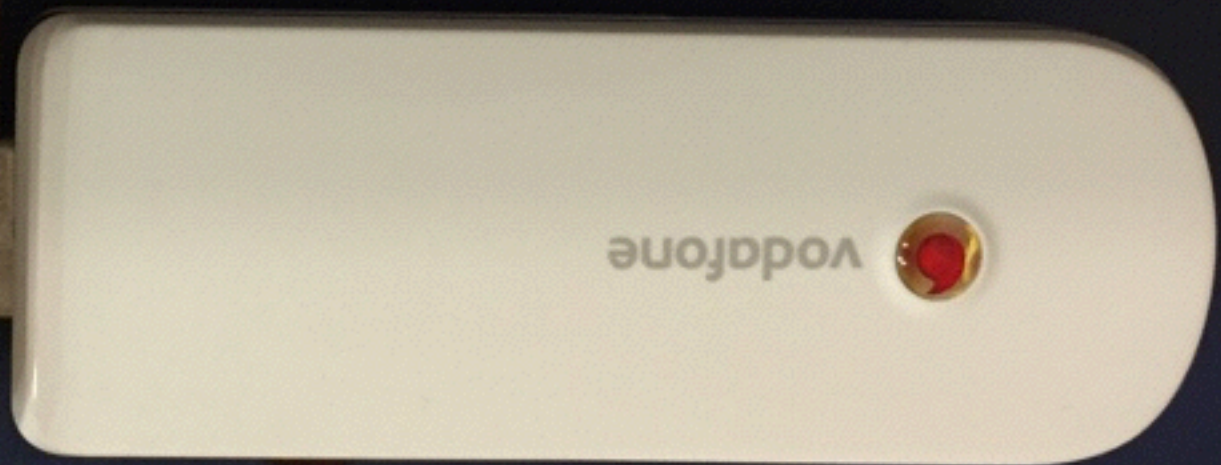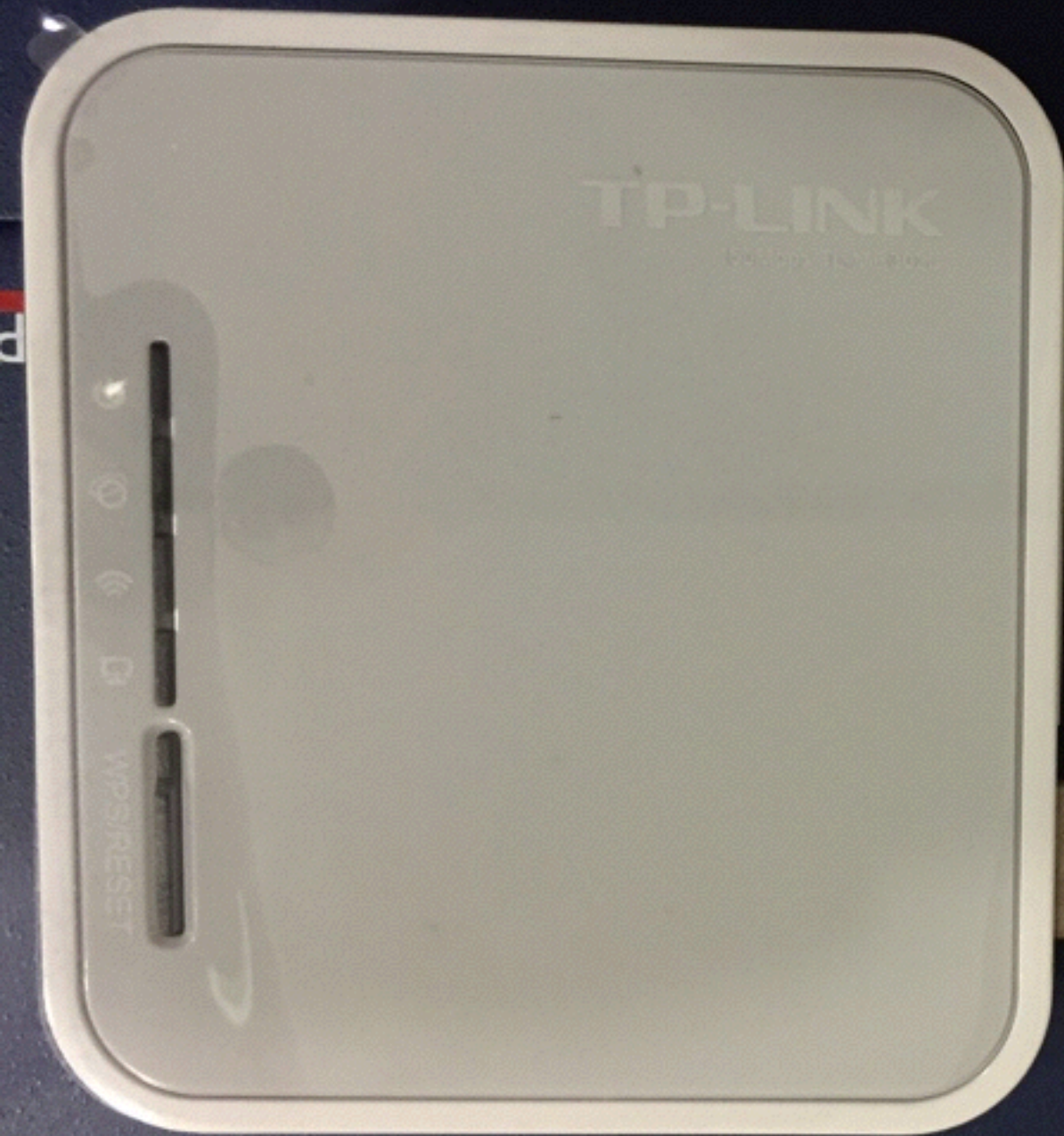Target: 147.28.0.1

Better Graph

What went wrong

- Pi USB power limitations

- iptables

Future Considerations

- Communication to choose network

- Software SIM: Multiple Operators

- Data Plans $$$

- SMS and Voice Measurements

Ripe Atlas Probe v3G ??

RIPE SIM Server hosted@ Vesna's House