

# **dnsprobe for probing anycast DNS**

## **-- Analysis & Future Work --**

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# What is dnsprobe ?

- ◆ dnsprobe is a tool for probing
  - ◆ RTT
  - ◆ hostname.bind
- ◆ To DNS Server Set
  - ◆ Root DNS Servers
  - ◆ ccTLD DNS Servers
- ◆ Active Measurement
  - ◆ Native probe
  - ◆ Dialup probe

# Measurement

- ◆ Started from May 2002
- ◆ Anycast Probing Started from Jun 2004
- ◆ Until Jun 2005, over 10,000,000 probes
- ◆ Target
  - ◆ Root (13 IP addresses)
  - ◆ ccTLD (638 IP addresses)

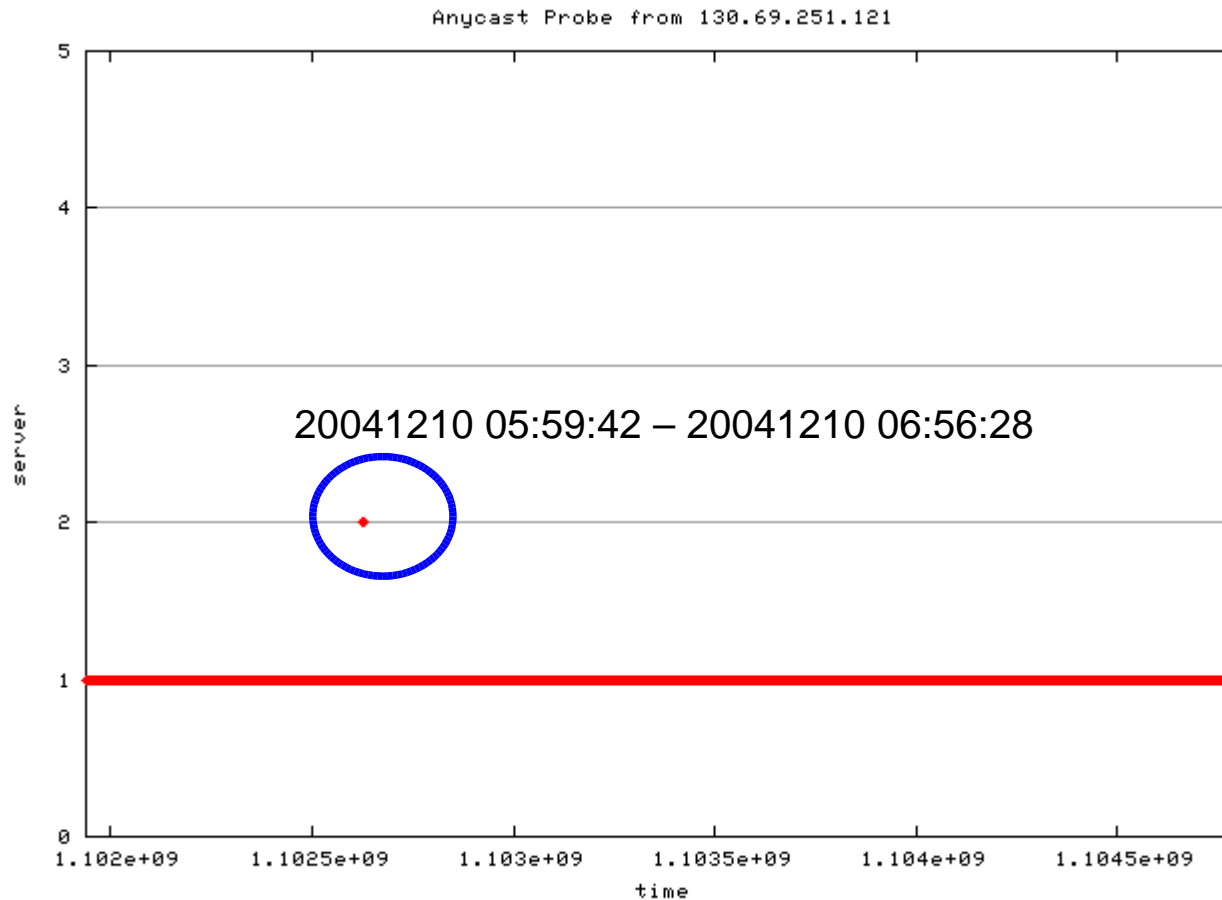
# Motivation

- ◆ Short span probe from many locations
  - ◆ Using dialup connection
  - ◆ Probes from location which we can't visit easily
- ◆ How anycast works
  - ◆ Checking `hostname.bind`
  - ◆ Which anycast instance is answering ?
  - ◆ Measuring RTT
  - ◆ short span probes (1–2 hour at each location)

# Probing Result

```
1105950738 130.69.251.116 eth1 A: rtt 205 ms: hostname ns3-aroot
1105950763 130.69.251.116 eth1 B: rtt 190 ms: hostname b1.isi.edu
1105950715 130.69.251.116 eth1 C: rtt 213 ms: hostname iad1a.c.root-servers.org
1105950756 130.69.251.116 eth1 D: rtt 193 ms: hostname d-root.net.umd.edu
1105950752 130.69.251.116 eth1 E: rtt 199 ms: hostname e2.arc.nasa.gov^U
1105950744 130.69.251.116 eth1 F: rtt 157 ms: hostname lax1b.f.root-servers.org
1105950748 130.69.251.116 eth1 G: timed out (60sec)
1105950720 130.69.251.116 eth1 H: rtt 201 ms: hostname H2
1105950734 130.69.251.116 eth1 I: rtt 1 ms: hostname s1.tok
1105950768 130.69.251.116 eth1 J: rtt 255 ms: hostname jns3-kgld.j.root-servers.net.j.root-
servers.net
1105950773 130.69.251.116 eth1 K: rtt 274 ms: hostname k2.ams-ix
1105950725 130.69.251.116 eth1 L: rtt 257 ms: hostname l2.l.root-servers.org
1105950730 130.69.251.116 eth1 M: rtt 0 ms: hostname M-d3
```

# Anycast Report - C (1)



Start : 2004/12/02  
End : 2005/01/04

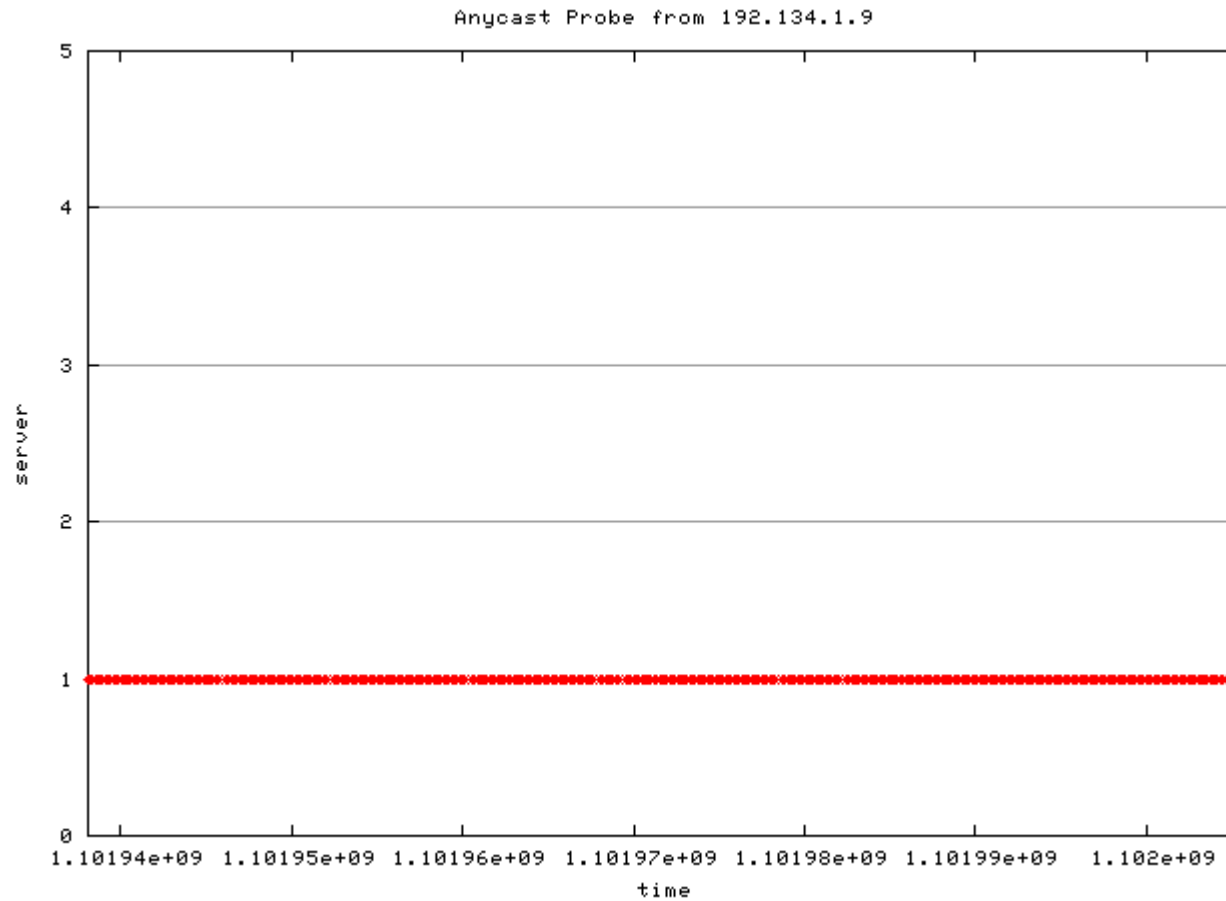
src : 130.69.251.121  
(AS2501)  
dst : 192.33.4.12

13468 queries

1: iad1a.c.root-servers.org  
2: ord1a.c.root-servers.org

"C-130.69.251.121" ♦

# Anycast Report - C (2)



Start : 2004/12/02  
End : 2004/12/03

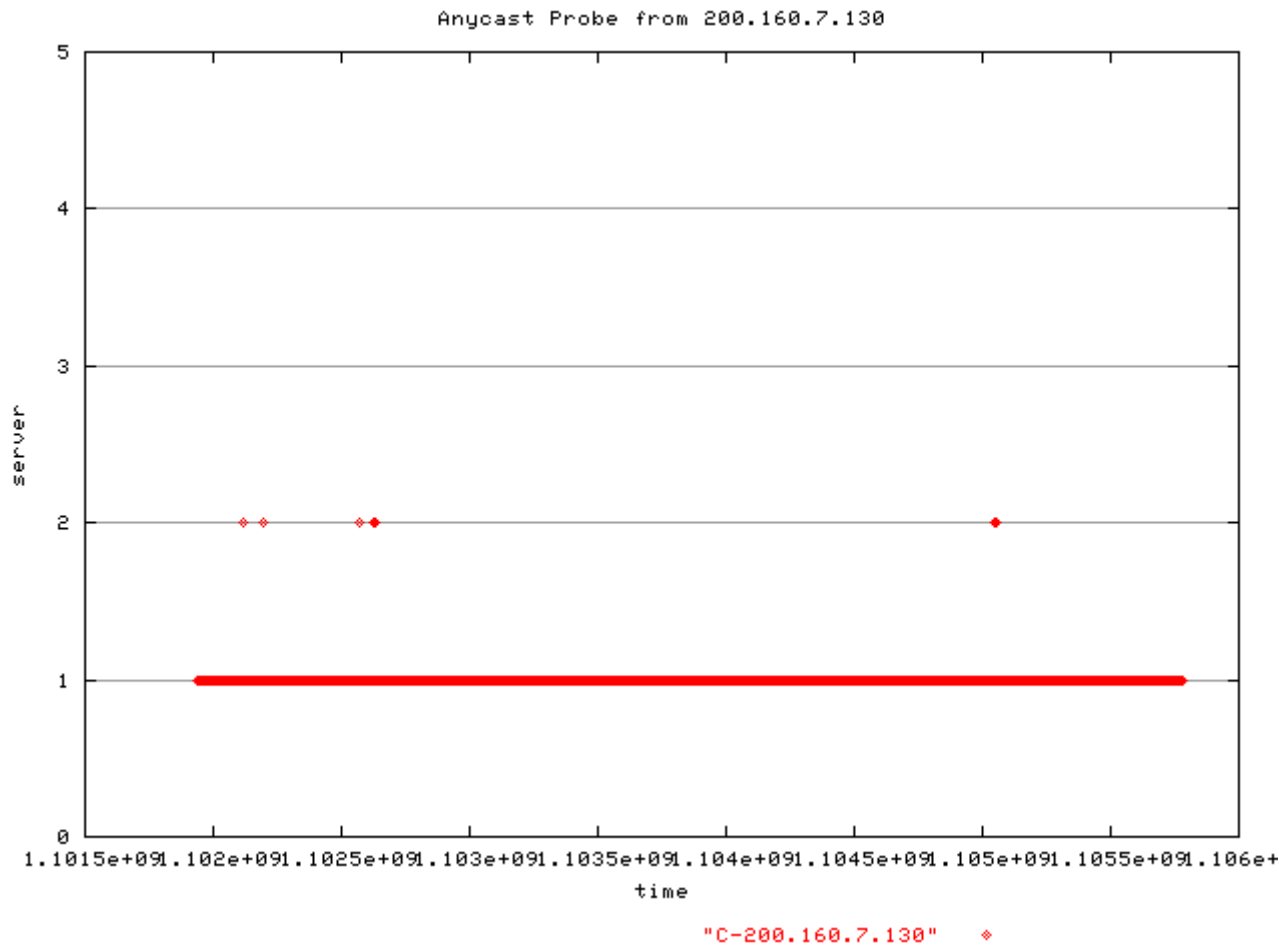
src : 192.134.1.9  
(AS2486)  
dst : 192.33.4.12

454 queries

1: jfk1b.c.root-servers.org

"C-192.134.1.9" ◆

# Anycast Report - C (3)



Start : 2004/12/02  
End : 2005/01/15

src : 200.160.7.130  
(AS22548)  
dst : 192.33.4.12

25601 queries

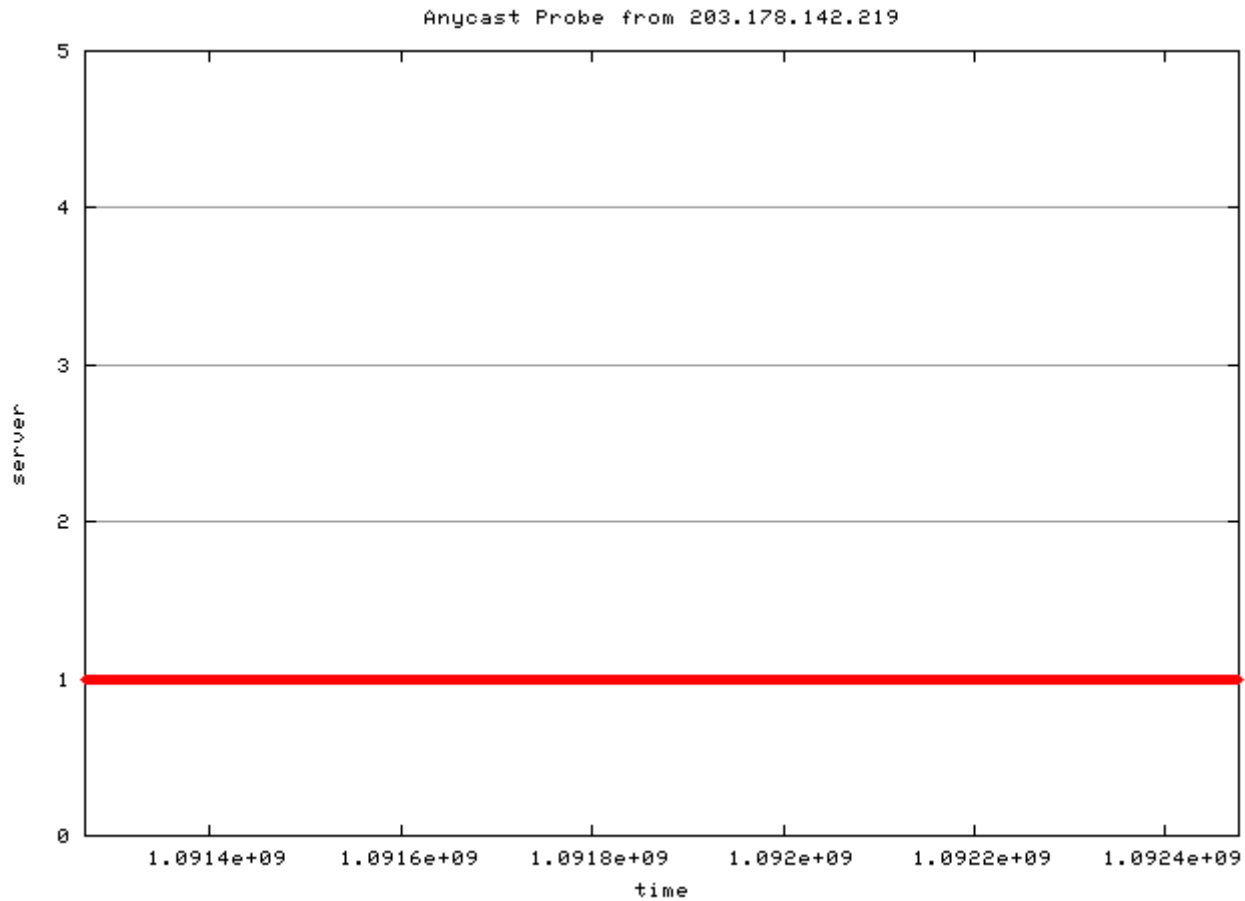
1: iad1b.c.root-servers.org  
2: ord1a.c.root-servers.org



# Anycast Report - C (3)

20041204093117	200.160.7.130	149	ord1a.c.root-servers.org
20041205055140	200.160.7.130	149	ord1a.c.root-servers.org
20041209132834	200.160.7.130	142	ord1a.c.root-servers.org
20041210060141	200.160.7.130	149	ord1a.c.root-servers.org
20041210060355	200.160.7.130	149	ord1a.c.root-servers.org
20041210060651	200.160.7.130	149	ord1a.c.root-servers.org
20041210060843	200.160.7.130	149	ord1a.c.root-servers.org
20041210061121	200.160.7.130	149	ord1a.c.root-servers.org
20041210061357	200.160.7.130	149	ord1a.c.root-servers.org
20041210061625	200.160.7.130	149	ord1a.c.root-servers.org
20041210061852	200.160.7.130	149	ord1a.c.root-servers.org
20041210062118	200.160.7.130	149	ord1a.c.root-servers.org
20041210062312	200.160.7.130	149	ord1a.c.root-servers.org
20041210062628	200.160.7.130	149	ord1a.c.root-servers.org
20041210062812	200.160.7.130	149	ord1a.c.root-servers.org
20041210063132	200.160.7.130	149	ord1a.c.root-servers.org
20041210063321	200.160.7.130	149	ord1a.c.root-servers.org
20041210063546	200.160.7.130	149	ord1a.c.root-servers.org
20041210063900	200.160.7.130	149	ord1a.c.root-servers.org
20041210064046	200.160.7.130	149	ord1a.c.root-servers.org
20041210064348	200.160.7.130	149	ord1a.c.root-servers.org
20041210064557	200.160.7.130	149	ord1a.c.root-servers.org
20041210064915	200.160.7.130	149	ord1a.c.root-servers.org
20041210065133	200.160.7.130	149	ord1a.c.root-servers.org
20041210065312	200.160.7.130	149	ord1a.c.root-servers.org
20041210065628	200.160.7.130	149	ord1a.c.root-servers.org
20050107072327	200.160.7.130	160	ord1a.c.root-servers.org
20050107072558	200.160.7.130	160	ord1a.c.root-servers.org
20050107072904	200.160.7.130	160	ord1a.c.root-servers.org
20050107073059	200.160.7.130	160	ord1a.c.root-servers.org
20050107080846	200.160.7.130	171	ord1a.c.root-servers.org

# Anycast Report - C (4)



"C-203.178.142.219" ◆

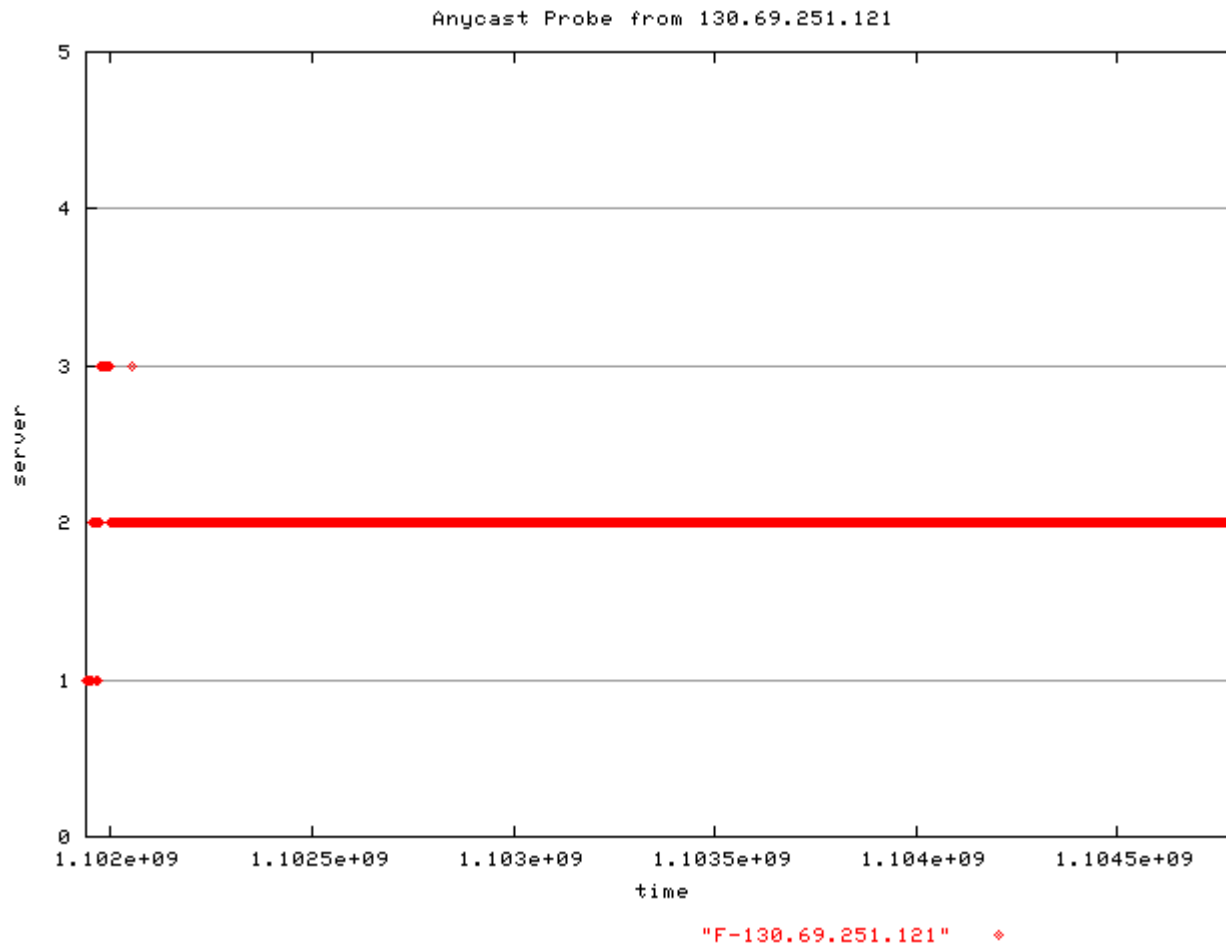
Start : 2004/07/03  
End : 2005/08/14

src :203.178.142.219  
(AS2500)  
dst :192.33.4.12

3988 queries

1: lax1b.c.root-servers.org

# Anycast Report - F (1)



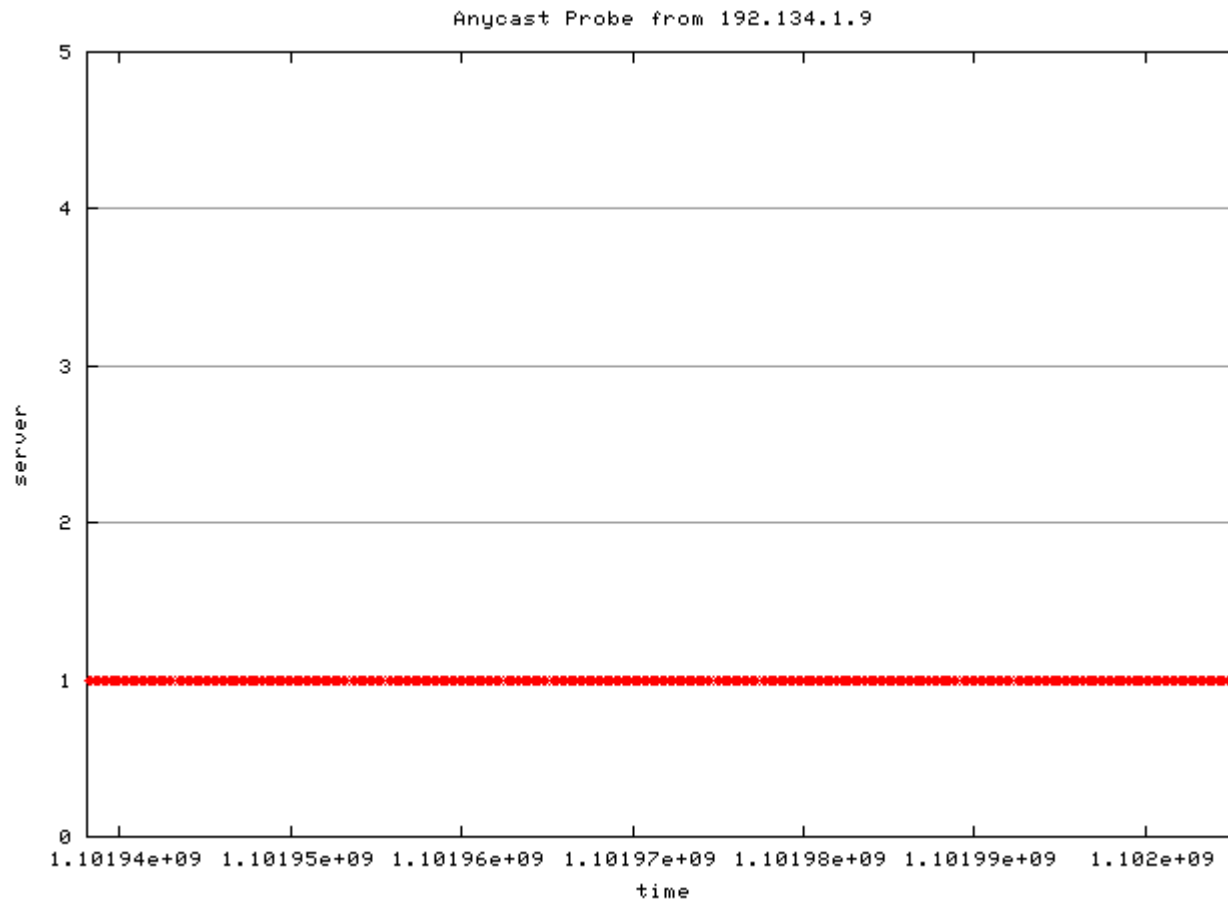
Start : 2004/12/02  
End : 2005/01/04

src : 130.69.251.121  
(AS2501)  
dst : 192.5.5.241

13398 queries

1: pao1c.f.root-servers.org  
2: lax1b.f.root-servers.org  
3: sel1b.f.root-servers.org

# Anycast Report - F (2)



Start : 2004/12/02  
End : 2004/12/03

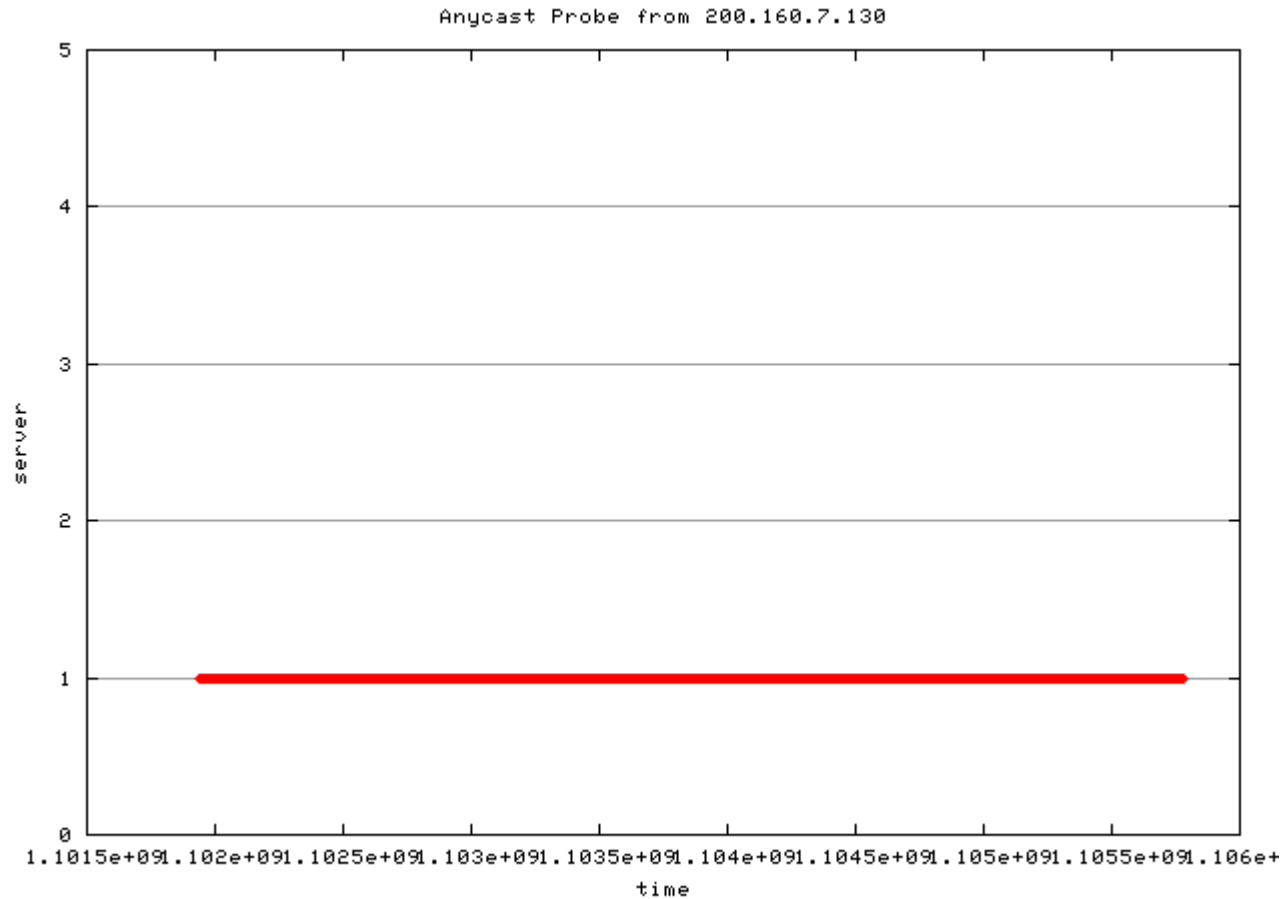
src : 192.134.1.9  
(AS2486)  
dst : 192.5.5.241

454 queries

1: sfo2a.f.root-servers.org

"F-192.134.1.9" ◆

# Anycast Report - F (3)



Start : 2004/12/02  
End : 2005/01/15

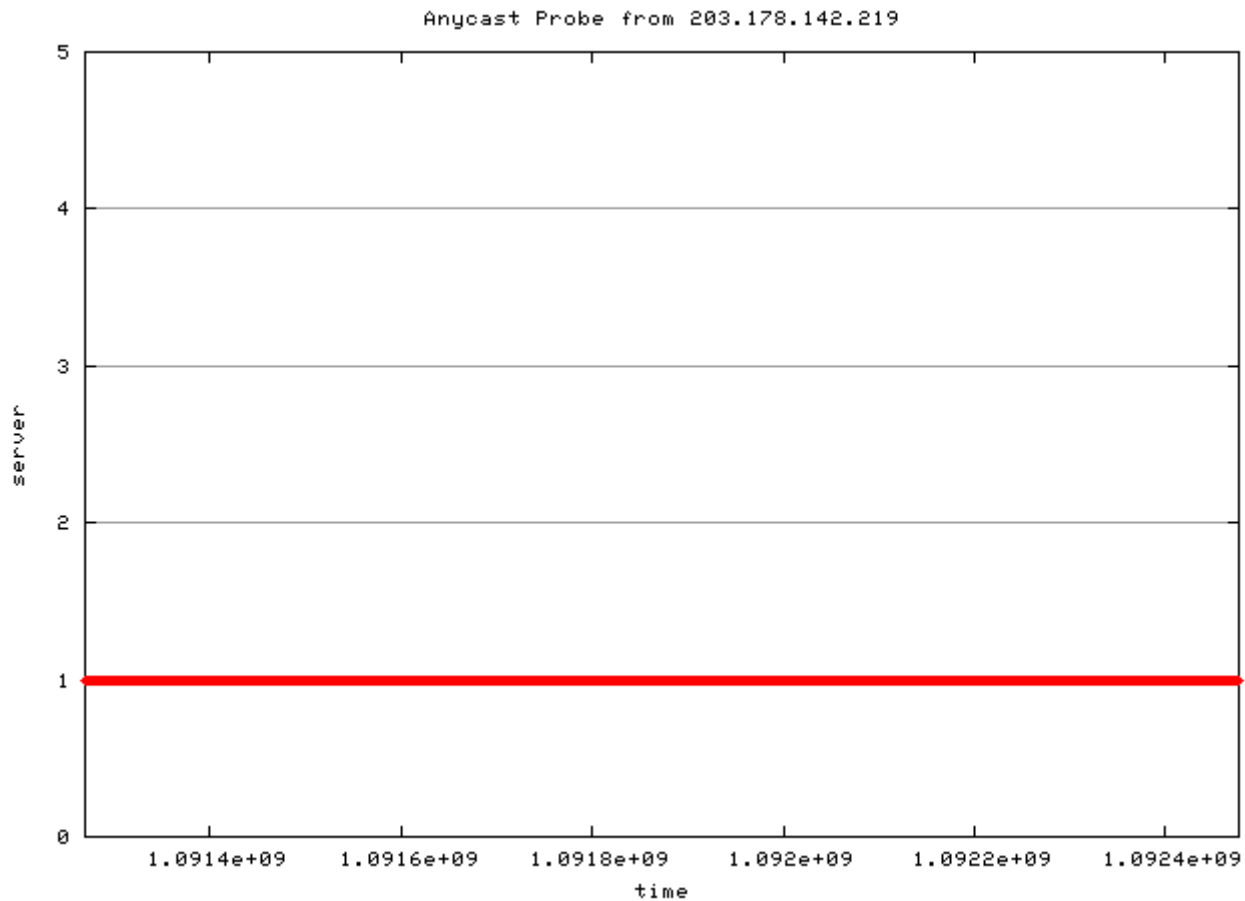
src :200.160.7.130  
(AS22548)  
dst :192.5.5.241

25630 queries

"F-200.160.7.130" ◆

1: gru1a.f.root-servers.org

# Anycast Report - F (4)



"F-203.178.142.219" ◆

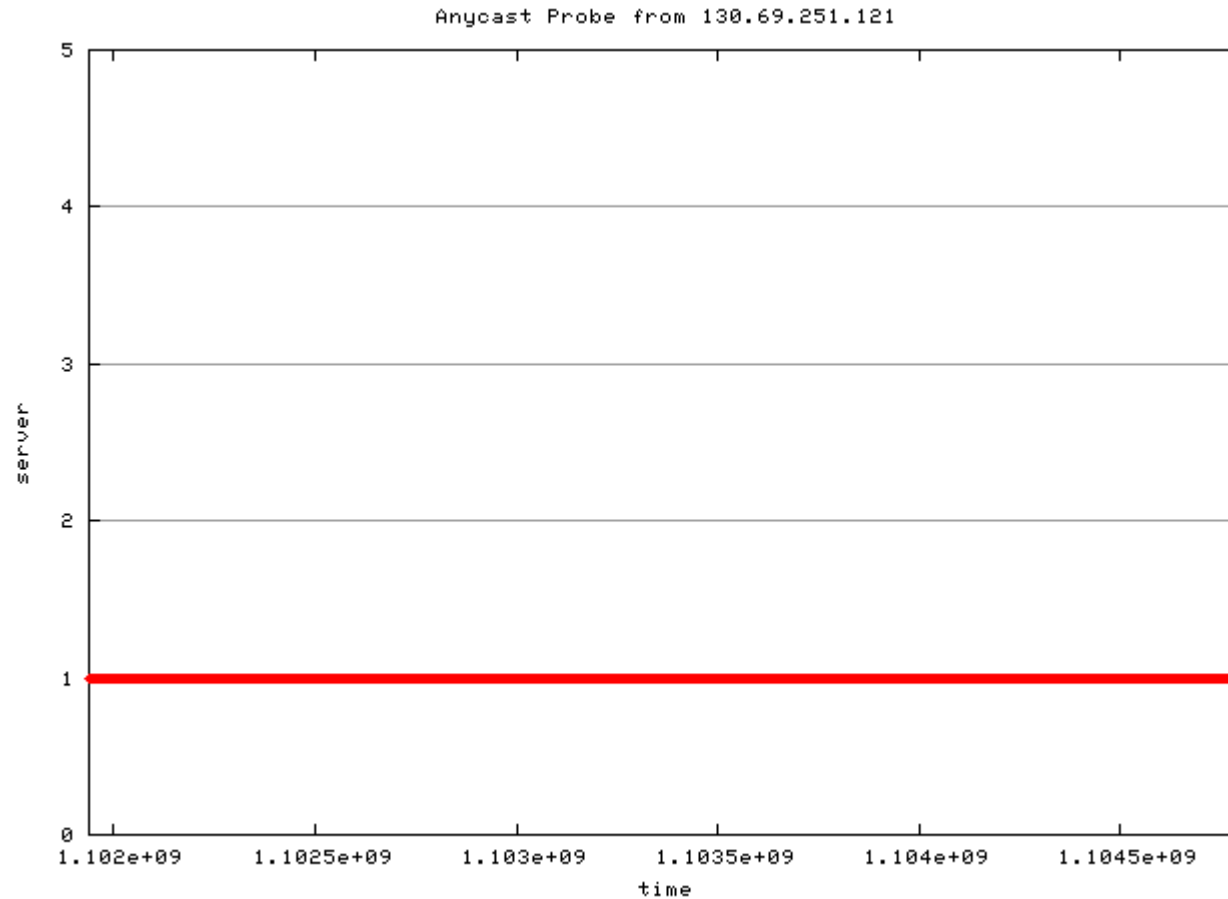
Start : 2004/07/31  
End : 2004/08/14

src :203.178.142.219  
(AS2500)  
dst :192.5.5.241

4020 queries

1: lax1a.f.root-servers.org

# Anycast Report - I (1)



Start : 2004/12/02  
End : 2005/01/04

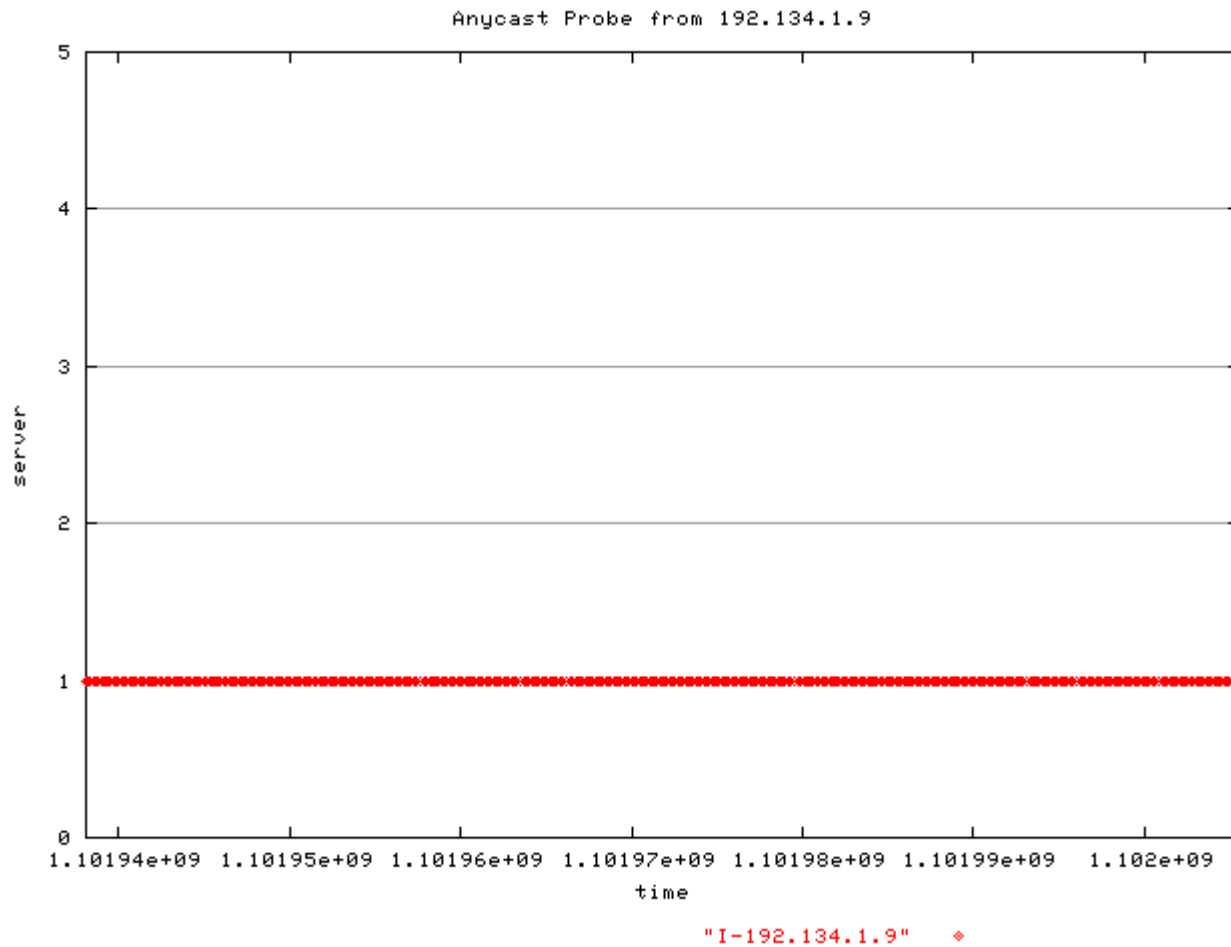
src : 130.69.251.121  
(AS2501)  
dst : 192.36.148.17

11499 queries

"I-130.69.251.121" ◆

1: s1.tok

# Anycast Report - I (2)



Start : 2004/12/02  
End : 2004/12/03

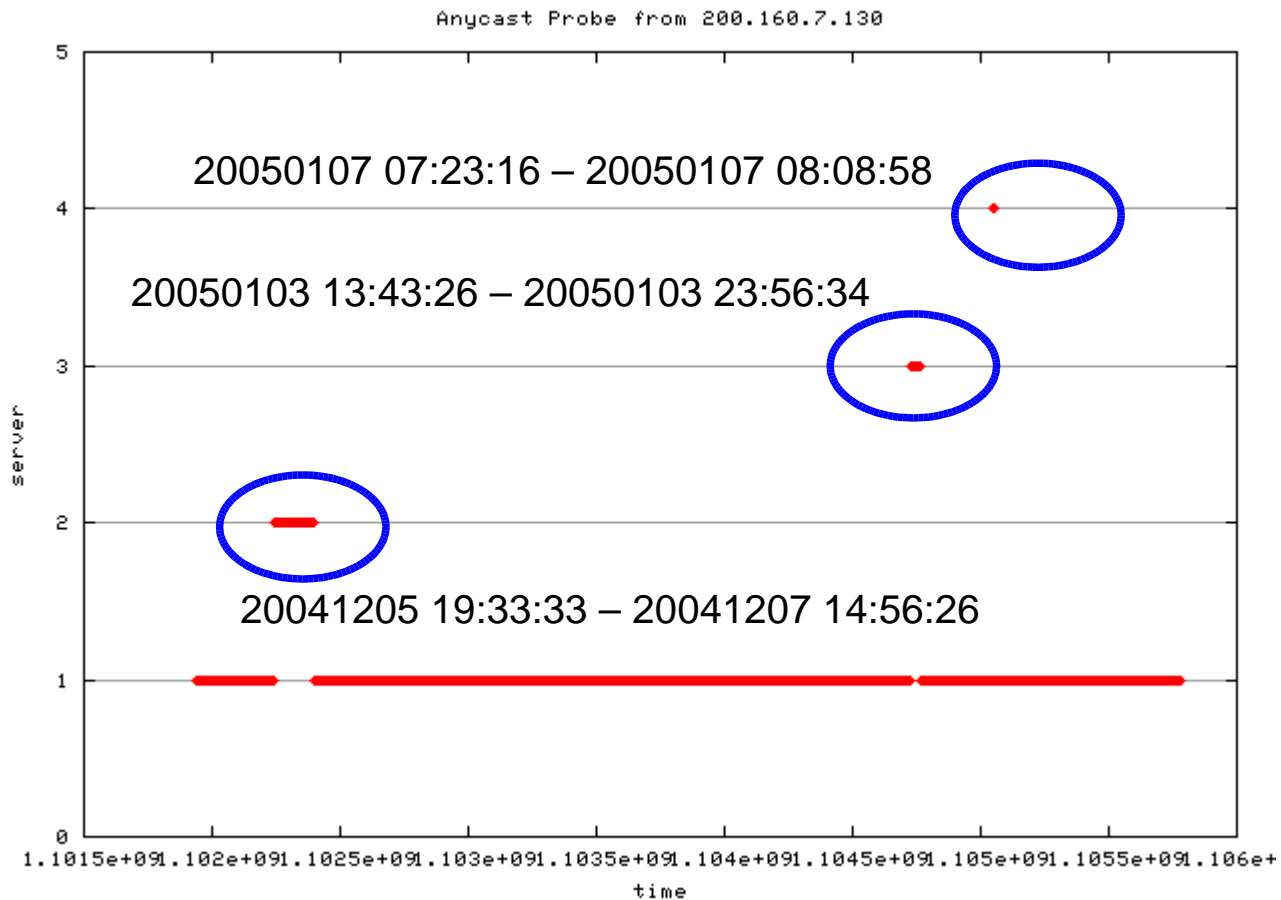
src : 192.134.1.9  
(AS2486)  
dst : 192.36.148.17

454 queries

1: s1.bnx



# Anycast Report - I (3)



Start : 2004/12/02  
End : 2005/01/15

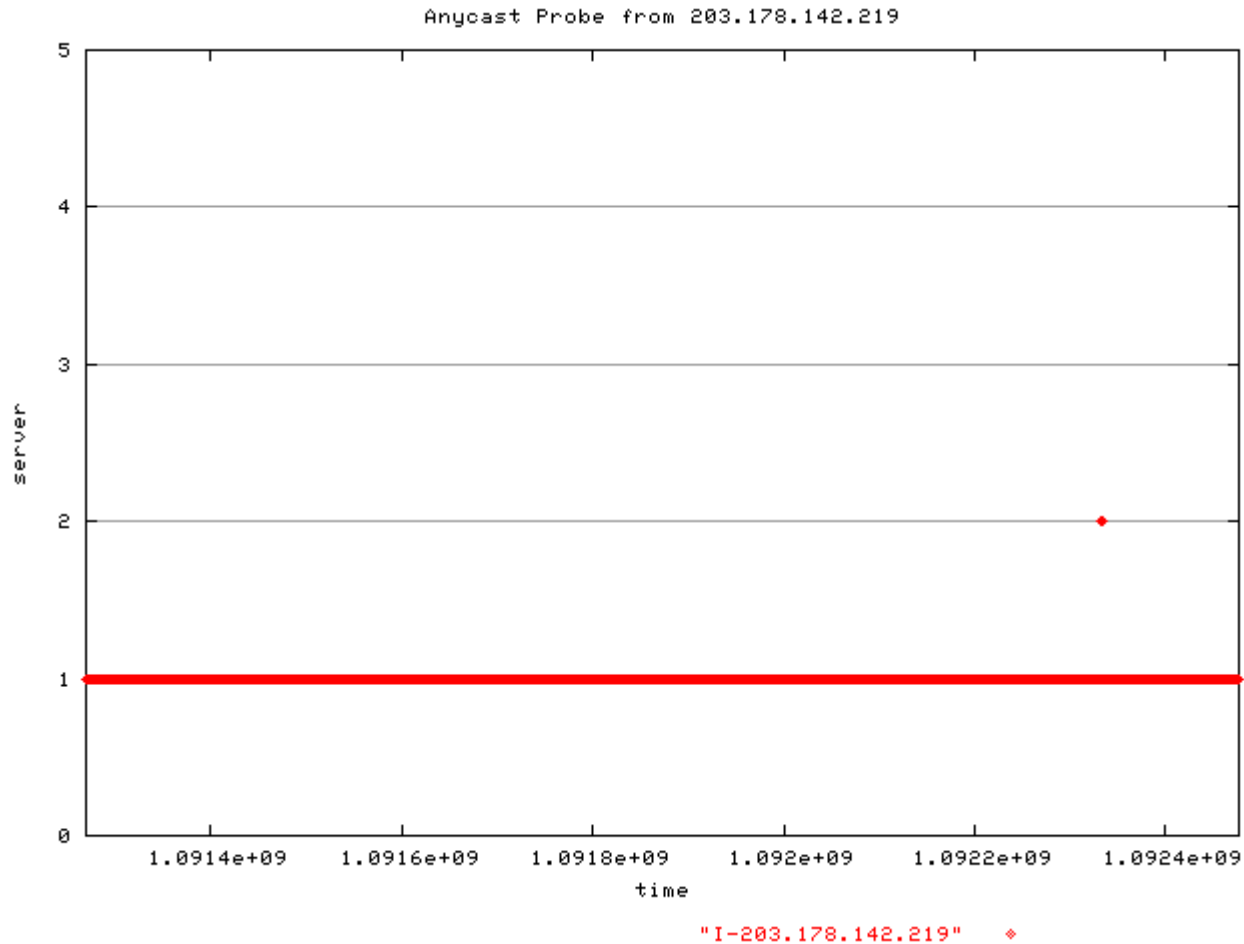
src :200.169.7.130  
(AS22548)  
dst :192.36.148.17

25530 queries

1: s1.tok  
2: s1.mix  
3: s1.gen  
4: s1.ams

"I-200.160.7.130" ◆

# Anycast Report - I (4)



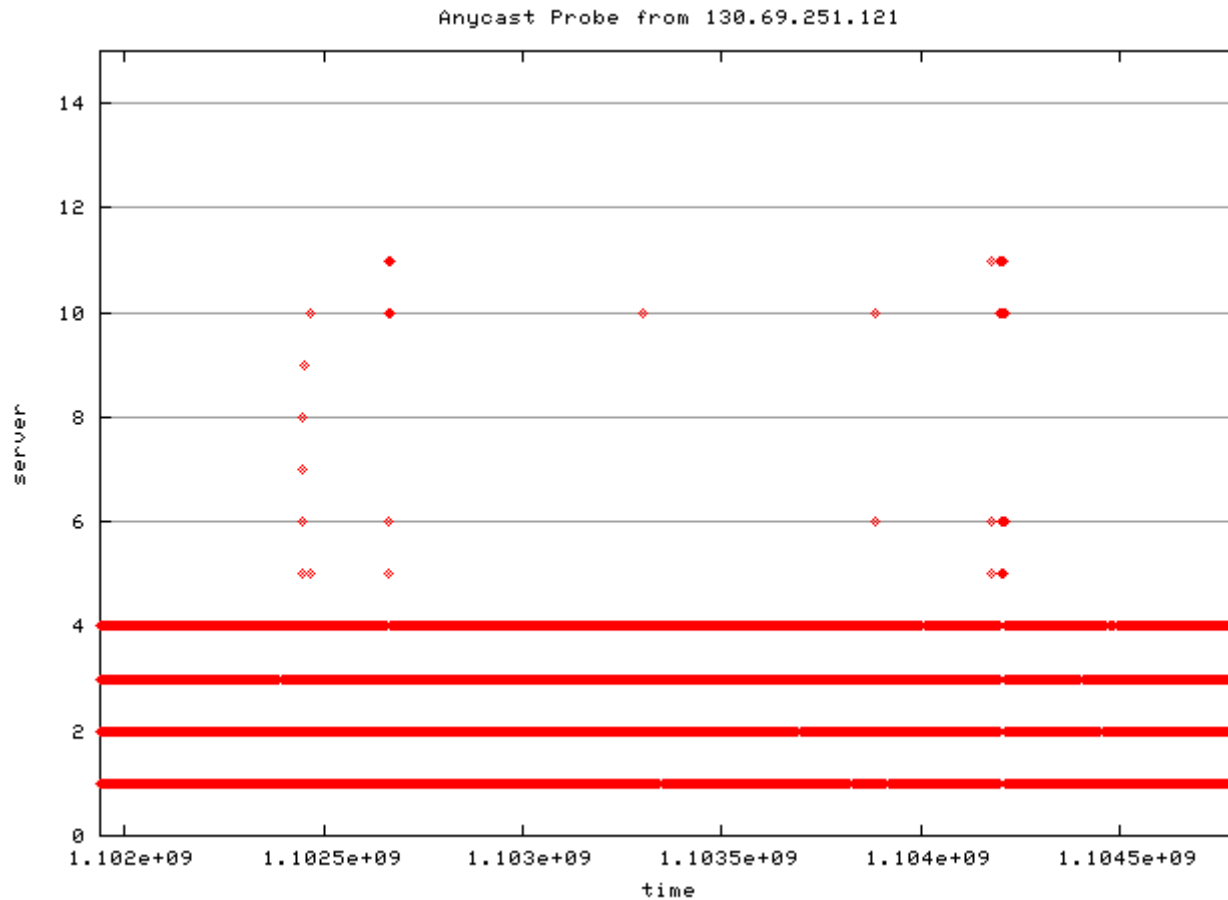
Start : 2004/07/31  
End : 2004/08/14

src :203.178.142.219  
(AS2500)  
dst :192.36.148.17

4029 queries

1: s1.sth  
2: s1.bkx

# Anycast Report - J (1)

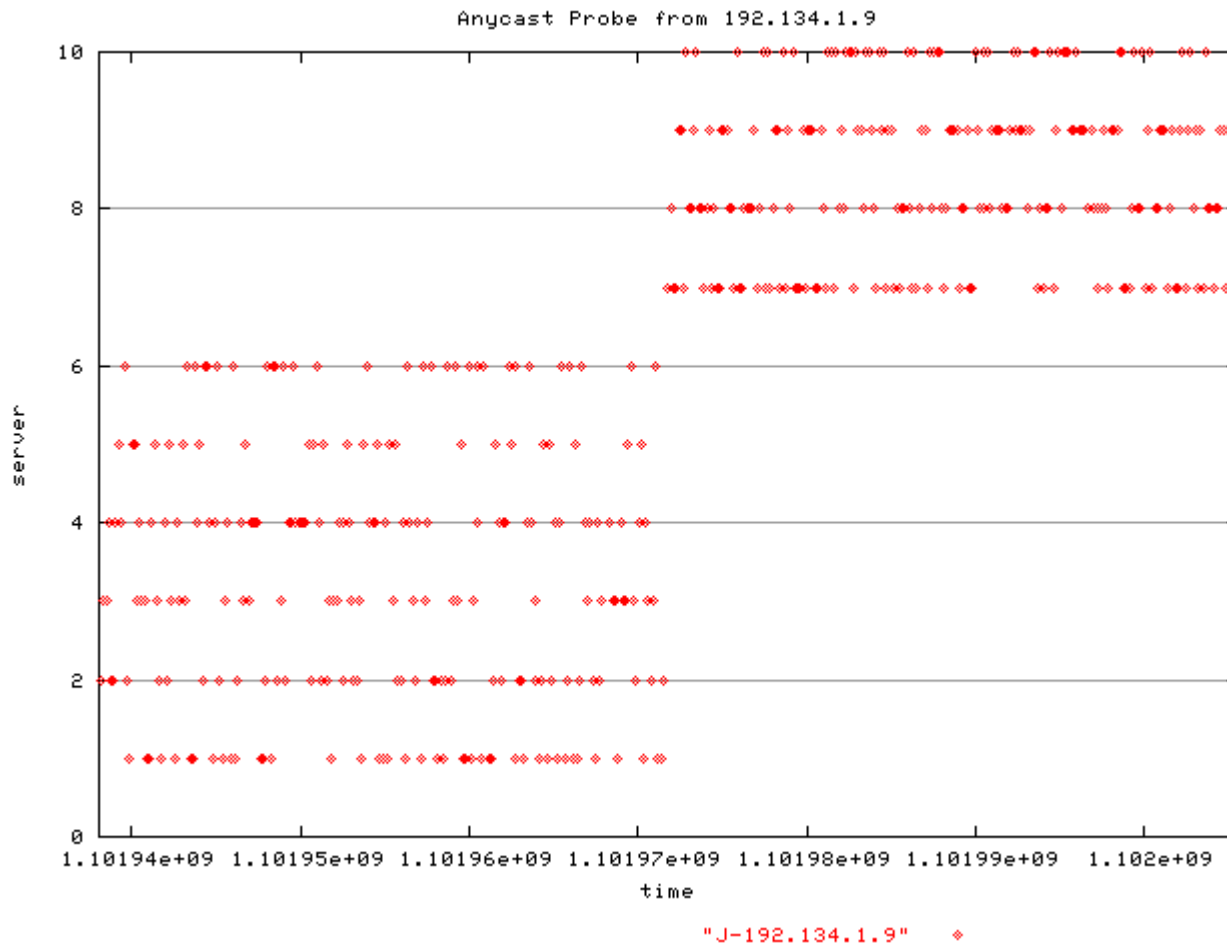


Start : 2004/12/02  
End : 2005/01/04

- 1: jns1-kgld.j.root-servers.net.j.root-servers.net
- 2: jns3-kgld.j.root-servers.net.j.root-servers.net
- 3: jns4-kgld.j.root-servers.net.j.root-servers.net
- 4: jns1-kgld.j.root-servers.net.j.root-servers.net
- 5: jns3-jgld.j.root-servers.net
- 6: jns1-jgld.j.root-servers.net
- 7: jns1-kr.j.root-servers.net
- 8: jns2-fgld.j.root-servers.net
- 9: jns3-fgld.j.root-servers.net
- 10: jns2-jgld.j.root-servers.net
- 11: jns4-jgld.j.root-servers.net
- 12: jns4-kgld.j.root-servers.net
- 13: jns3-kgld.j.root-servers.net
- 14: jns2-kgld.j.root-servers.net

13481 queries

# Anycast Report - J (2)

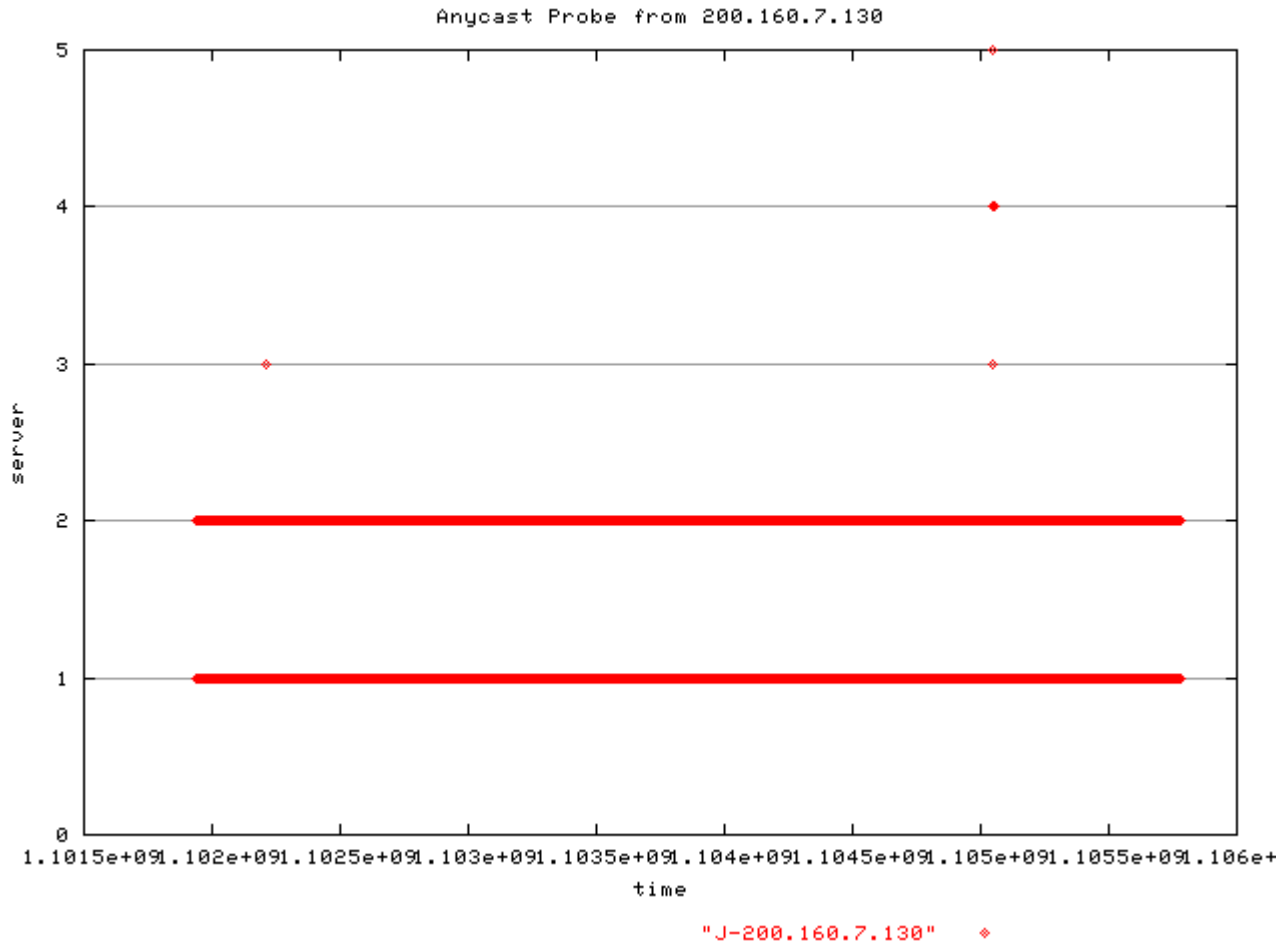


Start : 2004/12/02  
End : 2004/12/03

- 1: jns5-hgtld.j.root-servers.net
- 2: jns6-hgtld.j.root-servers.net
- 3: jns4-hgtld.j.root-servers.net
- 4: jns1-hgtld.j.root-servers.net
- 5: jns3-hgtld.j.root-servers.net
- 6: jns2-hgtld.j.root-servers.net
- 7: jns2-kgld.j.root-servers.net.j.root-servers.net
- 8: jns3-kgld.j.root-servers.net.j.root-servers.net
- 9: jns1-kgld.j.root-servers.net.j.root-servers.net
- 10: jns4-kgld.j.root-servers.net.j.root-servers.net

459 queries

# Anycast Report - J (3)

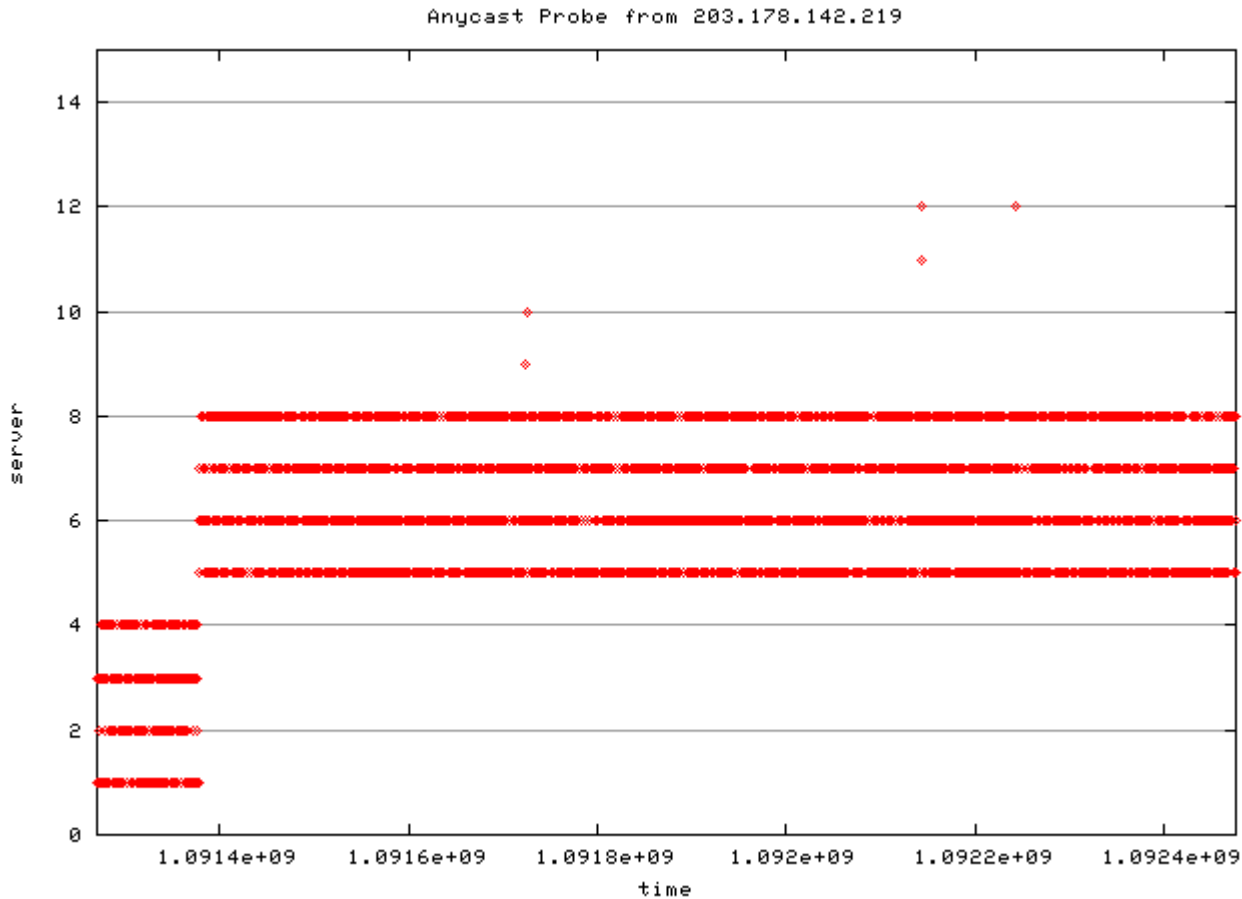


Start : 2004/12/02  
End : 2005/01/15

- 1: jns2-kr.j.root-servers.net
- 2: jns1-kr.j.root-servers.net
- 3: jns1-agtld.j.root-servers.net
- 4: jns4-agtld.j.root-servers.net
- 5: jns3-agtld.j.root-servers.net

22534 queries

# Anycast Report - J (4)

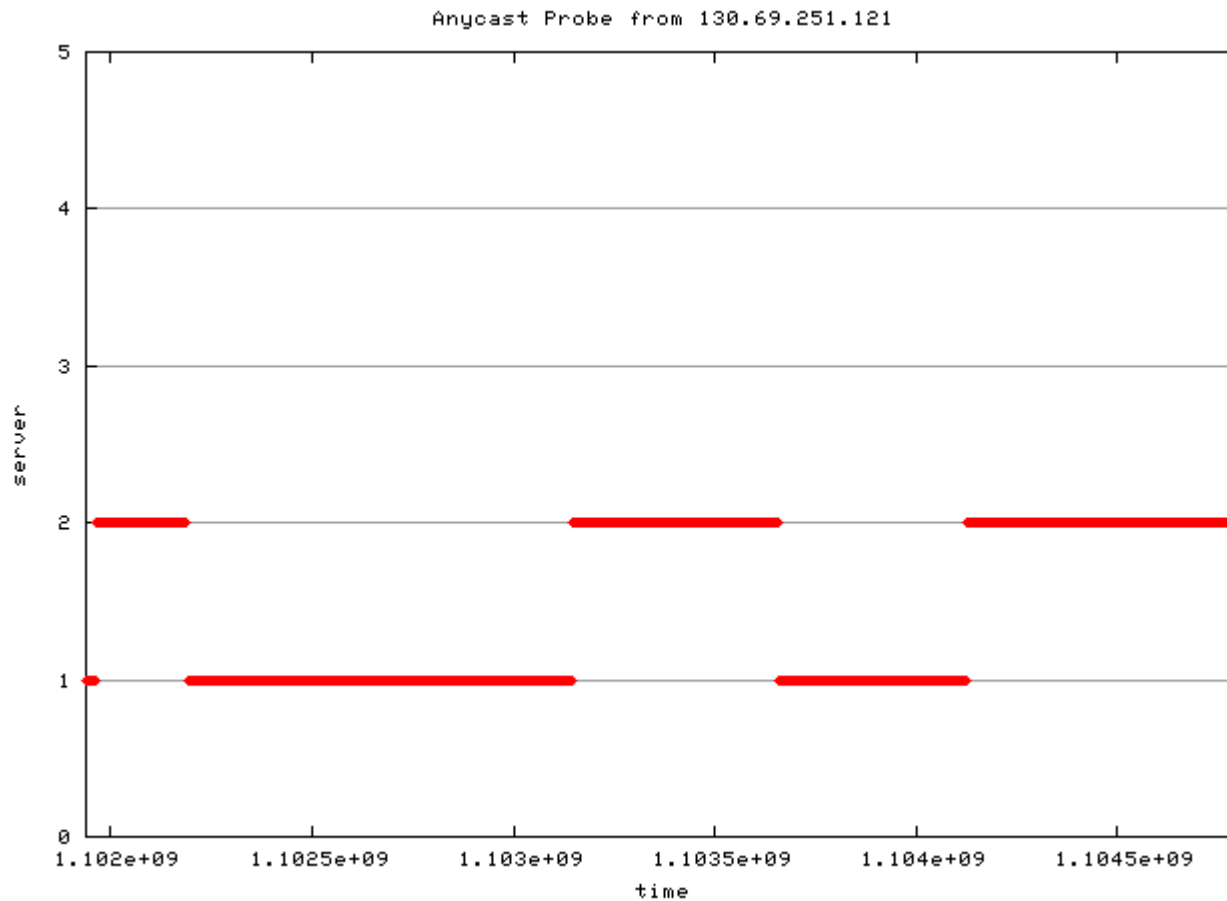


Start : 2004/07/31  
End : 2004/08/14

- 1: jns4-kgld
- 2: jns1-kgld
- 3: jns2-kgld
- 4: jns3-kgld
- 5: jns4-kgld.j.root-servers.net
- 6: jns3-kgld.j.root-servers.net
- 7: jns2-kgld.j.root-servers.net
- 8: jns1-kgld.j.root-servers.net
- 9: jns3-igtld.j.root-servers.net
- 10: jns2-igtld.j.root-servers.net
- 11: jns4-igtld.j.root-servers.net
- 12: jns1-igtld.j.root-servers.net

4034 queries

# Anycast Report - K (1)



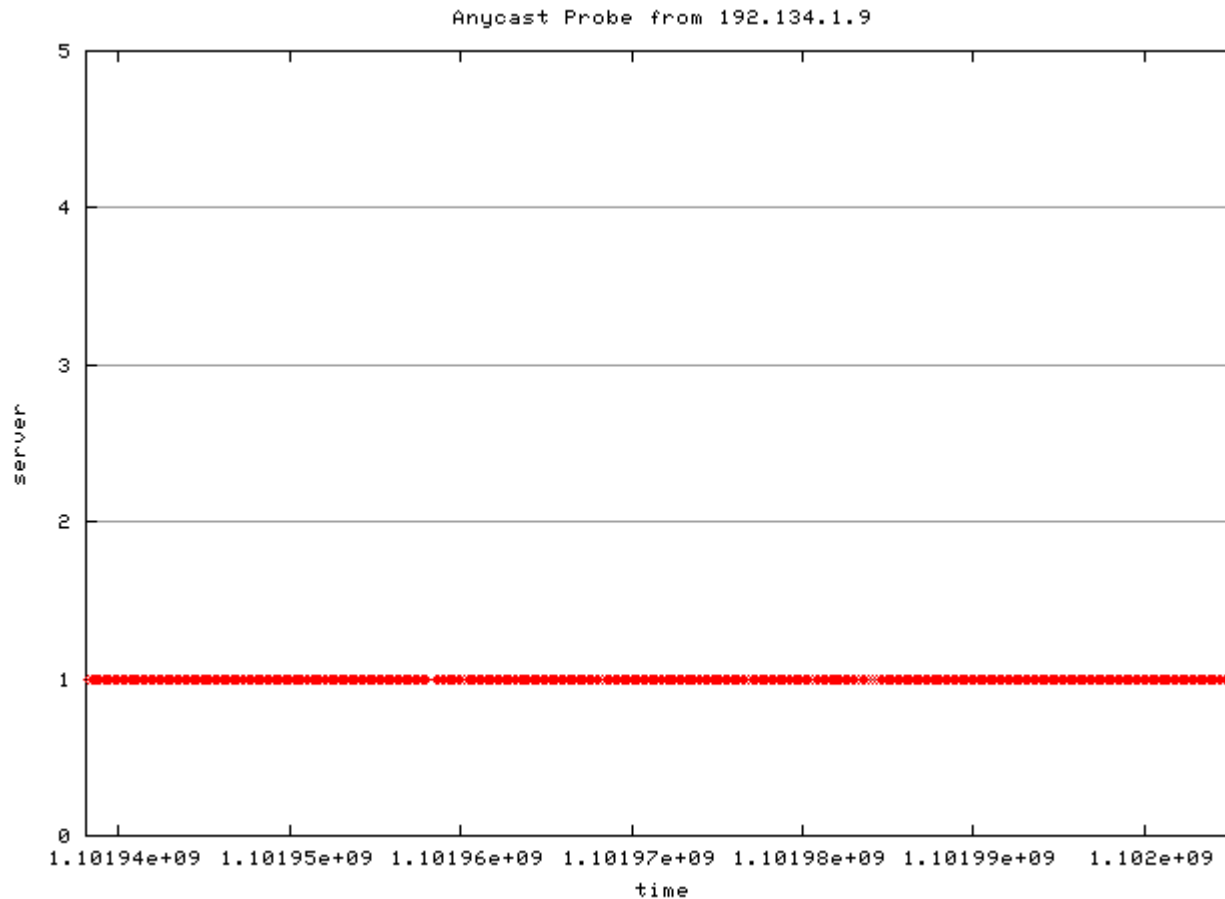
Start : 2004/12/02  
End : 2005/01/04

13465 queries

"K-130.69.251.121" ♦

1: k2.ams-ix  
2: k1.linx

# Anycast Report - K (2)



Start : 2004/12/02  
End : 2004/12/03

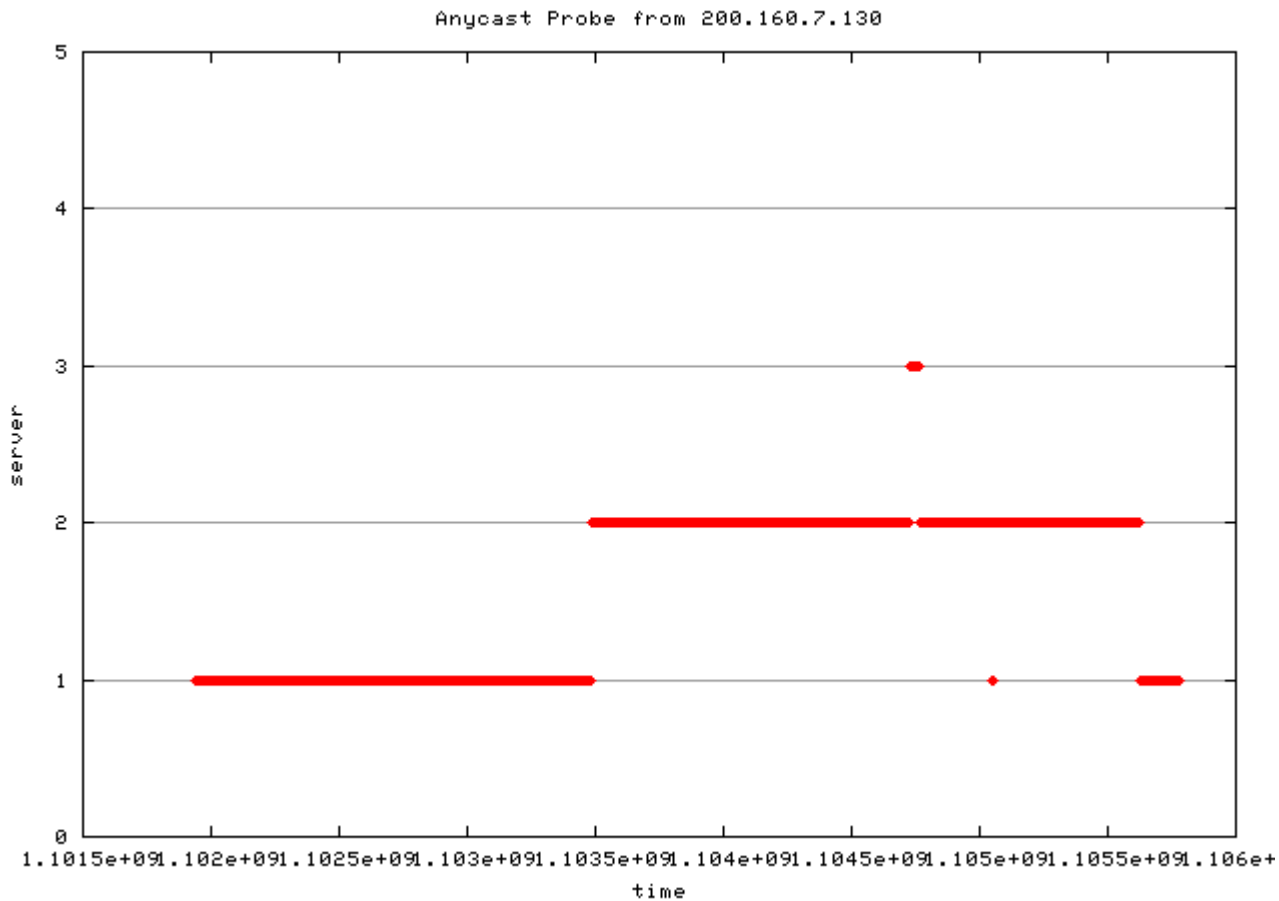
449 queries

"K-192.134.1.9" ♦

1: k2.linx



# Anycast Report - K (3)

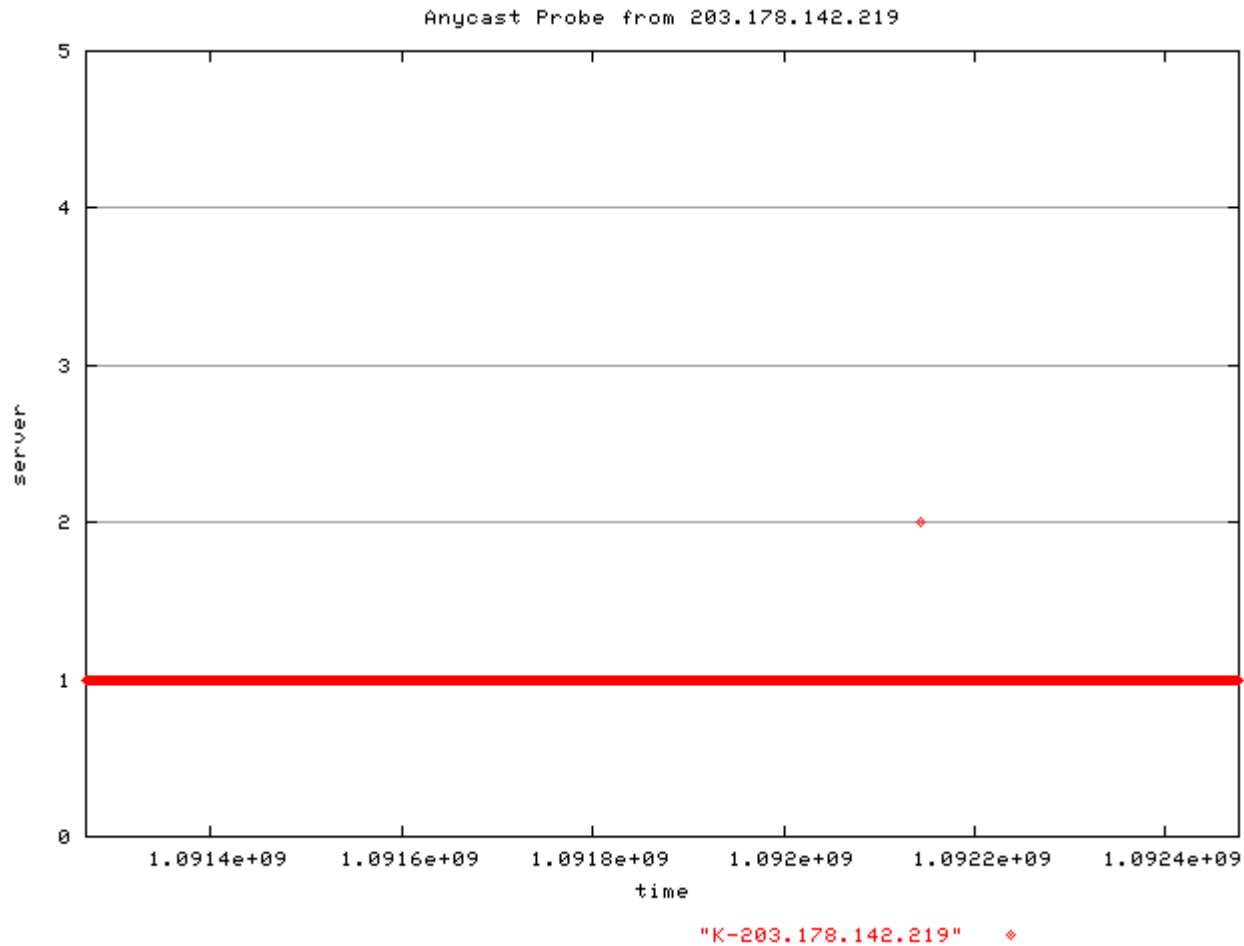


Start : 2004/12/02  
End : 2005/01/15

25611 queries

1: k1.linx  
2: k2.ams-ix  
3: k1.cern

# Anycast Report - K (4)

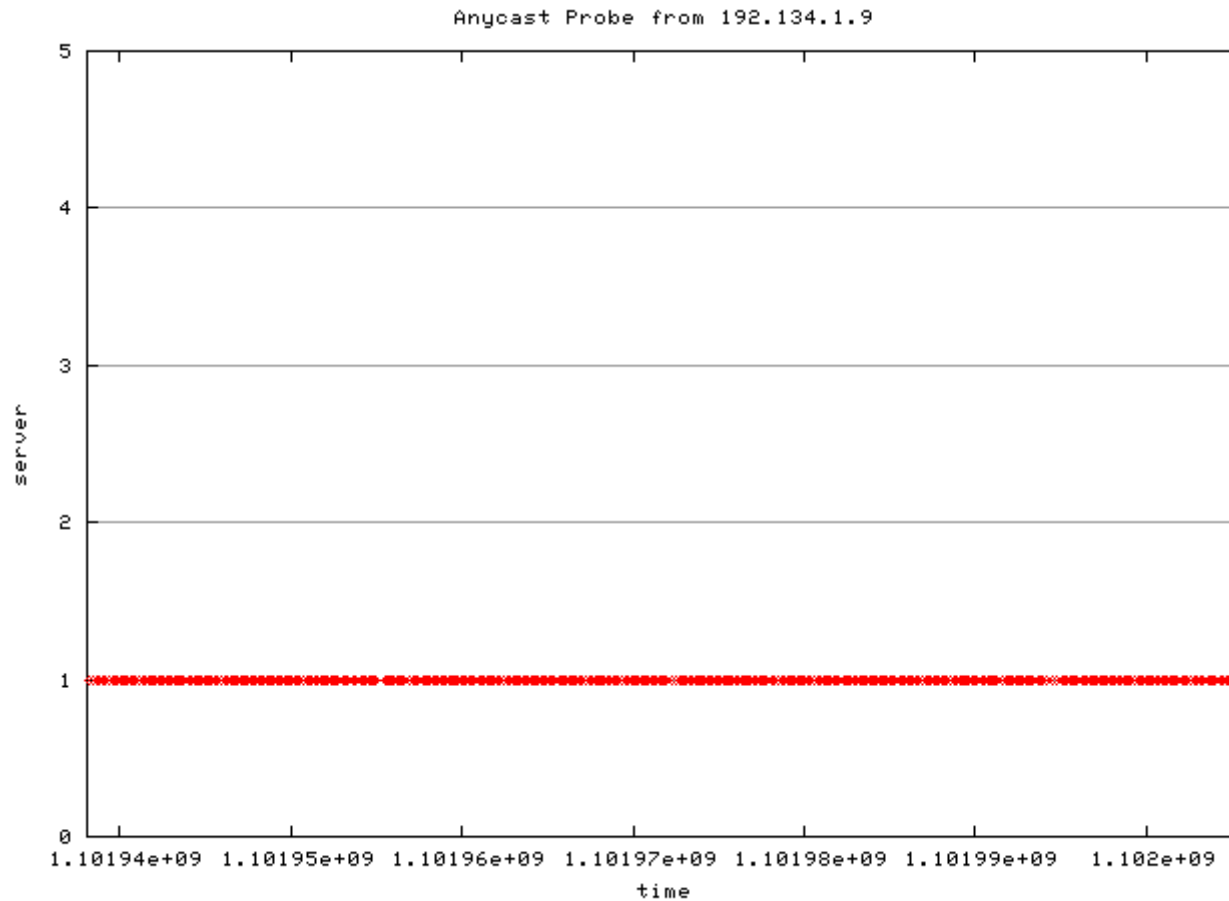


Start : 2004/07/31  
End : 2004/08/14

4025 queries

1: k2.linx  
2: k1.ams-ix

# Anycast Report - M (1)



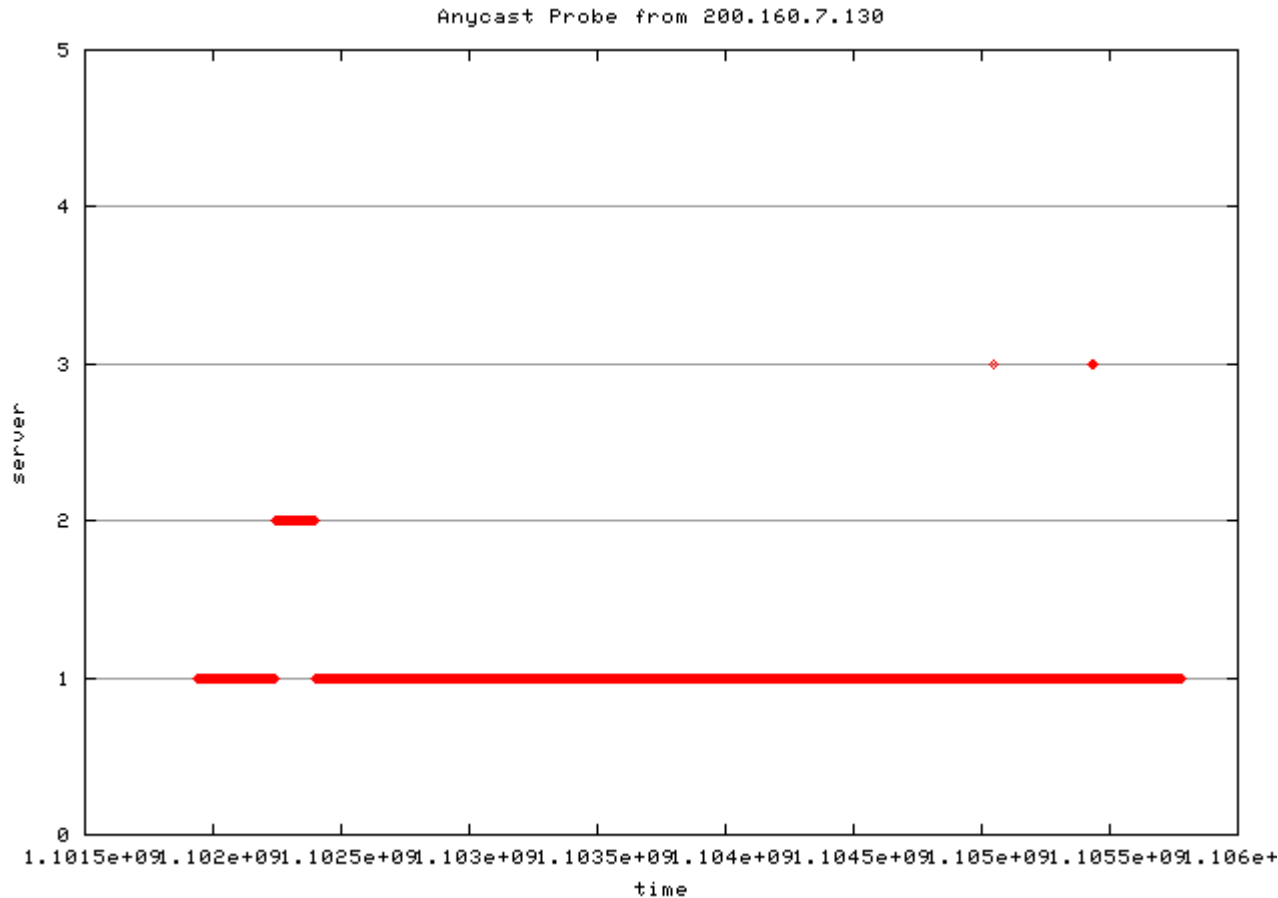
Start : 2004/12/02  
End : 2004/12/03

423 queries

"M-192.134.1.9" ◆

1: M-cdg2

# Anycast Report - M (2)



Start : 2004/12/02  
End : 2005/01/15

25524 queries

"M-200.160.7.130" ◆

1: M-d2  
2: M-cdg1  
3: M-n3

# Discussion

- ◆ Similar works
  - ◆ dnsmon
  - ◆ Randy's anycast probe
- ◆ However, not same results
  - ◆ From dnsprobe, not so many switches...
- ◆ Probe Interval ?
  - ◆ If we increase probes, dnsprobe observes switches ?
- ◆ Probe points ?
  - ◆ How Planet lab. Works ?
  - ◆ Where are servers of Planet lab. ?

# Future of anycast analysis

- ◆ How can we collect “reliable” data ?
- ◆ For collecting data ...
  - ◆ Need more distributed probe points
  - ◆ Just for anycast probing
    - ◆ Dialup probe is enough
  - ◆ For analysis of anycast stability
    - ◆ Fixed host
    - ◆ Long span probes
- ◆ How do we proceed ?

# How it works ?

