Observations on the anycast root using DNSMON

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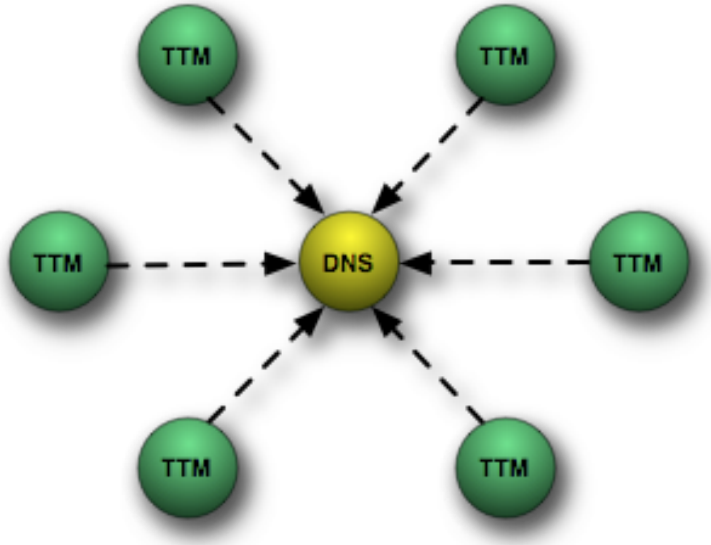
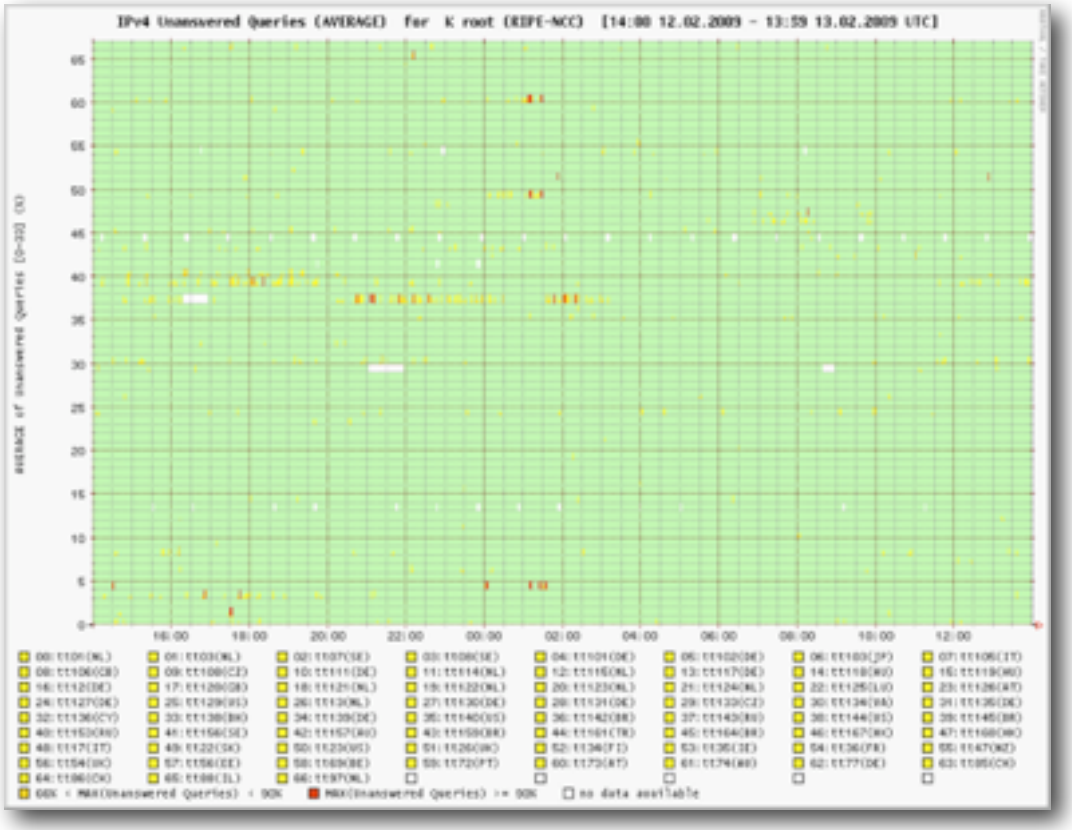
What is DNSMON anyway?

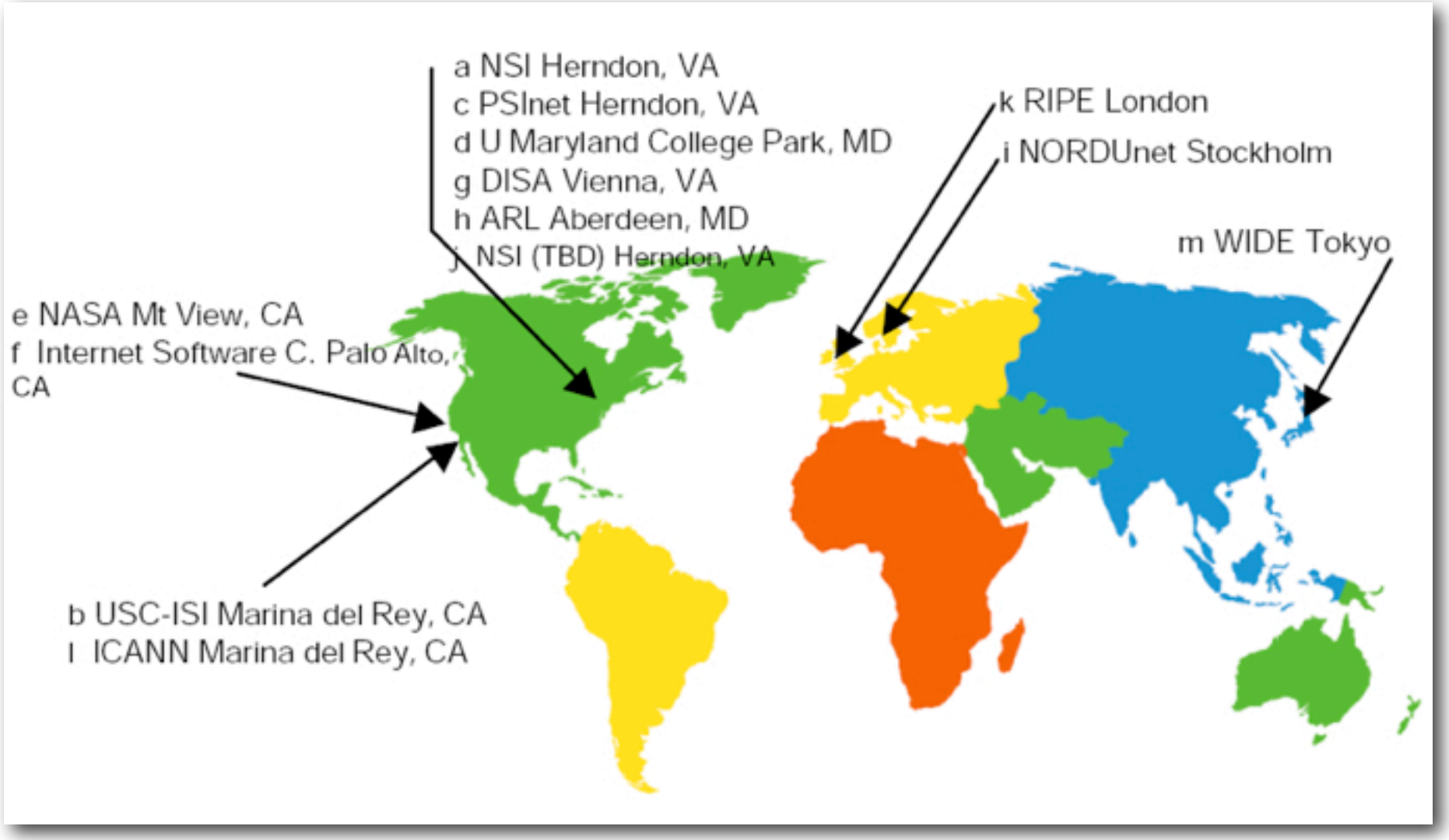
- Infrastructure DNS Monitoring
- Probes from ~80 globally distributed probes
- Monitors root, .arpa, ENUM, ccTLD, gTLD

Methodology

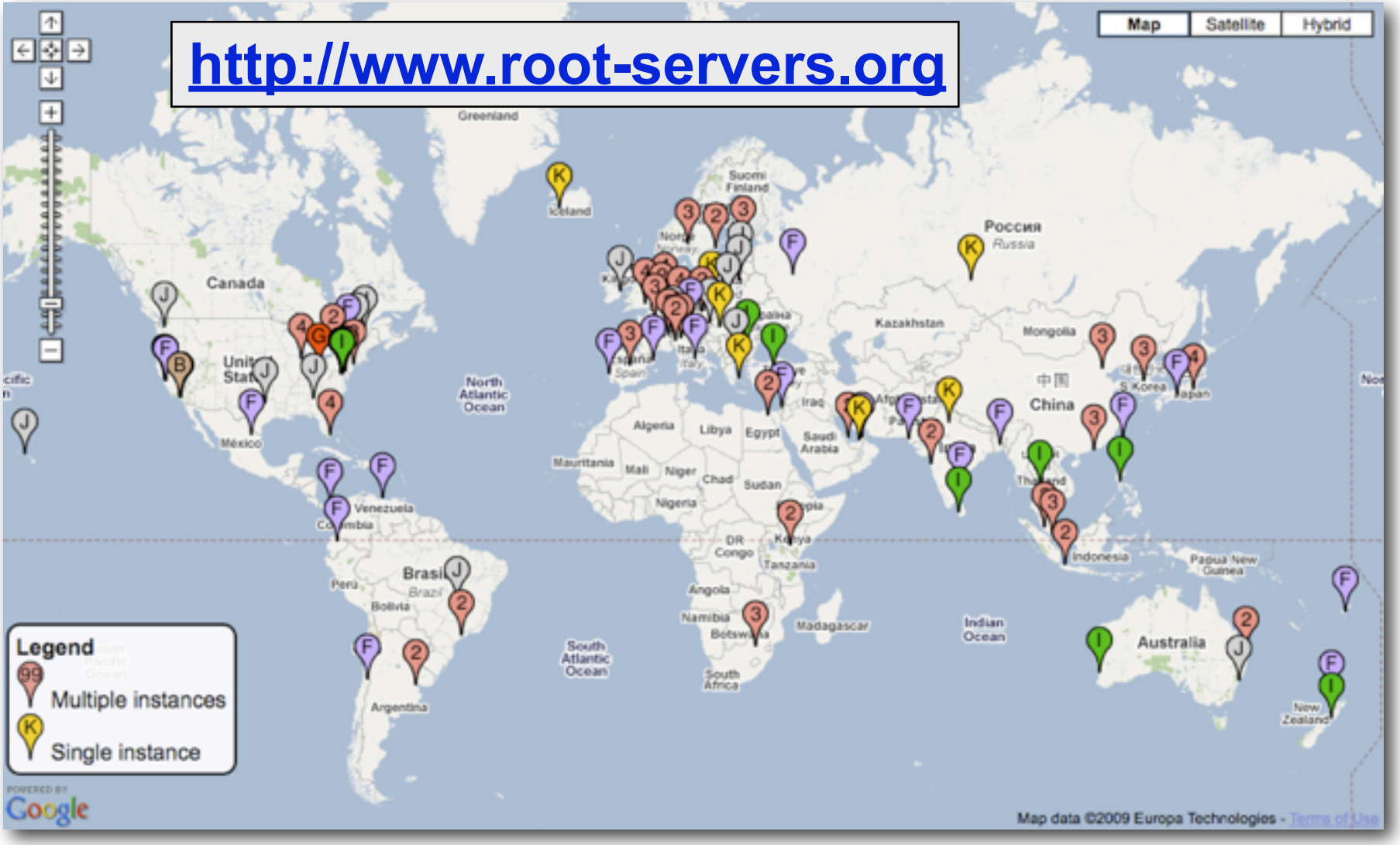




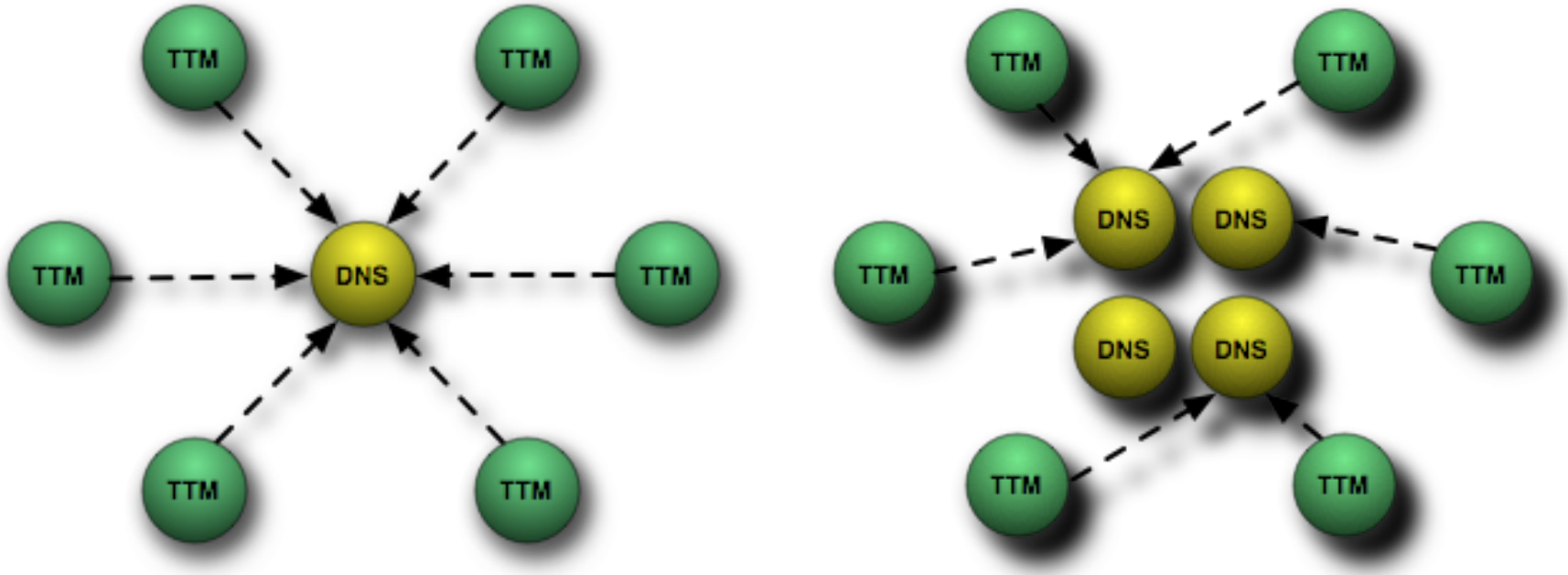
Root server locations?



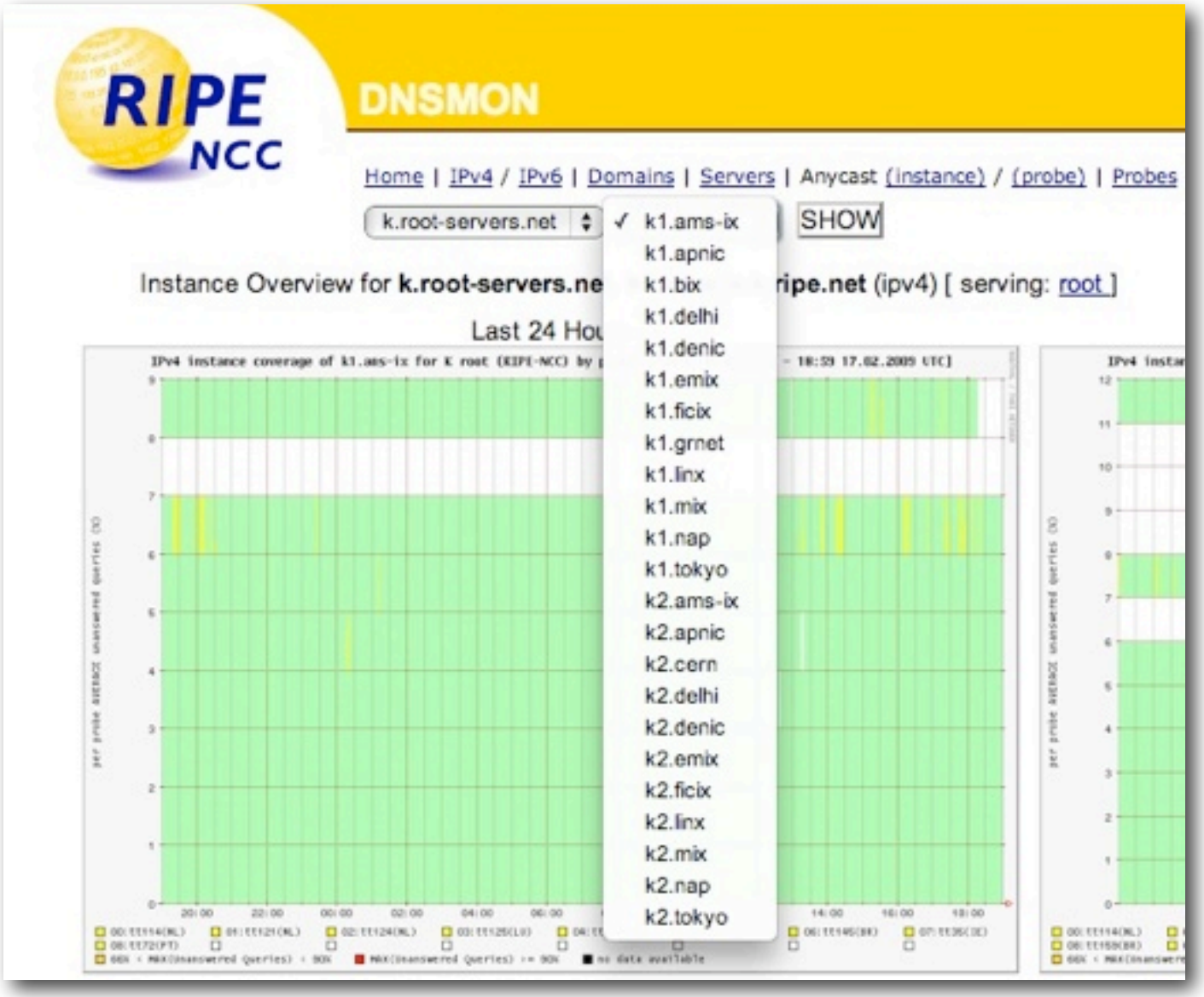
Root server locations



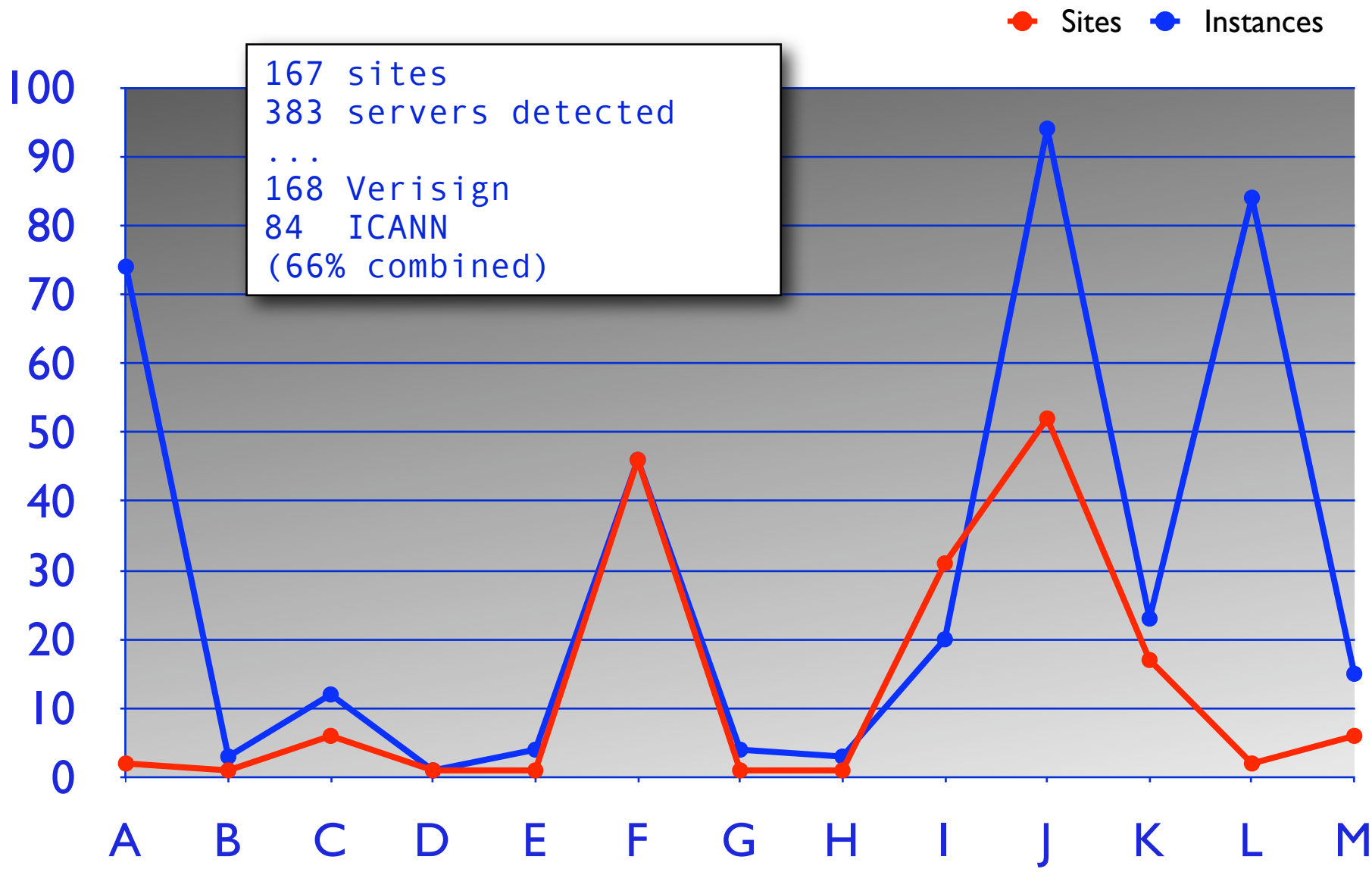
Anycast instance view



Anycast instance reporting

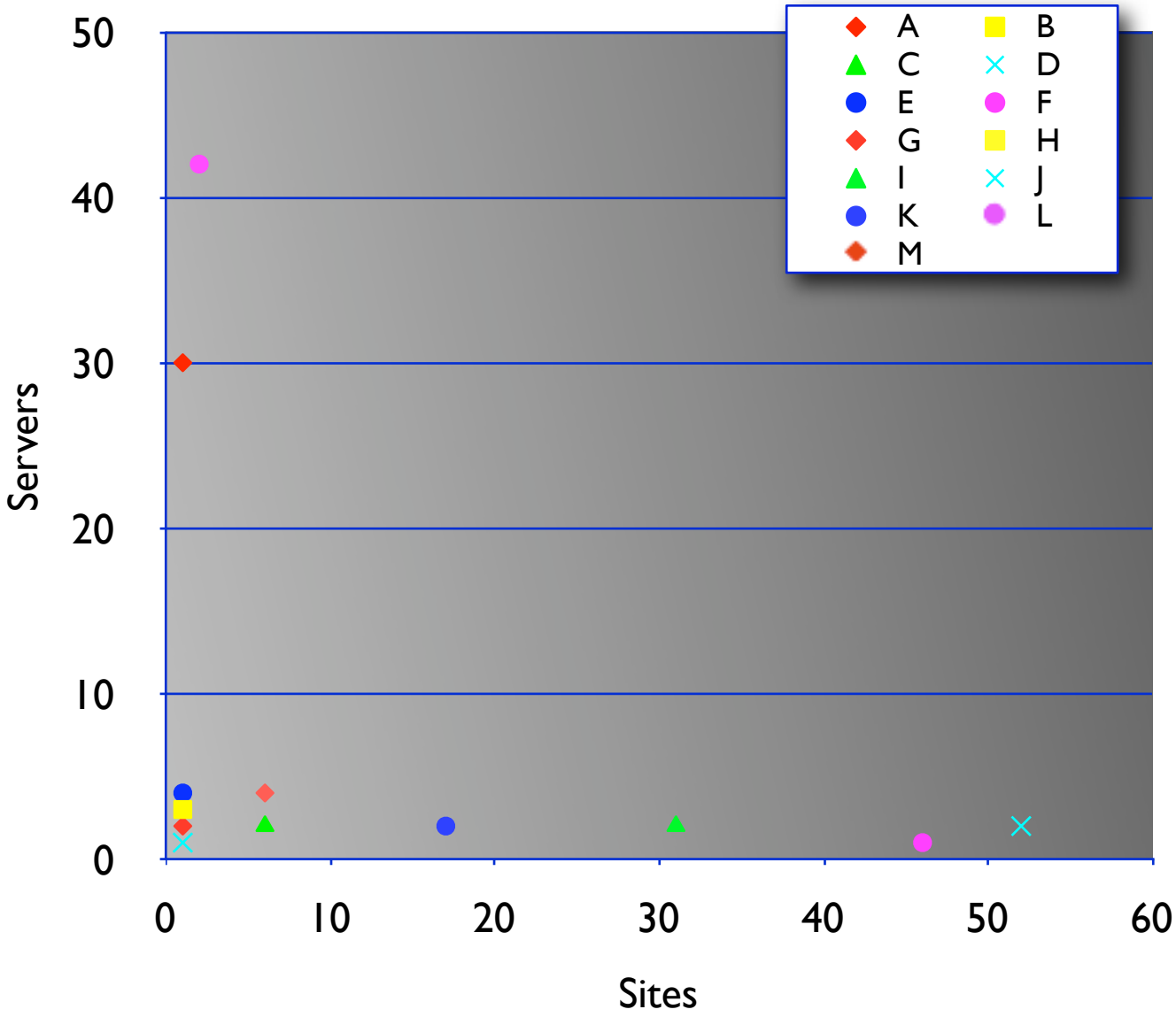


Total number of anycast servers seen

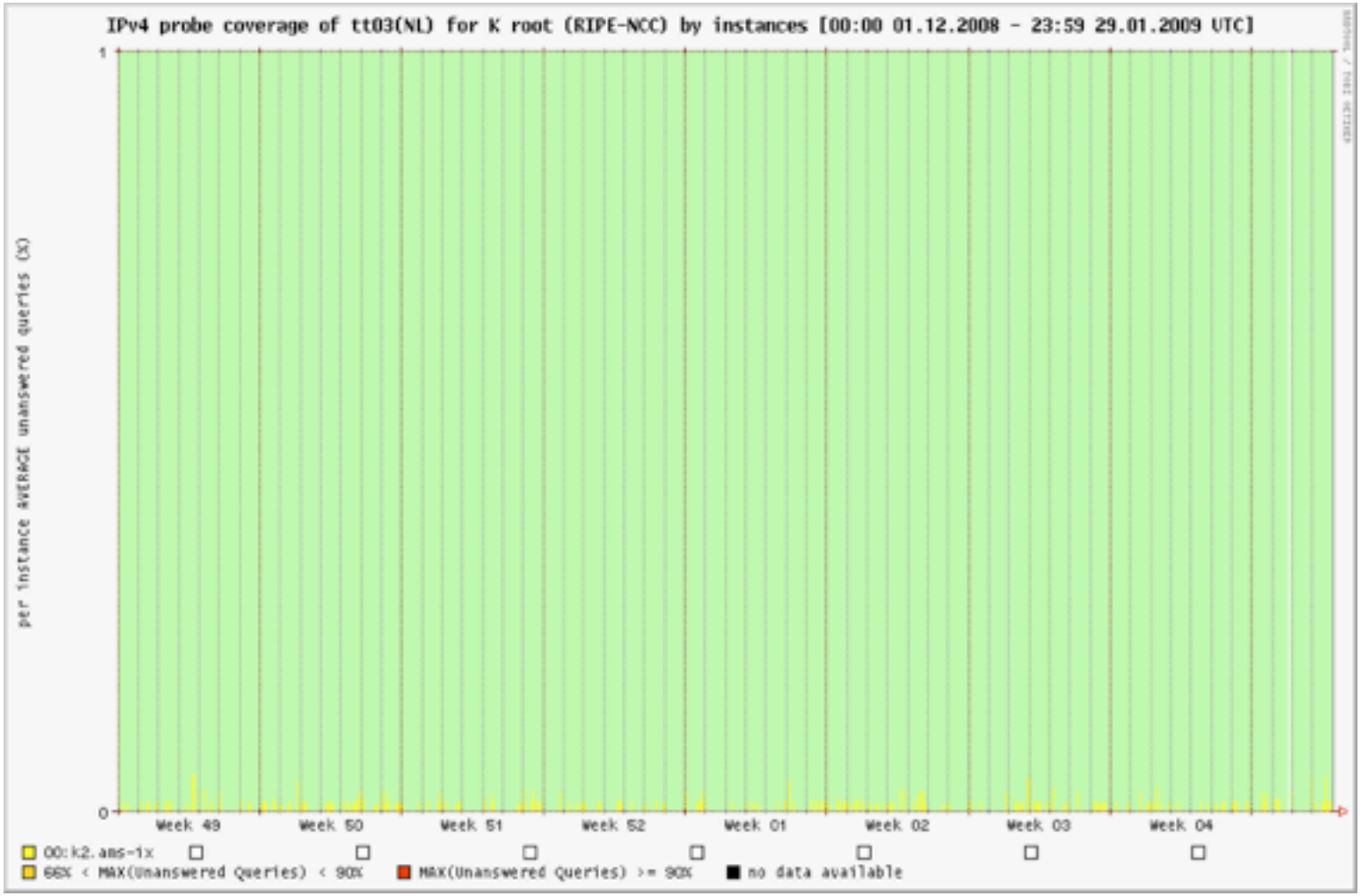


Anycast implementations

root	Sites	Servers
A	2	> 30
B	1	3
C	6	2
D	1	1
E	1	4
F	46	1
G	1	2
H	1	3
I	31	1-2
J	52	> 2
K	17	2
L	2	42
M	6	4

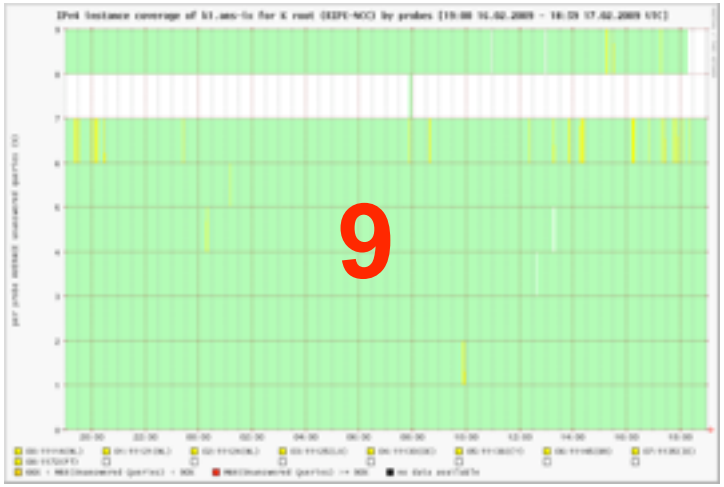


k2.amsix from one probe, 9 weeks

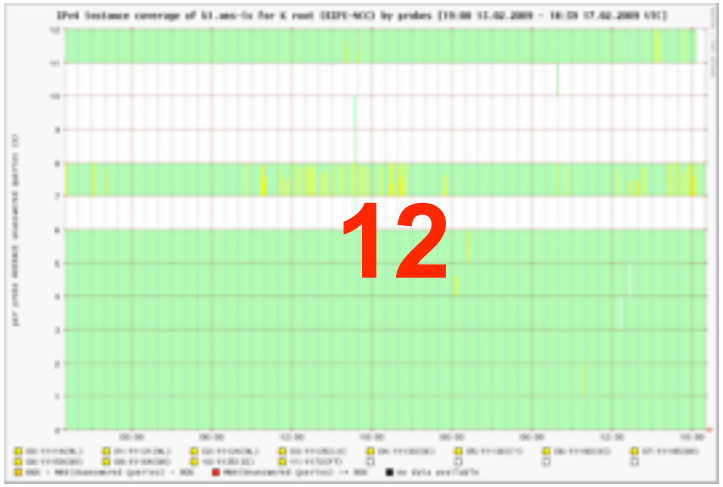


Probes seeing k1.amsix

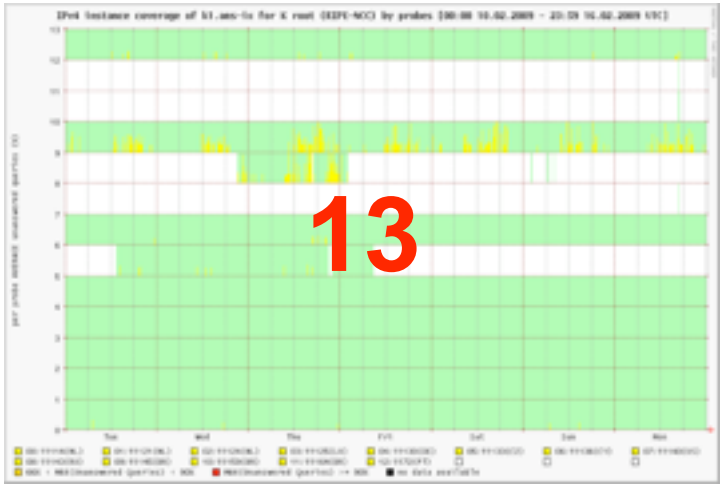
24 Hours



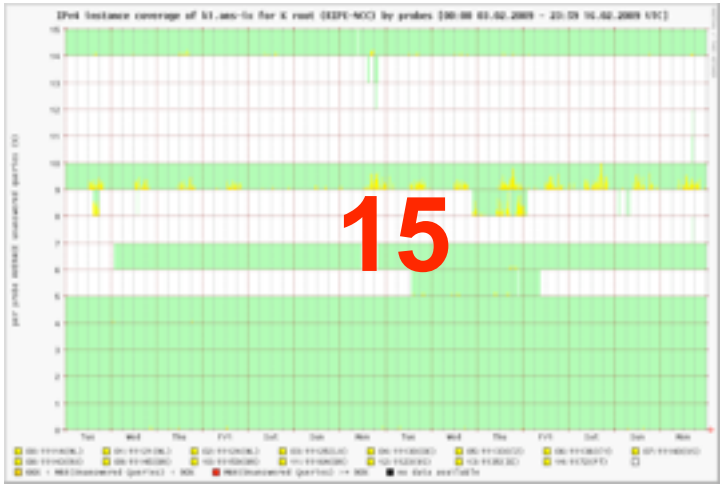
48 Hours



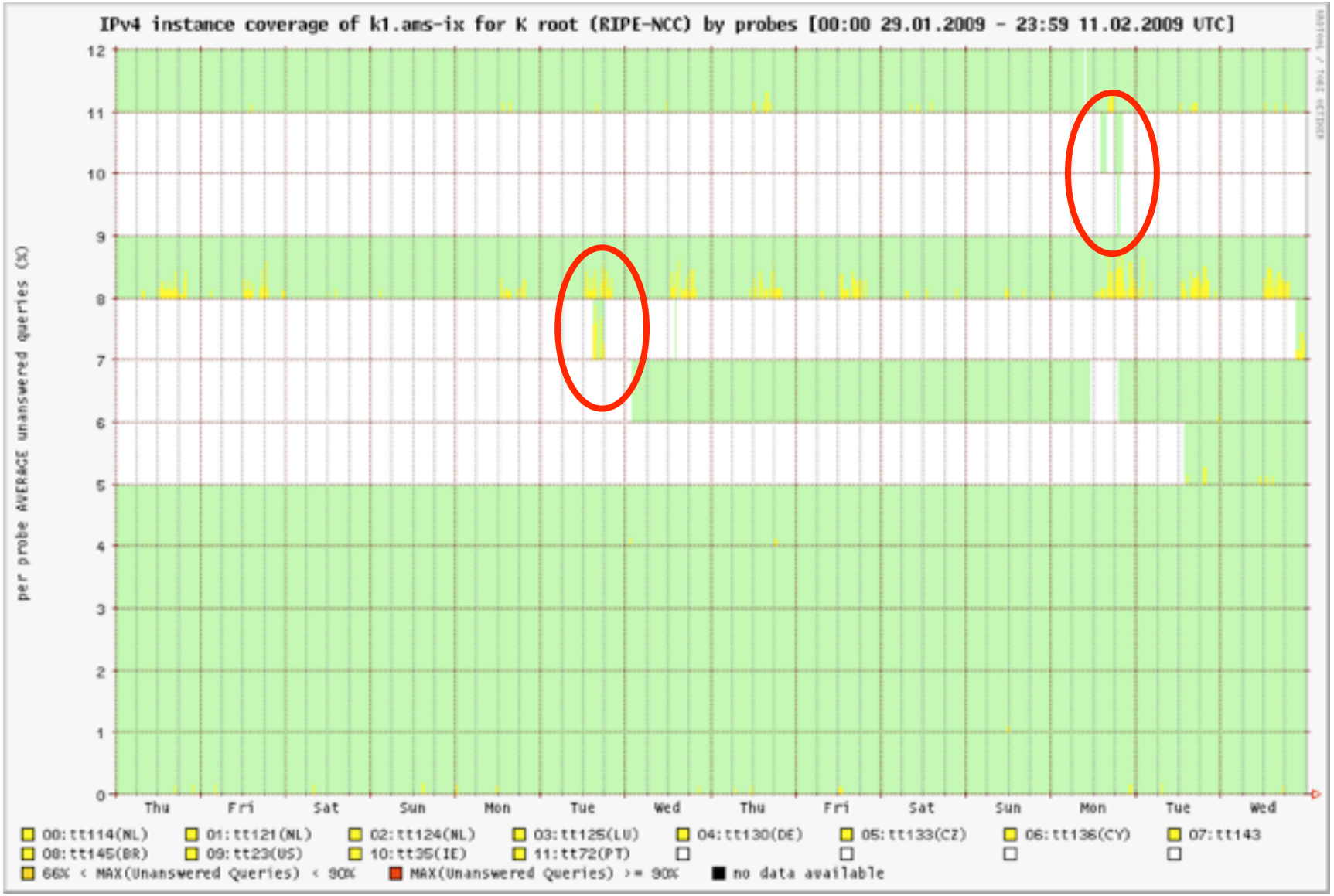
7 Days



14 Days

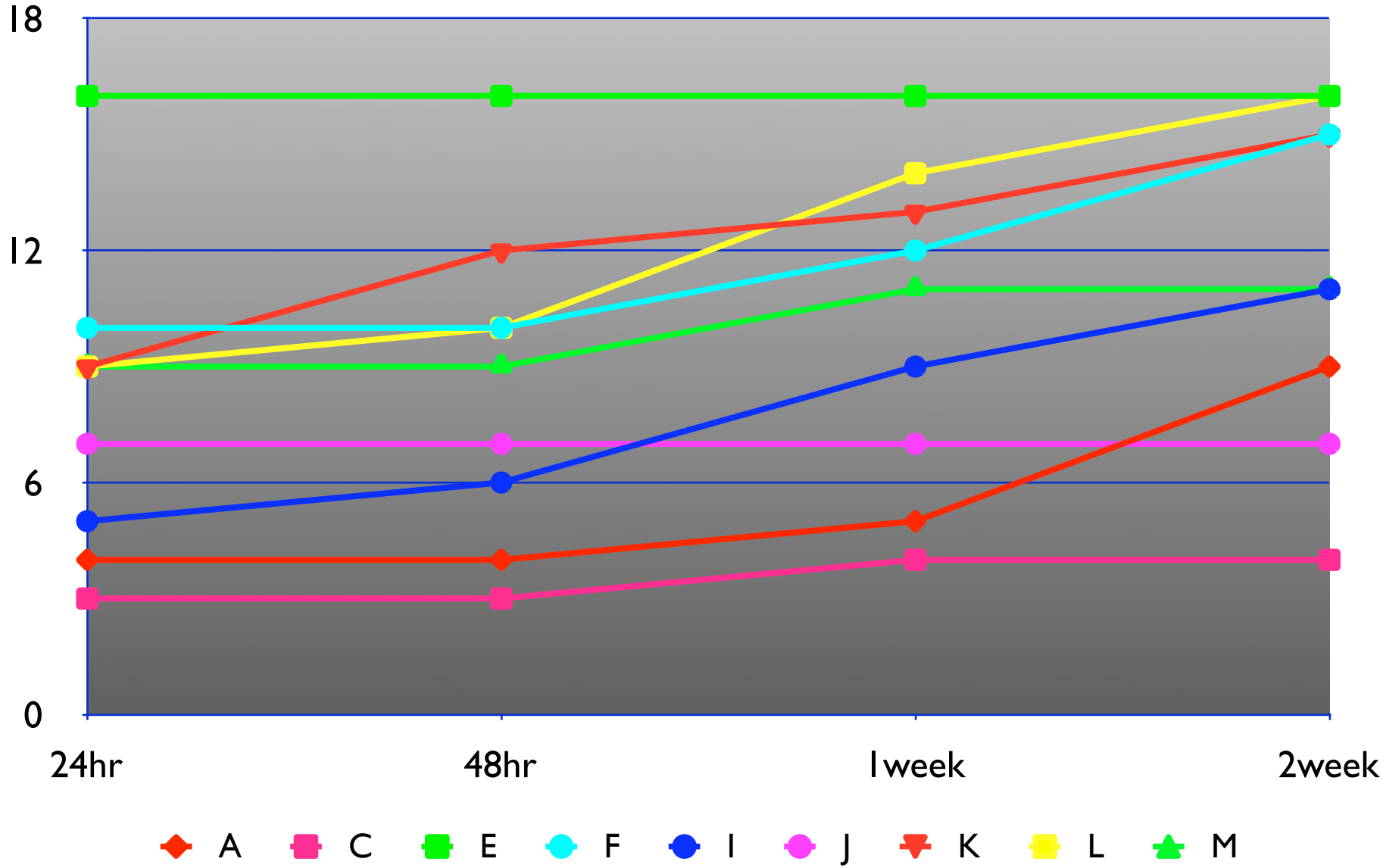


Server - k1.amsix - 2 weeks

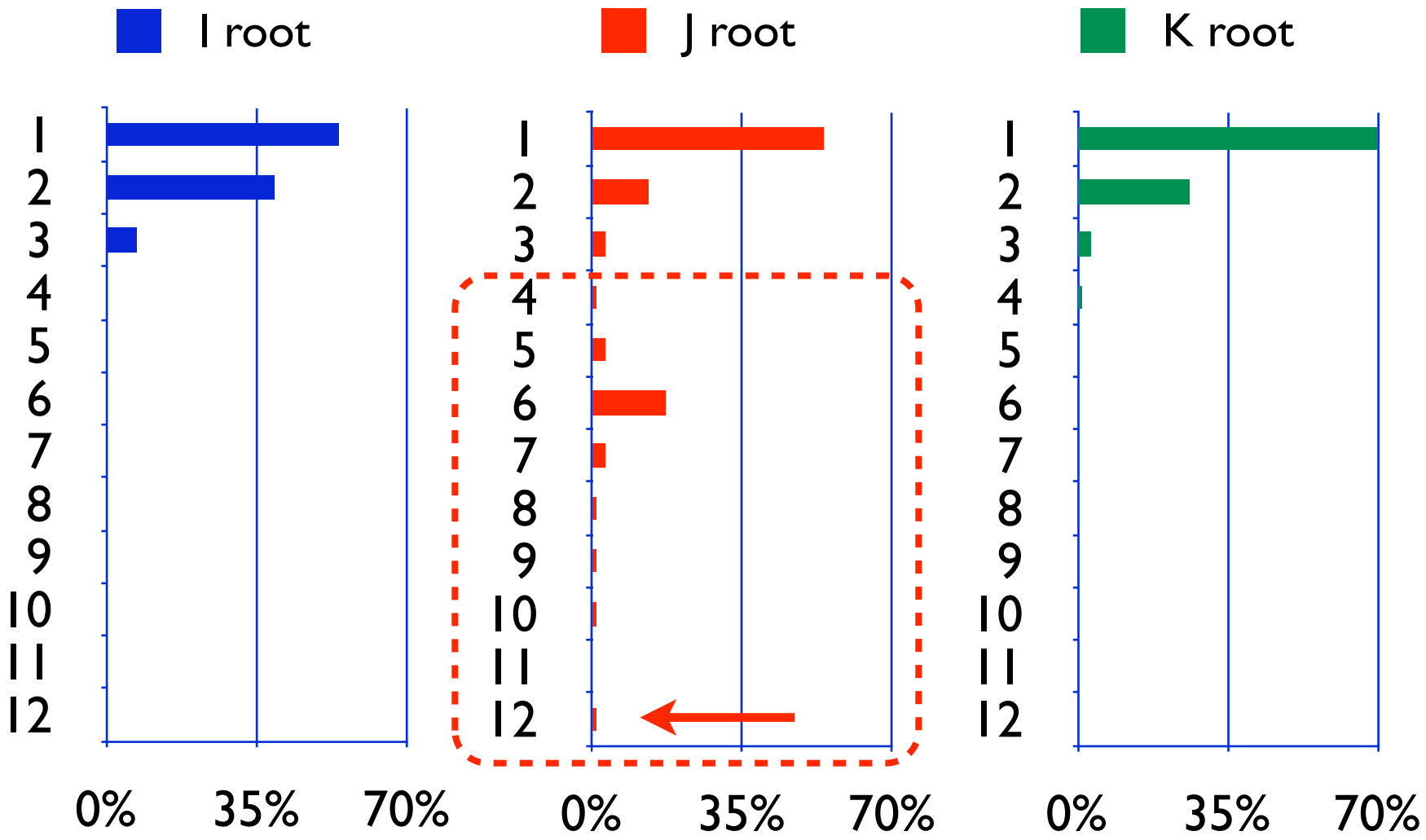


PT
IE
US
BR
RU
CY
CZ
DE
LU
NL
NL
NL

Probes seen over time

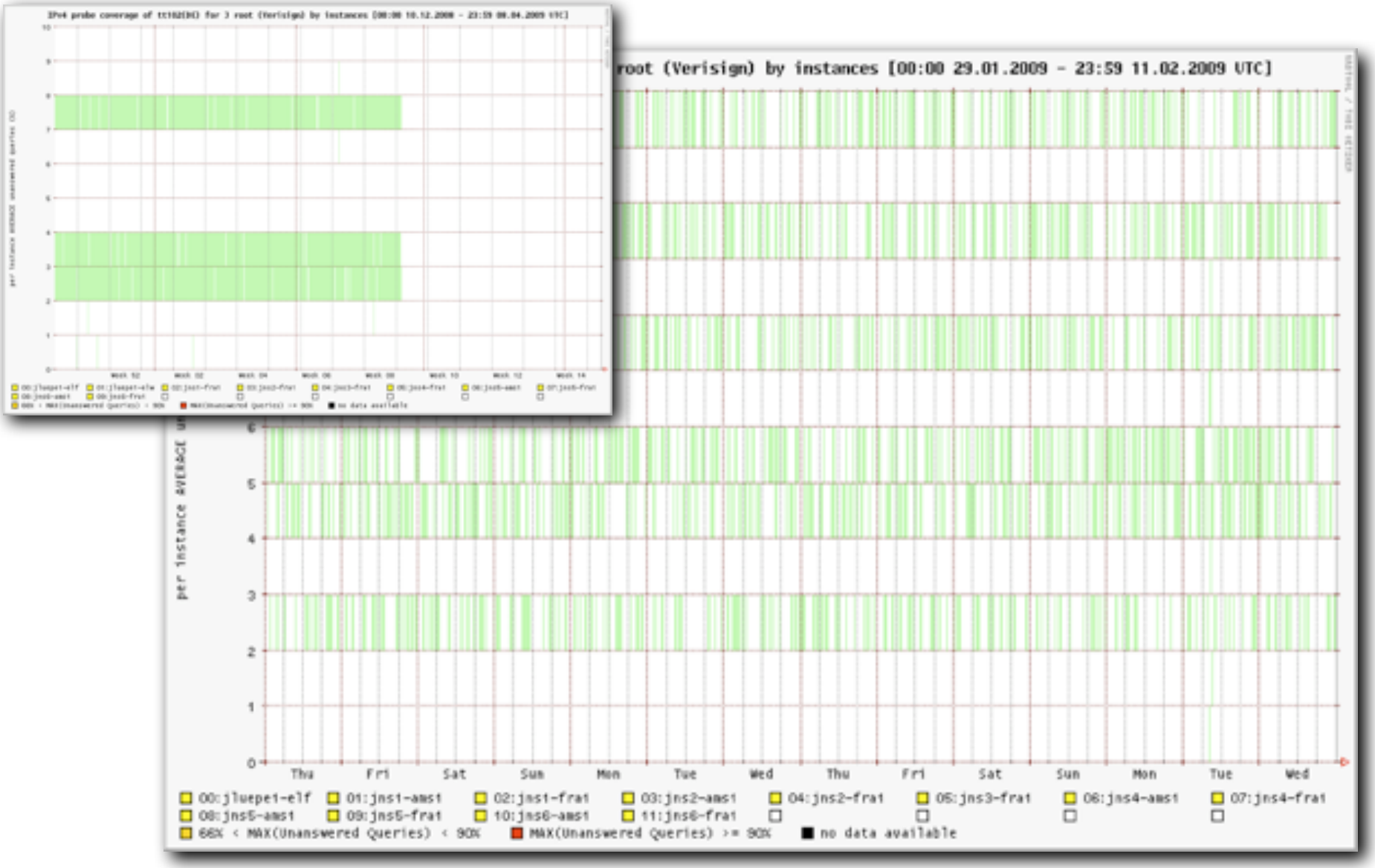


Instances seen per probe*



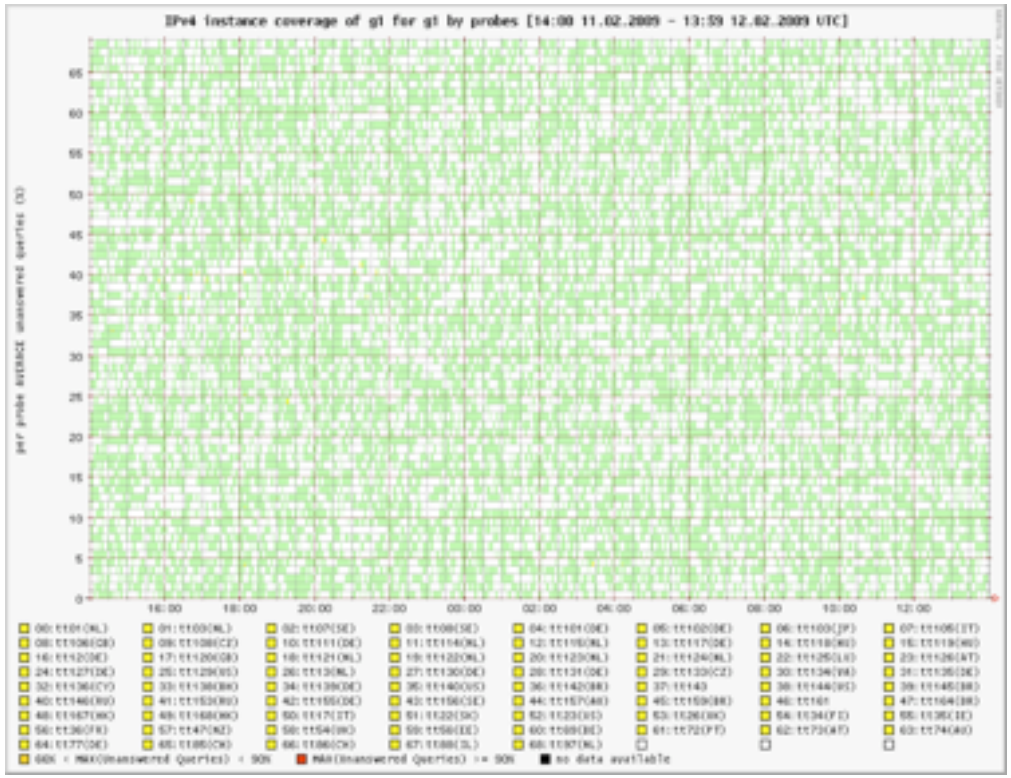
* Sample of 69 probes, 2 week period

Load balancing - J

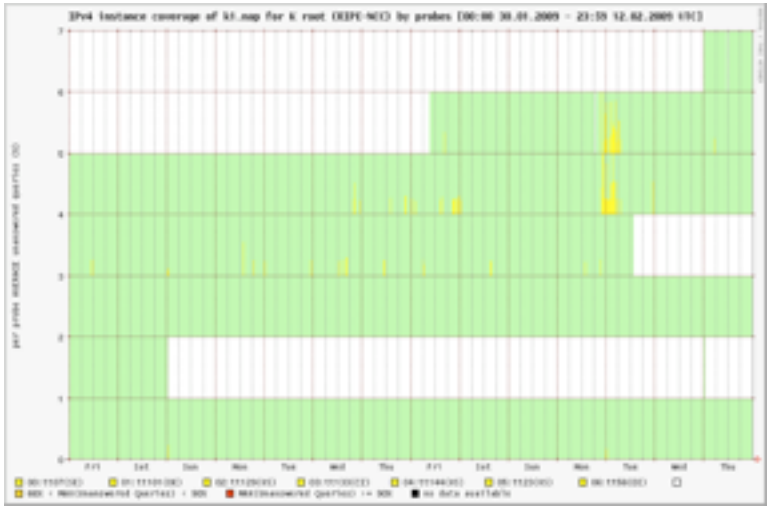


More load balancing

- G1 seen by all probes
- Similar to J, but fewer nodes



- k1.nap - clients focus



Conclusions

- Anycast DNS very stable
  - Due to high redundancy
- Most operators have few sites, few servers
  - 2 have few sites, many servers
  - 4 have many sites, few servers
  - Mix of static/dynamic load balancing
- Measurement probes fairly stable
  - Some strange routing going on
  - Temporary flaps observed due to local (probe) network

Obligatory IPv6 slide

- 8 enabled, 5 not enabled
- 127 sites operated by these 8 IPv6 enabled roots
- 38 of 127 sites IPv6 enabled (30%)

root	Total sites	v6 Sites	% IPv6	IPv4 Servers	Visible IPv4 servers	Visible IPv6 servers
A	2	2	100%	> 30	74	4
B	1	1	100%	3	3	0
F	46	17	40%	1	46	12
H	1	1	100%	3	3	1
J	52	2	4%	> 2	94	4
K	17	8	53%	2	23	11
L	2	2	100%	42	84	4
M	6	5	83%	4	15	10

Questions?