Measuring IPv6 Deployment

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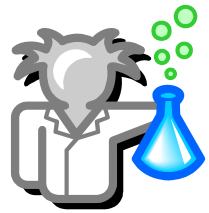

Available data sets

We have access to dual stack data for:

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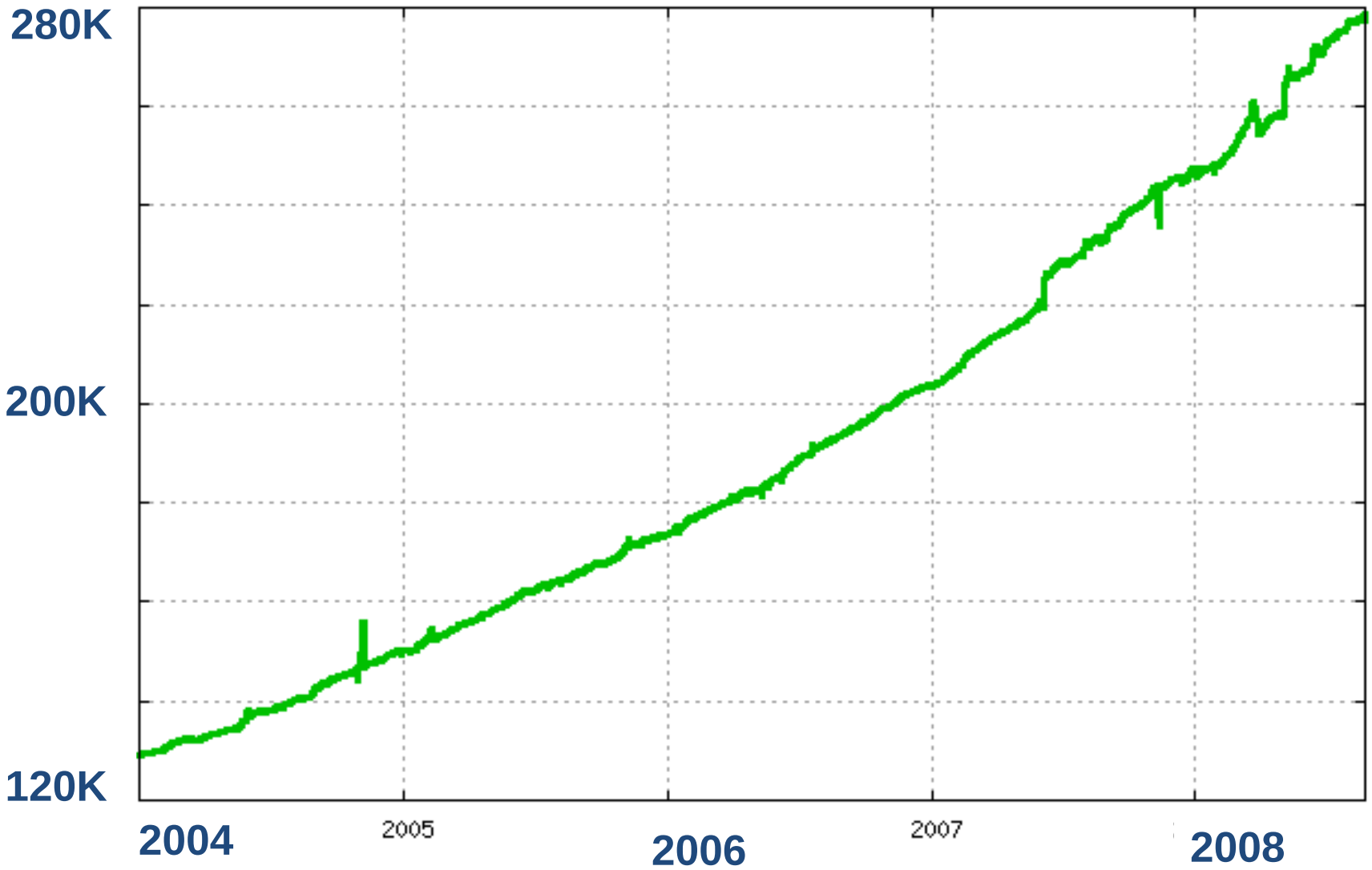
- BGP Route table
- DNS server traffic
- WEB Server access

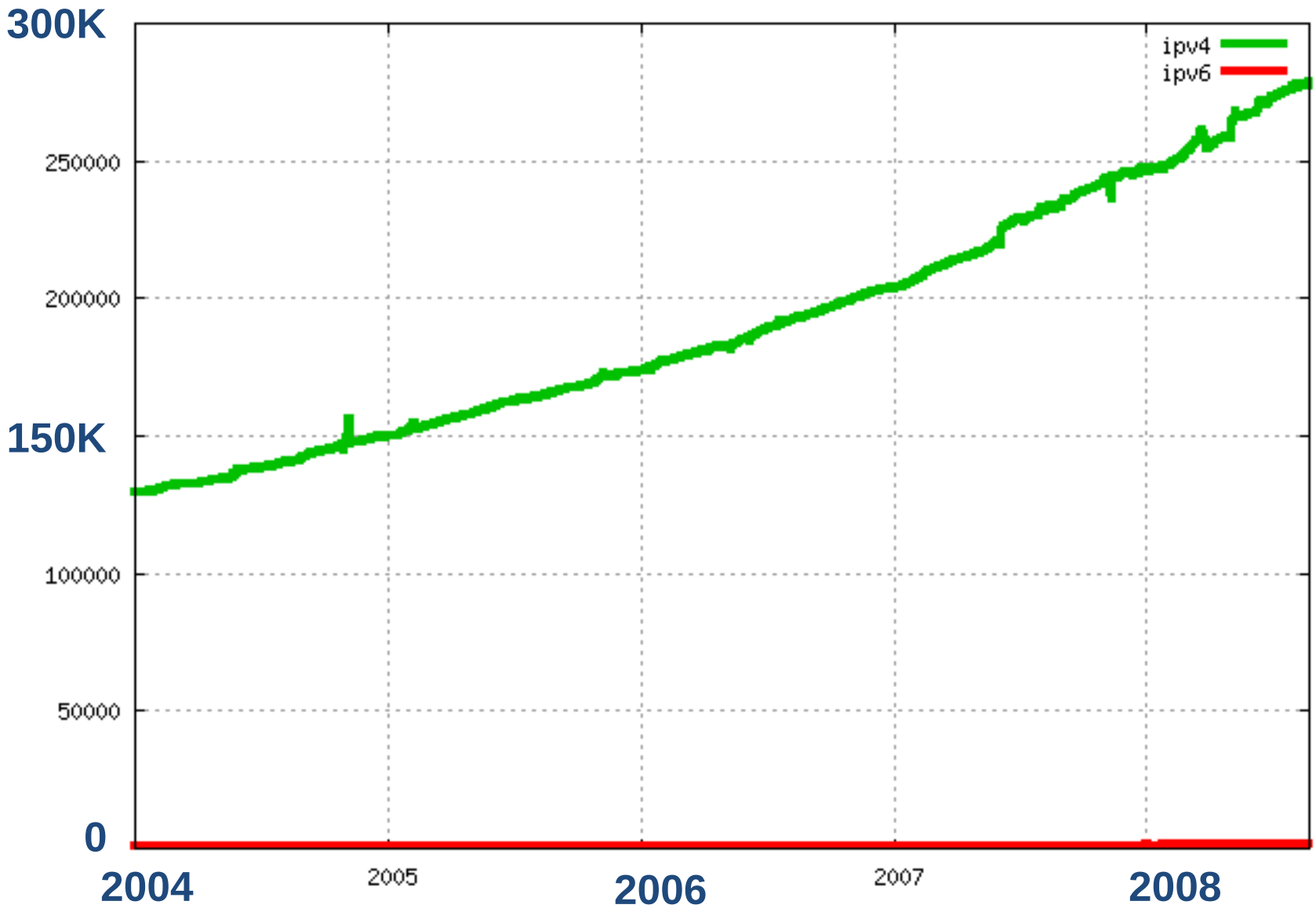
and the data sets go back over the past 4 years

The BGP view of IPv6

The BGP view of IPv4



BGP: IPv6 and IPv4



BGP IPv6 : IPv4

What's this saying?

IPv6 is 0.5% of IPv4 in terms of routing table entries

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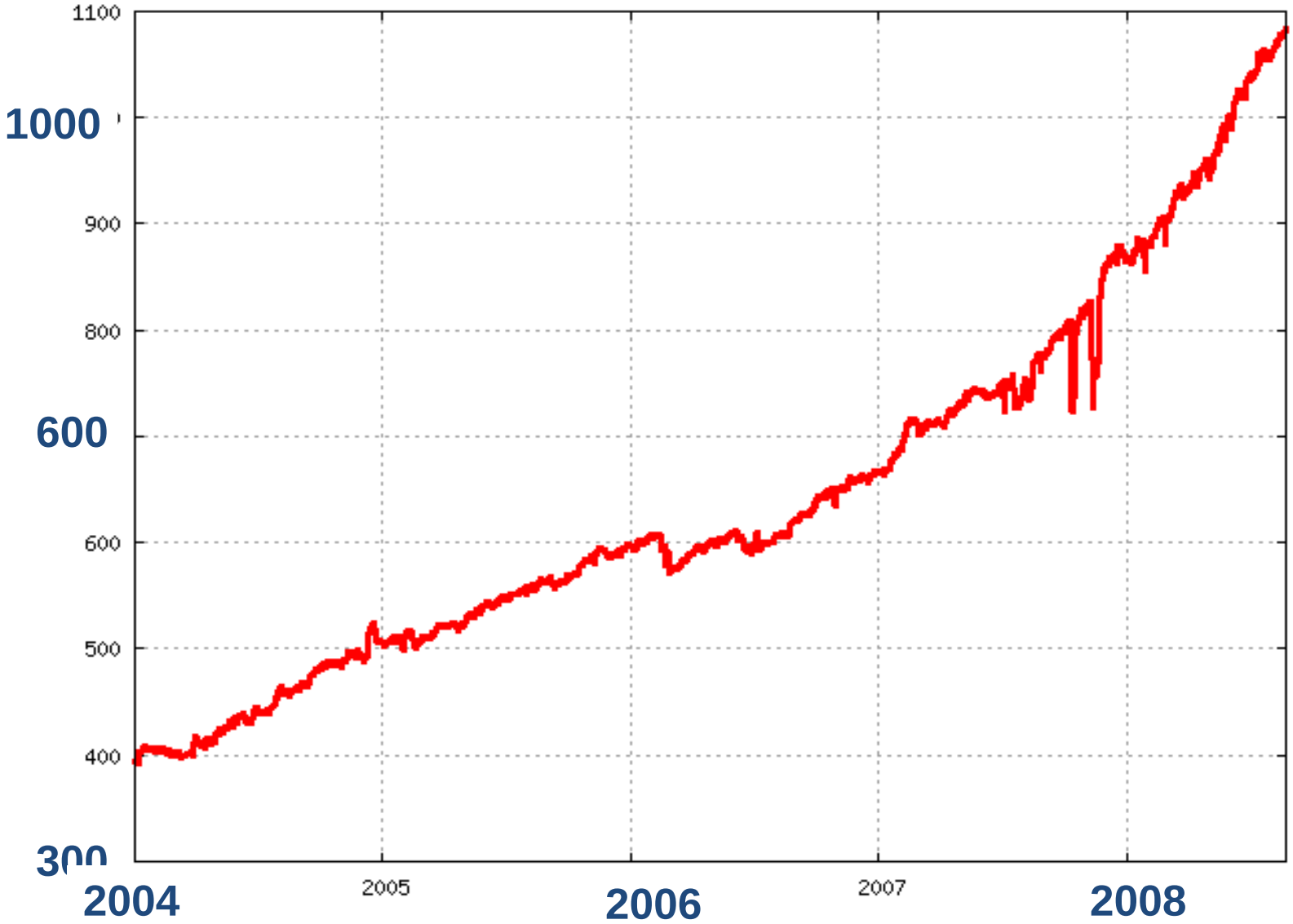
But the routing domain of IPv4 is heavily fragmented, while IPv6 is not, so this figure is not a good reflection of relative deployment

Let's refine the question:

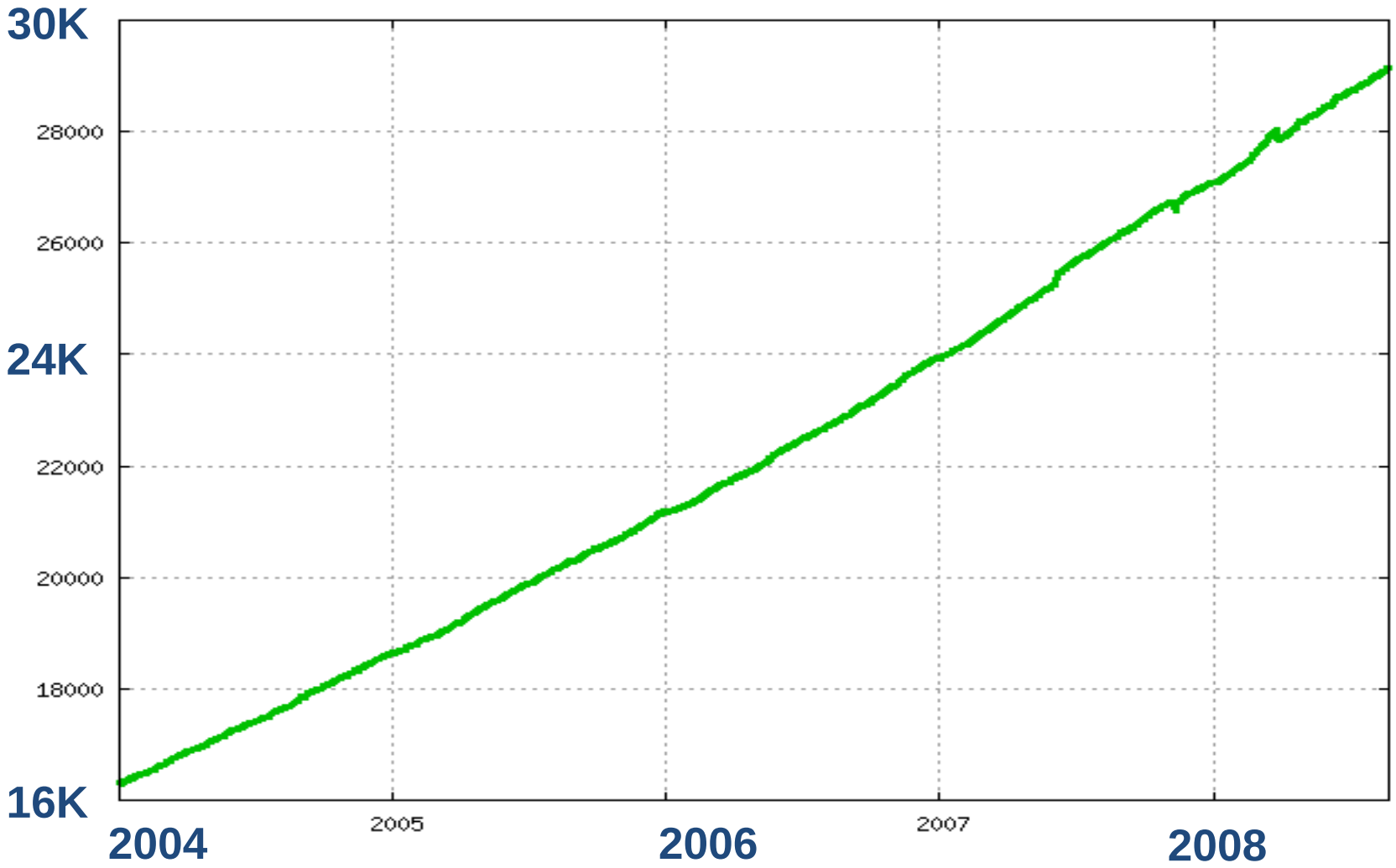
How much of the Internet today is **capable** of running IPv6?

One way to answer this is to look at the BGP table on a per AS basis

IPv6 AS Count



IPv4 AS Count



AS Count IPv6 : IPv4

What's this saying?

The number of AS's announcing IPv6 routes has risen from 2% to 4% in 4 years

That 4% is not uniform

15% of IPv4 Transit AS's also announce IPv6 routes

2% of IPv4 stub AS's also announce IPv6 routes

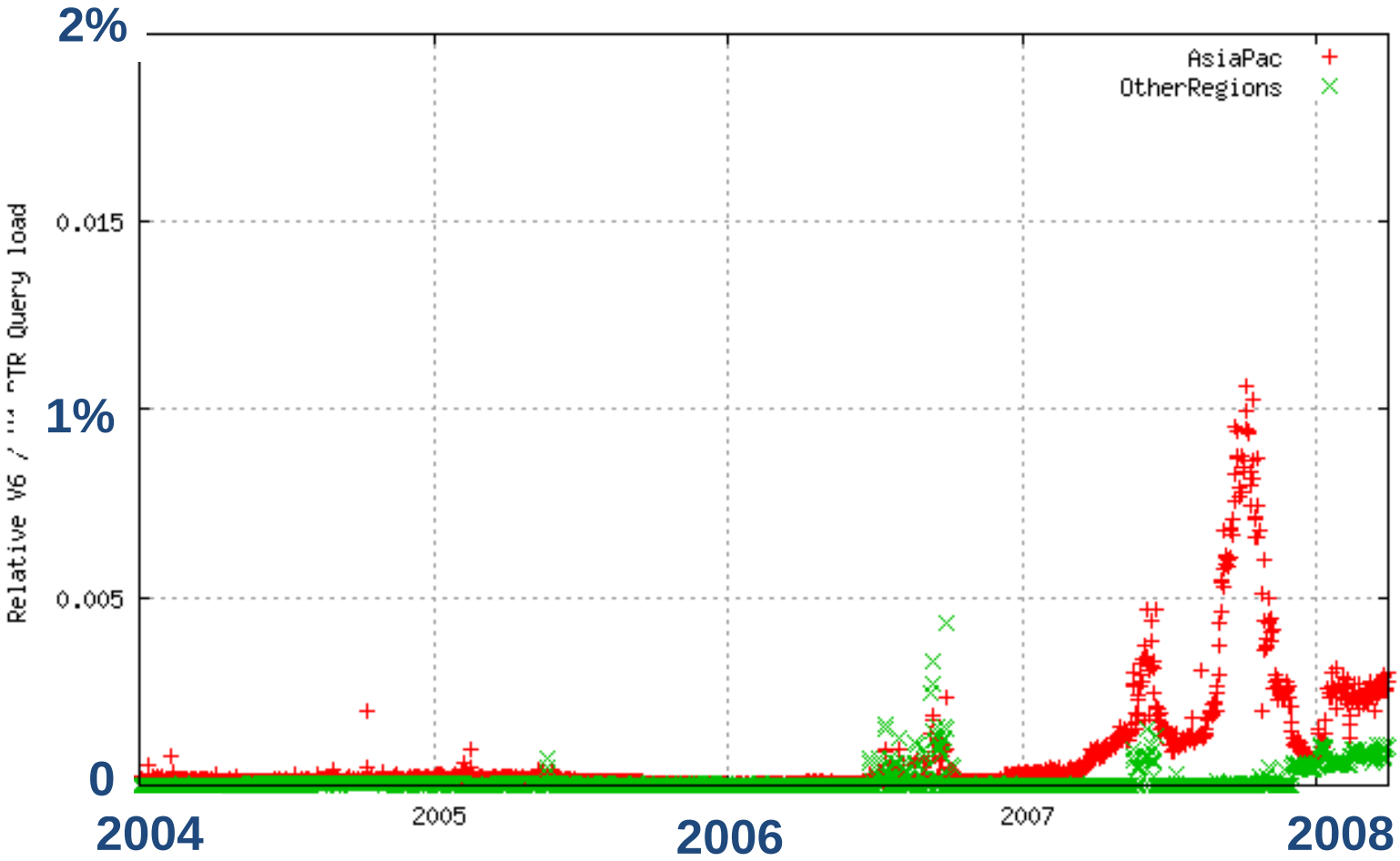
Capability vs Actual Use

If 15% of the number of transit AS's are announcing IPv6 address prefixes, does this mean that 15% of the Internet's "core" is running IPv6 right now?

DNS Reverse Query Load

Examine the average query load for reverse PTR queries for IPv6 and IPv4 zones for each of these server sets

Relative DNS Query Load



What's this saying?

- Reverse DNS queries for IPv6 addresses are around 0.2% of the IPv4 query load
- AsiaPac IPv6 query load is higher than for other regions
- Query load has increased since 2007
- The interactions of forwarders and caches with applications that perform reverse lookups imply a very indirect relationship between actual use of IPv6 and DNS reverse query data

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Interpretation of DNS reverse resolution data is really tough!

Web Server Stats

- Take a couple of dual—homed web servers:
  http://www.apnic.net
  http://www.ripe.net

- Count the number of distinct IPv4 and IPv6 query addresses per day
  - Not the number of 'hits', just distinct source addresses that access these sites, to reduce the relative impact of robots and crawlers on the data and normalize the data against different profiles of use
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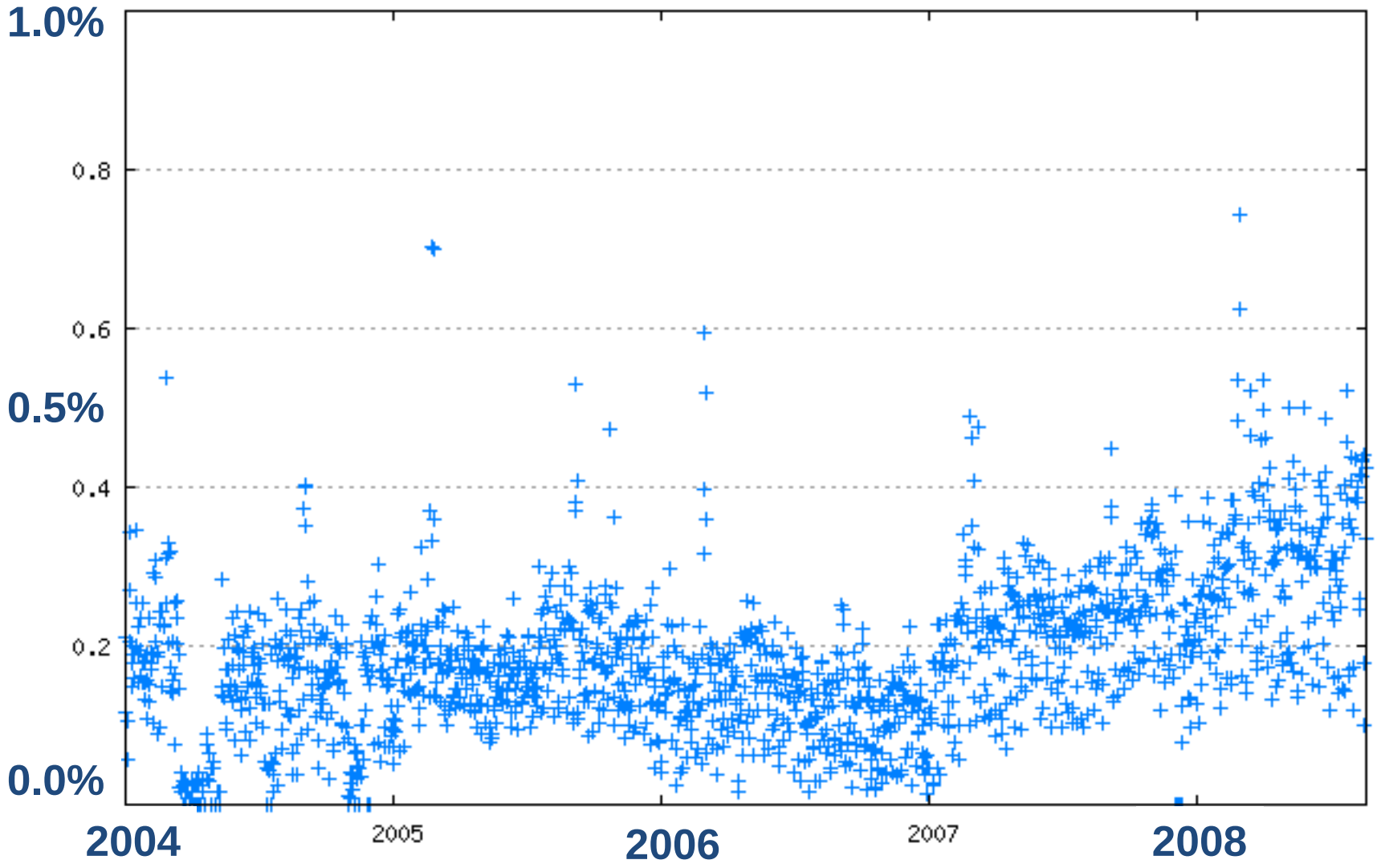
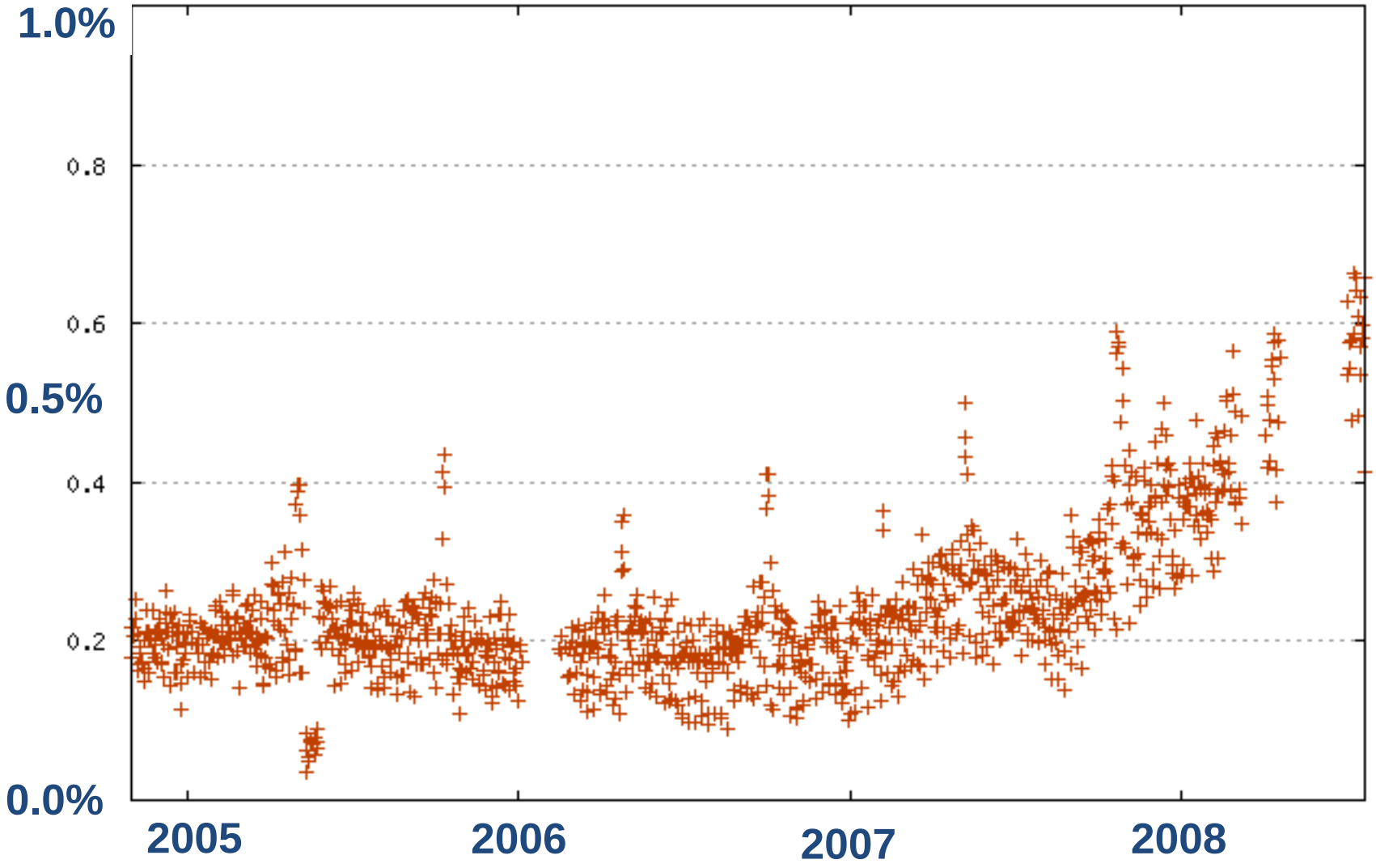
what proportion of end host systems will prefer end—to—end IPv6, when there is a choice?

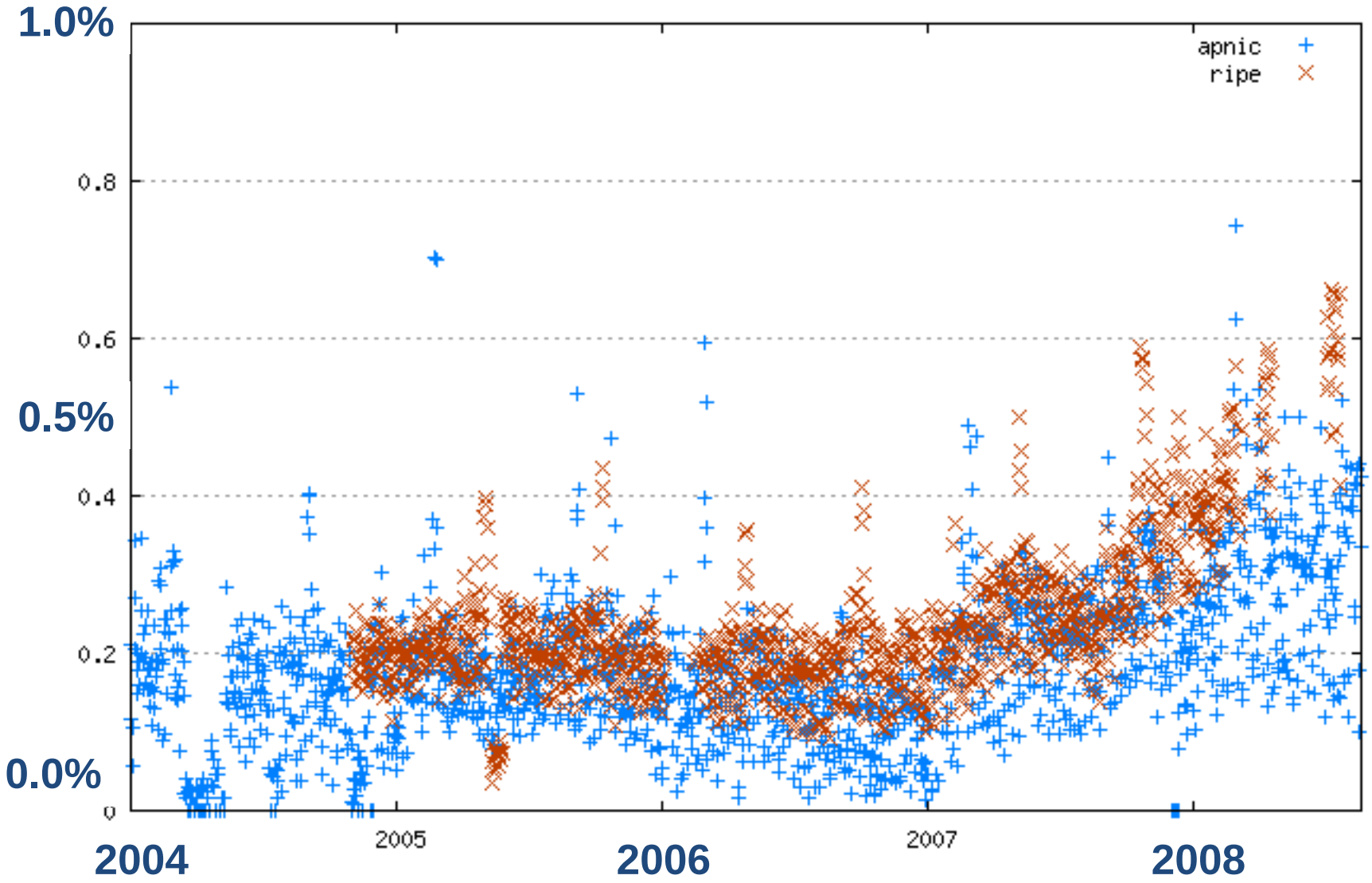
APNIC Web Server Stats



RIPE NCC Web Server Stats



Combined Stats



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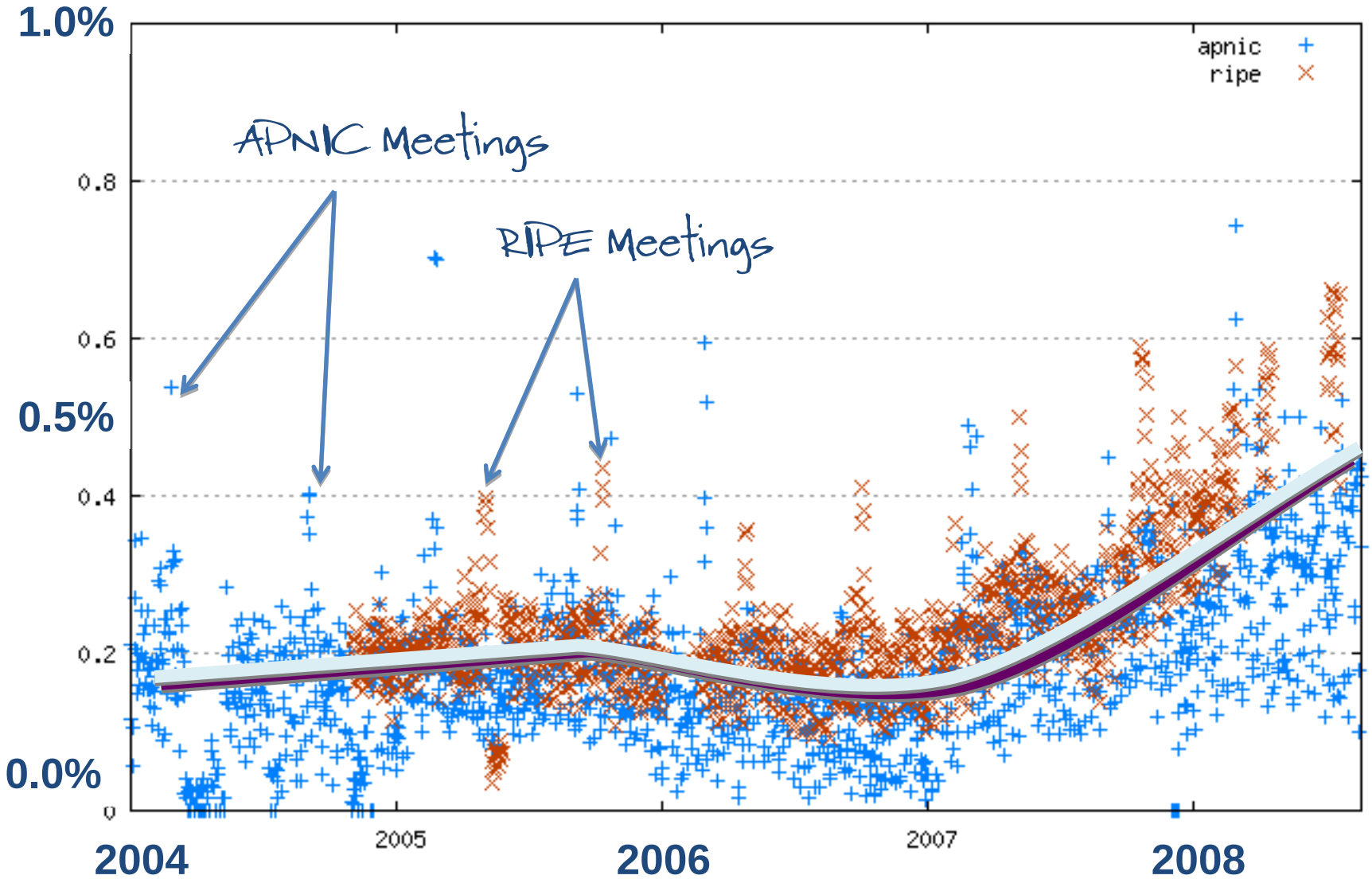


What's this saying?

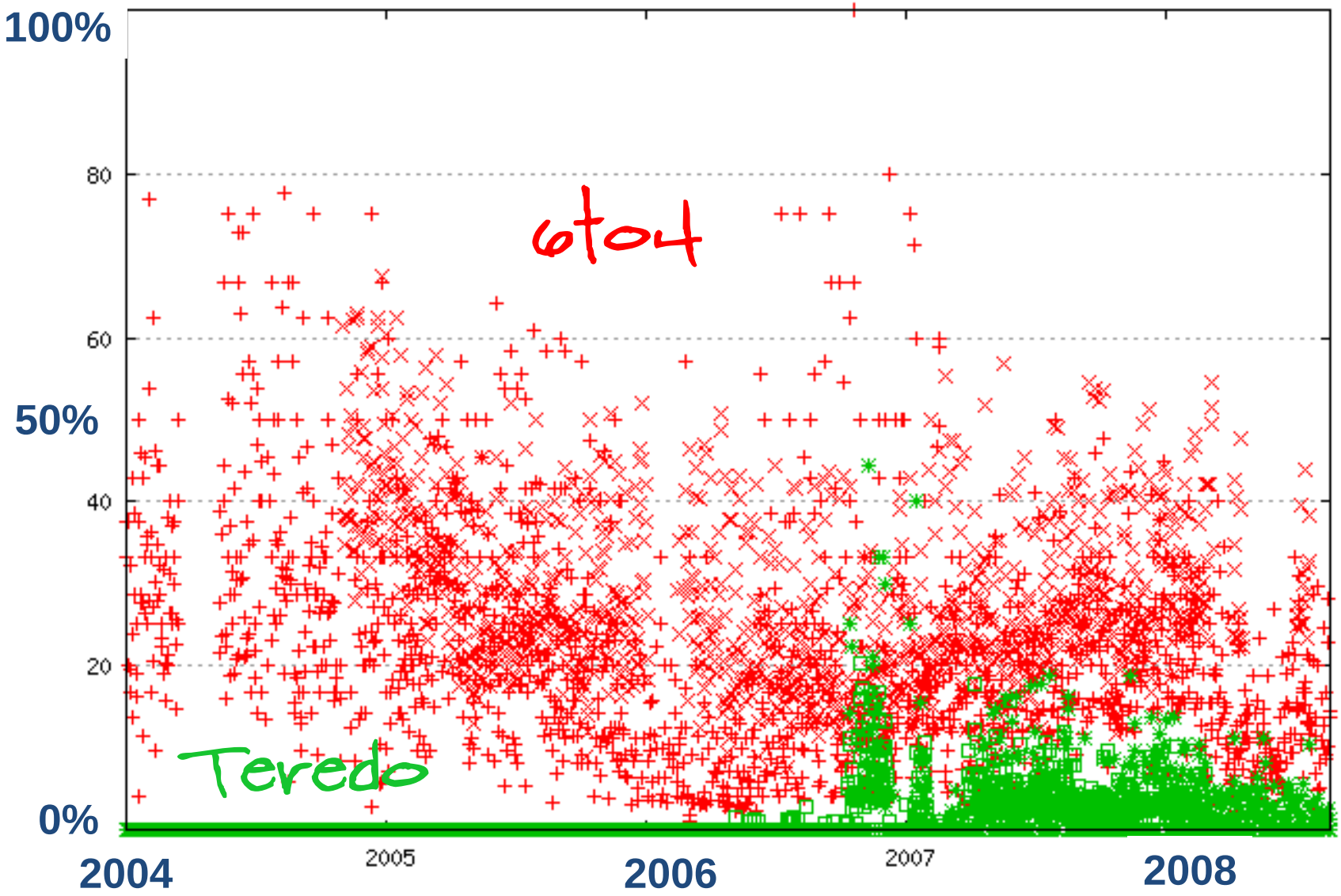
Relative use of IPv6 has slowly increased over four years to reach 0.4% today

Is interest in IPv6 slowing picking up again?

Or

Are we seeing Increased use of auto-tunnelling of IPv6 on end host stacks?

Use of V6 Transition Tools



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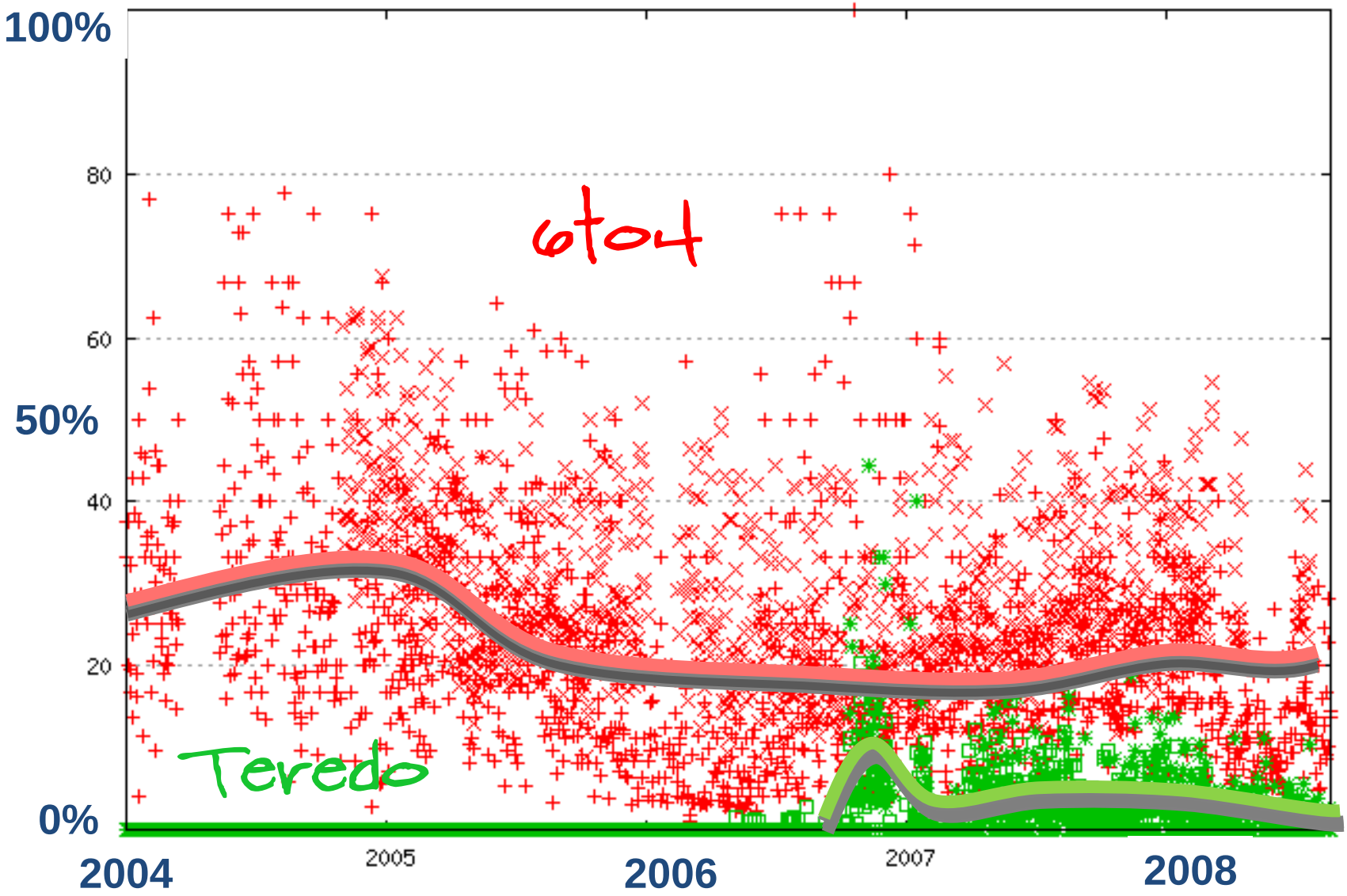

What's this saying?

Around 25% of IPv6 clients appear to use tunnels to reach IPv6 servers

And that hasn't changed much over time

Where are we with IPv6?

15%, or around one in six, of the transit ISPs of the IPv4 Internet are playing with IPv6 in some fashion

Where are we with IPv6?

The "size" of the IPv6 deployment in terms of end host IPv6 capability is around 4 parts per thousand Internet end hosts at present

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Buts that's probably overstating it!

- Widespread NAT use in IPv4 undercounts IPv4 host counts
- These web sites are tech weenie web sites. More general sites may have less IPv6 clients

Where are we with IPv6?

The "size" of the IPv6 deployment in terms of end host IPv6 capability is around 2 parts per thousand Internet end hosts at present

Where is IPv6?