

AS112-bis.

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AS112-IPv6

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Cut to the chase

- Lots of stupid DNS
- IPv6 brings new kinds of stupid DNS
- Time to re-work AS112 and delegate some IPv6 reverses to AS112

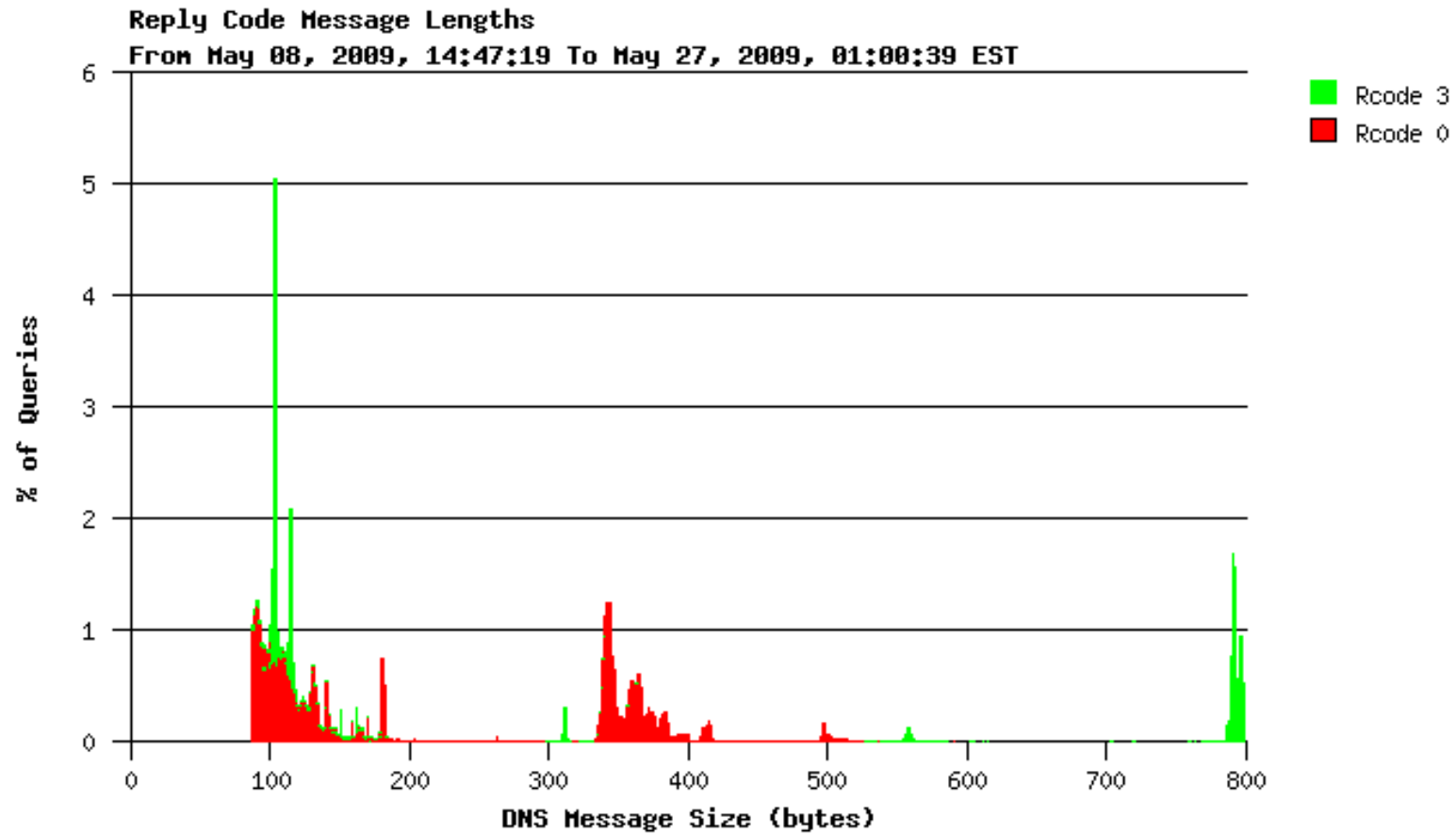
This is my problem

- Negative Answers cost more
 - There are lots of Negative-Answer questions

Negatives cost more?

- NXDOMAIN on average is 2-3x longer than OK
- DNSSEC makes this worse
 - Additional RRSET/NSEC sections in reply
 - Answer now approaching 1kb per query.
- How bad can this get?
 - Depends how much IPv6, and
 - what kind(s) of stupid questions get asked
 - dunnit?

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 - There are lots of Negative-Answer questions
 - Like IPv6 address types not expected to be seen in the global DNS but which are being looked up
- What kind of negative-answer demanding Questions are there?

Too many to count

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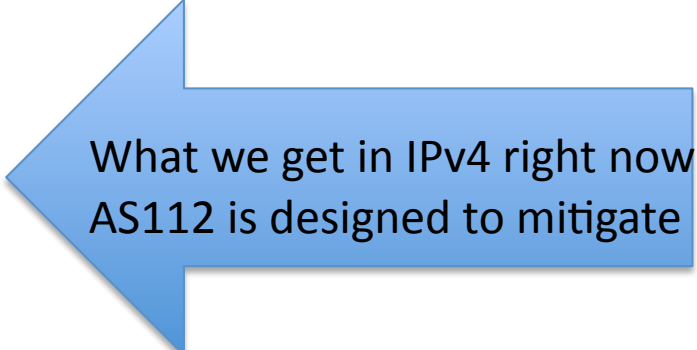
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- Link Local
- Site Local
- Multicast
 - Link and site-local multicast
- Unique Local Address (ULA)
- Tunnelled
 - 6RD, 6to4, Teredo

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What we get in IPv4 right now
AS112 is designed to mitigate



New in IPv6

A typical day in 2011

transport

v4: 369,917,141

v6: 6,605,575

1.78% of query carried in V6

v6/v4 ratio: 0.0178

PTR: 341,620,046

valid PTR: 341,271,155

invalid PTR: 322,778

odd PTR: 25,827

null PTR: 286

valid PTR: 341,271,155

in-addr: 317,287,473

ip6.arpa: 23,983,682

7.56% of query about V6

ip6/in-addr ratio: 0.0756

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v4: 369,917,141

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5% NXDOMAIN = Negative Answer Required

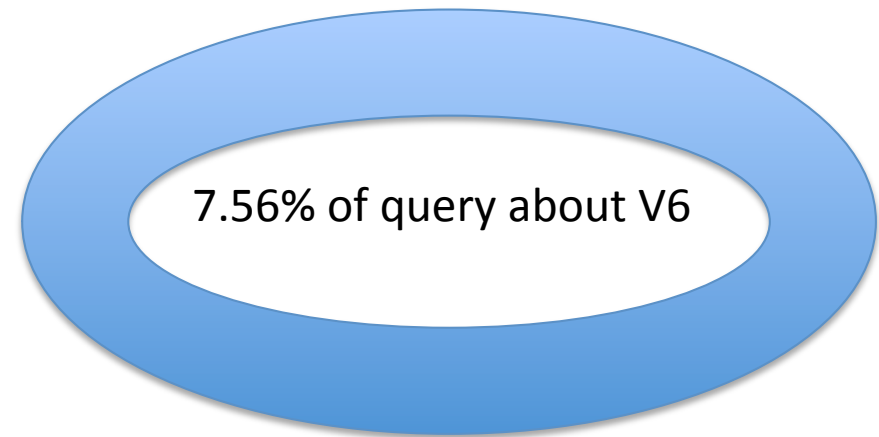
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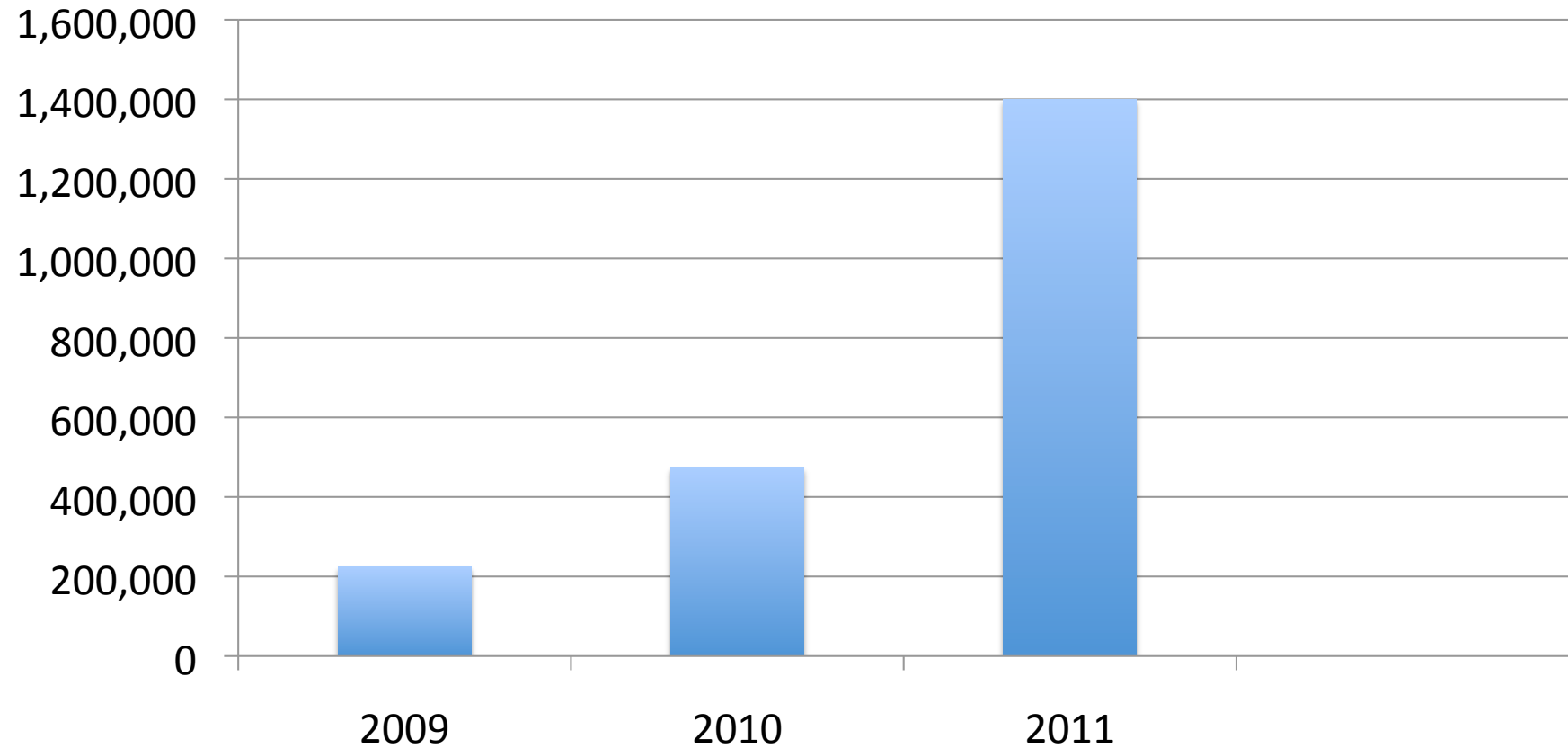
7.56%? What's the problem?

- Risk management is about **planning for the worst case**
 - In **this** case, the worst case is “IPv6 succeeds”
- The volume of queries seen in IPv4 therefore become the volume of queries seen in IPv6
 - Plus, all the new stupid queries
 - Most of which are NXDOMAIN
- So, how many stupid queries do I see?

Drilling down into stupid queries

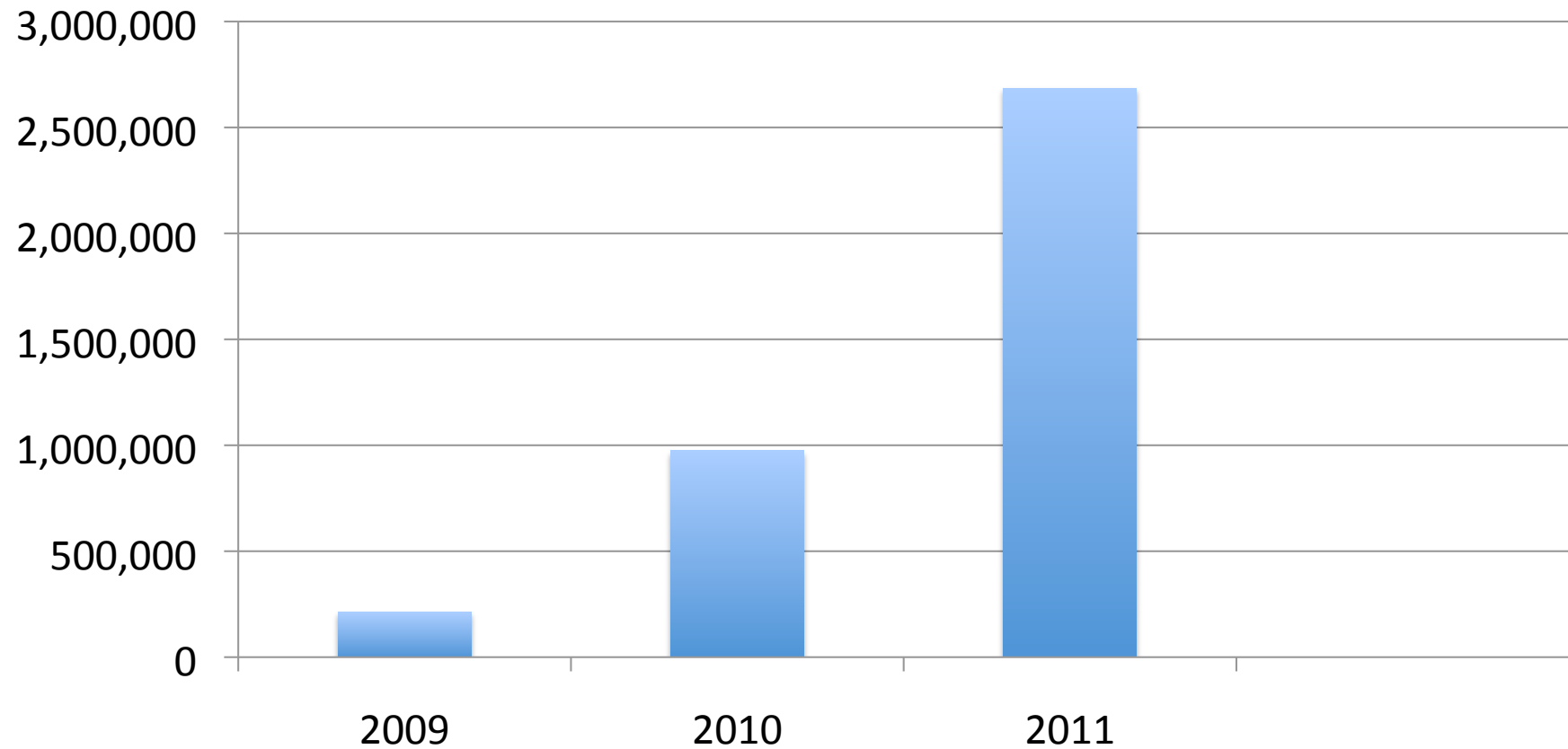
ULA query growth, 2009-2011

Unique Local Address queries/Day

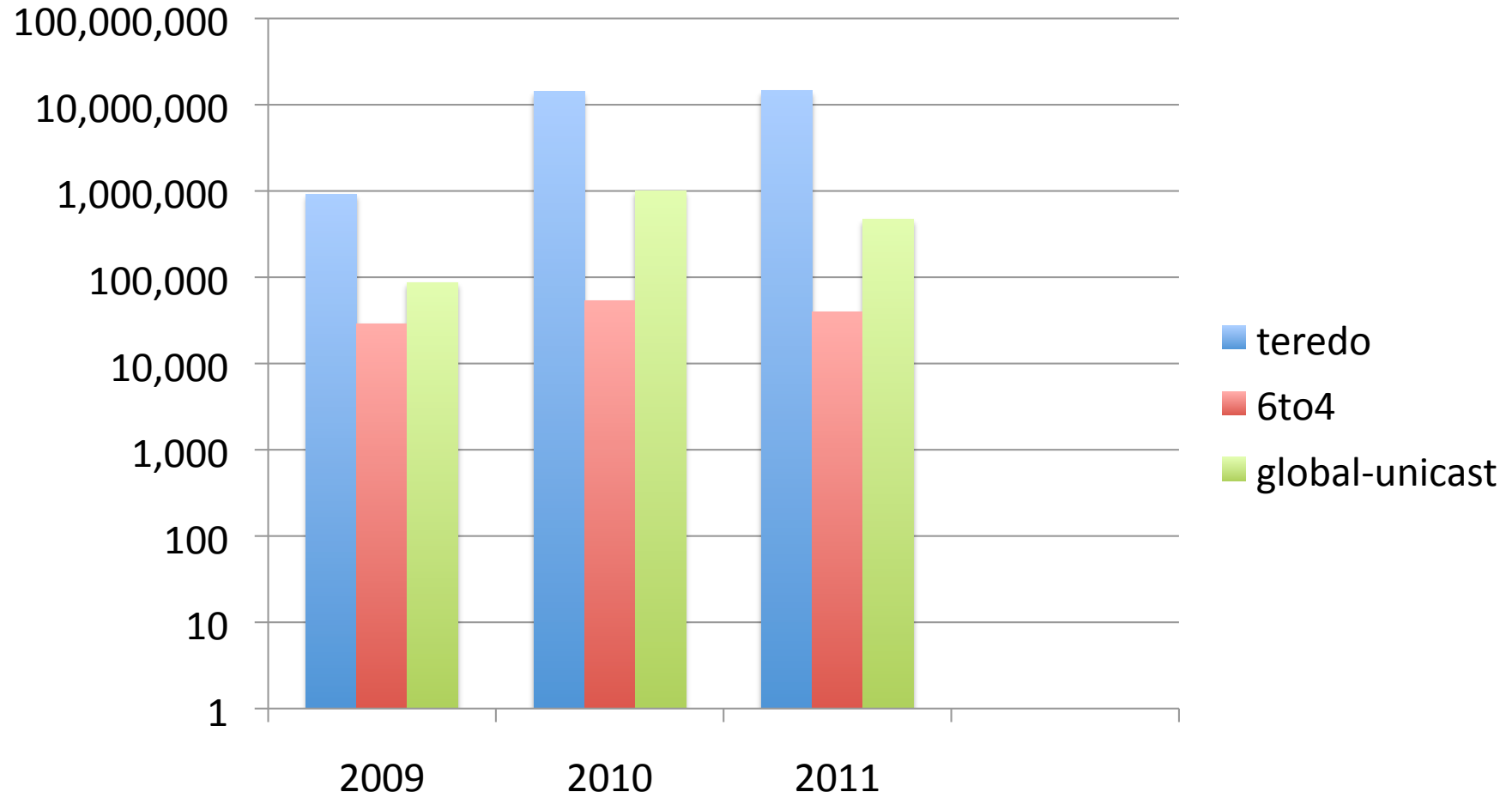


Scoped address query growth 2008-2011

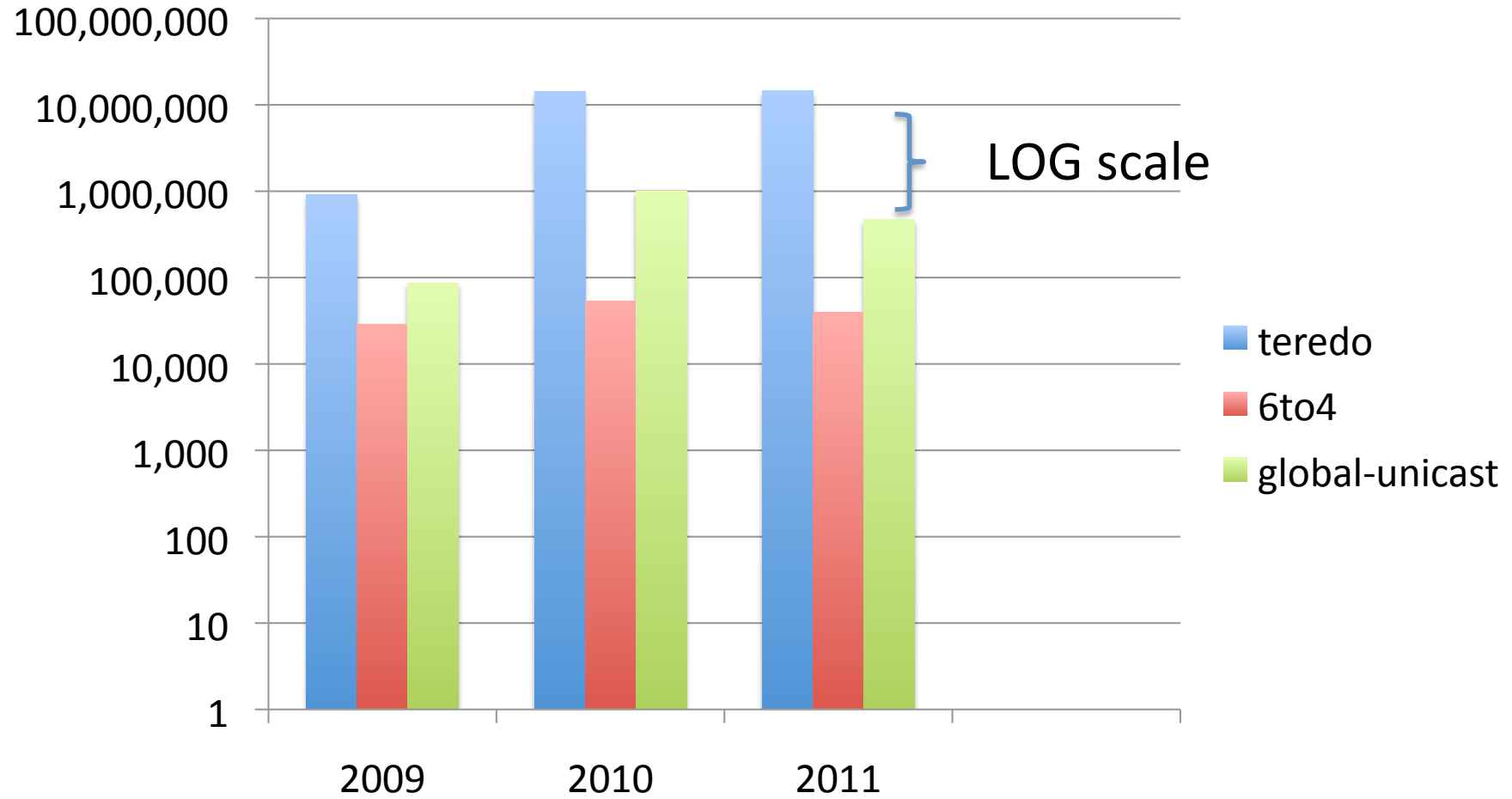
link-local and site-local queries/day



Tunnels compared to global-unicast 2009-2011



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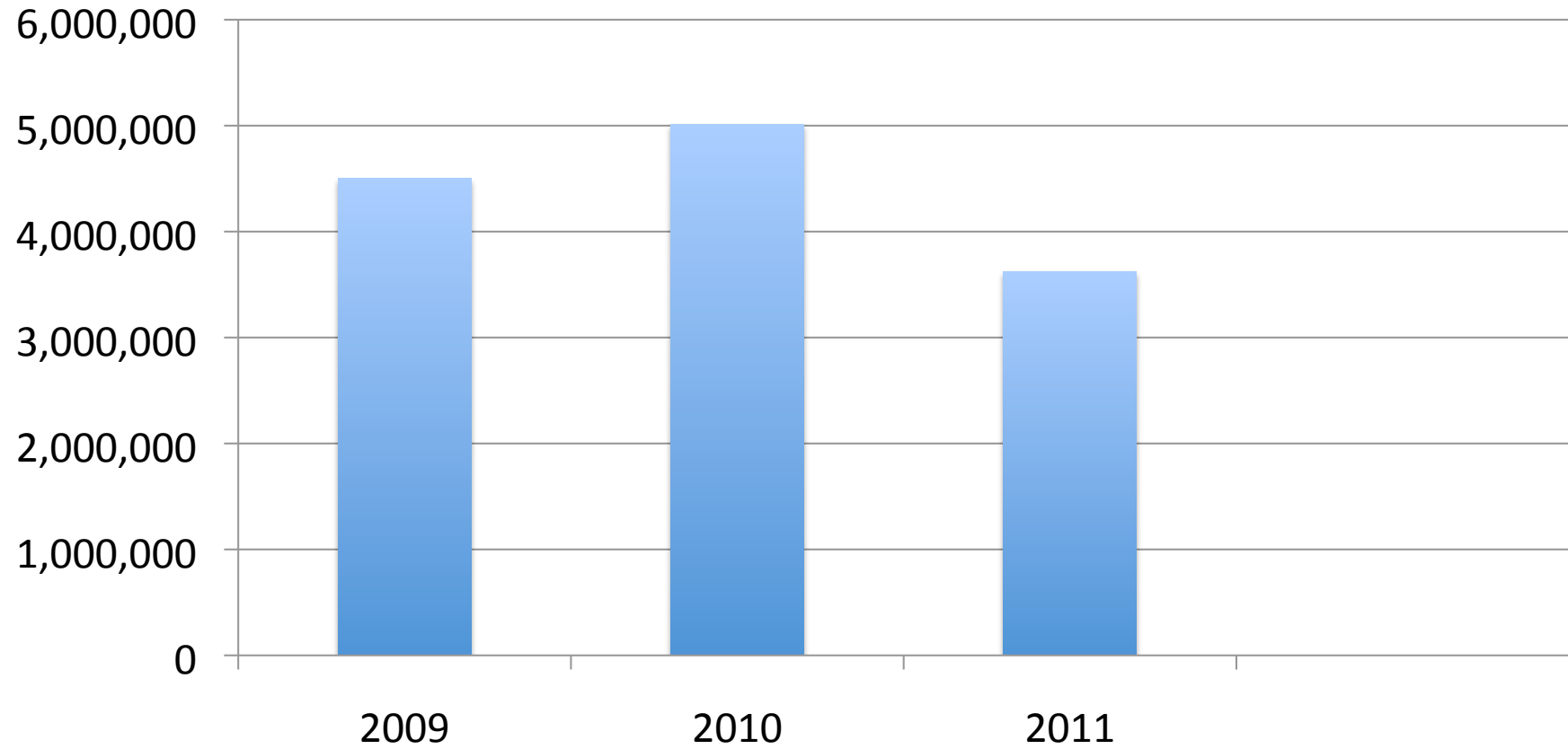


Tunnels a problem?

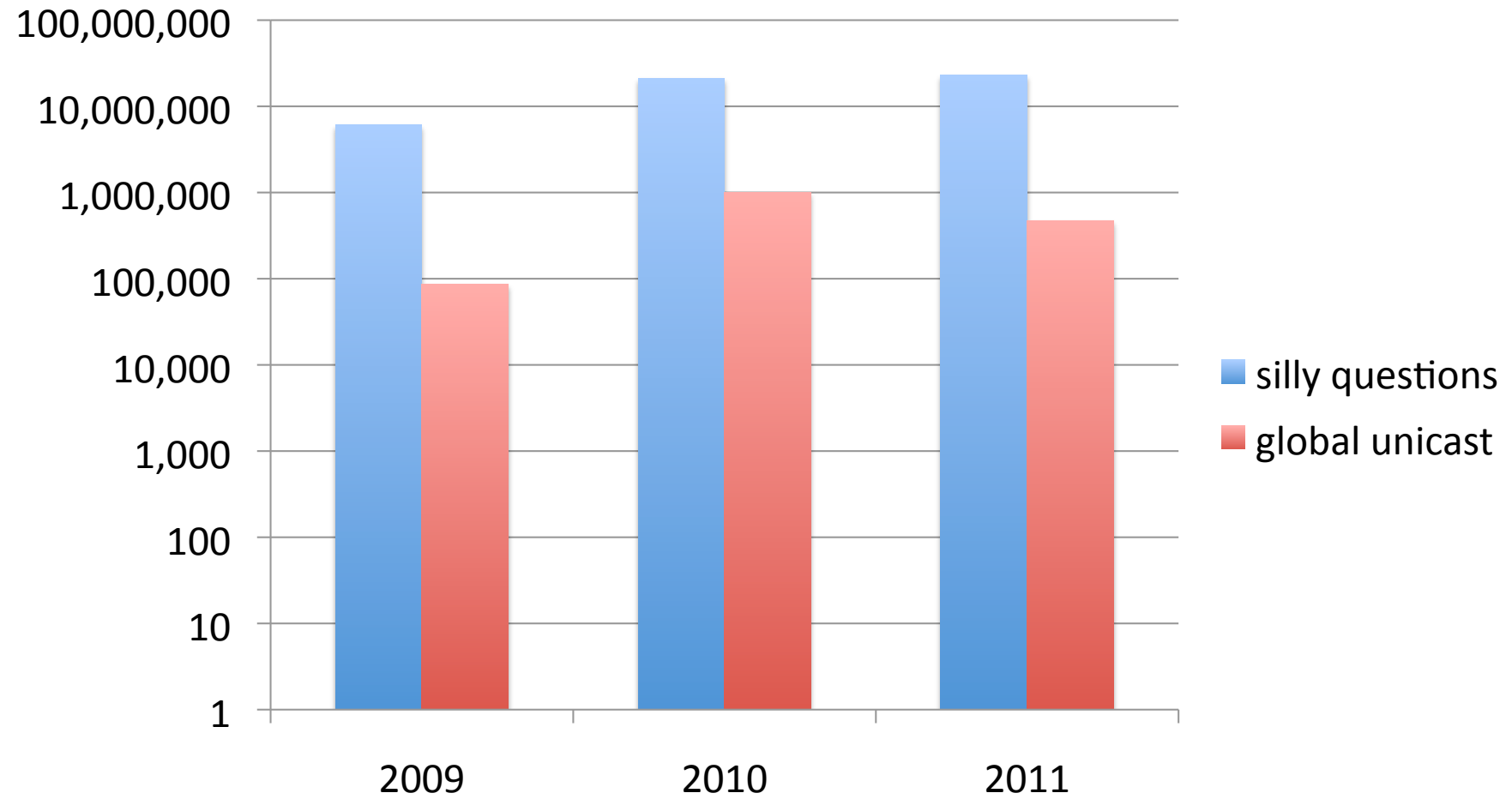
- We added 2.0.0.2.ip6.arpa to DNS
 - Ugly but solved problem
- Its harder to add Teredo
 - More random tunnel binding (per session)
 - Inherently unscalable
- In any case, these queries are mostly about FAILING tunnels:
 - The Teredo doesn't reflect actual usage seen at applications-level logs, tests

Mapped IPv4 addresses queries 2009-2011

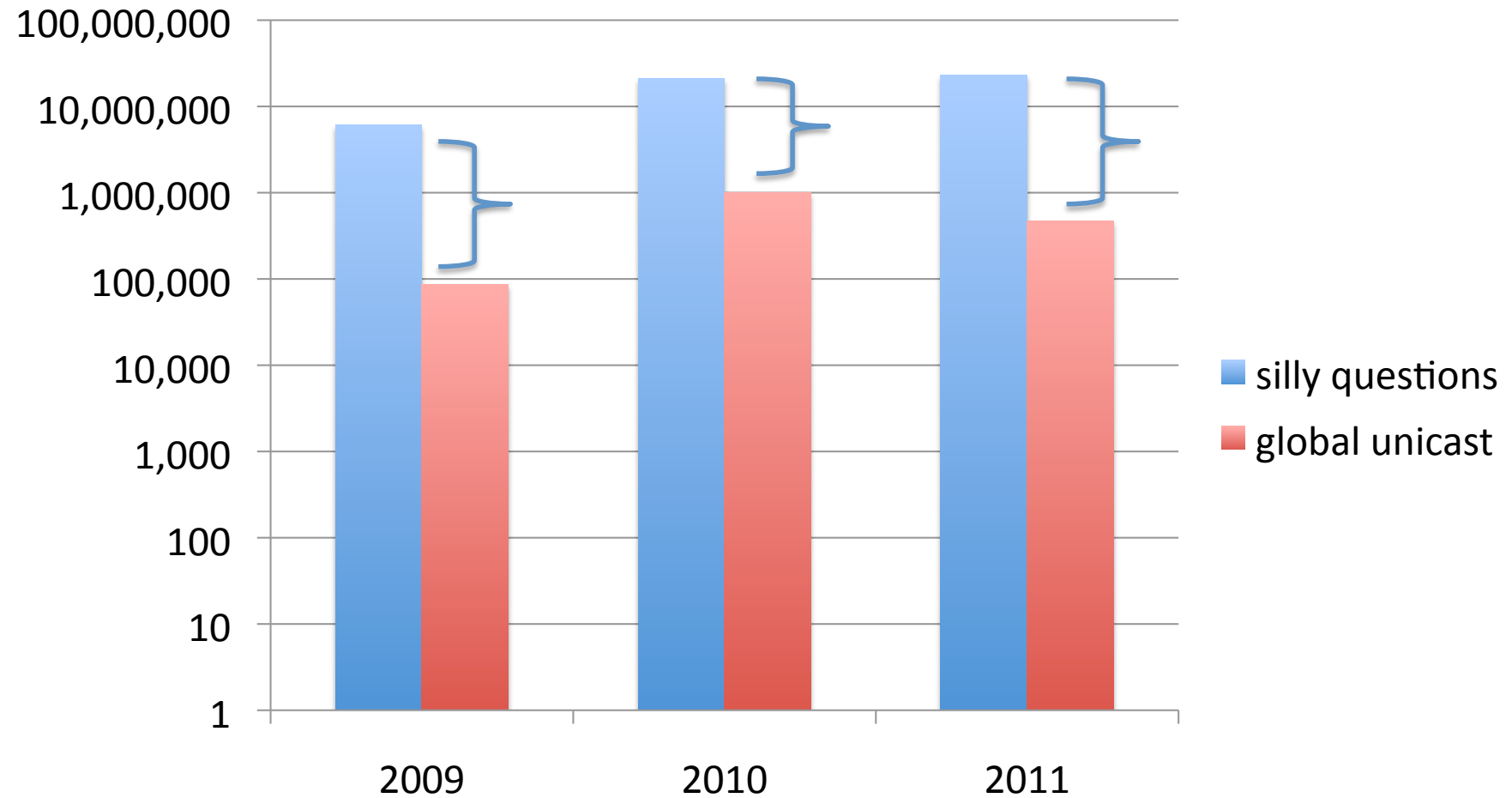
Unspecified address queries/day



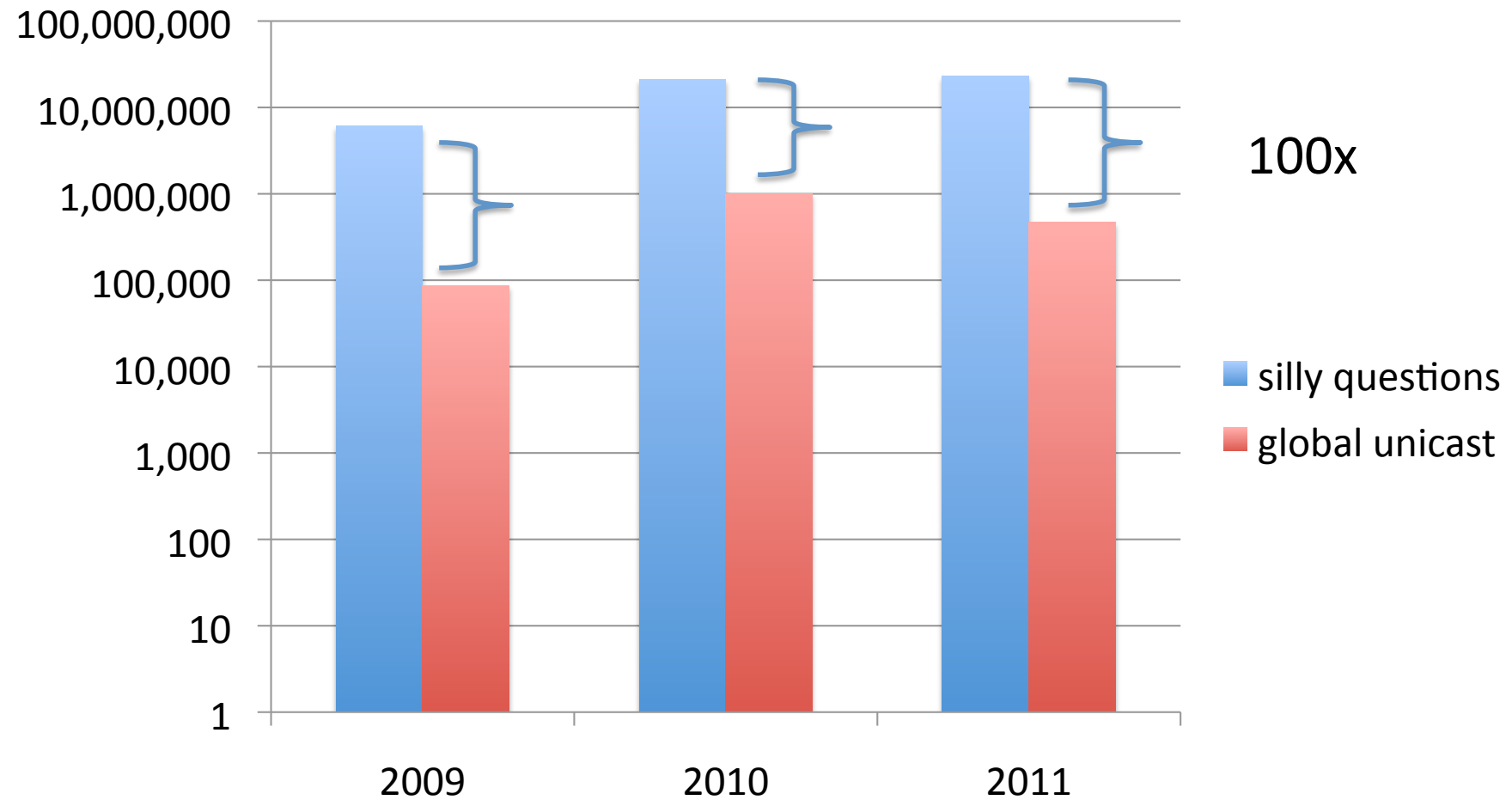
Can we stop now?



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- **“Dear IAB. Please instruct IANA to delegate the following reverse zone in ip6.arpa to AS112”**
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- **draft-michaelson-as112-ipv6-00**

Not another 'V6 is doomed' pack

- Remember this only scales to disaster if IPV6 **succeeds**
 - The Teredo problem goes if tunnels go
- Skepticism aside, this has potential to become a large problem, high in the DNS server tree
 - For the life of dual-stack, if not beyond
- We dodged this in IPv4 by taking action (AS112)
- This pack is arguing we just extend it to IPv6

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- Also mis-labels some sub-classes and requests the wrong delegations in the DNS
- All of which should be fixed in an 01 draft

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- ...Assumes AS112 has some management mechanism to update delegation/conf
- ...Which is the subject of another draft by other people

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- Yes.. But we have to be realistic: Broken DNS behavior persists in the global Internet for a very long time

Input to 00 Draft so far

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- AS112 should have a V6 prefix assigned
- Yes. Lets do this in a distinct instruction to have the delegation done from IANA held space for IPv6

Can we stop now?

- There is at least 1, if not 2 decimal orders of magnitude more 'silly' DNS queries than useful ones in IPv6.
- This problem will not go away without work
 - Code fixes to reduce unneeded DNS requests
 - Local delegations in bind-9, but do people use them?
 - AS112 set-aside is looking compelling..