



IPv6 National Forum

Google and IPv6

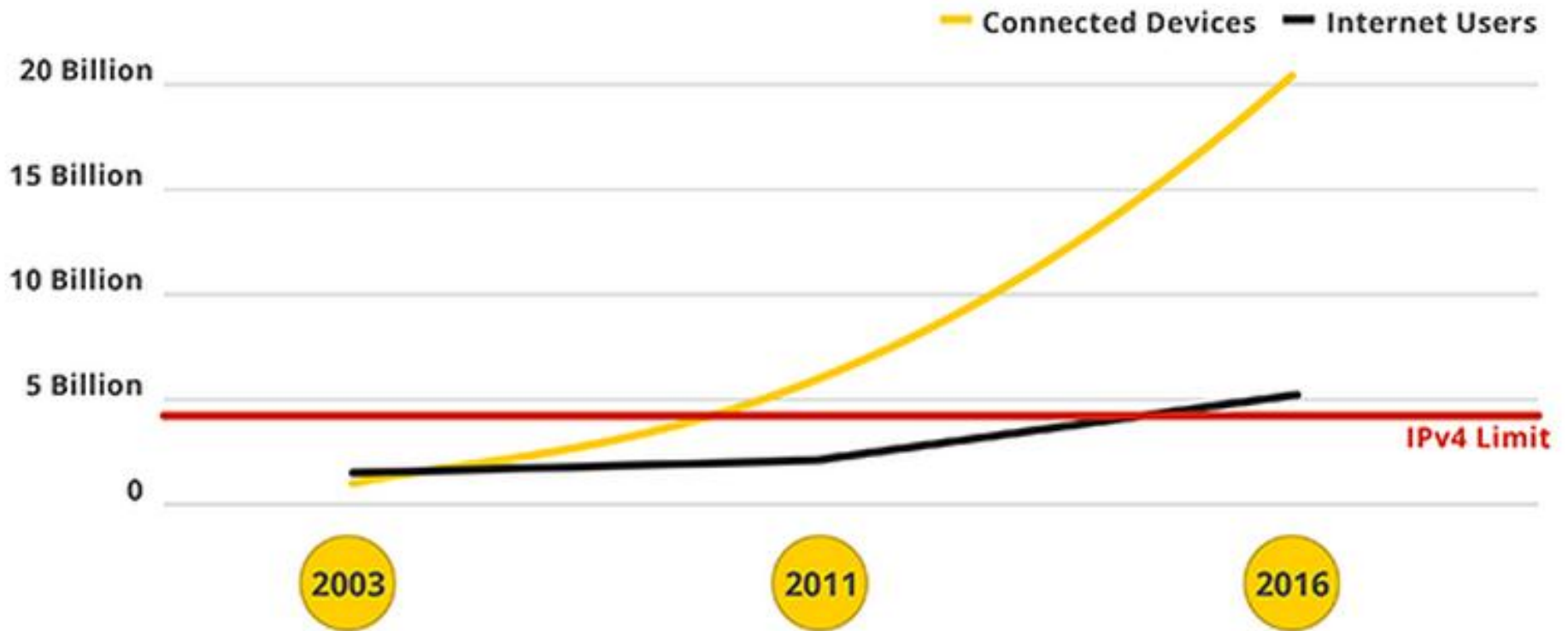
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Why is the internet running out of room?

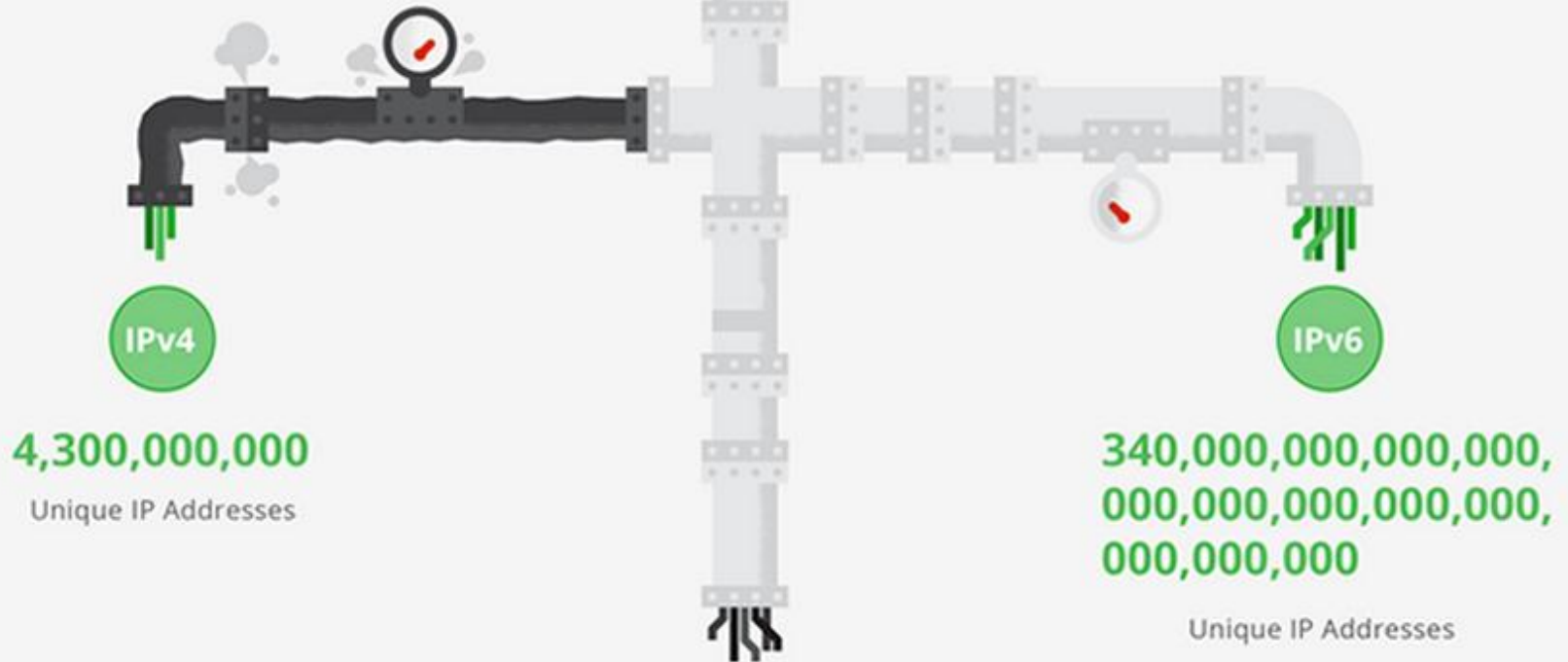
Just as phones use a system of phone numbers in order to place calls, every Internet-connected device gets a unique number known as an "IP address" that connects it to the global online network.

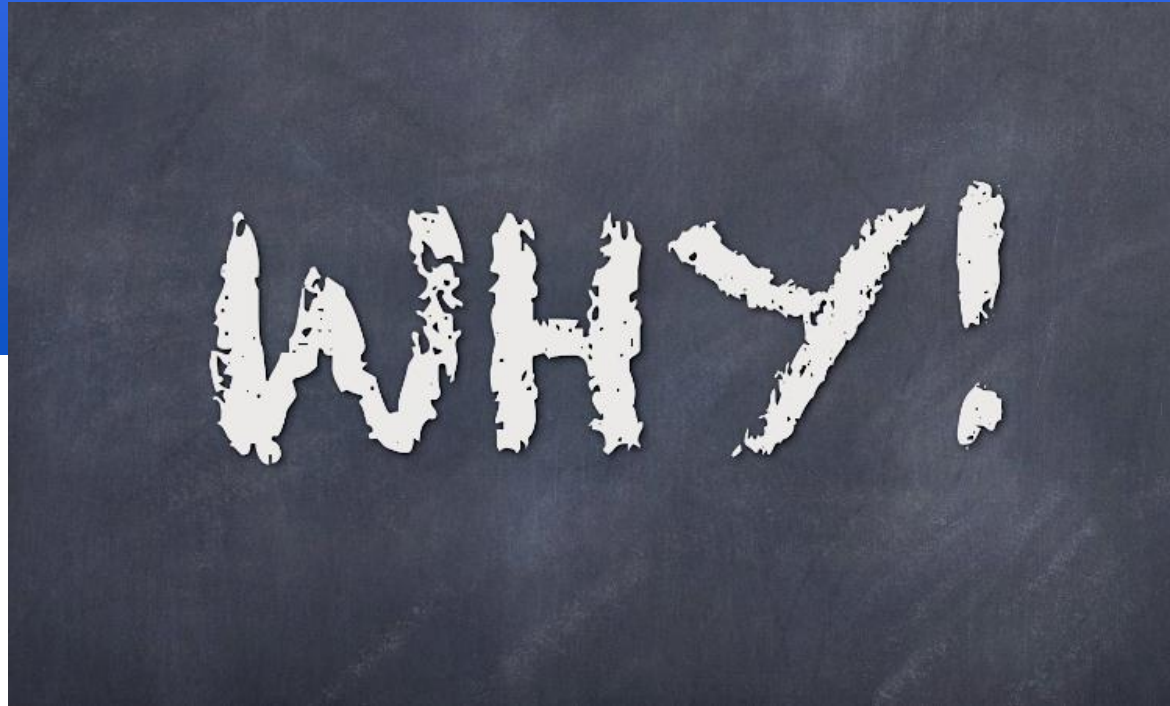




How are we making space to grow?

Clearly the Internet needs more IP addresses. How many more, exactly? Well, how about 340 trillion trillion trillion (or, 340,000,000,000,000,000,000,000,000,000,000)? That's how many addresses the Internet's new "piping," IPv6, can handle. That's a number big enough to give everyone on Earth their own list of billions of IP addresses. Big enough, in other words, to offer the Internet virtually infinite room to grow, from now into the foreseeable future.





WHY!

Why IPv6? Cost

- Buying addresses will be expensive
- Carrier-grade NAT may be expensive
 - Lots of session state memory
 - Session logging for legal reasons
 - Bandwidth
- Being behind a NAT is hard to manage
 - Can't fix problems without NAT operator's help
 - VPN, VOIP, video streaming, gaming, P2P
 - Expensive in operator time, support costs
- Network complexity creates operation / support costs

Why IPv6? Address semantics

- With carrier-grade NAT, users share IP addresses
- Less accurate geolocation
 - Content licensing for streaming, etc.
- Abuse identification / blocking
 - If an IPv4 address is spamming/hacking/...
 - Who is responsible?
 - If we block it, do we take out 100 users?
- IP-based authentication
 - Of course, nobody would ever do this

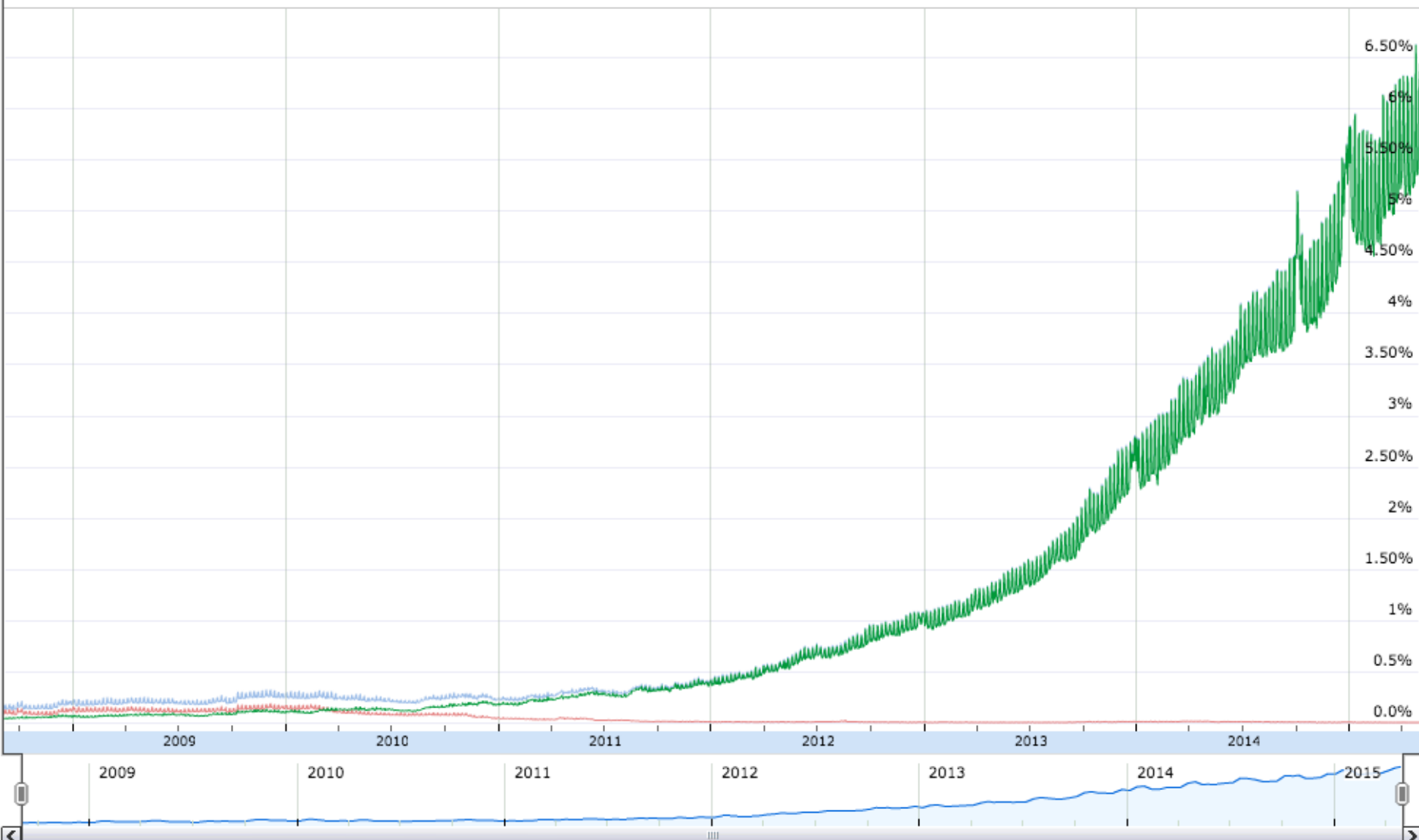
The search for the killer application

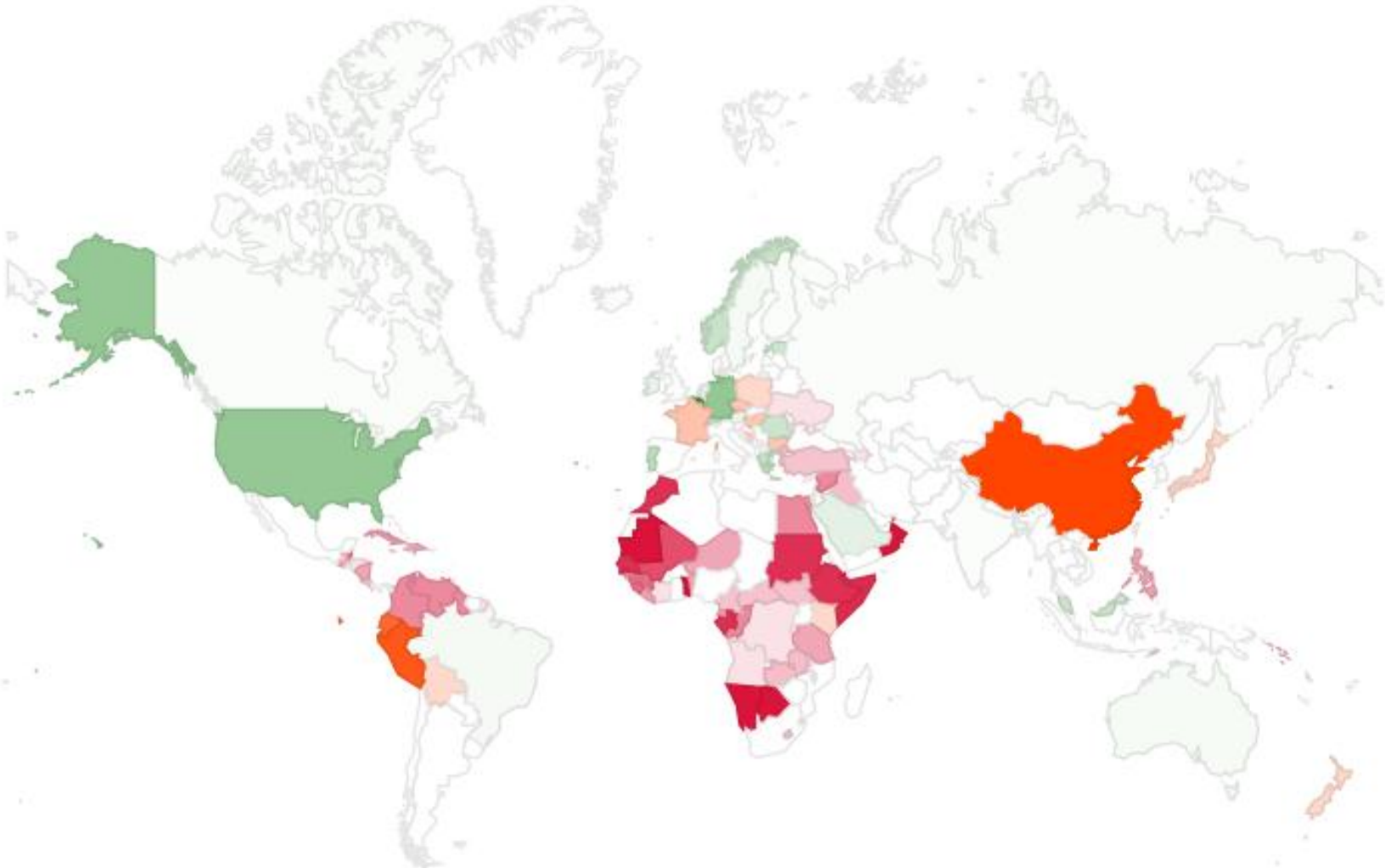
- Many are waiting for a "killer application" for IPv6
- This is a misconception
 - It's not "what can IPv6 do better than IPv4?"
 - It's "can the Internet as we know it continue to operate using IPv4?"
- The killer application of IPv6 is the survival of the open Internet as we know it

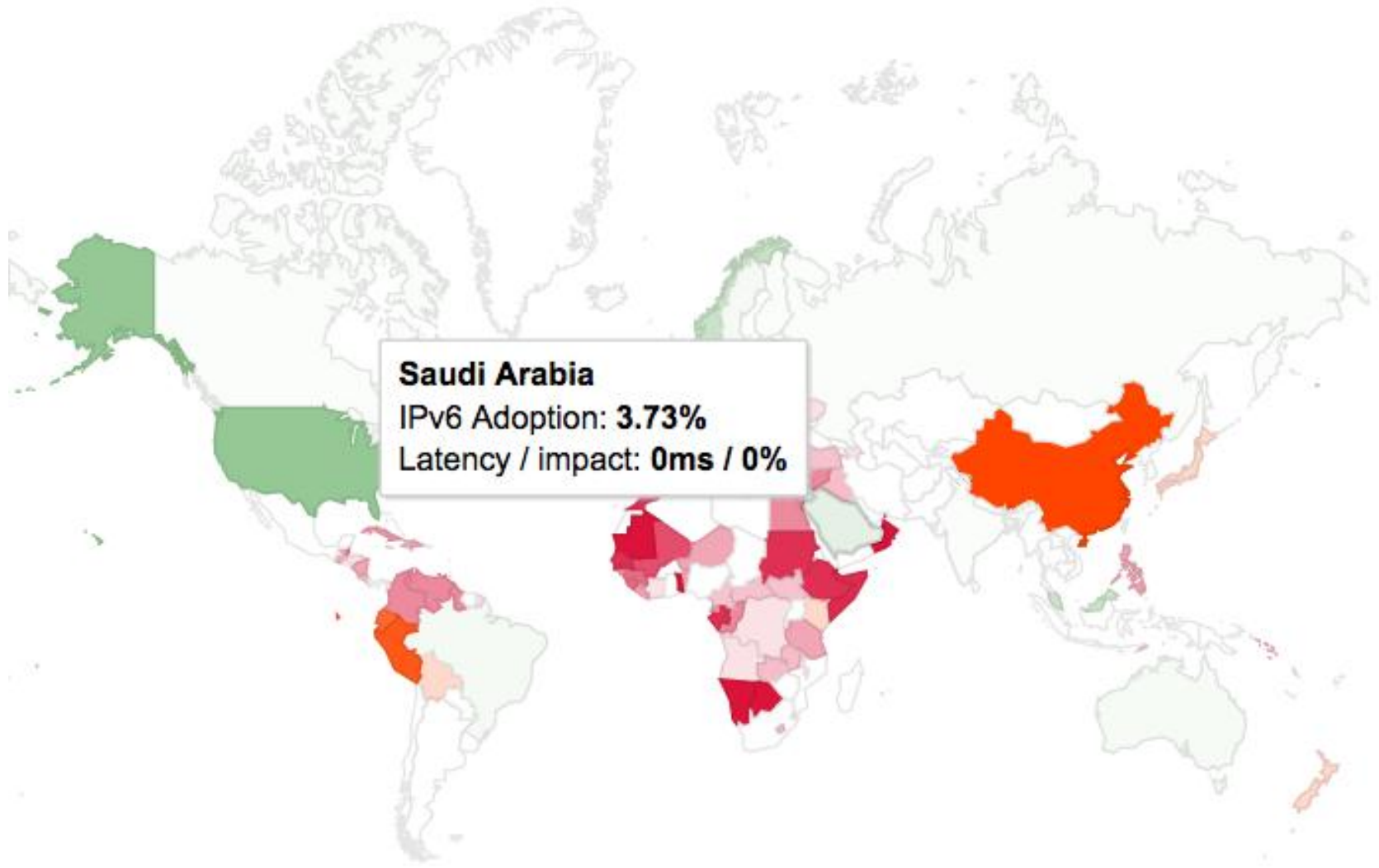
Why IPv6 at Google?

- When the day comes that users only have IPv6, Google needs to be there for them
- Serve current users better over IPv6
 - IPv6 can have lower latency and packet loss
 - We have user reports to prove it
 - AJAX applications break behind excessive NAT
 - Connections exhaust public IP port space
 - Growing number of IPv6-only client deployments
 - Set-top boxes, mobile, ...
- IPv6 is good for the Internet, and we want to help

● Native 6.63% ● 6to4/Teredo 0.01% ● Total IPv6 6.64% | May 02, 2015







<https://www.google.com/intl/en/ipv6/statistics.html#tab=per-country-ipv6-adoption>

What

What we have done so far ?

- IPv6 network rollout
- IPv6-only websites ipv6.google.com,
ipv6.google.cn, ipv6.google.co.jp
- IPv6 evangelism
- Google IPv6 conference : Conference talks,
panels, blackout sessions, ...
- Vendor outreach
- Google over IPv6
- IPv6 access to most Google web properties
www, [mail](mailto:), calendar, docs, ...



Ready for the future of the Internet?



No problems detected.

You don't have IPv6, but you shouldn't have problems on websites that add IPv6 support.

[Learn more](#) about IPv6, or read about [World IPv6 Launch](#).

Google

Google Public DNS IP addresses

The Google Public DNS IP addresses (IPv4) are as follows:

- 8.8.8.8
- 8.8.4.4

The Google Public DNS IPv6 addresses are as follows:

- 2001:4860:4860::8888
- 2001:4860:4860::8844

You can use either address as your primary or secondary DNS server. You can specify both addresses, but do not specify one address as both primary and secondary.

You can configure Google Public DNS addresses for either IPv4 or IPv6 connections, or both.

Cloud SQL instances now come with a free IPv6 address



Properties

IPv4 address	173.194.251.158
IPv6 address	2001:4860:4864:1:329a:211f:1d19:a258
Database version	MySQL 5.5
Region	United States
Backup window	3:27 AM – 7:27 AM
Binary log	Enabled
File system replication	Asynchronous
Preferred location	None
Tier	D1
Pricing plan	Per Use

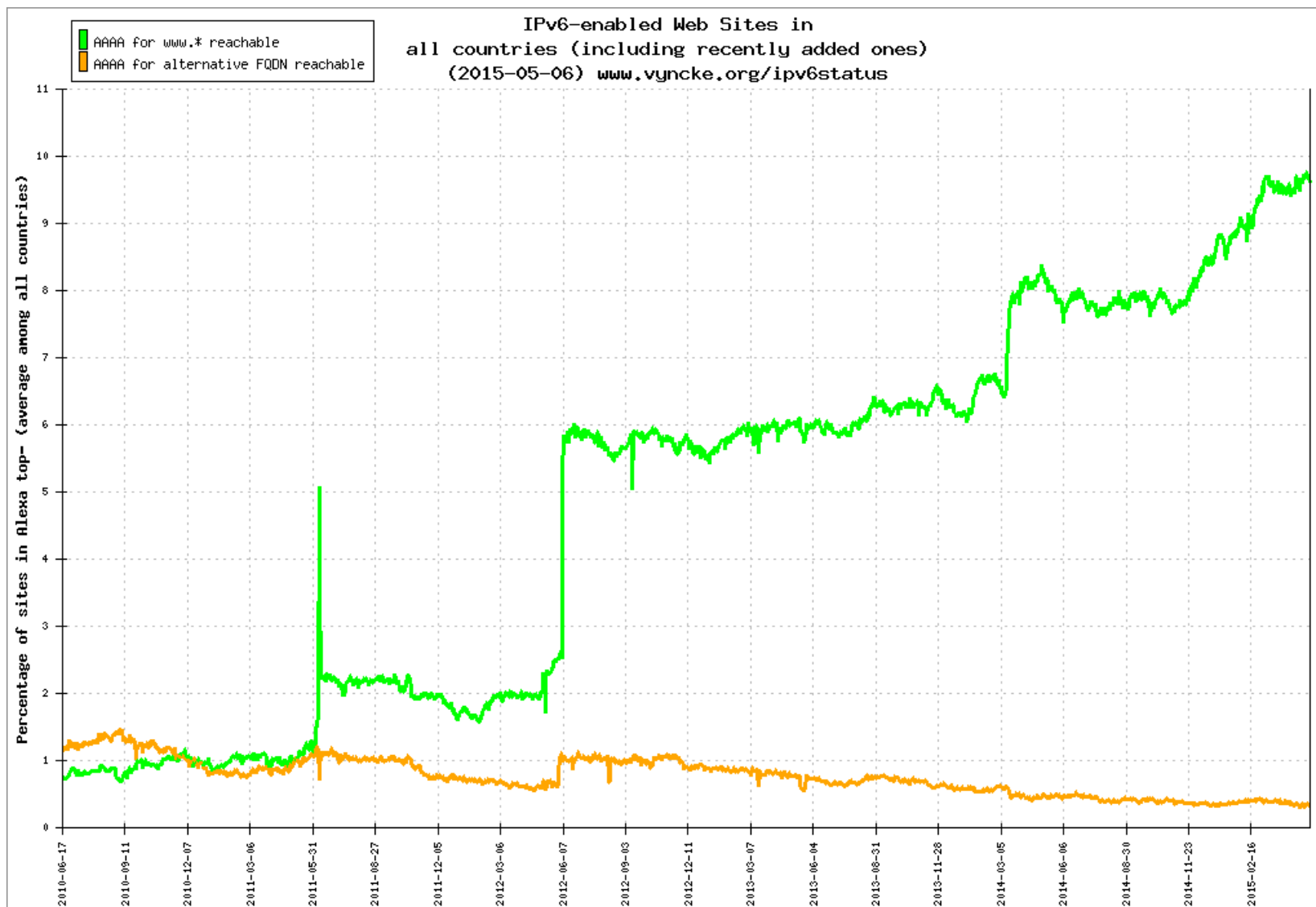
Android

- Android has pretty comprehensive IPv6 support.
- On major IPv6-capable carriers such as T-Mobile and Verizon Wireless, 70% - 90% of traffic from Android devices to Google (and presumably other IPv6-capable websites) is using IPv6

World IPv6 Launch

- World IPv6 Launch is a major coordinated global launch of IPv6.
- Participants will permanently enable IPv6 by default.
- Major websites like Google, Facebook, Netflix, Yahoo!, Bing, and AOL, major ISPs like AT&T, Comcast, Free, KDDI, and Internode, and home router vendors such as Cisco/Linksys and D-Link.





The government should lead the way

- ***Government as Network Operator and Content Provider:*** All government IP-based networks, applications, content, and services, should provide support for IPv6, both "internally" (civil servant-facing) and "externally" (citizen-facing).
- ***Government as Consumer:*** When the government contracts with private actors for Internet services (including peering, web hosting, and edge caching), such services must maintain robust IPv6 support.
- ***Government and Infrastructure Stimulus:*** The government should require robust IPv6 support as a condition of any subsidies or incentives aimed at broadband deployment.
- ***Government and R&D:*** The government should provide grants and support to the academic community to explore development of IPv6-capable networks and innovative IPv6-based applications.

Thank you