Analysis of IPv6 x IPv4 latencies

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We asked ourselves:

What is the difference between IPv6 and IPv4 latencies in today's Internet?

Does IPv6 have already "production quality"?

```
IPv4
$ ping -n -c3 ietf.org

PING ietf.org (64.170.98.30) 56(84) bytes of data.
64 bytes from 64.170.98.30: icmp_req=1 ttl=73 time=227 ms
64 bytes from 64.170.98.30: icmp_req=2 ttl=73 time=218 ms
64 bytes from 64.170.98.30: icmp_req=3 ttl=73 time=220 ms

--- ietf.org ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 218.773/222.129/227.588/3.931 ms


IPv6
$ ping6 -n -c3 ietf.org

PING ietf.org(2001:1890:1112:1::1e) 56 data bytes
64 bytes from 2001:1890:1112:1::1e: icmp_seq=1 ttl=49 time=363 ms
64 bytes from 2001:1890:1112:1::1e: icmp_seq=2 ttl=49 time=295 ms
64 bytes from 2001:1890:1112:1::1e: icmp_seq=3 ttl=49 time=383 ms

--- ietf.org ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 295.438/347.414/383.311/37.632 ms
```

It seems that there is a problem...

Would it be a routing problem?
A configuration problem?
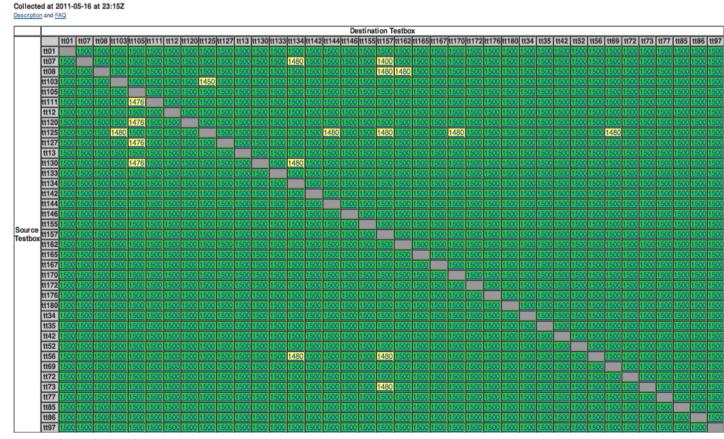
First things first...
We are not even testing it
the right way...

How can we measure it
in a more significative way?

RIPE TTM Data!
(http://ttm.ripe.net)

They have a lot of dual stack measurement boxes over the world, and a cool IPv6 tunnel discovery tool...
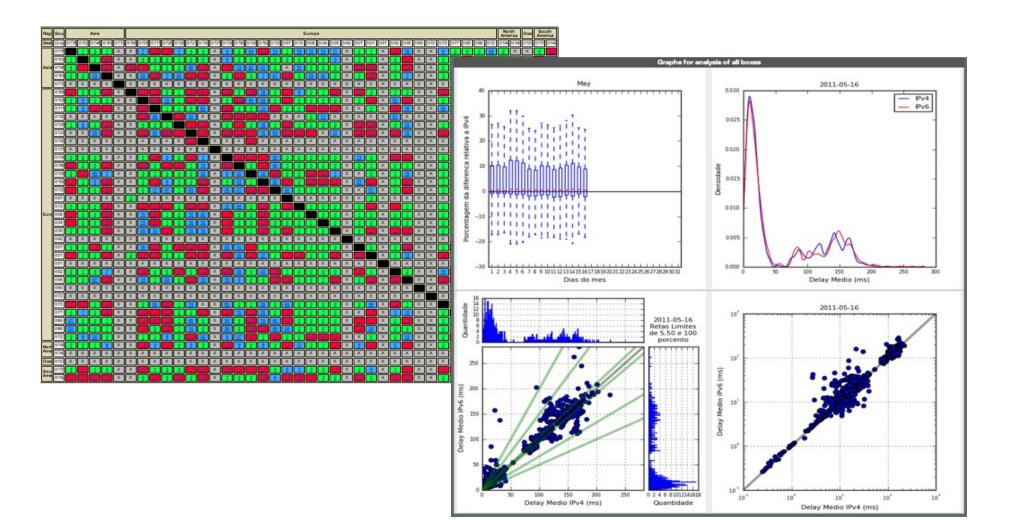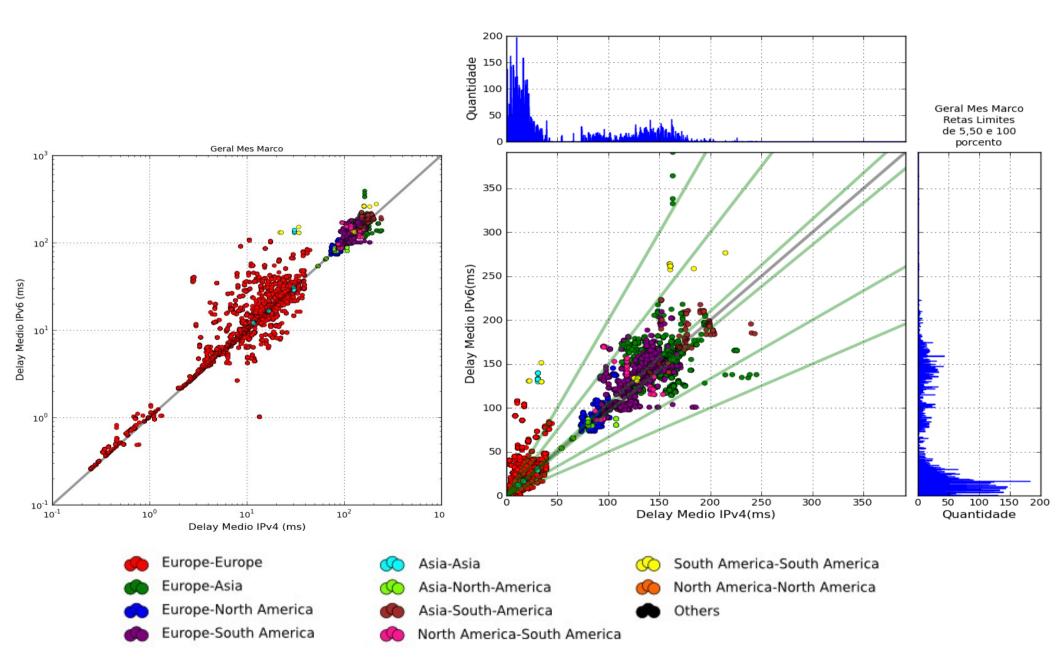
Table ordered by region, and colored by the percentual difference between v6 and v4 delays.

Mar

Legend:
- Europe-Europe
- Europe-Asia
- Europe-North America
- Europe-South America
- Asia-Asia
- Asia-North-America
- Asia-South-America
- North America-South America
- South America-South America
- North America-North America
- Others
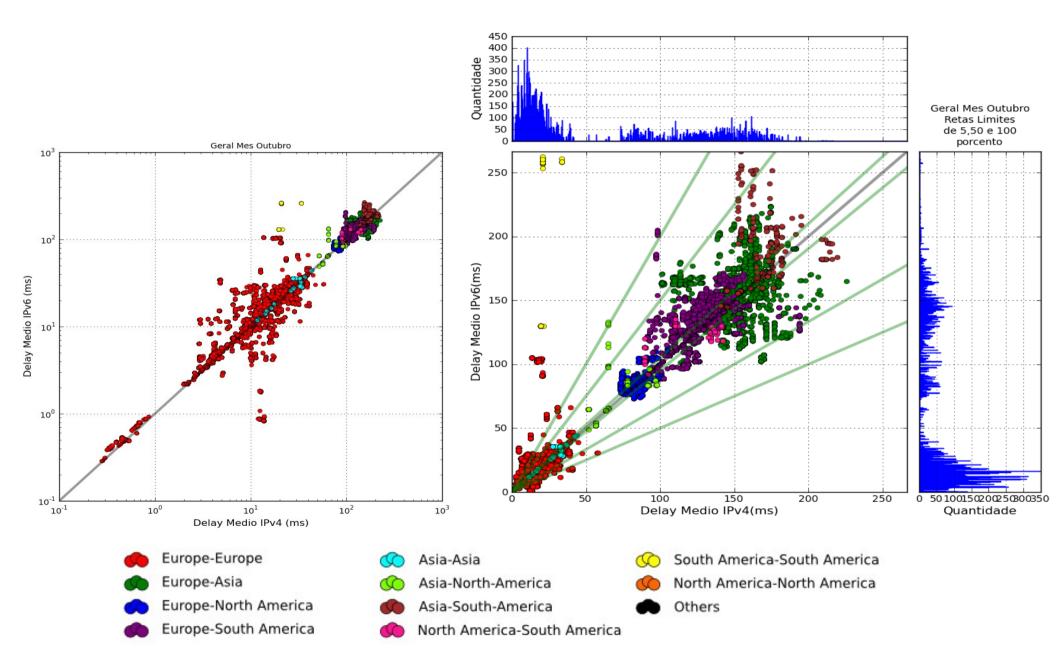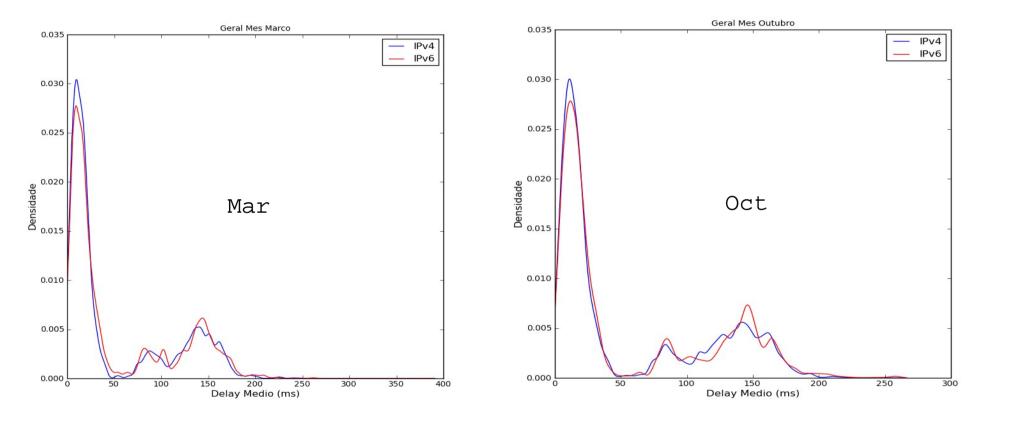
Oct

Delay density
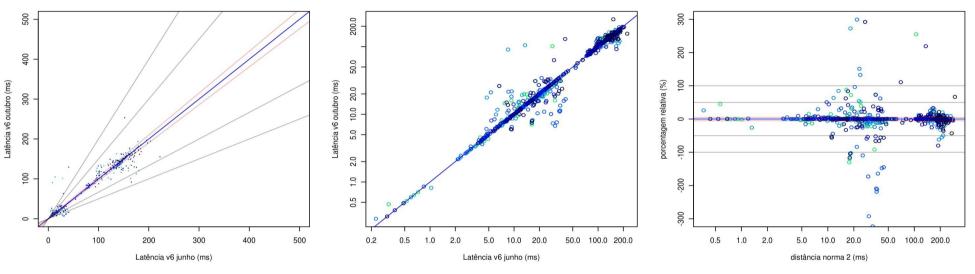
IPv6(Oct) x IPv6(Jun)
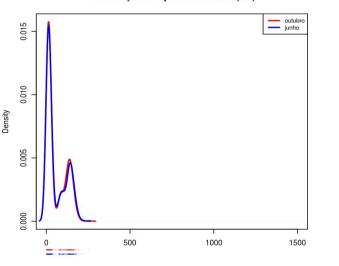
Valores para todos os sites e clientes em para os meses de junho e outubro

Distribuição linear junho v6 x outubro v6 separado por cliente de origem **Distribuição logarítmica junho v6 x outubro v6 separado por cliente de orig** **Distribuição radial junho v6 x outubro v6 separado por cliente de origem**

Distribuição RTT junho e outubro (ms)
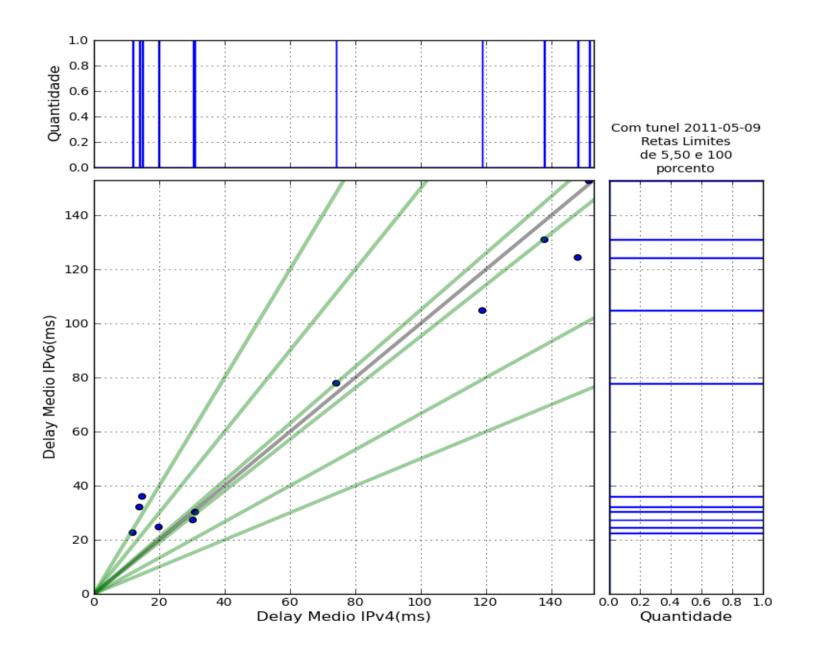
**Color Scale for clients**
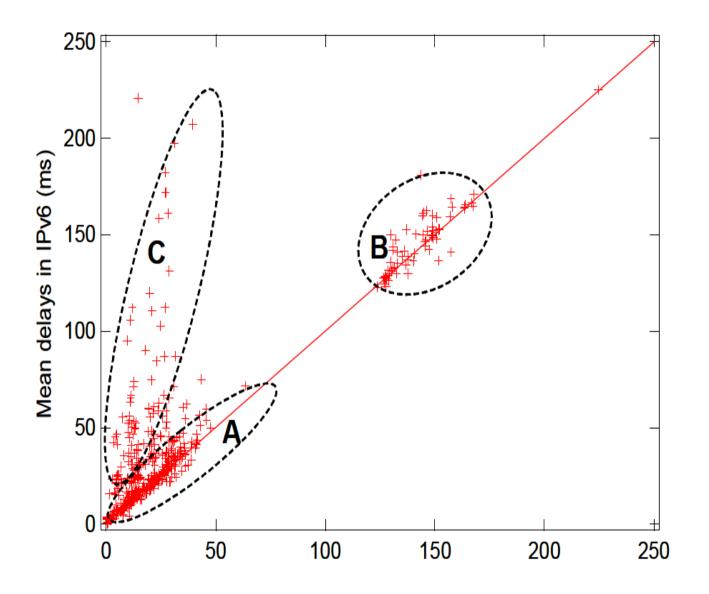
Tunnels?

Hopcount and E2E Delay: IPv6 Versus IPv4
Xiaoming Zhou and Piet Van Mieghem
Delft University of Technology
2005

OK

It seems a lot better than
the pings...

Why?

Do we have a problem
within the Brazilian networks?
Would this data be distorted because
TTM boxes are generally in the core
of the networks?

Get our own data...

From:

+ some VPS in
USA, europe
and asia

(15)

Against dual stack:

- TTM boxes (29)(NTP - UDP)
- Websites (366)(HTTP - TCP)

http://labs.ceptro.br/simonv6
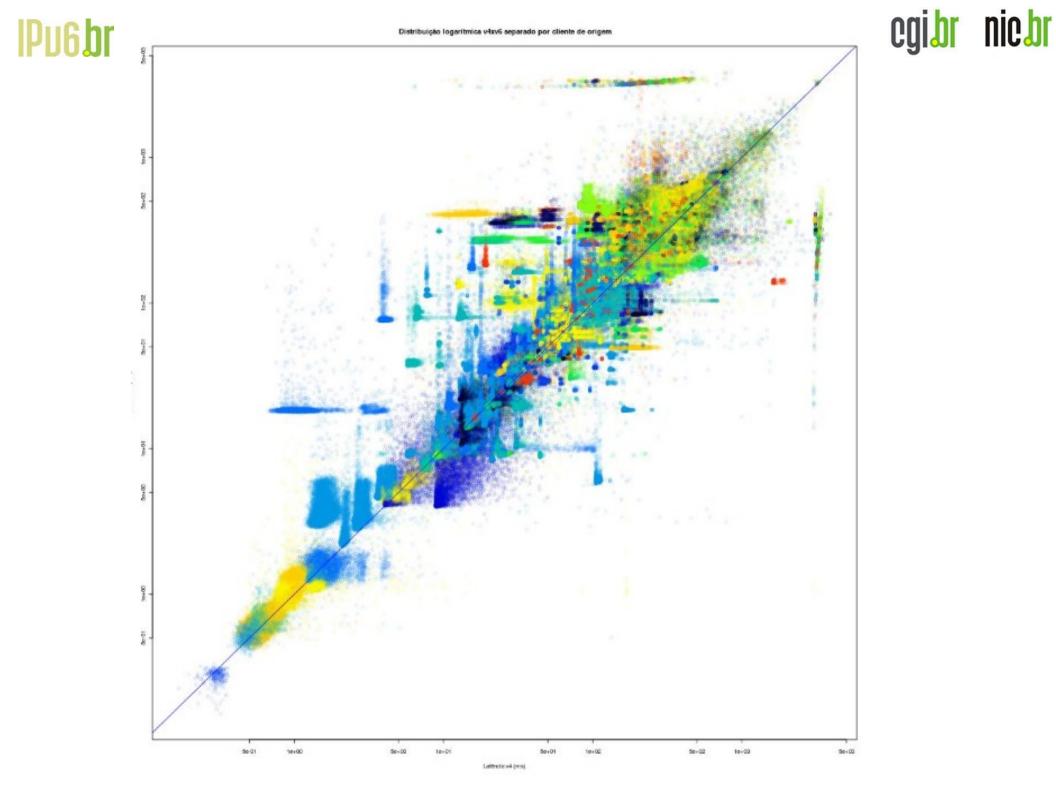
Origem (Origin)	ASN	Latência IPv4 (ms) (Latency IPv4)	Latência IPv6 (ms) (Latency IPv6)	IPv6 - IPv4	IPv4/IPv6	(IPv4-IPv6)/IPv4 (%)	Amostras (Samples)	País (Country)	Mais (More)
CTBC	16735	249.29	255.36	6.08	0.98	-2.44%	1727	BR	
DECEx	28301	235.76	261.63	25.87	0.9	-10.97%	1696	BR	
IBTelecom	28346	255.91	293.75	37.84	0.87	-14.78%	1736	BR	
NIC.br	22548	232.81	260.02	27.21	0.9	-11.69%	1708	BR	
pop-PR-RNP	10881	233.25	241.55	8.3	0.97	-3.56%	1834	BR	
SCW	28138	248.26	262.17	13.91	0.95	-5.6%	1553	BR	
NIC.cl	27678	241.74	246.14	4.39	0.98	-1.82%	2746	CL	
CEDIA - EC	27947	272.46	274.02	1.56	0.99	-0.57%	1537	EC	
Amsterdam-NL	35017	99.43	101.05	1.63	0.98	-1.64%	937	US	
Coimbatore-IN	38743	239.06	261.49	22.43	0.91				
NYC-US	32748	112.97	116.74	3.77	0.97				
Portland-US	14613	159.3	165.85	6.55	0.96				
SanJose-US	33597	151.55	159.46	7.91	0.95				
LACNIC	28000	319.59	331.12	11.53	0.97				

Destino (Destiny)	Tipo (Type)	ASN	Latência IPv4 (ms) (Latency IPv4)	Latência IPv6 (ms) (Latency IPv6)	IPv6 - IPv4
tt73.ripe.net	NTP	1853	234.82	232.21	-2.61
www.nextlayer.at	HTTP	1764	228.45	228.07	-0.38
monash.edu.au	HTTP	56132	354.46	346.14	-8.33

Relatório para o cliente: pop-PR-RNP

Distribuição logarítmica v4xv6 separado por cliente de origem

Latência v4 (ms)

May
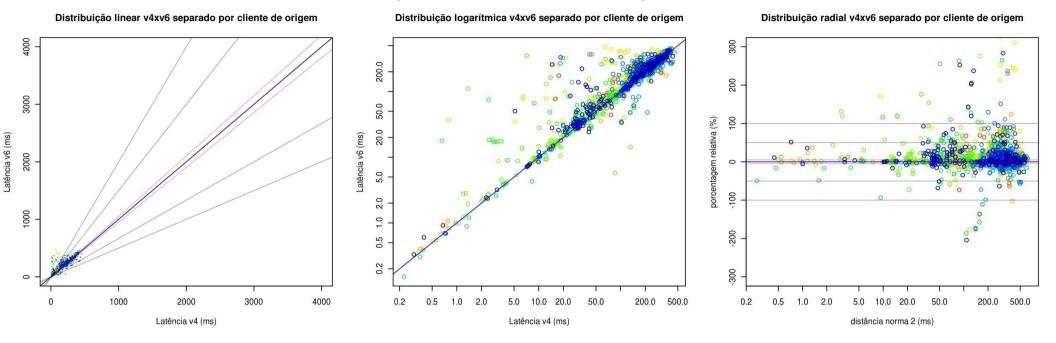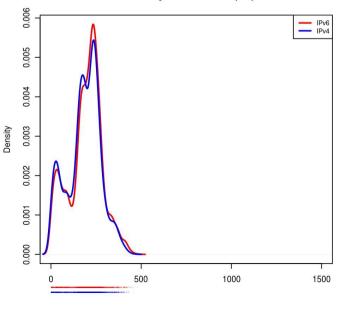
Valores mínimos para todos os sites e clientes para o mês de maio
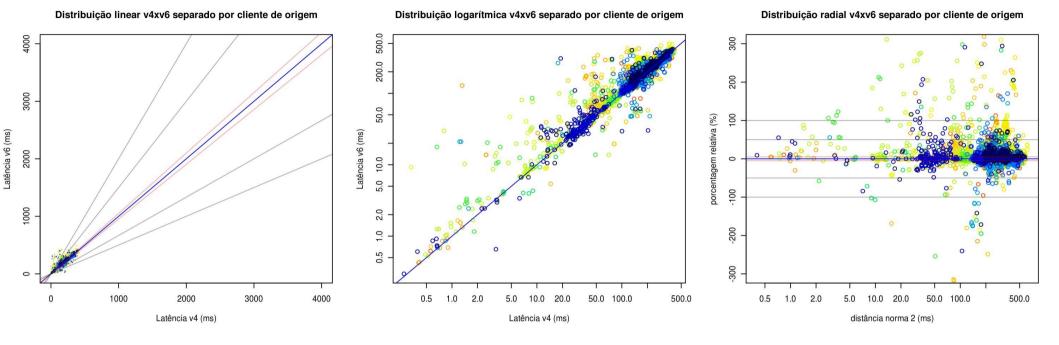
Distribuição linear v4xv6 separado por cliente de origem

Distribuição logarítmica v4xv6 separado por cliente de origem

Distribuição radial v4xv6 separado por cliente de origem

Distribuição RTT v4 e v6 (ms)

Color Scale for clients

Oct
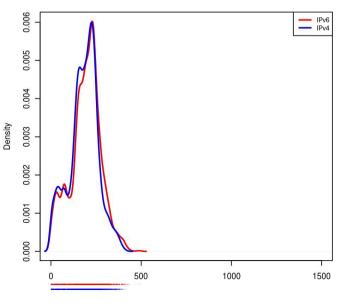
Valores mínimos para todos os sites e clientes para o mês de outubro

Distribuição linear v4xv6 separado por cliente de origem

Distribuição logarítmica v4xv6 separado por cliente de origem

Distribuição radial v4xv6 separado por cliente de origem

### Distribuição RTT v4 e v6 (ms)
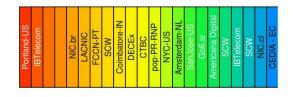
Color Scale for clients
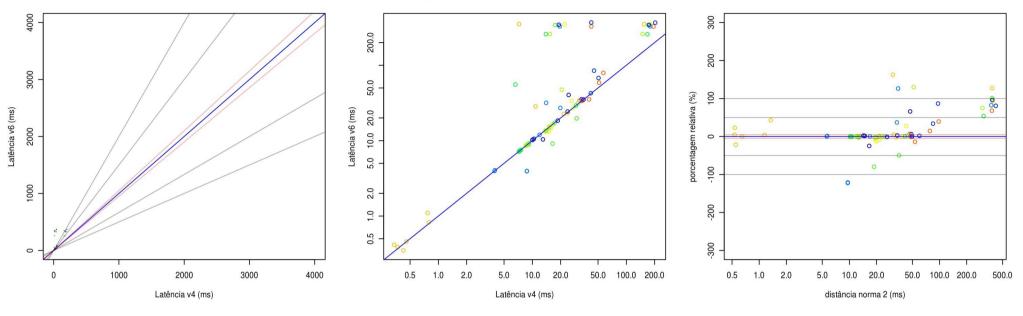
BR x BR

Todos os sites de BR e clientes de BR
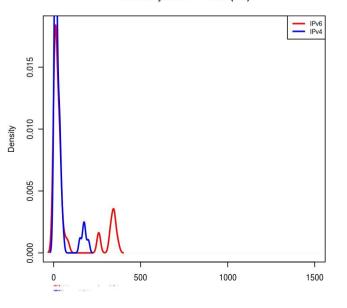
**Distribuição linear v4xv6 separado por cliente de origem**

Distribuição logarítmica v4xv6 separado por cliente de origem

Distribuição radial v4xv6 separado por cliente de origem

Distribuição RTT v4 e v6 (ms)

Color Scale for day hour and clients
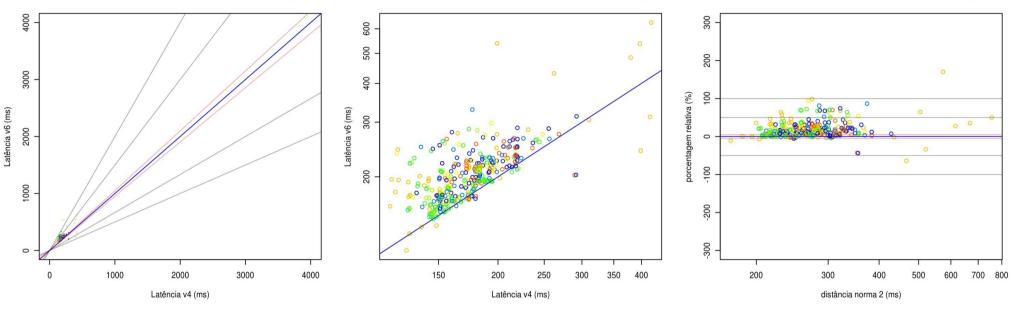
BR x US

Todos os sites de US e clientes de BR

Distribuição linear v4xv6 separado por cliente de origem
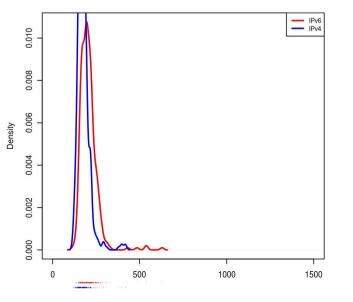

Distribuição logarítmica v4xv6 separado por cliente de origem

Distribuição radial v4xv6 separado por cliente de origem

Distribuição RTT v4 e v6 (ms)

Color Scale for day hour and clients

IBTelecom | NIC.br | SCW | DECEx | CTBC | pop-PR-RNP | Americana Digital | IBTelecom | SCW
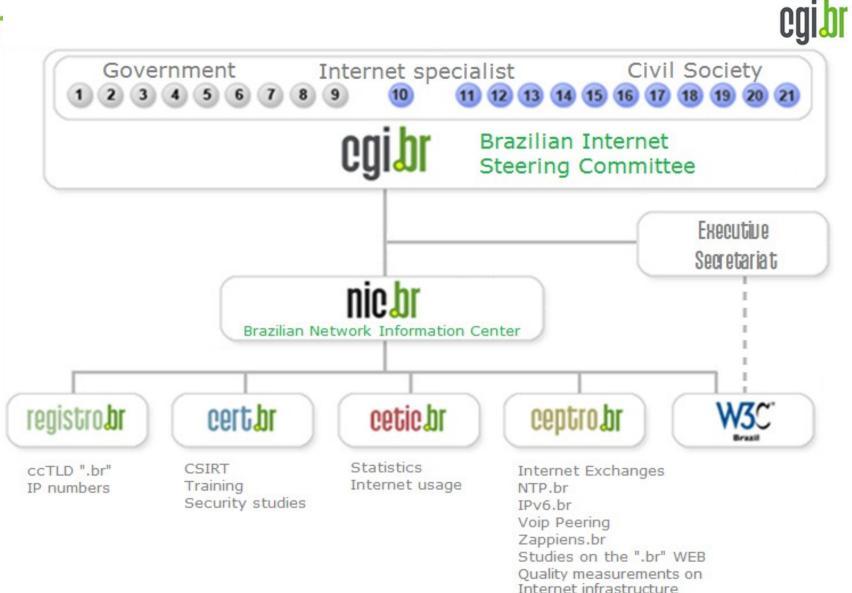
Comments and questions

- **Good news:** in the general picture, IPv6 is production quality!

- Not so good news: "production quality" for IPv6 and IPv4 could be a bit alike and better...

- Yes, it seems we do have a problem with Brazilian upstreams and specific destinations, for example US. Why? We do no know yet.

- Why IPv4 is worst sometimes?

NIC.br is a not for profit organization, created by the Brazilian Internet Steering Committee. We manage the ccTLD .br, that provides our funding. We are the Brazilian NIR. We also have a lot of projects and initiatives to foster the Internet development in Brazil, such as the 18 Brazilian Internet Exchanges "PTTMetro", and the IPv6 dissemination project "IPv6.br".
More information at http://www.nic.br/english

If you want to...

You can access the data:
http://labs.ceptro.br/ccl-ipv6
http://labs.ceptro.br/simonv6

We can talk about it.

You can host a measurement point.

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