



Network debugging never was easier

Job Snijders

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Who am I?

Job Snijders

Network guru @
AS 5580 (Atrato IP Networks)

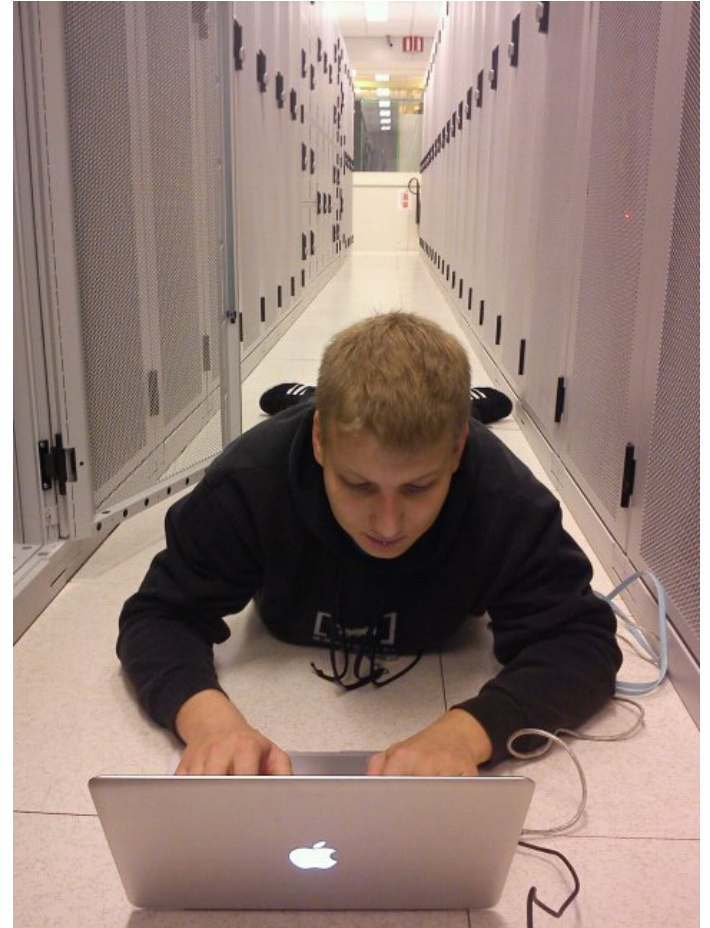
Twitter: @JobSnijders

Past or present affiliations:

AS41552, AS8954, AS8935, AS15562,
AS199036, AS197754, AS3943, AS8283,
MENOG IPv6 Roadshows & LISP Beta network

Hobbies: IP Routing, LISP, MPLS, IPv6, RING

Shoe size: 45/EU



What's NLNOG?



*This is where
It started!*

- Loosely connected group of Dutch network operators
- Drink beer once a year
- Active IRC channel
- mostly dormant mailing-list

So, what's this RING thing?

Metaphysical definition:

“Awesome network debugging platform”

Foundation:

*Trust – I trust you with access to my resources,
as you trust me with access to your resources*

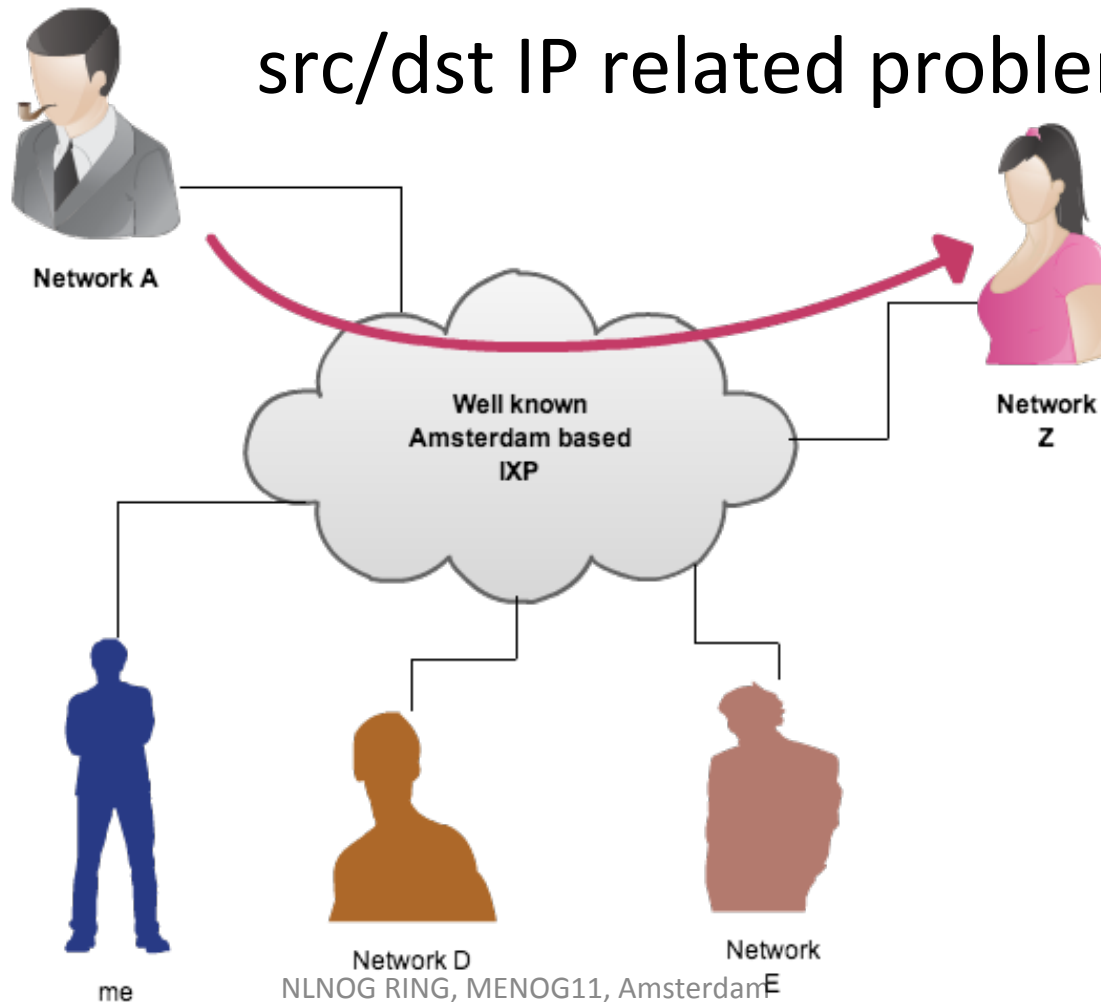
Agenda

- How the RING came to be
- Current state of the RING
- CLI interface
- Web interface
- BGP Looking Glass
- RING Governance
- How to join!

How did it start? (1/3)

In December 2010 a friend of mine had some

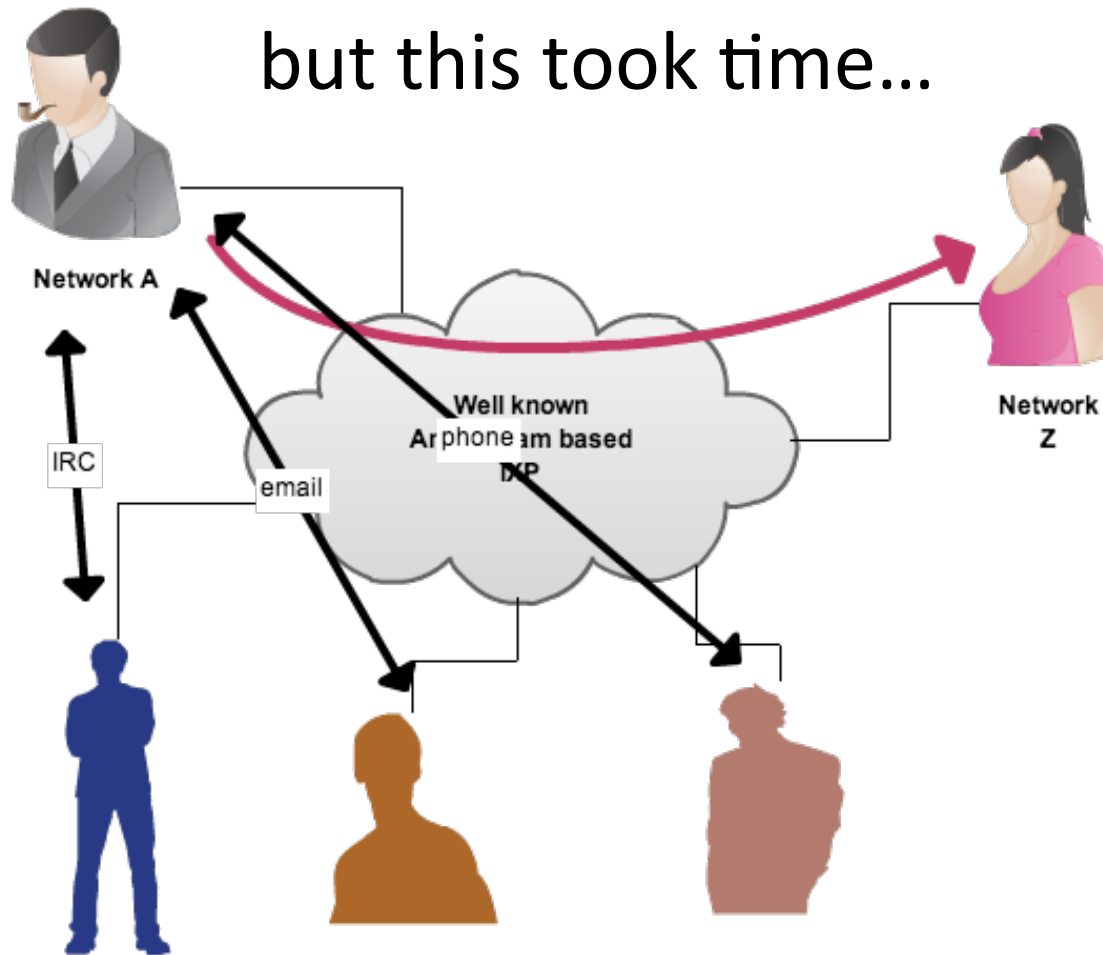
src/dst IP related problems

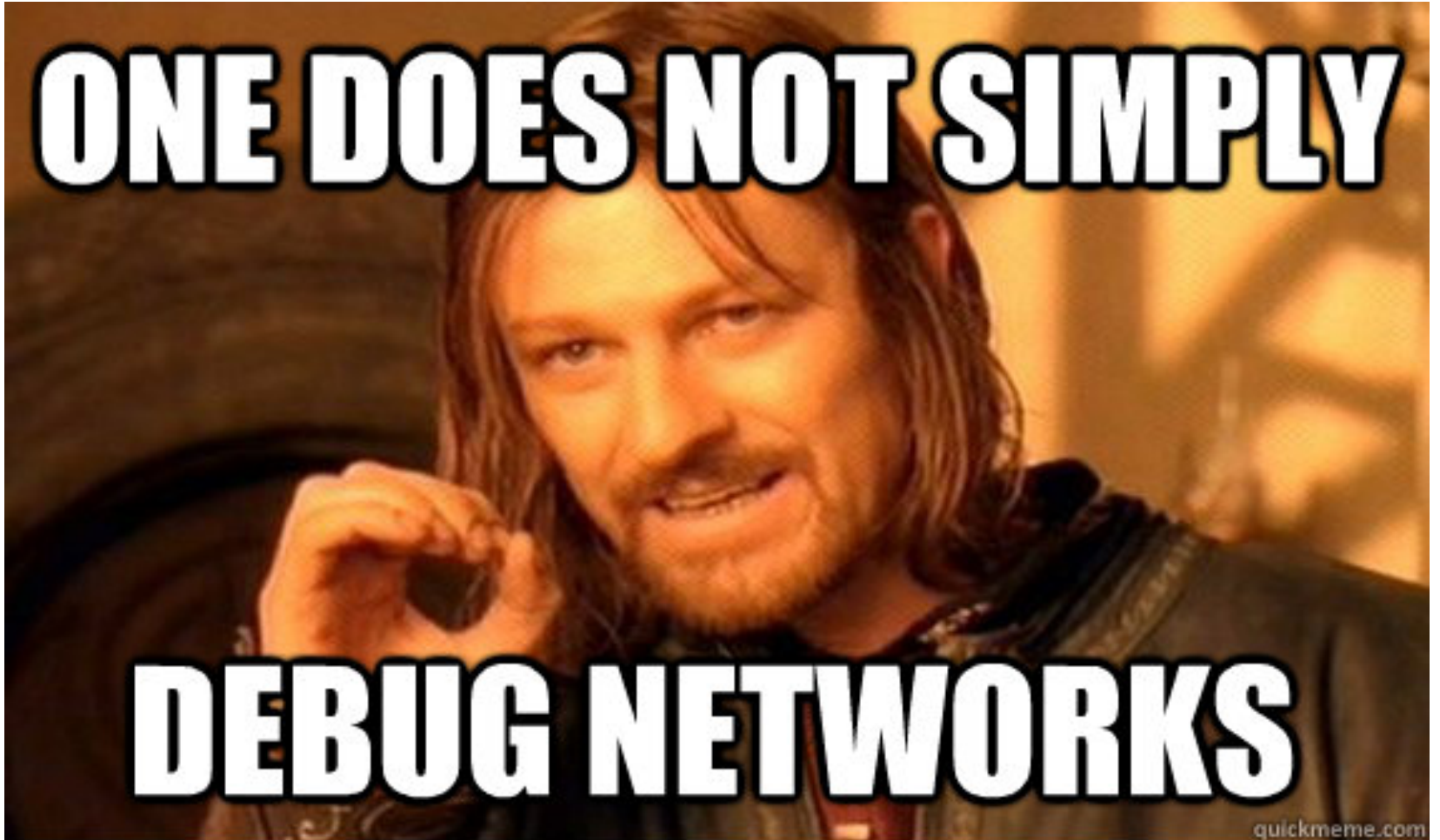


How did it start? (2/3)

He asked for help (pingsweep, traceroute, etc),

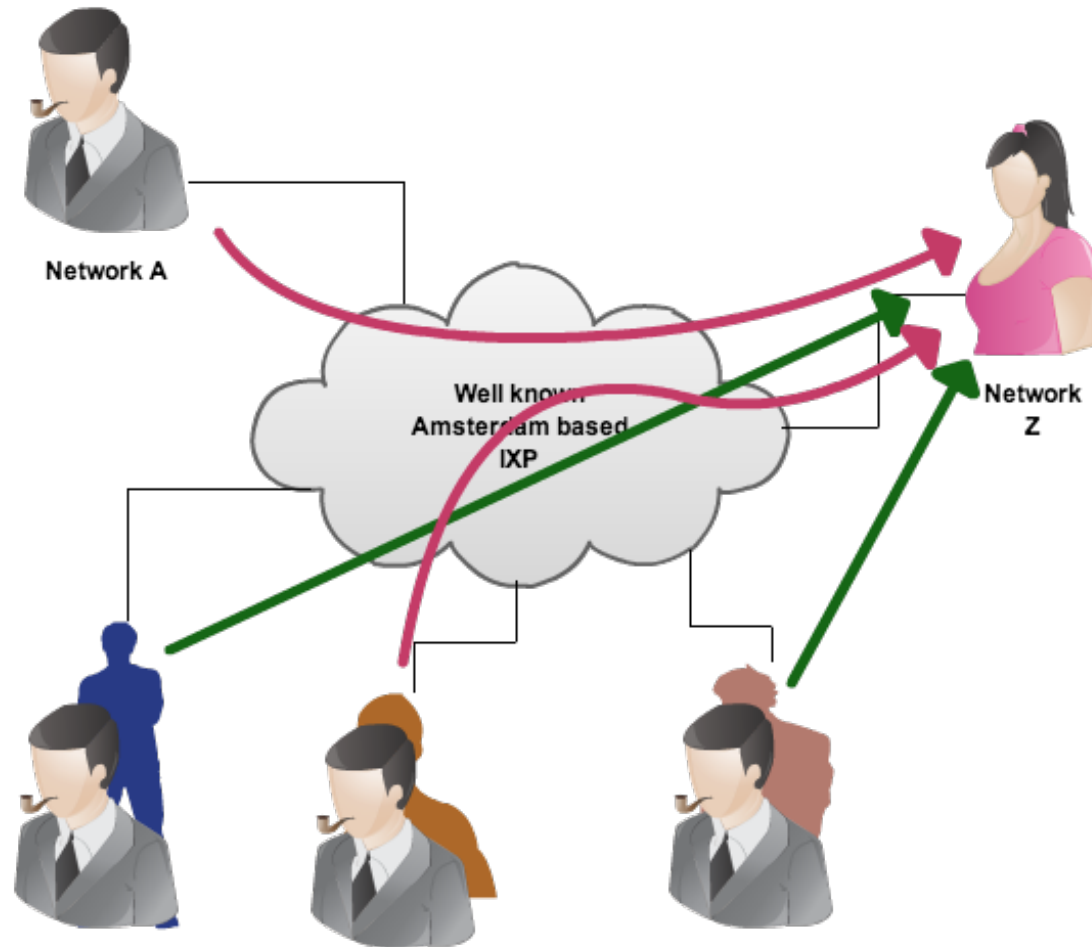
but this took time...





How did it start? (3/3)

But wouldn't DIY be much nicer?



State of the RING

148 nodes

30 countries

127 Autonomous Systems

Still growing!

September 2012



NLNOG RING, MENOG11, Amsterdam

Participants from all walks of life,
a random selection



SOFTLAYER®



claranet



And our latest participant!



First node in the Middle-East: bci01.ring.nlnoq.net !

CLI example – step 1

```
atrato@atrato01:~$ ring-ping www.iij.ad.jp  
occiad01 connect: Network is unreachable  
www.iij.ad.jp - 132 servers: 261ms average  
www.iij.ad.jp - unreachable via: occaid01
```

IPv4-only
test!

```
atrato@atrato01:~$ ring-ping -6 www.iij.ad.jp  
www.iij.ad.jp - 131 servers: 275ms average  
www.iij.ad.jp - unreachable via: inotel01 jump01  
atrato@atrato01:~$
```

IPv6-only
test!

CLI example – step 2

```
atrato@atrato01:~$ ssh inotel01.ring.nlnog.net traceroute6 www.ij.ad.jp
traceroute to www.ij.ad.jp (2001:240:bb42:b000::1:80) from 2a02:78:d443:8314::1,
port 33434, from port 42942, 30 hops max, 60 bytes packets
```

```
1 2a02:78:d443:8314:: (2a02:78:d443:8314::) 0.527 ms 0.573 ms 0.501 ms
```

```
2 * * *
```

```
3 * * *
```

```
4 * * *
```

```
^CKilled by signal 2.
```

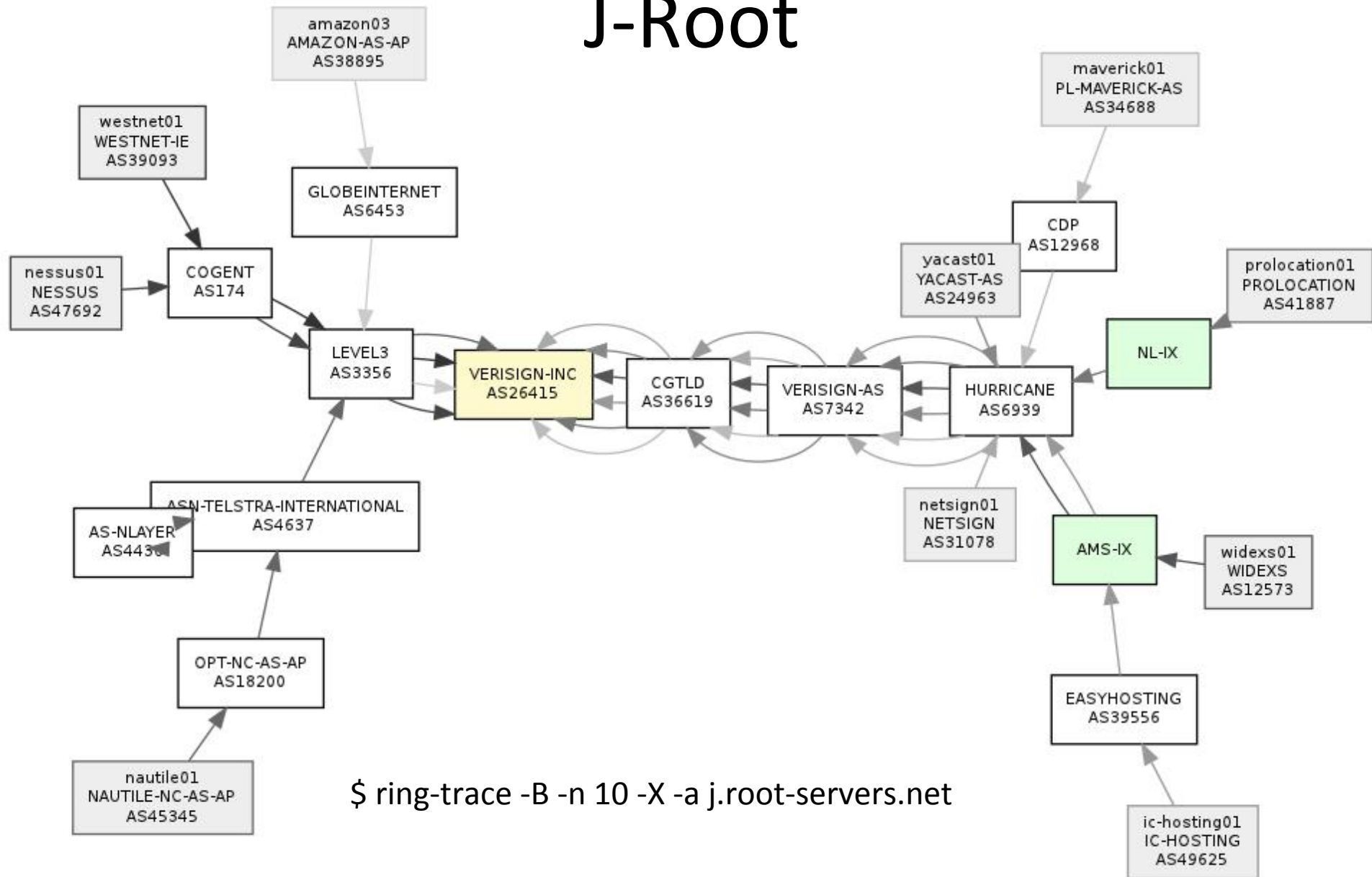
```
atrato@atrato01:~$
```



Other CLI uses

- Use dig to check nameservers from 121 ASNs
- Traceroute from 134 nodes to your target
- MTU testing between you and others
- Port scanning
- Debug L2/L3 load balancing issues
- Anything!

J-Root



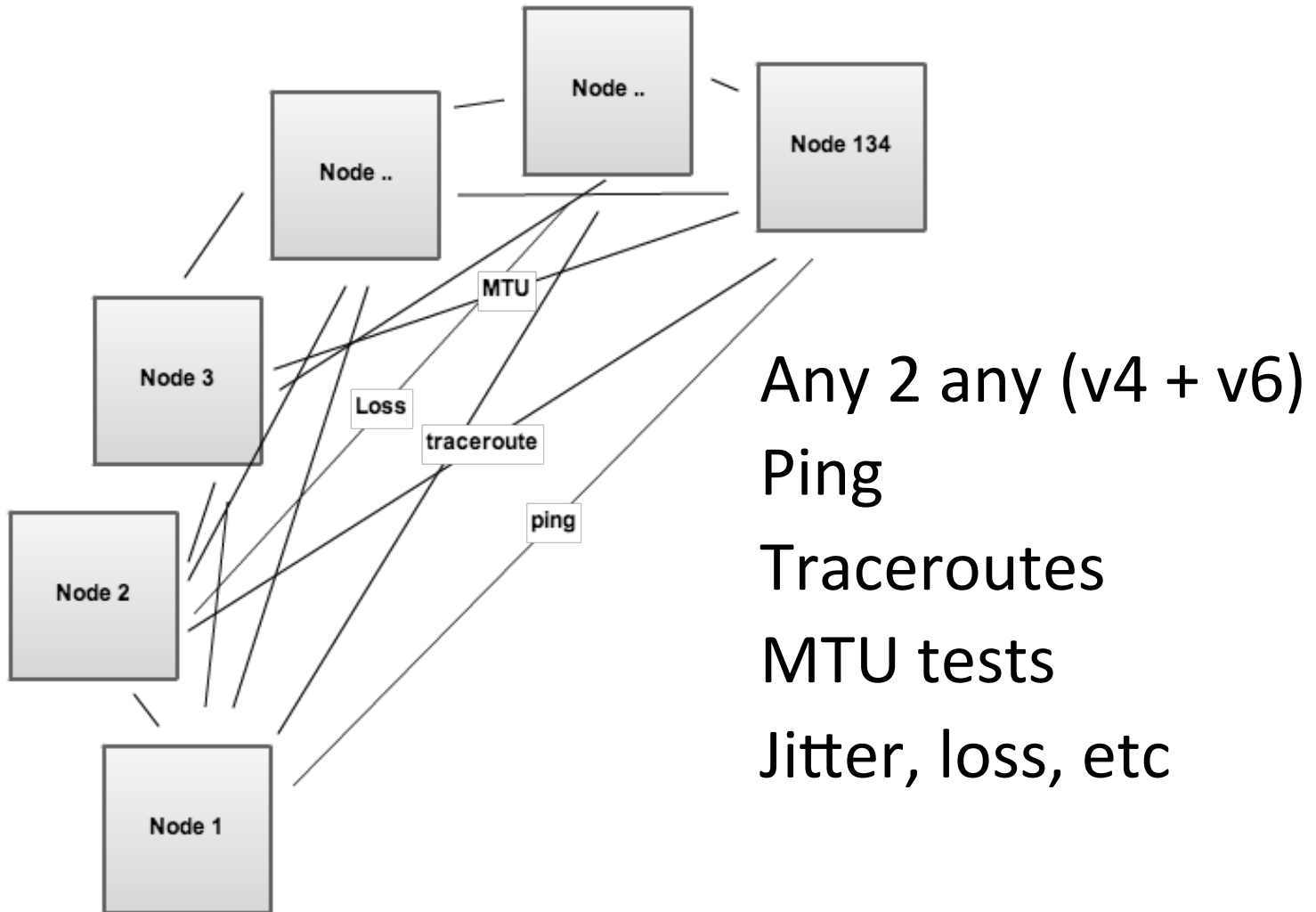
\$ ring-trace -B -n 10 -X -a j.root-servers.net

RING Web interface

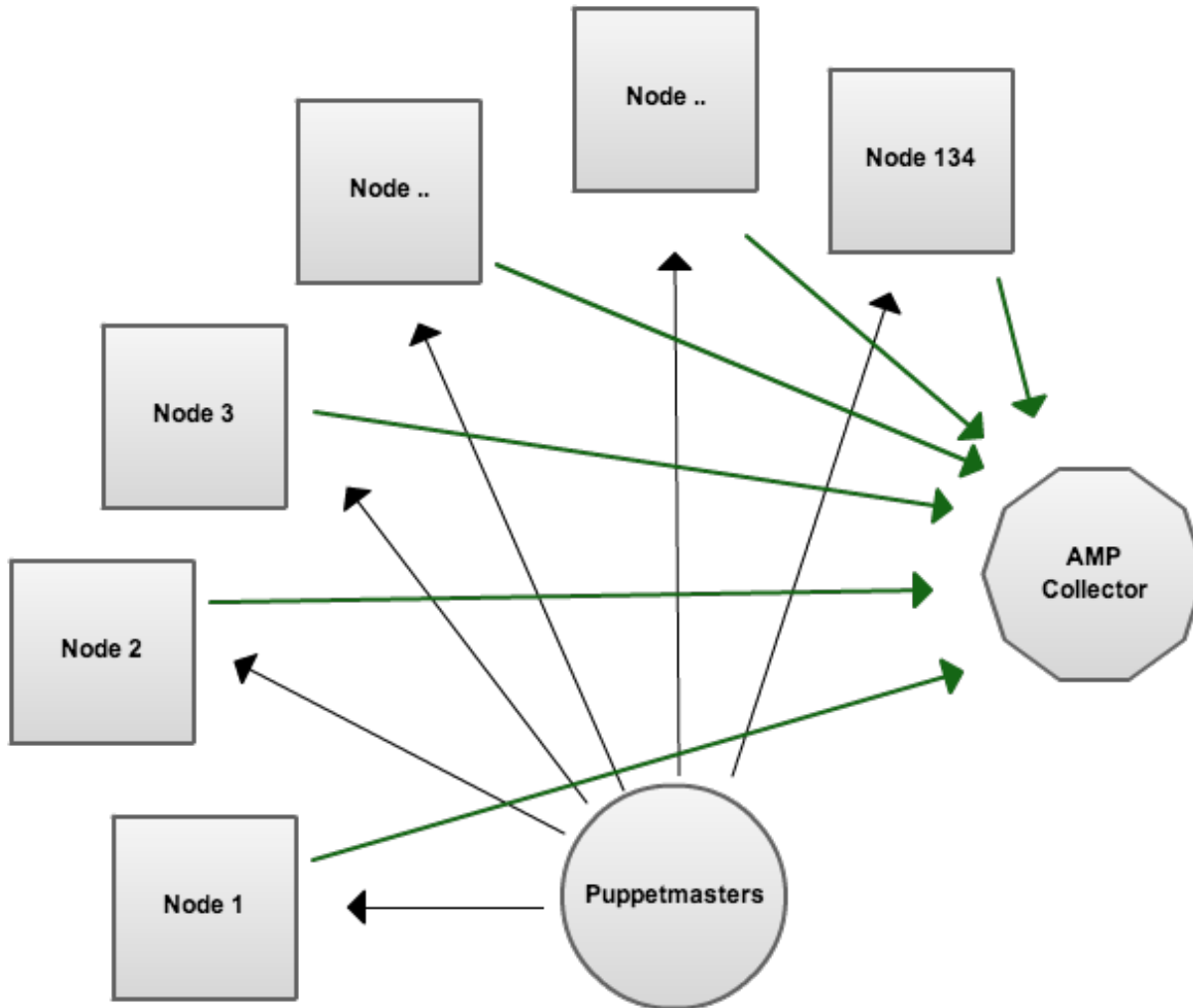
- AMP (Active Measurement Project)
 - Developed by WAND Network Research Group
 - Same guys as scamper & friends
 - Big thanks to Brendon Jones for his support
 - Info: <http://wand.cs.waikato.ac.nz/projects/details/amp>
- In beta phase, bear with us while we scale 😊

<http://amp.ring.nlnog.net/>

AMP concept – part 1



AMP concept – part 2



- Home
- Download Raw Data
- Add Event
- Performance Map
- Welcome back job,
- Edit Your Preferences
- Logout

View Mode

- Source View
- Matrix View

Comparison List

No graphs selected
View Comparisons >>
Reset Comparison List >>

DE to GB Update

ipv4 ipv6
latency loss hops mtu

Destination:

Source:	claranet01	globalaxs01	jump01	lchostr01	melbourne01	misp01	multiply01	simplytransit01	sixdegrees01	timico01
as250net01	50	51	34	43	50	47	44	40	53	33
belvue01	30	29	19	21	33	33	17	20	31	19
claranet02	24	29	24	21	32	35	16	25	34	24
filoo01	27	33	14	19	29	52	17	29	21	19
fremaks01	33	37	23	28	28	38	30	27	29	20
isarnet01	42	90	66	57	58	91	52	49	56	64
man-da01	20	34	17	17	21	32	13	17	28	16
netsign01	93	82	78	115	105	73	103	98	92	77
oneandone01	25	26	21	18	35	25	22	16	25	16
rrbone01	19	23	16	16	24	29	15	16	24	17
skyway01	29	35	21	22	24	45	21	24	31	20
spacenet01	26	29	21	24	26	38	25	23	33	18
speedpartner01	17	31	16	16	31	27	17	18	22	17
strato01	30	37	26	26	29	36	27	29	31	26
teamix01	29	27	16	18	26	32	16	16	30	16

DE to GB Update

ipv4 **ipv6**
latency loss hops mtu

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- View Mode**
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- No graphs selected
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- [Reset Comparison List >>](#)

Destination:

Source:	claranet01	globalaxs01	jump01	lchostr01	melbourne01	misp01	multiply01	simplytransit01	sixdegrees01	timico01
as250net01	37	47		49	71	38	50	30	58	30
belvue01	29	32		21	28	59		23	21	17
claranet02	24	31		29	31	52		23	24	20
filoo01	20	22		19	33	20		15	21	18
fremaks01	35	31		27	39	48		27	24	24
isarnet01	93	118		91	104	76		89	93	102
man-da01	20	23		16	40	43		17	20	16
netsign01	85	49		57	80	44	60	65	69	52
oneandone01	25	27		18	34	38	19	19	20	16
rrbone01	23	30		17	22	41	18	13	17	14
skyway01	24	26		21	26	49		21	25	21
spacenet01	26	47		24	44	52		24	26	21
speedpartner01	39	43		16	20	62	16	13	20	14
strato01	30	35		26	31	46		25	32	29
teamix01	24	26		19	35	39		17	21	16

DE to GB Update

ipv4 **ipv6**
 latency loss hops mtu

- Home
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Destination:

Source:	claranet01	globalaxs01	jump01	lchostr01	melbourne01	msp01	multiplay01	simplytransit01	sixdegrees01	timico01
as250net01	37	47		49	71	38	50	30	58	30
belwue01	29	32		21	28	59		23	21	17
claranet02	24	31		29	31	52		23	24	20
filoo01	20	22		19	33	20		15	21	18
fremaks01	35	31		27	39	48				
isarnet01	93	118		91	104	76				
man-da01	20	23		16	40	43				
netsign01	85	49		57	80	44	60	65	69	52
oneandone01	25	27		18	34	38	19	19	20	16
rrbone01	23	30		17	22	41	18	13	17	14
skyway01	24	26		21	26	49		21	25	21
spacenet01	26	47		24	44	52		24	26	21
speedpartner01	39	43		16	20	62	16	13	20	14
strato01	30	35		26	31	46		25	32	29
teamix01	24	26		19	35	39		17	21	16

ring-filoo01 to ring-multiplay01.v6

Latency (ms)	1 Hour (average)	24 Hour (average)	7 Day (average)
Packet Loss (%)	100	100	100

After clicking the cell in the table

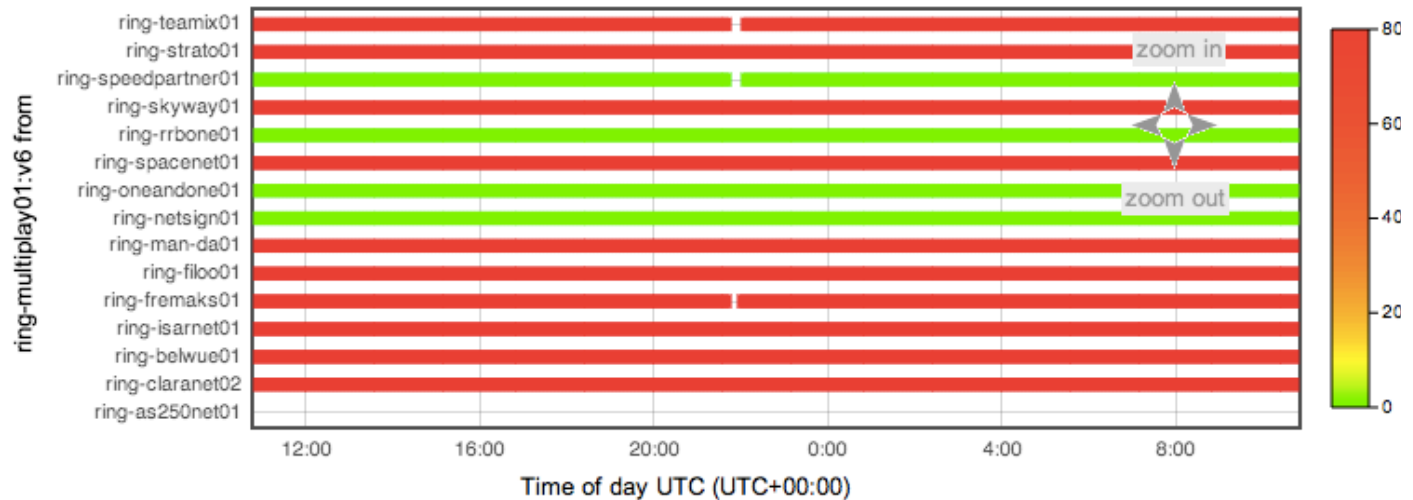
[Add to Comparison List]

- 576 byte ping packets

Summary Refresh Graph >>

Sat Sep 22 2012 to Sun Sep 23 2012

ring-multiplay01:v6 from DE



Snap Range: day | Jump To: << day Now day >> | Snap to day

[View other sources](#) | [other destinations for ring-softlayer02](#)

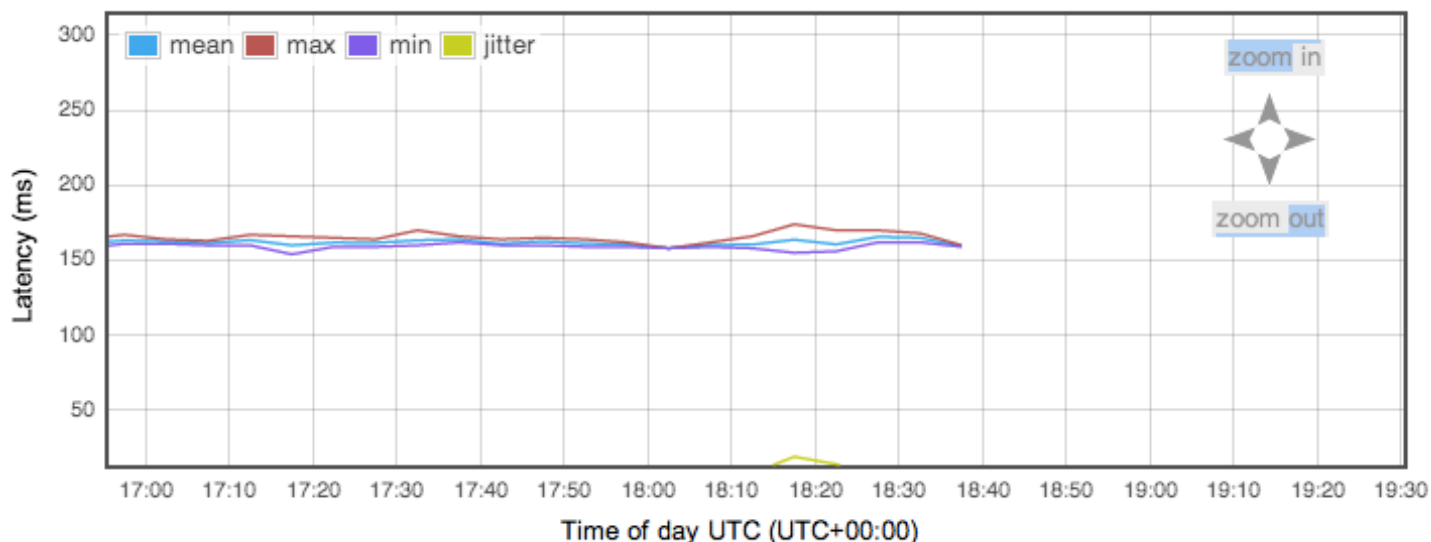
Show worth of data: [Refresh Graph >>](#)

[<< go back 1 day](#)

Latency - 576 byte ping packets

Options: Summary [Refresh Graph >>](#)

Sun Sep 23 2012 to Sun Sep 23 2012



Y-axis max: | Latency: max min mean jitter | Other: loss

Snap Range: | Jump To: |

Matrix - Viewing ipv6 mtu (10 min average) from US to US

US to US Update

Destination:

Source:	amazon01	amazon05	amazon06	atrato02	bigwells01	occaid01	softlayer01	softlayer02	softlayer03	softlayer04	softlayer05	towardex01	voxel01	webair01	yourorg01
amazon01		?	?	?	?	?	?	?	?	?	?	?	?	?	?
amazon05	?														
amazon06	?	1480		1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480
atrato02	1484 †	1500	1494 †		1500	1480	1500	1500	1500	1500	1500	1480	1500	1500	1500
bigwells01	1480 †	1500	1494 †	1500		1480	1500	1500	1500	1500	1500	1500	1500	1500	1500
softlayer01	1484 †	1500	1494 †	1500	1500	1480		1500	1500	1500	1500	1480	1500	1500	1500
softlayer02	1484 †	1500	1480 †	1500	1500	1480	1500		1500	1500	1500	1480	1500	1500	1500
softlayer03	1484 †	1500	1480 †	1500	1500	1480	1500	1500		1500	1500	1480	1500	1500	1500
softlayer04	1484 †	1500	1494 †	1500	1500	1480	1500	1500	1500		1500	1480	1500	1500	1500
softlayer05	1484 †	1500	1480 †	1500	1500	1480	1500	1500	1500	1500		1480	1500	1500	1500
towardex01	1480 †	1480	1480	1480	1500	1480	1500	1500	1500	1500	1500		1500	1480	1500
voxel01	1480 †	1500	1494 †	1500	1500	1480	1500	1500	1500	1500	1500	1480		1500	1500
webair01	?	?	?	1500	?	?	?	?	?	?	?	?	?		?
yourorg01	1484 †	1500	1494 †	1500	1500	1480	1500	1500	1500	1500	1500	1500	1500	1500	

Historic Traceroute - softlayer02 to YourOrg01

Traceroute details for ring-softlayer02 to ring-yourorg01

<<Sun Sep 23 2012 **Mon Sep 24 2012**

[View other sources](#) | [other destinations for ring-softlayer02](#) | [weekly graphs](#) | [reverse](#)

Mon Sep 24 00:00:00 2012 UTC

Hop	Name	Address	MTU
0	173.193.70.97-static.reverse.softlayer.com	173.193.70.97	1500
1	ae11.dar02.sr02.hou02.networklayer.com	173.193.118.132	1500
2	ae9.bbr01.sr02.hou02.networklayer.com	50.97.18.242	1500
3	xe-0-0-0-0.r05.hstntx01.us.bb.gin.ntt.net	128.241.1.49	1500
4	ae-1.r04.hstntx01.us.bb.gin.ntt.net	129.250.2.176	1500
5	ae-9.r20.dllstx09.us.bb.gin.ntt.net	129.250.5.225	1500
6	ae-0.r21.dllstx09.us.bb.gin.ntt.net	129.250.2.59	1500
7	ae-4.r21.chcgil09.us.bb.gin.ntt.net	129.250.2.201	1500
8	ae-2.r06.chcgil09.us.bb.gin.ntt.net	129.250.4.202	1500
9	xe-0-6-0-3.r06.chcgil09.us.ce.gin.ntt.net	128.242.186.130	1500
10	ae1-40g.cr1.ord1.us.nlayer.net	69.31.111.133	1500
11	ae1-20g.ar1.ord6.us.nlayer.net	69.31.110.250	1500
12	as19255.ge-0-0-9-106.ar1.ord6.us.nlayer.net	69.31.105.50	1500
13	yourorg01	204.9.55.77	1500

Mon Sep 24 00:00:00 2012 UTC

Hop	Name	Address	MTU
0	173.193.70.97-static.reverse.softlayer.com	173.193.70.97	1500
1	ae11.dar02.sr02.hou02.networklayer.com	173.193.118.132	1500
2	ae9.bbr01.sr02.hou02.networklayer.com	50.97.18.242	1500
3	xe-0-0-0-0.r05.hstntx01.us.bb.gin.ntt.net	128.241.1.49	1500
4	ae-1.r04.hstntx01.us.bb.gin.ntt.net	129.250.2.176	1500
5	ae-9.r20.dllstx09.us.bb.gin.ntt.net	129.250.5.225	1500
6	ae-0.r21.dllstx09.us.bb.gin.ntt.net	129.250.2.59	1500
7	ae-4.r21.chcgil09.us.bb.gin.ntt.net	129.250.2.201	1500
8	ae-2.r06.chcgil09.us.bb.gin.ntt.net	129.250.4.202	1500

And the reverse Traceroute! - YourOrg01 to softlayer02

Traceroute details for ring-yourorg01 to ring-softlayer02

<<Sun Sep 23 2012 **Mon Sep 24 2012**

[View other sources](#) | [other destinations for ring-yourorg01](#) | [weekly graphs](#) | [reverse](#)

Mon Sep 24 00:00:00 2012 UTC

Hop	Name	Address	MTU
0	ae0-4.cr1.ord2.us.your.org	69.31.98.1	1500
1	209.117.14.233	209.117.14.233	1500
2	vb1700.rar3.chicago-il.us.xo.net	216.156.0.161	1500
3	207.88.14.194.ptr.us.xo.net	207.88.14.194	1500
4	216.1.123.26	216.1.123.26	1500
5	tex-x.bbr01.eq01.chi01.networklayer.com	66.109.11.106	1500
6	ae20.bbr01.eq01.dal03.networklayer.com	173.192.18.136	1500
7	ae0.bbr01.sr02.hou02.networklayer.com	173.192.18.219	1500
8	ae5.dar01.sr02.hou02.networklayer.com	173.192.18.223	1500
9	po1.fcr01.sr02.hou02.networklayer.com	173.193.118.131	1500
10	softlayer02	173.193.70.99	1500

Mon Sep 24 00:15:00 2012 UTC

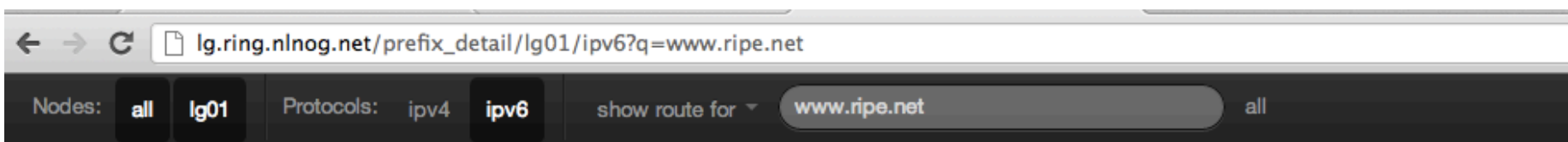
Hop	Name	Address	MTU
0	ae0-4.cr1.ord2.us.your.org	69.31.98.1	1500
1	209.117.14.233	209.117.14.233	1500
2	vb1700.rar3.chicago-il.us.xo.net	216.156.0.161	1500
3	207.88.14.194.ptr.us.xo.net	207.88.14.194	1500
4	216.1.123.26	216.1.123.26	1500
5	tex-x.bbr01.eq01.chi01.networklayer.com	66.109.11.106	1500
6	ae20.bbr01.eq01.dal03.networklayer.com	173.192.18.136	1500
7	ae0.bbr01.sr02.hou02.networklayer.com	173.192.18.219	1500
8	ae5.dar02.sr02.hou02.networklayer.com	50.97.18.243	1500
9	po2.fcr01.sr02.hou02.networklayer.com	173.193.118.133	1500
10	softlayer02	173.193.70.99	1500

=ring-softlayer02&dst=ring-yourorg01&date=2012-09-24

BGP Looking glass

<http://lg.ring.nlnog.net/>

30 x IPv4 – 31 x IPv6 full table



lg01: show route for 2001:67c:2e8:22::c100:68b/128 all

[View the BGP map](#)

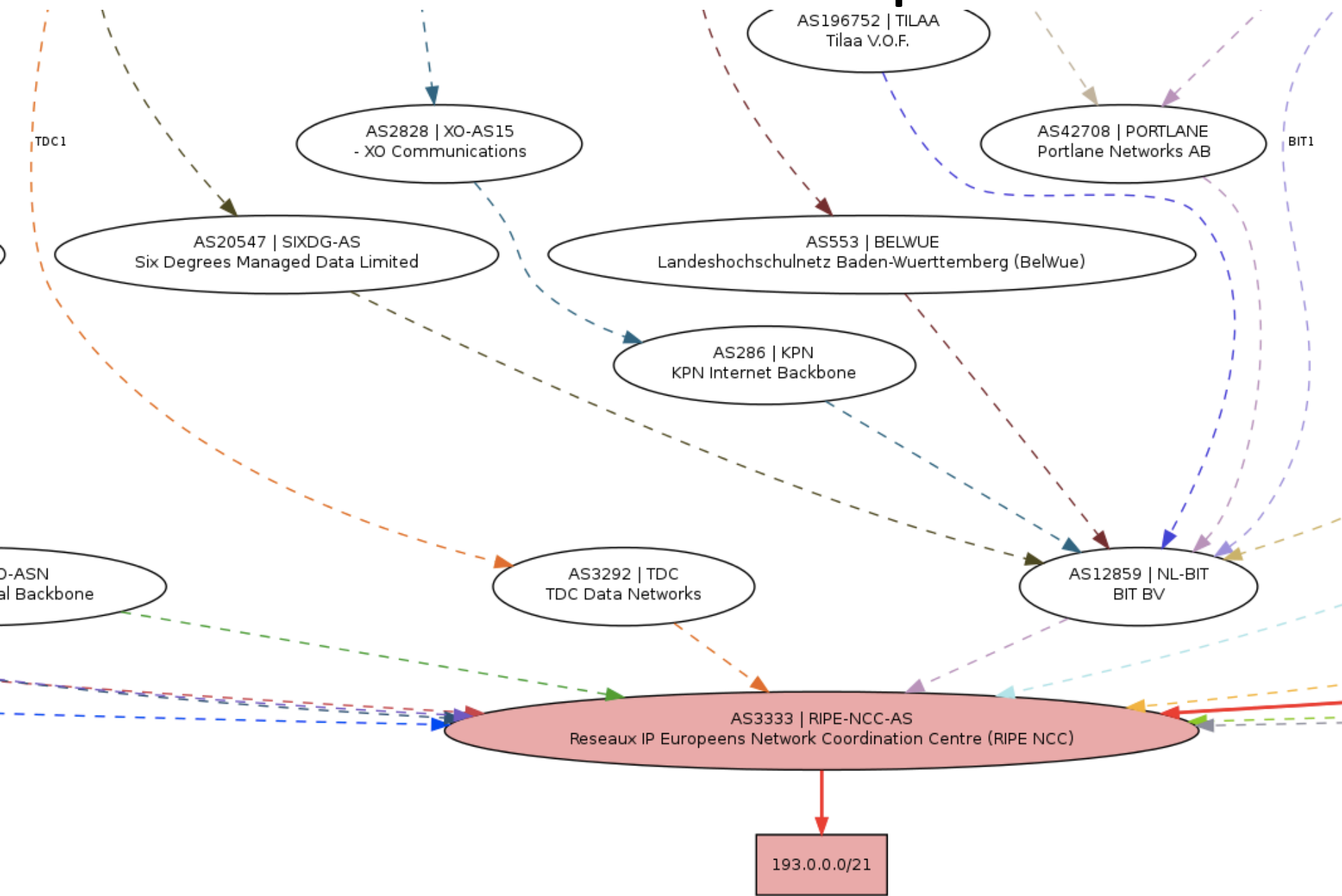
DNS: [www.ripe.net](#) => [2001:67c:2e8:22::c100:68b](#)

```
2001:67c:2e8::/48
[LEASEWEB1 06:43 from 2001:1af8::62:212:80:80] * (100/-) [AS3333i]
  Type: BGP unicast univ
  BGP.origin: IGP
  BGP.as_path: 16265 3333
  BGP.next_hop: 2001:1af8::62:212:80:80
  BGP.local_pref: 100
  BGP.community: (16265,1200) (16265,65531)

[EBAYCLASSIFIEDSGROUP1 16:52 from 2001:67c:2d0::218] (100/-) [AS3333i]
  Type: BGP unicast univ
  BGP.origin: IGP
  BGP.as_path: 41552 12859 3333
  BGP.next_hop: 2001:67c:2d0::218
  BGP.local_pref: 100
```

```
[HOSTWAY1 06:44 from 2506:6a00::e] (100/-) [AS3333i]
```

Visual BGP map



RING governance

- 4 RING Administrators (install, update,..):
Job Snijders, Martin Pels,
Peter van Dijk, Edwin Hermans
- Rough consensus
- Very active community (software dev, ideas)
- All equipment & hosting comes from Sponsors

***The RING is a community effort, built by
and for us, network engineers.***

How to join?

- Requirements

- 1 machine (virtual is fine)
- 1 IPv4 and 1 IPv6 address
- Fresh install of Ubuntu 12.04 (64 bit)
- You must be present in the DFZ with own ASN
- Fill in application form on <https://ring.nlnog.net/>

Mega easy!

Gratis!