
Network debugging never was easier

Mathieu Paonessa
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# Who am I?

## Mathieu Paonessa

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Twitter: @Mat0a

I’m actually French, not Dutch !

# 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:

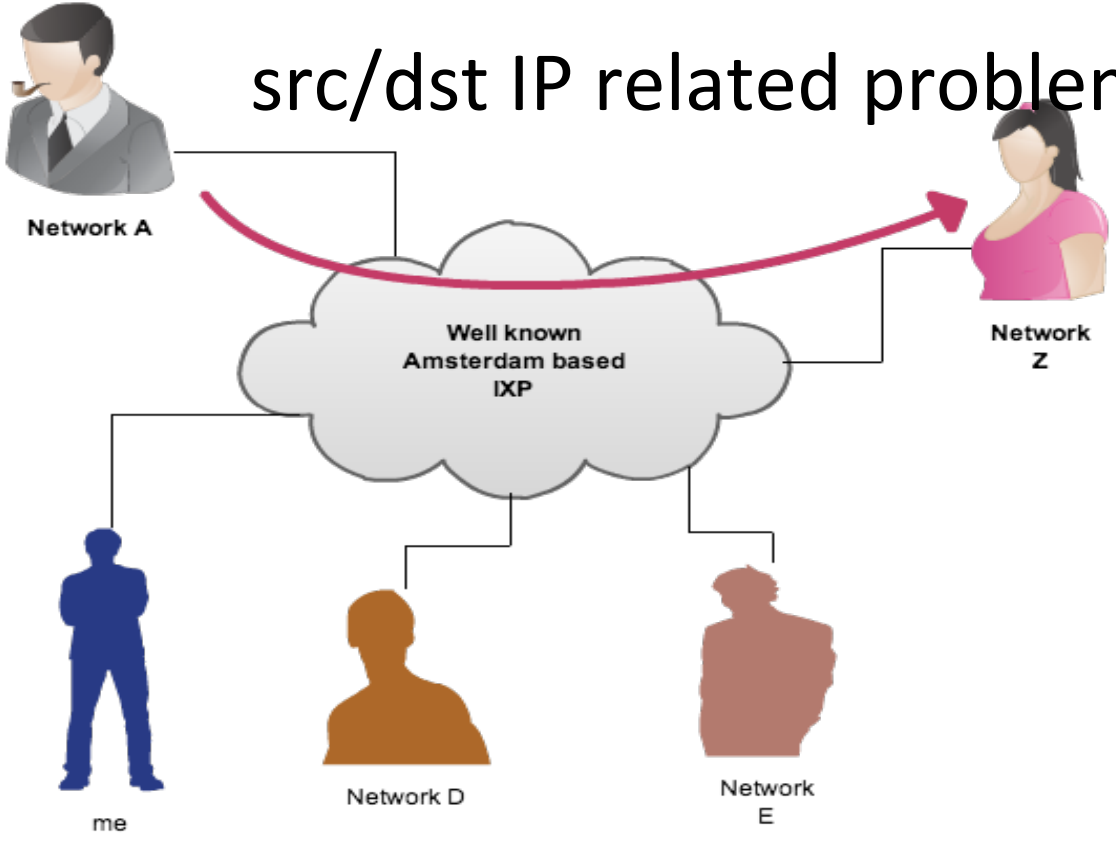
*"Awesome network debugging platform"*

Foundation:

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

# How did it start? (1/3)

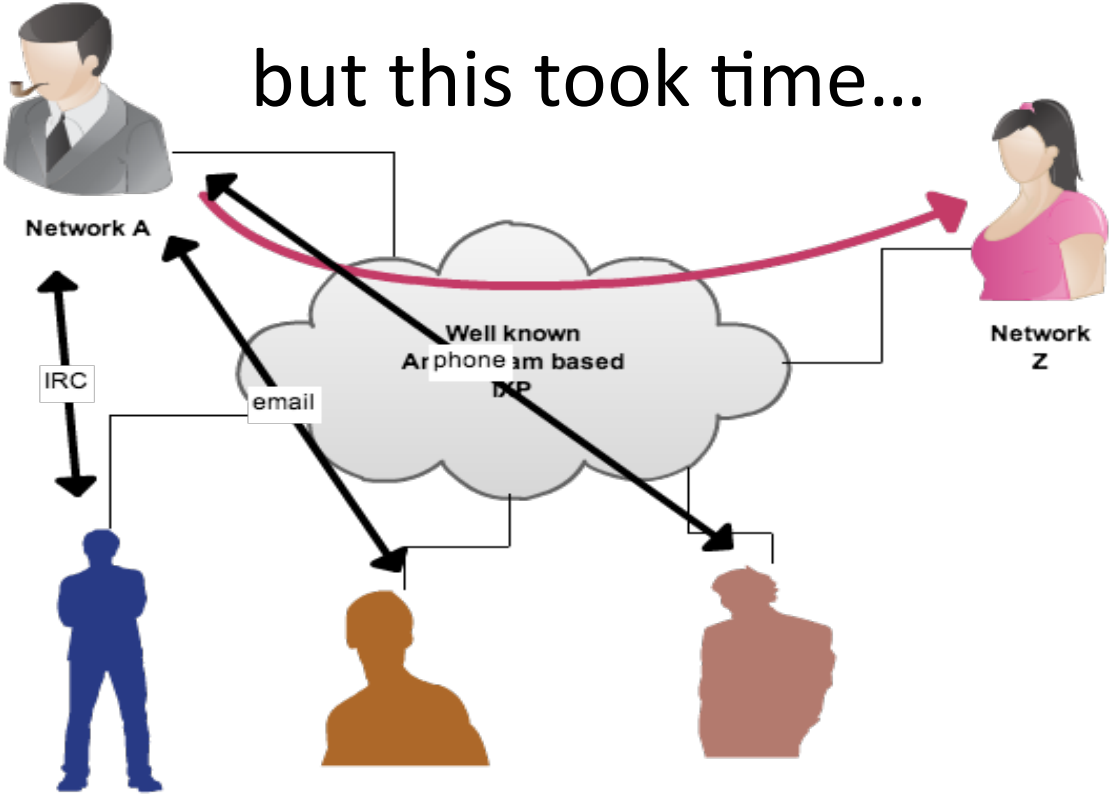
In December 2010 a friend of mine had some src/dst IP related problems

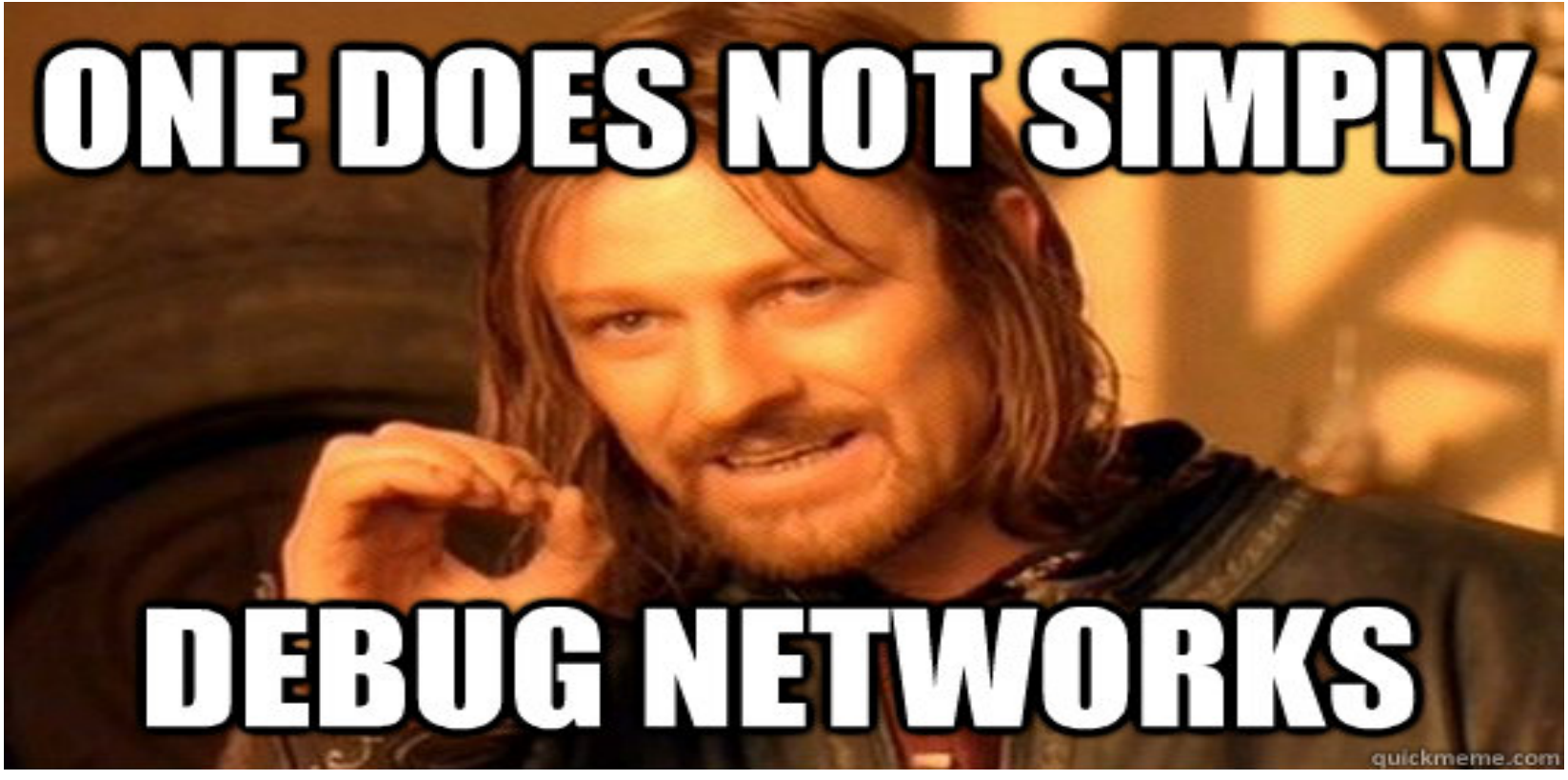


# How did it start? (2/3)

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

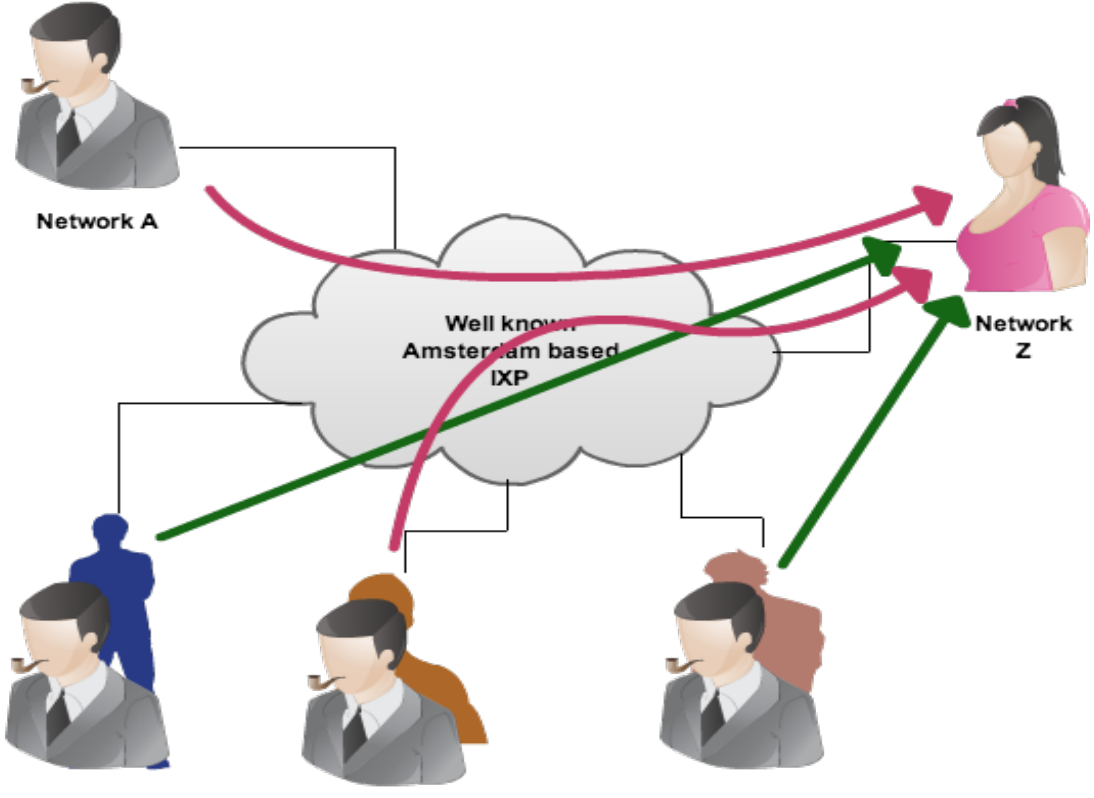
but this took time…




ONE DOES NOT SIMPLY
DEBUG NETWORKS
quickmeme.com

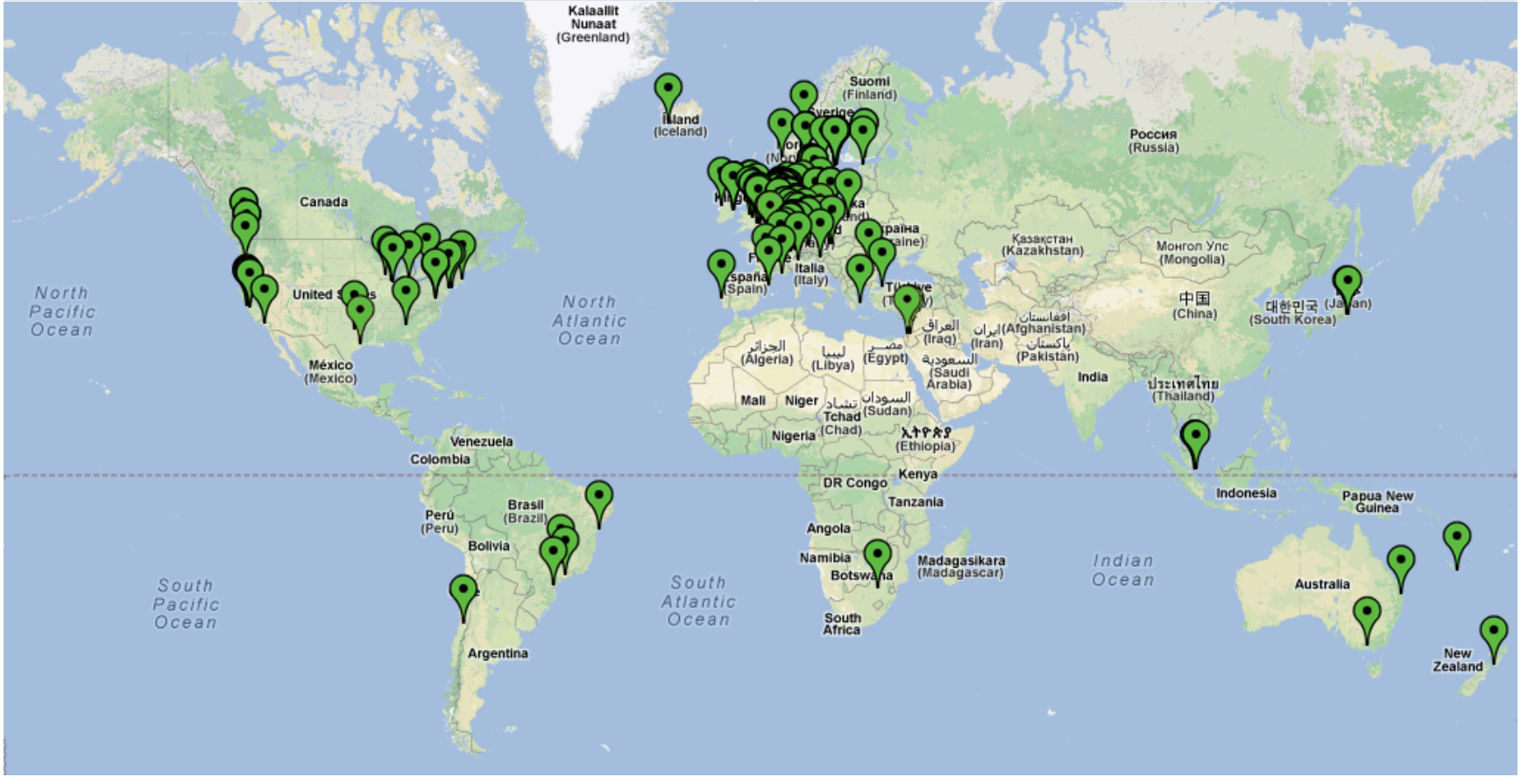
# How did it start? (3/3)

## But wouldn't DIY be much nicer?



# State of the RING

| 206 nodes | 37 countries |
| --- | --- |
| 183 Autonomous Systems | Still growing! |



# Participants from all walks of life, a random selection

# CLI example – step 1

atrato@atrato01:~$ **ring-ping www.iij.ad.jp**
occiad01 connect: Network is unreachable
www.iij.ad.jp - 148 servers: 246ms average
www.iij.ad.jp - unreachable via: occaid01

IPv4-only test!

IPv6-only test!

atrato@atrato01:~$ **ring-ping -6 www.iij.ad.jp**
www.iij.ad.jp - 146 servers: 286ms average
www.iij.ad.jp - unreachable via: rezopole01 nexellent01
atrato@atrato01:~$

# CLI example – step 1

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occiad01 connect: Network is unreachable
www.iij.ad.jp - 148 servers: 246ms average
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www.iij.ad.jp - unreachable via: rezopole01 nexellent01
atrato@atrato01:~$

# CLI example – step 1

atrato@atrato01:~$ **ring-ping www.iij.ad.jp**
occiad01 connect: Network is unreachable
www.iij.ad.jp - 148 servers: 246ms average
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IPv4-only test!

IPv6-only test!

**ring-ping -6 www.iij.ad.jp**
www.iij.ad.jp - 146 servers: 286ms average
www.iij.ad.jp - unreachable via: rezopole01 nexellent01
atrato@atrato01:~$

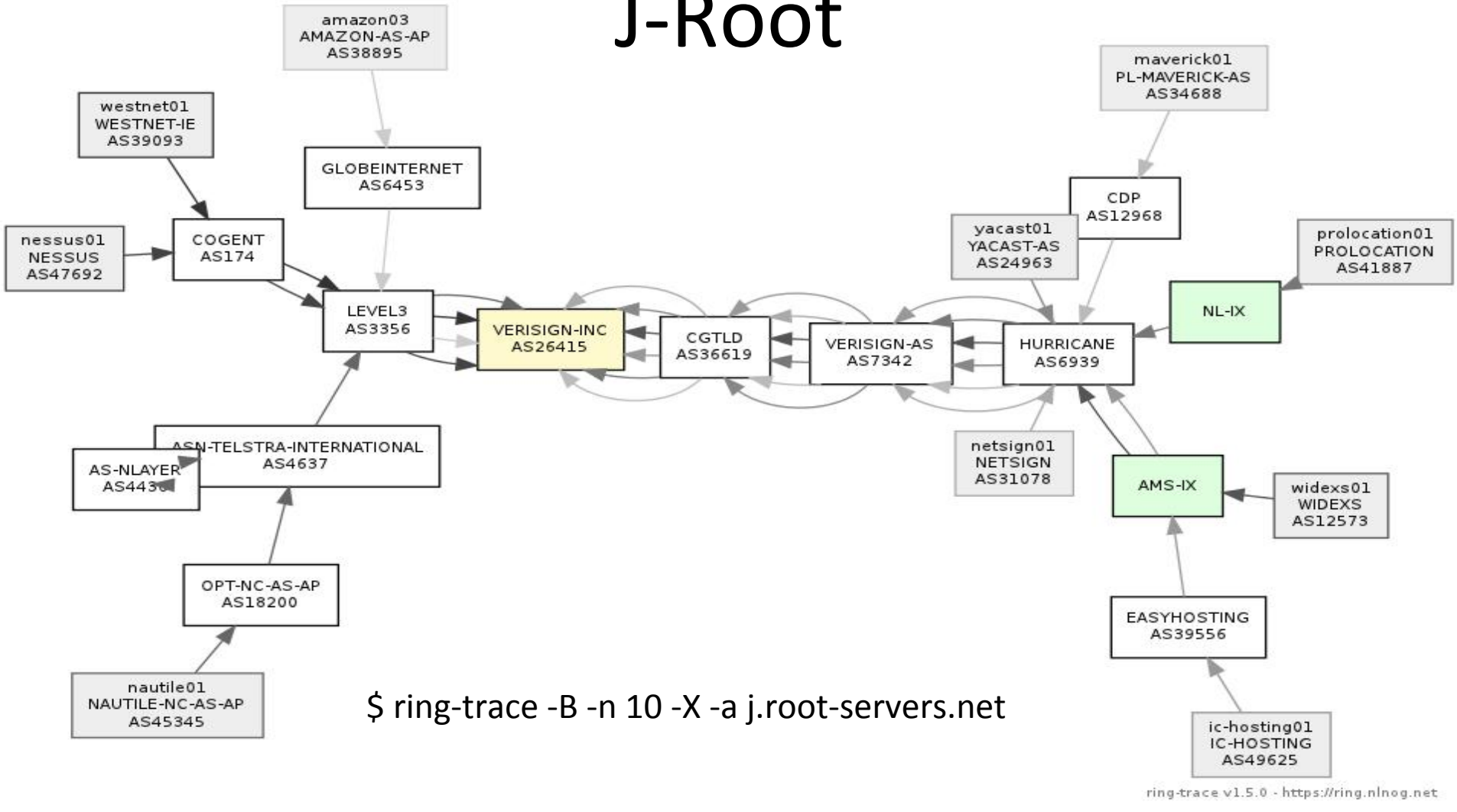
# CLI example – step 2

```
Alice:~ job$ ssh rezopole01.ring.nlnog.net mtr -r6wc 10 www.iij.ad.jp
HOST: rezopole01.ring.nlnog.net     Loss%   Snt   Last   Avg  Best  Wrst StDev
  1.|-- 2001:7f8:47:40::1            0.0%    10    0.7   0.7   0.5   1.4   0.3
  2.|-- c2821-l2b-v22.rezopole.net   0.0%    10    6.1   1.9   1.2   6.1   1.5
  3.|-- 2a01:240:400:2::1            0.0%    10    1.8   1.8   1.5   3.1   0.5
  4.|-- ams-ix-1.ip.tiscali.net      0.0%    10   22.0  22.2  22.0  23.4   0.4
  5.|-- ams-ix-1.ip.tiscali.net      0.0%    10   22.3  24.3  22.0  43.3   6.7
  6.|-- xe-4-2-0.nyc20.ip6.tinet.net 0.0%    10  102.7 102.5 102.3 102.7   0.1
  7.|-- ???                        100.0    10    0.0   0.0   0.0   0.0   0.0
Alice:~ job$
```

# Other CLI uses

- Use dig to check nameservers from 175 ASNs
  - $ **ring-all 'dig +short ring.nlnog.net @127.0.0.1'**
- Traceroute from 198 nodes to your target
  - $ **ring-all 'mtr –wrc 10 www.nanog.org'**
- MTU testing, L2/L2 loadbalancing,
- **Anything!**

# J-Root




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

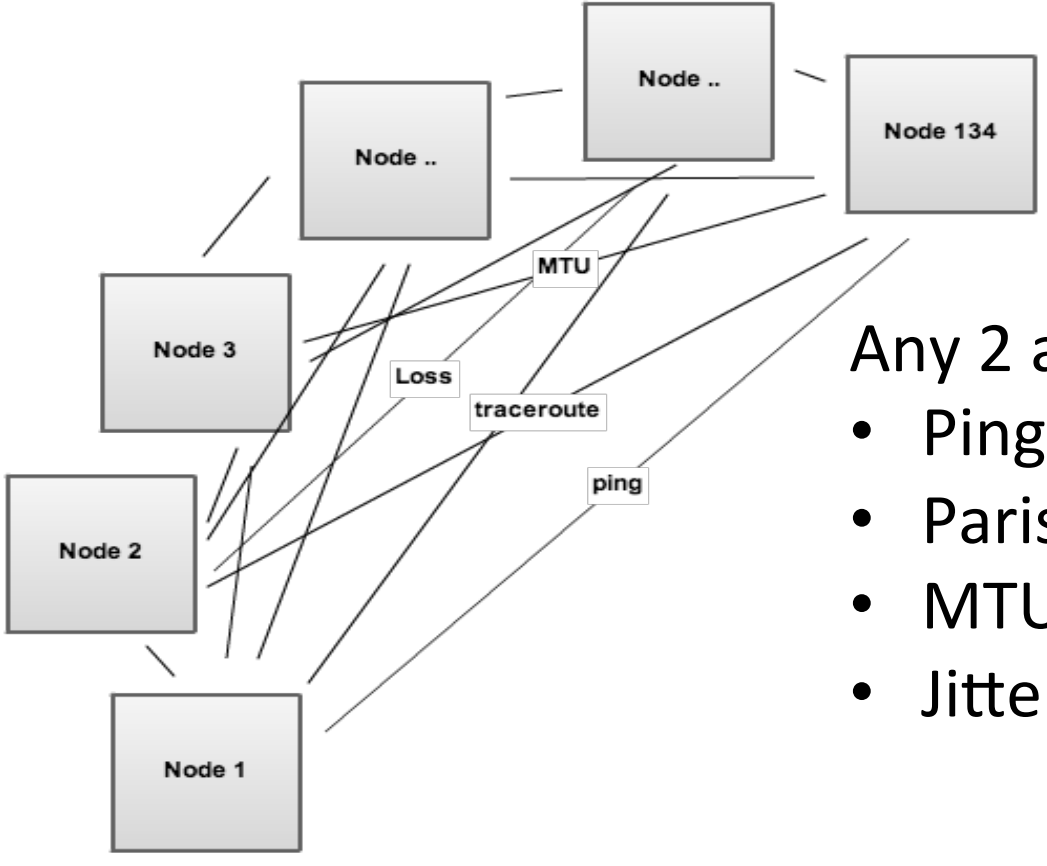
# RING Web interface

- 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 ☺

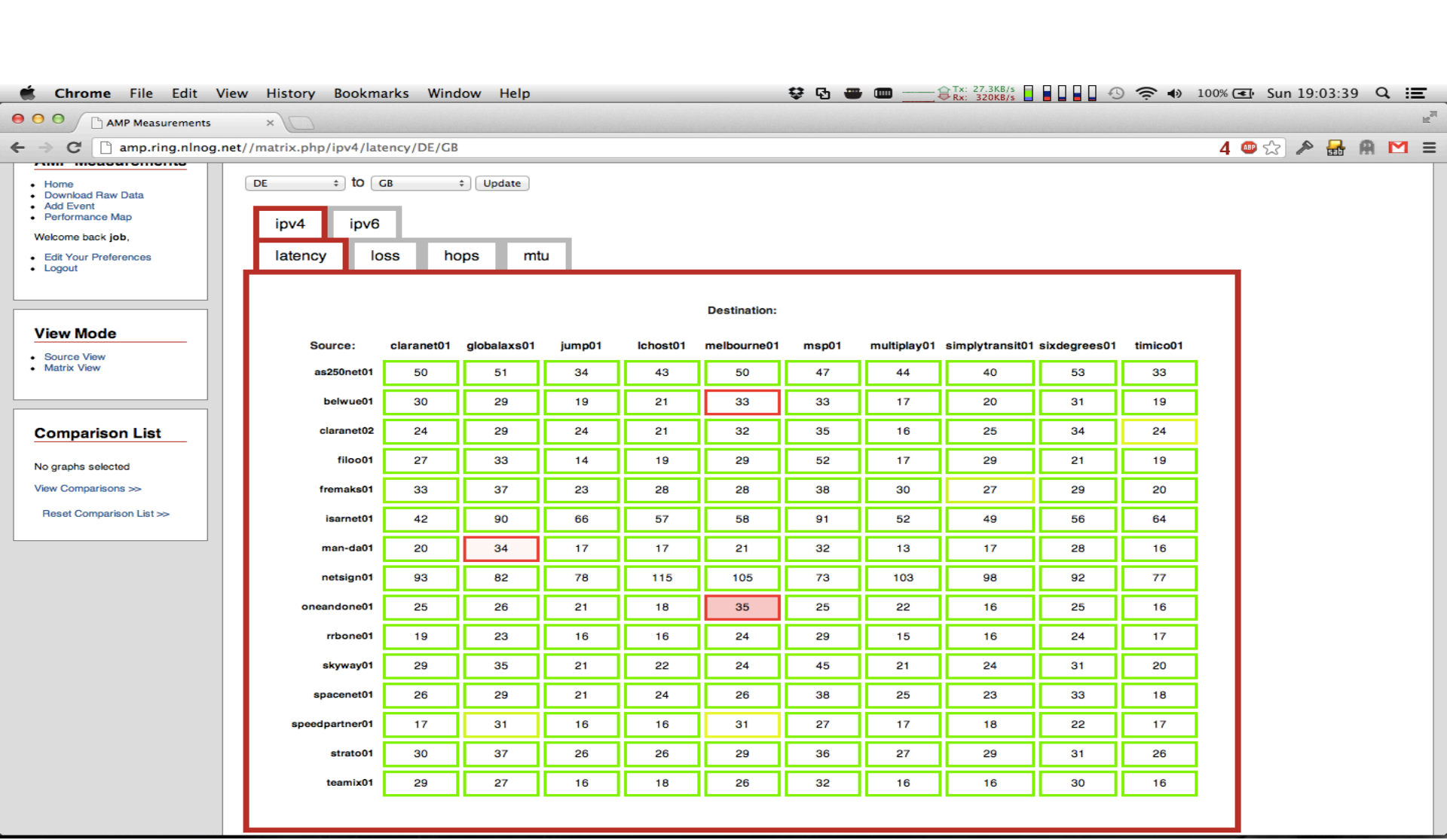
http://amp.ring.nlnog.net/

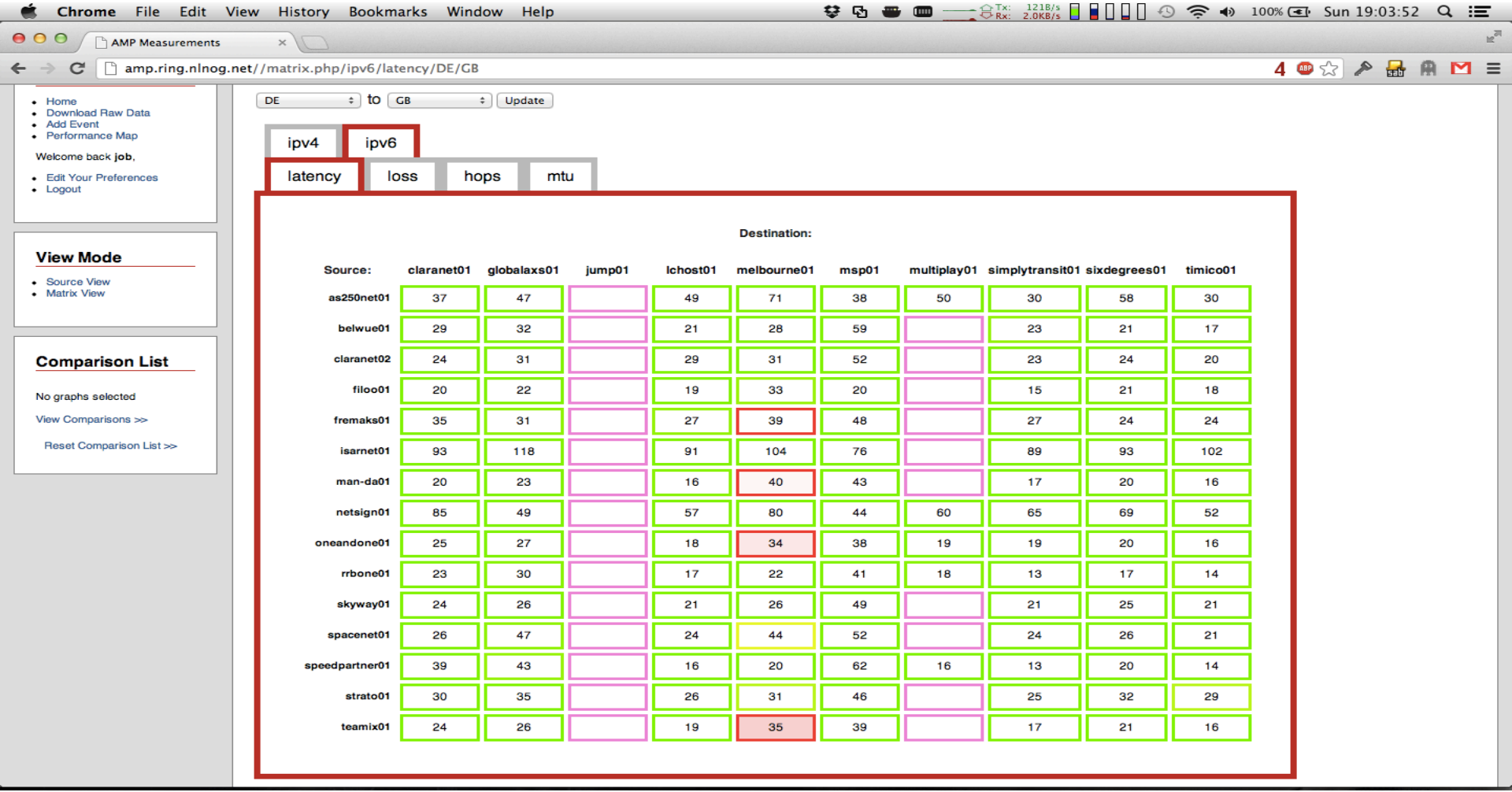
# AMP concept

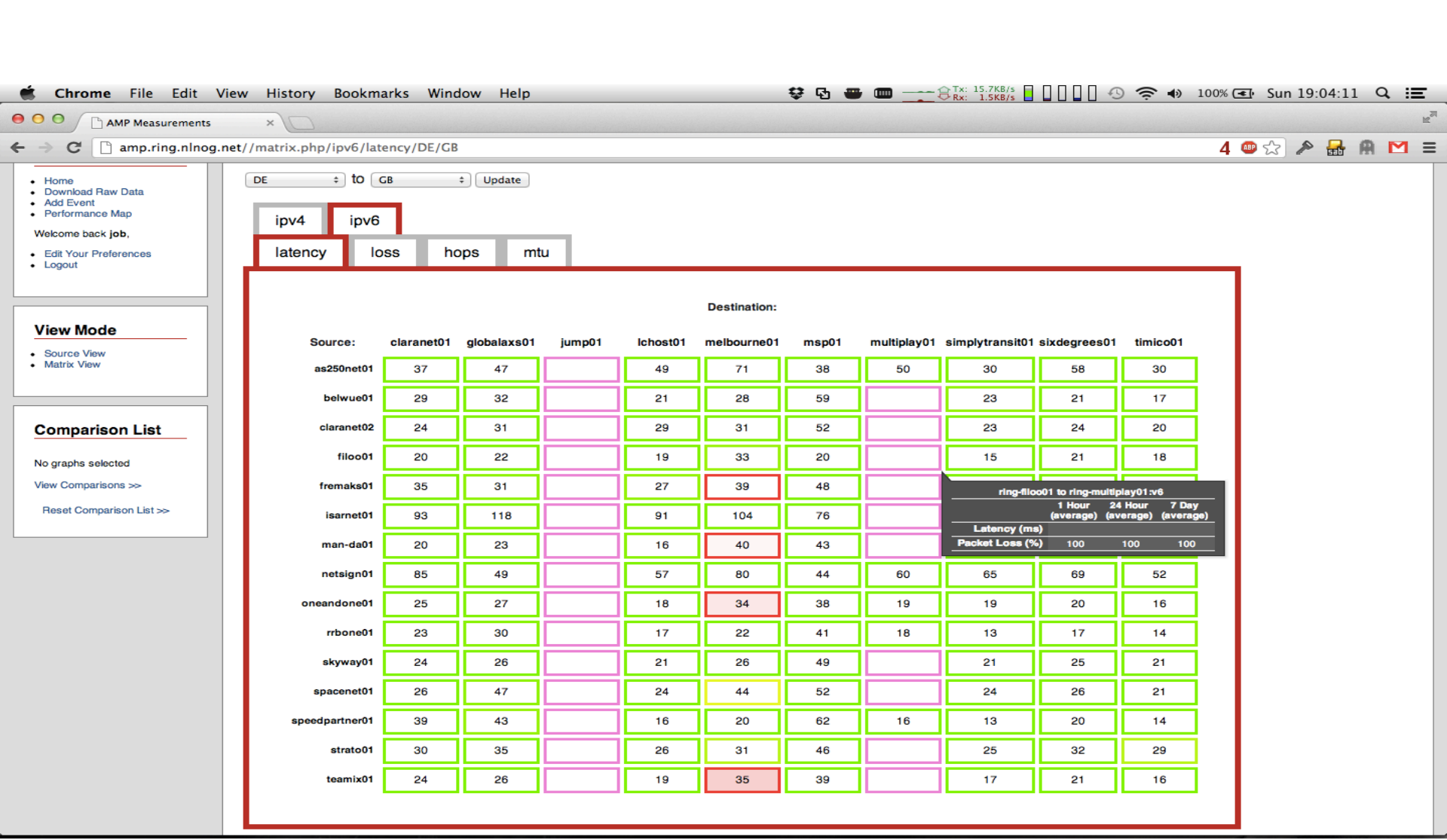



Any 2 any (v4 + v6):

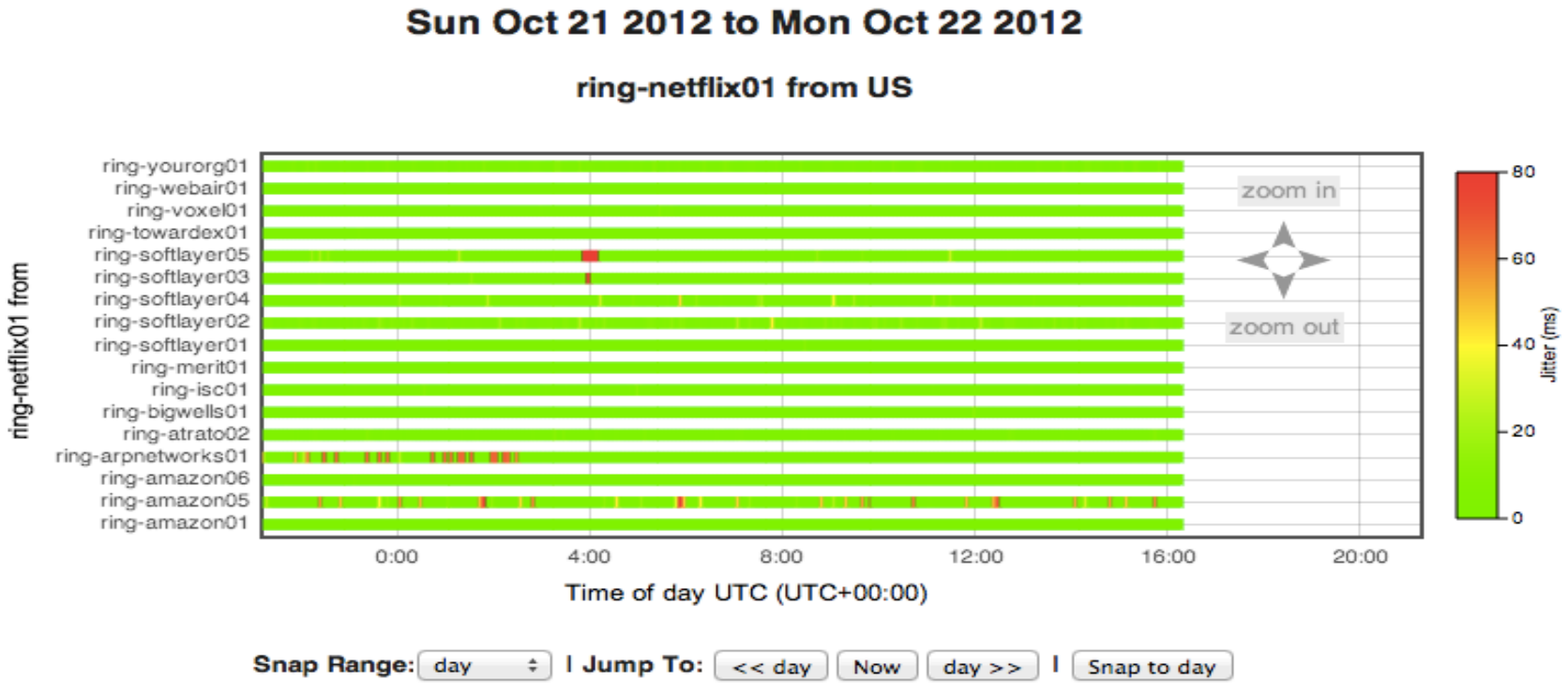
- Ping
- Paris Traceroute
- MTU testing
- Jitter, loss, etc


Chrome File Edit View History Bookmarks Window Help
Sun 19:03:39
AMP Measurements
amp.ring.nlnog.net//matrix.php/ipv4/latency/DE/GB
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
lchost01
melbourne01
msp01
multiplay01
simplytransit01
sixdegrees01
timico01
as250net01 50 51 34 43 50 47 44 40 53 33
belwue01 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

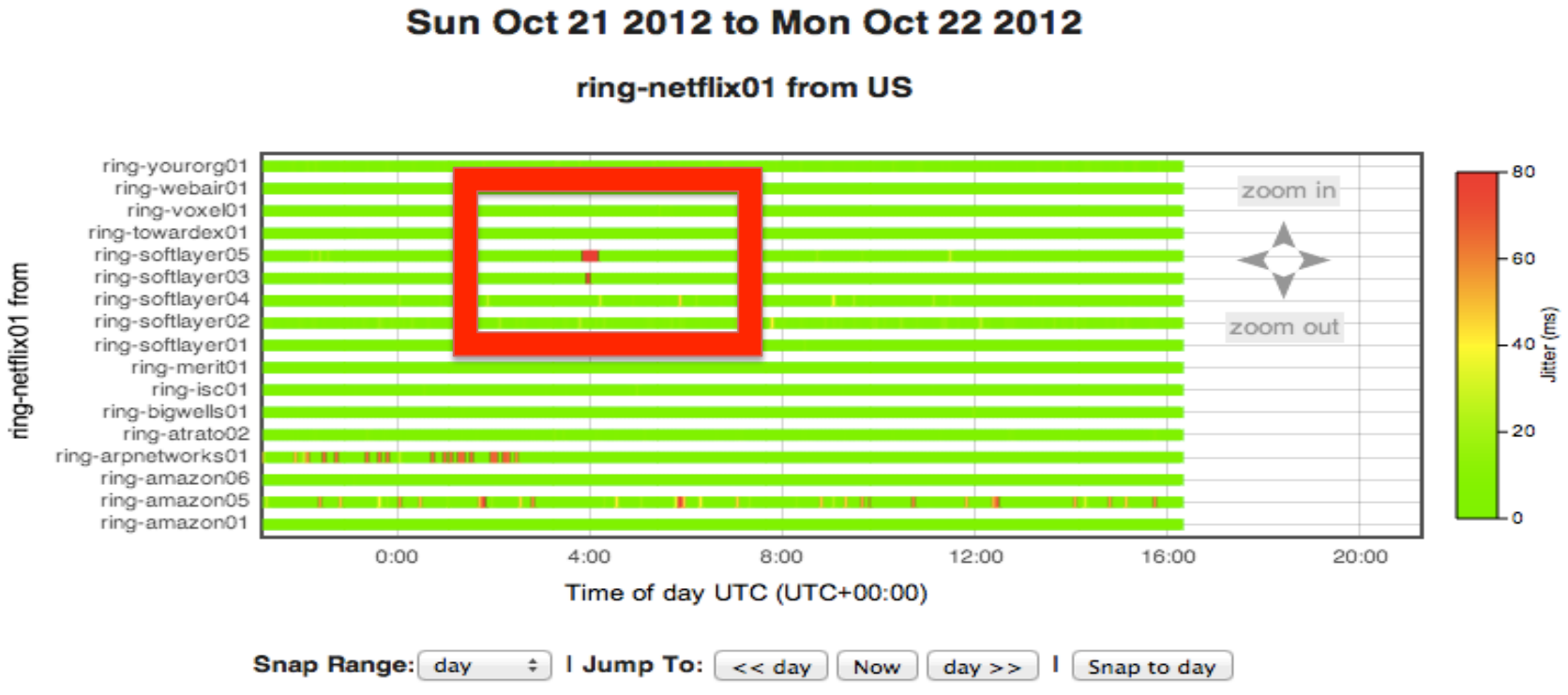

Chrome File Edit View History Bookmarks Window Help
Sun 19:03:52
AMP Measurements
amp.ring.nlnog.net//matrix.php/ipv6/latency/DE/GB
Home
Download Raw Data
Add Event
Performance Map
Welcome back job,
Edit Your Preferences
Logout
View Mode
Source View
Matrix View
Comparison List
No graphs selected
View Comparisons >>
Reset Comparison List >>
DE
to
GB
Update
ipv4
ipv6
latency
loss
hops
mtu
Destination:
Source:
claranet01
globalaxs01
jump01
lchost01
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 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


Chrome File Edit View History Bookmarks Window Help
Sun 19:04:11
AMP Measurements
amp.ring.nlnog.net//matrix.php/ipv6/latency/DE/GB
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 lchost01 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
1 Hour (average) 24 Hour (average) 7 Day (average)
Latency (ms)
Packet Loss (%) 100 100 100

# Historic graphs (jitter / loss/ latency)

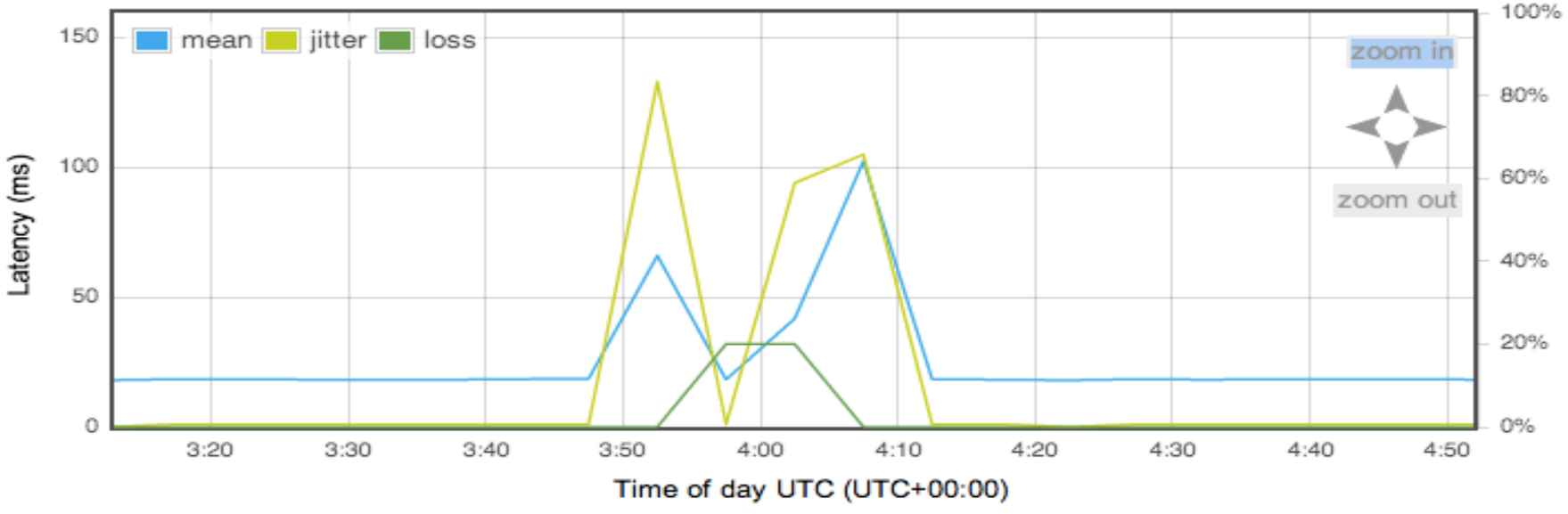


# Historic graphs (jitter / loss/ latency)



# Jitter / Latency / Loss graph from softlayer05 to netflix01

## Mon Oct 22 2012 to Mon Oct 22 2012




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

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

Auto Scale | Get Link

# 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 |

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

# 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

# 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?

Mega easy!

- 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/**

- **BTW:** Treat it like any regular Colo/Access customer!

Gratis!