

Introduction to the RIPE NCC Test Traffic Measurements Service

Henk Uijterwaal
RIPE NCC New Projects Group
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Test Traffic Measurements Service

- Goals of the project (1997):
 - One way end-to-end measurements
 - As routing is often a-symmetric
 - Dedicated measurement device: *Test-box*
 - Active measurements
 - “Real traffic”
 - Follow well defined IETF-IPPM standards
 - (2000:) Offer as a “black box service”

*Let's assume that you have
installed a test-box...*

Parameters that we measure

Now:

- Routing information
 - Router/Interface level
 - AS-level
- Delay or Latency
- Packet Loss
- Derived quantities:
 - IPDV or Jitter
- Long term trends

Next:

- Bandwidth
- Derived quantities:
 - Packet reordering
 - Protocol specific performance
 - ...

Data from a RIPE NCC Test-Box

- “Active”: we warn the user
 - Network alarms
- “Passive”: user has to look
 - Plots:
 - Online:
 - WWW interface on the boxes.
 - <5 minutes delay
 - Offline:
 - The next morning, full statistical analysis
 - Raw data

Alarm Messages

Date: Fri, 19 Apr 2002 05:55:14 GMT

From: Test traffic project <ttraffic@ripe.net>

Subject: Testbox ALARM SET on tt01.ripe.net

TB 69 at 1019195711 ALARM SET

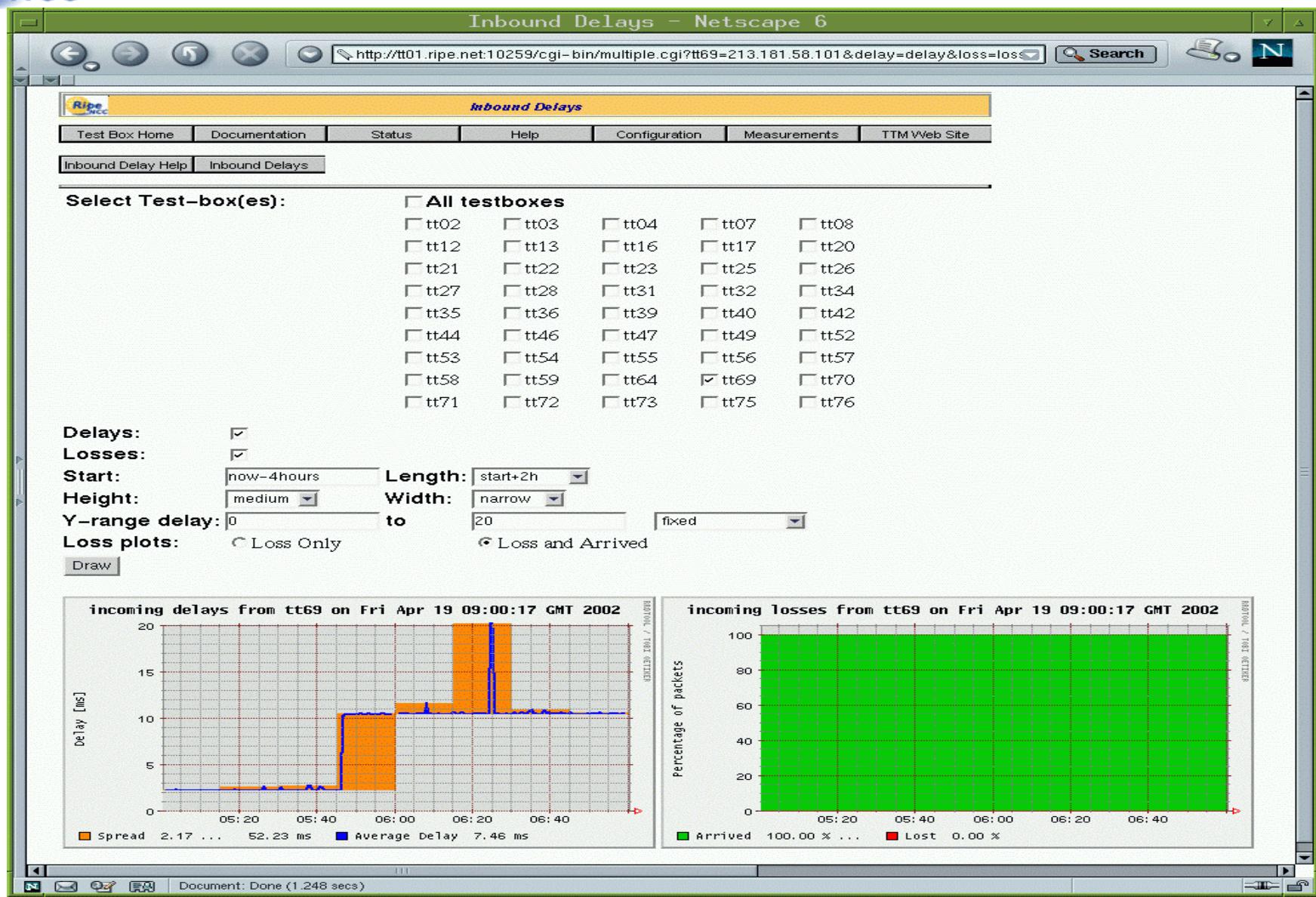
TB 69 at 1019195711 Long: 2226 2.0/ 2.5/ 3.0

Short: 59 10.0/10.5/11.0

[...]

To see how the delays developed in the last days, open this URL: [http://tt01.ripe.net:10259/cgi-bin/multiple.cgi?
&tt69=213.181.58.101&delay=delay&loss=loss&RRD_STA
RT=now-2days&RRD_END=now](http://tt01.ripe.net:10259/cgi-bin/multiple.cgi?&tt69=213.181.58.101&delay=delay&loss=loss&RRD_STA_RT=now-2days&RRD_END=now)

Online Interface





TTM Summaries for ttXX.ripe.net

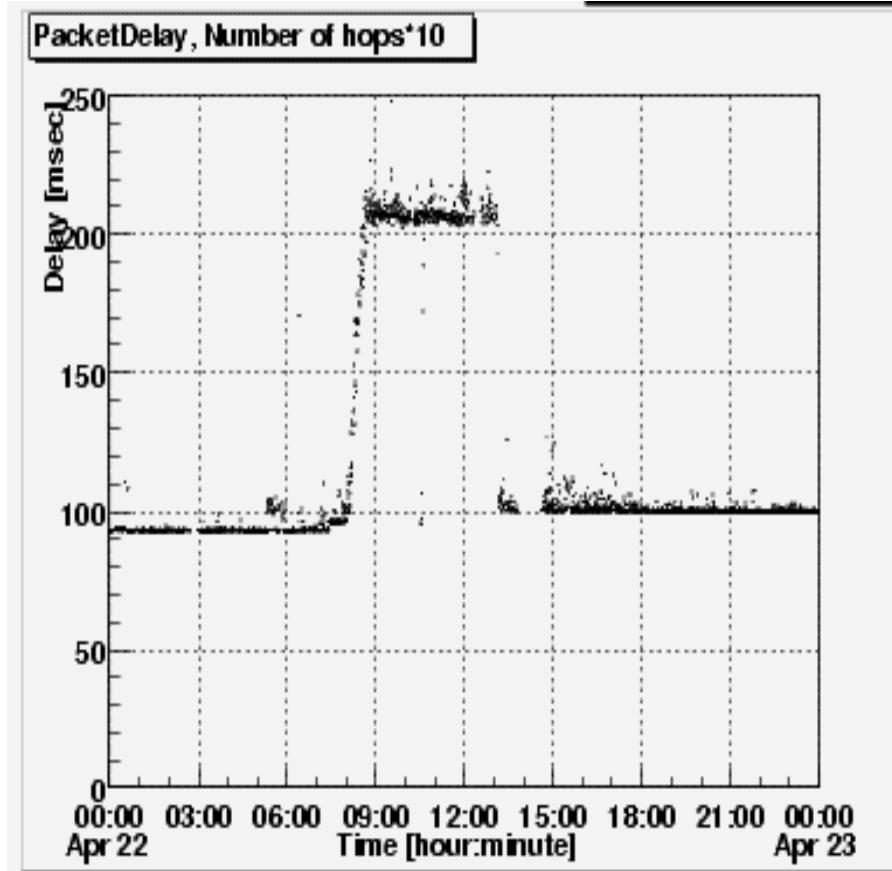
Monday 22 April 2002

The table below displays the TTM delay & loss parameters [...]

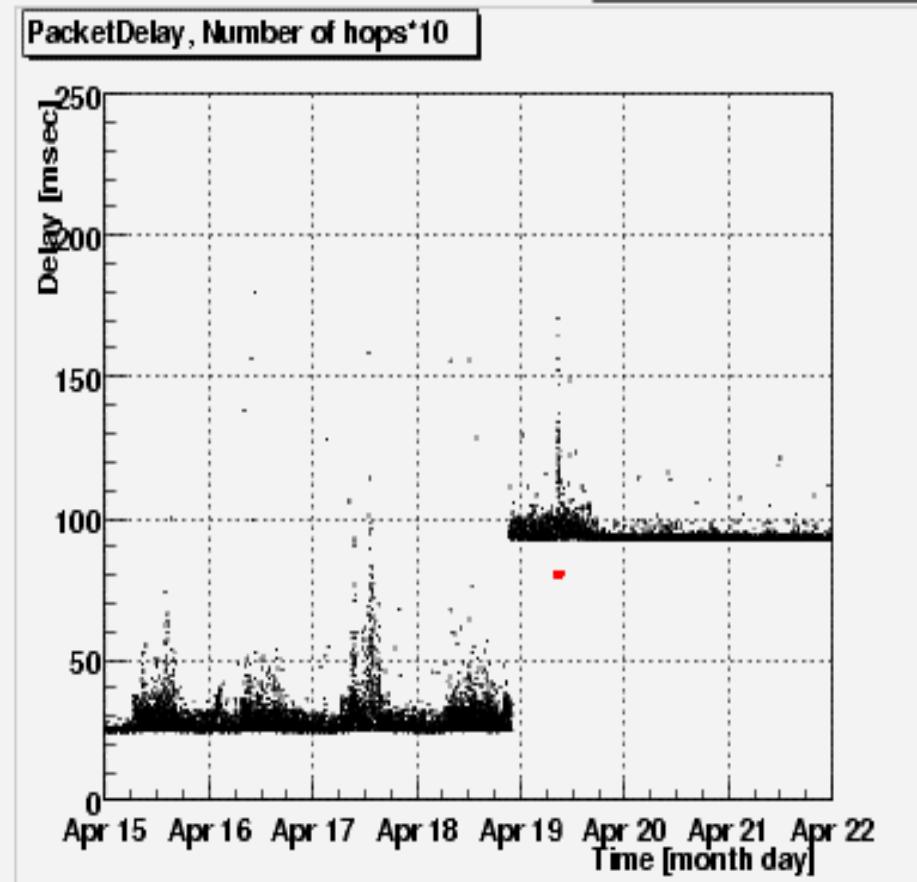
	Incoming				Outgoing			
	2.5 perc.	median	97.5 perc.	% Lost	2.5 perc.	median	97.5 perc.	% Lost
tt01	<u>22.59</u> (27.92)	<u>24.08</u> (28.57)	<u>60.35</u> (54.21)	<u>0.432</u> (0.770)	<u>27.96</u> (28.03)	<u>28.38</u> (28.46)	<u>32.17</u> (32.17)	<u>0.206</u> (0.422)
tt07	<u>23.32</u> (23.32)	<u>23.47</u> (23.52)	<u>32.79</u> (40.84)	<u>0.104</u> (0.104)	<u>109.0</u> (110.7)	<u>112.5</u> (112.5)	<u>136.4</u> (136.1)	<u>0.0698</u> (0.0710)
tt08	<u>19.31</u> (19.38)	<u>19.51</u> (19.56)	<u>30.06</u> (30.06)	<u>0.0349</u> (0.104)	<u>19.49</u> (19.27)	<u>19.74</u> (20.03)	<u>26.49</u> (30.60)	<u>0.0349</u> (0.0348)
tt12	<u>12.83</u> (12.90)	<u>13.27</u> (13.30)	<u>23.22</u> (25.47)	<u>0.0347</u> (0.0695)	<u>12.88</u> (12.66)	<u>13.27</u> (13.82)	<u>20.53</u> (24.65)	<u>0.00</u> (0.105)
tt13	<u>11.50</u> (11.57)	<u>11.64</u> (11.70)	<u>21.78</u> (21.80)	<u>0.210</u> (0.210)	<u>11.72</u> (11.48)	<u>11.90</u> (12.02)	<u>18.63</u> (22.40)	<u>0.245</u> (0.175)
tt25	<u>92.95</u> (24.89)	<u>100.0</u> (26.85)	<u>211.7</u> (94.31)	<u>0.454</u> (0.0699)	<u>27.42</u> (27.11)	<u>27.81</u> (28.19)	<u>95.39</u> (41.72)	<u>0.174</u> (0.0694)
tt26	<u>18.10</u>	<u>18.87</u>	<u>29.68</u>	<u>0.672</u>	<u>95.90</u>	<u>96.15</u>	<u>103.0</u>	<u>1.15</u>

Zoom in

Last Day



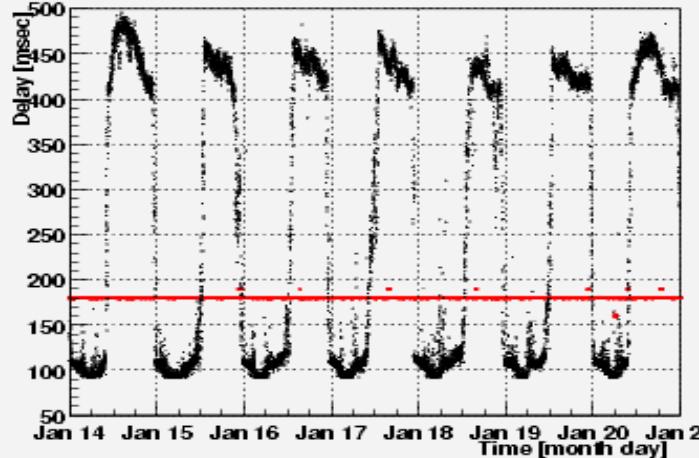
Last Week



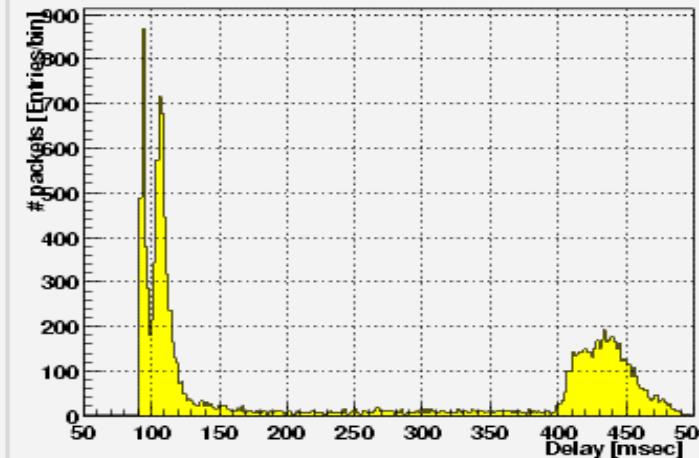
More statistics

(day, week, month, or user specified range)

Packet Delay, #hops*10



Packet Delay



Statistics

STATISTICS:

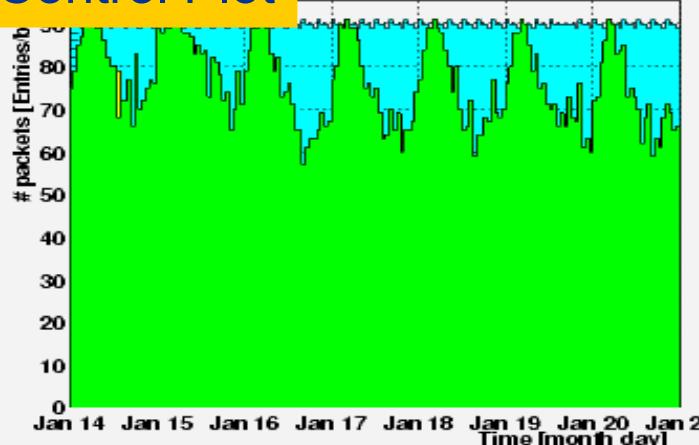
Delay & Hops:

Entries: 12830
 Overflow: 8
 Underflow: 32
 2.5 Perc: 92.9ms
 Median: 127.8ms
 97.5 Perc: 469.6ms
 Mean: 247.1ms
 RMS: 157.4ms
 Min. hops: 16
 Max. hops: 19

Packets sent/valid:

Total: 15120
 Valid: 12830 = 84.9 %
 Send bad: 0 = 0 %
 Recv bad: 11 = 0.073 %
 2 Clocks bad: 0 = 0 %
 Lost: 2279 = 15 %

Control Plot



packets Arrived



Packets lost:

2.5 Perc: 0.0 %
 Median: 16.5 %
 97.5 Perc: 32.6 %
 Uptime: 100 %

Over-all statistic:

Time period: 7 days
 Number of routing vectors: 51
 Number of bins: 168
 Minutes/bin: 60



Rip Test Traffic Measurements

Plots on Demand

Date Format: yyyyymmdd

Time Format: hh:mm

SRC: tt01.ripe.net Start Date: 20020415

DST: tt34.ripe.net End Date: 20020415

Min Delay (ms): 0

Max Delay (ms): 140

Plot Format: gif

PostScript

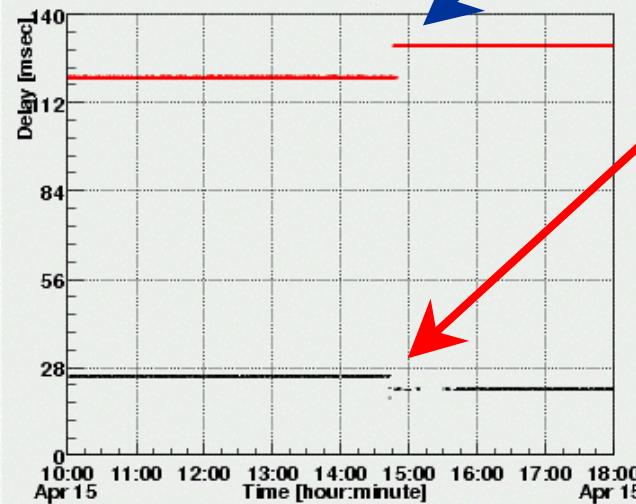
Plot Type: delay

trends

jitter

tt01.ripe.net → tt34.ripe.net from 20020415 10:00 to 20020415 18:00

Packet Delay, #hops*10

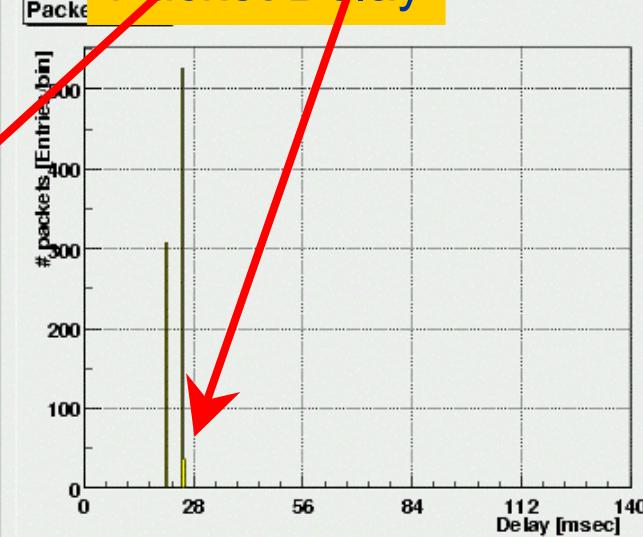


Around 14:45

#Hops 12 → 13

Delay 25ms → 21ms

Packet Delay



STATISTICS:

Delay & Hops:

Entries: 872
Overflow: 0
Underflow: 0
2.5 Perc: 21.0ms
Median: 25.1ms
97.5 Perc: 25.2ms
Mean: 23.7ms
RMS: 1.9ms
Min. hops: 12
Max. hops: 13

Packets sent/valid:

Total: 960
Valid: 872 = 90.8 %
Send bad: 85 = 8.9 %
Recv bad: 0 = 0 %
2 Clocks bad: 0 = 0 %
Lost: 3 = 0.31 %

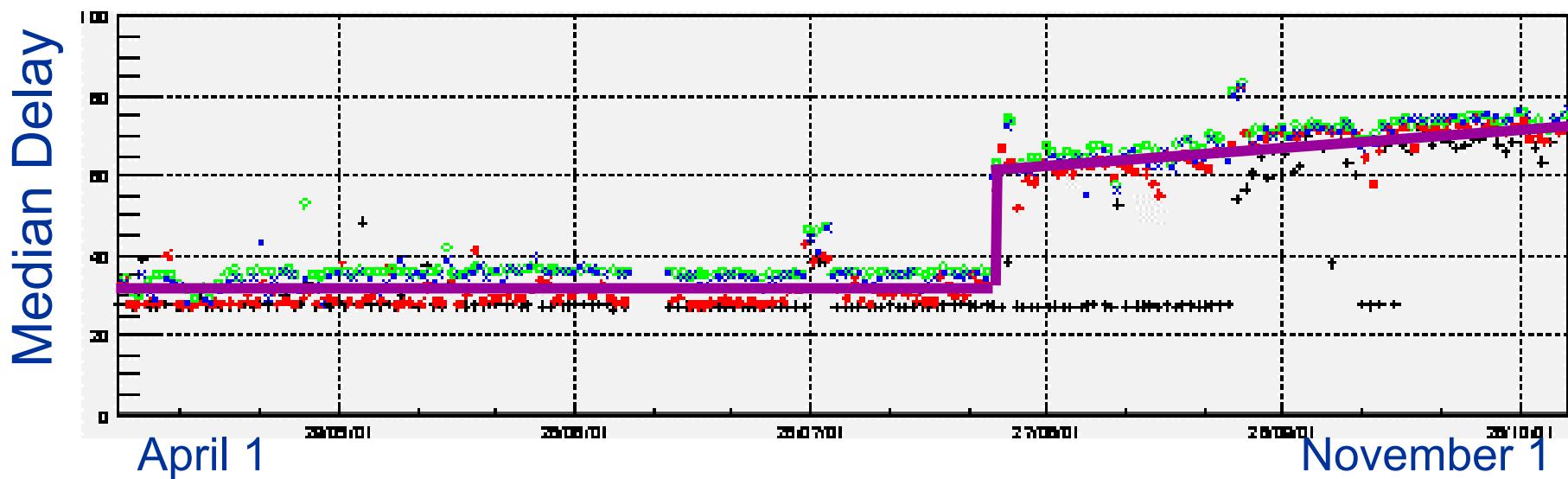
Change in Routing

Routing

- From Mon Apr 15 07:12:41 2002
 - To Mon Apr 15 14:36:20 2002
- | | | | |
|-----------------|-----------------------|-----------------|-----------------------------|
| 1. X.Y.0.238 | g0013.nikrtr.ripe.net | 1. X.Y.0.238 | g0013.nikrtr.ripe.net |
| 2. X.Y.15.44 | amster-dam11.z.z | 2. X.Y.15.97 | Asd-nr19.NL.z.z |
| 3. X.Y.103.105 | Unknown address | 3. X.Y.96.81 | r1-Gi1-2-1.12.Ledn-KQ1.z.z. |
| 4. X.Y.96.114 | nl.uk1.uk.z.z | 4. X.Y.230.14 | r1-Se0-1-0.0.ffd-KQ1.z.z |
| 5. X.Y.96.125 | uk.se1.se.z.z | 5. X.Y.230.110 | r1-Se0-3-0.0.hmbg-KQ1.z.z |
| 6. X.Y.103.118 | nordunet-gw.se1.z.z | 6. X.Y.230.150 | r2-Se1-1-0-0.Sthm-KQ1.z.z |
| 7. X.Y.252.130 | s-gw.z.z | 7. X.Y.119.213 | sw-gw.z.z |
| 8. X.Y.68.42 | fi-gw.z.z. | 8. X.Y.252.130 | s-gw.z.z |
| 9. X.Y.252.50 | Unknown address | 9. X.Y.68.42 | fi-gw.z.z |
| 10. X.Y.255.190 | funet6-p21-csc0.z.z | 10. X.Y.252.50 | Unknown address |
| 11. X.Y.187.46 | csc1-e00-funet6.z.z. | 11. X.Y.255.190 | funet6-p21-csc0.z.z |
| 12. X.Y.4.105 | tt34 | 12. X.Y.187.46 | csc1-e00-funet6.z.z |
| | | 13. X.Y.4.105 | tt34 |

Anonymized and edited to fit on the screen

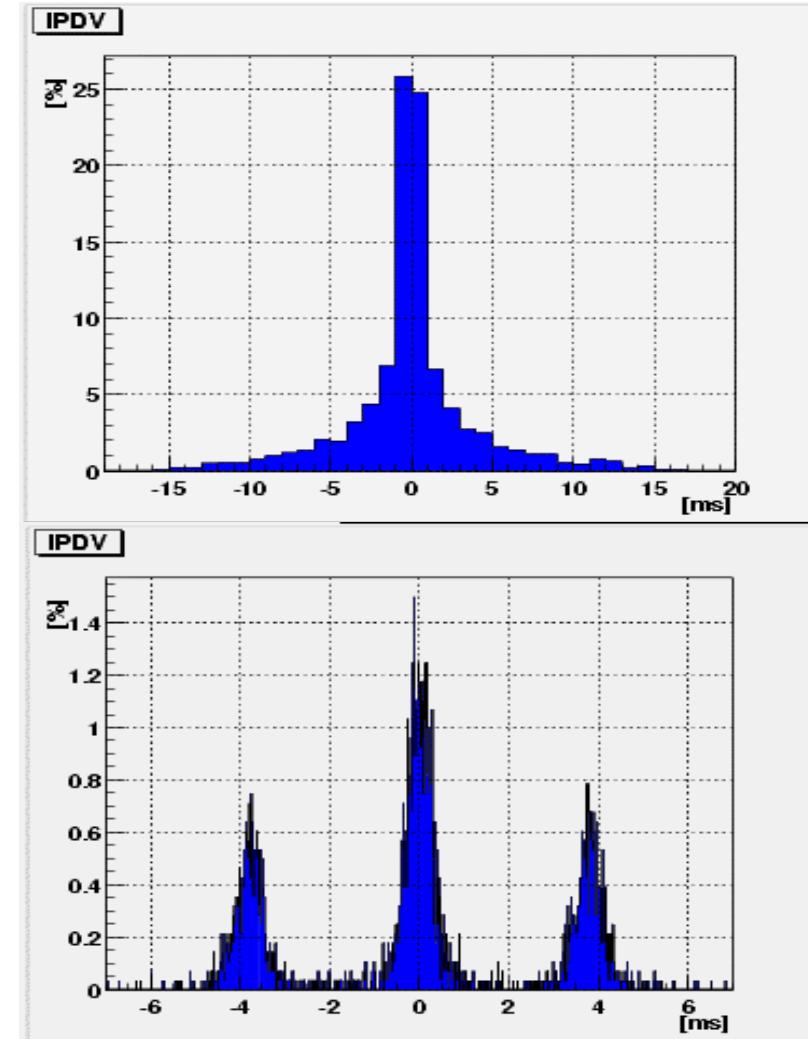
Trends



- Delay over 6 months
 - Night • Morning • Afternoon • Evening
- Content provider with new customers
- Intended for capacity planning

IP-Delay Variations or Jitter

- For some applications, the absolute delay does not really matter
- However, packets should arrive with constant intervals
 - Voice over IP
 - Video on demand
- Metric and Plots

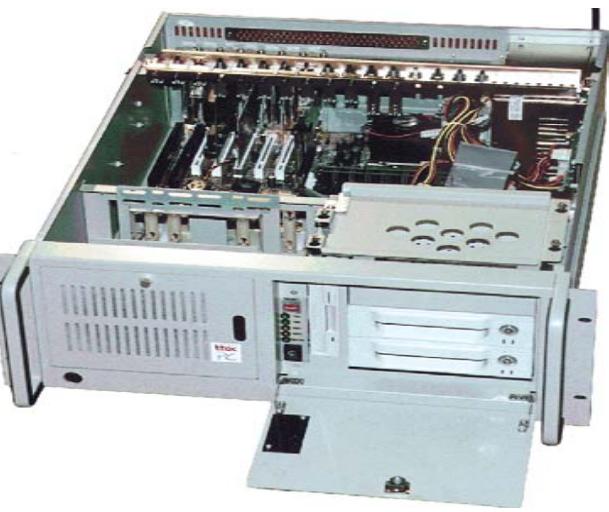


Bandwidth

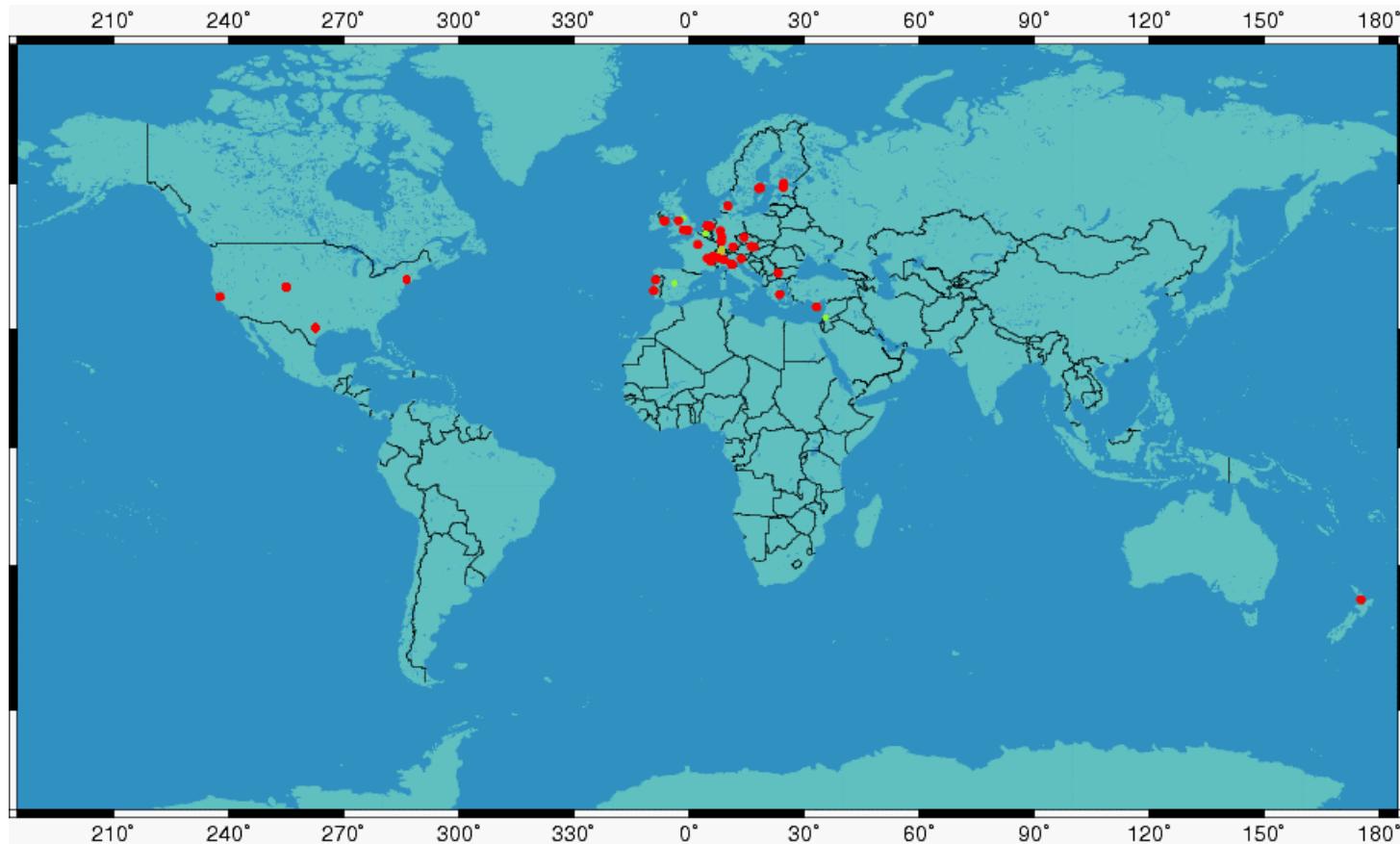
- The next measurement to be added
- 2 Parameters:
 - C: Total Capacity
 - A: Available Bandwidth
- Method based on packet dispersion
- β -testing

How to get these numbers?

- Install a measurement device
- RIPE NCC Test-Box
 - 1u or 4u rackmount PC
 - GPS antenna
 - Roof, window
 - 250m of UTP cable
- Plug and play



Where are the test-boxes located?



- 7 boxes in European Data Grid
- Others at ISP's, research networks, Major IX's, etc

Service model

- You buy the hardware once
 - € 2100... 2500
- You get a service contract for the machine
 - Maintenance of the machine
 - Measurements between your machine and all others
 - Analysis of the data by the NCC staff
 - Software upgrades, access to new features
 - User support
 - € 3000/year 1st machine, volume discounts

All you have to do, is to look at the results

Why get this service from the RIPE NCC?

- Neutral and independent organization
- Correct results without a commercial bias
- Access to PoP's of competitors
- Load sharing

Major Development Plans

- Interface with NMS
- New measurements
- 2nd NIC in TB
- IPv6 version
- ...

Conclusion

- Measurements are necessary to get a good overview of end-to-end performance
- Measuring parameters like delay, loss, bandwidth requires a measurement device
- The RIPE NCC test-box is a plug-and-play device to get these numbers, all you have to do is look at the data

Questions, Discussion, URL's



- <http://www.ripe.net/test-traffic>
 - Papers
 - Presentations
 - “For future test-box hosts”
- European data grid version:
<http://www.ripe.net/cgi-bin/gttm/pod>
- ttm@ripe.net : TTM Crew @ NCC
- tt-wg@ripe.net: RIPE WG on this topic (Majordomo)