



# Network Management & Monitoring

Measuring Delay with



These materials are licensed under the Creative Commons *Attribution-Noncommercial 3.0 Unported* license  
(<http://creativecommons.org/licenses/by-nc/3.0/>)

# Introduction

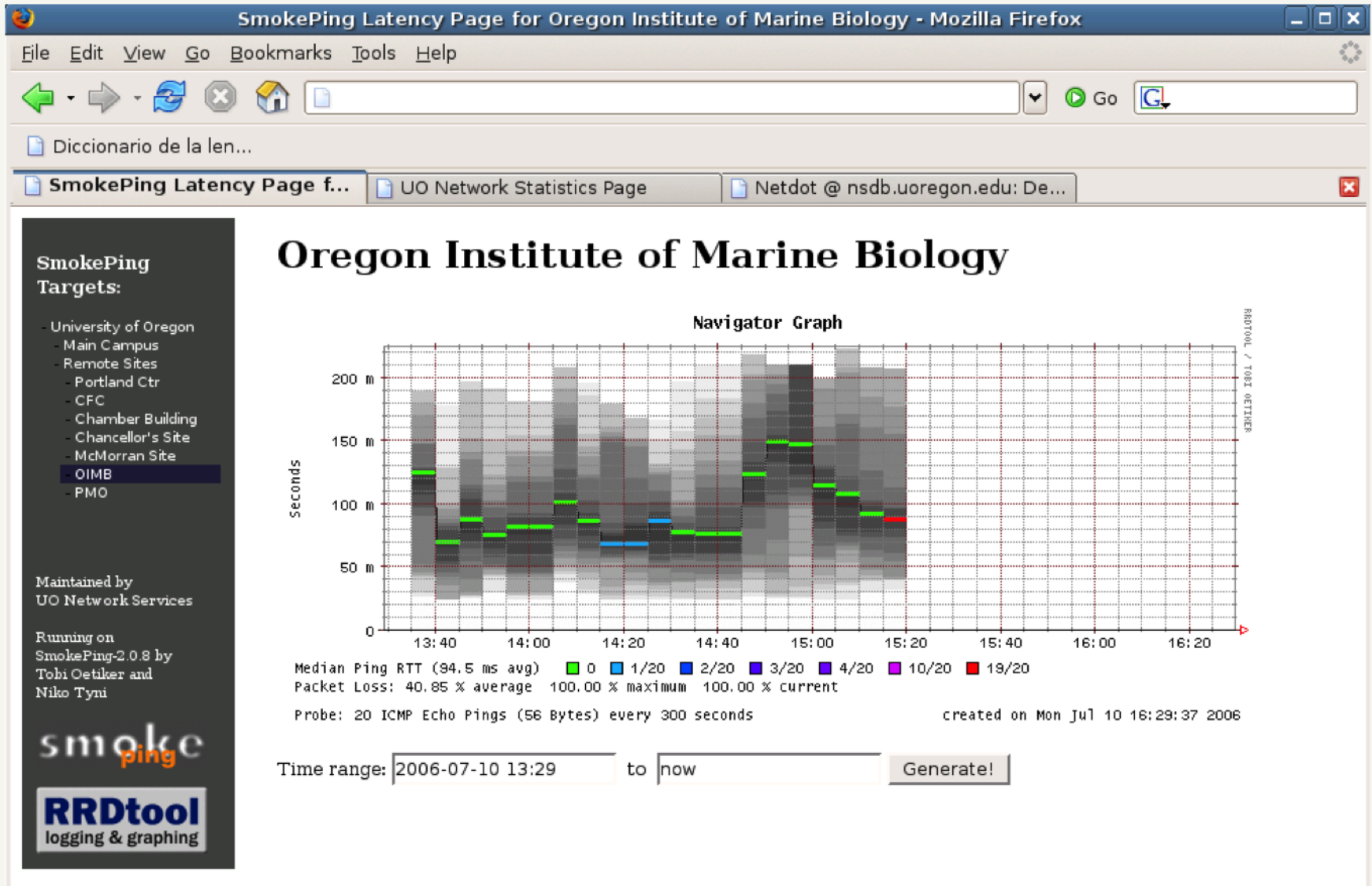
- Based on RRDTool (the same author)
- Measures ICMP delay and can measure status of services such as HTTP, DNS, SMTP, SSH, LDAP, etc.
- Allows you to define ranges on statistics and generate alarms.
- Written in Perl for portability
- Relatively easy to install. In Ubuntu it's very simple.

# Introduction: “Marketing”

- SmokePing keeps track of your network latency:
- Best of breed latency visualisation.
- Interactive graph explorer.
- Wide range of latency measurement plugins.
- Master/Slave System for distributed measurement.
- Highly configurable alerting system.
- Live Latency Charts with the most 'interesting' graphs.
- Free and OpenSource Software written in Perl written by Tobi Oetiker, the creator of MRTG and RRDtool



# The “Smoke” and the “Pings”

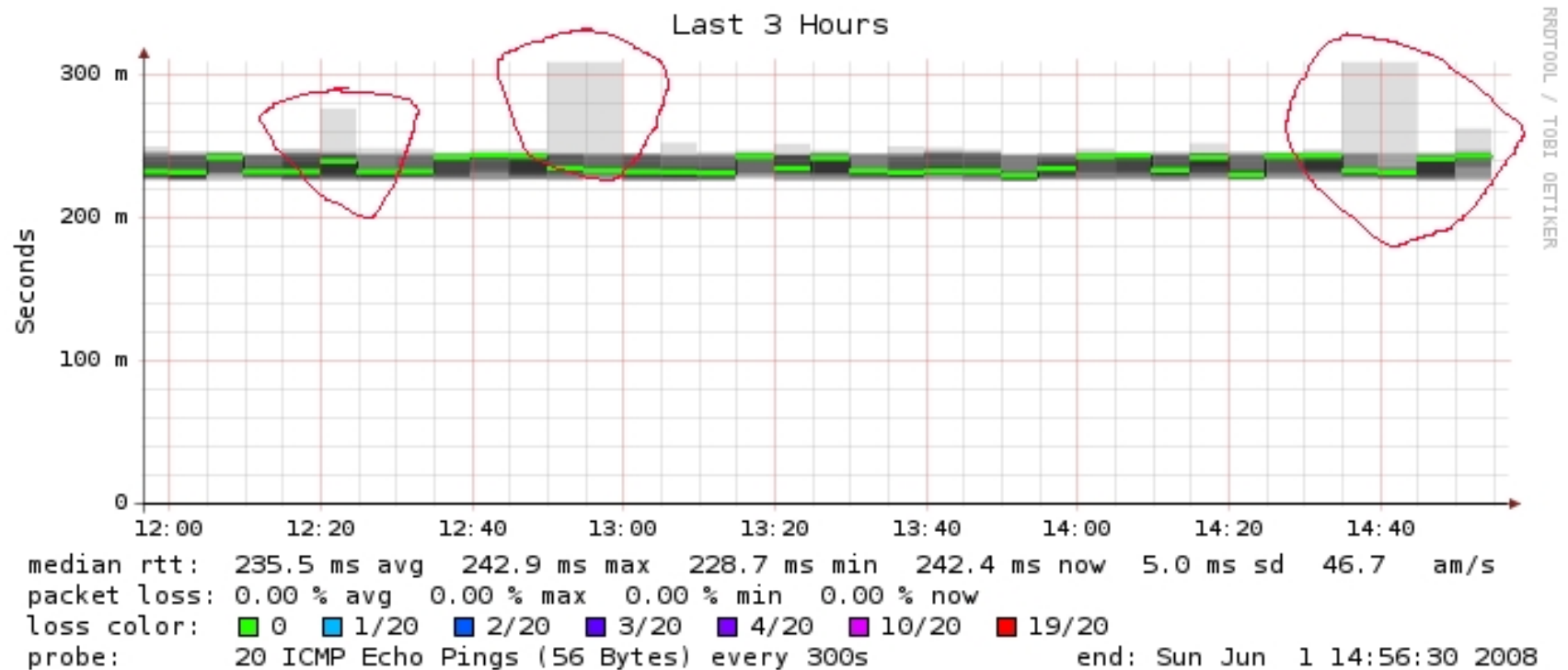


# How to Read Smokeping Graphs

- Smokeping sends multiples tests (pings), makes note of RTT, orders these and selects the median.
- The different values of RTT are shown graphically as lighter and darker shades of grey (the “smoke”). This conveys the idea of variable round trip times or *jitter*.
- The number of lost packets (if any) changes the color of the horizontal line across the graph.

# An Example

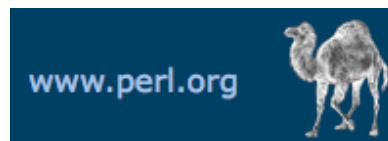
## African Network Operators Group



# The Bits and Pieces

## The following packages are needed or recommended:

- **rrdtool** <http://oss.oetiker.ch/rrdtool/>
- **fping** <http://www.fping.com/>
- **echoping** <http://echoping.sourceforge.net/>
- **speedyCGI** <http://www.daemoninc.com/SpeedyCGI/>
- **Apache** <http://httpd.apache.org/>
- **Perl** <http://www.perl.org/>



# Smokeping: Installation

## Debian/Ubuntu:

- `apt-get install smokeping`
- Configure **`/etc/smokeping/config.d/*`**
- Change Smokeping's appearance here:
  - **`/etc/smokeping/basepage.html`**
- Restart the service:
  - **`/etc/init.d/smokeping restart`**
  - **`/etc/init.d/smokeping reload`**



# Smokeping Installation

You will find Smokeping running here:

<http://YourMachine/cgi-bin/smokeping.cgi>

SmokePing  
Targets:

Filter:

Charts  
- Local

Maintained by  
Joe Random

Running on  
SmokePing-2.3.6 by  
Tobi Oetiker and  
Niko Tyni

smoke  
ping

RRDtool  
logging & graphing

## Network Latency Grapher

Welcome to the SmokePing website of 'A poorly maintained site running Debian.'

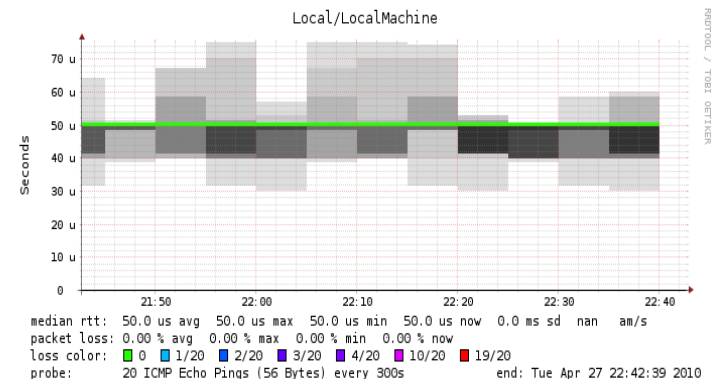
SmokePing  
Targets:

Filter:

Charts  
- Loss  
- by Max  
- by Median  
- Std Deviation  
- Local

## The most interesting destinations

### Top Standard Deviation



# Configuration

Smokeping configuration files in Ubuntu 9.10 include:

- /etc/smokeping/config.d/**Alerts**
- /etc/smokeping/config.d/Database
- /etc/smokeping/config.d/**General**
- /etc/smokeping/config.d/pathnames
- /etc/smokeping/config.d/Presentation
- /etc/smokeping/config.d/**Probes**
- /etc/smokeping/config.d/Slaves
- /etc/smokeping/config.d/**Targets**

Generally we spend most of our time in **Alerts, General, Probes** and **Targets**.

# Configuration: General

Update:

- owner → NOC
- contact → sysadmin@localhost
- cgiurl → <http://localhost/cgi-bin/smokeping.cgi>
- mailhost → localhost

```
*** General ***

@include /etc/smokeping/config.d/pathnames

# Please edit this to suit your installation
owner      = NOC
contact    = sysadmin@localhost
cgiurl     = http://localhost/cgi-bin/smokeping.cgi
mailhost   = localhost
# specify this to get syslog logging
syslogfacility = local0
# each probe is now run in its own process
# disable this to revert to the old behaviour
# concurrentprobes = no
```

# Configuration: pathnames

Normally you should not need to update this file:

```
sendmail = /usr/sbin/sendmail
imgcache = /var/www/smokeping
imgurl    = ../smokeping
datadir   = /var/lib/smokeping
dyndir    = /var/lib/smokeping/__cgi
piddir    = /var/run/smokeping
smokemail = /etc/smokeping/smokemail
tmail     = /etc/smokeping/tmail
precreateperms = 2775
```

# Configuration: Presentation

- If you wish to customize Smokeping's look and feel you can edit the file

/etc/smokeping/basepage.html

- To change how Smokeping presents graphs you can edit this file.

```
*** Presentation ***

template = /etc/smokeping/basepage.html

+ charts

menu = Charts
title = The most interesting destinations

++ stddev
sorter = StdDev(entries=>4)
title = Top Standard Deviation
menu = Std Deviation
format = Standard Deviation %f

++ max
sorter = Max(entries=>5)
title = Top Max Roundtrip Time
menu = by Max
format = Max Roundtrip Time %f seconds
```



File continues...

# Configuration: Alerts

- Very flexible. Create your own type of alert.
- Send alerts to ticket queues (RT using rt-mailgate, for instance)
- Somewhat complex to understand. Read the Alerts section of the Smokeping on-line configuration documentation:

[http://oss.oetiker.ch/smokeping/doc/smokeping\\_config.en.html](http://oss.oetiker.ch/smokeping/doc/smokeping_config.en.html)

```
*** Alerts ***
to = net@localhost
from = smokeping-alert@localhost

+bigloss
type = loss
# in percent
pattern = ==0%,==0%,==0%,==0%,>0%,>0%,>0%
comment = suddenly there is packet loss

+someloss
type = loss
# in percent
pattern = >0%,*12*,>0%,*12*,>0%
comment = loss 3 times in a row over 12 samples
```

Remember this goes to our RT queue.

Ubuntu-specific alert. The name is misleading as the alert is for any loss when there was none previously.

# Configuration: Database

- Defines how RRDtool will save data over time in Round Robin Archives (RRAs)
- By default each step is 300 seconds (5 minutes).
- You cannot trivially change the step setting once data has been collected.
- Details on each column in the Database section of the Smokeping on-line configuration documentation:

[http://oss.oetiker.ch/smokeping/doc/smokeping\\_config.en.html](http://oss.oetiker.ch/smokeping/doc/smokeping_config.en.html)

```
*** Database ***

step      = 300
pings     = 20

# consfn mrhb steps total
AVERAGE  0.5   1   1008
AVERAGE 0.5  12  4320
  MIN     0.5  12  4320
  MAX     0.5  12  4320
AVERAGE  0.5 144   720
  MAX     0.5 144   720
  MIN     0.5 144   720
```

**consfn:** Consolidation function

**mrhb:** Percent of consolidated steps that must be known to warrant an entry.

**steps:** How many steps to consolidate for each entry in the RRA.

**total:** Total number of rows to keep in the RRA. Use rows and steps to determine time data will be saved.

12 steps = 12 x 300 sec = 1 hour

4320 rows = 4320 hours = **180 days**

# Configuration: Probes

Smokeping is installed with a number of additional probes. They must, however, be specified here – including their default behaviors.

```
*** Probes ***


+ FPing
binary = /usr/sbin/fping

+ DNS
binary = /usr/bin/dig
lookup = nsrc.org
pings = 5
step = 180

+ EchoPingHttp
binary = /usr/bin/echoping
ignore_cache = yes
pings = 5
url = /

+ EchoPingHttps
binary = /usr/bin/echoping
pings = 5
url = /

+ EchoPingSntp
binary = /usr/bin/echoping
forks = 5
```



Use the DNS probe to verify that your Registry services are available and responding as expected.

We use "nsrc.org" as a sample hostname to lookup, to verify that the DNS works.



# Configuration: Slaves

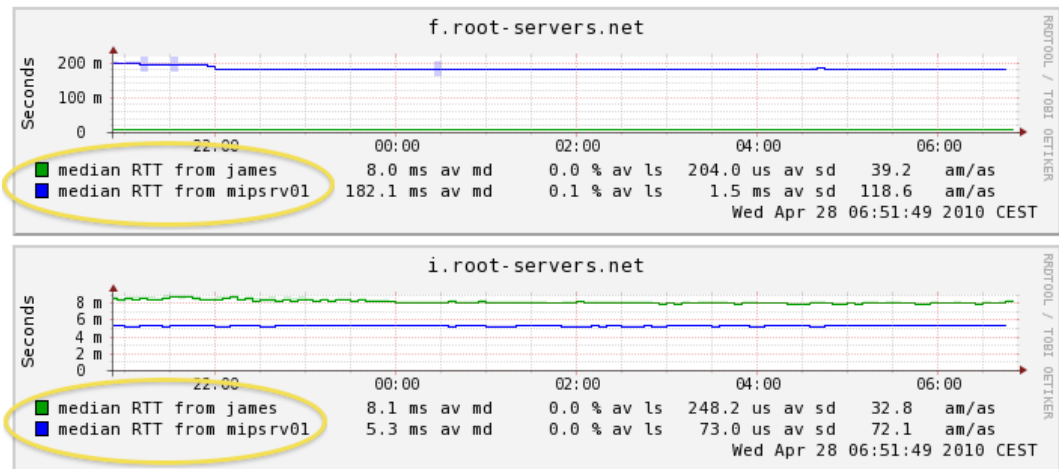
Smokeping slave servers allow for multi-viewpoint monitoring and graphing of the same services, machines or links. Details here:

[http://oss.oetiker.ch/smokeping/doc/smokeping\\_master\\_slave.en.html](http://oss.oetiker.ch/smokeping/doc/smokeping_master_slave.en.html)

```
# *** Slaves ***
#
## make sure this is not world-readable!
## secrets=/etc/smokeping/slave-secrets
#
# +slavel
# display_name=slave_name
# color=0000ff
```

## Root Name Server System

That is, you can  
externally monitor  
your network!



# Configuration: Targets

- Where we spend most of our time configuring Smokeping.
- Web menu hierarchy defined by “+”, “++”, etc.
- Each new *probe* statement resets the default probe in use.
- Probes have defaults set in the Probes config file. These can be overridden in Targets.

```
*** Targets ***

probe = FPing

menu = Top
title = Network Latency Grapher

+ UO
menu = University of Oregon
title = UO webserver
host = www.uoregon.edu

+ NSRC
menu = NSRC
title = Network Startup Resource Center
host = www.nsrc.org

++ HTTP
menu = HTTP
probe = EchoPingHttp

+++ www
menu = NSRC web
host = www.nsrc.org

++ DNS
menu = DNS
probe = DNS

+++ dns
menu = NSRC DNS
host = www.nsrc.org
```

# Default Probe: FPing

- **Probing for delay and jitter (ping)**
- **Performance and availability probe of a server.**
- **Entry belongs in the Targets file:**

## Latency

**+++ LocalMachine**

menu = localhost

title = Our local machine

host = localhost

alerts = startloss,someloss,bigloss,rttdetect

# Probe: DNS Check

In /etc/smokeping/config.d/Targets:

## DNS Latency

```
++ DNS
```

```
probe = DNS
```

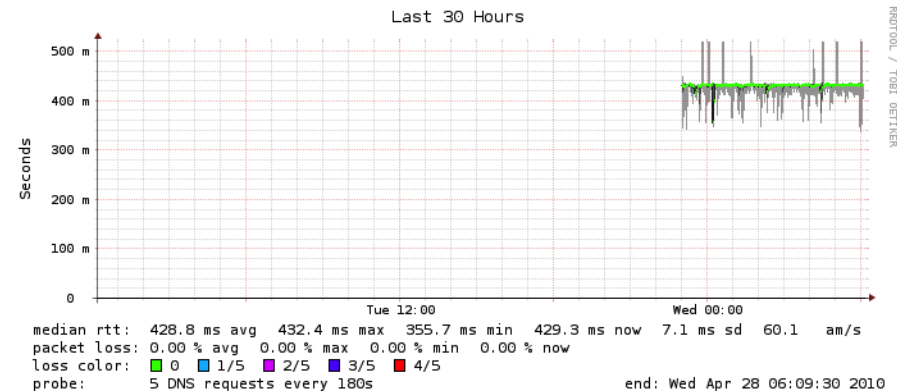
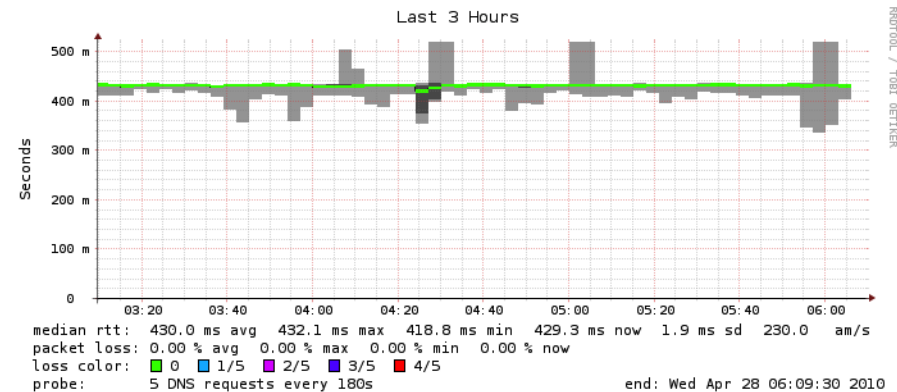
```
menu = External DNS Check
```

```
title = DNS Latency
```

```
+++ nsrc
```

```
host = nsrc.org
```

**nsrc.org**



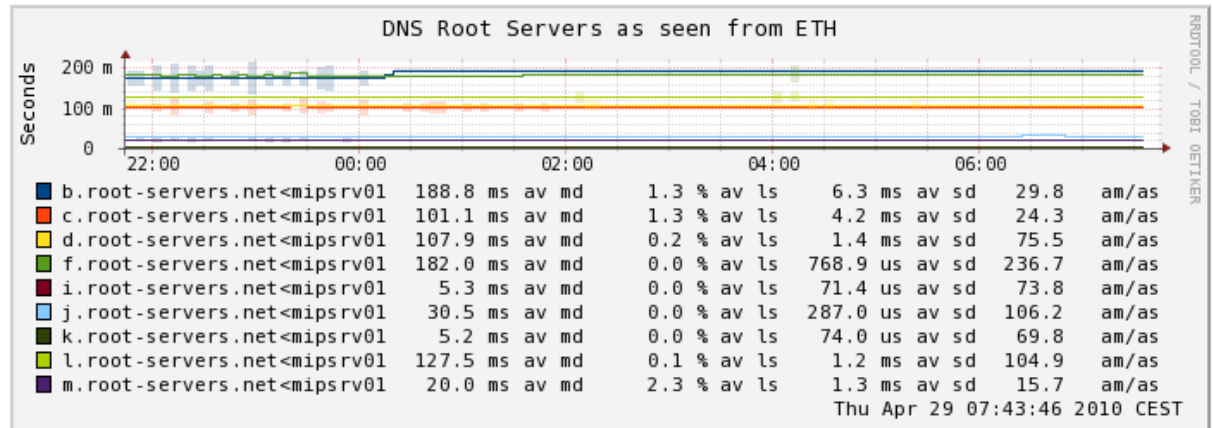
# MultiHost Graphing

Solve the issue of multiple hosts, one probe and missing differences in the Y axis (time):

[http://oss.oetiker.ch/smokeping/doc/smokeping\\_examples.en.html](http://oss.oetiker.ch/smokeping/doc/smokeping_examples.en.html)

## Sample configuration

```
+++MultihostRouters
menu = MutihostRouters
title = Combined Router Results
host = /Local/Routers/gw-rtr /Local/Routers/group1-rtr
      /Local/Routers/group2-rtr
```



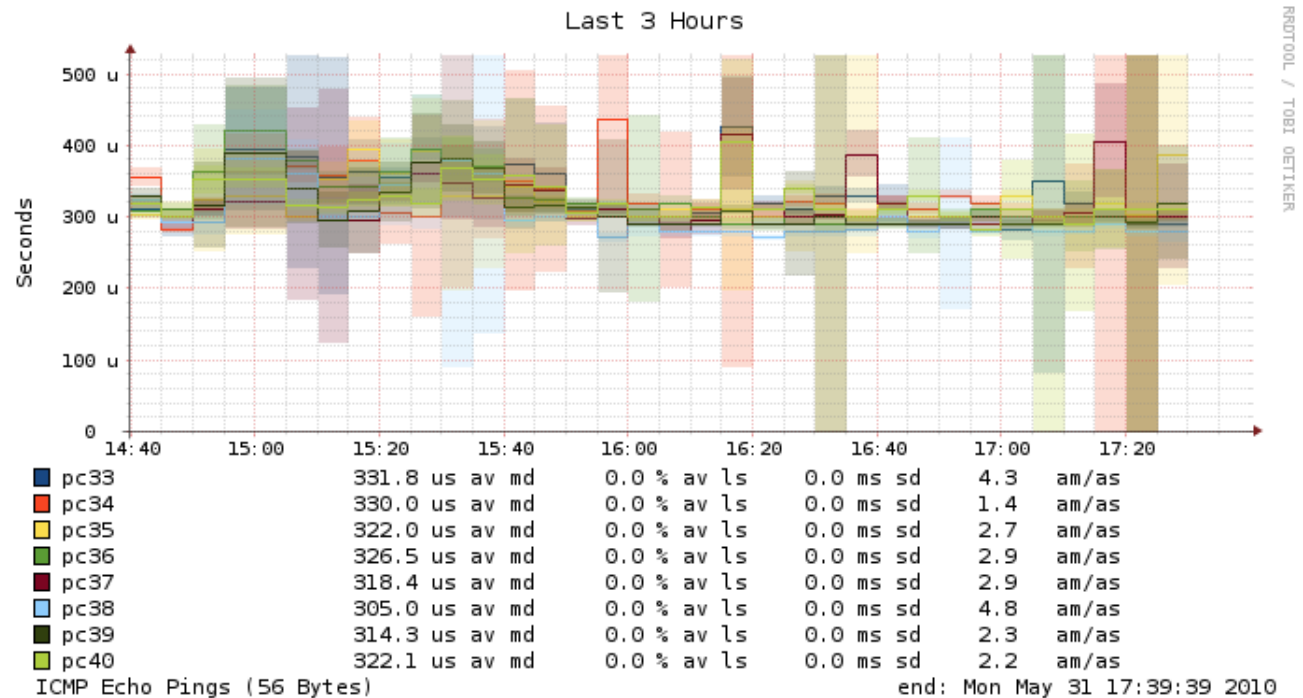
# Example Multihost Graph

SmokePing  
Targets:

Filter:

- Charts
- Local
- Ping Check Tutorial
- Web Check Tutorial
- Router Ping Check
- Switch Ping Check
- MultiHost Ping Row1
- MultiHost Ping Row2**
- DNS Check Tutorial

## Consolidated Ping Response Time



# More Types of Probes

## More information available here:

<http://oss.oetiker.ch/smokeping/probe/index.en.html>

## A few more probes...

- DNS
- HTTP(S)
- LDAP
- Whois
- SMTP
- CiscoRTTMonDNS
- CiscoRTTMonTcpCon
- Tacacs
- WebProxyFilter
- WWW-Cache
- Radius
- IOS
- FPing6
- Etc.

# Summary

- Simple but powerful network monitoring
- Monitor machines, services and link health
- Distributed instances for external views – often a paid-for service
- Easy to configure and customize, but very extensible.
- Can use with Ticketing Systems to automate alerts
- Very small disk and CPU footprint



# References

## **Smokeping website:**

<http://oss.oetiker.ch/smokeping/>

## **Smokeping Demo:**

<http://oss.oetiker.ch/smokeping-demo/?target=Customers.OP>

## **Good examples:**

[http://oss.oetiker.ch/smokeping/doc/smokeping\\_examples.en.html](http://oss.oetiker.ch/smokeping/doc/smokeping_examples.en.html)