# Network Monitoring & Management
# Measuring Delay with Smokeping

## Network Startup Resource Center
## www.nsrc.org

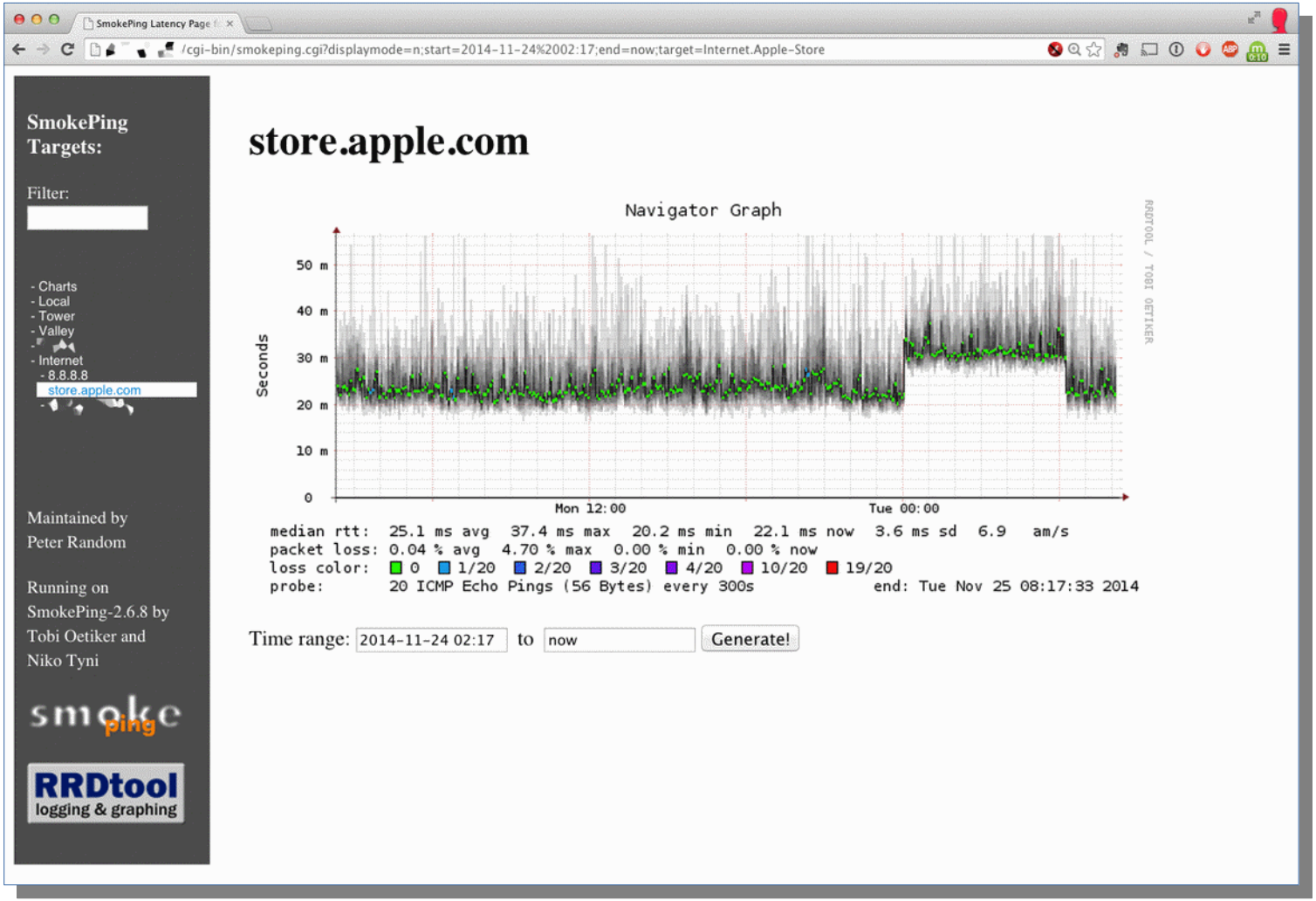
# Introduction

- SmokePing keeps track of your network latency:
- Best of breed latency visualization.
- 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

# Technical Introduction

- Based on RRDTool (the same author)
- Measures ICMP delay & status of services like:
  - HTTP, DNS, SMTP, SSH, LDAP, and more
- Define ranges on statistics and generate alarms
- Written in Perl for portability
- Easy to install - harder to configure

# The Smoke & The Pings



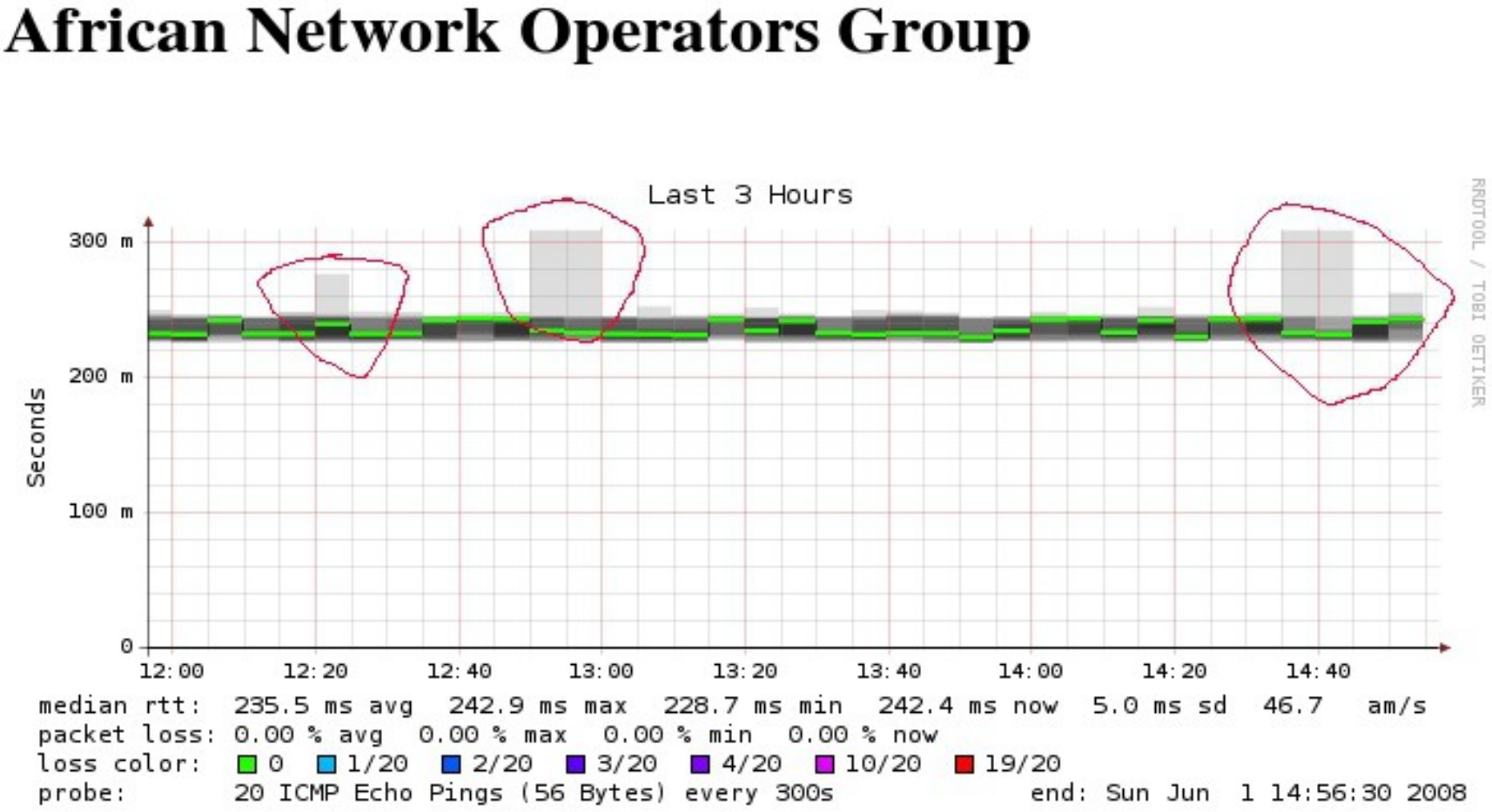
# How To Read Smokeping Graphs

- 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.

# Example: African Network Operators Group



# What Makes It Tick

The following packages:

- **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/



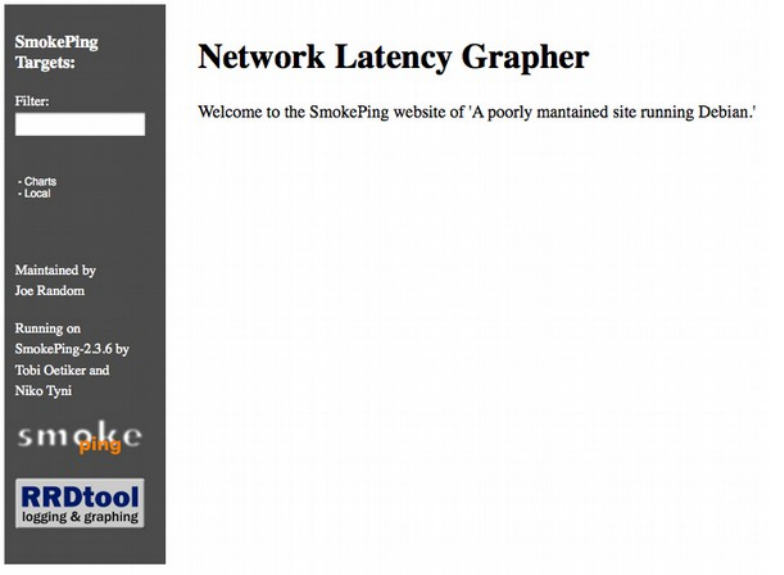
# Smokeping Installation

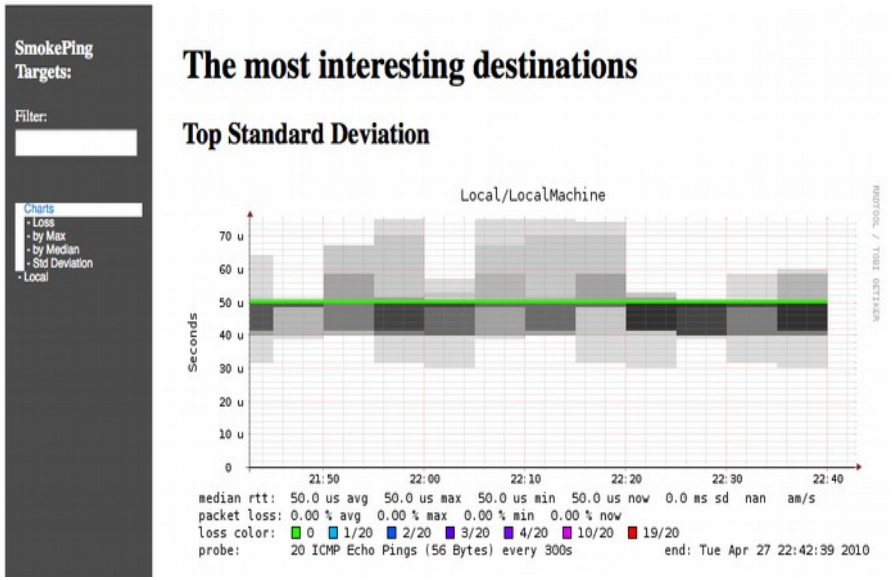
- **Debian/Ubuntu:**
- apt-get install smokeping
- Configure **/etc/smokeping/config.d/***
- Change Smokeping's appearance here:
  - **/etc/smokeping/basepage.html**
- Restart the service:
  - service smokeping {start|stop|restart|reload}

# Smokeping Installation

## You will find Smokeping running here:

http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi



# Configuration

Smokeping configuration files in Ubuntu:

```
/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

**To be updated:**

- owner ➔ NOC
- contact ➔ sysadm@pcN.ws.nsrc.org
- cgiurl ➔ http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi
- mailhost ➔ localhost
- syslogfacility ➔ local5

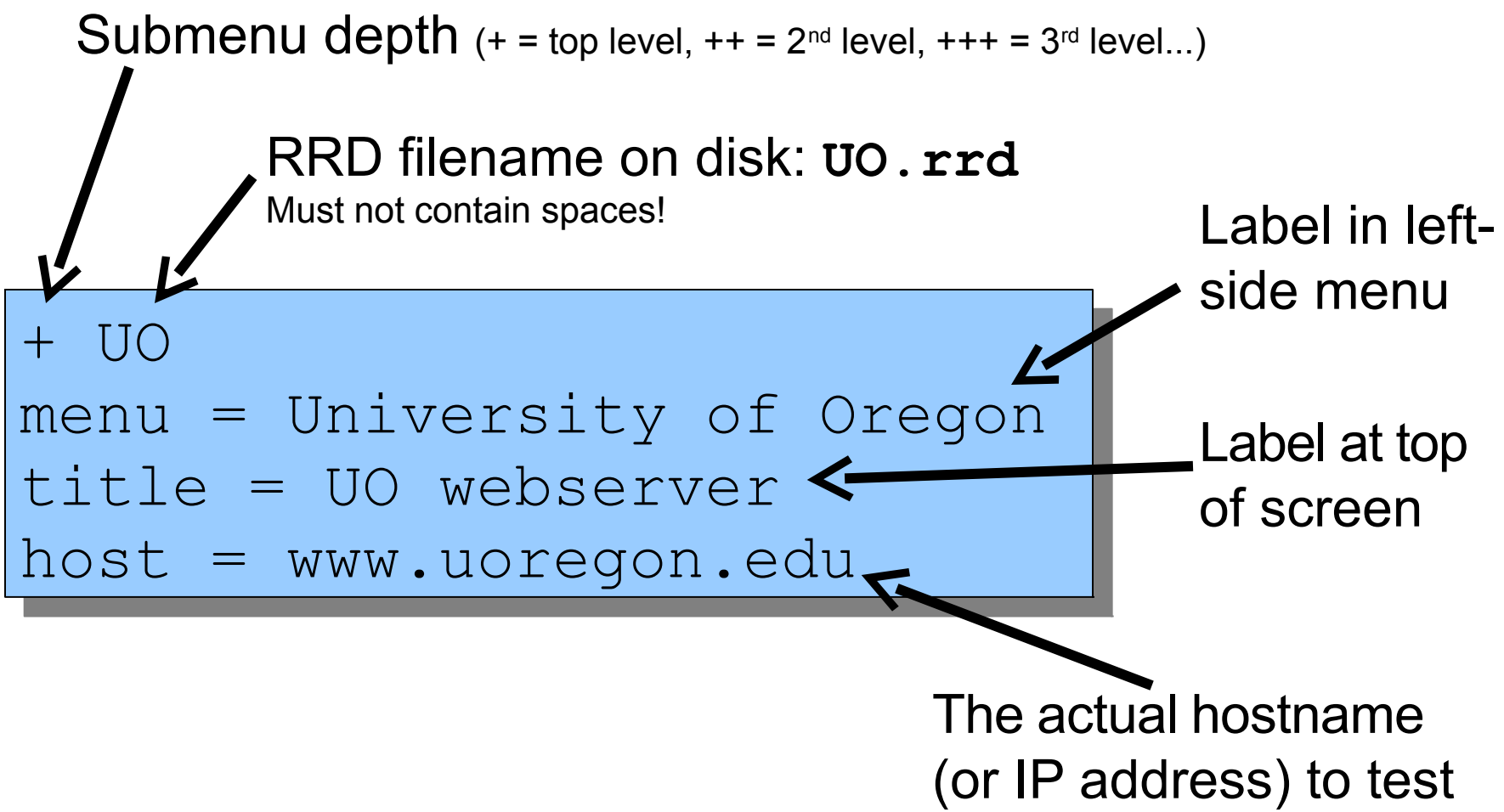
```
*** General ***

owner    = NOC
contact  = sysadm@pcN.ws.nsrc.org
mailhost = localhost
# NOTE: do not put the Image Cache below cgi-bin
# since all files under cgi-bin will be executed ... this is not
# good for images.
cgiurl   = http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi
# specify this to get syslog logging
syslogfacility = local5
# each probe is now run in its own process
# disable this to revert to the old behaviour
# concurrentprobes = no

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

# 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
```

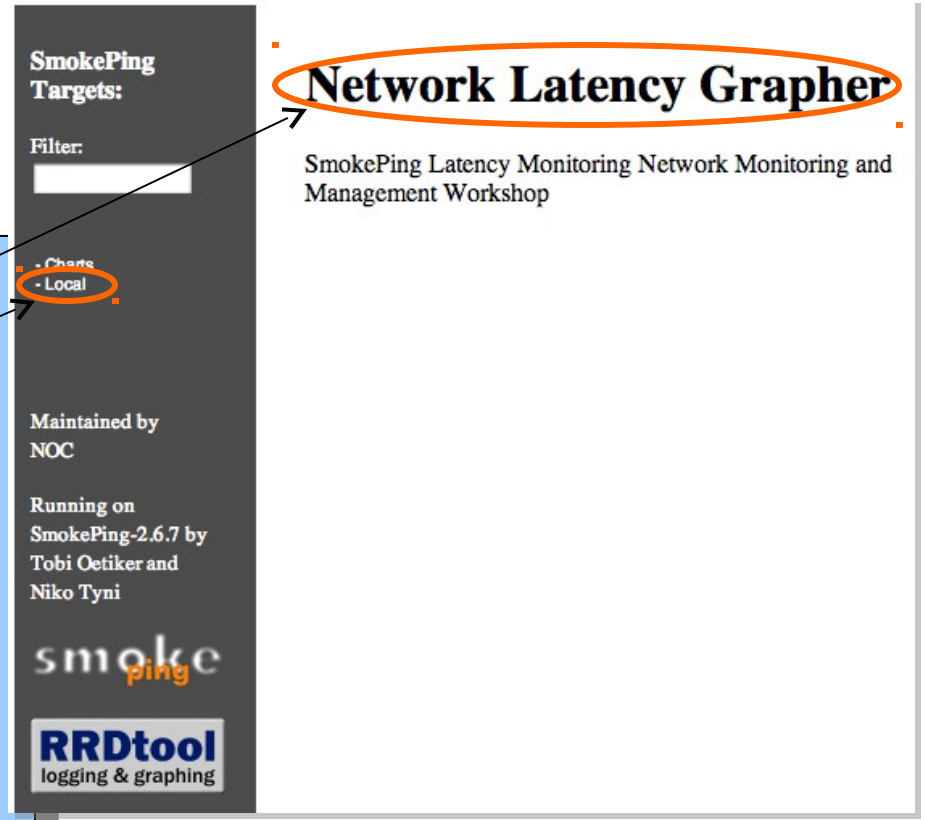
# Target Entry



# Configuration: Targets Example

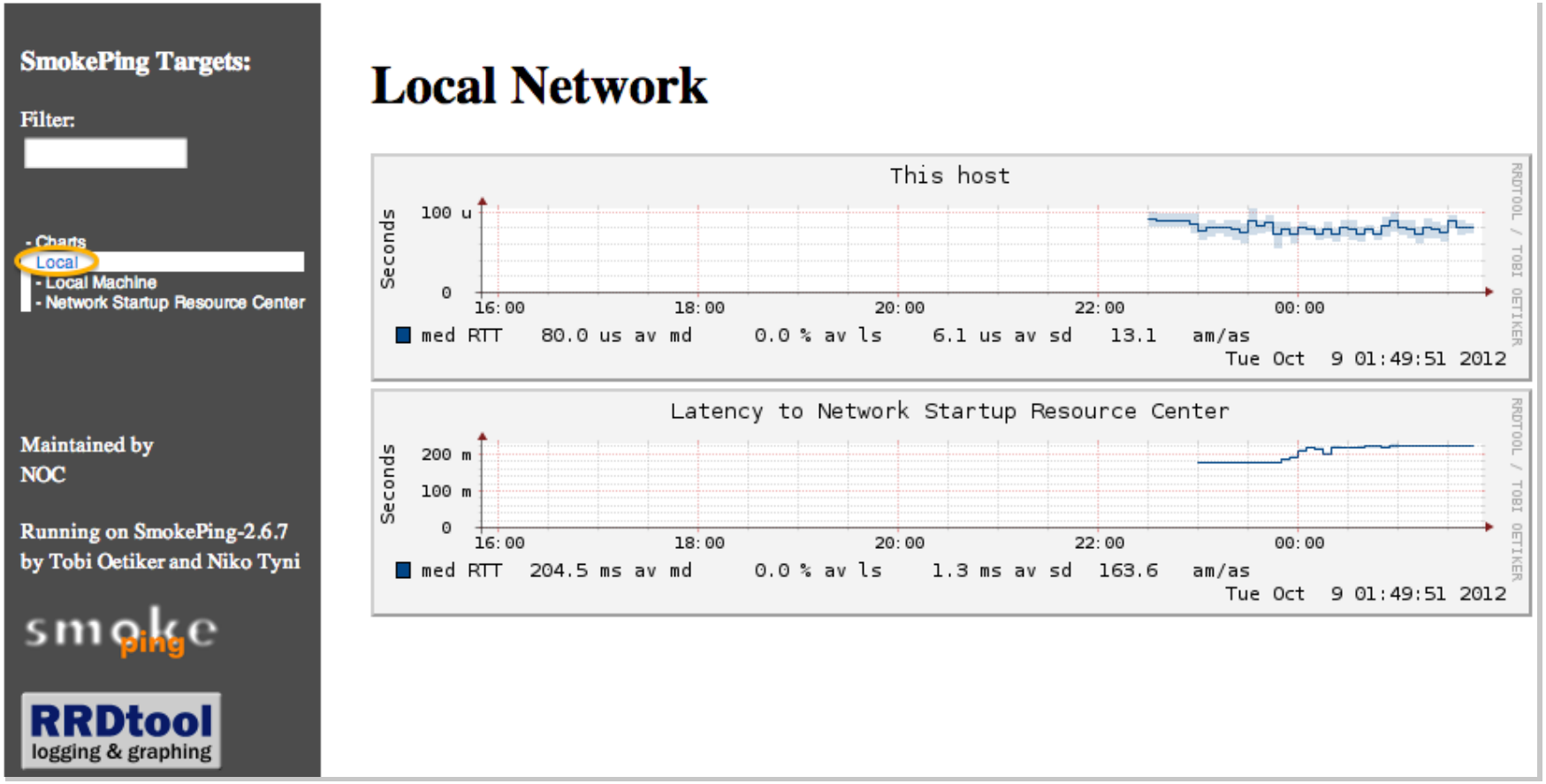
**Targets file below produces the following default SmokePing page:**

```
*** Targets ***

probe = FPing

menu = Top
title = Network Latency Grapher
remark = SmokePing Latency Monitoring \
         Network Monitoring and Management Workshop

+ Local

menu = Local
title = Local Network

++ LocalMachine

menu = Local Machine
title = This host
host = localhost

++ NSRC

menu = Network Startup Resource Center
title = Latency to Network Startup Resource Center
host = nsrc.org
```



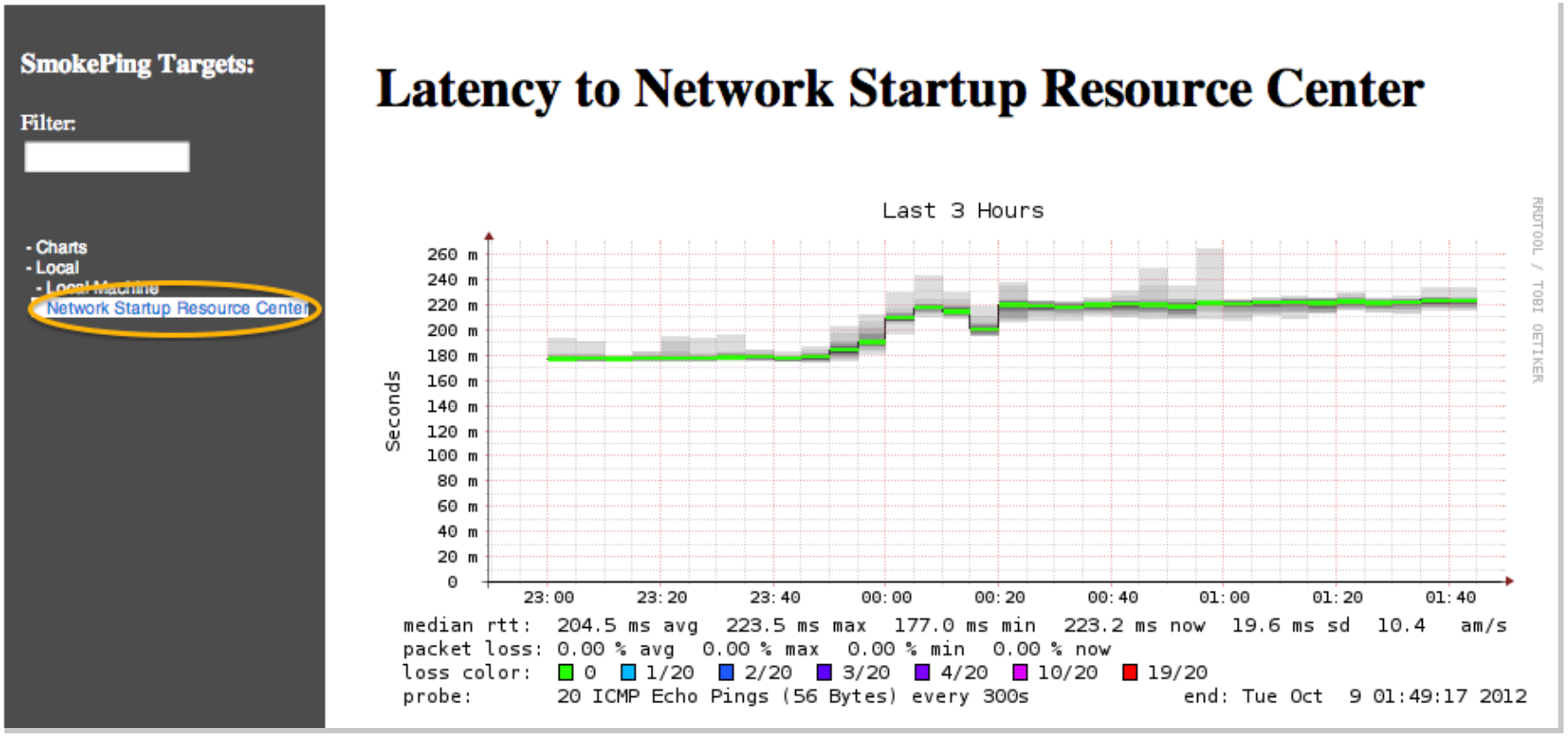
# Configuration: Targets Example

*Clicking on "Local" in the previous slide gives us:*



# Configuration: Targets Example

*Clicking "Network Startup Resource Center" in the previous slides gives us:*



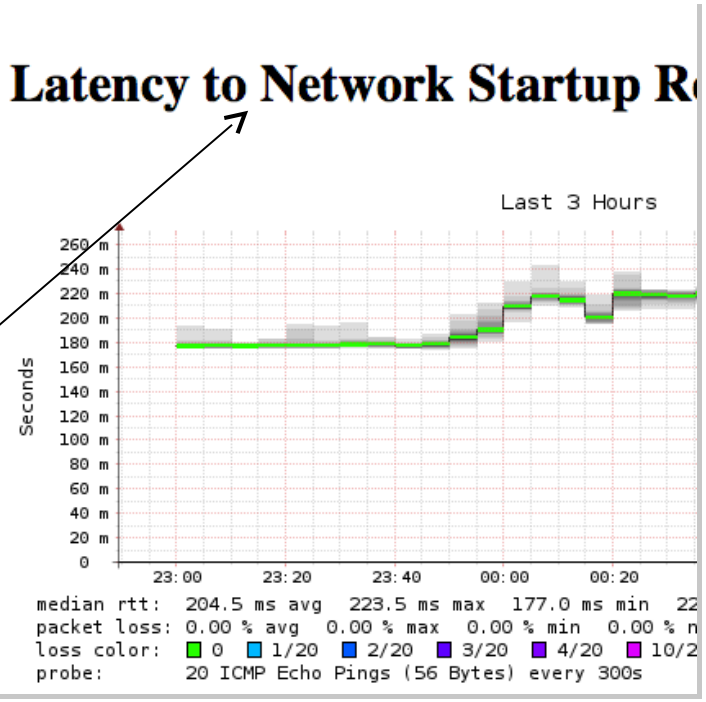
# Hierarchy in Targets File → Web UI

```
*** Targets ***

probe = FPing

menu = Top
title = Network Latency Grapher
remark = SmokePing Latency Monitor… \
         Network Monitoring and Mana…

+ Local

menu = Local
title = Local Network

++ LocalMachine

menu = Local Machine
title = This host
host = localhost

++ NSRC

menu = Network Startup Resource Center
title = Latency to Network Startup Re…
host = nsrc.org
```

1st level

2nd level

2nd level


**+ Local** → /var/lib/smokeping/Local

**++ LocalMachine** → /var/lib/smokeping/Local/LocalMachine.rrd

**++ NSRC** → /var/lib/smokeping/Local/NSRC.rrd

# Configuration: Alerts

- Very flexible. Create your own type of alert.
- Send alerts to ticket queues (RT using rt-mailgate, for instance)
- Complex to understand. Read the Alerts section of the Smokeping docs:
  http://oss.oetiker.ch/smokeping/doc/smokeping_config.en.html

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

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

This could go to a ticketing queue instead.

Target

```
++ LocalMachine
menu = localhost
title = This host
host = localhost
alerts = startloss,someloss,bigloss,rttdetect
```

# 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 = /

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

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

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

**Note:** Initial Probes file only has FPing defined.

# Default Probe: fping

- **Probing for delay and jitter (ping)**
- **Entry belongs in the Targets file**

**Network Latency**

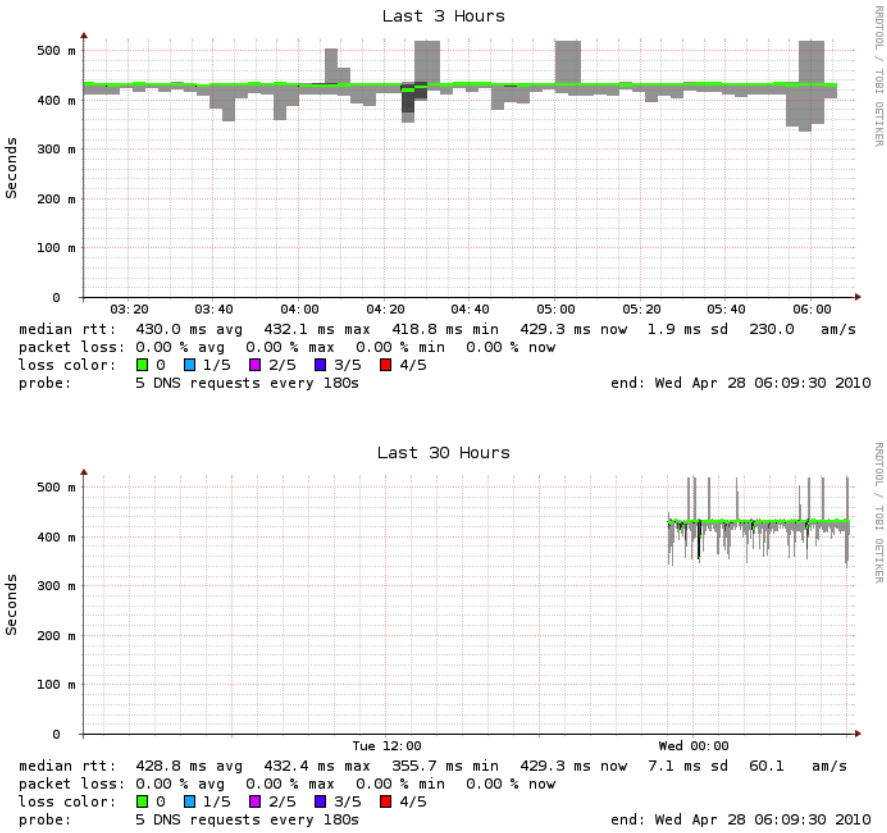
```
probe = FPing
...
++ LocalMachine
menu = localhost
title = This host
host = localhost
```

# Probe: DNS Check

In /etc/smokeping/config.d/Tar

## DNS Latency

```
++ DNS
probe = DNS
menu = External DNS Check
title = DNS Latency

+++ GoogleA
menu = 8.8.8.8
Title = DNS Latency GoogleA
host = google-public-dns-
       a.google.com
```



# More Types of Probes:

**More information available here:**

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

**A few more probes...**

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

# Configuration: Pathnames

Normally you should not need to update this file:

```
sendmail = /usr/sbin/sendmail
imgcache = /var/cache/smokeping/images
imgurl   = ../smokeping/images
datadir  = /var/lib/smokeping
piddir  = /var/run/smokeping
smokemail = /etc/smokeping/smokemail
tmail = /etc/smokeping/tmail
```

# Configuration: Presentation

- If you wish to customize Smokeping's look and feel you can edit the file /etc/smokeping/basepage.html

```
*** Presentation ***

template = /etc/smokeping/basepage.html
charset  = utf-8

+ 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
```

# Configuration: Database

- Defines how RRDtool will save data 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.
- Find details on each column in the database section of the online docs:
  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.

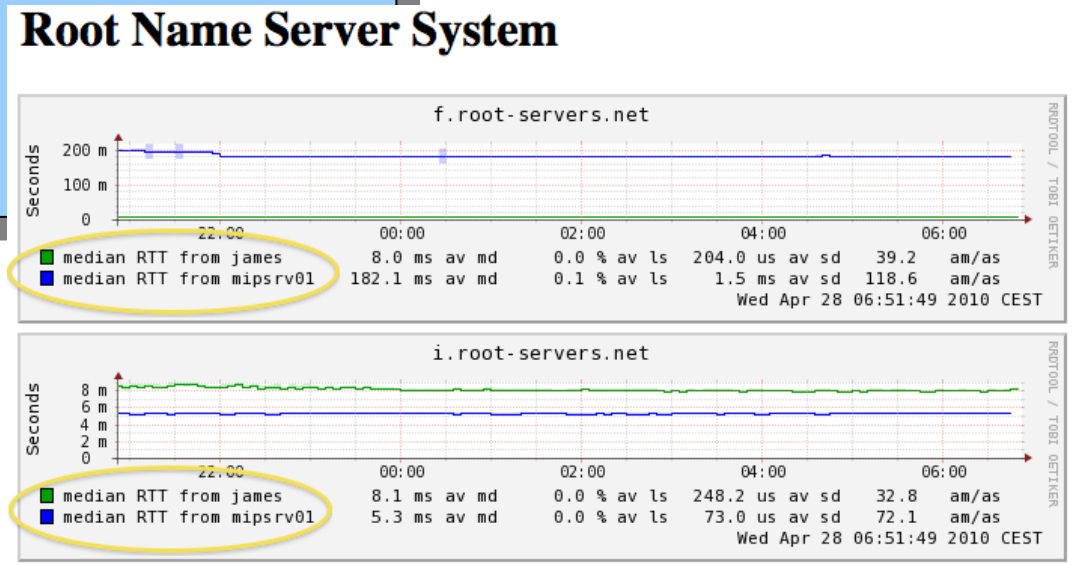
12 steps = 12 x 300 sec = 1 hour
4320 rows = 4320 hours = **180 days**

# Configuration: 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

```
*** Slaves ***
secrets=/etc/smokeping/smokeping_secrets
#+boomer
#display_name=boomer
#color=0000ff

#+slave2
#display_name=another
#color=00ff00
```




Externally monitor your network!

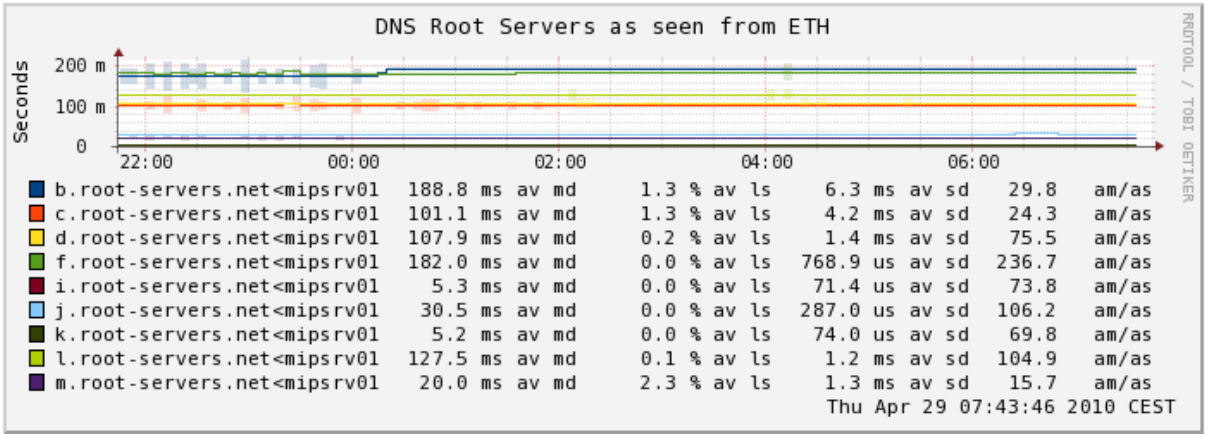
# Multi-Host Graphing

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

**Sample configuration**

```
+++MultihostRouters
menu = MutihostRouters
title = Combined Router Results
host = /Local/Routers/gw /Local/Routers/rtr1
       /Local/Routers/rtr2
```

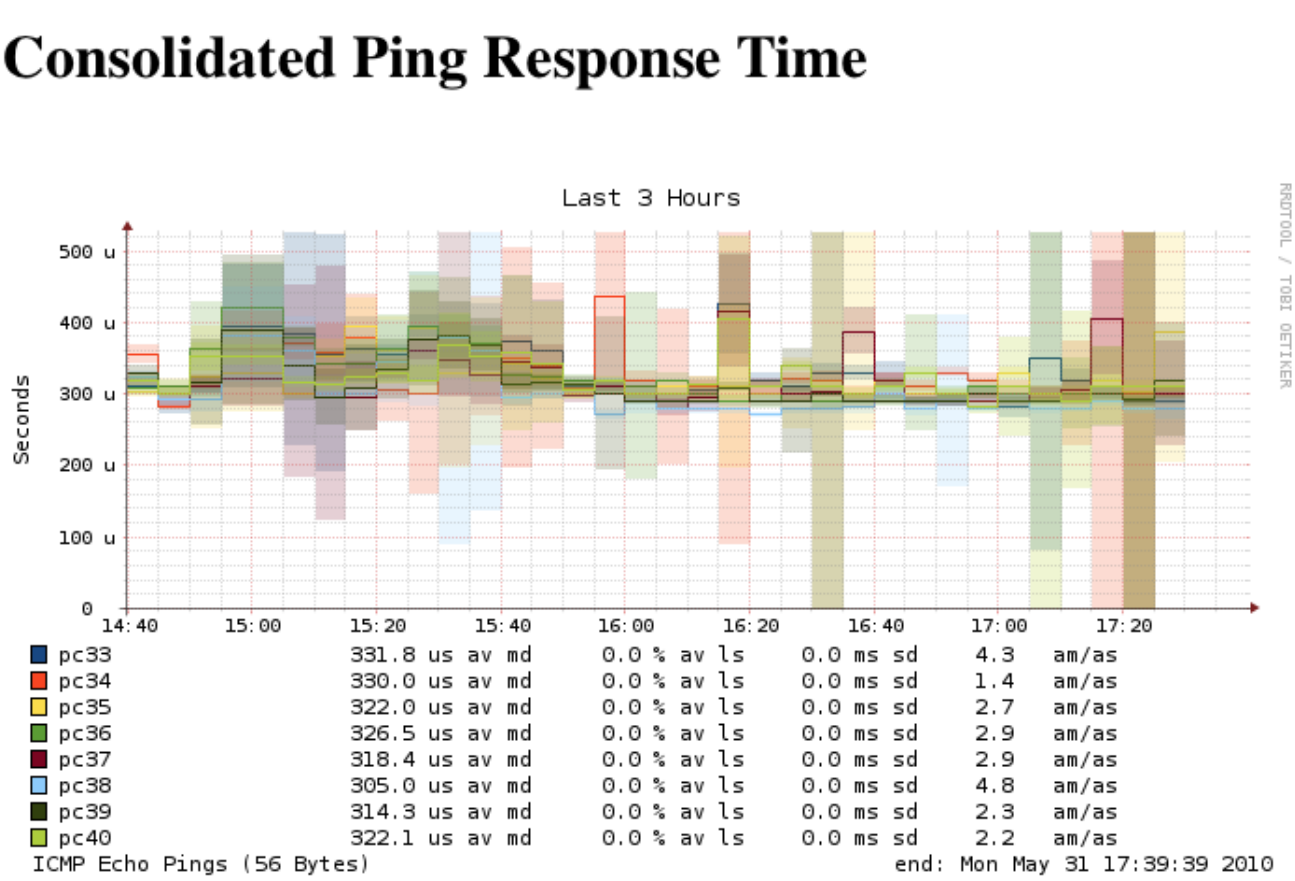


# Example: Multi-Host Graph

**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



# Smokeping 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.
- 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

# Questions?