



# Network Management & Monitoring

Measuring Delay with



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# Introduction

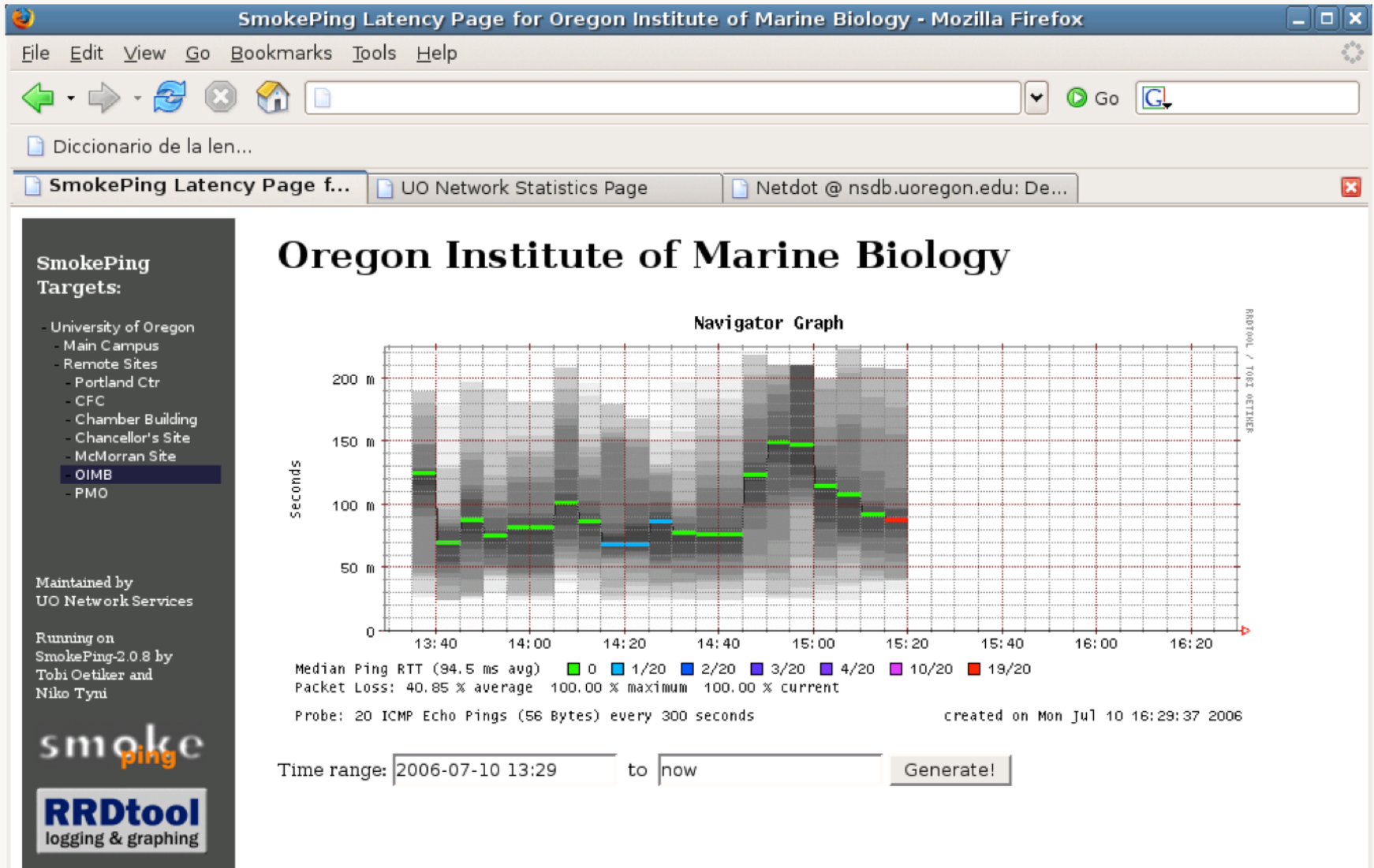
- Based on RRDTool (the same author)
- Measures ICMP delay and can measure status of services such as HTTP, DNS, SMTP, SSH, LDAP, etc.
- Define ranges on statistics and generate alarms.
- Written in Perl for portability
- Easy to install - harder to configure.

# Introduction: “Marketing”

- 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



# The “Smoke” and the “Pings”

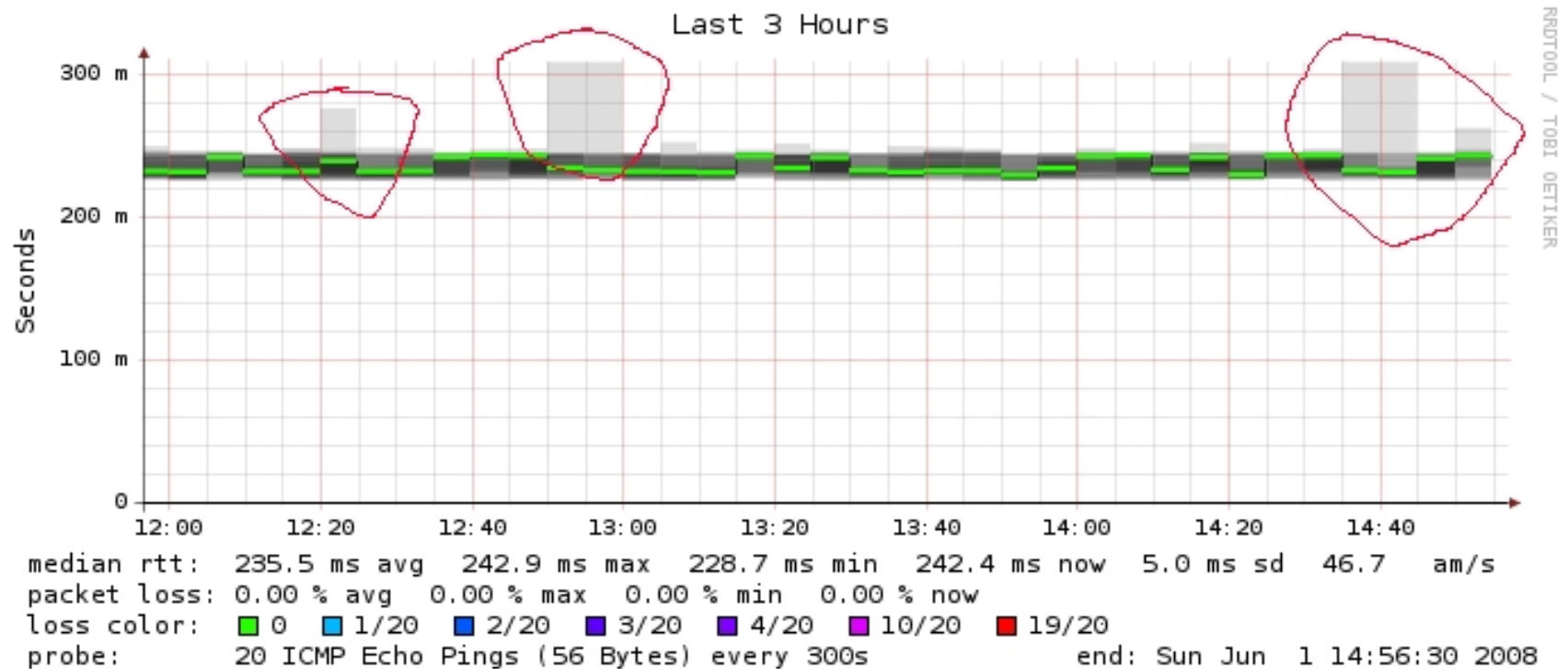


# How to Read Smokeping Graphs

- 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

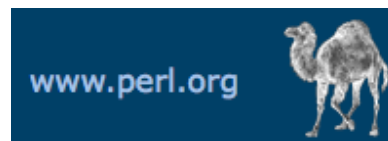
## African Network Operators Group



# What makes it tick!

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:
  - `service smokeping {start|stop|restart|reload}`

# Smokeping Installation

You will find Smokeping running here:

<http://pcN.ws.nsrc.org/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.'

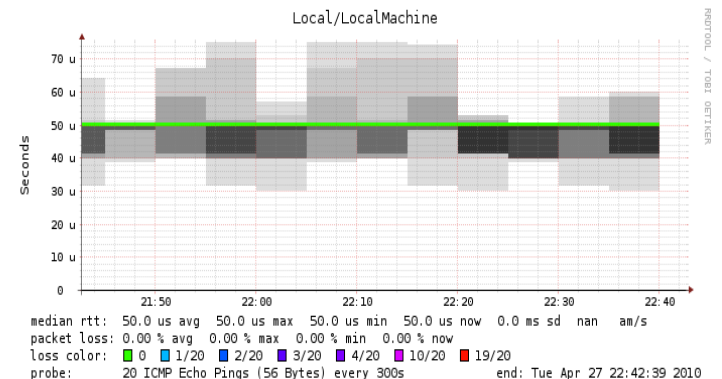
**SmokePing Targets:**

Filter:

[Charts](#)  
[Loss](#)  
[by Max](#)  
[by Median](#)  
[Std Deviation](#)  
[Local](#)

## The most interesting destinations

### Top Standard Deviation



# Configuration

Smokeping configuration files in Ubuntu 12.04 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

## To be updated:

|                  |   |                                                                                                         |
|------------------|---|---------------------------------------------------------------------------------------------------------|
| • owner          | ➔ | NOC                                                                                                     |
| • contact        | ➔ | sysadm@pcN.ws.nsrc.org                                                                                  |
| • cgiurl         | ➔ | <a href="http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi">http://pcN.ws.nsrc.org/cgi-bin/smokeping.cgi</a> |
| • 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

Submenu depth (+ = top level, ++ = 2<sup>nd</sup> level, +++ = 3<sup>rd</sup> level...)

RRD filename on disk: **UO.rrd**

Must not contain spaces!

Label in left-side menu

Label at top of screen

The actual hostname  
(or IP address) to test

+ UO

menu = University of Oregon

title = UO webserver

host = www.uoregon.edu

# 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

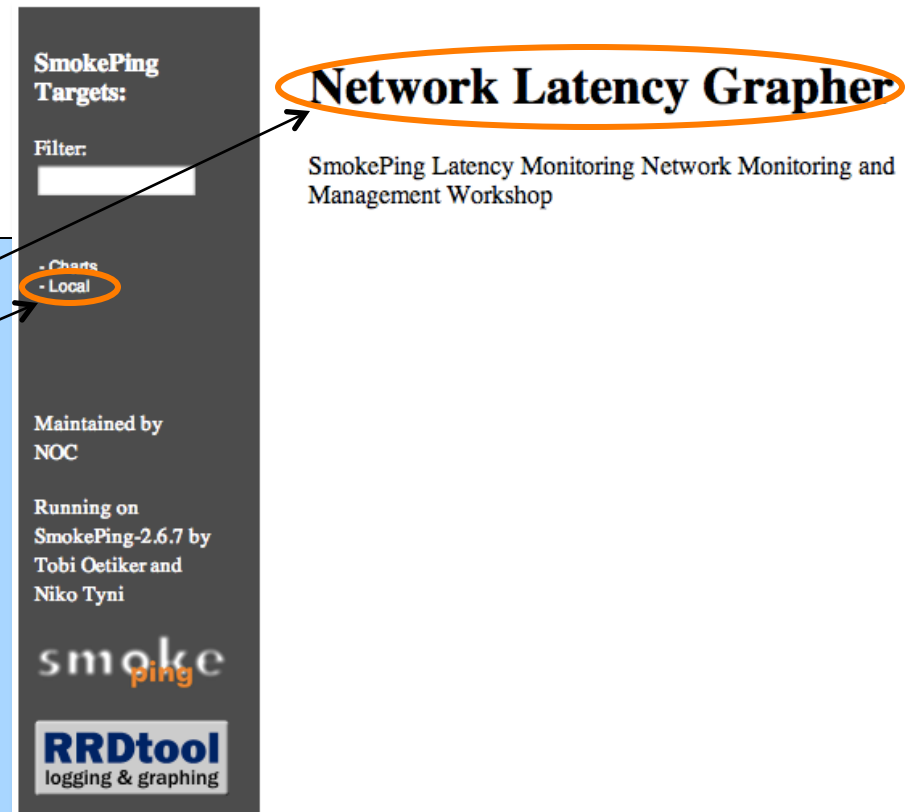
menu = Local
title = Local Network

++ LocalMachine

menu = Local Machine
title = This host
host = localhost

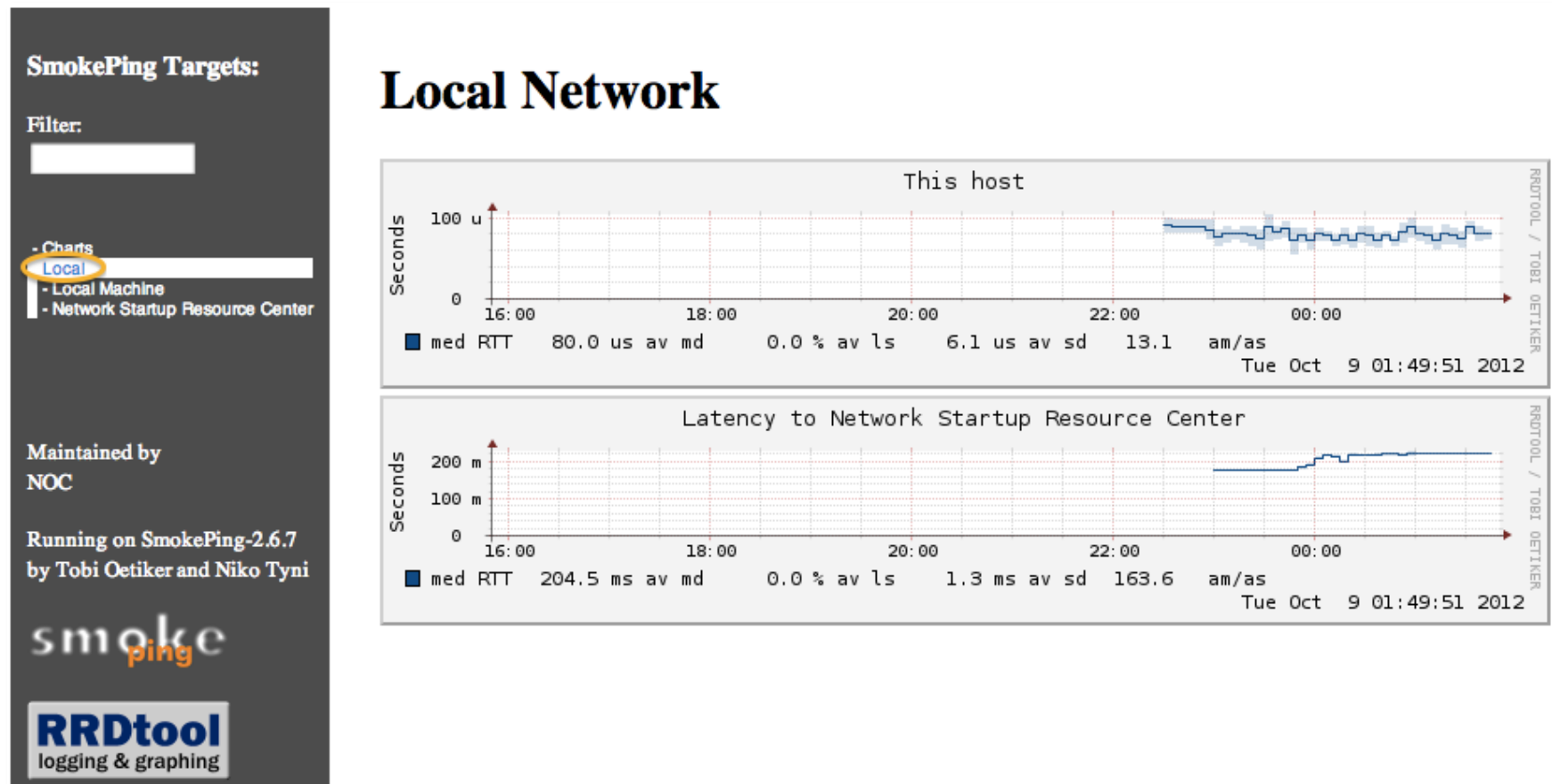
++ NSRC

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



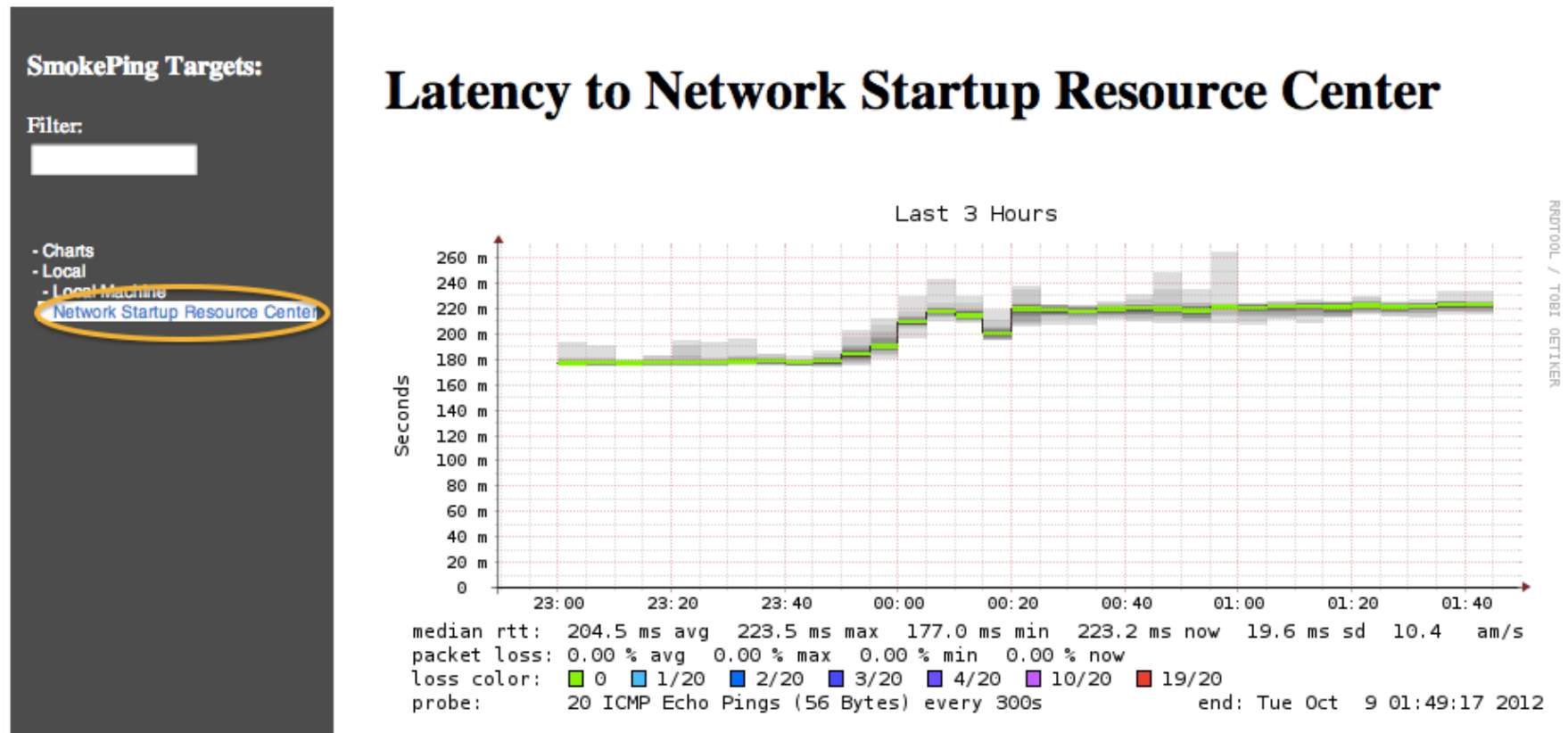
# Configuration: Targets Example

Clicking on “Local” in the previous slide gives us:



# Configuration: Targets Example

Clicking “Network Startup Resource Center” in the previous slides gives us:



# Configuration: Targets Example

## Hierarchy of web interface to Targets file explained:

```
*** Targets ***
```

```
probe = FPing
```

```
menu = Top
```

```
title = Network Latency Grapher
```

```
remark = SmokePing Latency Monitor... \
        Network Monitoring and Mana...
```

```
+ Local
```

*1st level*

```
menu = Local
```

```
title = Local Network
```

*2nd level*

```
++ LocalMachine
```

```
menu = Local Machine
```

```
title = This host
```

```
host = localhost
```

*2nd level*

```
++ NSRC
```

```
menu = Network Startup Resource Center
```

```
title = Latency to Network Startup Re...
```

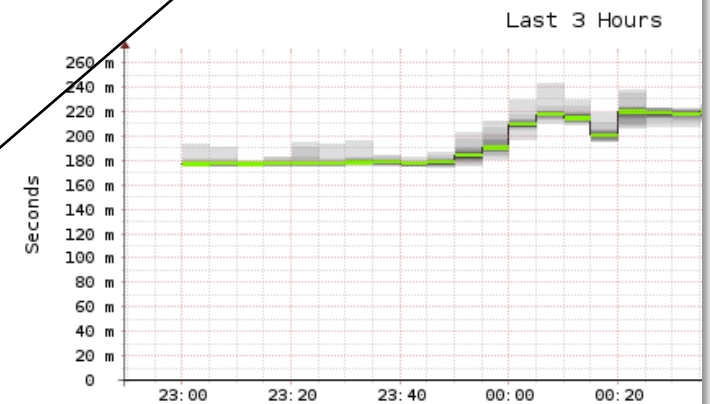
```
host = nsrc.org
```

### SmokePing Targets:

Filter:

- Charts
- Local
  - Local Machine
  - Network Startup Resource Center

### Latency to Network Startup Resource Center



median rtt: 204.5 ms avg 223.5 ms max 177.0 ms min 22  
packet loss: 0.00 % avg 0.00 % max 0.00 % min 0.00 % n  
loss color: 0 1/20 2/20 3/20 4/20 10/20  
probe: 20 ICMP Echo Pings (56 Bytes) every 300s

+ Local → /var/lib/smokeping/Local

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

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

# Questions?

# 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 = 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 = /

+ EchoPingSntp
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/Targets:

## DNS Latency

++ DNS

probe = DNS

menu = External DNS Check

title = DNS Latency

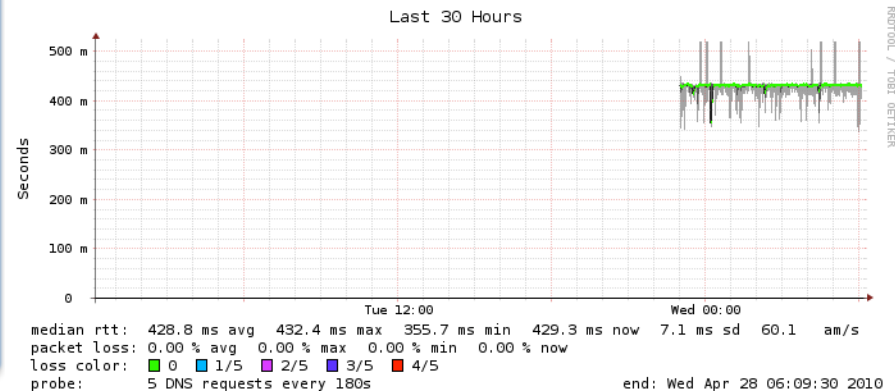
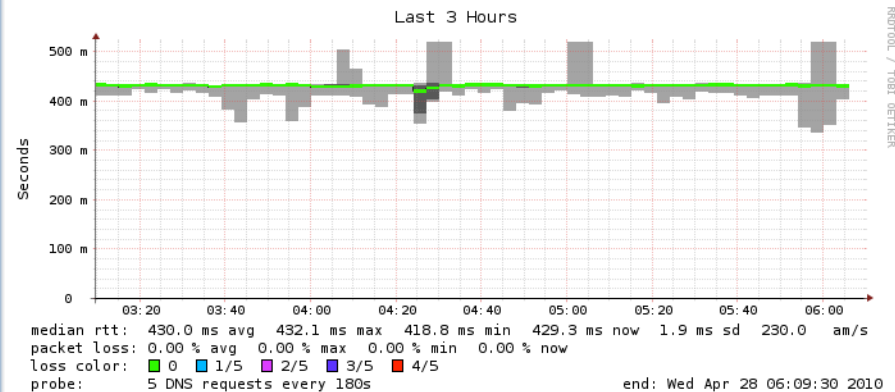
+++ GoogleA

menu = 8.8.8.8

Title = DNS Latency GoogleA

host = google-public-dns-a.google.com

nsrsrc.org



# 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.

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

```
*** 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
```



File continues...

# 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: Slaves

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

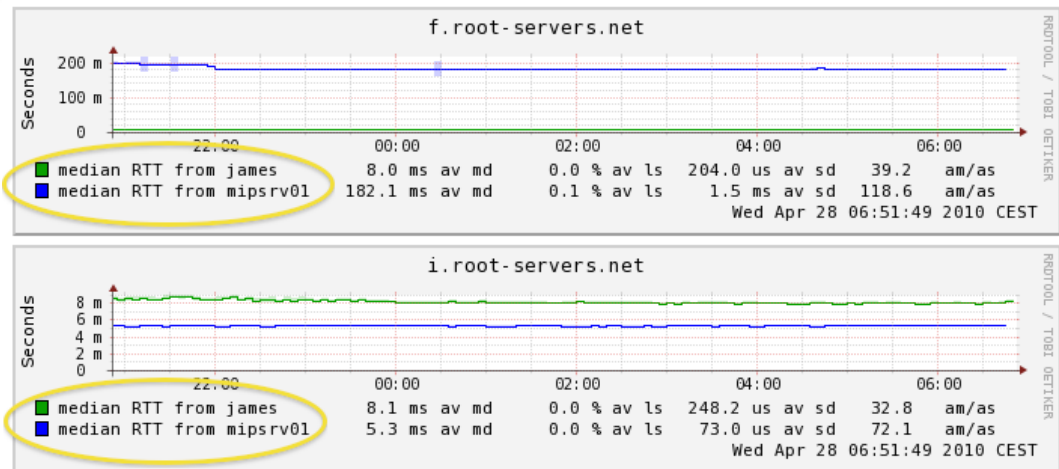
[http://oss.oetiker.ch/smokeping/doc/smokeping\\_master\\_slave.en.html](http://oss.oetiker.ch/smokeping/doc/smokeping_master_slave.en.html)

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

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

That is, you can  
externally monitor  
your network!

## Root Name Server System



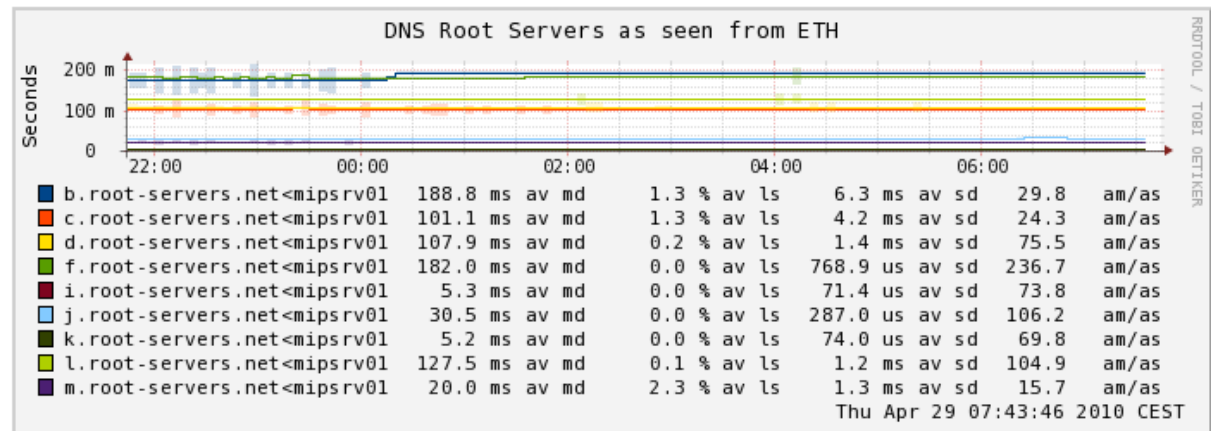
# MultiHost Graphing

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 /Local/Routers/rtr1
      /Local/Routers/rtr2
```



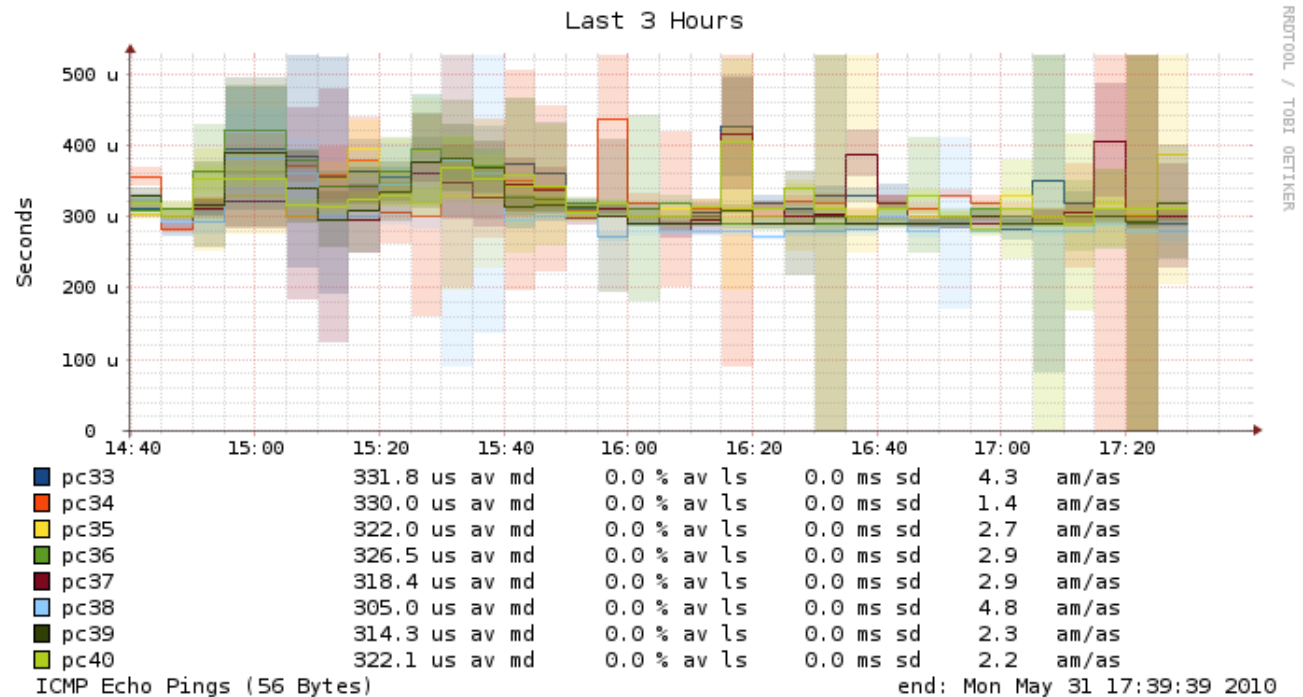
# Example Multihost Graph

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



# 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 be used 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)