

Measuring Delay with Smokeping

Campus Network Design & Operations Workshop



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UNIVERSITY OF OREGON

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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

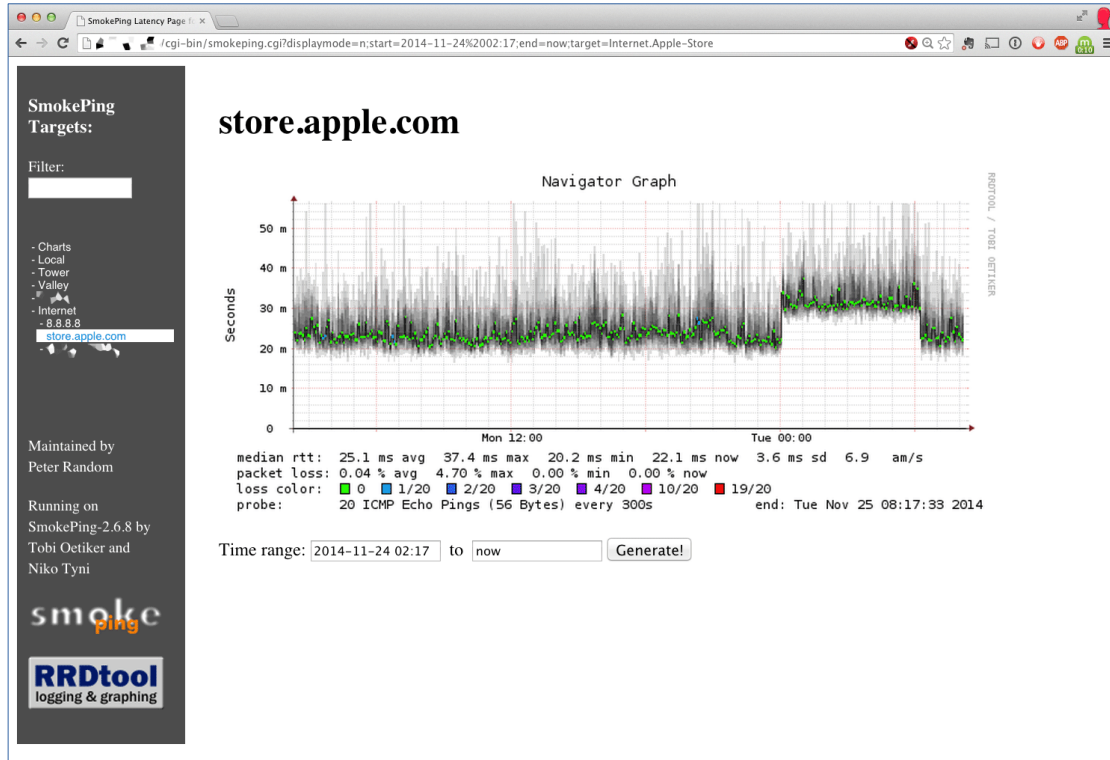


Technical Introduction

- 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



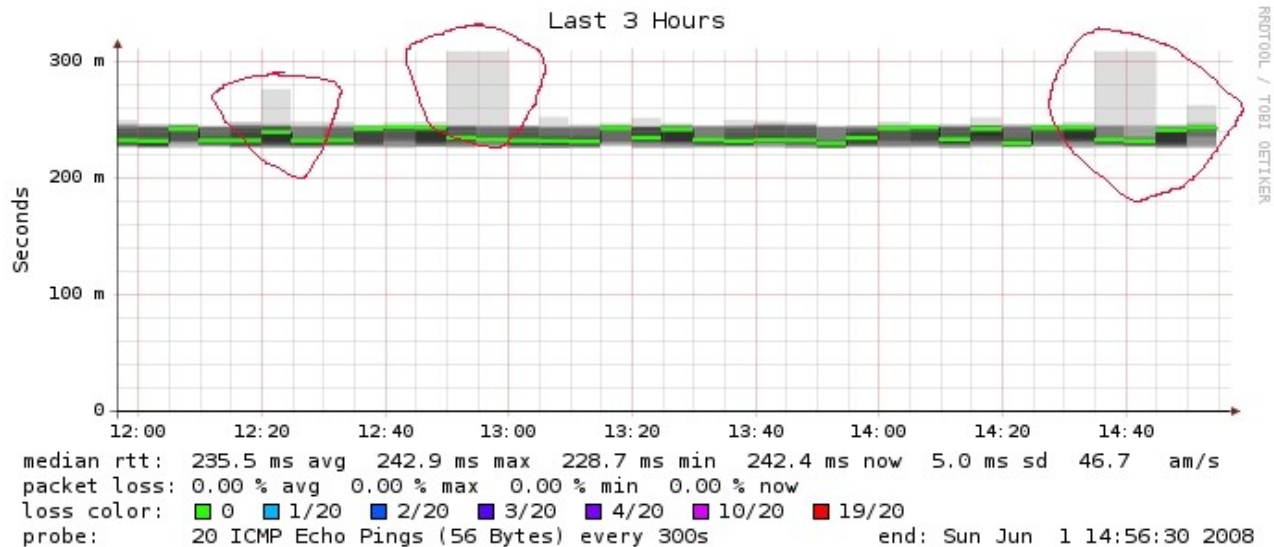
How to Read Smokeping Graphs

- 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 colour of the horizontal line across the graph.



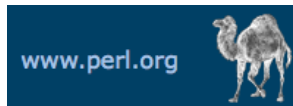
Example: African Network Operators Group

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://srv1.campusX.ws.nsrc.org/smokeping/smokeping.cgi>


SmokePing
Targets:

Filter:

- Charts
- Local

Maintained by
Joe Random

Running on
SmokePing-2.3.6 by
Tobi Oetiker and
Niko Tyni



RRDtool
logging & graphing

Network Latency Grapher

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

SmokePing
Targets:

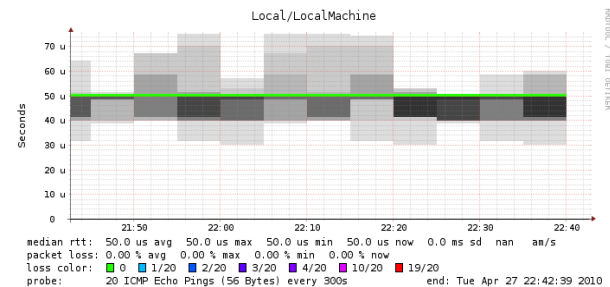
Filter:

Charts

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

The most interesting destinations

Top Standard Deviation



Configuration

- Smokeping configuration files in Ubuntu:

```
/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@srv1.campusX.ws.nsrc.org`
 - cgiurl → `http://srv1.campusX.ws.nsrc.org/smokeping/smokeping.cgi`
 - mailhost → localhost
 - syslogfacility → local5

```
*** General ***  
  
owner      = NOC  
contact    = sysadm@srv1.campusX.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://srv1.campusX.ws.nsrc.org/smokeping/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 webservers
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, ++ = 2nd level, +++ = 3rd level...)

RRD filename on disk: `UO.rrd`
Must not contain spaces!

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

Label in left-side menu

Label at top of screen

The actual hostname
(or IP address) to test



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

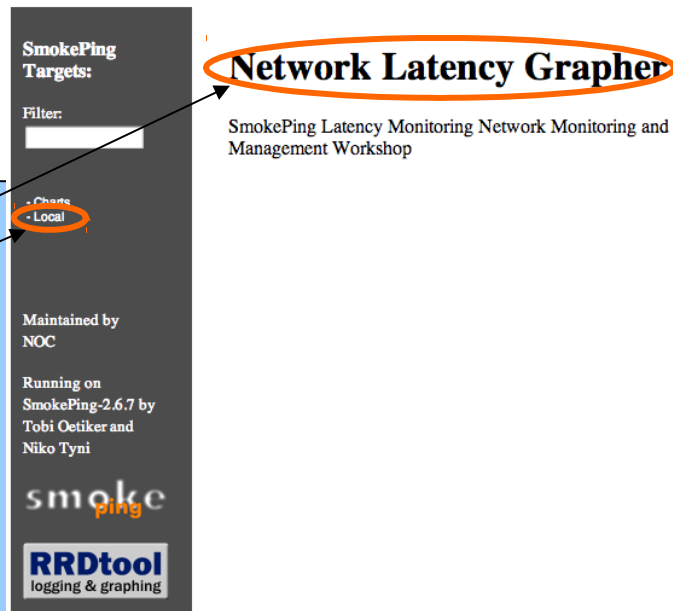
menu = Local
title = Local Network

++ 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
```



The screenshot shows the SmokePing web interface. At the top, it says "SmokePing Targets:". Below that is a "Filter:" input field. A dropdown menu is open, showing "Local" selected, which is circled in orange. To the right of the dropdown, the text "Network Latency Grapher" is circled in orange. Below the dropdown, it says "Maintained by NOC" and "Running on SmokePing-2.6.7 by Tobi Oetiker and Niko Tyni". At the bottom, there is a logo for "smoke ping" and a logo for "RRDtool logging & graphing".



Configuration: Targets Example

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

SmokePing Targets:

Filter:


- Charts

Local

- Local Machine
- Network Startup Resource Center

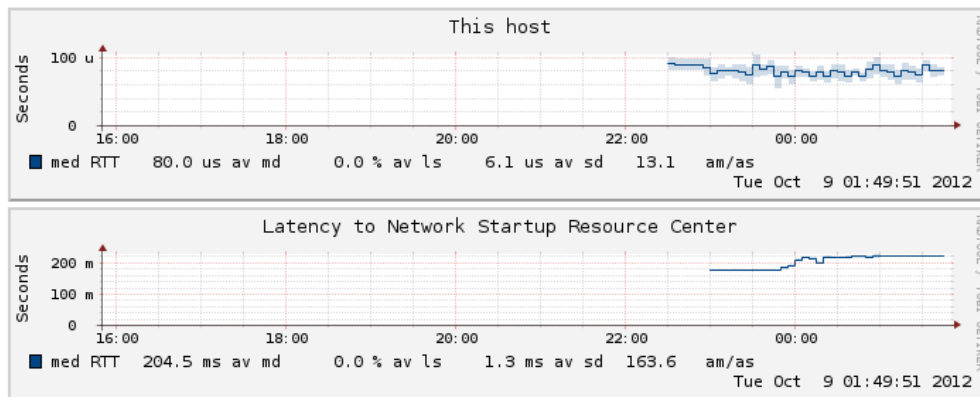
Maintained by
NOC

Running on SmokePing-2.6.7
by Tobi Oetiker and Niko Tyni



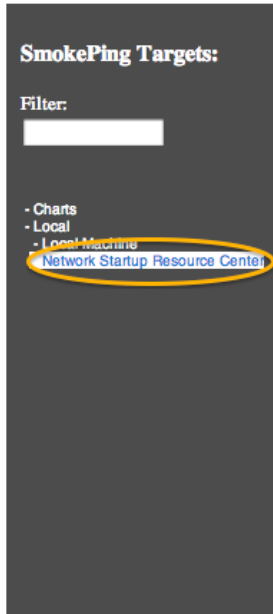
RRDtool
logging & graphing

Local Network

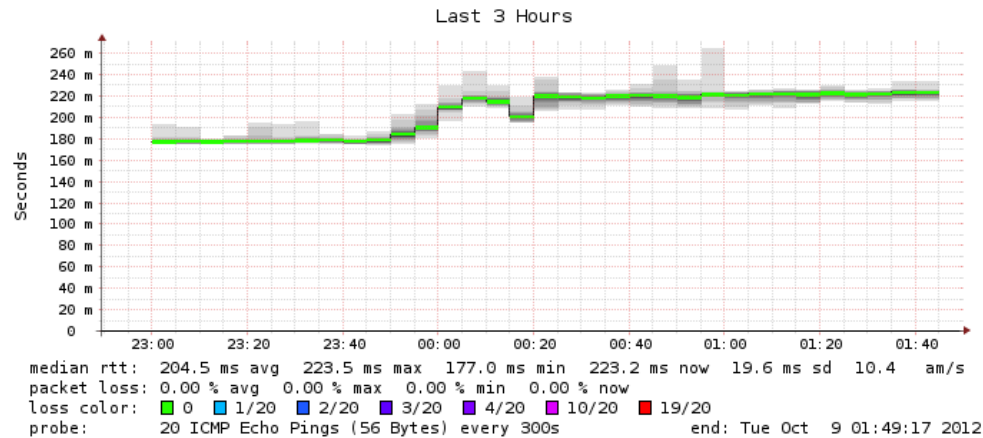


Configuration: Targets Example

Clicking “Network Startup Resource Center” in the



Latency to Network Startup Resource Center



Hierarchy in Targets File → Web UI

```
*** Targets ***

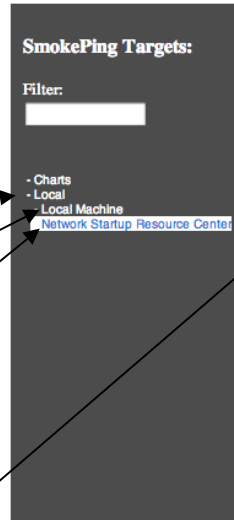
probe = FPing

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

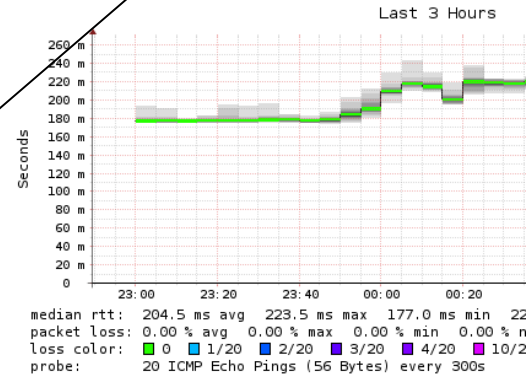
+ Local
      1st level
      menu = Local
      title = Local Network

      ++ LocalMachine
            2nd level
            menu = Local Machine
            title = This host
            host = localhost

            ++ NSRC
                  2nd level
                  menu = Network Startup Resource Center
                  title = Latency to Network Startup Re...
                  host = nsrc.org
```



Latency to Network Startup R...



+ 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 = /

+ 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
```

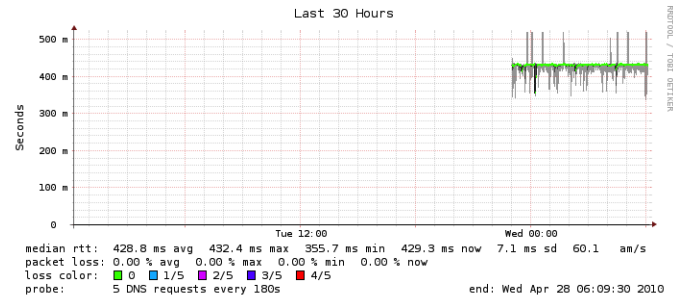
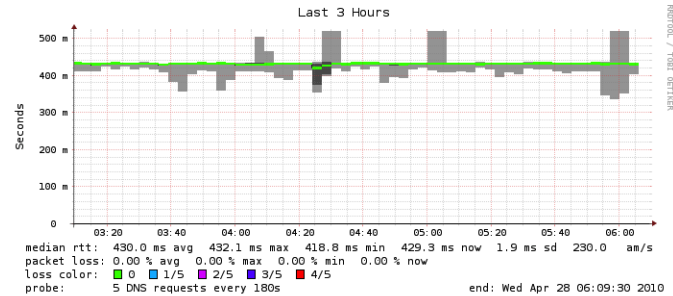
```
title = DNS Latency
```

```
+++ GoogleA
```

```
menu = 8.8.8.8
```

```
Title = DNS Latency GoogleA
```

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



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/tmail6
```



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

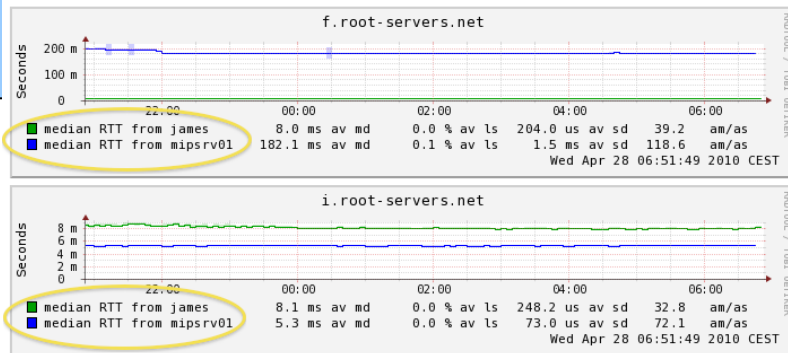
- Smokeping slave servers allow for multi-viewpoint monitoring and graphing of the same services, machines or links. Details here:
 - http://oss.oetiker.ch/smokeping/doc/smokeping_master_slave.en.html

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

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

Externally monitor
your network!

Root Name Server System

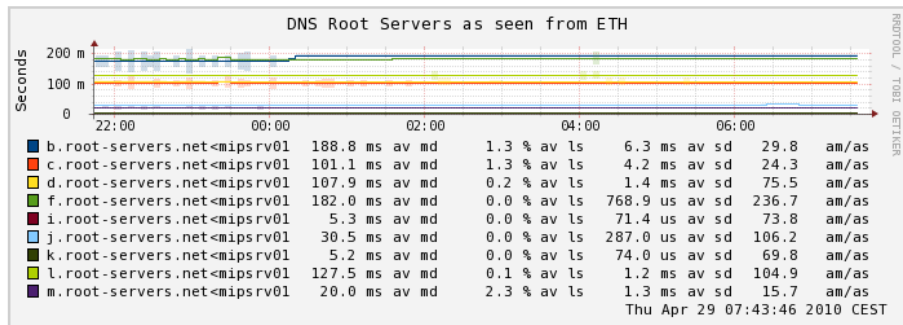


Multi-Host Graphing

- 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

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

Sample configuration



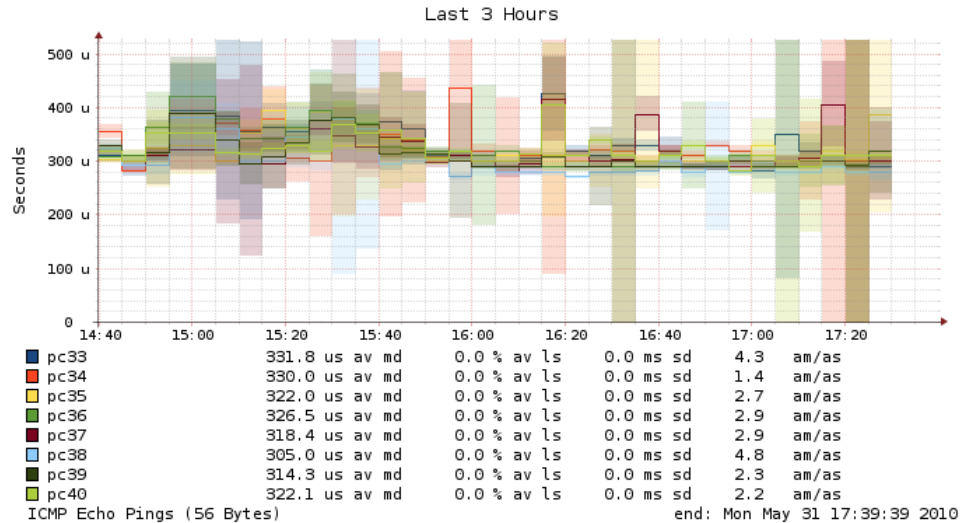
Example: Multi-Host Graph

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

Consolidated Ping Response Time



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.
- 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?



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