Network Management & Monitoring

Measuring Delay with

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
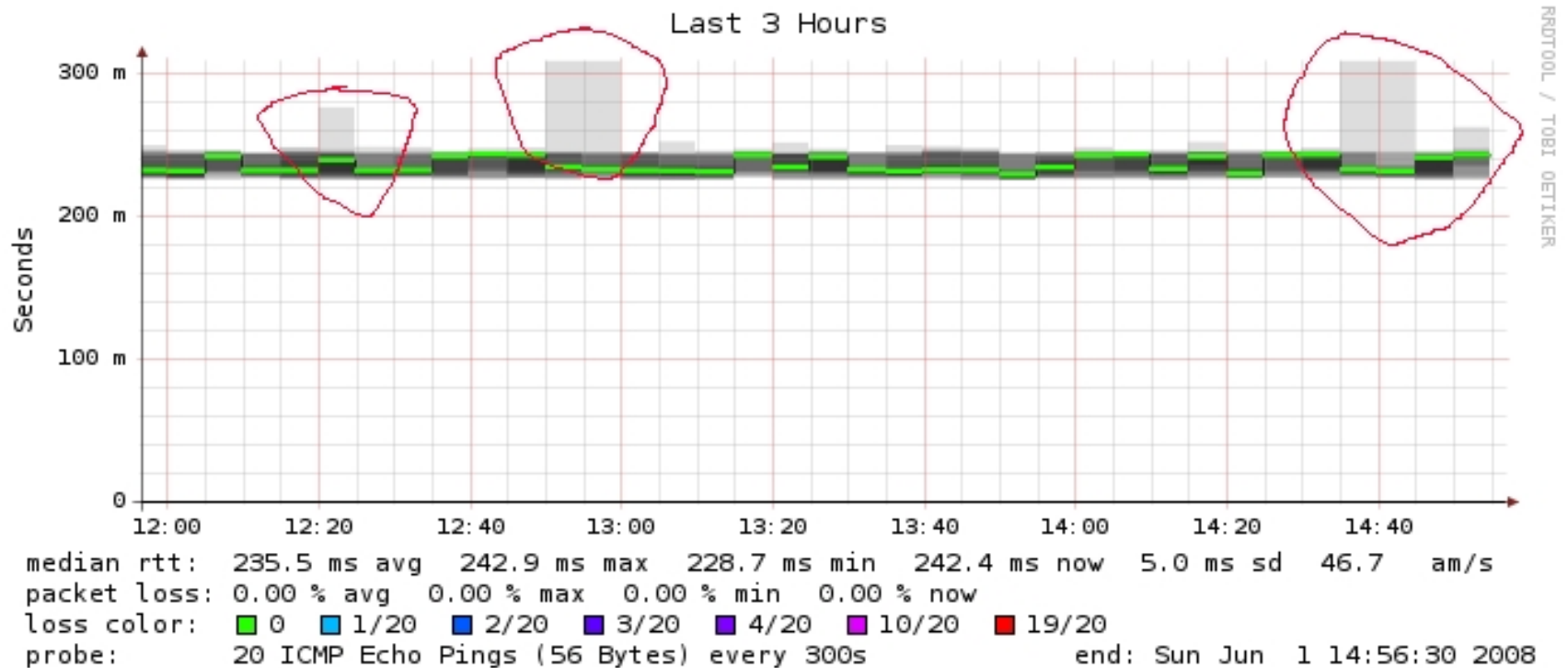
The "Smoke" and the "Pings"
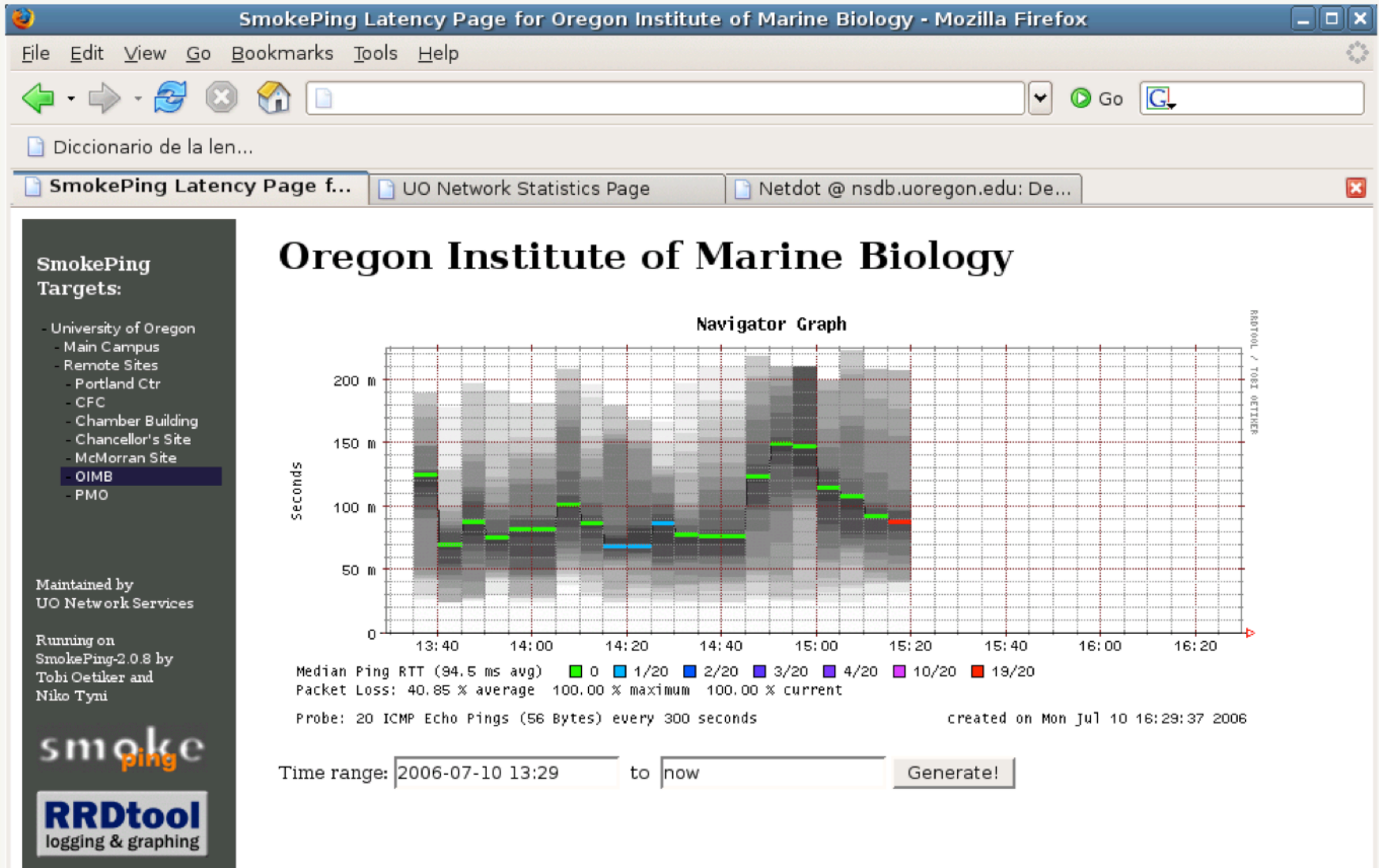
How to Read Smokeping Graphs

- 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.
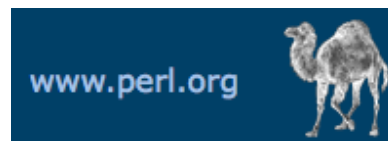
An Example

African Network Operators Group

Last 3 Hours

median rtt:	235.5 ms avg	242.9 ms max	228.7 ms min	242.4 ms now	5.0 ms sd	46.7 am/s

packet loss: 0.00 % avg   0.00 % max   0.00 % min   0.00 % now

loss color: ■ 0 ■ 1/20 ■ 2/20 ■ 3/20 ■ 4/20 ■ 10/20 ■ 19/20

probe: 20 ICMP Echo Pings (56 Bytes) every 300s   end: Sun Jun 1 14:56:30 2008

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
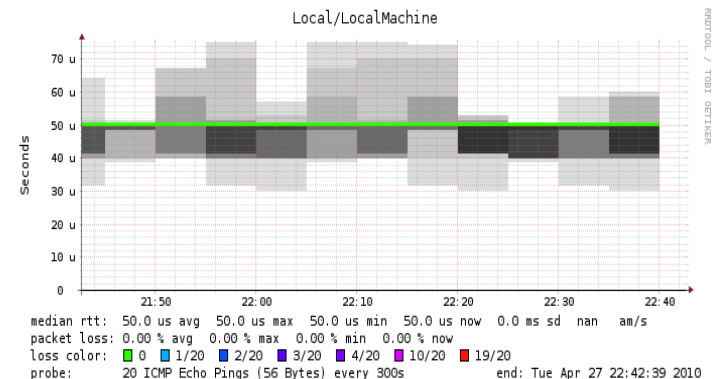
Configuration

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   ➔   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

Submenu depth (+ = top level, ++ = 2nd level, +++ = 3rd level...)

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

Label in left-side menu

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

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
```

SmokePing Targets:

Filter:

- Charts
- Local

Maintained by NOC

Running on SmokePing-2.6.7 by Tobi Oetiker and Niko Tyni

smoke ping

RRDtool logging & graphing

Network Latency Grapher

SmokePing Latency Monitoring Network Monitoring and Management Workshop

Configuration: Targets Example

Clicking on "Local" in the previous slide gives us:
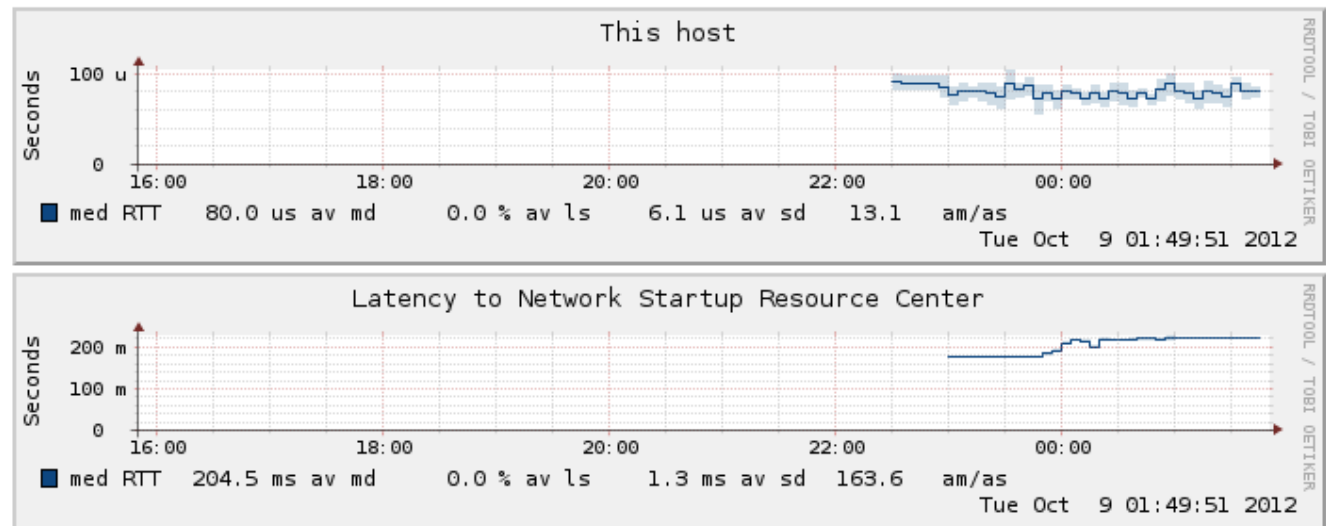
Configuration: Targets Example

Clicking "Network Startup Resource Center" in the previous slides gives us:
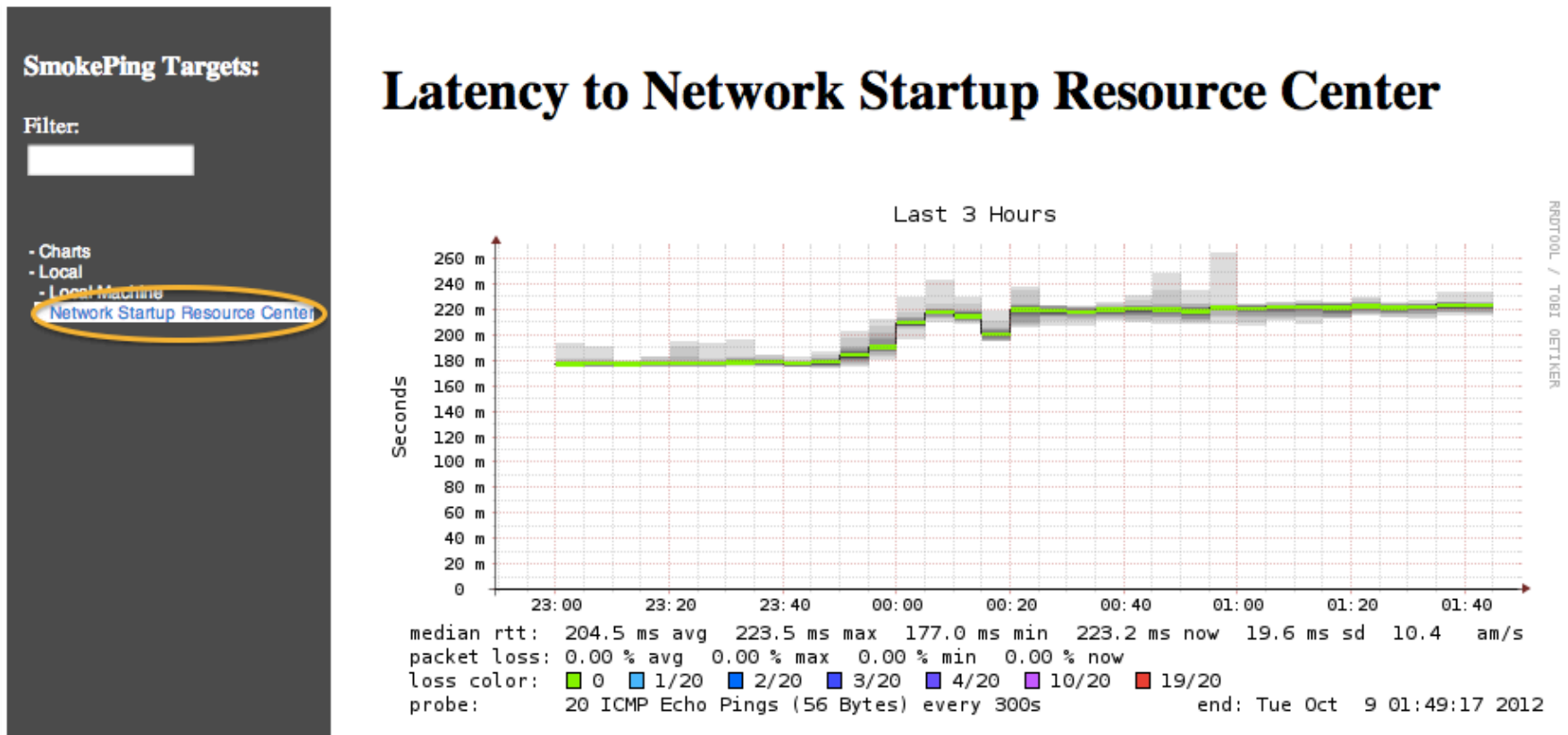
Configuration: Targets Example

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

++ LocalMachine            2nd level

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

++ NSRC

menu = Network Startup Resource Center
title = Latency to Network Startup Re...
host = nsrc.org
```
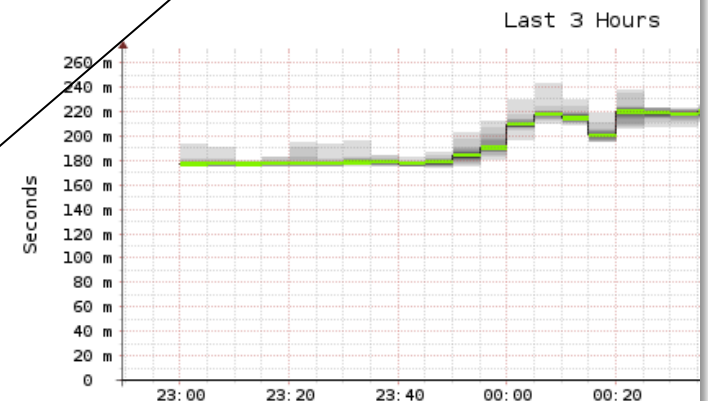
SmokePing Targets:

Filter:

- Charts
- Local
- Local Machine
Network Startup Resource Center

Latency to Network Startup R

Last 3 Hours

```
        260 m
        240 m
        220 m
        200 m
Seconds 180 m
        160 m
        140 m
        120 m
        100 m
         80 m
         60 m
         40 m
         20 m
          0
         23:00   23:20   23:40   00:00   00:20
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  ■ 10/2
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

```
*** 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**

<u>Network Latency</u>

```
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
```
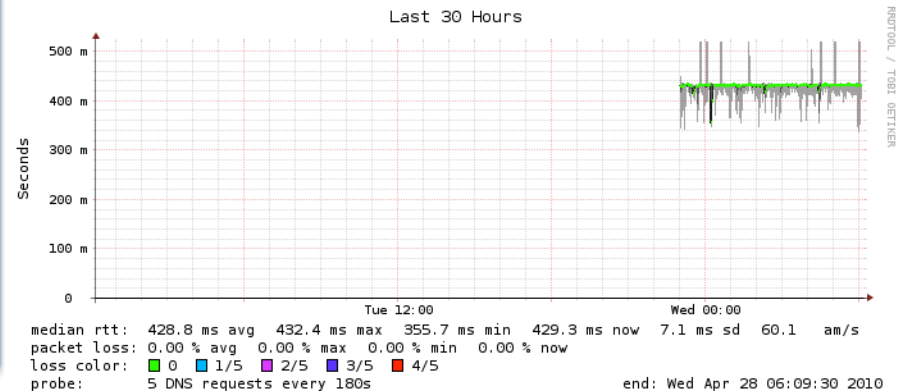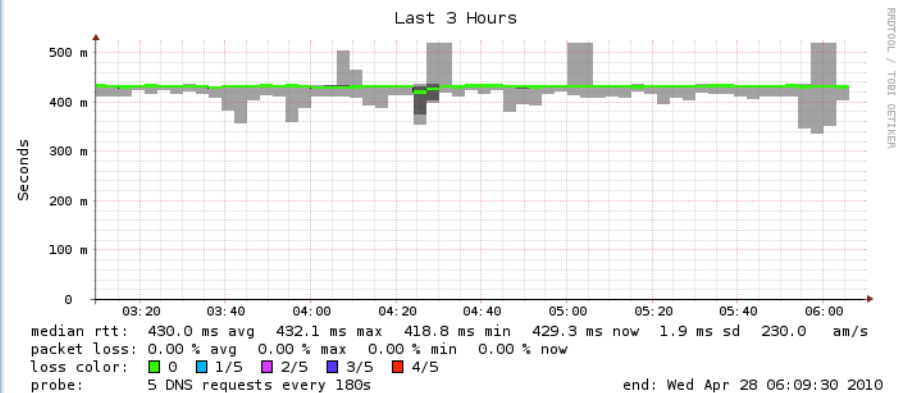
More Types of Probes

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/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

```
*** 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:
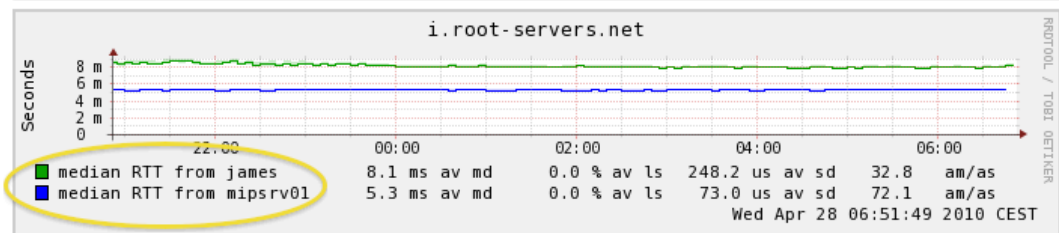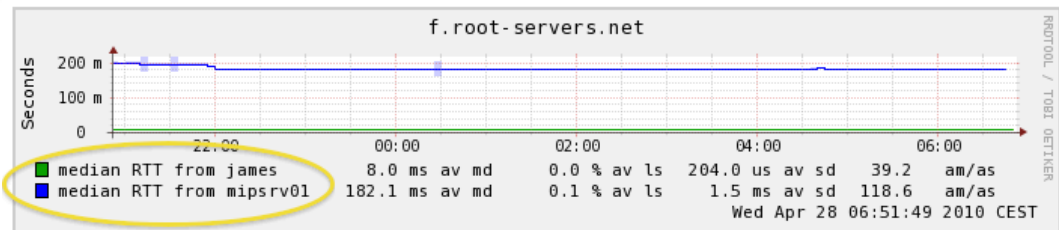
http://oss.oetiker.ch/smokeping/doc/smokeping_master_slave.en.html

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

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

That is, you can externally monitor your network!
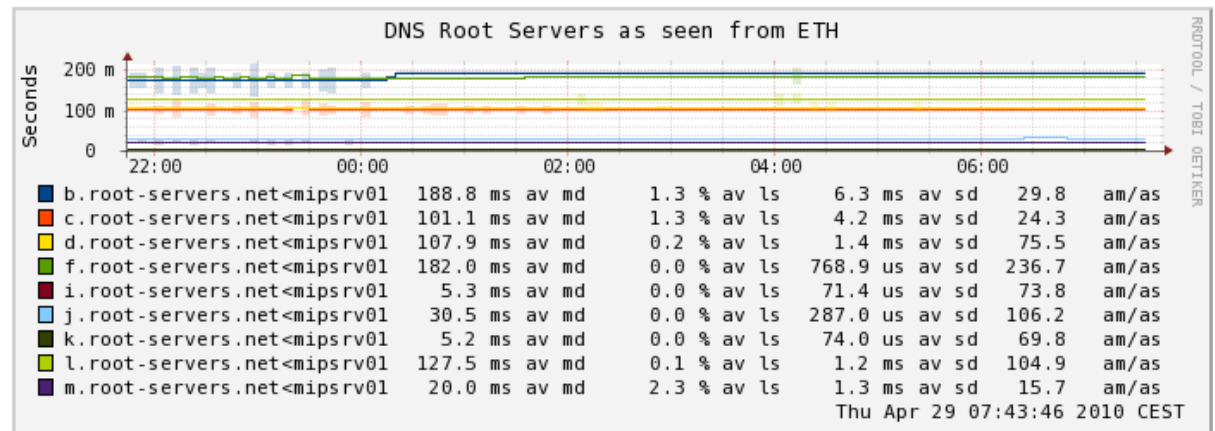

Root Name Server System

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

<u>Sample configuration</u>

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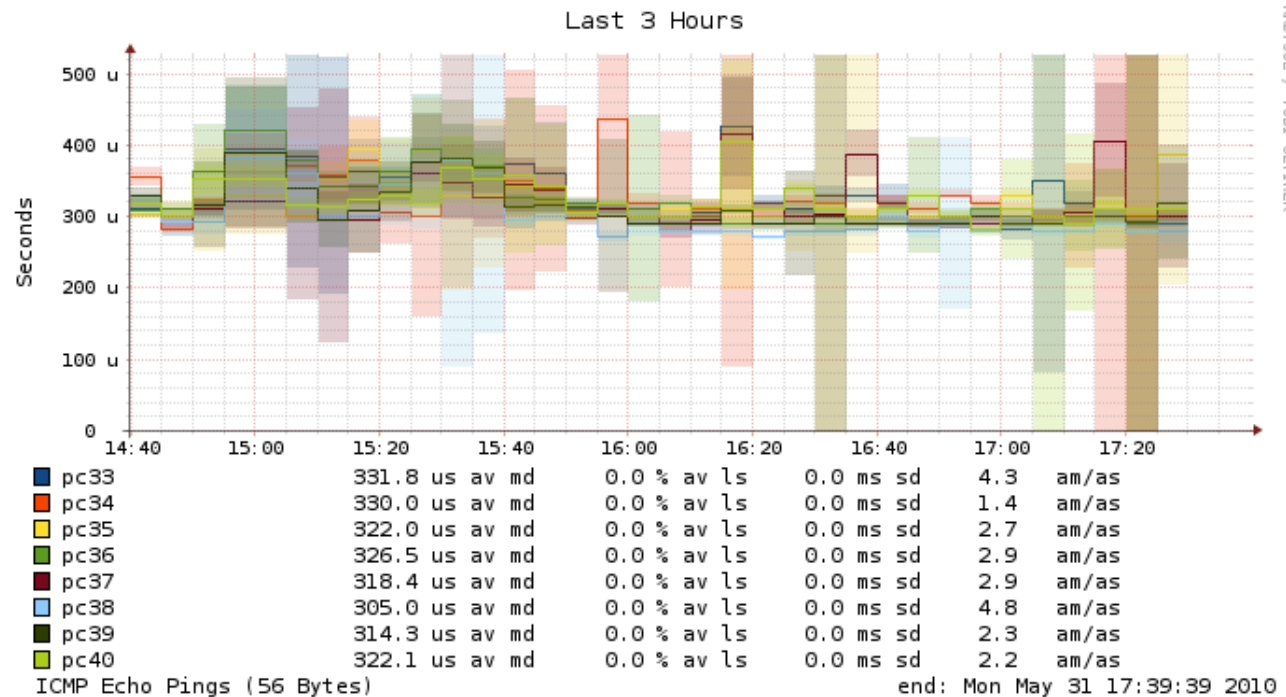
Example Multihost Graph

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