



Network Monitoring and Management

MRTG and RRDTool



MRTG: Multi Router Traffic Grapher

- MRTG is a tool to monitor the traffic load on network-links. MRTG generates HTML pages containing PNG images which provide an almost live visual representation of this traffic. You can find MRTG at <http://oss.oetiker.ch/mrtg/>.
- MRTG has been the most common network traffic measurement tool for all Service Providers.
- MRTG uses simple SNMP queries on a regular interval to generate graphs.

MRTG

- External readers for MRTG graphs can create other interpretation of data.
- MRTG software can be used not only to measure network traffic on interfaces, but also build graphs of anything that has an equivalent SNMP MIB - like CPU load, Disk availability, temperature, etc...
- Data sources can be anything that provides a counter or gauge value – not necessarily SNMP.
- For example, graphing round trip times
- MRTG can be extended to work with RRDTool

MRTG: Issues

- MRTG generates each graph (what if you have hundreds of graphs!) every 5 minutes, creating a lot of overhead.
- It also has very few customizable graphing options.
- Disk space is always an issue.
- MRTG management itself can be tedious work.

Using MRTG

- Get the required packages
- Compile and install the packages
- Make `cfg` files for router interfaces with `cfgmaker`
- Create `html` pages from the `cfg` files with `indexmaker`
- Trigger MRTG periodically from `cron` or run it in `daemon` mode

RRDTool

- Round Robin Database for time series data storage
- Command line based
- From the author of MRTG
- Made to be faster and more flexible
- Includes CGI and Graphing tools, plus APIs
- Solves the Historical Trends and Simple Interface problems as well as storage issues

Defining the Output (Archives)

RRA : AVERAGE : 0.5 : 1 : 24

RRA : AVERAGE : 0.5 : 6 : 10

RRA = Round Robin Archive

AVERAGE = consolidation function

0.5 = up to 50% of consolidated points may be UNKNOWN

- 1:24 = this RRA keeps each sample (average over one 5 minute primary sample), 24 times (which is 2 hours worth)
- 6:10 = one RRA keeps an average over every six 5 minute primary samples (30 minutes), 10 times (which is 5 hours worth)

Clear as mud!

- All depends on original step size which defaults to 5 minutes

RRDTool Database Format

Recent data stored once every 5 minutes for the past 2 hours (1:24)

Old data averaged to one entry per day for the last 365 days (288:365)

--step
300
(5 minute
input step
size)



RRA
1:24

RRA
6:10

RRA
288:365

Medium length data averaged to one entry per half hour for the last 5 hours (6:10)

So simple...

```
rrdtool create /var/nagios/rrd/host0_load.rrd -s 600
DS:1MIN-Load:GAUGE:1200:0:100 DS:5MIN-
Load:GAUGE:1200:0:100 DS:15MIN-
Load:GAUGE:1200:0:100 RRA:AVERAGE:0.5:1:50400
RRA:AVERAGE:0.5:60:43800
```

```
rrdtool create /var/nagios/rrd/host0_disk_usage.rrd -s
600 DS:root:GAUGE:1200:0:U DS:home:GAUGE:1200:0:U
DS:usr:GAUGE:1200:0:U DS:var:GAUGE:1200:0:U
RRA:AVERAGE:0.5:1:50400 RRA:AVERAGE:0.5:60:43800
```

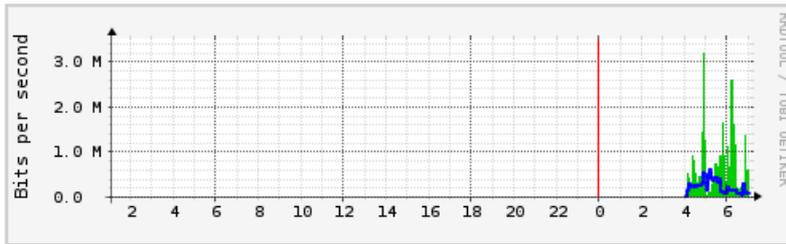
```
rrdtool create /var/nagios/rrd/apricot-INTL_Ping.rrd
-s 300 DS:ping:GAUGE:600:0:U
RRA:AVERAGE:0.5:1:50400 RRA:AVERAGE:0.5:60:43800
```

```
rrdtool create /var/nagios/rrd/host0_total.rrd -s 300
DS:IN:COUNTER:1200:0:U DS:OUT:COUNTER:600:0:U
RRA:AVERAGE:0.5:1:50400 RRA:AVERAGE:0.5:60:43800
```

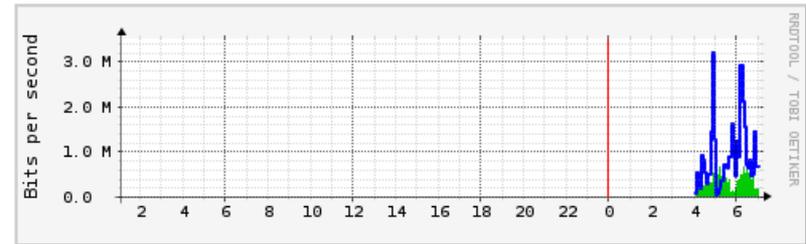
What it looks like...

<http://noc.ws.nsrc.org/mrtg/device.html>

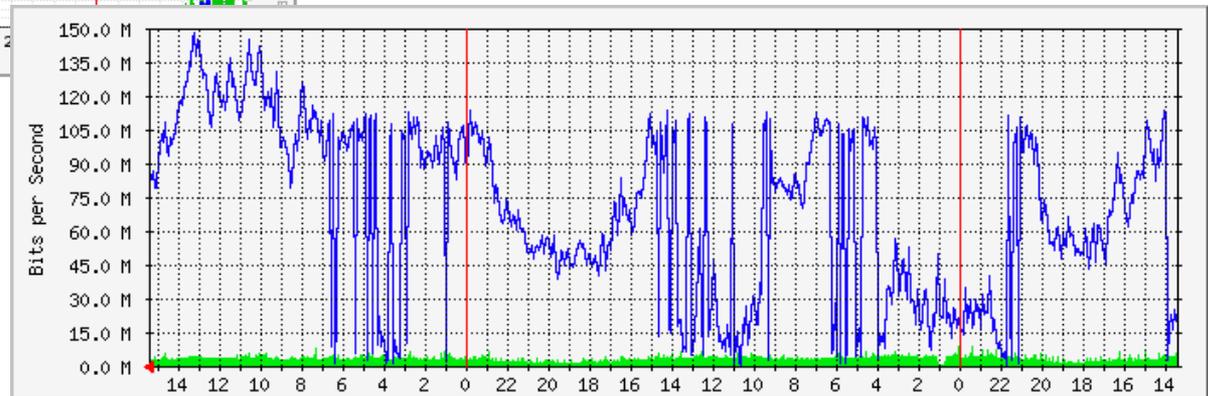
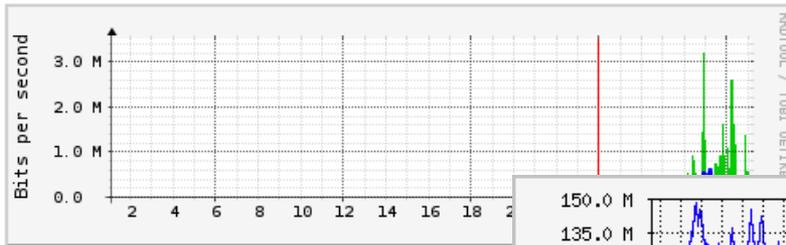
[Traffic Analysis for Fa0/0 -- rtr.ws.nsrc.org.nsrc.org](#)



[Traffic Analysis for Fa0/1 -- rtr.ws.nsrc.org.nsrc.org](#)



[Traffic Analysis for Fa0/0.173 -- rtr.ws.nsrc.org.nsrc.org](#)



MRTG

In Ubuntu / Debian

```
$ sudo apt-get install mrtg
```

Configuration

- /etc/mrtg/<device.mrtg>
- Global directory : /var/www/mrtg/
- Run MRTG against the configuration file from cron

cfgmaker

Uses snmpwalk and creates an mrtg configuration file

```
/usr/bin/cfgmaker \
  --output=/etc/mrtg/router.mrtg \
  --global 'workdir: /var/www/mrtg' \
  --global 'options[_]: growright,bits' \
  NetManage@10.10.0.254
```

Sample

Part of /etc/mrtg/device.mrtg

```
### Interface 1 >> Descr: 'FastEthernet0/0' | Name: 'Fa0/0' | Ip: '' | Eth: '' ###  
  
Target[10.10.0.254_Fa0_0]: #Fa0/0:NetManage@10.10.0.254:  
SetEnv[10.10.0.254_Fa0_0]: MRTG_INT_IP="" MRTG_INT_DESCR="FastEthernet0/0"  
MaxBytes[10.10.0.254_Fa0_0]: 12500000  
Title[10.10.0.254_Fa0_0]: Traffic Analysis for Fa0/0 -- rtr.ws.nsrc.org.nsrc.org  
PageTop[10.10.0.254_Fa0_0]: <h1>Traffic Analysis for Fa0/0 -- rtr.ws.nsrc.org.nsrc.org</h1>
```

Creating HTML with indexmaker

Execute `indexmaker` like this:

```
/usr/bin/indexmaker \
--output=/var/www/mrtg/device.html \
/etc/mrtg/device.mrtg
```

If your mrtg configuration file is well commented, the html is nice and detailed.

Lab Instructions

In a separate file