AlliedWare™ OS

How To | Configure the Switch and MRTG to Graph Traffic Rates for each VLAN via SNMP

Introduction

This document describes an example of how to monitor the throughput for each VLAN on the switch, on a per port basis. To do this, we use QoS to split the traffic from each VLAN into separate QoS traffic classes, and then we configure MRTG (Multi Router Traffic Grapher) to query the QoS traffic class counters MIB via SNMP. MRTG can then use the results obtained to create graphical representations of the traffic throughput over different periods of time.

This document assumes that you are already familiar with MRTG. For more information and to download it, see oss.oetiker.ch/mrtg/.

What information will you find in this document?

This How To Note includes the following information:

- "Switch configuration" on page 2
- "MRTG configuration" on page 4
- "Example of the graphical results" on page 7
- "Complete MRTG configuration script" on page 8

Which products and software version does it apply to?

This configuration applies to the following Allied Telesis switches running the AlliedWare OS:

- x900 series
- AT-9900 series
- AT-9900s series
- AT-8948

It applies to all AlliedWare software versions that support those switches.

Related How To Notes

You also may find the following How To Notes useful:

- *How To Configure QoS on AT-9900, x900-48, and x900-24 Series Switches*
- *How To Configure QoS To Conform To Standard Marking Schemes*
- *Overview of the Quality of Service (QoS) features on the AT-8948 switch*

How To Notes are available from www.alliedtelesis.com/resources/literature/howto.aspx.

The following White Paper explains the concepts behind QoS:

- *Advanced QoS White Paper*

White Papers are available from
www.alliedtelesis.com/resources/literature/literature.aspx?id=3.

Switch configuration

This section gives an example of how to configure the switch to count the traffic for three VLANs on port 24.

1. Enable QoS counter enhanced mode

In order for the QoS MIB to increment the traffic class counters, the QoS counter enhanced mode must first be enabled on the switch, by using the command:

```
set switch enhancedmode=qoscounters
```

Note that enabling this option reduces the number of traffic classes available to QoS.

2. Reboot the switch

To activate the enhanced mode, reboot the switch by using the command:

```
restart switch
```

3. Configure the VLANs

Create the extra VLANs and add ports to them, by using the commands:

```
create vlan="v2" vid=2
create vlan="v3" vid=3
add vlan="2" port=24 frame=tagged
add vlan="3" port=24 frame=tagged
```

4. Create classifiers to match on VLAN ID

Use the commands:

```
create classifier=1 vlan=1
create classifier=2 vlan=2
create classifier=3 vlan=3
```

5. Configure IP

Use the commands:

```
enable ip
add ip int=vlan1 ip=172.28.45.23
add ip rou=0.0.0.0 mask=0.0.0.0 int=vlan1 next=172.28.0.1
```

6. Configure SNMP

Use the commands:

```
enable snmp
create snmp community=public open=on
```

7. Configure the QoS hierarchy to map each VLAN to a traffic class

Use the commands:

```
create qos policy=1
create qos trafficclass=1-3
create qos flowgroup=1-3
add qos policy=1 trafficclass=1-3
set qos po=24 policy=1
add qos trafficclass=1 flowgroup=1
add qos trafficclass=2 flowgroup=2
add qos trafficclass=3 flowgroup=3
add qos flowgroup=1 classifier=1
add qos flowgroup=2 classifier=2
add qos flowgroup=3 classifier=3
```

MRTG configuration

Using cfgmaker as a starting point

The simplest way to create the MRTG configuration is to use MRTG's "cfgmaker" to create the base template configuration and then edit the configuration file manually to use the SNMP OID. It is not possible to use cfgmaker to automatically create the complete config file.

MRTG's cfgmaker creates a config script by contacting the router via SNMP and reading particular MIB objects, such as system description, number of interfaces, etc. The cfgmaker PC must be able to contact the router via its IP address, SNMP must be correctly configured on the router, and you must specify the correct community name in the cfgmaker command on the PC.

We used the following cfgmaker command:

```
cfgmaker public@172.28.45.23 --ifref=descr --global "WorkDir: C:www\mrtg"
   --output mrtg.cfg
```

The resulting config file contains an entry for each interface. Each entry starts with several commented-out lines like the following:

```
### Interface 50 >> Descr: 'port50' | Name: 'port50' | Ip: '' | Eth: '' ###
### The following interface is commented out because:
### * it is operationally DOWN
### * has a speed of 0 which makes no sense
```

For this How To Note, we made the minimum number of changes to get this solution to work, and left the rest of the config file as it was automatically generated. Therefore, we left the above commented-out lines in place.

An excerpt from our config file

After using cfgmaker to get a template configuration, we modified the template suitably, as little as possible. This section contains an excerpt from our modified config file, showing which variables to set to make MRTG obtain the QoS counter information via SNMP. Any line preceded by "#" is a comment and will be ignored by MRTG.

The excerpt has an entry for a single VLAN and port—add more as required. The complete MRTG configuration file for this example is found at the end of this document.

More information about the syntax is given after the excerpt, especially about the syntax for the Target and MaxBytes parameters, which we have colour-coded in the excerpt.

```
### Interface 1 >> Descr: 'port1' | Name: 'port1' | Ip: '' | Eth: '' ###
### The following interface is commented out because:
### * it is operationally DOWN
### * has a speed of 0 which makes no sense
#
Target[172.28.45.23_1]:
1.3.6.1.4.1.207.8.4.4.4.99.1.4.2.1.4.24.2.2&1.3.6.1.4.1.207.8.4.4.4.99.1
.4.2.1.4.24.2.2:public@172.28.45.23:
SetEnv[172.28.45.23_1]: MRTG_INT_IP="" MRTG_INT_DESCR="port1"
MaxBytes[172.28.45.23_1]: 1250000
Title[172.28.45.23_1]: Traffic Analysis for 1 -- QoS SNMP
PageTop[172.28.45.23_1]: <h1>Traffic Analysis for Vlan 1 -- QoS SNMP</h1>
               <div id="sysdetails">
                       <table>
                               <tr>
                                       <td>System:</td>
                                       <td>QoS SNMP in </td>
                               </tr>
                               <tr>
                                       <td>Maintainer:</td>
                                       <td></td>
                               </tr>
                               <tr>
                                       <td>Description:</td>
                                       <td>port24  </td>
                               </tr>
                               <tr>
                                       <td>ifType:</td>
                                       <td>VLAN </td>
                               </tr>
                               <tr>
                                       <td>ifName:</td>
                                       <td>Vlan1</td>
                               </tr>
                               <tr>
                                       <td>Max Speed:</td>
                                       <td>1250000.0 Bytes/s</td>
                               </tr>
                       </table>
               </div>
```

Explanation of parameters

There are five parameters in the above excerpt: Target, SetEnv, MaxBytes, Title, and PageTop.

In this file entry, the Title and PageTop parameters set the graphical display descriptions and layout. The SetEnv parameter lets you pass data to a threshold script. We left the SetEnv parameter unchanged from the default.

The Target and MaxByte parameters are most important. The syntax for these is complex, and is described below. The values of these parameters must use the format we show, or the configuration file will not work correctly.

MaxBytes parameter

The syntax is:

```
MaxBytes[switchIPAddress_configurationFileEntry]: MaxPortSpeedInBytes
```

Target parameter

The syntax is:

```
Target[switchIPAddress_configurationFileEntry]:
   counterOID&counterOID:SNMPCommunity@switchIPAddress:
```

You can use the colour coding to compare this with the example in the configuration file excerpt. Note that the "`configurationFileEntry]:`" part is followed by a space, not a line break.

The syntax includes the `counterOID` twice. The two entries are for the counters for received and transmitted traffic, because typically people use MRTG to graph traffic in both directions. However, the QoS traffic class counter that we are graphing here is a receive counter only, so we only have one OID to use. In order for MRTG to operate we are required to enter this OID twice, as both the receive and the transmit counter. The resulting graphs do appear to show both "in" and "out" traffic (see page 7), but it is important to remember that both values are actually showing "in" traffic.

The OID value for the QoS MIB traffic class counters is:
1.3.6.1.4.1.207.8.4.4.4.99.1.4.2.1.4.*x.y.z*

where *x* is the switch port, *y* is the QoS policy and *z* is the QoS traffic class. However, the first QoS policy and traffic class on the switch are numbered 0, but in SNMP you cannot use index 0 because it is reserved for SNMP traps. Therefore to work out the OID from the QoS policy or traffic class number, add 1 to the given policy or traffic class number (and to work out the policy or traffic class number from the OID, subtract 1).

For example, for traffic class 1 applied to policy 1 applied to port 24, the OID is:
1.3.6.1.4.1.207.8.4.4.4.99.1.4.2.1.4.**24.2.2**

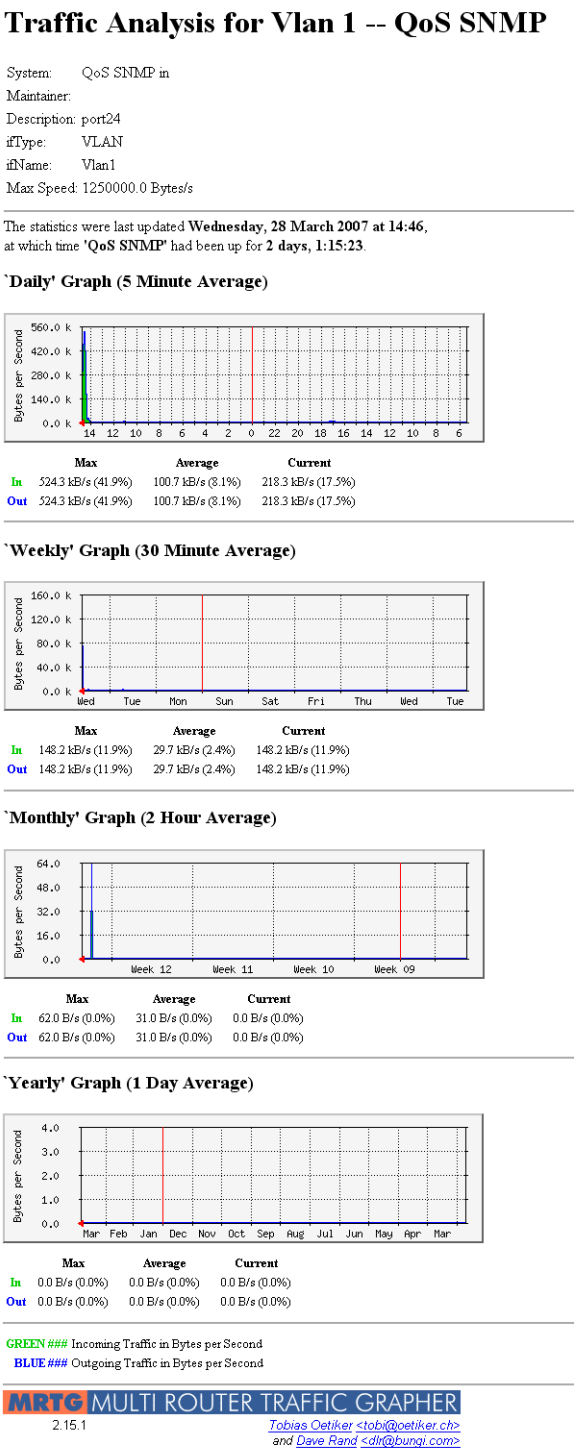
24= Port 24 **2**= Policy 1 **2**= Traffic class 1

The full path of the QoS traffic class counter OID in words is:

```
iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).alliedTelesis(207
   ).mibObject(8).brouterMib(4).atRouter(4).modules(4).qos(99).qosSwitch(1).
   qosSwitch8948(4).qosSwitch8948TrafficClassCountersTable(2).qosSwitch8948T
   rafficClassCountersEntry(1).qosSwitch8948TCCountersAggregateBytes(4)
```

Example of the graphical results

Below is a sample of the graphical output created by MRTG for the above configuration example. MRTG actually produces output as HMTL pages with embedded PNG image files, but the HTML pages look very similar to what is shown below.



Traffic Analysis for Vlan 1 -- QoS SNMP

System: QoS SNMP in
Maintainer:
Description: port24
ifType: VLAN
ifName: Vlan1
Max Speed: 1250000.0 Bytes/s

The statistics were last updated **Wednesday, 28 March 2007 at 14:46**, at which time **'QoS SNMP'** had been up for **2 days, 1:15:23**.

`Daily' Graph (5 Minute Average)

	Max	Average	Current
In	524.3 kB/s (41.9%)	100.7 kB/s (8.1%)	218.3 kB/s (17.5%)
Out	524.3 kB/s (41.9%)	100.7 kB/s (8.1%)	218.3 kB/s (17.5%)

`Weekly' Graph (30 Minute Average)

	Max	Average	Current
In	148.2 kB/s (11.9%)	29.7 kB/s (2.4%)	148.2 kB/s (11.9%)
Out	148.2 kB/s (11.9%)	29.7 kB/s (2.4%)	148.2 kB/s (11.9%)

`Monthly' Graph (2 Hour Average)

	Max	Average	Current
In	62.0 B/s (0.0%)	31.0 B/s (0.0%)	0.0 B/s (0.0%)
Out	62.0 B/s (0.0%)	31.0 B/s (0.0%)	0.0 B/s (0.0%)

`Yearly' Graph (1 Day Average)

	Max	Average	Current
In	0.0 B/s (0.0%)	0.0 B/s (0.0%)	0.0 B/s (0.0%)
Out	0.0 B/s (0.0%)	0.0 B/s (0.0%)	0.0 B/s (0.0%)

GREEN ### Incoming Traffic in Bytes per Second
BLUE ### Outgoing Traffic in Bytes per Second

MRTG MULTI ROUTER TRAFFIC GRAPHER
2.15.1
Tobias Oetiker <tobi@oetiker.ch>
and Dave Rand <dlr@bungi.com>

Note that the graphs appear to show both “in” and “out” traffic, but both values are actually showing “in” traffic (see "Explanation of parameters" on page 6).

Complete MRTG configuration script

For this How To Note, we made the minimum number of changes to get this solution to work, and left the rest of the config file as it was automatically generated. Therefore, we left the automatically-generated comment lines in place.

```
# Created by
# cfgmaker public@172.28.45.23 --ifref=descr --global "WorkDir: C:www\mrtg"
   --output mrtg.cfg


### Global Config Options

#  for UNIX
# WorkDir: /home/http/mrtg

#  or for NT
# WorkDir: c:\mrtgdata

### Global Defaults

#  to get bits instead of bytes and graphs growing to the right
# Options[_]: growright, bits
WorkDir: C:\Inetpub\wwwroot\MRTG
EnableIPv6: no

######################################################################
# System: QoS SNMP
# Description: Allied Telesis x900-48FE AT-8948i version 2.9.2-00 30-Jan-2005
# Contact:
# Location:
######################################################################


### Interface 1 >> Descr: 'port1' | Name: 'port1' | Ip: '' | Eth: '' ###
### The following interface is commented out because:
### * it is operationally DOWN
### * has a speed of 0 which makes no sense
#
Target[172.28.45.23_1]:
   1.3.6.1.4.1.207.8.4.4.4.99.1.4.2.1.4.24.2.2&1.3.6.1.4.1.207.8.4.4.4.99.1.
   4.2.1.4.24.2.2:public@172.28.45.23:
SetEnv[172.28.45.23_1]: MRTG_INT_IP="" MRTG_INT_DESCR="port1"
MaxBytes[172.28.45.23_1]: 1250000
Title[172.28.45.23_1]: Traffic Analysis for 1 -- QoS SNMP
PageTop[172.28.45.23_1]: <h1>Traffic Analysis for Vlan 1 -- QoS SNMP</h1>
               <div id="sysdetails">
                       <table>
                               <tr>
                                       <td>System:</td>
                                       <td>QoS SNMP in </td>
                               </tr>
                               <tr>
                                       <td>Maintainer:</td>
                                       <td></td>
                               </tr>
                               <tr>
                                       <td>Description:</td>
                                       <td>port24  </td>
                               </tr>
                               <tr>
                                       <td>ifType:</td>
                                       <td>VLAN </td>
                               </tr>
```

```
                                <tr>
                                        <td>ifName:</td>
                                        <td>Vlan1</td>
                                </tr>
                                <tr>
                                        <td>Max Speed:</td>
                                        <td>1250000.0 Bytes/s</td>
                                </tr>
                        </table>
                </div>


### Interface 2 >> Descr: 'port2' | Name: 'port2' | Ip: '' | Eth: '' ###
### The following interface is commented out because:
### * it is operationally DOWN
### * has a speed of 0 which makes no sense
#
Target[172.28.45.23_2]:
   1.3.6.1.4.1.207.8.4.4.4.99.1.4.2.1.4.24.2.3&1.3.6.1.4.1.207.8.4.4.4.99.1.
   4.2.1.4.24.2.3:public@172.28.45.23:
SetEnv[172.28.45.23_2]: MRTG_INT_IP="" MRTG_INT_DESCR="port2"
MaxBytes[172.28.45.23_2]: 1250000
Title[172.28.45.23_2]: Traffic Analysis for 2 -- QoS SNMP
PageTop[172.28.45.23_2]: <h1>Traffic Analysis for Vlan 2 -- QoS SNMP</h1>
                <div id="sysdetails">
                        <table>
                                <tr>
                                        <td>System:</td>
                                        <td>QoS SNMP in </td>
                                </tr>
                                <tr>
                                        <td>Maintainer:</td>
                                        <td></td>
                                </tr>
                                <tr>
                                        <td>Description:</td>
                                        <td>port24  </td>
                                </tr>
                                <tr>
                                        <td>ifType:</td>
                                        <td>VLAN </td>
                                </tr>
                                <tr>
                                        <td>ifName:</td>
                                        <td>Vlan2</td>
                                </tr>
                                <tr>
                                        <td>Max Speed:</td>
                                        <td>1250000.0 Bytes/s</td>
                                </tr>
                        </table>
                </div>


### Interface 3 >> Descr: 'port3' | Name: 'port3' | Ip: '' | Eth: '' ###
### The following interface is commented out because:
### * it is operationally DOWN
### * has a speed of 0 which makes no sense
#
Target[172.28.45.23_3]:
   1.3.6.1.4.1.207.8.4.4.4.99.1.4.2.1.4.24.2.4&1.3.6.1.4.1.207.8.4.4.4.99.1.
   4.2.1.4.24.2.4:public@172.28.45.23:
SetEnv[172.28.45.23_3]: MRTG_INT_IP="" MRTG_INT_DESCR="port3"
MaxBytes[172.28.45.23_3]: 1250000
Title[172.28.45.23_3]: Traffic Analysis for 3 -- QoS SNMP
```

```
PageTop[172.28.45.23_3]: <h1>Traffic Analysis for Vlan 3 -- QoS SNMP</h1>
                <div id="sysdetails">
                        <table>
                                <tr>
                                        <td>System:</td>
                                        <td>QoS SNMP in </td>
                                </tr>
                                <tr>
                                        <td>Maintainer:</td>
                                        <td></td>
                                </tr>
                                <tr>
                                        <td>Description:</td>
                                        <td>port24  </td>
                                </tr>
                                <tr>
                                        <td>ifType:</td>
                                        <td>VLAN </td>
                                </tr>
                                <tr>
                                        <td>ifName:</td>
                                        <td>Vlan3</td>
                                </tr>
                                <tr>
                                        <td>Max Speed:</td>
                                        <td>1250000.0 Bytes/s</td>
                                </tr>
                        </table>
                </div>
```

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