VIRTUAL ACCESS
Service Provider Solutions

Service Managed Gateway™

How to Use the Performance Monitor

Issue 1.2

Date 14 August 2007

1.0 Introduction

Performance Monitor is a feature of the Service Managed Gateway that gives the user the ability to monitor, process and record any SNMP variable supported by the router.

1.1 What does a performance monitor do?

The system is configured to sample values of SNMP variables, which are the monitored objects. There are two types of object: a counter, which increases continually, or a gauge, whose value fluctuates with time.

The object is sampled at intervals specified by the sample period. Then, if the object being monitored is a simple counter such as frames received (ifInOctets), it is converted to a rate by setting the rate conversion to delta. If the object being monitored is a gauge such as CPU utilization (vaSysCpuUtil), then rate conversion should be set to absolute. This means that the value is not converted.

Next the averaging algorithm and the peak processor process the object values. These run every sample interval and generate values according to the chosen averaging algorithm. The results of this processing are then written to non-volatile memory, but only at intervals specified by the configuration parameters. Typically, the sample period is much shorter than the period that records are written.

The performance monitors you set up will record the values in non-volatile memory. The Performance Monitor java applet then displays the data in graphical form. The recorded data can also be transferred in text format to other systems or retrieved for further processing using SNMP.

Figure 1 shows a schematic of the performance monitor system.

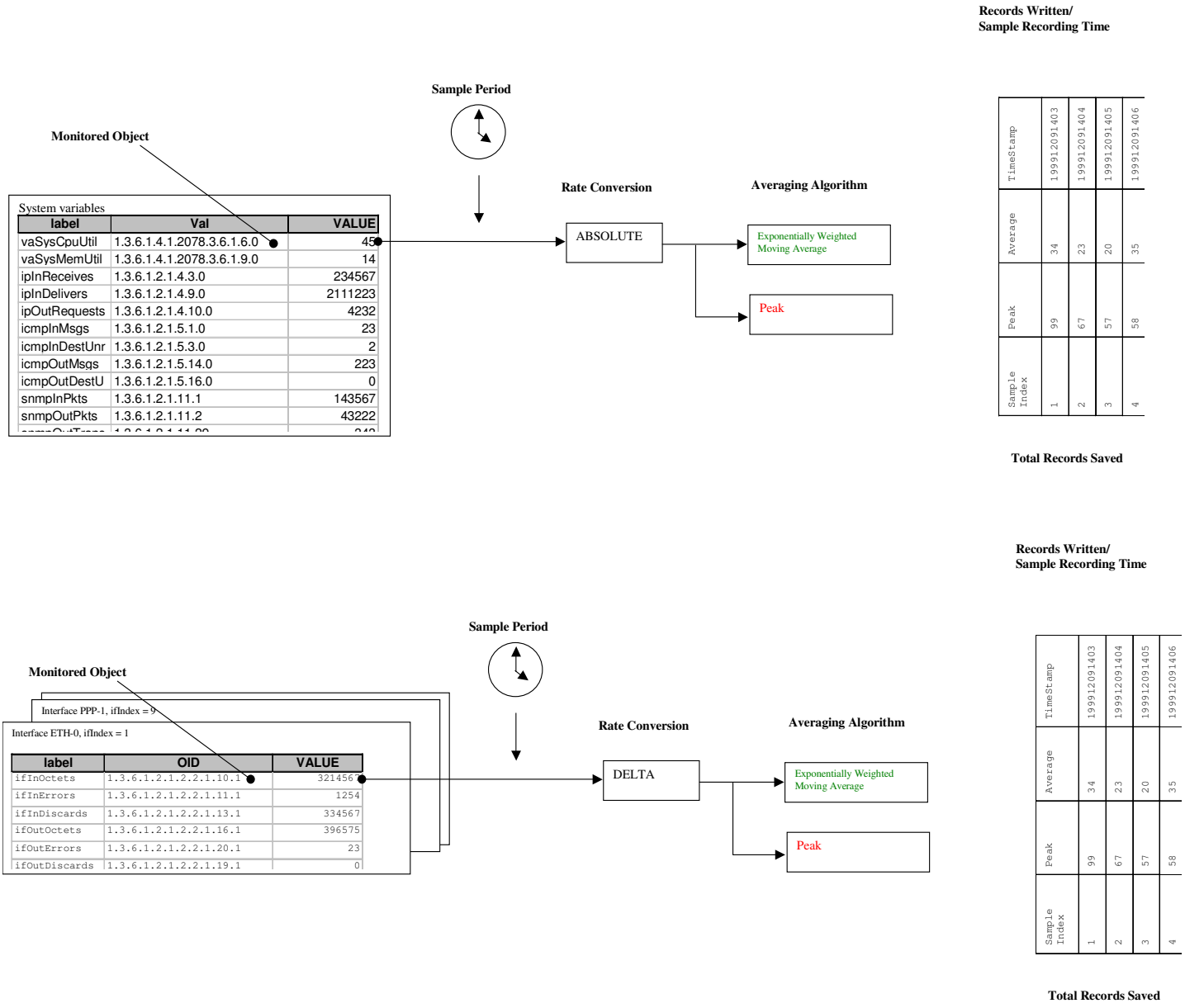

Figure 1. Performance Monitor Architecture. A system variable and an interface variable are being tested.

2.0 How to configure the Performance Monitor

It is easy to configure the Performance Monitor. First, navigate to the performance monitor page. On the home page of the Gateway, click Advanced. In the Advanced menu, click Expert View. In the left pane, select **system** - **performance** - **monitor**. The System Monitor List appears. Click **add** to add new monitors. Click **modify/delete** to modify or delete existing monitors.

2.1 How to specify monitor options

You specify monitor options in the System Monitor form. The form contains standard options and advanced options. If you want to specify advanced options, click **Advanced** at the bottom of the form. The form expands, and the advanced options are displayed in dark red.

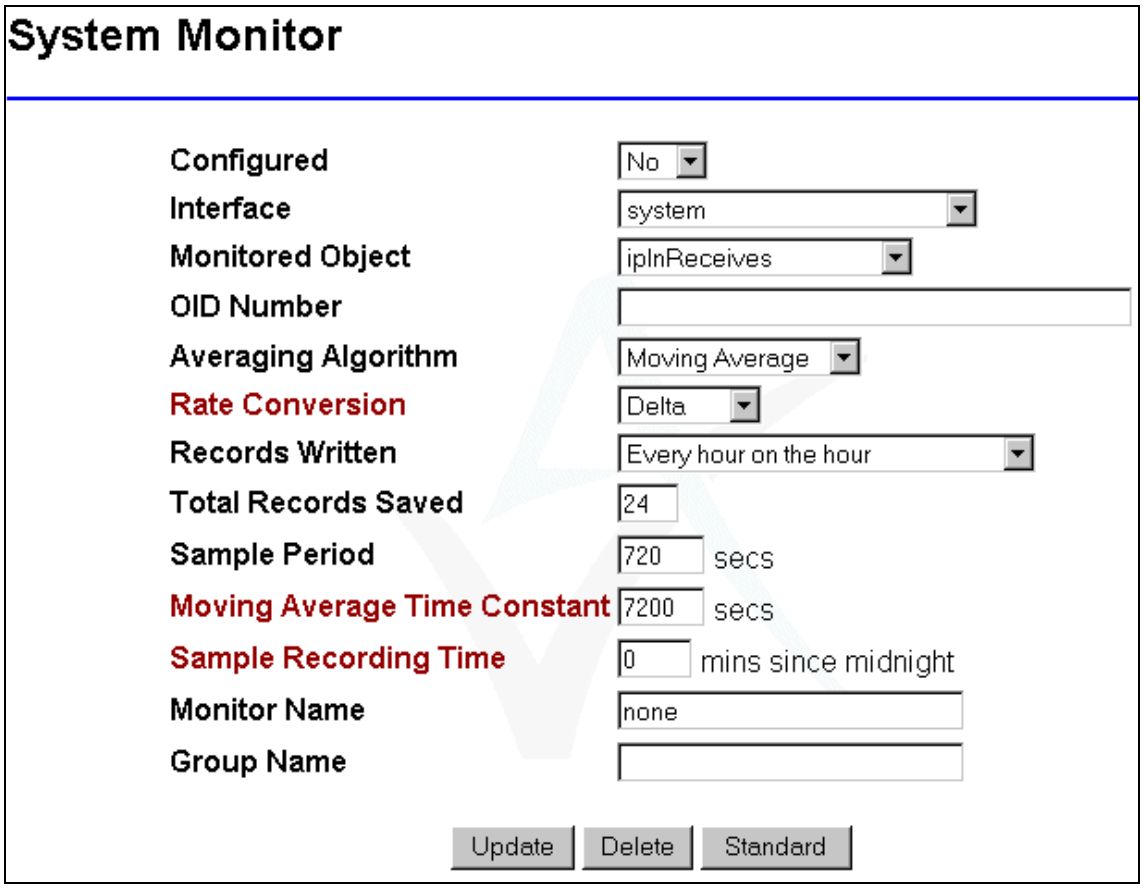

Figure 2. The System Monitor form with advanced options displayed.

Select the object to be monitored in the **Interface** field. Then select the SNMP object you want to monitor in the **Monitored Object** field. An SNMP Object Identifier (OID) number is automatically displayed in the **OID Number** field. The OID number identifies the object that is going to be monitored. If the object you want to monitor is not in the list, just type its number into the **OID Number** field.

In the **Averaging Algorithm** drop-down list, select one of three averaging algorithms.

Moving Average – The values sampled are averaged according to the Exponentially Weighted Moving Average (EWMA) algorithm, as specified by the ITU. This is effectively a low pass filter that smoothes out rapid fluctuations in the measured data.

The **Moving Average Time Constant** field contains the time constant of this filter. This field is always displayed in the System Monitor form, but it is applied only if you select the Moving Average algorithm. Depending on the parameter you select in the **Records Written** drop-down list, a sensible suggested value will be automatically inserted into the **Moving Average Time Constant** field.

Arithmetic Mean – The values sampled are averaged according to the Arithmetic Mean algorithm. This algorithm generates a mean using the simple Arithmetic Mean but without the smoothing available in EWMA. It computes (Σ(sample values))/(number of samples in recording interval).

Rate Over Interval – This is simply the change in the (converted) variable over the Recording Interval. Typically, this algorithm is used when Rate Conversion is set to Absolute and with counter rates such as ISDN Call counter. The output is then the number of calls in the interval. This enables you to obtain graphs such as calls per day or calls per hour.

In the **Rate Conversion** drop-down list, select Absolute or Delta rate conversion. If you select Absolute, the value will not be converted. If you select Delta, the system will compute the difference between the new sample and the previous sample.

In the **Records Written** drop-down list, select how often you want records written. If you choose an option that includes 'on the hour', the system will write the records in intervals based on the start of the hour. So, if you choose **Every 15 minutes on the hour**, it will write the records at 0, 15, 30, and 45 minutes after the start of the hour. It will not write the records fifteen minutes after you choose the option or reboot the system.

When you select a write option in the **Written Records** drop-down menu, the suggested values for the sample period and the moving average time constant are automatically added to their respective fields. The sample period is normally set to one fifth of the value of the records written. The moving average time constant is set to the same value or double the value of the records written.

If you select **At specified minutes after midnight**, a suggested sample recording time is automatically added to the **Sample Recording Time** field.

In the **Total Records Saved** field, type a value between 1 and 365. The default value is 24. If you set a value of 1 for total records saved, it provides a simple mechanism for converting any simple counter in the system into its EWMA equivalent. For example, the CPU utilization can be rendered as an EWMA variable.

3.0 How to view the performance monitor

To check the values of an object being monitored, navigate to performance monitor in the Operations view. Click on **Operations** in the button menu at the top of the web interface. Then, in the left pane, click on **performance** – **performance monitors**. The Performance History Records are displayed. To view a monitor, click on its name in the **Monitor Name** column.

The applet graphically displays the values of the object being monitored. You can adjust the view using **Auto scale**, **zoom out** and **zoom in**. Your changes take effect only when the applet updates itself. The red bars are peaks and the green bars are the averages.

3.1 How to download data to a spreadsheet

You can download a .csv file so you can view performance data in a spreadsheet. The .csv file contains the details of the object monitored, records of the peak, averages and a time stamp.

To download the file, click **Download Data**.

3.2 Examples of performance monitor data

Below are some examples of the output from the performance monitor.

3.2.1 An example of exponentially weighted moving average

Figure 3 shows frames received (ifInOctets) being sampled on Eth-0. The EWMA algorithm is being used to smooth the data. The input data to the router was generated by sending a repetitive PING to the router, effectively creating a step function input to the system. The peak in red shows the input step function. The averaged value in green shows the typical exponential curve as the average asymptotically approaches the input value.

For demonstration purposes, every **minute on the hour** was selected from the **Records Written** drop-down list.

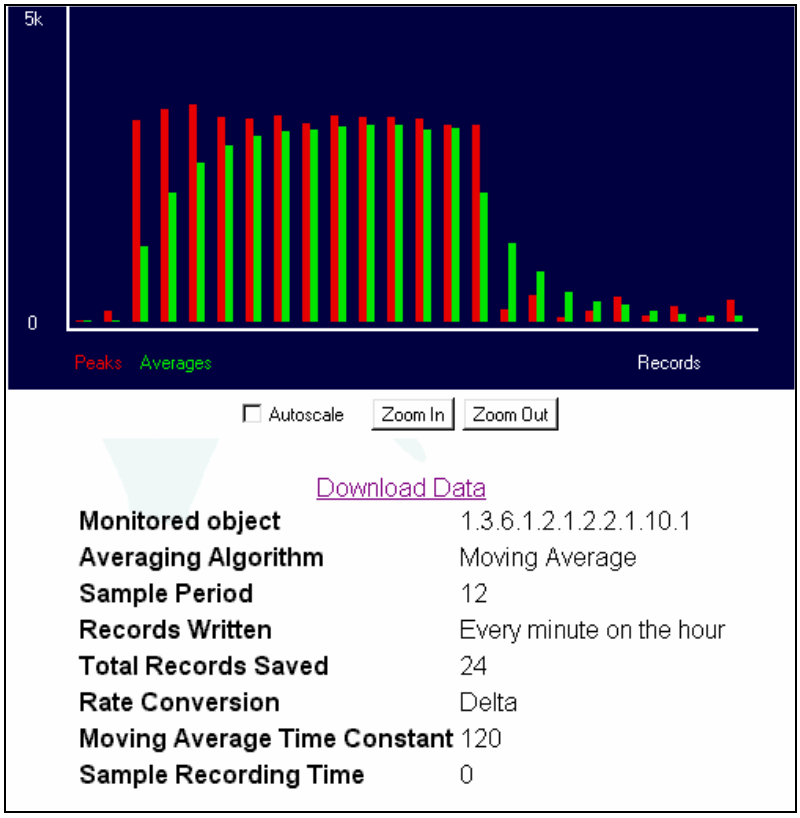

Figure 3. An example of an exponentially weighted moving average

3.2.2 An example of arithmetic mean processing

Figure 4 shows frames received (ifInOctets) being monitored using the arithmetic mean to process the sampled data. The average value shows none of the smoothing associated with EWMA, so it closely follows the input.

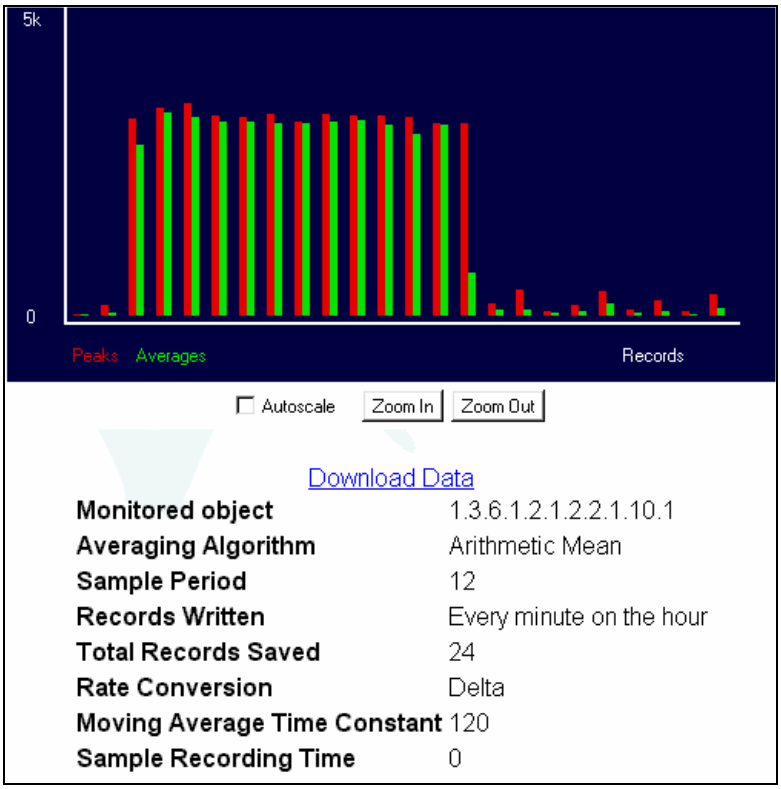

Figure 4: An example showing arithmetic mean processing

3.2.3 An example of rate over interval

Figure 5 shows an example of frames received (ifInOctets) being monitored with Rate over Interval. In this case, the input data is generated by sending PING -l 1 to the router. Note that the peak is effectively the value of the input data because **Absolute** is selected in the **Rate Conversion** drop-down list. The average is showing the differences in values over the recording interval. Effectively, this is the number of events that occurred in the interval.

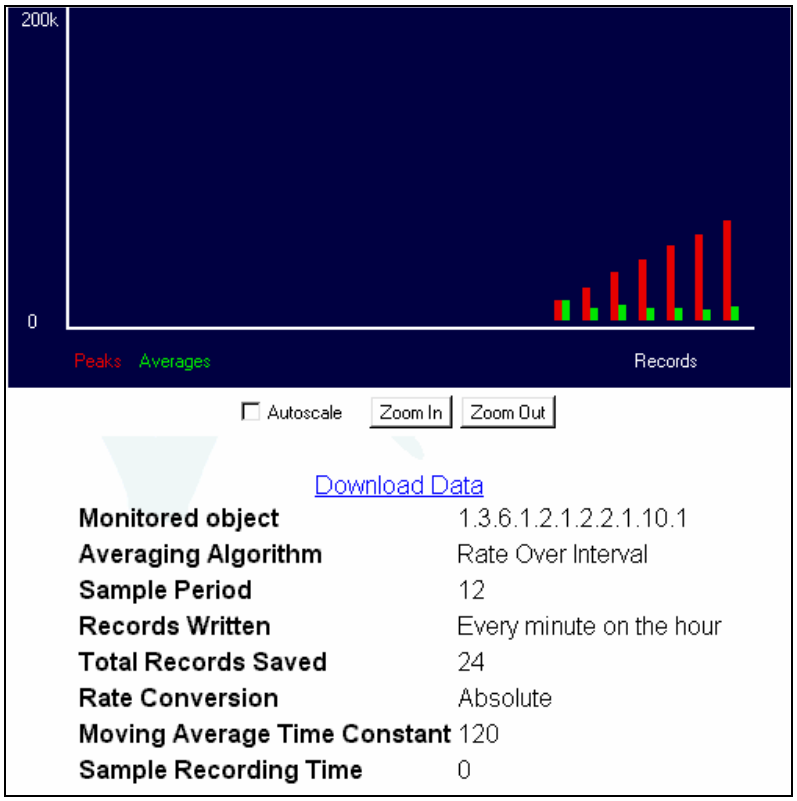

Figure 5: An example of rate over interval