



Bytemon Version 2.1 Manual

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May 5, 2011

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Chapter 1

Introduction

Bytemon is a multi-purpose resource and performance monitoring application, intended to give administrators real-time information about the condition of networks and servers, while at the same time collecting data to provide historical data and charts for reporting, resource planning, intrusion detection and other administrative purposes.

1.1 How It Works

Bytemon can be used to monitor resource availability and usage as well as performance data of all kinds, such as network performance parameters (bandwidth usage, protocols usage), system performance parameters (CPU and memory usage), the availability of network resources, and the network latency of access to remote devices and services.

Bytemon supports several protocols and methods for resource data acquisition:

Simple Network Management Protocol (SNMP) Bytemon is able to collect data from all kinds of SNMP-enabled devices, supporting SNMP versions 1, 2 and 3. SNMP data encompasses network traffic, processor loads, ambient temperature, disk space and the like. When monitoring network interfaces, Bytemon is capable of dealing with shifting interface indexes.

Network Packet Capture and Filtering (WinPcap) Packet capturing can be used to count network packets passing one or more of the physical network interfaces of a computer with Bytemon installed. This allows detailed analysis of network traffic: ie. which hosts were sending or receiving packets of some particular network protocol. Bytemon uses the industry-standard WinPcap library.

Windows Management Instrumentation (WMI) Bytemon supports querying WMI to gather operating system performance data. Though some of the data available using WMI is available using SNMP as well, WMI queries can be sampled at short intervals and are well suited to provide real-time information.

Custom data sources Using Bytemon's command line interface, users can input numeric data from arbitrary sources into Bytemon's data base, and make it available for charting and reporting.

Bytemon runs on one or more Windows machines in your network 24 hours a day and collecting data. The collected information is made available either as raw data or in the form of highly customizable charts.

Collected data is archived and compacted using sophisticated algorithms, combining instant access with a small storage footprint. Historical data is kept available back to the time when Bytemon was initially installed and configured.

1.2 Overview

Installation procedures are covered in *Installation* (chapter 2). Be sure not to miss the *Getting Started* (section 2.4). If Bytemon is used from more than one user account, administrators will find valuable hints in *Overall Structure and Security* (section 2.3).

Configuration of Bytemon is described in *Configuration* (chapter 3).

See the *Reference* (chapter 5) for details about the structure and content of Bytemon's configuration files.

See *Licensing* (chapter 6) for ordering and license details.

There are additional resources available online. Take a look at the FAQ list if you are running into problems. You will also find some 'How to...' documents there.

Bytemon support can also be contacted by email to support@byteplant.com.

Chapter 2

Installation

The installation section covers system requirements, Bytemon installation, and Bytemon uninstallation procedures.

2.1 System Requirements

The Bytemon installation includes a Windows Service. For this reason Windows version 5 (Windows 2000/XP) or later is required.

The following basic system configuration is required:

- 256 MB RAM (1 GB and more recommended).
- 10 MB of disk space for installation
- 0.1 MB of disk space per data source
- Network Access

2.1.1 System Requirements for SNMP Monitoring

The monitored device(s) must support SNMP Version 1, 2c or 3. Keep the SNMP authentication information readily available, because you will need it when setting up SNMP data sources. The computer running Bytemon must be allowed access to the SNMP port of the SNMP device (be sure to check any firewalls that might interfere).

To monitor Windows computers using SNMP, you need to install the Windows SNMP agent. The Windows SNMP agent is part of the Windows operating system, and is not always installed by default. To install the Windows SNMP agent, open the 'Control Panel', choose 'Add/Remove Programs', and then 'Add/Remove Windows Components'. From the list, choose 'Management and Monitoring Tools',

click the 'Details' button and check 'Simple Network Management Protocol'. Leave the dialog with the 'OK' button.

2.1.2 System Requirements for Packet Capturing

Only data packets passing the local machines network card can be analyzed. For remote network monitoring using packet capturing in switched networks, you can use network switches with a **monitoring port**, and connect the monitoring port to one of the network interfaces your computer. You can also install Bytemon on a remote computer, and access packet capture data collected there using the remote data source facility, or by accessing Bytemon's web interface.

2.2 Bytemon Setup

Bytemon setup features a standard Microsoft Windows®setup interface you can complete in a few steps. You can cancel setup at any time by clicking the 'Cancel' button.

Double click `bytemon.exe` (or similar filename) file on either the distribution media or from the downloaded `.zip` file. This will launch the Bytemon Setup Wizard.

Click 'Next' on the Welcome screen.

Read the Bytemon license and click 'I accept' to agree with this license.

Choose a folder where Bytemon should be installed. The setup program will suggest a default location. If you do not want to use the default location, you can browse for a different directory (placing Bytemon in a location other than the default will not affect the operation of the program). Unless your Bytemon directory already exists (either the suggested, default directory or one of your choice), the setup program will ask you if it can create that directory. Click 'Yes'. If you want to change the location of the program, click 'No'. This will keep you on the directory screen to choose another location.

The next step is to decide upon the name of the Bytemon program group name that you will see in the Start Menu. Bytemon suggests a default, but you can change that to whatever name you would like (changing the name of the Bytemon program group will not affect the program operation in any way). After you have decided upon a name, click 'Next'.

There are some optional setup tasks that you may enable. You can select these tasks by clicking on the appropriate check-box:

Install Bytemon Service The Bytemon service is required to collect monitoring data. If you do not install the service, you can only view data from remote computers running Bytemon.

Create a desktop icon Put a shortcut for Bytemon on your desktop

Create a quick launch icon Put a Bytemon icon into the quick launch bar

Allow connections to Bytemon's data feed ports Reconfigures the Windows firewall (Windows XP SP2 or later) to allow access to the Bytemon service from remote computers.

Click on the 'Next' button to continue. Bytemon will now install the program files and options. If there were no problems during installation, you will see the Finish screen. From here you can launch the Bytemon application. If you don't want to launch Bytemon, un-check the corresponding checkbox. Alternatively, you can just start the Bytemon service. Click the 'Finish' button when done.

2.3 Overall Structure and Security

Bytemon consists of two parts: the Bytemon service, and the Bytemon client application. The Bytemon service is started whenever the computer is powered up, and only stopped when the computer is shut down. This way the service is capable of collecting data 24 hours every day.

To configure Bytemon, the administrator needs to run the client application. All the configuration settings the Bytemon service needs are collected as *data source* (section 3.1) settings. The data source configuration files are stored in the common application data directory, and are usually only writable with administrator permissions.

The Bytemon client application is also run by users to view data collected by the Bytemon service. Each user has his own configuration file in his account's application data directory. This configuration file only stores screen layouts or *views* (section 3.3) and *chart* (section 3.2) settings.

To access data source settings, users need read access to the common application data directory. Just like an administrator, non-privileged users can try to modify Bytemon's data source settings, but will normally fail doing so. This behaviour is intended, but can be overridden, if the administrator changes the access permissions of Bytemon's files in the common application data directory.

The Bytemon client application connects to the service to receive monitoring data for display in its charts. This connection is done using TCP/IP over the loopback interface when receiving data from the computer its running on, or over the network when receiving data from remote computers. The default port number used for these connections is 8282 by default. You may need to reconfigure firewalls to allow access to this port from remote computers.

2.4 Getting Started

When you start Bytemon for the first time, the Quick Start wizard will create an initial set of charts and data sources to acquaint you with the main features of Bytemon. Based on this basic configuration, you can continue to create your charts.

- Install Bytemon on the machine you want to use for monitoring using the *setup program* (section 2.2)
- Launch the Bytemon client application.
- In Bytemon's Quickstart Wizard, first select the local network interface you want to use for packet sniffing (if you leave this empty, no packet capture data sources will be configured by the quickstart wizard).
- In the next step, SNMP data sources for monitoring the incoming and outgoing traffic either local or on a remote device can be configured. Just enter a hostname (localhost or the hostname of some remote device) and choose one or more interfaces to monitor.
- Bytemon allows collecting ping latency data for a remote host. You can enter the hostname or IP address of a remote computer on the next page to create a sample ping latency data source and the corresponding charts.
- Complete the Wizard by clicking 'Next' and then 'Finish'. The Bytemon Windows service will be restarted automatically to put your configuration changes into effect.

After finishing the Quickstart Wizard, the main window will show a list of charts on the left side. Charts can be combine several other charts to form a chart group. Chart groups themselves are like any other chart, can be viewed or exported as image files, and can be used as inputs for yet other chart groups.

The right side displays the chart as it looks like with the data already collected. You may need to wait 10 minutes until you see anything worthwhile, as data collection starts only after the Quickstart Wizard is finished.

You can switch the tabs on the right side to show the raw data currently displayed, or to show the chart settings.

You can switch to data source display, by clicking the data source icon on the left side of the window. When the data source display is enabled, you see a list of data sources, and the settings of the data source currently selected.

While chart settings are concerned with the appearance of data, data source settings hold all the information needed to collect data from a device you want to monitor. Data sources act as an input to charts only, and cannot be grouped or combined directly.

After switching back to the chart display, you can use drag & drop to move or copy charts about (hold the 'CTRL' key to copy a chart instead of moving it). Note that one and the same chart can be referenced by many other charts. To open a new window that shows some particular chart, select this chart, and drag it to a screen position where you want the new window to appear. Windows can be docked to the main window, or you can leave them floating anywhere on screen. Bytemon remembers the screen positions of windows, and restores them when it is restarted. In the 'View' menu you can also create named views you can recall anytime later.

In the lower right corner you will find an example of a thumbnail window. Thumbnail windows are intended to show you the state of your network and your servers at a glance, occupying only a small screen space. Network traffic displays of important backbone networks, and the CPU load of important servers should go here. If Bytemon is unable to collect live data from the device, a tombstone will indicate the device (or the connection to the device) is down, and that some administrator action is required.

You can change the appearance of thumbnail windows from the setup dialog you find in the file menu. To make a particular thumbnail window appear or disappear, you have to edit the settings of the corresponding chart: right-click the thumbnail window, and choose "Show Settings" from the menu that appears.

2.5 Registering Bytemon

To register Bytemon, enter the registration name and license key you received when you purchased in the registration window. To make sure you enter the license key correctly, use copy/paste (CTRL-C and CTRL-V keys).

To obtain a license key, please visit our online shop.

2.6 Uninstalling Bytemon

Bytemon can be uninstalled in one of two ways.

2.6.1 Using Bytemon Uninstall

This program is located in the Bytemon program group (the program group name may be different if you chose another name during setup). You can access it through the Start menu: Find and select 'Uninstall Bytemon' to run the uninstall program.

You will be asked if you want to completely remove Bytemon and all of its components. Click 'Yes' to continue with the de-installation or 'No' to cancel. If you click 'Yes', all installed files will be removed, any configuration files you created

will be preserved. If removal was successful, a success message will appear (if you encounter problems during de-installation, please visit the Trouble Shooting section of this manual).

2.6.2 Using The Microsoft Windows Control Panel

Select 'Add or Remove Programs' icon and then Bytemon. This will launch the Bytemon uninstall program. Follow the process as described in the *previous section* (section2.6.1).

Chapter 3

Configuration

Bytemon's configuration consists of **data source** settings and **chart** settings.

A data source is a facility for collecting and storing data for a variable to be monitored. Variables can be resources like e.g. CPU load and memory usage, network bandwidth or any other measurable quantity.

Charts display the data from a data source or, as a chart group, the data from a number of subcharts.

You can directly create new data sources and charts (using 'Edit' → 'New' in the menu bar), but you also create them using one of the wizards in the 'Edit' menu.

Views store the layout of Bytemon's windows, and the names of charts shown in these windows. If you like a particular window layout, you can save this layout as a named view, and recall it at a later time.

This feature can be also useful if you prepare several different views for repeating administrative tasks, or to check on the progress of a task.

Additionally, you can edit global settings that define Bytemon's behavior on start up or when iconized, logging options, or the size and position of thumbnail charts.

All graphical aspects of charts and chart groups can also be fully customized to your liking.

3.1 Data Sources

There are five different types of data sources:

SNMP data sources SNMP is mostly used to provide network traffic data, but can also be used to acquire information about processor loads and disk space. Which data is available is dependent on type and make of the device monitored. Bytemon's SNMP Wizard helps you to configure the data sources to

access network traffic data. To access other data, the vendor's web page and many other network resource usually provide all the information you might need.

Packet capture data sources Packet capture data sources count network packets passing a physical network interface of a computer. Packets need not to be originating from that computer, or addressed to that computer. You can filter packets by source or destination, by the ports used, and by any combination of these criteria. This allows detailed analysis of network traffic. If you connect the monitoring port of a router to one of your computer's interfaces, you can analyze the traffic of entire networks.

WMI data sources The Windows Management Instrumentation can be used to gather operating system performance data. This also works on remote computers, if they support WMI and if you provide the necessary authentication data.

Custom data sources Using Bytemon's command line interface, users can input numeric data from arbitrary sources into Bytemon's data base, and make it available for charting and reporting.

Remote data sources A remote data source can be used to access data collected on some other computer running the Bytemon service. Data from remote data sources is passed over the network, using TCP/IP connections on port 8282 (default). Remote Data Sources can be used to set up a distributed monitoring infrastructure to collect and consolidate monitoring data from various Bytemon instances in one place.

Data sources of all types have some settings in common: the data source name, the sample interval, and the value type.

3.1.1 Name

Data sources are identified by an unique name, which is used by charts to reference to data sources. Choose the name with care, if you ever need to change the name of a data source at a later time, all collected data is lost. Also, changing a name can be painful if data sources are accessed from remote computers or from multiple user accounts. For this reason, if you do not agree with a default data source name as it was created by a wizard, change the name early.

While names should say something about the variable that is monitored, like the device or interface name, it should be unlikely that whatever you use for the name is not changed in the foreseeable future. For example, don't use an IP address in the data source name, use the host name instead, which is less likely to change. Examples for good data source names are 'Interface 1 Inbound', 'Print Server CPU Load', 'Name Server 1 Ping Latency'.

3.1.2 Sample Interval

One of the most important settings for many types of data sources is the sample interval. It defines how many times a device is queried for an update of the value of the monitored variable. A sample interval too long may make the collected information useless for real-time viewing, and a sample interval too short may in the best case only cause unnecessary network traffic, and in the worst case cause a remote device to shut down.

For SNMP devices, the default sample interval is 10 seconds. Many devices do some sort of internal averaging, so querying these devices more frequently only results in the same value being reported multiple times.

Due to the internal structure of the Pcap data source implementation, Pcap data sources have a fixed sample rate of one second.

WMI queries can be queried up to once every second, which is the default. Ping latency queries default to a sample interval of 60 seconds.

Remote data sources do not allow the sample interval to be set, the same sample interval information is read from the remote host upon creation of the remote data source.

3.1.3 Value Type

Data sources support three different types of variable values. Once you create data sources without the help of a wizard, it is important to choose the correct value type for charts to display meaningful data.

Counter A counter value always increases over time. An example for a counter is the SNMP outOctets counter, counting bytes (octets) that have been sent over an interface. If this counter increases from 122332 to 122539 within 10 seconds, a total of 207 Byte has been transmitted within 10 seconds, corresponding to an average bandwidth of 20.7 Byte/s. Once a counter reaches its maximum value, it restarts with zero.

Delta A delta value always describes a count in reference to the last time a variable was sampled. A value of 207, collected after a sample interval of 10s, corresponds to a value 20.7 per second. This is useful for custom data sources, and rarely encountered with SNMP devices. Users familiar with MRTG know this value type as 'absolute'.

Gauge A gauge value always describes the current content of a variable. An example for this is the CPU load as reported by the WMI. The current CPU load is independent from the sample interval, and there are no calculations done that take the previous value or the sample interval into account.

3.1.4 SNMP Data Source Settings

Bytemon is installed with a data base of SNMP enabled devices that encompasses all major vendors and all the most commonly used devices. This data base is usually sufficient to learn about specific SNMP objects. If you run into trouble, visit one of the Internet data bases that provide MIB files for all kinds of devices. Bytemon uses MIB files stored in the common application data directory, in the subdirectory `Bytemon\mibs`.

3.1.4.1 SNMP Authentication Settings

Bytemon supports three versions of SNMP: version 1, version 2c and version 3. Only protocol version 3 requires the full set of authentication settings. Choose these settings according to the configuration of the SNMP device. For SNMP version 1 and version 2c, enter the community string in the user input field (the default setting is `public`).

3.1.4.2 Device

Enter the IP adress or host name of SNMP enabled device. As the IP address is more likely to change than the host name, you should prefer to use the host name.

3.1.4.3 Interface

The interface setting is optional, and only useful if you wish to setup a data source that collects data for a network interface. Some network devices may change the interface indexes when they are rebooted, and referencing interfaces by their name enables Bytemon to connect to the same interface afterwards. In all other cases (for example when you access CPU load or disk space data), you should leave this setting empty.

If you click the search button, a dialog will pop up that presents you with a choice of network interfaces available for this device. This works for all major vendors, but may fail for outdated or rare SNMP devices. In this case you should leave this setting empty.

3.1.4.4 OID

The OID setting defines the SNMP object that is accessed by an SNMP data source. You can click the search button to choose a list of OIDs available on the device you selected before. The list only contains OIDs that return numeric values. Once you have chosen an OID, the description field is automatically updated.

The OID field allows input in various formats, for example using the numeric form (ie. .1.3.6.1.2.1.2.1.10.2), or the long form (.iso.org.dod.internet...). If the interface setting is not empty, the last part of the OID (the interface index) is overridden and replaced with the real index of the interface with that name.

3.1.5 Pcap Data Source Settings

Pcap data sources use a kernel driver in the operating system to access the low-level network layers. Every packet that enters the low-level network layers is filtered, and if it matches the filter criteria, added to the counters of Pcap data sources.

On a cautionary note, heavy traffic results in an increase of the CPU load on the computer running Bytemon, so you should be careful when setting up many Pcap data sources on an interface connected to a router's monitoring port.

3.1.5.1 Interface

Choose one of the physical network interfaces of your computer from the list. When you change hardware or drivers on the computer, interface names may change, and you may need to reconfigure Bytemon.

3.1.5.2 Type

Pcap data sources can either count packets, or the size of packets (Byte).

3.1.5.3 Filtering Options

Packets can be filtered by netmask, and by the filter setting. There are some predefined filter settings, to give you an idea what can be done in this setting. For a complete description, see the WinPcap web page.

3.1.6 WMI Data Source Settings

WMI data sources support a number of predefined WMI queries, such as CPU load and available memory, but you can also enter custom WQL queries.

3.1.6.1 WMI Authentication Settings

WMI data can be accessed from the local computer without specific authentication. If you want to access WMI data from a remote computer, you need to set the authentication settings depending on your network configuration.

The WMI authentication settings include the WMI Namespace, Domain, Domain Prefix, User and Password.

Note: If you are using remote WMI queries, make sure the Bytemon service runs under an account with the necessary permissions

3.1.6.2 WMI Query Settings

You can choose from a set of predefined queries, or enter a custom query. The 'Result Aggregation' defines what to do with the results, if a query returns more than one row. The field lets you choose between two settings:

Average The values returned by the query are averaged.

Sum The result is the sum of all return values.

3.1.7 Custom Data Sources

Available in upcoming Bytemon releases.

3.1.8 Remote Data Source Settings

Remote data sources fetch data collected on some other computer running the Bytemon service.

3.1.8.1 Remote Host

This setting specifies the remote host you want to access.

3.1.8.2 Remote Data Source Name

The name of the data source as it is named on the remote host. Click the search button to pop up a list of available variables.

3.1.9 Alert Settings

Alert settings can be used with all types of data sources, except remote data sources. If an alert condition is encountered, a line is written to Bytemon's log file, and if you configured a mail address, Bytemon will additionally send an email to this address.

The following alert types can be defined:

Status changes A status change alert can be generated whenever a data source changes from online to offline state, or vice versa. A data source may be offline either because the device is down, or because the network connection to the device is down.

Limit checks Alerts can be generated whenever the data source moving average value exceeds a user-definable threshold, or whenever it drops below a threshold. The time interval used for averaging can be specifically defined by the user, but normally the default setting (auto-averaging) is suitable in most cases.

Alert conditions are checked every full minute, and if an alert condition changes, the condition change is logged and an alert mail is sent to the specified mail recipient.

The alert mail settings can be configured globally ('File' → 'Alert Settings') for all alerts you enable. Additionally, you can override the mail settings for individual alerts, for example to send notifications to a different user.

If you want to send alerts to a group of recipients, configure a group of recipients in your mail server, and enter the address of this group as the mail recipient.

3.2 Charts

All charts have the same basic configuration options, such as axis type, and time range.

Chart groups combine several subcharts together and display some aggregate data, obtained using a configurable aggregation method. There is no limit to the nesting depth of charts, and there is no limit to what you combine. However, combining a percentage value with a Byte/s value rarely results in useful output and should be avoided.

For use in reports charts can be exported to image files, and chart data can be exported to `.csv` (comma-separated values) files, readable by Excel or similar programs.

To make it easy to permanently keep an eye on critical resources in your environment, you can configure Bytemon to display thumbnail charts for these resources on your desktop.

3.2.1 Name

Charts are identified by an unique name, which is used in window captions and chart titles. Names should contain a short description of the resources displayed.

If you want to, you can add some information about the time range, or about the units displayed, something like '[MBit/s]' or '[%]'.

You can change chart names anytime: unlike data sources, charts do not loose data if the name is changed.

3.2.2 Thumbnail Enable

The Thumbnail checkbox enables a thumbnail display of this charts. Thumbnails enabled for the first time appear in the default position in one of the corners of the screen. You can move thumbnails any place you like.

Some of the rendering settings for charts (as can be configured in the chart settings dialog ('File' → 'Chart Settings')) do not make sense for small thumbnail charts, and overridden by suitable values automatically.

3.2.3 Time Axis Settings

The time axis settings are **Time Range** and **Time Averaging**. Both settings are related: Depending on the time range setting, not all time averaging settings are available, and the time averaging auto setting defaults to different values.

The time range setting "Auto" displays all data collected so far.

Thumbnail charts always have a time range of 1 Minute.

3.2.4 Value Axis Settings

The value axis settings are **Value Axis Type**, **Value Range**, **Scale** and **Offset**.

Bytemon supports 4 axis types:

Linear A standard linear axis, suitable to display percentage values or packet counts.

Logarithmic A logarithmic axis, suitable to display variables with wide value ranges, but where values are usually only small

Binary Linear Similar to a linear axis, but the axis ticks are aligned to powers of two.

Binary Logarithmic Similar to a logarithmic axis, but the axis ticks are aligned to powers of two.

The value range setting defines the maximum value that can be encountered for a variable. If a chart displays a percentage, the value range can be set to 100, or if

you know the maximum bandwidth of a network link, you can enter this value as the value range.

If the value is unset or zero, Bytemon determines the value range automatically. This is sufficient in most cases.

In thumbnail charts, the value axis is not painted. To see the current usage of a resource at a glance, it can be helpful to use a fixed value range instead of auto-ranging the chart.

The scale and offset settings modify the values before they are displayed according to the following formula:

$$\text{Display Value} = \text{Scale} \times \text{Value} + \text{Offset}$$

A negative scale combined with an offset that equals the value range can be used to invert a chart.

3.2.5 Input Settings

The input for a chart can be a data source, or in case of a chart group, one or more other charts.

For simple charts the input selection is straightforward: you can choose one of the data sources you have already configured.

For chart groups the input charts can be configured by moving and copying charts (or chart references) in or out of the chart group you want to configure.

The appearance of a chart group is determined by its **Aggregation Method** setting:

Overlay The data from each input chart is used to draw a line in the group chart. Line colors depend on the order of charts: the first input chart is painted with a green line, the second with a red line, and so on (you can override the default colors). The line fill colours are fully transparent, to make sure all lines are always visible.

Stacked The data from each input chart is used to draw a line, but all following line values are added to a value before a line is actually painted. The line fill colours are used.

Sum Only Similar to the *Stacked* setting, but only the sum of all input values is drawn in a single line.

Percent Shows the percentage each input chart contributes to the sum of all values. The value range is always 100, regardless of the value entered in the **Value Range** input field. The line fill colours are used.

Separate Paints the input charts as separate charts into the chart window. If the window is too small, not all charts will be displayed. Instead a scroll bar will appear. This setting is useful for groups of historic charts, or if you just want a chart group to organize your charts. Chart groups with this type can not be displayed as thumbnail chart.

Charts may be used as input for more than one chart group, by copying a reference to the chart to another group. You can do this using cut, copy and paste (from the toolbar, or using the keyboard shortcuts). You can also use drag & drop to move or copy charts about (hold the CTRL key to copy a chart instead of moving it).

If a chart group with the **Separate** setting is used as input for another chart group, the chart group is not displayed in its parent.

3.3 Views

Views can be used to store and recall screen layouts of Bytemon. To create a view, choose 'View' → 'Add View' from the menu. Once you have created a view, a new item will appear in the 'View' menu. You can use this menu item to recall the view later. The 'View' → 'Default' menu item restores Bytemon to the default window layout.

3.4 Reports

Charts can be retrieved as an image file from the Bytemon Service using the HTTP protocol. This allows to embed resource usage information into your website.

To enable this feature, you have to make your chart definitions available to the Bytemon Service first. You can do this by choosing 'Update All Report Settings' from the 'Report' menu.

The Bytemon service also provides HTML reports, consisting of a chart image with some additional information. Choose 'Open Report' to display a chart's report in your web browser.

Chapter 4

Network Traffic and Resource Monitoring

Network and resource availability and usage monitoring play an important role in most businesses and organizations. To be able to manage networks components and computing resources proactively it is vital to have a comprehensive monitoring system in place.

Bytemon helps you to monitor the availability, current status and usage of key resources in your network:

- Network Traffic Monitoring: Bandwidth and Usage Monitoring of your networking equipment (hubs, routers, switches)
- Performance Monitoring for Servers and Networked Devices like e.g. printers
- Availability and Latency Monitoring of remote devices and servers e.g. mail or web servers

Bytemon allows you to quickly and easily set up and run a distributed monitoring system for networks of all sizes. Using Bytemon's built-in wizards, you can log the amount of data flowing through routers and leased lines, monitor CPU utilization, analyze the traffic by protocol, or check disk space usage with just a few mouse clicks. The Bytemon Windows service runs on one or more machines in your network for 24 hours every day and collects information on network and resource usage. With the Bytemon client, the collected data can be visualized and analyzed in an easy and flexible way.

4.1 Network Traffic Monitoring: Bandwidth and Usage Monitoring

Using Bytemon's SNMP and Packet Capture data sources, it is very easy to keep an eye on the network traffic in a LAN or going over a shared internet connection/leased line. With SNMP and packet capturing (Pcap) data sources you can collect and display performance data of your networking equipment:

- Monitor bandwidth usage for each switch port
- Analyze traffic by source/destination IP or MAC address or by protocol (source or destination port) to get a clear view on what is going on in your network in detail.

4.1.1 Simple Network Management Protocol (SNMP)

SNMP is the preferred and most commonly used data acquisition method as it is easy to set up and requires only minimal bandwidth. It can be used to monitor bandwidth and network usage as well as other parameters like CPU load, disk usage, temperatures and many more. With a view to security, the SNMP V3 protocol should be preferred over SNMP V1 and V2c as it supports authentication and encryption.

Vendor or device specific data made available through SNMP readings can easily be accessed from Bytemon by just copying the corresponding MIB files to the "data folder.

4.1.2 Packet Capturing and Filtering

Packet Filtering is the right solution if a device you want to monitor does not support SNMP or if the differentiation of bandwidth usage by network protocol and/or source or destination IP address is needed. Another advantage of packet filtering is the sample interval of one second, which allows better real-time monitoring of bandwidth usage.

Bytemon analyzes each packet passing the network card (promiscuous mode) or it can be connected to the monitoring port of a switch.

Packet Filtering can only inspect traffic that actually flows through the network interface(s) of the machine Bytemon runs on. In switched networks only the traffic directed to specific machine is sent to each machines network card, which means that if you want to analyze the traffic of other devices in your network you must use a switch that offers a monitoring port or port mirroring configuration. In this case the switch sends a mirrors each packets traveling through the switch on the monitoring port.

Packet Filtering creates considerable CPU load and should only be used in small to medium networks or for individual computers.

4.1.3 Network Traffic Monitoring Scenarios

4.1.3.1 Monitoring network traffic for a single PC connected to the Internet via DSL, cable, or a modem

- The Packet Capture Wizard helps you to create a data source and the corresponding charts.
- Select the network interface you want to monitor and make sure that the host name field contains the host name or IP address of your PC.

4.1.3.2 Monitoring network traffic for each device (or connection) in a network using a switch/router with SNMP support

- Enable SNMP on the switch/router (for a Windows machine install the generic SNMP agent from the Windows installation CD).
- Use the SNMP Traffic Wizard to create separate data sources and charts for each port/interface you want to monitor.
- Enter the host name or IP address of the device you want to monitor and press the "Refresh" button to load the list of available interface of this device. If the default authentication (SNMP V1 with community "public") fails, you will see a pop-up dialog where you can enter suitable authentication information.

4.1.3.3 Monitoring Network traffic and protocol usage separately for each device using a switch with monitoring port or a hub

- Enable Mirroring: Configure the switch to send a copy of all network packets to the IP address of the machine where Bytemon is running.
- Use the Packet Capture Wizard to create a data source and the corresponding charts for each device you want to monitor.

4.1.3.4 Monitoring Overall Network traffic and protocol usage using a switch with monitoring port or a hub

- Enable Mirroring: Configure the switch to send a copy of all network packets to the IP address of the machine where Bytemon is running.

- The Packet Capture Wizard helps you to create a data source and the corresponding charts.
- To monitor all traffic, you have to deactivate the Inbound/Outbound traffic option as this option filters only traffic coming to or going from the specified IP address or host.

4.2 Performance Monitoring for Servers and Networked Devices

Bytemon supports SNMP and Performance Monitoring data sources (using Windows Management Instrumentation (WMI) services) to make detailed performance and environment data from Windows servers and networked devices like printers oder NAS devices available:

- CPU and Memory Load
- Disk Usage
- Detailed information on processor queue length, thread context switches etc.

Vendor or device specific performance data made available through SNMP or WMI can easily be accessed from Bytemon as well.

4.3 Availability and Latency Monitoring

The availability and performance of a connection can be monitored automatically with a Ping Latency data source. The Ping Latency Wizard creates a data source that periodically sends an ICMP echo request ("Ping") to the host and measures the response time. A high latency time variation on a data line (jitter) usually indicates overload. Too many lost ICMP requests (packet loss) is also a sign of an overloaded connection or network device.

4.4 Monitoring Large Networks

This section describes the deployment of Bytemon in large networks. To support large installations with many networked nodes, Bytemon provides a multi-tier approach with multiple instances of the Bytemon Windows service. Each Bytemon service instance collects data from the local machine or the network it is attached to and publishes the data in the form of Remote Data Sources (feeds) for upstream processing and analysis.

Bytemon service instances can be grouped into layers and data aggregation takes place from one layer to the other. Data collected by such a distributed monitoring system can be displayed and analyzed in a very flexible way by having any number of Bytemon clients accessing data from any layer.

For a better overview in large, complex networks, creating chart groups for each separate site or location is strongly recommended. Chart groups help to organize and arrange information clearly. The use of thumbnail charts on your desktop for key resources is a good way of constantly keeping an eye on the system status without having to look at the details.

4.4.1 Remote Data Sources

In addition to the SNMP, WMI, Packet Capture and Ping Latency data sources, Bytemon offers remote data sources to collect data from other Bytemon instances running on Windows machines anywhere in the network.

Chapter 5

Reference

5.1 Bytemon Configuration Files

Bytemon's data source settings are saved in a plain text file, `Bytemon.cf`, stored in the common application data directory (the exact location depends on the Windows version you use). Advanced users can also use a simple text editor to change the settings by modifying the file directly.

Note: The Bytemon service automatically re-reads the configuration file once it has been modified. The client application needs to be restarted (make sure you do not overwrite the changes you made with the text editor by saving any pending changes in the client afterwards).

Chart settings and screen layouts are stored in the user's application data directory (the exact location depends on the Windows version you use). The file name is `Bytemon.ini`. There is a different configuration file for every user account. If you wish to reuse another account's configuration file, you can copy it to your account. The chart settings should not be modified with a text editor.

The chart settings used to provide HTTP access to charts and reports are reside in the common application data directory (next to the data source settings). There are no separate files for different users: a user that updates the report settings, automatically overwrites the report settings another user might have set.

The report templates can be found in a subdirectory named 'web'. All files in this subtree are available by HTTP, and you can add your own files to supplement the distribution reports. Like the configuration files, the templates can be modified with a text editor, but any changed files are replaced with the default files when you reinstall or upgrade Bytemon. If you want to create your own reports, use different file names.

5.1.1 Configuration file format

Both config files are plain text files, in a format similar to the Windows *.ini file format.

- The first line identifies the file format version.
- Configuration settings are grouped in sections. Each section starts with a section label in square brackets ([]).
- A section may include other sections (subsections). The section label of such a section repeats the section label of the enclosing section, and its own label.
- Configuration settings are given as <name>=<value>" lines. Note that values should always be quoted (using double-quote characters (")). Empty values (denoted by a pair of double quotes with no other characters between) may be allowable for some settings.
- Lines starting with the # character are ignored, and can be used to add comments, but will be removed when the client application updates the file.

All settings not explicitly overridden in the configuration file, take on their default value.

5.1.2 Value Types

Configuration settings can have the following types:

boolean Set to either 0 (meaning false, no, disable), or to 1 (meaning true, yes, enable). In some cases it may be allowable that a boolean value may be empty or unset (meaning unset, undefined, unknown).

numeric Set to a numerical value. Numbers must be given as classic decimal numbers, a leading - denotes negative numbers, the dot character . is used as decimal point. In some cases it may be allowable that a numeric value is unset (empty).

string A sequence of printable ASCII characters, other than the double quote character.

5.1.3 Main Configuration Settings

The main section of the config file is labelled [MonitorProfile]. It contains the following settings:

CheckForUpdates (boolean) Enables or disables the check for program updates at midnight. This value defaults to "1" (enabled).

CheckForUpdatesProxy (string) Sets the HTTP proxy server and port used for the update check. Defaults to an empty value, in this case Bytemon connects directly to `www.byteplant.com`, port 80, to perform the update check.

DetailedLogging (numeric) Sets the logging level of Bytemon. Defaults to "0" (normal logging), set to "1" to enable detailed logging.

MailRecipient (string) Sets the recipient name for alert notification messages. Defaults to an empty value (alert mail notification disabled).

MailSender (string) Sets the sender name for alert notification messages. Defaults to an empty value (alert mail notification disabled).

MailServer (string) Sets the mail server host name or IP address for alert notification messages. Defaults to an empty value (alert mail notification disabled). Alert notifications are transmitted using the default SMTP port (port 25), unless a different port is explicitly specified (ie. `127.0.0.1:2525`).

MaxLogFileDays (numeric) The log file is cycled (a new log file is started) after so many days. Set to "1" by default (daily log file cycling), both unsetting this value or setting it to 0 disables this feature.

MaxLogFileSize (numeric) The log file is cycled once it is larger than the given size. Allowable values are 1048576 (1MB) to 1048576000 (1000MB), the default is unset, disabling this feature.

5.1.4 Feed Server Configuration Settings

The main section contains a Server subsection, that defines the settings for the data source feed server used by clients to access the Bytemon service to receive statistics data.

Allow (string) A list of IP addresses or hostnames that may access the server. All addresses within private network IP address blocks (RFC-1918) are automatically allowed. If you want client access over the Internet, enter the remote hosts that may access the server. Note that dynamic DNS is supported. Defaults to an empty value.

ConnectionCount (numeric) Set the maximum number of simultaneous active connections on this port. Defaults to 500, allowable values are in the range of 1 to 1000.

Deny (string) A list of IP addresses or hostnames that may not access the server. Defaults to an empty value.

Host (string) Sets the IP address or name of the server socket. If empty, the socket is bound to all interfaces. Defaults to an empty value.

Port (numeric) Sets the port number of the server socket. The default is 8282. Allowable values are in the range of 0 to 65535.

QueueLength (numeric) Sets the length of the listening queue on the proxy port server socket. Use an empty value to set to the maximum allowable value (operating system dependent). Defaults to empty.

Timeout (numeric) Sets a connection and negotiation timeout in seconds. Allowable values are in the range of 10 to 300.

5.1.5 Data Source Configuration Settings

The main section contains a subsection for each data source that is defined. There are different types of data sources with different settings.

5.1.5.1 Packet Capture Data Source Configuration Settings

CounterType (string) Set the type of data counted, may take the value "Packets" or "Byte". Defaults to "Byte".

Filter (string) A WinPcap packet filtering string. See the WinPcap page for details. Defaults to an empty value (no filtering).

Name (string) The name of the data source. Data source names must be unique, and the name must not be left empty. There is no default setting. The data source name is used in the names for the data source history files.

Netmask (numeric) Packet filtering netmask. See the WinPcap page for details. Defaults to `verb0xffffffff`.

NetworkDeviceName (string) Identifies the network device. This name depends on the operating system, on the network hardware, and on the drivers used. This setting must not be empty.

5.1.5.2 Remote Data Source Configuration Settings

Connection (string) Specifies the remote host (host name or IP address), and the remote port (separated by the `:` character). The default setting is `localhost:8282`.

Name (string) The name of the data source. Data source names must be unique, and the name must not be left empty. There is no default setting. The data source name is used in the names for the data source history files.

RemoteName (string) Specifies the name of the data source as it is named in the configuration of the remote Bytemon service. The setting must not be empty.

SampleInterval (numeric) The sample interval in seconds should be the same value as in the configuration of the remote Bytemon service, to ensure correct chart display. Defaults to 10.

5.1.5.3 SNMP Data Source Configuration Settings

Name (string) The name of the data source. Data source names must be unique, and the name must not be left empty. There is no default setting. The data source name is used in the names for the data source history files.

Authentication (string) Specifies the SNMP version 3 authentication protocol, and is only required when SNMP version 3 is selected. Allowable values are: "MD5", "SHA1", "DES", "AES". Defaults to empty.

Device (string) IP address or host name of SNMP enabled device, may specify a port (separated by the : character).

Interface (string) If set, the interface name overrides the interface number given in the OID. This is useful for SNMP devices that may change interface indexes upon reboot. Defaults to empty.

OID (string) Defines the SNMP object identifier or MIB name. This setting must not be empty.

Password (string) SNMP version 3 security password setting. This setting is only required when SNMP version 3 is selected. Defaults to empty.

SampleInterval (numeric) The sample interval in seconds, defining how often a value should be queried. Allowable values are in the range of 1 second to 2600 seconds. Defaults to 10.

Security (string) SNMP version 3 security level. This setting is only required when SNMP version 3 is selected. Allowable values are: "No Authentication", "AUTHNOPRIV", "AUTHPRIV". Defaults to empty.

Type (string) The data source value type. Allowable values are: "Counter", "Delta", "Gauge". Defaults to `VCounter`.

User (string) Security name (SNMP version 3) or SNMP community name (SNMP versions 1 and 2). Defaults to `public`.

Version (string) This setting selects the SNMP version. Allowable values are: "Version 1", "Version 2c", "Version 3". Defaults to `Version 1`.

5.1.5.4 WMI Data Source Configuration Settings

AggregationMethod (string) Defines the handling of multiple result rows returned by the WMI query. Allowable values are "Sum" and "Average". This setting must not be empty.

DomainPrefix (string) Defines the WMI domain prefix, see the WMI documentation for details. Defaults to "NTLMDOMAIN:".

Name (string) The name of the data source. Data source names must be unique, and the name must not be left empty. There is no default setting. The data source name is used in the names for the data source history files.

Namespace (string) WMI namespace, see the WMI documentation for details. The default value is "ROOT\CIMV2".

Password (string) Password (for remote WMI access only). Defaults to empty.

Query (string) The WQL query, see the WMI documentation for details. The default query (if unset) queries the CPU load.

SampleInterval (numeric) The sample interval in seconds, defining how often a value should be queried. Allowable values are in the range of 1 second to 3600 seconds. Defaults to 1.

User (string) User name (for remote WMI access only). Defaults to empty.

5.1.5.5 Alert Settings

Alert settings can be used with all types of data sources, except remote data sources.

AlertOffline (boolean) If set to true, an alert is generated whenever the data source changes from online to offline state, or vice versa. A data source may be offline either because the device is down, or because the network connection to the device is down. Disabled by default.

AlertThresholdHigh (numeric) If set, an alert is generated whenever the data source moving average value exceeds the threshold. Defaults to empty.

AlertThresholdLow (numeric) If set, an alert is generated whenever the data source moving average value drops below the threshold. Defaults to empty.

AlertAverageTime (numeric) This setting defines the moving average interval used to generate the below/over threshold alerts. Leave this setting empty for automatic averaging. Defaults to empty.

MailRecipient (string) Sets the recipient name for alert notification messages. If unset, the global setting is used.

MailSender (string) Sets the sender name for alert notification messages. If unset, the global setting is used.

MailServer (string) Sets the mail server host name or IP address for alert notification messages. If unset, the global setting is used.

Alerts are checked every full minute.

Chapter 6

Licensing and Contact Information

6.1 License Information

Licenses are restricted by the number of data sources, a 100 data sources license will enable you to monitor up to 100 different data sources simultaneously. There are licenses on sale for 25, 50, 100, or unlimited data sources. A site license is also available. Please inquire at sales@byteplant.com for information about enterprise licenses, as well as volume discounts.

- The freeware version is restricted to personal and non-commercial use. It is limited to collect data for up to 10 data sources and does not support alert notifications.
- Licenses other than the site license may be installed and used on up to 10 computers owned by the licensee and located on one property owned by this person, company or institution (e.g. campus or business premises).
- Site licenses may be installed and used on any number of computers owned by the licensee and located on one property owned by this person, company or institution (e.g. campus or business premises).
- Enterprise licenses may be installed and used on any number of computers owned by the licensee.

You can upgrade to a larger license anytime by simply paying the price difference.

6.2 Ordering Bytemon

For the latest pricing information, please visit our online shop.

Bytemon is distributed online electronically and shipped on CD-ROM, if requested. Please visit our online shop to place your order online. Ordering online and paying by credit card is by far the fastest way to order: Your license key is usually delivered in a matter of minutes.

If you do not want to order online using your credit card, we offer a variety of alternative ordering methods. Please visit our online shop to find out more.

For multi-server or site/multi-site license packages of Bytemon please contact sales@byteplant.com for a price quote.

6.3 Support

A purchase of Bytemon includes maintenance and support for 12 months. Please write to us at support@byteplant.com. We will also try to help you with the Trial version of Bytemon if we can.

Contact us for information regarding other support options by email to sales@byteplant.com

For the latest version always check the Bytemon download page.

Byteplant offers consulting and the development of custom software. Please inquire by email to sales@byteplant.com.

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