Interoperability
for your devices
and software applications.

SAEAUT SNMP OPC Server™
User's guide

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by SAE - Automation, s.r.o.

Product SAEAUT SNMP OPC Server™ is a gateway between SNMP devices and applications with OPC client.

It consists of:
- runtime application - for communication and data processing,
- configuration application - for configuring of OPC server address space and data preprocessing.

Table of Contents

Foreword 0

Part I Introducing SAEAUT SNMP OPC Server 4

1 How to buy SAEAUT SNMP OPC Server 6

2 SAEAUT SNMP OPC Server on Web 8

3 Usage 8

4 Features 10

5 System requirements 12

6 Installed software and examples 12

7 Background 14

Basic Functionality 14
SNMP 15
OPC 17
ICMP ping 21
JScript 21
JScripts for data processing 22
Global JScript variables 24
Examples of using JScript 26
Example 1 27
Example 2 28
Example 3 30

Part II Working with SAEAUT SNMP OPC Server 32

1 Product instalation 33

2 Product activation 37

3 The first start of SAEAUT SNMP OPC Server 37

4 The user interface (Overview) 40

Details 41
Dialog view 42
Monitor view 42
Toolbars and Status bar 43
Standard toolbar 43
Data manipulation toolbar 43
Tree view control 44
Address Space 44
Dialog View Device 45
Dialog View Folder 46
Dialog ViewTrap Folder 46
Dialog View OPC Item 47
Dialog View JScript OPC Item 50
Dialog View Global JScript Variable 52
Conversions 53
Simulation Signals 54
Alarm Definition 55
Digital Alarm 55

Limit Alarm ... 56
Navigation menu ... 57
File menu ... 57
New ... 58
Open ... 59
Save as ... 59
Connection properties ... 60
View server script ... 61
Make Active ... 61
Edit menu ... 62
New ... 62
Device ... 63
Folder ... 64
Trap ... 64
Data Item ... 65
Rename ... 66
Delete ... 67
Find ... 68
Find Results ... 70
View menu ... 71
Go menu ... 72
Tools menu ... 73
Options ... 73
IP Scanner ... 75
View Log Files ... 76
Compact / Repair Configuration database ... 76
Help menu ... 77

Part III How to 77

1 Methods how to configure SAEAUT SNMP OPC Server effectively ... 78
IP Scanner ... 88
MIB Browser (On-Line) - browsing SNMP variables from a connected Device ... 90
MIB Browser (Off-Line) - browsing SNMP variables a MIB file that describe Device ... 93
2 How to verify whether your SNMP device is available? How to use GET, SET operations from the server
The GET operation retrieves a value from a SNMP device. ... 97
The SET operation sets a new value in a SNMP device. ... 99
3 How to access SAEAUT SNMP OPC Server data through Internet ... 100
How to set the Access Rights for OPC XML-DA Wrapper ... 102
SAEAUT SNMP OPC Server available from Internet Explorer ... 106
4 How to use SAEAUT SNMP OPC DA and XML DA Client ... 106
Connection to SAEAUT SNMP OPC Server through OPC XML-DA 1.01 ... 109
Connection to SAEAUT SNMP OPC Server through OPC DA 3.0 ... 109
5 How to simulate SNMP device functionality on YOUR computer ... 110
6 How to work with SNMP TRAPs ... 110

Part IV FAQ 111

Part V Known issues 113

Part VI Support & Contacts 114

Index 115

1 Introducing SAEAUT SNMP OPC Server

Product SAEAUT SNMP OPC Server™ consists of two main applications for Windows operating systems - **configurator** (with user interface) and **runtime application** (without user interface) plus a few help applications and software modules. It is sold in three modifications - BASIC, ENHANCED and PROFESSIONAL.

SAEAUT SNMP OPC Server™ is supposed to be used with customer's OPC client applications. However, to gain experience with OPC client usage, some ready made OPC client applications are delivered within SAEAUT SNMP OPC Server™ . There are also source codes for some OPC clients that can be used as templates by development own OPC clients.

The configurator enables to configure *address space* (sometimes called namespace) and ways of data processing for the runtime application - the SNMP OPC server itself.

Runtime application is used as a **communication gateway between SNMP and OPC communication protocols**. Some interfaces (OPC DA, AE custom) are provided by the runtime application and some using wrappers (OPC DA automation, OPC XML DA, OPC UA).
There is also application (SAEAUT Web View) enabling reading /writing data using web browser.

Configurator itself contains OPC DA client (Monitor view) that can be used for debugging of integrated applications with SAEAUT SNMP OPC Server™ as well as a few productivity tools enabling fast configuring of big amounts of communication data points. Configuration is mostly saved to mdb database file.

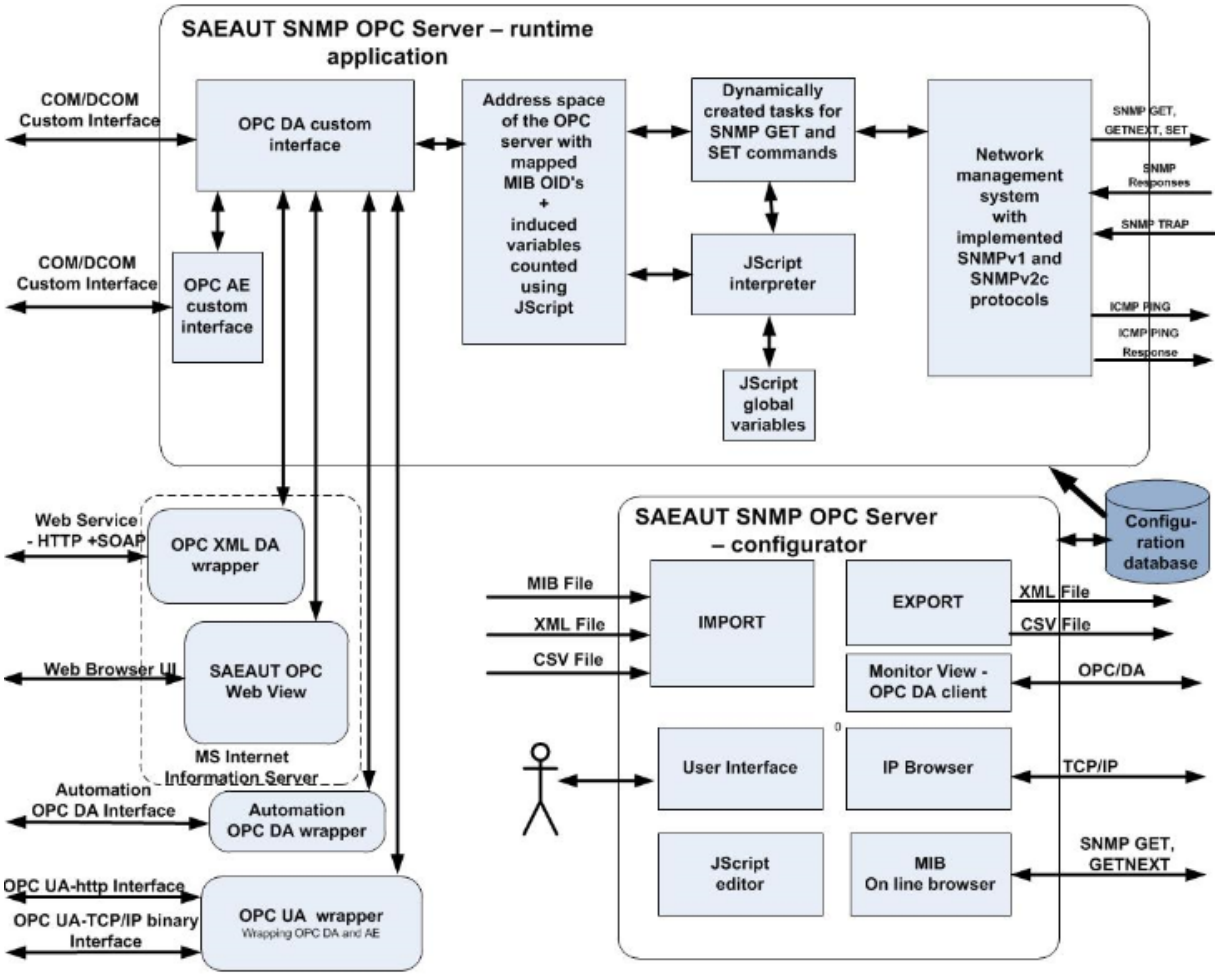


Figure: *SAEAUT SNMP OPC Server - configurator, runtime application, wrappers, interfaces, functionality overview*

SAEAUT SNMP OPC Server™ usage:

- Integration of monitoring and control of network communication infrastructure and other devices using the SNMP protocol with monitoring and control systems, SCADA and other applications using OPC interfaces.
- Alarming of devices communicating by SNMP protocol using OPC AE (UA) standard.
- Monitoring and control of devices with running SNMP agent.
- Monitoring and evaluation of the availability of unmanaged devices (without SNMP agent).
- Identification of devices using IP protocol in communication networks.
- Creating custom applications in JScript to communicate with devices using the SNMP protocol:
  - Recalculation of MIB variables by reading and writing them from / to devices using functions written in JScript
  - Calculation of induced variables, based on MIB variables from devices and other variables and objects provided by JScript engine
  - Store data in databases
  - Sending e-mails
  - Creating custom OPC servers
- Import of MIB variables from devices connected to manageable devices (with the SNMP agent) and

automatic configuration of address space of the OPC server
- Import of MIB variables from the MIB files to the address space of the OPC server
- Export and import directories from / into the address space of the OPC server from / to CSV files
- Providing access to the OPC server address space over Internet/intranet

1.1 How to buy SAEAUT SNMP OPC Server

You can place your order online, by fax /e-mail or by phone (+421 42 4450701). Online orders are processed immediately and therefore more quickly than other methods. It is the preferred method of ordering.

The modification of the SAEAUT SNMP OPC Server™ can be chosen according to the following features table.

SAEAUT SNMP OPC Server	Basic	Enhanced	Professional
SNMPv2c, SNMPv1	✓	✓	✓
OPC DA 3.0, 2.05, 1.0	✓	✓	✓
OPC AE 1.10 (Alarm management)	✓	✓	✓
OPC UA 1.01 wrapper	✗	✓	✓
OPC XML DA 1.01 wrapper	✓	✓	✓
Configuration tool	✓	✓	✓
Monitoring OPC client in configuration tool	✓	✓	✓
Max. number of connected devices	15	unlimited	unlimited
MIB Browser (On-line)	✓ (without an option to add new items)	✓ (full-featured)	✓ (full-featured)
MIB Browser (Off-line)	✗	✗	✓
SNMP GET/SET operations can be called from the configuration tool	✓	✓	✓
JScripts - possibility to use scripting	✗	✓	✓
IP Scanner	✗	✓	✓
Logging of runtime functionality to file	✓	✓	✓
Find tool	✓	✓	✓
SAEAUT SNMP Agent	✗	✓	✓
SAEAUT SNMP OPC Client	✗	✓	✓
OPC Client examples with source code	✓	✓	✓
Import from CSV file	✓	✓	✓
Export device data to CSV file	✗	✗	✓
Installing as Windows NT Service	✗	✗	✓
With SAEAUT OPC WebView	✗	✗	✓

Buy the SAEAUT SNMP OPC Server™ modification on line:

- PROFESSIONAL
- ENHANCED
- BASIC

1.2 SAEAUT SNMP OPC Server on Web

- FAQ on Web
- News on Web
- Newest documentation in pdf format
- **Buy SAEAUT SNMP OPC Server in e-shop**
- About SAEAUT SNMP OPC Server on Web
- YouTube

1.3 Usage

There are many devices that SAEAUT SNMP OPC Server™ can communicate using SNMP protocol with. From the beginning, this protocol has been used mainly for managing of network communication infrastructure consisting of computers,switches routers, bridges. Because of broad usage SNMP protocol within different operating systems, clearly defined meaning of variables within standardised and also enterprise and device specific MIB files, the creating of communication gateway for other communication standards is very useful.

OPC standards are very much used not only in industry but also in building automation and bussines applications. The most used standards is OPC DA. Its possibilities are complemented by OPC XML DA (that brings possibility of web service based communication) and the newest OPC UA standards that (except of web services and binary communication) brings higher interoperability and data modeling capability.

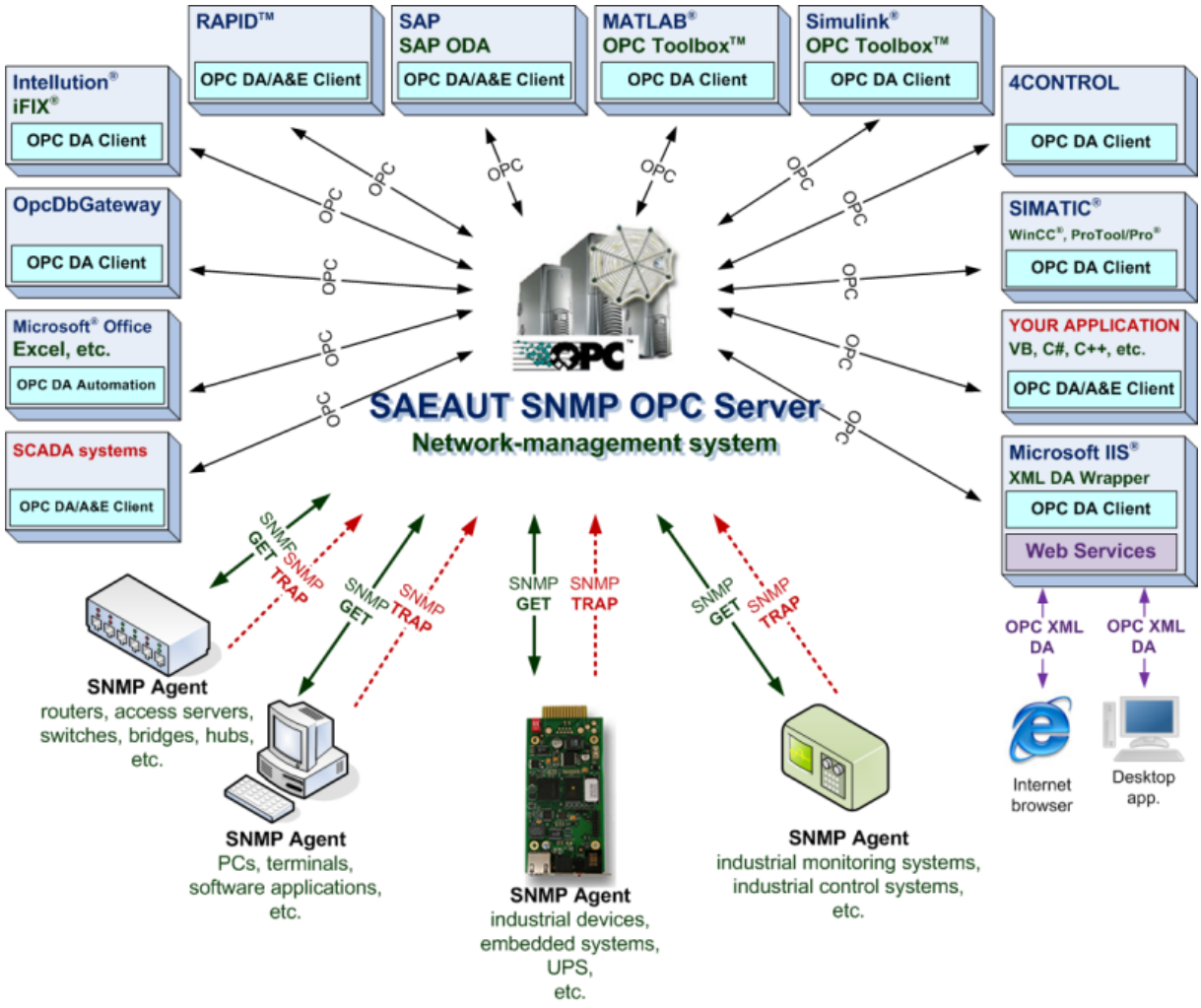


Figure : *Using of SAEAUT SNMP OPC Server.*

Built in JScript data processing brings not only the possibility of the preprocessing of transferred data but also possibility to integrate different not foreseen functionalities as saving of data to databases, sending them per mail and SMS...

For management of the network equipment SNMP manager working on workstation and SNMP agent running on network equipment are used. To be able to integrate this network management into the various HMI or SCADA systems, which include OPC clients, it is very useful to implemented SNMP manager into the application of OPC server.

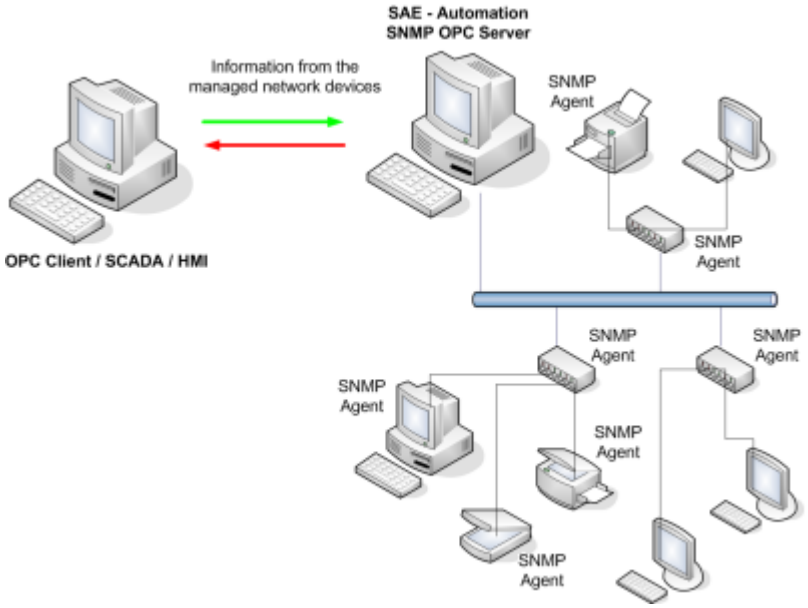


Figure: *SNMP usage for management of the network equipment.*

The product is supposed to be used with custom or third party OPC client applications. OPC client applications delivered with product should be used only to learn underlying technologies.

1.4 Features

SAEAUT SNMP OPC Server™ has following features:

- implementation of protocols **SNMPv1**, **SNMPv2c**
- implemented OPC specification **OPC DA 3.0, 2.05, 1.0 OPC Server**, **OPC Alarms and Events Version 1.10 a 1.0**
- from SNMP point of view, it acts as a **Network Management System**
- installation package is enhanced with **OPC XML-DA** and **OPC UA wrappers**, **OPC DA** and **OPC UA test clients**,
- runtime application cun run either as **out of process server** started by an OPC client localy or remotely. or as **Windows NT service******
- the possibility to manage unlimited number of devices with running SNMP agent using one of above mentioned SNMP protocols**
- using **ICMP ping** (RFC 792) to manage devices without running SNMP agent, **displaying of round trip time** as one OPC variable
- using SNMP (RFC 1157) commands **GET**, **SET** and **TRAP**
- processing data using **JScripts*** (Microsoft's dialect of the ECMAScript standard)
- support of **global JScript variables** enabling historical data processing*
- tags in address space of the OPC server are defined using MIB object identifier (Object ID), for example .1.3.6.1.4.1.2681.1.2.102; defined **Object ID's can be validated by input in OPC configurator**, data type are updated by validation process
- implementation of **on line MIB browser**, which requests SNMP manageable device for its SNMP variables corresponing to MIB objects and supplies user with MIB objects IDs, data types and vaules*off **
- **off line MIB browser** for import from MIB files
- if there are some traps defined, one special thread waits for any notification from SNMP OPC server in-built network management system (NMS)

- Module **IP Scanner**, which is used for scanning computer network in defined IP area*
- **Event logging** of SAEAUT SNMP OPC Server™ *
- Examples of OPC clients
- Source codes for OPC clients*

* These modules are available only in the Enhanced version, Dasic version doesn't support them
** Basic version has limited number (15) of the devices, which can be connected to server
*** Basic version include MIB Browser but without possibility to Adding new items
**** Only Professional

For development of own OPC client applications and reviewing of usability with third parties applications with OPC clients it is necessary to know interfaces implemented in the SAEAUT SNMP OPC Server™ runtime. They are listed in tables bellow.

Data Access Server Required Interfaces	1.0	2.0	3.0	SAE – Automation SNMP OPC Server
OPCServer				
IUnknown	Required	Required	Required	Supported
IOPCServer	Required	Required	Required	Supported
IOPCCommon	N/A	Required	Required	Supported
IConnectionPointContainer	N/A	Required	Required	Supported
IOPCItemProperties	N/A	Required	N/A	Supported
IOPCBrowse	N/A	N/A	Required	Supported
IOPCServerPublicGroups	Optional	Optional	N/A	N/A
IOPCBrowseServerAddressSpace	Optional	Optional	N/A	Supported
IOPCItemIO	N/A	N/A	Required	Supported
OPCGroup				
IUnknown	Required	Required	Required	Supported
IOPCItemMgt	Required	Required	Required	Supported
IOPCGroupStateMgt	Required	Required	Required	Supported
IOPCGroupStateMgt2	N/A	N/A	Required	Supported
IOPCPublicGroupStateMgt	Optional	Optional	N/A	N/A
IOPCSyncIO	Required	Required	Required	Supported
IOPCSyncIO2	N/A	N/A	Required	Supported
IOPCAsyncIO2	N/A	Required	Required	Supported
IOPCAsyncIO3	N/A	N/A	Required	Supported
IOPCItemDeadbandMgt	N/A	N/A	Required	Supported
IOPCItemSamplingMgt	N/A	N/A	Optional	Supported
IConnectionPointContainer	N/A	Required	Required	Supported
IOPCAsyncIO	Required	Optional	N/A	Supported
IDataObject	Required	Optional	N/A	Supported

Following table summarizes the OPC Alarms and Events ServerInterfaces interfaces supported by the SAEAUT SNMP OPC Server™ :

OPC Alarms and Events Server Interfaces	Version 1.0	Version 1.10	SAE -Automation OPC SNMP OPC Server
OPCEventServer			
IOPCCommon	Required	Required	Supported
IOPCEventServer	Required	Required	Supported
IOPCEventServer	Required	Required	Supported
IOPCEventServer2	N/A	Optional	Supported
IConnectionPointContainer	Required	Required	Supported
OPCEventAreaBrowser	Optional	Optional	Supported
IOPCEventAreaBrowser	Optional	Optional	Supported
OPCEventSubscription			
IOPCEventSubscriptionMgt	Required	Required	Supported
IOPCEventSubscriptionMgt2	N/A	Optional	Supported
IConnectionPointContainer	Required	Required	Supported

1.5 System requirements

- Computer/Processor Pentium II compatible CPU
- Memory: at least 128 MB (recommended 512 MB)
- OS: Windows XP and higher
- Already installed SNMP service
- Disk space: 40 MB for full installation

In addition:

- if you want to use XML-DA or SAEAUT OPC Web View, then the Internet Information Services (IIS) server is needed too. For more information please see the How to access OPC data from Internet/Intranet through Web Service.
- For UA SDK is necessary. NET Framework 3.0, respectively. 3.5
- UA Client requires the. NET Framework 4.0, respectively. 4.5
- The source code projects require either Visual Studio 6.0 or Visual Studio .NET 2003.

Related articles

How to use access through Web Service, OPC XML-DA Wrapper

1.6 Installed software and examples

Not all parts of the product SAEAUT SNMP OPC Server™ are installed within initial installation process. In the first step, following parts are installed:
- SNMP OPC Server - runtime application
- SNMP OPC Server - Configurator

Except of this, links to documentation and installation packages are copied and added to the start menu of the application. From that, they can be installed in next steps. Some of them have then own folder of the highest level in the start menu (see items SAEAUT SNMP OPC WebView and SAEAUT UA Data Access Client in the Figure bellow). From the start menu can be opened also OPC client example projects for MS Visual Studio.

Within the first installation step, are copied also:
- example configurations to the folder *x:\Users\user\Documents\SAEAUT SNMP OPC*

Server\Configurations\
- example MIB files to the folder x:\Program Files\SAEAUT SNMP OPC Server\mibs\
- example MIB files to the folder x:\Program Files\SAEAUT SNMP OPC Server\CSV
Within the first installation step, directory for log files Within the first installation x:\Users\user\Documents\SAEAUT_SNMP_OPC_Server\Log is created. Contrary to other directories, this folder is not removed by uninstall process.

SAEAUT SNMP OPC Server™ is often used for monitoring and control of uninterruptible power sources - UPS. Therefore it is delivered with example configuration SNMPConf UPS-MIB rfc1628.mdb where MIB variables according to the rfc1628.mib are mapped to the OPC server address space.

Some OPC functionality related dll's e.g. OPCDAAuto.dll and components e.g. OPC Enum are installed to System32 folder. There are also dll's ReleaseTrace.dll and TraceWorX.dll that belong to the module TraceWorX from ICONICS, Inc.

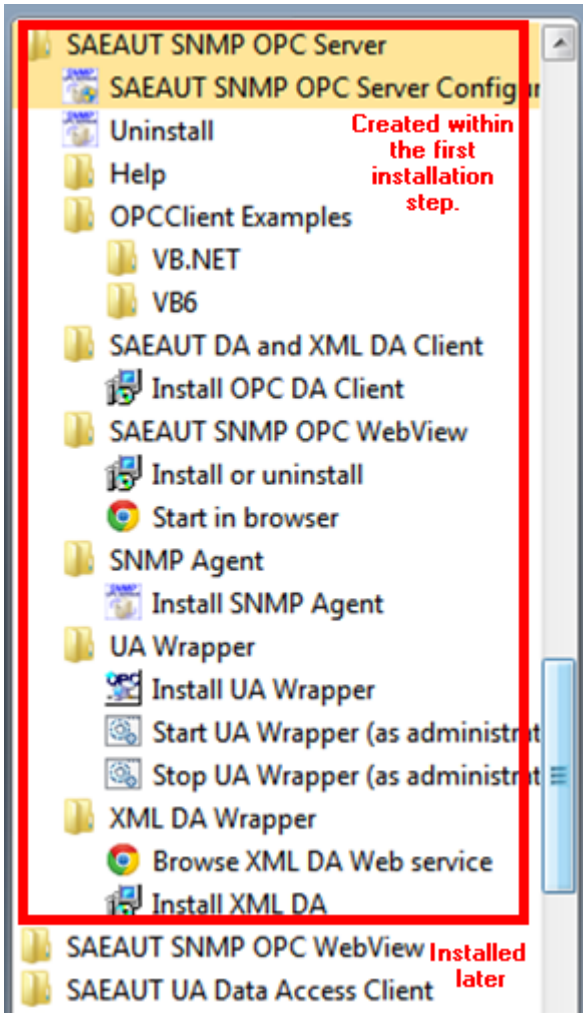


Figure: Start menu for SAEAUT SNMP OPC Server™

Next applications can be installed from folders of the SAEAUT SNMP OPC Server start menu (figure above):
- SAEAUT DA and XML DA client to learn OPC DA and OPC XML DA functionality
- SAEAUT SNMP OPC WebView - to access of the OPC DA address space from a web browser
- SNMP Agent - to learn working with SNMP agents on managed devices

- UA Wrapper - by instalation of that also SAEAUT UA Data Access Client and UA configuration tool (see in Start menu in OPC Foundation folder) are installed.
- XML DA Wrapper - to use HTTP SOAP communication

1.7 Background

In this topic you can find information about basic functionality and underlaying technologies used within SAEAUT SNMP OPC Server™ . The topic is divided into five chapters:

- Basic fubnctionality - what enables SAEAUT SNMP OPC Server™
- OPC - this chapter describes OPC technology, it gives a briefing about the background of OPC, about its fundamentals.
- SNMP - this chapter will bring you to the Simple Management Network Protocol (SNMP). It describes basic definitions, basic commands of this protocol and also mapping of the values which are stored in SNMP Agents (MIB files).
- ICMP ping
- JScript - this chapter shortly describes interpreted, object-based scripting language

1.7.1 Basic Functionality

SAEAUT SNMP OPC Server™ **runtime application** (Figure bellow) contains *SNMP Manager application* using SNMP commands GET for reading and SET for writing of variables from / to SNMP agents running on managed devices. When using SET and GET commands the communication is initiated by SNMP manager. SNMP agents on devices can also initiate communication using SNMP command TRAP.

Which variables have to be transferred between *SAEAUT SNMP OPC Server*™ and devices with running SNMP Agents is defined within **address space** (namespace) **of the SNMP OPC server** (address space is configured by **configuration application** of the SAEAUT SNMP OPC Server™) . SNMP OPC server makes these variables available for applications with OPC client interfaces. Address space can be configured as flat or as a tree structure. Tree structure of the address space can match the tree structure of OID for MIB variables. In this case, configuring of big amounts of MIB variables either by their **mapping from connected devices or from MIB files** can be very fast and easy.

Values transferred to / from devices can be **recalculated using *JScript*** engine within *SAEAUT SNMP OPC Server*™ runtime. (Within SNMP OPC server address space, also variables that have not related mapped variables on managed devices can be defined. Values of these variables can be affected by functionality of JScript itself.)

Variables from address space are available to applications with OPC client first of all through OPC DA interface. Directly within runtime application is implemented also OPC AE server that can generate alarms and events based on values of SNMP variables or variables affected by JScript engine functionality.

Available OPC server interfaces can be enhanced by OPC UA, OPC XML DA and OPC DA automation by wrappers delivered within product SAEAUT SNMP OPC Server™ .

Using SNMP agents running on managed devices, it is possible to transfer a lot of information, but SAEAUT SNMP OPC Server™ can gain leastwise information about availability also from unmanaged devices (without SNMP agent) . It is achieved using ICMP ping protocol. Every unmanaged device communicating with IP protocol can have defined variable within SAEAUT SNMP OPC Server™ address space where information about round trip time can be periodically actualised.

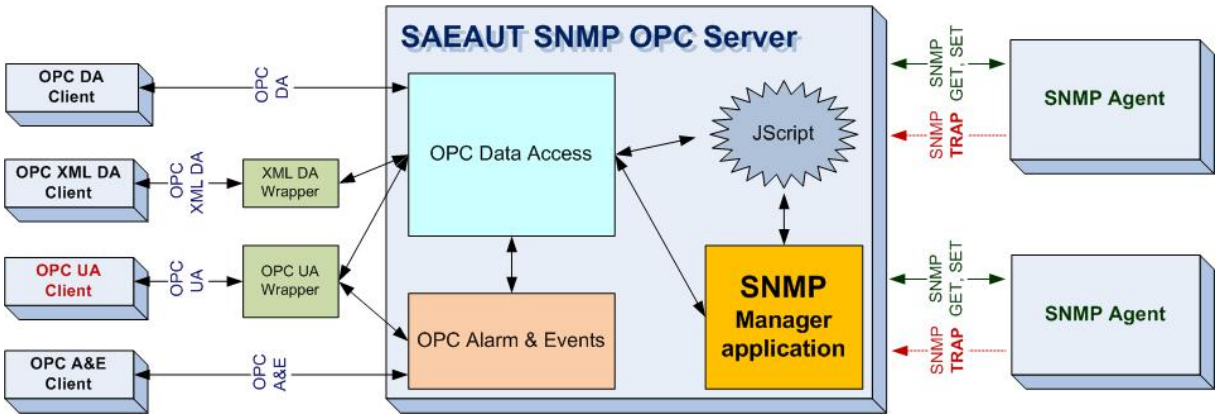


Figure: *Using of SAEAUT SNMP OPC Server (simple block diagram).*

1.7.2 SNMP

Background

The **Simple Network Management Protocol (SNMP)** is an application layer protocol (according to RFC 1157) that facilitates the exchange of management information between network devices. It is a part of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol suite. SNMP enables network administrators to manage network performance, find and solve network problems, and plan for network growth.

An SNMP-managed network consists of three key components: managed devices, agents, and network-management systems.

- A *managed device* is a network node that contains an SNMP agent and that resides on a managed network. Managed devices collect and store management information and make this information available to network-management system using SNMP. Managed devices, sometimes called network elements, can be routers and access servers, switches and bridges, hubs, computer hosts, or printers.
- An *agent* is a network-management software module that resides in a managed device. An agent has local knowledge of management information and translates that information into a form compatible with SNMP.
- An *network-management system* (NMS) executes applications that monitor and control managed devices. an network-management system provides the bulk of the processing and memory resources required for network management. One or more network-management systems must exist on any managed network.

SNMP Basic commands

Managed devices are monitored and controlled using three basic SNMP commands: **read**, **write**, and **trap**.

- The **read** command (GET) is used by an NMS to monitor managed devices. The NMS examines different variables that are maintained by managed devices.
- The **write** (SET) command is used by an NMS to control managed devices. The NMS changes the values of variables stored within managed devices.
- The **trap** command is used by managed devices to asynchronously report events to the NMS. When certain types of events occur, a managed device sends a trap to the NMS.

SNMP Management Information Base

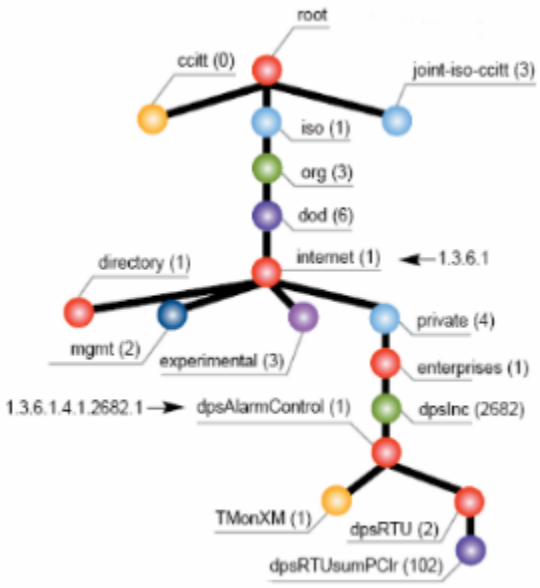
A *Management Information Base (MIB)* is a collection of information that is organized hierarchically. MIBs are accessed using a network-management protocol such as SNMP. They are comprised of managed objects and are identified by object identifiers.

A managed object (sometimes called a MIB object, an object, or a MIB) is one of any number of specific characteristics of a managed device. Managed objects are comprised of one or more object instances, which are essentially variables.

Two types of managed objects exist: scalar and tabular. *Scalar objects* define a single object instance. *Tabular objects* define multiple related object instances that are grouped in MIB tables.

An example of a managed object is atInput, which is a scalar object that contains a single object instance, the integer value that indicates the total number of input AppleTalk packets on a router interface.

An object identifier (or object ID) uniquely identifies a managed object in the MIB hierarchy. The MIB hierarchy can be depicted as a tree with a nameless root, the levels of which are assigned by different organizations.
The top-level MIB object IDs belong to different standards organizations, while lower-level object IDs are allocated by associated organizations.



Vendors can define private branches that include managed objects for their own products. MIBs that have not been standardized typically are positioned in the experimental branch.
The managed object atInput can be uniquely identified either by the object name—iso.identified-organization.dod.internet.private.enterprise.cisco.temporary variables.AppleTalk.atInput—or by the equivalent object descriptor, 1.3.6.1.4.1.9.3.3.1.

1.7.3 OPC

OPC History

OPC is an industry standard created in a collaboration of a number of leading worldwide automation and hardware software suppliers working in cooperation with Microsoft. The organization that manages this standard is the OPC Foundation. The Foundation has over 500 members from around the world, including all of the world's major providers of control systems, instrumentation, and process control systems.

Originally based on Microsoft's OLE COM (component object model) and DCOM (distributed component object model) technologies OPC defined a standard set of objects, interfaces and methods for use in process-control and manufacturing-automation applications to facilitate inter operability. The COM/DCOM technologies provided the framework for software products to be developed such that upward migration and support of legacy applications is provided as the foundation.

OPC provides common standard interfaces for the sole purpose of facilitating inter operability between software components for a variety of different applications. Different specifications have been specified to provide standard interfaces to address the various needs of the overall industrial automation marketplace, inclusive of supporting new technology and the ever changing needs of the marketplace.

OPC Fundamentals

OLE for process control (OPC) is a standard mechanism for communicating to numerous data sources. It is an open and effective communication architecture concentrating on data access.

OPC was based on Microsoft's OLE/COM (DCOM) technology for data exchange between applications. The OPC was designed by OPC Foundation organization.

The architecture of OPC is a client-server model. OPC servers and OPC clients may be provided by different vendors (vendor independence). More than one OPC clients can be connected to one OPC server at the same time (multi-client access). An OPC Client can connect to OPC servers running on different nodes of the network (network access).

OPC Servers

OPC servers can be divided into following types:

- **OPC Data Access**
- **OPC Alarms & Events**
- OPC Batch
- OPC Data eXchange
- OPC Historical Data Access
- OPC Security
- **OPC XML-DA**
- OPC Complex Data
- OPC Commands
- **OPC UA**

OPC DataAccess Servers provide the access mechanism for OPC Clients to get the current state of the device sources.

OPC Alarm&Event Servers provide the mechanisms for OPC Clients to be notified of the occurrence of specified events and alarm conditions. Provides alarm and event notifications on demand (in contrast

to the continuous data flow of Data Access). These include process alarms, operator actions, informational messages, and tracking/auditing messages.

OPC Data eXchange specification takes us from client/server to server-to-server with communication across Ethernet fieldbus networks. This provides multi-vendor interoperability! It adds remote configuration, diagnostic and monitoring/management services.

OPC Historical Data Access - where OPC Data Access provides access to real-time, continually changing data, OPC Historical Data Access provides access to data already stored. From a simple serial data logging system to a complex SCADA system, historical archives can be retrieved in a uniform manner.

OPC Security - All the OPC servers provide information that is valuable to the enterprise and if improperly updated, could have significant consequences to plant processes. OPC Security specifies how to control client access to these servers in order to protect this sensitive information and to guard against unauthorized modification of process parameters.

OPC XML-DA was developed to provide flexible, consistent rules and formats for exposing plant floor data using XML, leveraging the work done by Microsoft and others on BizTalk, SOAP, and other XML frameworks.

OPC Complex Data is companion specification to Data Access and XML-DA that allows servers to expose and describe more complicated data types such as binary structures and XML documents.

OPC Commands -set of interfaces that allow OPC clients and servers to identify, send and monitor control commands which execute on a device.

OPC Unified Architecture is new set of specifications that are not based on Microsoft COM that will provide standards based cross-platform capability.

vision of interoperability in multi vendor systems has become a reality, via the OPC standards. Certification is the process of ensuring that applications meet the standards. OPC Certification programs include Self-Certification, Interoperability Workshops and 3rd party testing by Independent Certification Test Labs.

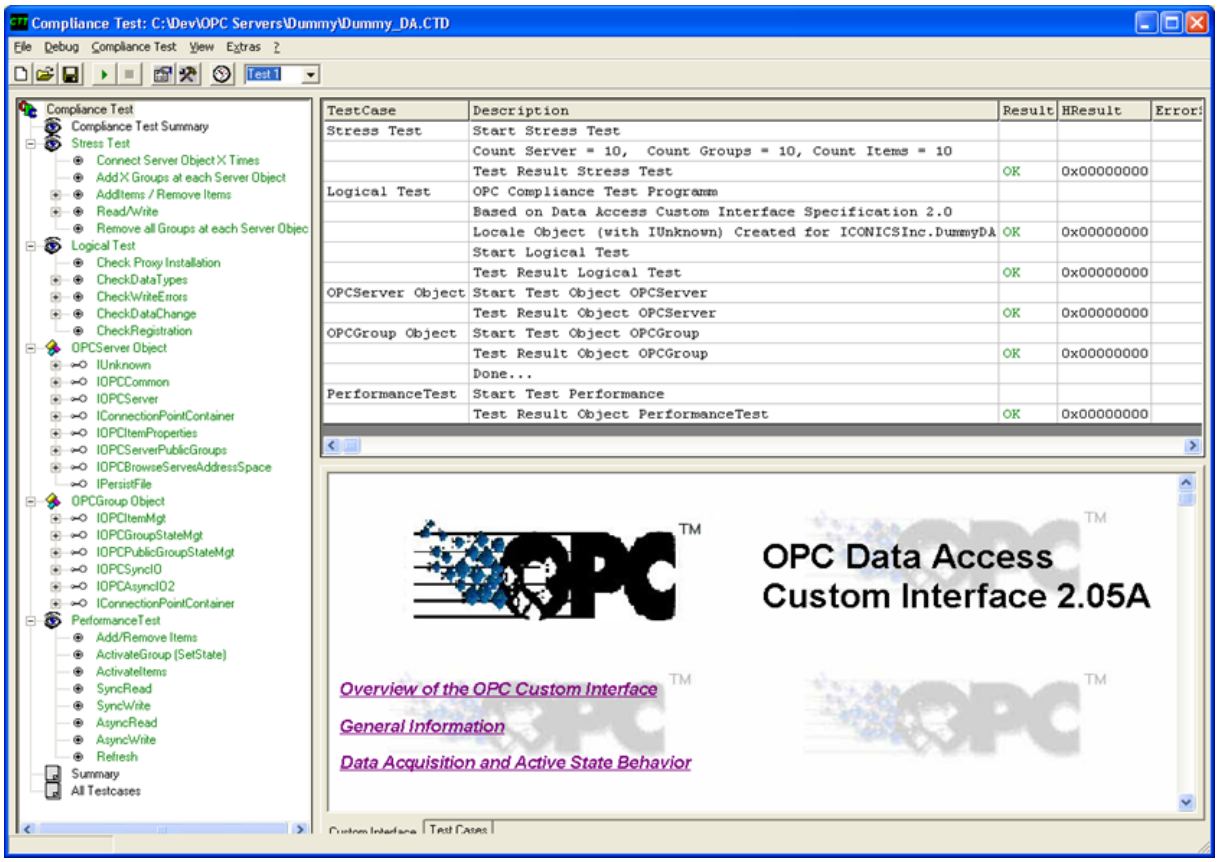


Figure: Tool to provide compliance test

OPC Server interfaces

An OPC client application communicates with an OPC server through the specified custom and automation interfaces. The custom interface can be used by function pointer oriented languages, such as C++. The automation interface can be used by script languages, such as Visual Basic. OPC servers must implement the custom interface, and optionally may implement the automation interface. OPC Foundation provides a standard automation interface wrapper, which can be used by any custom-server.

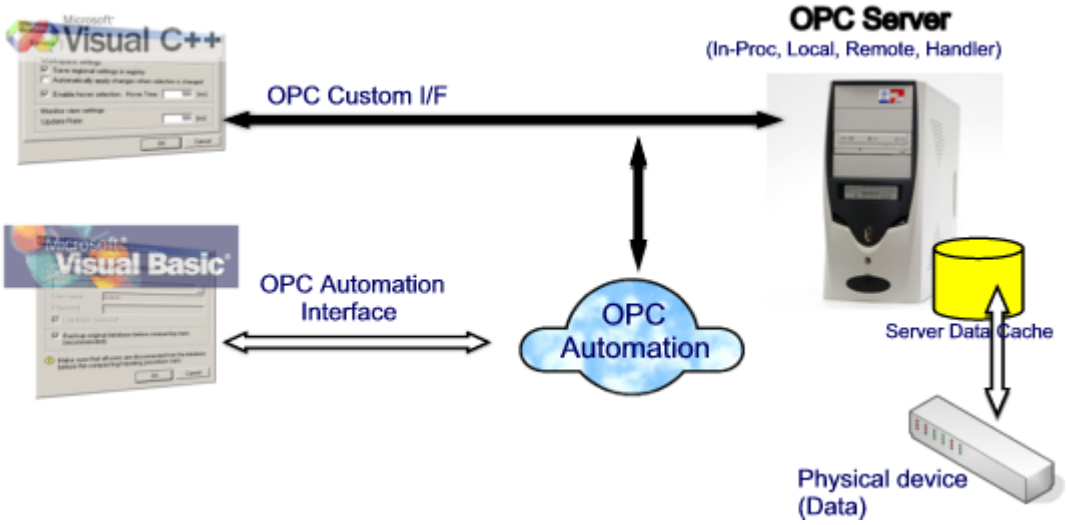


Figure *OPC client / OPC server cooperation over custom or automation interface.*

OPC Data Access Server

All OPC DA Servers are comprised of several objects: the server, the group, and the item.
The OPC server object maintains information about the server and serves as a container for OPC group objects. It provides functions such as getting of the server status information and browsing of the servers address space. The server address space is a set of all available data items of the server.

The OPC group object enables to group data items. Also, it enables data exchange between OPC server and OPC client. The OPC client can periodically read and write data to the items in the group. Also, the OPC group object enables to create exception based connections between the client and the items in the group. An OPC client can configure the rate at which an OPC server should provide the data changes to the OPC client.

The OPC item objects represent connections to data sources within the server. An OPC item, from the custom interface perspective, is not accessible as an object by an OPC client. Therefore, there is no external interface defined for an OPC item. All access to OPC items is via an OPC group object that "contains" the OPC item, or simply where the OPC item is defined.

The OPC item object is accessible as an object only from the automation interface perspective. It enables to maintain the item status and to read and write to the item.

All objects - server object, group objects and item objects are COM-objects. The methods of the objects are organized into logical groups - interfaces. These interfaces are common for all OPC servers. The OPC servers must have all required interfaces implemented. Some of the interfaces are optional. Optional interfaces do not have to be implemented.

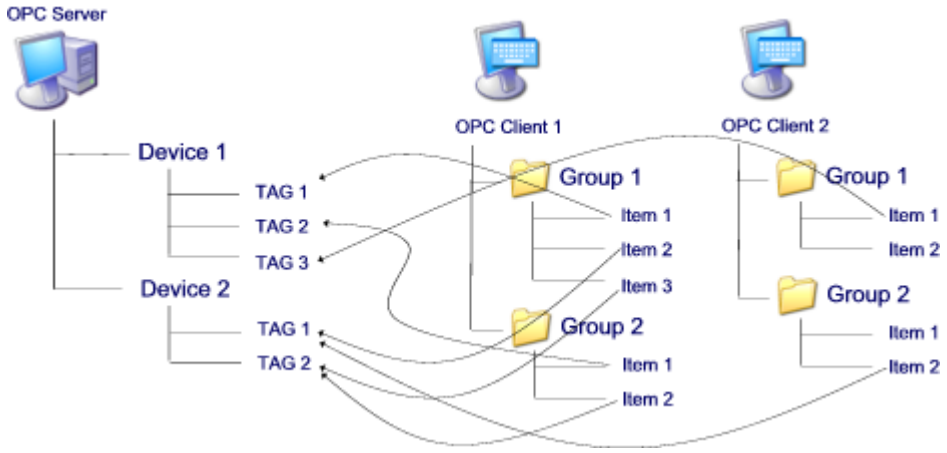


Figure: *OPC server / OPC client - mapping of data*

Data in the OPC server are organized either flat or in a tree structure. OPC server consists of devices, which can have items (tags) defined. Clients can than access signle items in the server or groups of items. On the side of a client it is created a tree structure, which includes groups that have items defined. The groups in general are not the same as the devices in the OPC server (but could be) and different client can have different groups of items defined. Single items could be repeated in the same client in the several groups. For each group, client can define different properties - for example different time of reading values of items in the group.

1.7.4 ICMP ping

Ping is a computer network administration utility used to test the reachability of a host on an Internet Protocol (IP) network and to measure the round-trip time for messages sent from the originating host to a destination computer.
Ping operates by sending Internet Control Message Protocol (ICMP - rfc 792) echo request packets to the target host and waiting for an ICMP response. In the process it measures the time from transmission to reception (round-trip time).

Within SAEAUT SNMP OPC Server™ , it is used two fold – to identify IP devices in network by configuring. (It functions only on devices that do not have disabled pinging), and for continual monitoring – cyclic measuring of round trip time of the unmanaged or also managed devices.

1.7.5 JScript

JScript is the Microsoft implementation of the ECMA 262 language specification (ECMAScript Edition 3). With only a few minor exceptions (to maintain backwards compatibility), JScript is a full implementation of the ECMA standard. The JScript is an interpreted, object-based scripting language. Although it has fewer capabilities than full-fledged object-oriented languages like C++, JScript is more than sufficiently powerful for its intended purposes. JScript is not a cut-down version of another language (it is only distantly and indirectly related to Java, for example), nor is it a simplification of anything. It is, however, limited. You cannot write stand-alone applications in it, for example, and it has no built-in support for reading or writing files. Moreover, JScript scripts can run only in the presence of an interpreter or "host", such as Active Server Pages (ASP), Internet Explorer, or Windows Script Host. JScript is a loosely typed language. Loosely typed means you do not have to declare the data types of variables explicitly. In fact, JScript takes it one step further. You cannot explicitly declare data types in JScript. Moreover, in many cases JScript performs conversions automatically when needed. For instance, if you add a number to an item consisting of text (a string), the number is converted to text.

SNMP OPC Server proposes two ways of data processing using JScript - recomputation of the value of existing OPC item (by reading, writing or both) or creation of new OPC item (called Script item) as a

result of procesing none, one or several SNMP values.

1.7.5.1 JScripts for data processing

SNMP OPC Server allows user to execute data pre-processing right inside the server runtime application using JScripts. It enables two ways of data pre-processing:

- recomputation of the value of existing OPC item associated with MIB variable on a connected device
- creation of new OPC item (called Script item) as a result of procesing none, single or several MIB variables.

In the first case, user can accomplish recomputation of OPC Item through the use of created JScript after read or write its value. When the new Data Item is created (user can check the check box *Use script* in the configuration dialog view. After that, in the edit box, two function headers for JScript are created. SNMP OPC Server allows user to define, when the JScript with processing algorithm will be executed - after reading of the OPC value or before writing of the OPC value. The processing of the value will be excuted in the following sequence (first reading, than writing).

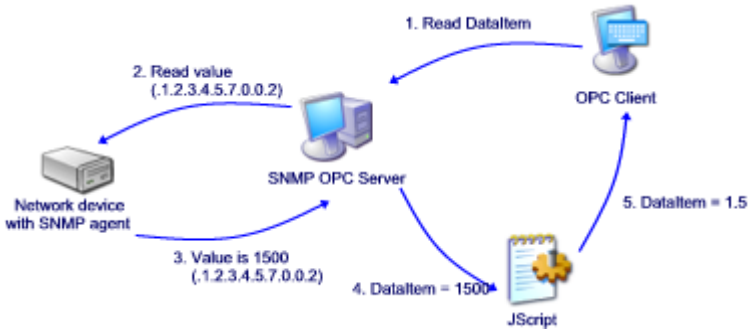


Figure: *Pre-processing by reading of value by OPC client.*

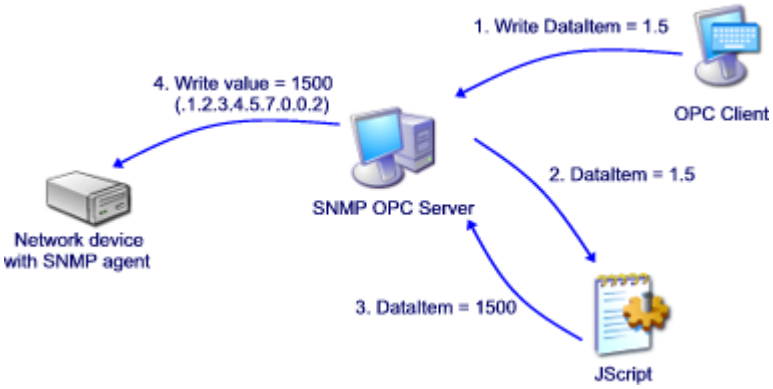


Figure: *Pre-processing by writing of value by OPC client*

This way of the data processing can be used e.g. in case of processing raw values to their engineering form. The disadvantage of this processing of the OPC item is possibility to process only one value without possibility to use futher OPC values in this JScript. However, by mentioned processing global JScript variables can be used within JScript functions and so to reduce mentioned limitation.

The second way to pre-process data right in the SNMP OPC Server is creating the new OPC item as JScript Item. This is special OPC Item, whose value is defined by return value of the JScript function, in which none, single or several SNMP values from defined SNMP devices stored in the database can

be processed .
For creation of such script Item, user has to push the right mouse button on the item Address space in Item list control. From the pop-up, command New -> Script item has to be choosen. (These items can't be organized in the folder structure and added to existing devices). After choosing this command following dialog will be displayed
The user can define the name of the new OPC (Script) item, its description and data type (the same data type as returned value of JScript is the condition for this data type value) here.
Next, user can define the items which will be presented as input arguments of JScript. These items can be already defined items with OID in the database or new OID items but from defined devices. If the user wants to use as input argument the existing SNMP values, than he can choose these values from he predefined list or he can type the new value os OID (in the box Device, the device which has the item with new OID, has to be choosen).

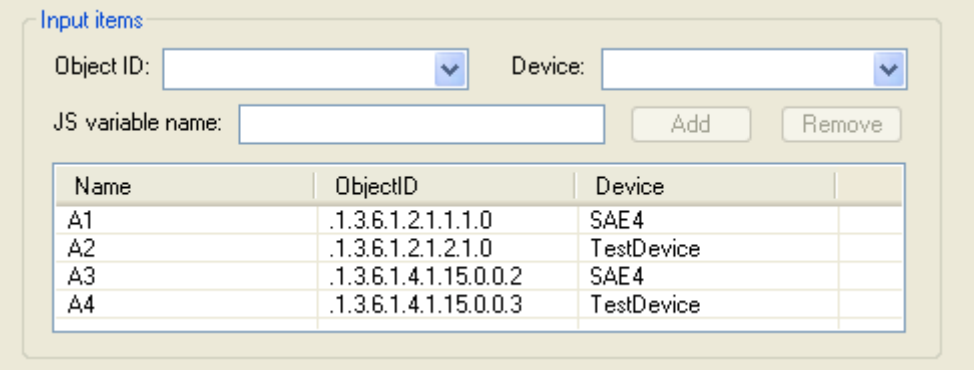


Figure: *Configuring of OID's that have to be used by computing JScript OPC item.*

In the edit box *JS variable name* (Figure above), user defines the name of chosen SNMP value which will represent this value in the JScript. Here user can find the list of all defined values that will be used as input arguments for JScript. The values can be also removed from this list.
The body of the JScript is in the bottom part of the configuraton dialog. The function header and input arguments are created automatically, user only defines the body of the script.

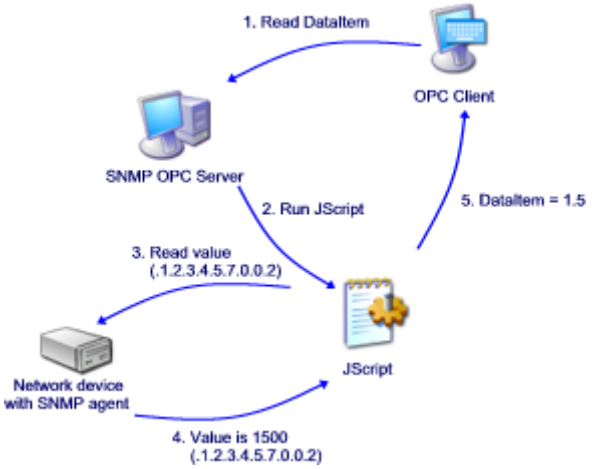


Figure: *Pre-processing by reading of JScript OPC item by OPC client.*

According to client's requirements for reading of this script item, the server starts the JScript, reads all input values, processes the JScript and then returns processed value back to the client.

1.7.5.1.1 Global JScript variables

Global JScript variables behave as standard global variables, it means they are visible and usable in any defined JScript. They can store and pass data actually or previously read, and thus enable processing over actual and historical data. Global JScript variables can be defined as numerical, string and array variables. Specially global variables of array type facilitate work with historical data.

Global JScritp variables are listed in a TreeView in a folder called Global JScript variables.
When adding a new variable, user right-clicks on this folder and chooses New Global JS variable item.

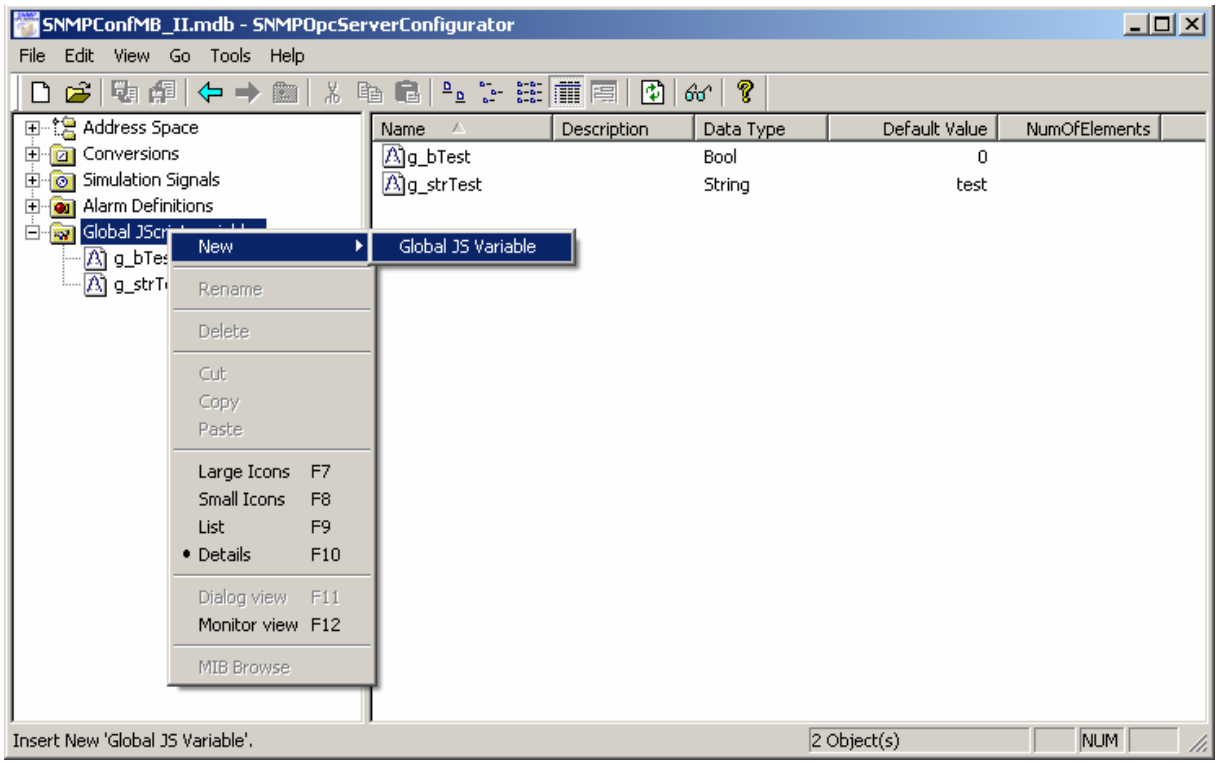


Figure: *Creating of new global JScript variable*

Defining of the variable is designed similaraly as of Data items. User defines unique name, chooses the data type of the variable and sets its default value. If user does not define default value, it is set to zero or empty string in case of string data type. In addition user can define an array of chosen data types with a specific length. Arrays are supported for all the data types apart from string data type.

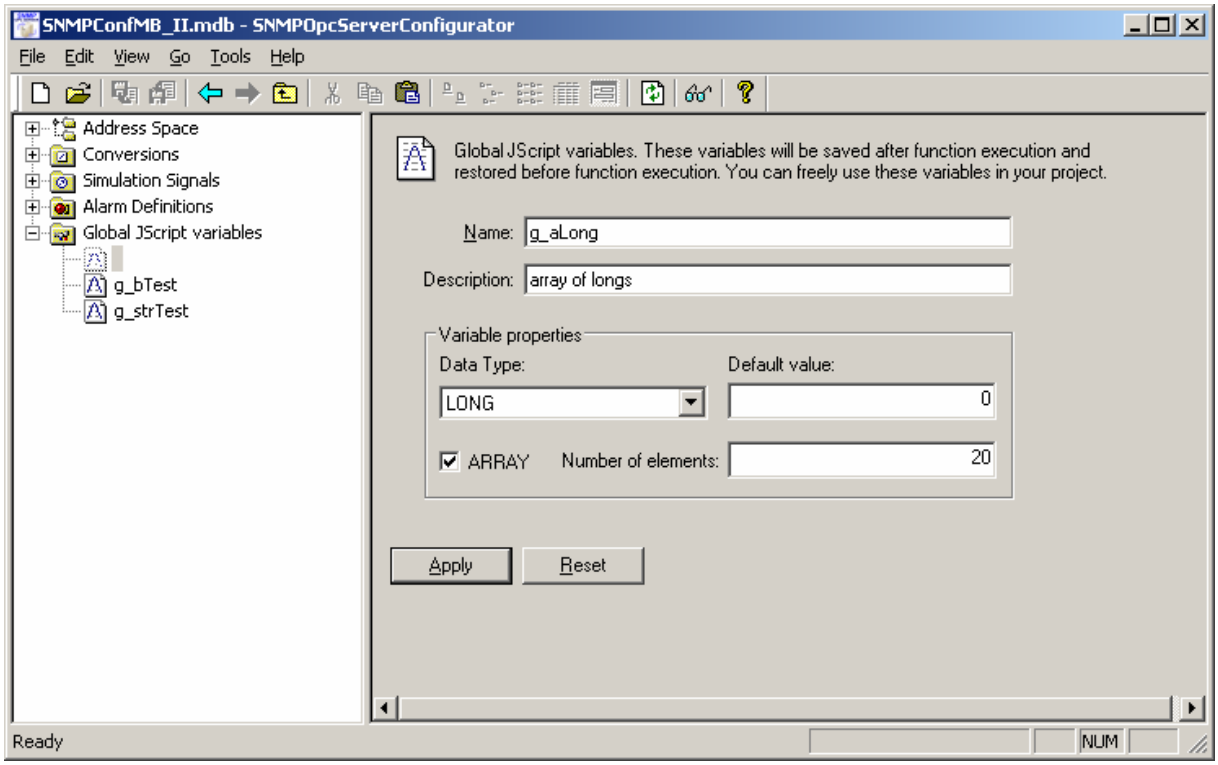


Figure: *Dialog View - global JScript variable*

Following example is a demostration of possible using of global variables in computing running average over ring buffer, which represents simple filtration of a variable. Used global variables are g_aInPkts (represents an array where the values of input SNMP packets (inPkts) are stored), g_nLength (represents the length of the array), g_nPointer (represents a pointer in an array).

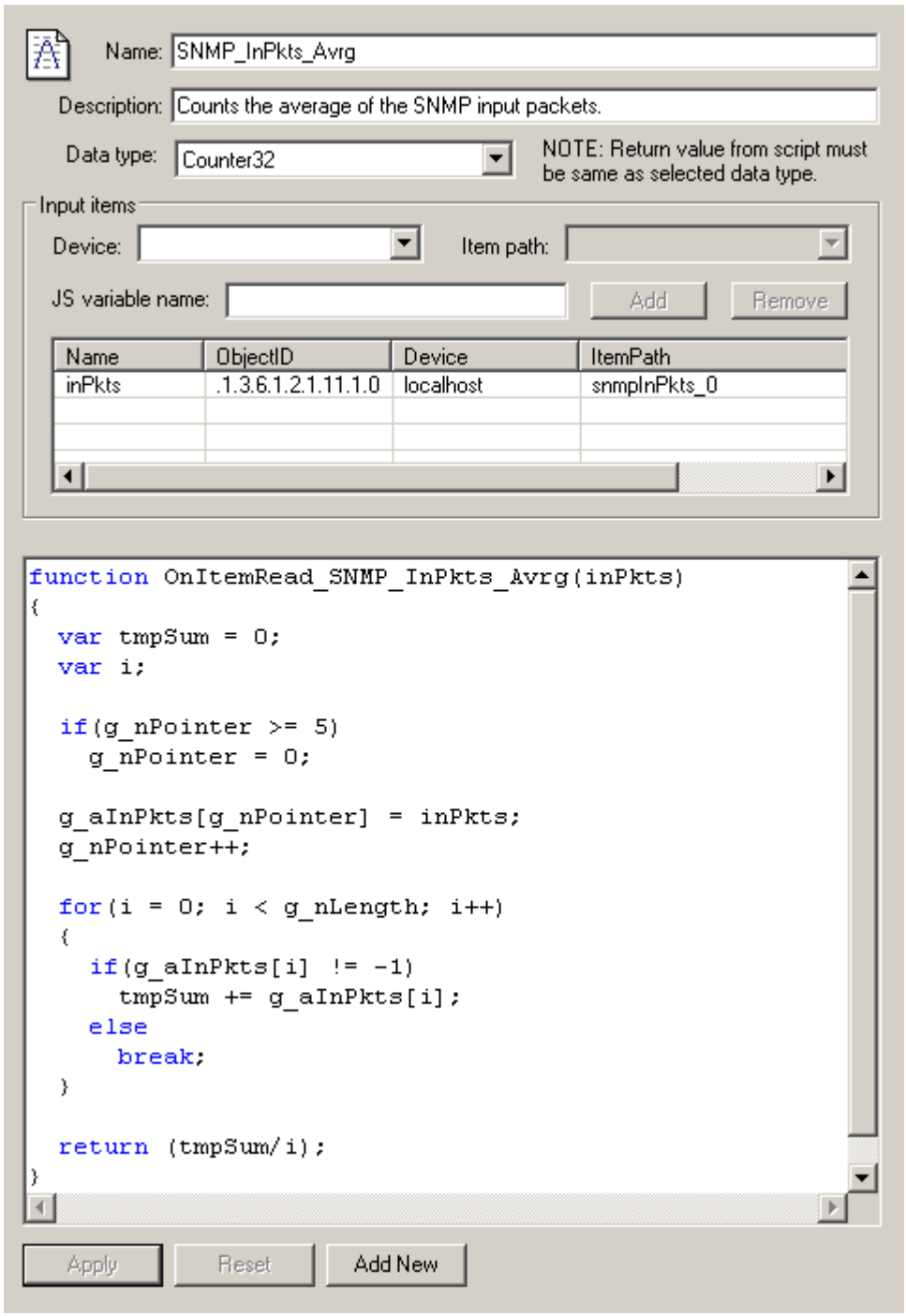


Figure: *Example of global JScript variable usage.*

1.7.5.1.2 Examples of using JScript

Using JavaScripts in SNMP OPC Server - Examples

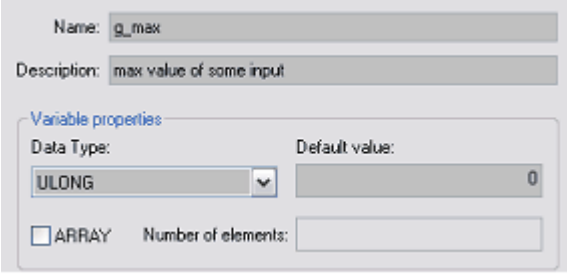
- Example 1 - Watch and test input variables, using of math functions
- Example 2 - Storing data in array, the processing of those data

- Example 3 - Control of the output, using of internal functions and user's defined functions

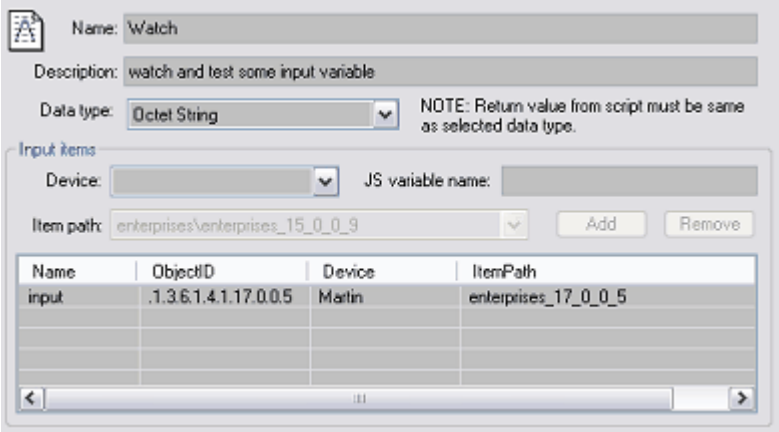
1.7.5.1.2.1 Example 1

This script reads the value of the given input Data Item, make some mathematical operations (sqrt, round), and than compare it with the max value saved as global variable. If this max value is exceeded, a warning text is shown, and new max value is set.

First, new global variable called g_max is created, to store the max value:



Second, a new Script Item called Watch is created. Than add new JS variable, set name to input, and set Item Path to the data item, that we want to watch.



And the script :

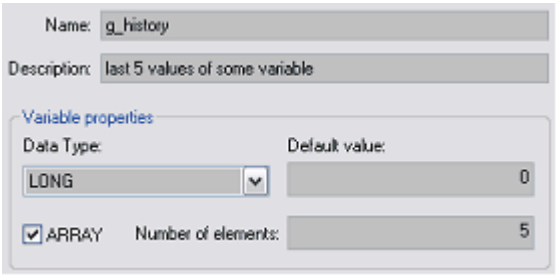
```
// watch given input, modify it, and if it is higher than
// max value, show message, and set new max value
function OnItemRead_Watch(input)
{
  var RetVal;

  // examples of mathematical operations
  var v = Math.sqrt(input);
  var r = Math.round(v);

  // compare with max value
  if ( r > g_max )
  {
    // if max value exceeded, show warning, and set new max
     RetVal = "MAX VALUE EXCEEDED";
    g_max = r;
  } else {
    // else everything OK
    RetVal = "VALUE IN RANGE";
  }

  return RetVal;
}
```

1.7.5.1.2.2 Example 2

Here we wil show :

- how to save last 5 values of some variable
- how to view these stored values to user
- statistical processing of these values, computing of average value

First, we need to create global array of size 5, we will call it g_history:



This array should be the same type as the watched item, in our case it is LONG. To save the values of this item into g_history array, the following script is used:

```
function
OnItemRead_MartinPC_enterprises_enterprises_15_0_0_4(enterprises_15_
0_0_4)
{
  // save last 5 inputs into g_history
  var i;

  // shift left values in g_history
  for ( i=0; i<4; i++ )
  {
    g_history[i] = g_history[i+1];
  }

  // set new top value
  g_history[4] = enterprises_15_0_0_4;

  return enterprises_15_0_0_4;
}

function
OnItemWrite_MartinPC_enterprises_enterprises_15_0_0_4(enterprises_15
_0_0_4)
{
  return enterprises_15_0_0_4;
}
```

The script to view these 5 values :

```
// function shows last 5 values of some input
// these values are saved in g_history global array
function OnItemRead_LastValues()
{
  var RetVal = "";
  var i;

  // show all values in []
  for ( i=0; i<5; i++ )
  {
    RetVal += "[" + g_history[i] + "]";
  }

  return RetVal;
}
```

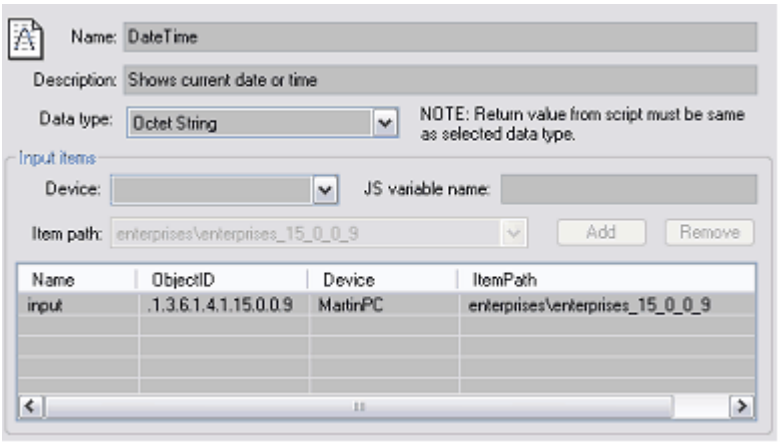
And the computing of average value :

```
// compute the average of values in g_history
function OnItemRead_Average()
{
  var RetVal = "";
  var avg=0.0;
  var i=0;

  // compute sum of the values
  for ( i=0; i<5; i++ )
  {
    avg += g_history[i];
  }

  // divide the sum with the number of elements
  avg /= 5;
  RetVal = "Average = " + avg;

  return RetVal;
}
```

1.7.5.1.2.3 Example 3

This example shows how to use JavaScript to control or configure the output of SNMP OPC Server, and how to use internal and user's defined functions. According to the input value, the output will show today's date, or current time.

First, new Script Item called DateTime is created:



Than add new JS variable input, and set the Item Path to the Data Item. The output is different, according to the input value:

0 – View today's date
1 – View current time
2 – View both, date and time
Other – Undefined command

And the script :

```
// according to input value, shows current date or time
// the input is a data item
function OnItemRead_DateTime(input)
{
  var RetVal;

  switch( input )
  {
    // if 0 show date
    case 0 : RetVal = GetCurrentDate();
             break;

    // if 1 show time
    case 1 : RetVal = GetCurrentTime();
             break;

    // if 2 show both, date and time
    case 2 : RetVal = GetCurrentDate();
             RetVal += "  ";
             RetVal += GetCurrentTime();
             break;

    // if 3 undefined commands
    default : RetVal = "UNDEFINED COMMAND";
              break;

  };
  return RetVal;
}

// get current date in format : "DD.MM.YYYY"
function GetCurrentDate()
{
  var s = "";

  dt = new Date();

  s = dt.getDate();                  // days
  s += "." + ( dt.getMonth() + 1 ); // months
  s += "." + dt.getFullYear();       // years

  return s;
}

// get current time in format "HH:MM:SS"
function GetCurrentTime()
{
  var s ="";

  dt = new Date();

  s = dt.getHours();             // hours
  s += ":" + dt.getMinutes();    // minutes
  s += ":" + dt.getSeconds();    // seconds

  return s;
}
```

2 Working with SAEAUT SNMP OPC Server

Steps that have to be / can be done depend on installed product modification. Following steps, described bellow are for the most complete modification – SAEAUT SNMP OPC Server™ PROFESSIONAL (in modifications BASIC and ENHANCED some steps can not / need not be done):

- Installation of SNMP services and MS IIS
  SAEAUT SNMP OPC Server™ runtime application uses services SNMP service and SNMP Trap that can be turned on as Windows OS features. Please turn them on. If you will use XML DA wrapper or SAEAUT OPC WebView install also Microsoft Internet Information Services

- Installation of base applications – Configurator and runtime application
  By installation of the product, first, only these two applications are installed. Others can be installed later from START MENU of the SAEAUT SNMP OPC Server™ .

- Installation of other applications if you will use them – OPC XML DA and OPC UA wrappers, SNMP agent, SAEAUT OPC WebView from START MENU of the SAEAUT SNMP OPC Server™ .

- Setting of Windows NT service features for SNMP OPC Server running in service mode (if required)
  There is possibility e.g. to set it to be started by start of the host computer

- Product activation – from demo mode to full featured mode
  It is provided using software license key.

- Start Configurator
  it will be started immediately after installation with demo configuration, or can be started from START MENU

- Configuration of:
  - Devices
    - Manually
    - Using IP scanner
  - Configuring of new simulation signals if you need them
  - Configuring of new alarm definitions if you will use OPC AE interfaces
  - Configuring of new conversions if you need them
  - OPC items / OID's
    - Directly using dialog OPC items dialog boxes
    - By scanning of connected devices for MIB variables
    - By import from MIB files
  - JScript processing by reading/writing of MIB variables
  - Pre-processing for OPC items mapped only to JScript variables
  - Define global JScript variables (if you need them)

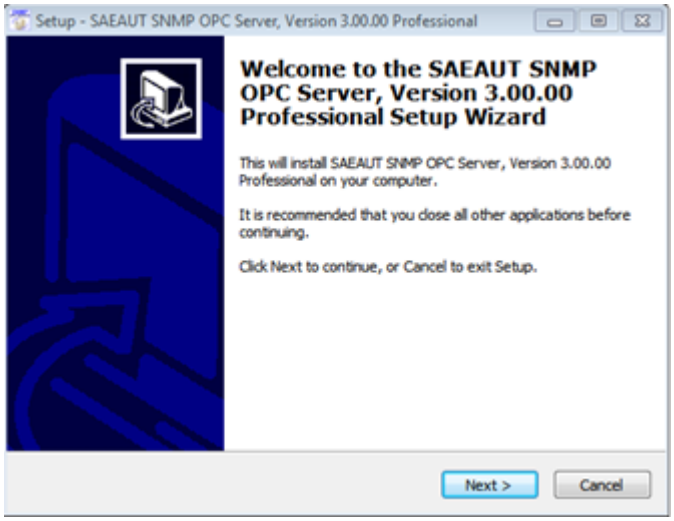
- Set options in Configurator

- Testing of pure SNMP communication with devices from Configurator
- Activation of the actual configuration
- Start OPC server runtime from Configurator and watch OPC item values in Monitor view
- View log files in Log file viewer if a problem occur
- Start of the wrappers (if necessary)
- Start of the SNMP OPC Server runtime as Windows NT service (if not started by an wrapper)

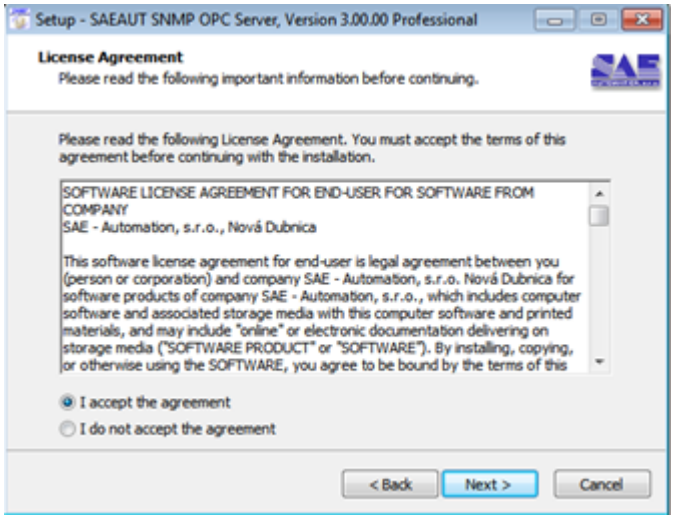
- Start of the SNMP OPC Server runtime by an OPC client application (if not started by an wrapper or as Windows NT service) .
- Use SAEAUT OPC WebView to read / write OPC items over Internet /intranetTest and learn using of TRAPs with SAEAUT SNMP Agent
- Use source codes of OPC client applications as templates by development of your own OPC client applications

2.1 Product instalation

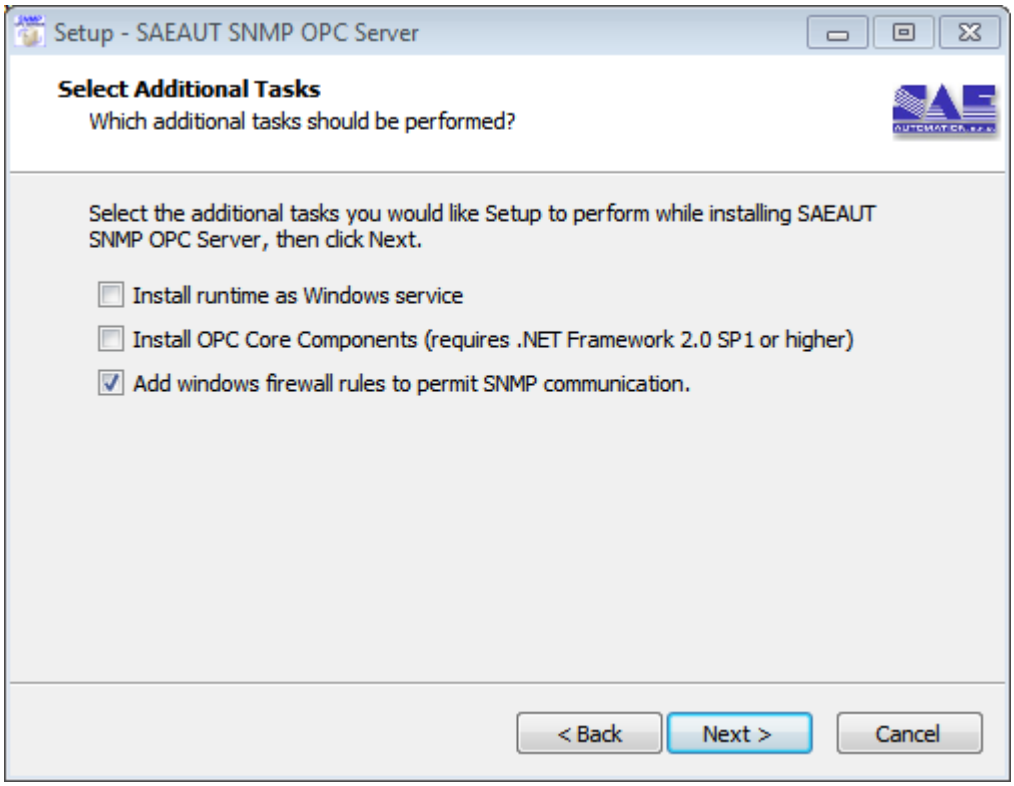
1. Lunch the installation application - the installation of SAEAUT SNMP OPC Server™ will be started



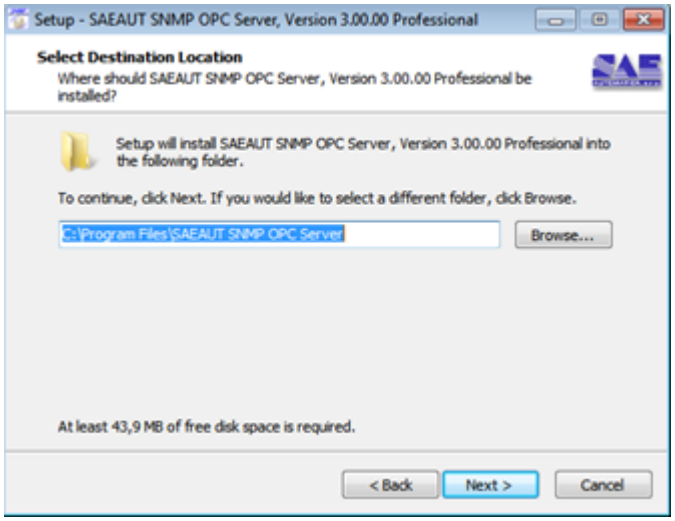
2. Confirm license agreement



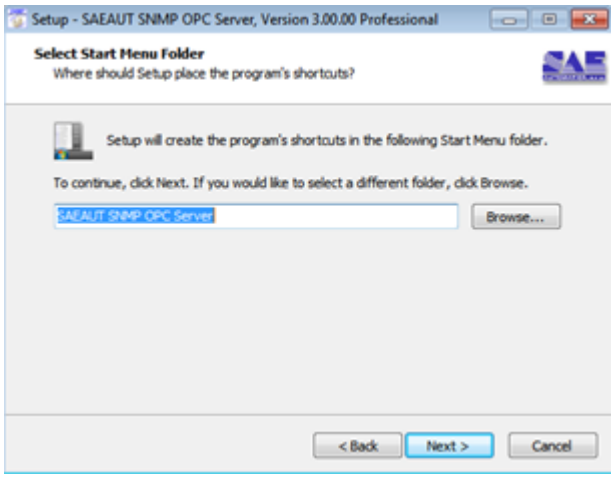
3 Select additional tasks
a) Choose the possibility to run SAEAUT SNMP OPC Server™ runtime as Windows Service if you like (it is possible only in SAEAUT SNMP OPC Server™ Professional)
b) Install OPC core components - mostly it is not necessary - all components to run runtime and configurator are installed anyway
c) Add Windows firewall rules and settings for SNMP and SNMP TRAP services (it they are installed). If you chose this option, you will mostly not need to configure settings for SNMP services by hand.



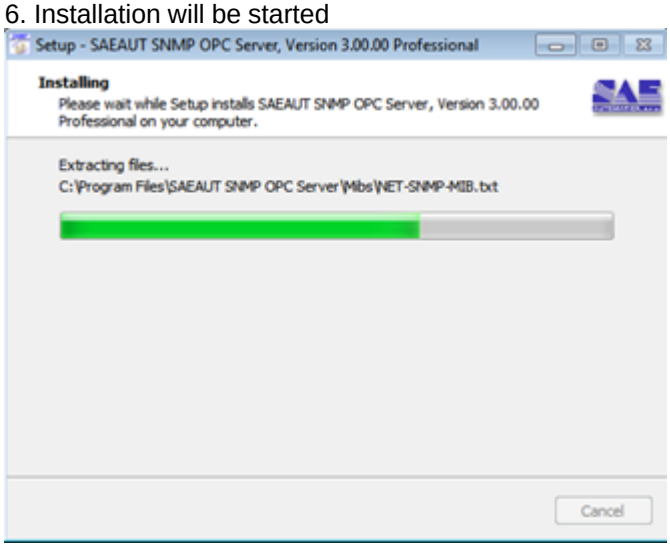
4. Chose placement of SAEAUT SNMP OPC Server™ - e.g. *c:\Program Files\SAEAUT SNMP OPC Server*



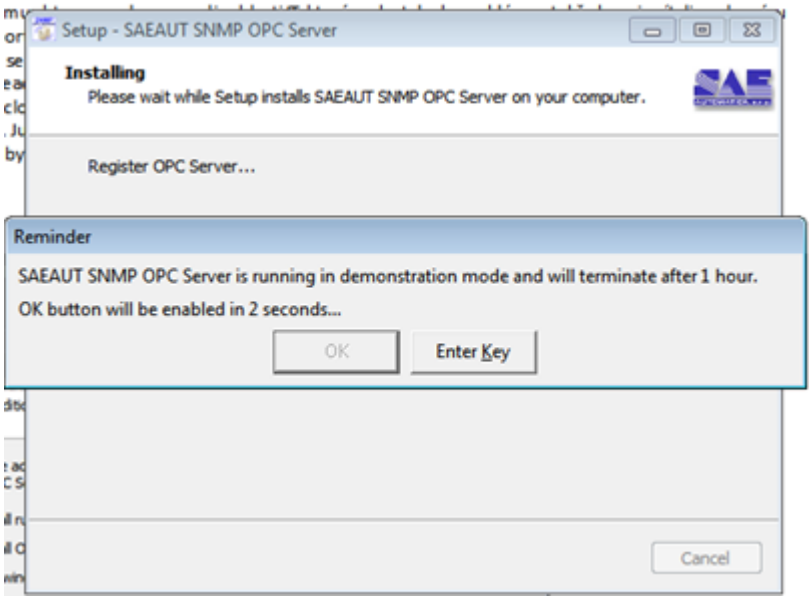
5.Chose placement in START Menu



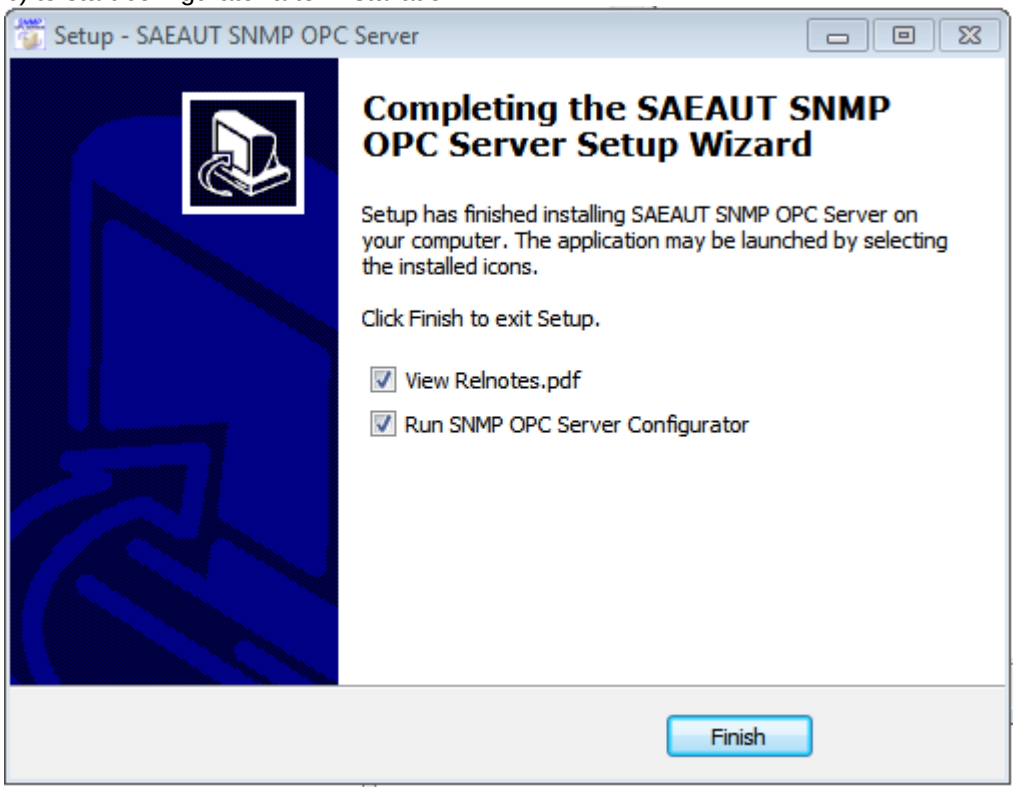
6. Installation will be started



7. When SAEAUT SNMP OPC Server runtime is registered you will see the reminder to "*Enter Key*". You can do it now, as described in Product activation, or any time later.



8. It is possible to choose
a) to open release notes after installation
b) to start configurator after installation.



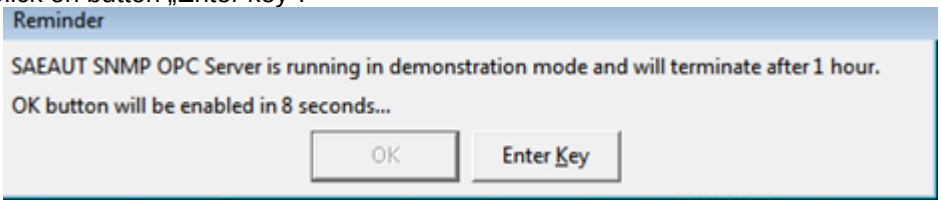
There are some products in the installation package that can be installed from start menu later if you need them.

2.2 Product activation

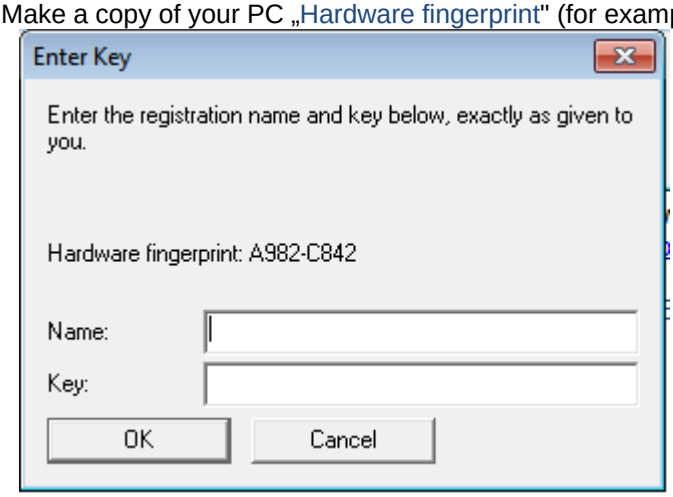
In order to activate your software product to full version you will need to enter a name and the license key. Please start the product you want to activate and click **Enter key** when asked about product registration. You will see the dialog window that shows hardware fingerprint. Please e-mail us this fingerprint and tell us the Name under which you'd like to activate your product. Based on this information we will send you back the license key that can be used to activate your product.

To activate SAEAUT SNMP OPC Server™ version:

1. Install application SAEAUT SNMP OPC Server™ on PC where it will run.
2. Launch the SAEAUT SNMP OPC Server Configurator (Start d Program Files d SAEAUT SNMP OPC Server d SAEAUT SNMP OPC Server Configurator).
3. Click on button „Enter key".



4. Make a copy of your PC „Hardware fingerprint" (for example: Hardware fingerprint: A982-C842)



5. Please send us your „Hardware fingerprint" and also Name (if you like) to e-mail sae-automation@saeautom.sk.

On the basis of your PC „Hardware fingerprint", we will generate the valid „Enter key" for your PC and send it back to you.

Please see the video about product activation.

Remark: It is possible to test full functionality of the SAEAUT SNMP OPC Server™ also without activation, but restart always after 1 hour of running is necessary.

2.3 The first start of SAEAUT SNMP OPC Server

Configurator Start

After installation of the SAEAUT SNMP OPC Server™ , in case that you picked out this option in the

last installation dialog box, configurator will be started with the demo configuration *SNMPconf*. If not, you can start it from the start menu using *SAEAUT SNMP OPC Server -> SAEAUT SNMP OPC Configurator*.

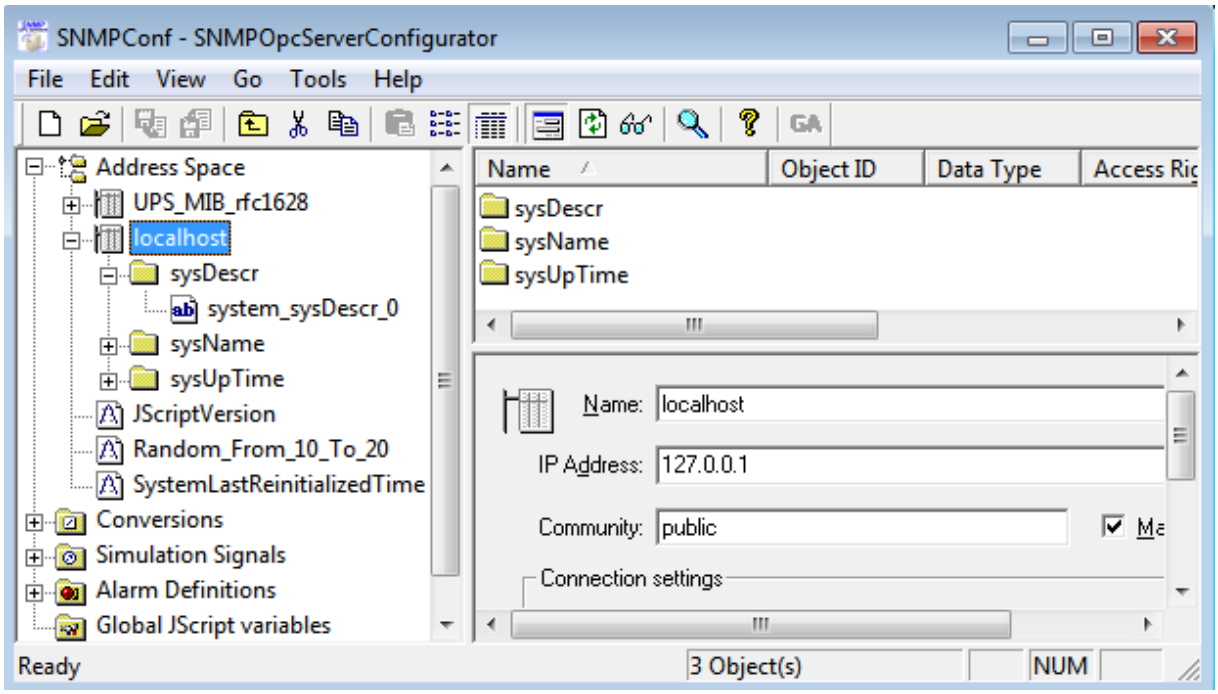


Figure 1: Configurator with demo configuration SNMPConf.

Within tree view Address space (*Figure 1*) you will see preconfigured two devices – ***UPS_MIB_rfc1628*** (for now, we will not work with that) and ***localhost*** (there are preconfigured some MIB variables that can be accessible on your computer in case that Windows service the SNMP Service is running) . There are also some **JScript variables** – *JScriptVersion*, *Random_From_10to_20*, *SystaemLastReinitialisationTime*.

Runtime Start

As the configurator contains an OPC client (Monitor View) we can use it to start SNMP OPC Server within runtime application. (If you chose *Install as Windows Service* during installation it will be already started and OPC client only connect to that.)
Please click on menu-item *View -> Monitor View* or toolbar-item *Monitor View*.

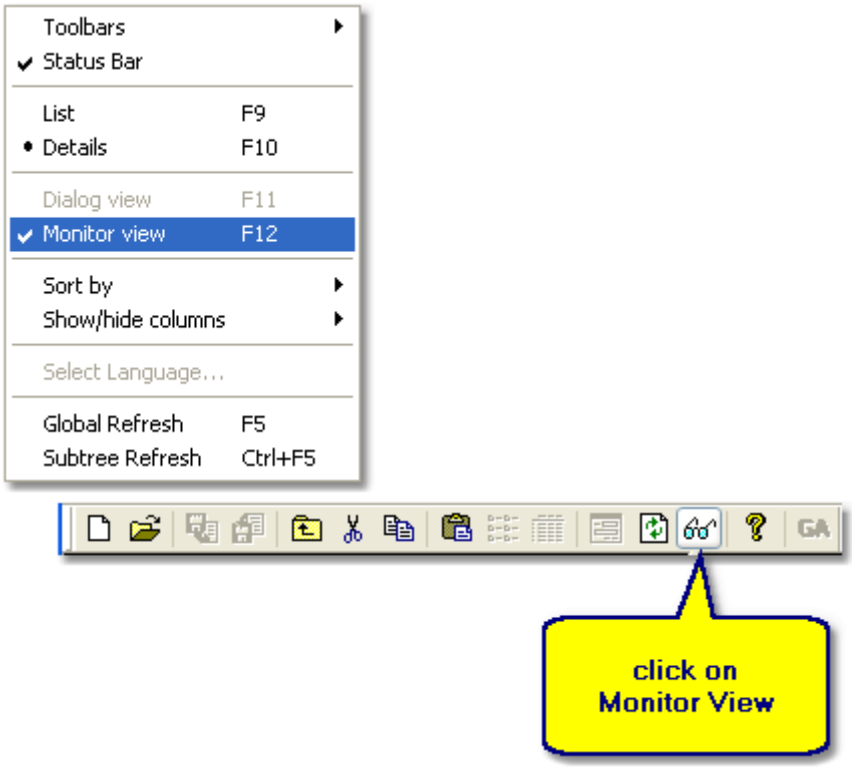


Figure 2: Start Monitor View OPC client

After that, Monitor View in the configurator will be open. But, we will probably see none OPC items in that. To be able to see OPC items from a folder under the folder Address space in tree view, we need to **click on the folder from that we want to watch OPC items**. To watch the JScript variables we can click on *Address space* folder itself. Now we can see values of the JScript variables in the Monitor View and also their **Quality** and **Time stamps**. These variables are not mapped on any MIB variables. They show return values of functions running within JScript engine. Their quality should be good even if SNMP service does not run.

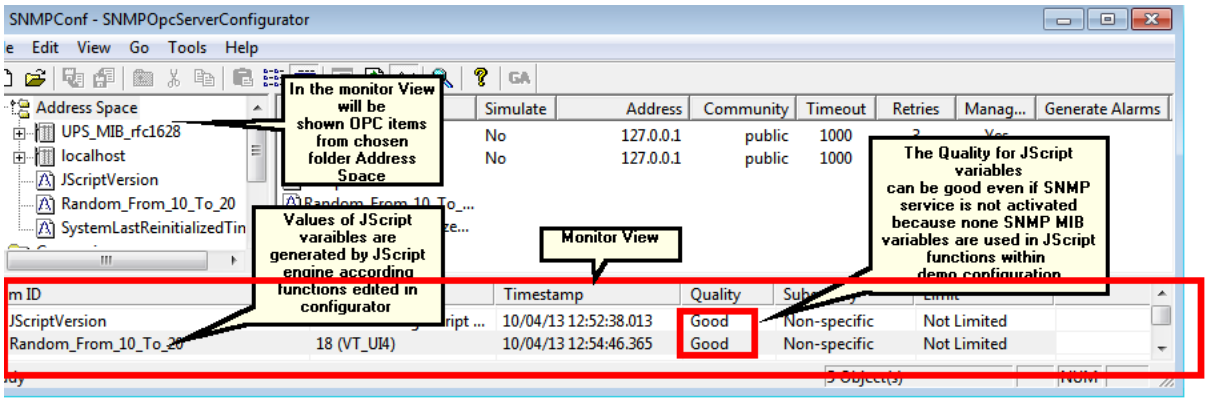


Figure 2: JScript variables in Monitor View - they show return values of functions programmed using JScript

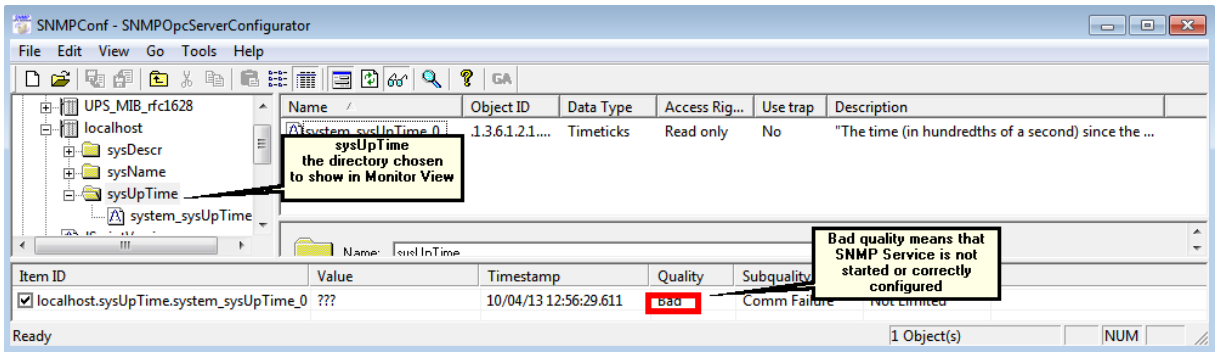


Figure 2: OPC Item related to MIB variable in Monitor View.

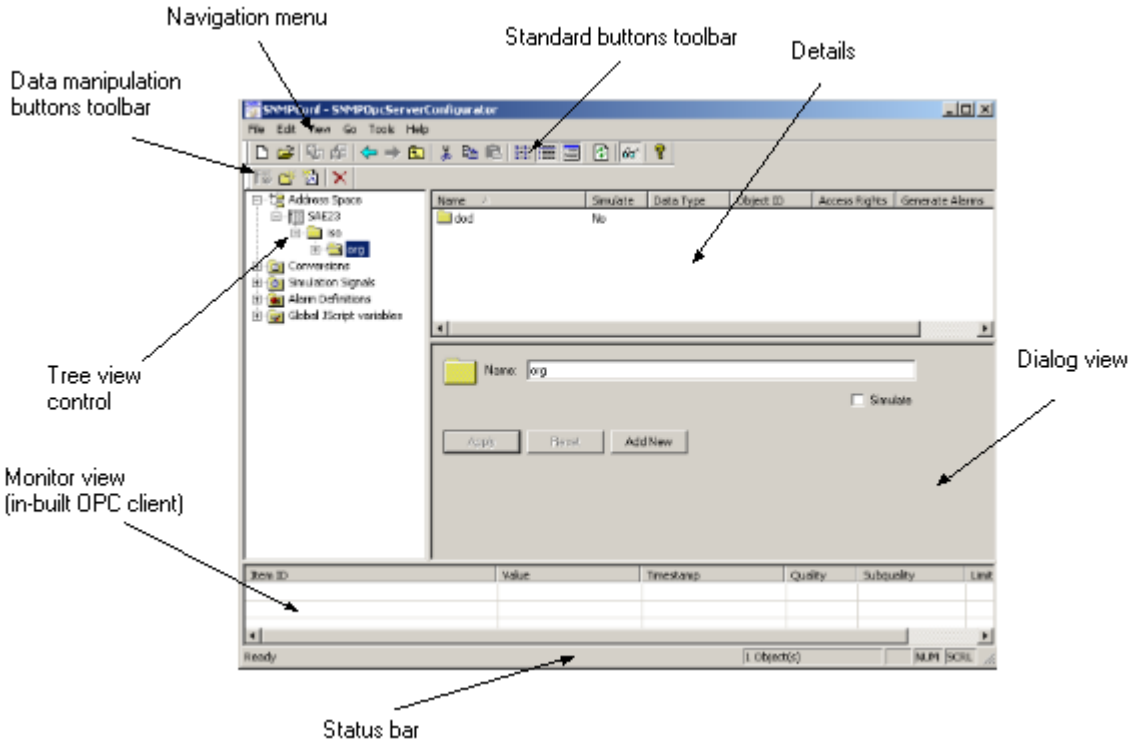
Remark: By installation of the SAEAUT SNMP OPC Server™ also the SNMP Service in Windows is configured and started. However, by next start of your computer it may be will not be running if you have not configured it to start when computer is starting. There can be also problem with configuring SNMP Service by installation in case that you have not installed SNMP Service in advance. In such case please set it by hand as described in white paper or shown in video.

Related articles

How to access SAEAUT SNMP OPC Server data through Internet
How to use SAEAUT SNMP OPC Client

2.4 The user interface (Overview)

The configurator is the graphic configuration part of the SNMP OPC server, which helps user to configure the SNMP OPC Server. The configurator display is divided into several parts



- Navigation menu
- Toolbars
- Tree view

2.4.1 Details

For folders Address Space, Conversions, Simulation Signals, Alarm Definition and subfolders of the Address Space folder you can display the Details. It is the table with the information about all items in the selected folder.

In this Detail view you can order items by each column by command **View→Sort by...**. And you can hide or display columns by command **View→Show/Hide columns**.

Details for Address Space

Name	Simulate	Address	Community	Timeout	Retries	Managed
SAE4	No	192.168.16.81	private	1000	3	-1

Details for Conversions

Name	Type	Low EU	High EU	Low IR	High IR	Clamping	Low Clamp	High Clamp
Default Linear	Linear	0	100	0	10000	Clamp on EU	0	100
Default Square Root	Square Root	0	100	0	10000	Clamp on EU	0	100
None (to/from float)	None	0	100	0	10000	None	0	100

Details for Simulation Signals

Name	Type	Amplitude	Number of steps	Period	Phase	Position	Ratio
100*Ramp(T)	Ramp	100	3	1	0	0	0,333333333333333
100*Ramp(T/10)	Ramp	100	3	10	0	0	0,333333333333333
100*Ramp(T/100)	Ramp	100	3	100	0	0	0,333333333333333
100*Random	Sine	100	3	1	0	0	0,333333333333333
100*Sine(T)	Sine	100	3	1	0	0	0,333333333333333
100*Sine(T/10)	Sine	100	3	10	0	0	0,333333333333333
100*Sine(T/100)	Sine	100	3	100	0	0	0,333333333333333
100*Square(T)	Square	100	3	1	0	0	0,333333333333333
100*Square(T/10)	Square	100	3	10	0	0	0,333333333333333
100*Square(T/100)	Square	100	3	100	0	0	0,333333333333333
100*Step(T)	Step	100	3	1	0	0	0,333333333333333

Details for Alarm definitions folder

Name	HiHi Val.	Hi Val.	Lo Val.	LoLo Val.	Dig. Value
Default Limit Alarm (0-10-90-100)	100	90	10	0	
Demo Limit Alarm	90	80	-80	-90	
Faster Limit Alarm (0-10-90-100)	100	90	10	0	
Default Digital Alarm (on TRUE)					True (1)
Demo Digital Alarm					True (1)
Faster Digital Alarm (on TRUE)					True (1)

2.4.2 Dialog view

There is a dialog view for every item in tree view as well as for items that can be chosen from navigation menu. They will be described in next chapters.

For example, the dialog view to define parameters for devices is in the figure bellow.

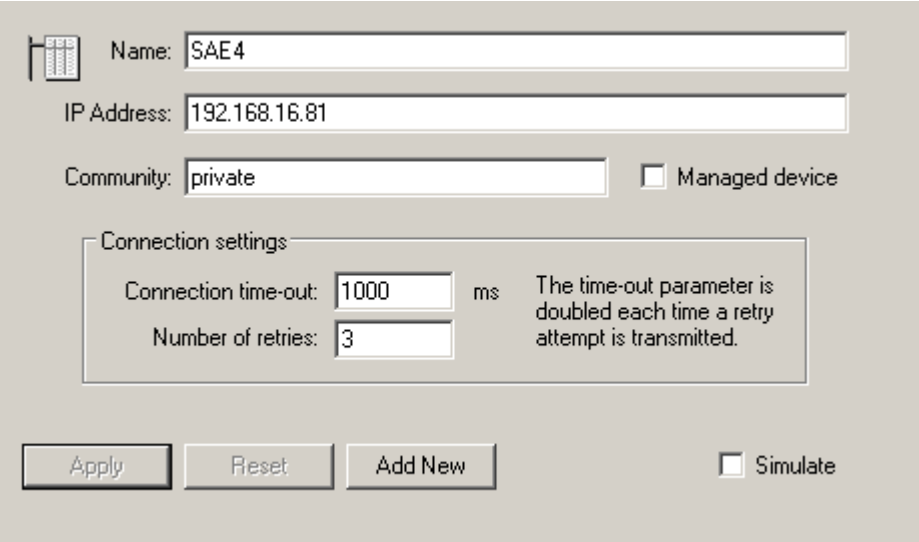


Figure: *Dialog view used to define parameters for devices.*

All dialog views of the address space contain the same buttons:

Apply
Values written in the view will be saved to the configuration.

Reset
Values written in the view will be replaced by original values from configuration or by default values.

Add New
New item of the same type will be created and filled by default values that can by edited

Some dialog views contain check box **Simulate**. When checked in, instead of values from devices, within OPC items in given folder, values of simulation signals (if defined for the OPC item.) will be published.

2.4.3 Monitor view

The Monitor view is the in-built OPC DA client application. After this command the application will start reading/writing data from/to the SNMP devices and it will display the results in the following view.

Item ID	Value	Timestamp	Quality	Subquality	Limit
☑ SAE4.Int	10 (VT_I4)	07/04/05 12:33:39.431	Good	Non-specific	Not Limited
☑ SAE4.Str	"Test trap" (VT_BSTR)	07/04/05 12:33:39.431	Good	Non-specific	Not Limited

Figure: *Monitor view*

See also
The first start of SAEAUT SNMP OPC Server

2.4.4 Toolbars and Status bar

In the Configurator of the SNMP OPC Server there are two types of toolbar available. The first is the toolbar with Standard buttons and then the toolbar for Data manipulation.

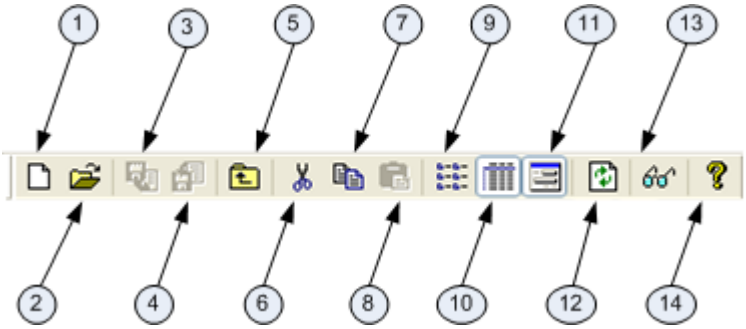
- Toolbar with standard buttons - Standard toolbar

- Toolbar with buttons for data manipulation - Data manipulation toolbar

There is also the Status bar available on the bottom of the Configurator window

2.4.4.1 Standard toolbar

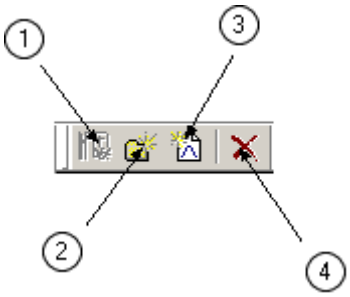
There are following buttons with predefined functions in Standard toolbar



1. Create New project
2. Open project from the hard-drive
3. Not used
4. Not used
5. Move up one level
6. Standard Cut button
7. Standard Copy button
8. Stabndard Paste button
9. List in Details table
10. Display or hide Details table
11. Display or hide Dialog view
12. Refresh of Item list
13. Internal monitoring client
14. Help file

2.4.4.2 Data manipulation toolbar

There are following buttons with predefined functions in Data manipulation toolbar



1. Create new Device
2. Create new Folder
3. Create new Data Item
4. Delete item

2.4.5 Tree view control

The SNMP OPC Server can define 5 categories of the items. All are stored in the Item list control. The following picture shows this control.

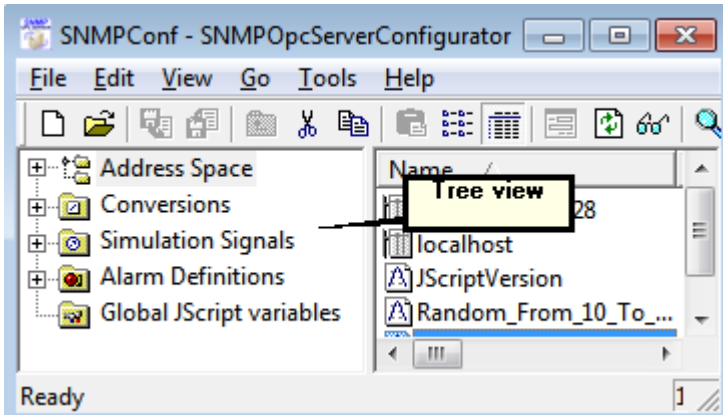


Figure: *SAEAUT SNMP OPC Server configurator - tree view*

There are following items:

1. Address Space - contains *Device*s and the *Data items* related to MIB variables from managed devices or round trip time of the ICMP ping for unmanaged devices. The data items can be organized in a folder structure.
2. Conversions - SNMP OPC server allows you to create some conversion functions for reading / writing the values from / to SNMP Agents
3. Simulation Signals - you can set simulations signal that can be offered to OPC client applications instead of values from devices up.
4. Alarm Definition - defines alarms for SNMP OPC Server
5. Global JScript variables - defines global JScript variables

2.4.5.1 Address Space

Address space contains folders that are used as containers for OPC items and subfolders. There are special folders on the highest level for connected devices. They can contain subfolders and OPC items related to MIB variables. They can contain also OPC items associated with round trip time of the ICMP ping responses for different devices.
Directly under folder Address space resides JScript items. These are OPC items related to return values of functions written in JScript.

There is also special folder for Global JScript variables that can be used for variables that can be shared globally by all above mentioned JScript functions.

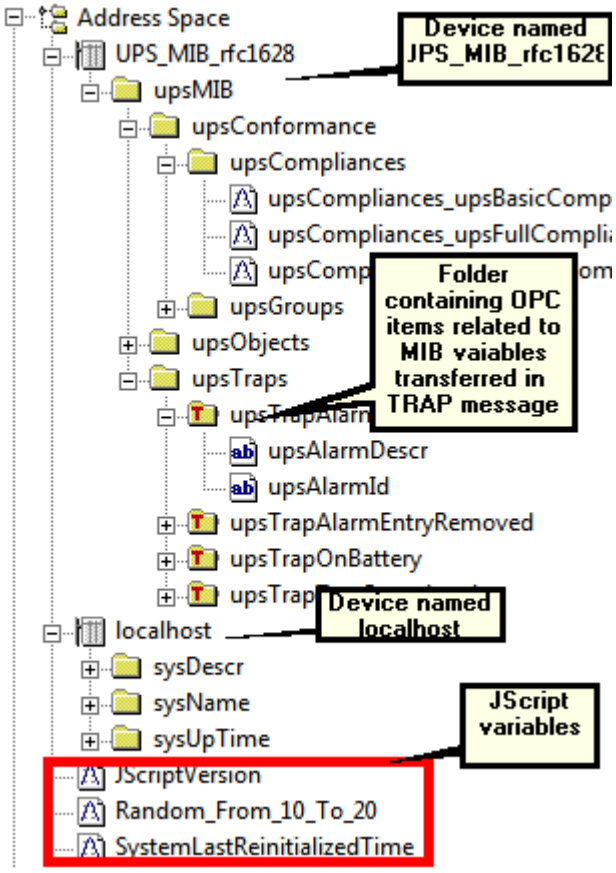


Figure: *Addressspace in the tree view*

2.4.5.1.1 Dialog View Device

This dialog view enables to configure managed (with running SNMP agent) and unmanaged devices.

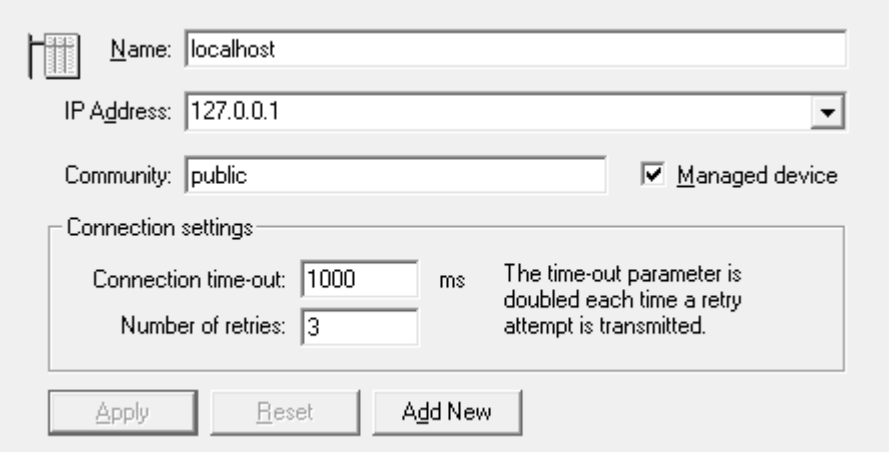


Figure: *Dialog View used to configure a device*

Name
arbitrary within address space unique name that does not contain spaces.

IP Address
IPv4 IP address xxx.yyy.zzz.www

Community
Community used for SNMP SET, GET and TRAP messages

Managed device
If checked in it is supposed that managed device is configured, Other way unmanaged device is configured

Connection settings

Connection time-out
Time after that communication will be repeated if none answer has come from device and number of retries is lower than configured

Number of retries
Number of retries if none answer from device

2.4.5.1.2 Dialog View Folder

It is used to organize OPC Items.

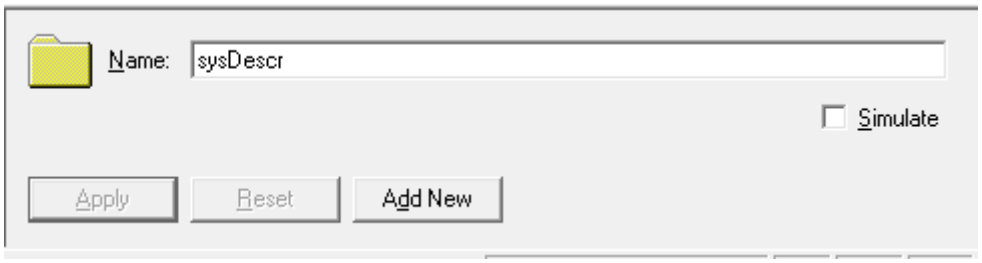


Figure: *Dialog view to define standard folder to organize OPC items*

Name
arbitrary within address space unique name that does not contain spaces.

Simulate
When checked in, instead of values from devices, within OPC items in given folder, values of simulation signals (if defined for the OPC item.) will be published.

2.4.5.1.3 Dialog ViewTrap Folder

It is used to organize OPC Items that are mapped to MIB variables transferred within SNMP TRAP.

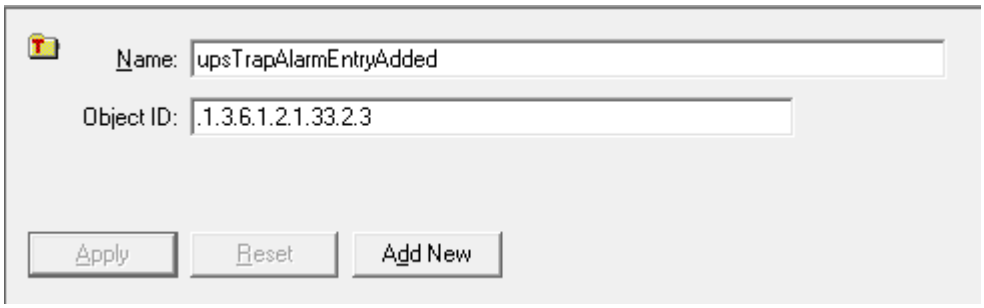


Figure: *Dialog view to define folder to organize OPC items associated with MIB variables transferred within SNMP TRAP*

Name
an arbitrary within address space unique name that does not contain spaces.

Object ID
ID of the SNMP TRAP. (can be found out e.g. from the MIB file of a device)

2.4.5.1.4 Dialog View OPC Item

The dialog view is used for:

- Configuring of:
  - OPC Item mapped to the MIB variable transferred using SNMP commands SET and GET
  - OPC Item mapped the MIB variable transferred within SNMP TRAP – the check box *Notification (Use SNMP Trap)* must be checked in
  - Configuring of OPC Item mapped to round trip time of ICMP ping for the device - the check box *Heartbeat* must be checked in
- Assigning of:
  - a simulation signal to the OPC item
  - a constant value to the OPC item
  - a conversion to the OPC item
  - an alarm definition to the OPC item
- Editing of a function(s) written in JScript:
  - that is used for recalculating of MIB variable value to the OPC item value when OPC clients reads from SNMP OPC server
  - that is used for recalculating of OPC item value to the MIB variable value when OPC clients writes to the SNMP OPC server
  - that are used for both reading and writing
- Sending SNMP command SET or GET to MIB variable on device with defined OID

Most important parameters (if the checkbox *Heartbox* is not checked in) are in the group *Item properties*. The Object ID is the SNMP Object Identifier for the tag. It is the specific data address for the information you are requesting from SNMP agent embedded in your manageable network device. Most MIB addresses follow an Object ID nomenclature that has a series of whole numbers separated by periods (for example: .1.3.6.1.2.1.2.2.1.7.1.). To set up the Item you have to specify its Object ID from MIB file of the device.

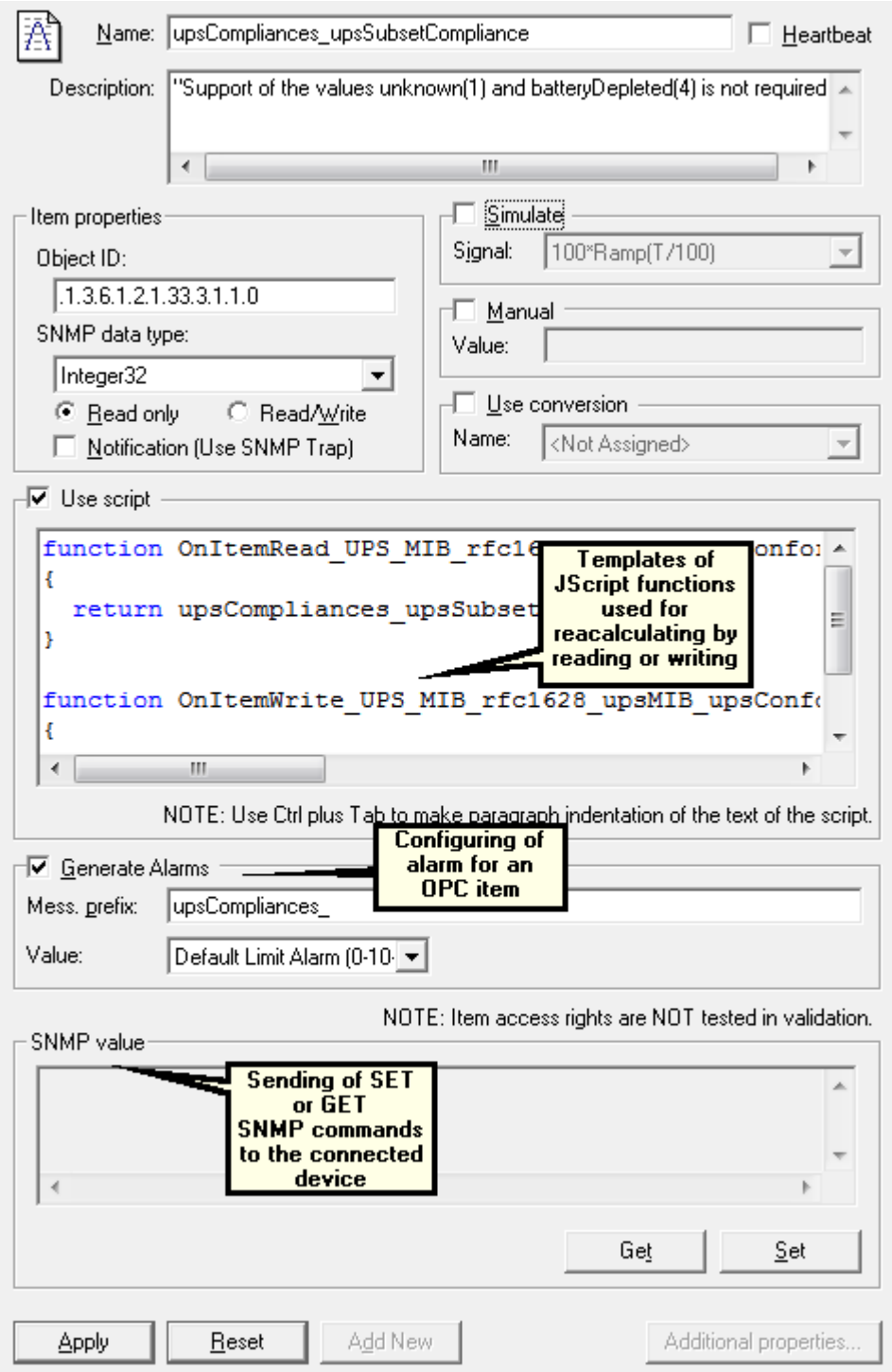


Figure: *Dialog view to define OPC items*

Name

arbitrary within address space unique name of the OPC Item that does not contain spaces. It can be edited by hand, imported on line from device or off line from MIB file of a device (the characters like *, ., /, -, :, _, ;, " are not allowed).

Heartbeat
If checked in, the OPC item will on runtime contain round trip time of the ICMP ping to the device

Description
It can be edited by hand or imported from MIB file of a device

Item properties
Object ID
OID of the MIB variable from device. It can be edited by hand, imported on line from device or off line from MIB file of a device

SNMP Data Type
Type of data as can be read / written to the SNMP device

Read only - Read/Write
Access rights from OPC client to OPC server

Notification (Use SNMP Trap)
If checked in, it is supposed that MIB variable from device will be transferred within SNMP TRAP. Other way SNMP GET / SET will be used

Simulate
If checked in, instead of a MIB variable OPC item will be changed according to predefined simulation signal

Signal
Name of the predefined simulation signal

Manual
If checked in, instead of a MIB variable OPC item will have constant predefined value

Value
Value of constant predefined value

Use conversion
If checked in, predefined conversion will be applied on OPC item value by reading or writing

Name
Name of the predefined conversion

Use script
If checked in, calculations by reading / writing will be executed. Edit box is used as JScript editor with highlighted syntax. Within functions can be used global variables. The result of editing can be found in the file ServerScript.js in directory C:\Users\user\Documents\SAEAUT SNMP OPC Server\Configurations\. In case that you want to open another configuration, please back up the file first.

Generate alarms
If checked in, a preconfigured alarm definition will be associated with the OPC item.

Mess. prefix
A few OPC items can be associated with the same alarm definition. To distinguish alarm messages for distinct OPC items a message prefix can be used.
Value
Name of the preconfigured alarm definition

SNMP Value

There is possibility to verify OID on device on line and read / write values directly from configurator

GET

Value of the MIB variable will be read and show in edit box

SET

Value of the MIB variable edited within edit box will be sent to device using SNMP command SET

Remark: In case that check box Heartbeat is checked in, only Name and description has to be configured.

2.4.5.1.5 Dialog View JScript OPC Item

JScript OPC items enable computing of OPC Items values using none, one or more variables associated with MIB variables from devices.
In the figure bellow, the item is computed without variables associated with MIB variables. The return value of the associated JScript function is string with information about JScript engine. Please see also example of JScript OPC items using variables associated with MIB variables.

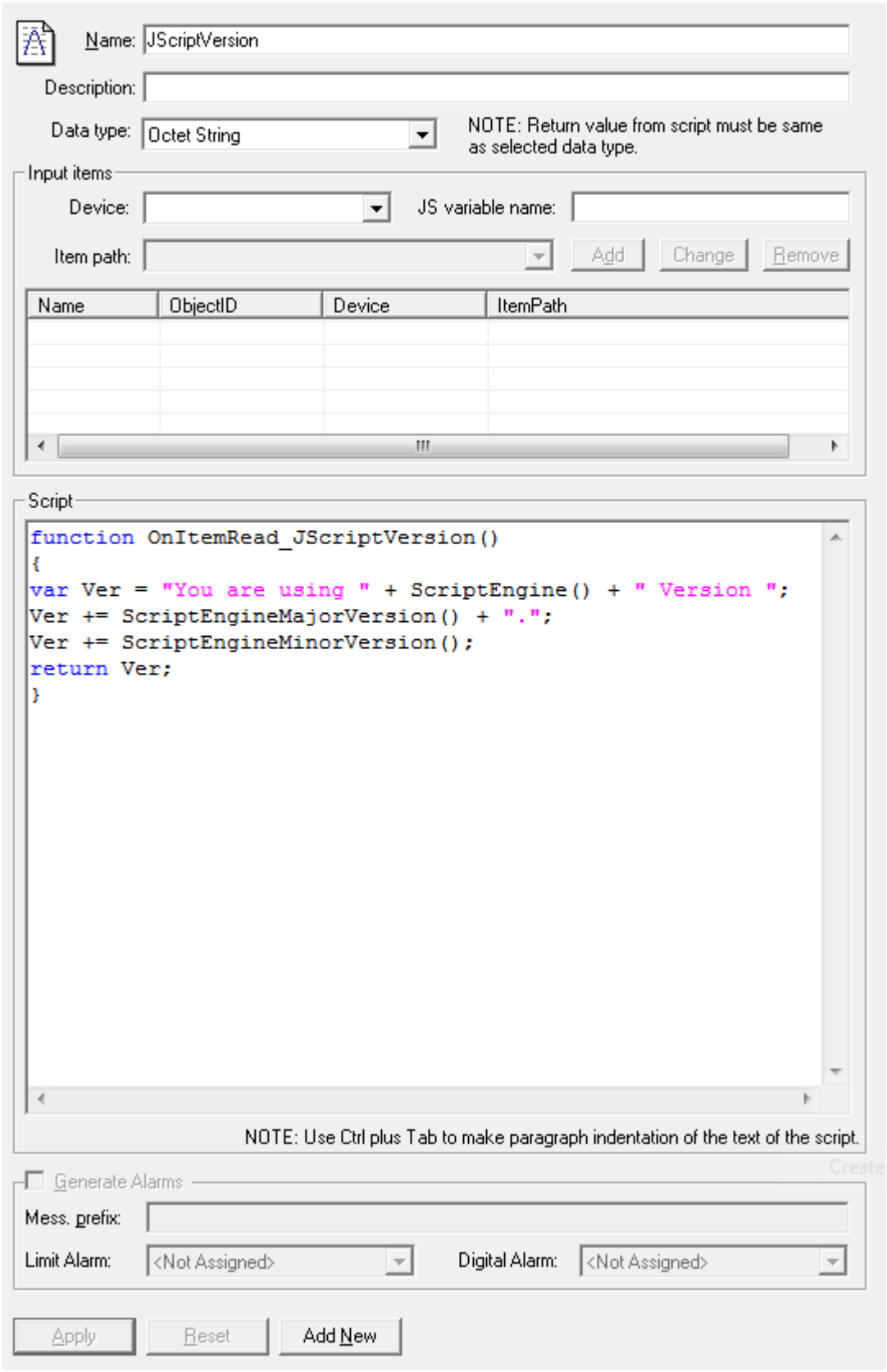


Figure: *Dialog view to define a JScipt OPC item.*

Name
arbitrary within address space unique name of the OPC Item that does not contain spaces. It can be edited by hand, imported on line from device or off line from MIB file of a device (the characters like *, ., /, -, :, _, ;, " are not allowed).

Description
It can be edited by hand or imported from MIB file of a device

Data type
Data type of the return value from JScript function

Input items
Configuring of items that will be used as input variables for JScript function

Device
Device from that variables will be used - device and variables must be configured in advance

JS variable name
Name of the variable that will be used in JScript function

Item path
Path to the variable from device - folder, sub folders, variable name. In the list box only variables from chosen device will be listed

Add
adding of new variable from device

Change
changing of definition for the configured variable from device

Remove
Remove variable from list of input variables

Generate alarms
If checked in, a preconfigured alarm definition will be associated with the OPC item.

Mess. prefix
A few OPC items can be associated with the same alarm definition. To distinguish alarm messages for distinct OPC items a message prefix can be used.

Value
Name of the preconfigured alarm definition

2.4.5.1.6 Dialog View Global JScript Variable

Global JScript variables enable to share values of variables between different JScript functions called by data pre-processing in SNMP OPC server.
They can be defined as scalar variables or as arrays. Please see
example of working with global JScript variables.

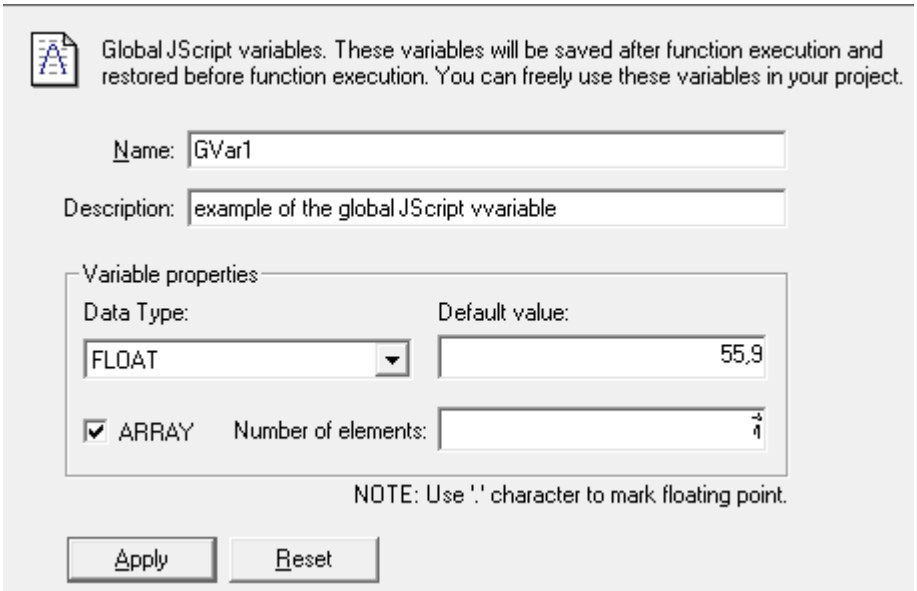


Figure: *Dialog view to define a global JScript variable.*

Name
arbitrary within address space unique name of the OPC Item that does not contain spaces. It can be edited by hand, imported on line from device or off line from MIB file of a device (the characters like *, ., /, -, :, _, ;, " are not allowed).

Description
Informative string to explain global variable

Variable properties

Data Type
Following data types for a variable can be chosen from list box: BOOL, DOUBLE, FLOAT, LONG, STRING, ULONG

Default value
Default value of the scalar variable or all values in array

ARRAY
If checked in array of global variable will be created instead of scalar variable

Number of elements
Number of elements in array of global variables.

2.4.5.2 Conversions

You can tell the server to convert device data value simply settings the following properties. There are two types of units:

- **EU** engineering unit (client scale)
- **IR** instrument range (device scale)

No conversion converts the data into float data type.
Linear or square root conversions keep a linear or square root relation between EU and IR.

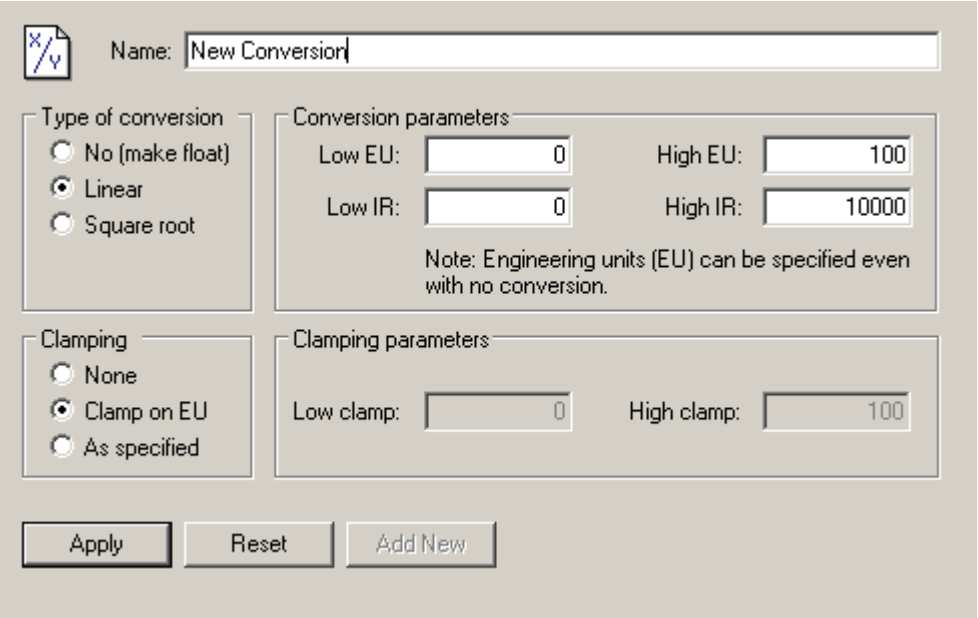


Figure: *Dialog view to define an OPC item conversion.*

Note that definition of range limits helps some client applications and makes sense even when no conversion is specified.

If clamping is on, the data value will be limited to its High clamp/EU value when it exceeds the upper limit, and similarly with Low clamp parameter.

2.4.5.3 Simulation Signals

There is a wide range of simulation signals offered. You can select from them in the *Type* group of radio boxes.

Read Count is incremented by one every time when the item is read (**Write Count** increments when the item is written). **Random** generates random value within the Amplitude range starting with Position. **Ramp**, **Sine**, **Square**, **Triangle** and **Step** are periodical signals. Their time behavior is influenced by Period and Phase parameters. Period specifies the signal frequency, while Phase moves the signal origin on the time axis.

Square and Triangle signal types have one more parameter: Ratio. Ratio defines Triangle signal steepness, or Square signal H/L proportions. # of steps parameter of the Step signal defines a number of steps that signal amplitude will be divided into.

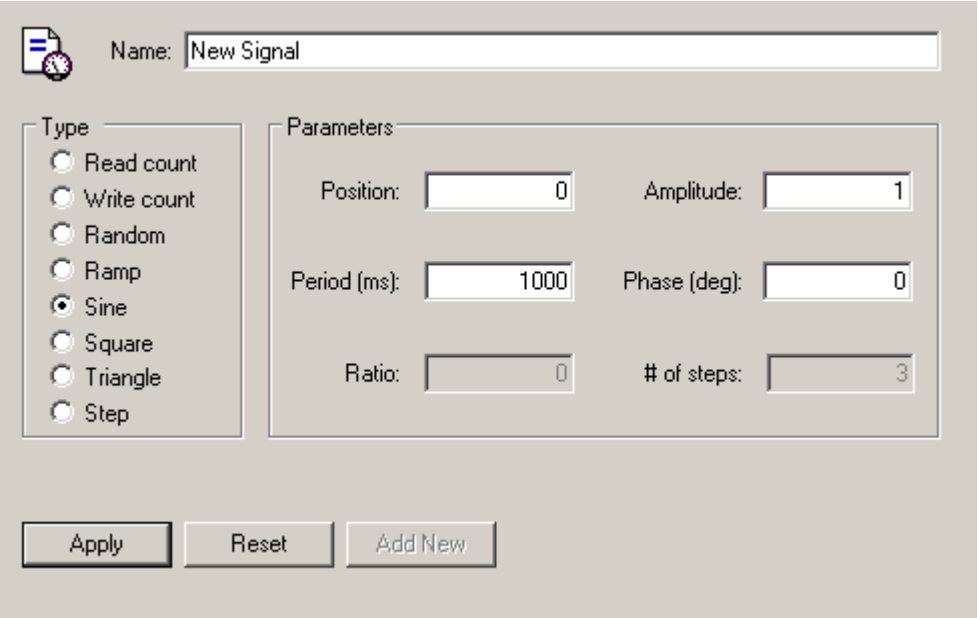


Figure: *Dialog view to define a simulation signal for an OPC item.*

2.4.5.4 Alarm Definition

Alarm definitions are divided into two alarm template types: Digital and Limit (Analog) alarm definition. Digital alarm can be defined for data item of BOOL type only, while Limit alarm definition for the rest except String data type.

- Limit Alarm definition
- Digital Alarm definition

2.4.5.4.1 Digital Alarm

Update rate parameter defines the frequency of checking the data item value, and possibly responding with sending the alarm message.

User can request the alarm when the value equals to TRUE or FALSE, define the Message body that carries the information, and Severity, which is the alarm message importance. The Severity value ranges from 0 to 1000.

Checking Return to normal will generate a separate alarm message when the data item gains the opposite value.

Req. Ack. Tells the client that the alarm requires an acknowledgement. Then alarm message can be not only sent, but also acknowledged, etc.

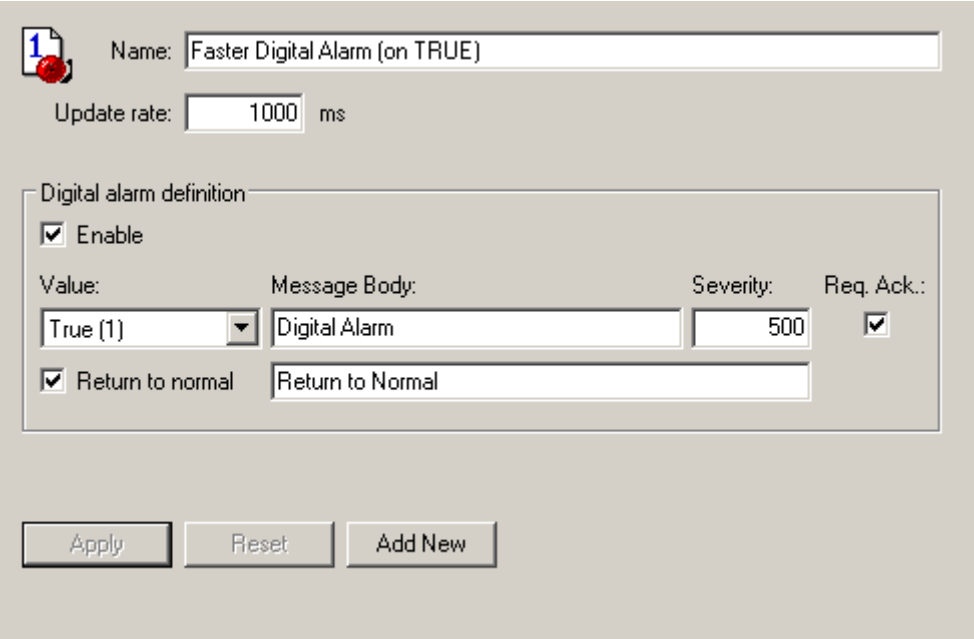


Figure: *Dialog view - digital alarm*

2.4.5.4.2 Limit Alarm

Limit alarm parameters can have subranges within the data item amplitude. Every subrange definition includes Message body that will be appended to the alarm message, the Severity of the alarm and Req. Ack. flag.

Update rate parameter defines the frequency of checking the data item value, and possibly responding with sending the alarm message.

Dead band prevents the server from generating huge amount of alarm messages and overloading the clients when the signal oscillates around one of the limits specified. Dead band value extends the limit zone. It results in sending only one alarm message even if the signal oscillates.

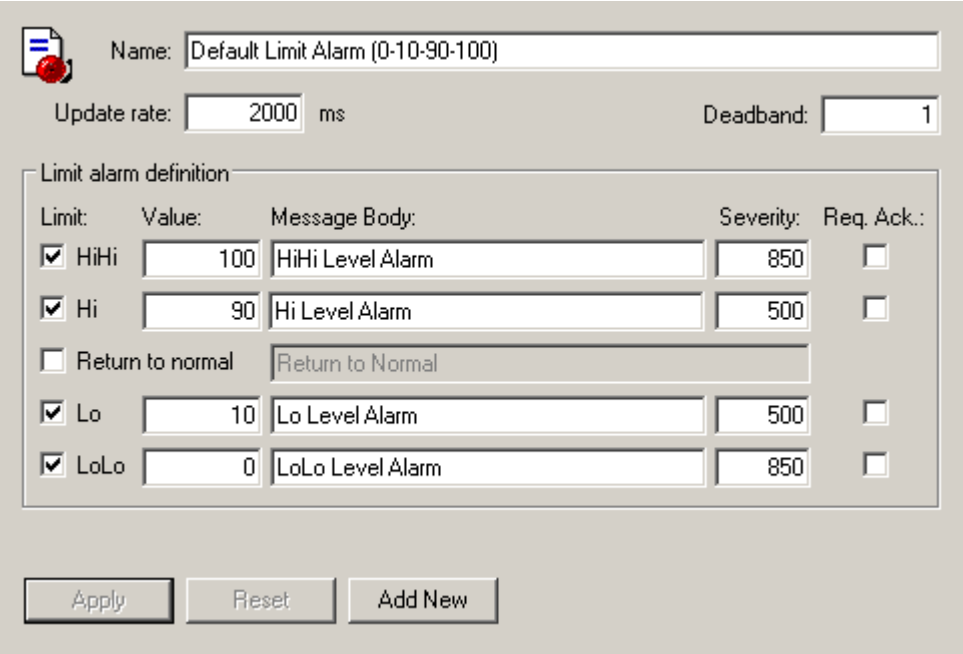


Figure: *Dialog view - limit alarm*

2.4.6 Navigation menu

From navigation menu you can choose any commands of the SNMP OPC Configurator.

- File menu - commands for New project, Save project, Active database or Close the application ...
- Edit menu - commands for creating new items, renaming or deleting existing ...
- View menu - here you can control displaying views of the configurator
- Go menu - contains commands for walking through items defined in project
- Tools menu - includes some options for SNMP OPC Server
- Help menu - displays this help file and information about application

2.4.6.1 File menu

In this menu you can create new project, load a stored project or save the current project. You can also display the connection properties of the opened project, make some XML export, import and validation. Here is also a command to make current project active.
Also contains list of the last opened projects and command for closing the configurator application.

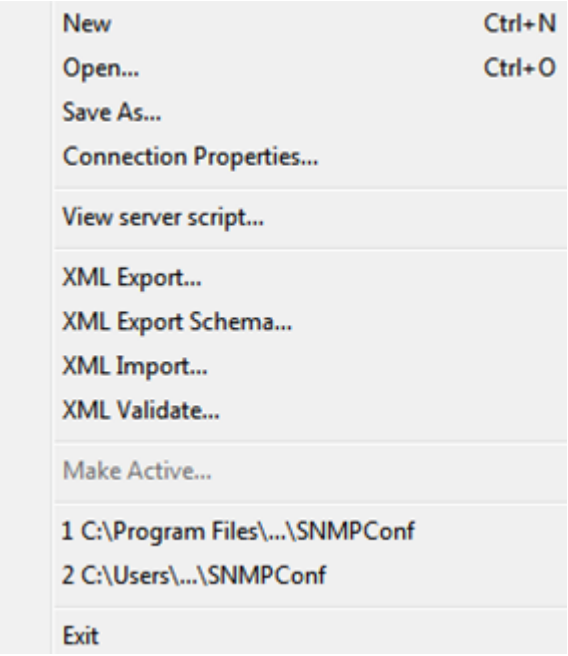


Figure: *Menu File*

Here is short description of each command:

- Command New - creates a new SNMP OPC Server project (configuration mdb file)
- Command Open - opens existing stored SNMP OPC Server project
- Connection properties - information about active configuration file as well as used database driver
- View server script - shows all used JScript function used within a configuration with syntax highlight
- Command Save as - saves the current opened SNMP OPC project with defined name
- Command Connection properties - displays the connection properties of the opened project
- Command Make Active - activates the current opened project
- Command Exit - closes the configurator application

2.4.6.1.1 New

With this command you can start the new project. To start the project, select from the File menu command **New** (the shortcut is Ctrl+N) or you can choose the button  from the toolbar of configurator.

Then you have to specify the new project database. SNMP OPC Server work with MS Access database. In the following dialog, you have to define the destination and the name of this project database.

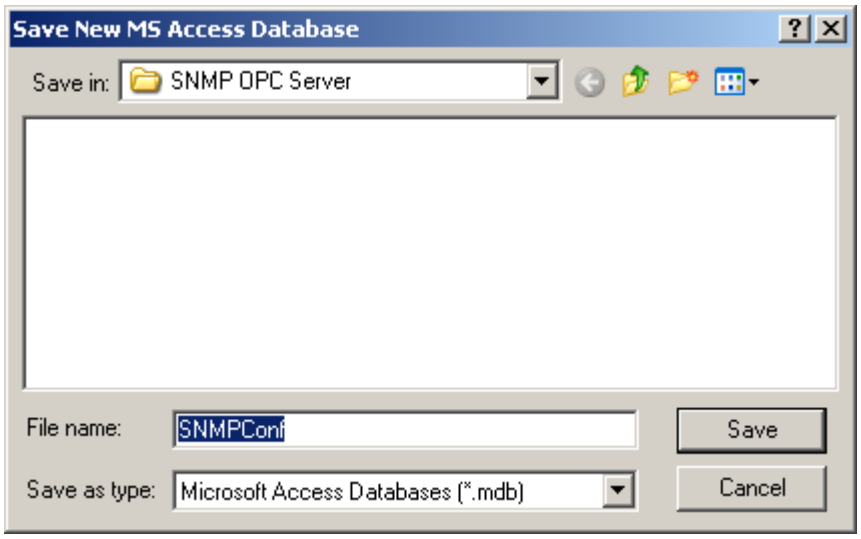


Figure: *Dialog box - new configuration*

2.4.6.1.2 Open

With this command you can open the stored project. To open existing project, select from the File menu command **Open** (shortcut Ctrl+O) or you can choose the button  from the toolbar of configurator.

After that you have to specify the database of the existing project.

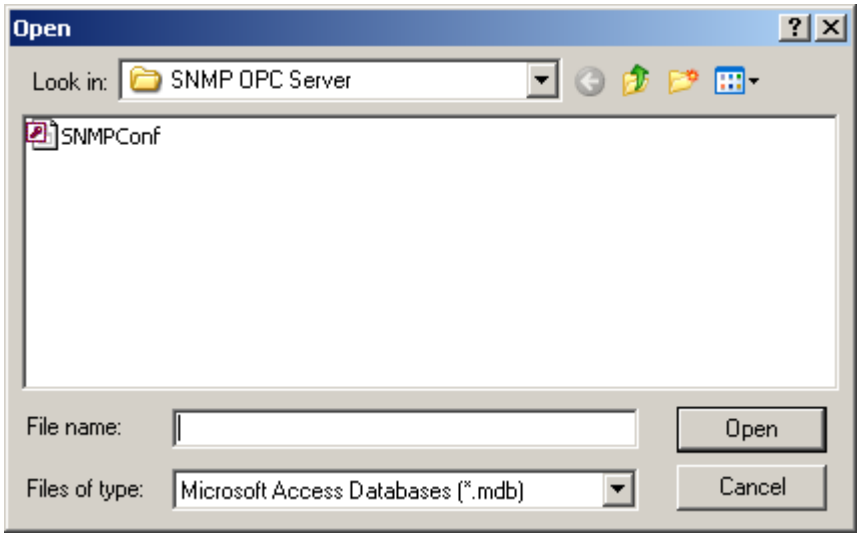


Figure: *Dialog box - open configuration*

2.4.6.1.3 Save as

The configurator allows you to save the project database to your hard drive. You can select from the File menu command **Save as**, and than specify the name and the location of the project database. You can define the name and the directory of the project database.

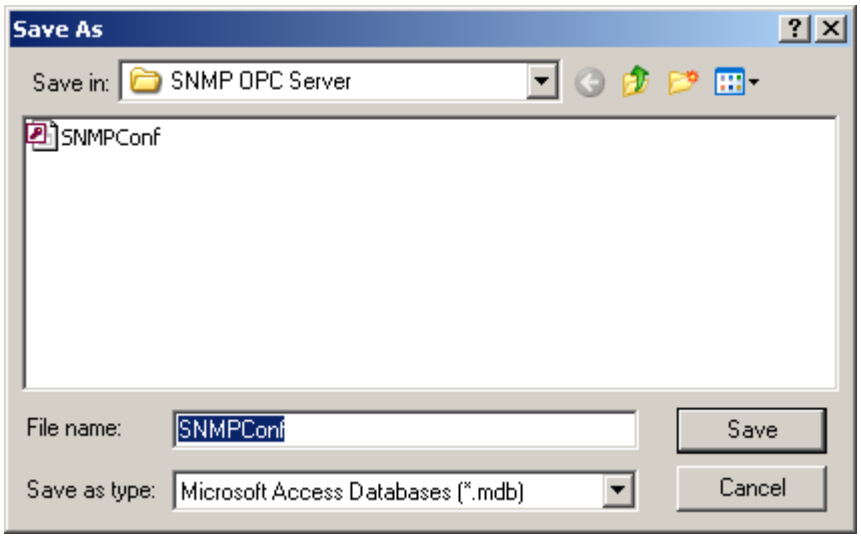


Figure: *Dialog box - Save configuration as*

2.4.6.1.4 Connection properties

From the File menu you can choose the command **Connection properties**. This will open a dialog, where the state of the connection is displayed. There are the initialization properties for current database connection of the opened project.

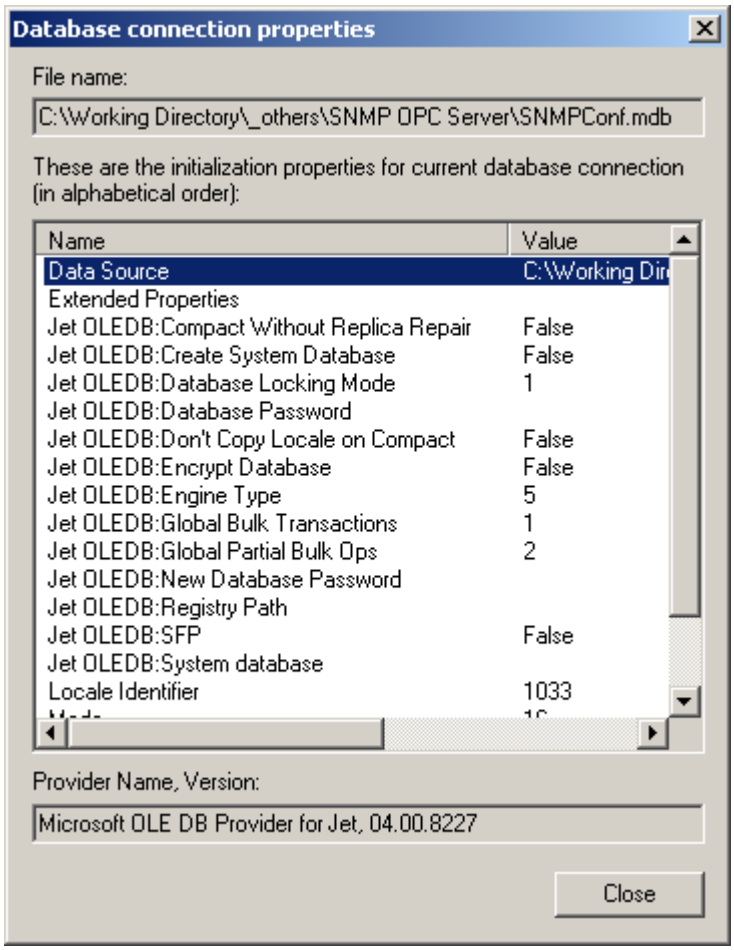


Figure: *Dialog box - Database connection properties*

2.4.6.1.5 View server script

It enables to display all used JScript function used within a configuration with syntax highlight.

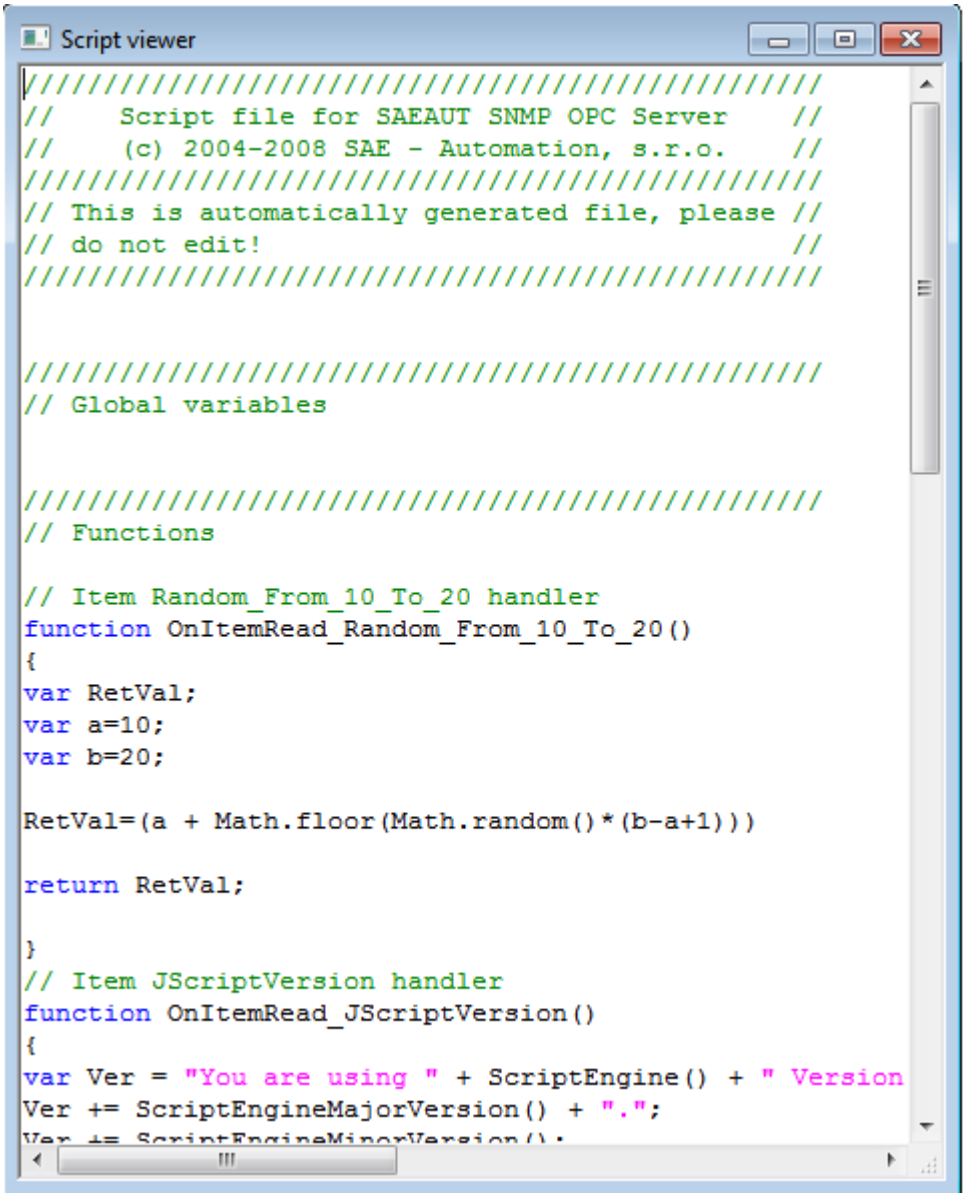


Figure: *JScript viewer*

Remark: before switching to another configuration, please, backup the file with JScript functions under other name because all configurations use the script file with the same name.

2.4.6.1.6 Make Active

With this command, you activate the project database. The active database is the database that the server will load when started. To activate the database, select command from the menu **File→Make Active**. After that, the configurator will inform you about activation of the database.

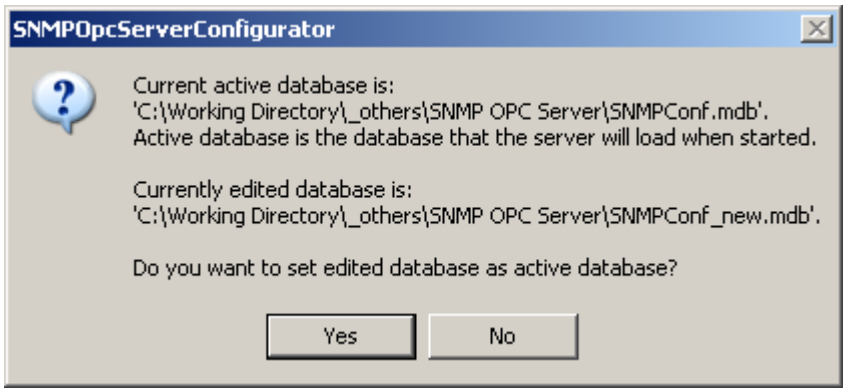
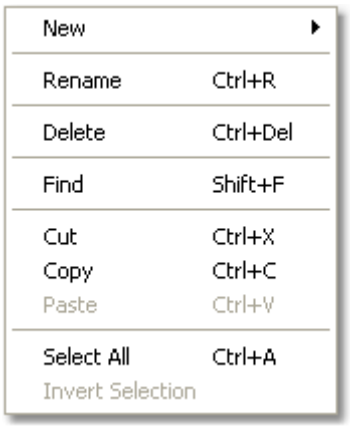


Figure: *Dialog box to activate configuration opened in configurator*

When the current database is activated, the command **Make active** is disabled from the menu.

2.4.6.2 Edit menu

In this menu you find commands which can be used for editing the items in the list control - devices, folders and data items. You can create new item, rename existing item, delete item. Then standard edit function as Cut, Copy and Paste and also command for selection items are available there.



This commands are available in **Edit menu**:

- New - creates a new item (device, folder, data item)
- Rename - renames an existing item
- Delete - deletes selected item
- Find - allows you to search for text within the current configuration and then interactively review matches.
- Cut, Copy and Paste - standard clipboard functions
- Select all - this command selects all items
- Invert selection - this command invert the selection of items

2.4.6.2.1 New

With this command you can add a new device to the project, create a new folder for the existing device or add a new data item.

- Command Device - adds a new device in the project
- Command Folder - creates a new folder for the existing device
- Command Data Item - adds a new data item of the chosen device in the project

2.4.6.2.1.1 Device

With this command you can add the new device to the project. When in the tree view control of the configurator (on the left panel), the folder **Address space** is highlighted, you can choose from the menu **Edit → New → Device** (or the shortcut key Ctrl+D) or you can click with the right mouse button on this folder and from the pop-up menu choose the command **New → Device** (or the shortcut key Ctrl+D).

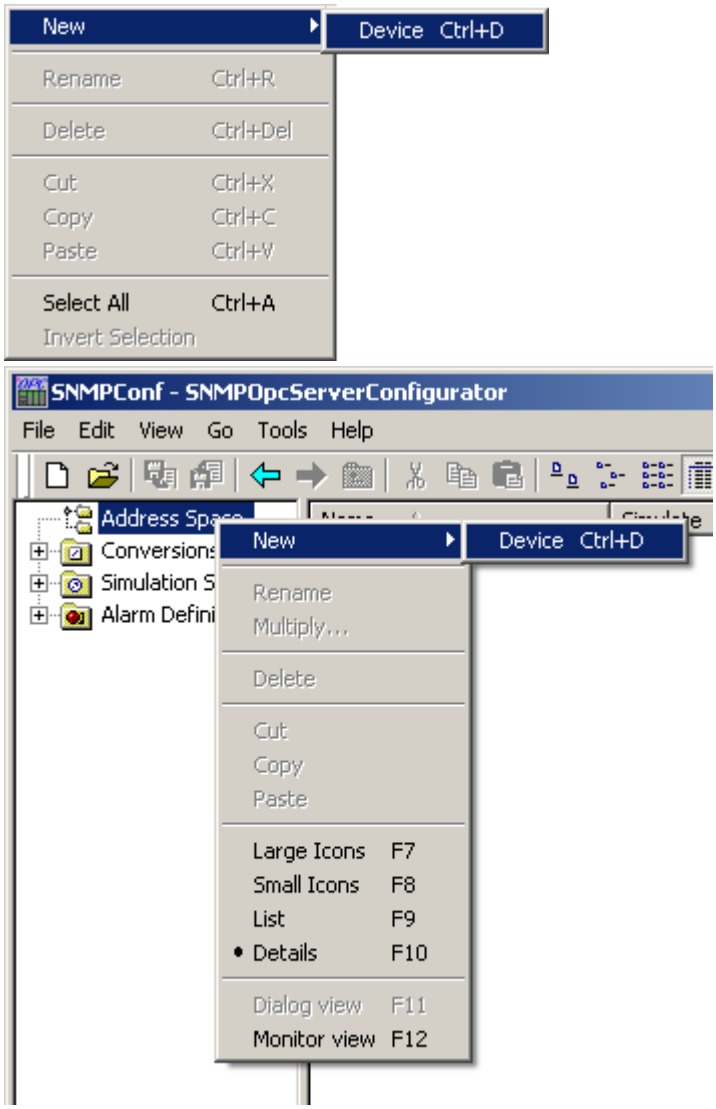


Figure: *Opening of Device dialog view*

After that device dialog view will be opened.

2.4.6.2.1.2 Folder

The configurator of SNMP OPC Server makes it possible to define folders for devices. You could create your own folder structure and divide the data items into this folder structure.
With this command you can create new folder for the existing device in the project. When in the List control of the configurator (on the left panel) the device is highlighted, than you can choose from the menu **Edit → New → Folder** (or the shortcut key Ctrl+F) or you can click with the right mouse button on the device and from the pop-up menu choose the command **New → Folder** (or the shortcut key Ctrl+F).

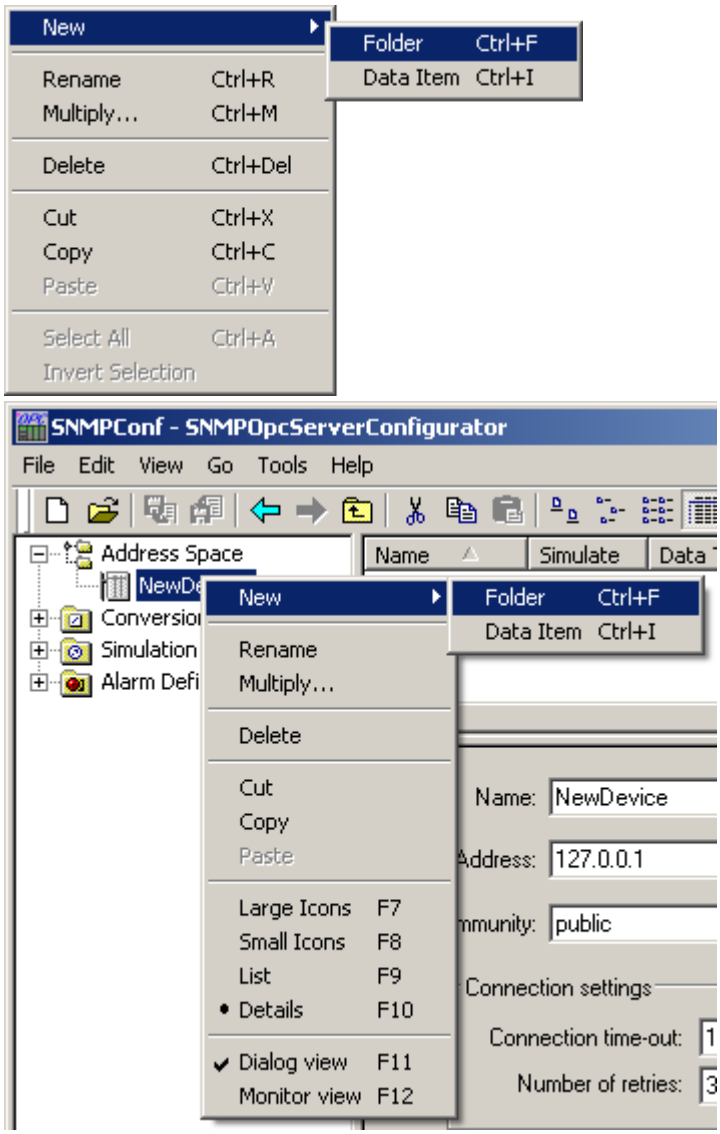


Figure: *Opening of Folder dialog view*

After this you have to specify the name of the folder in the folder setting dialog,

2.4.6.2.1.3 Trap

This way a special trap folder for OPC items that can be updated according to SNMP varbind that is received within trap can be created.

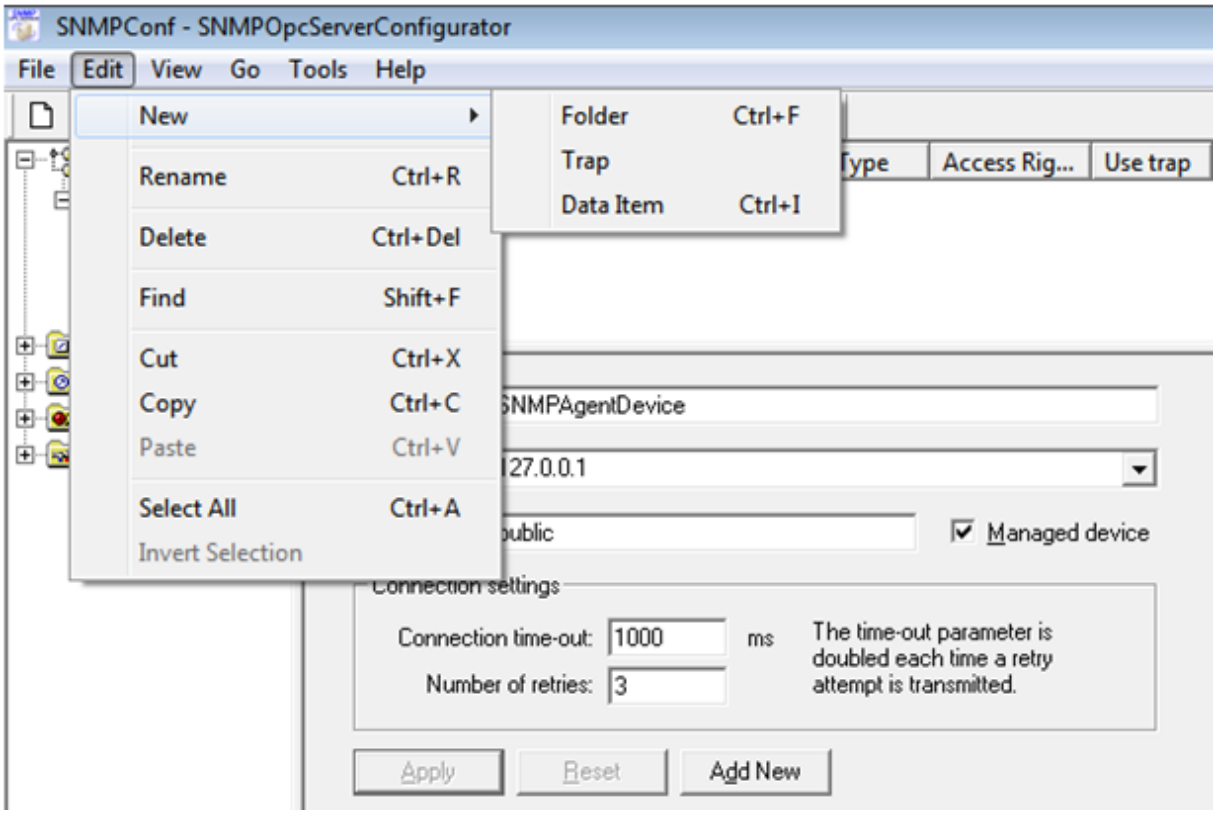


Figure: *Opening of Trap dialog view*

Remark: to be able receive TRAP with related SNMP varbind the SNMP agent of the device has to provide it. The best practice is to let create trap folders automatically by creating OPC items using off line browsing from device MIB file.

2.4.6.2.1.4 Data Item

With this command you can add the data item into the device in the project. When in the List control of the configurator (on the left panel) an option device is highlighted, than you can choose from the menu **Edit → New → Data Item** (or the shortcut key Ctrl+I) or you can click with the right mouse button on the device and from the pop-up menu choose the command **New → Data Item** (or the shortcut key Ctrl+I).

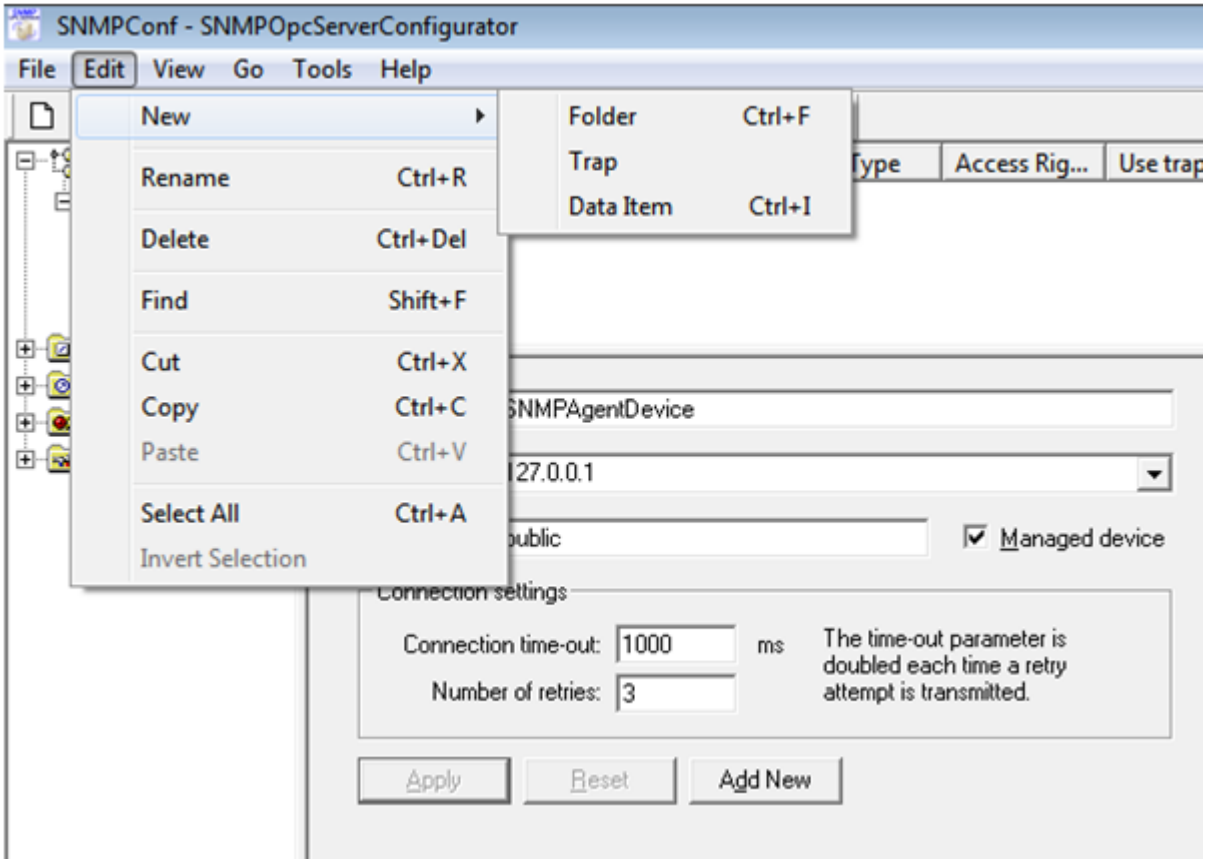


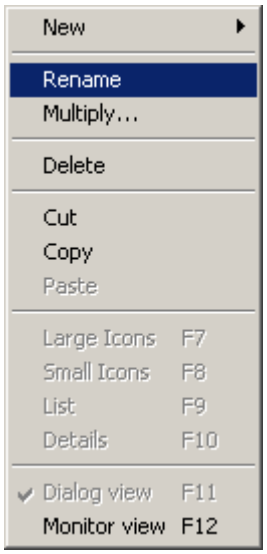
Figure: *Opening of Data item dialog view.*

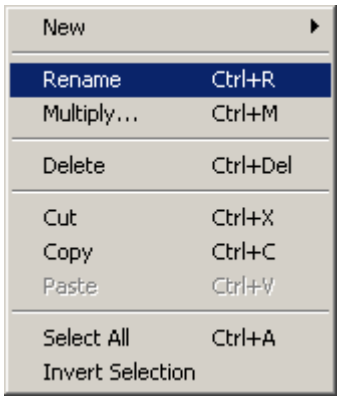
2.4.6.2.2 Rename

With this command you can rename the devices and data items. First you have to select in the list control the item you want to rename and then you have to choose the command from the **Edit→Rename**, or by the right mouse click on the item and than Rename from the pop-up menu (you can also use the shortcut Ctrl+R).

At first, choose the item you want to rename from the list box (it could be, device, folder or data item)

Then right-mouse click on the item or from the menu





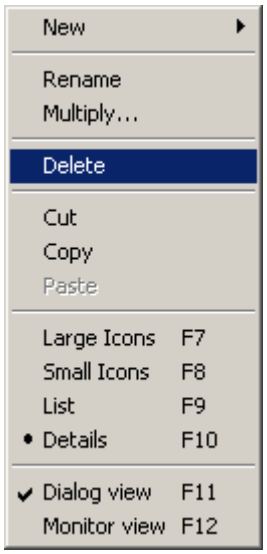
Now you can change the name of the selected item

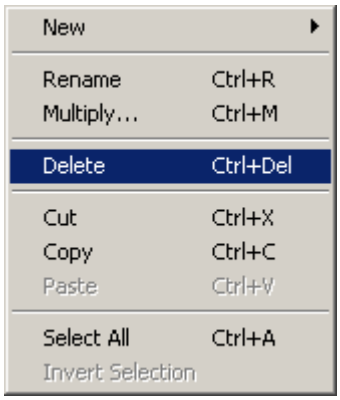
2.4.6.2.3 Delete

With this command, you can delete the items (device, folder or data item) from the configuration. At first you have to select the item you want delete and than you choose from the menu command **Edit→Delete**, or by right-mouse click you display the pop-up menu and from this menu you chose delete (or you simply push the Delete button on your keyboard, or shortcut Ctrl+Delete).

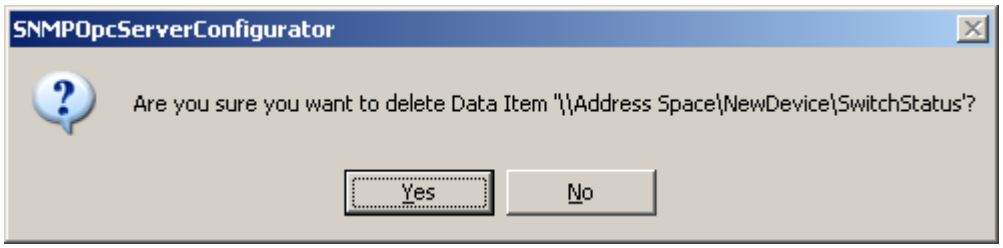
At first select the item you want to delete.

Then from the menu or from the pop-up, choose the command Delete





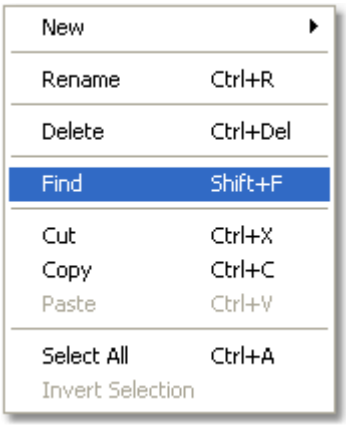
After that you have to confirm your option to delete the item in the following dialog



2.4.6.2.4 Find

The Find dialog box allows you to search for text within the current configuration and then interactively review matches. You can access the Find dialog box by choosing Find on the Edit menu, choosing the loupe icon on toolbal or through hot key Shift+F.

To display Find dialog box click on menu-item **Edit** → **Find** or toolbar-item **Find**.



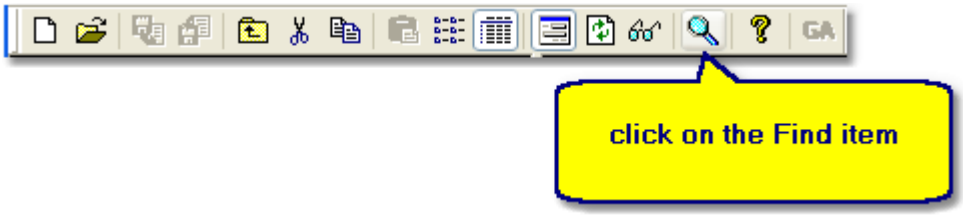


Figure: *The Find dialog box in the application menu and toolbar.*

You can see the Find dialog box as it is shown on the following figures.

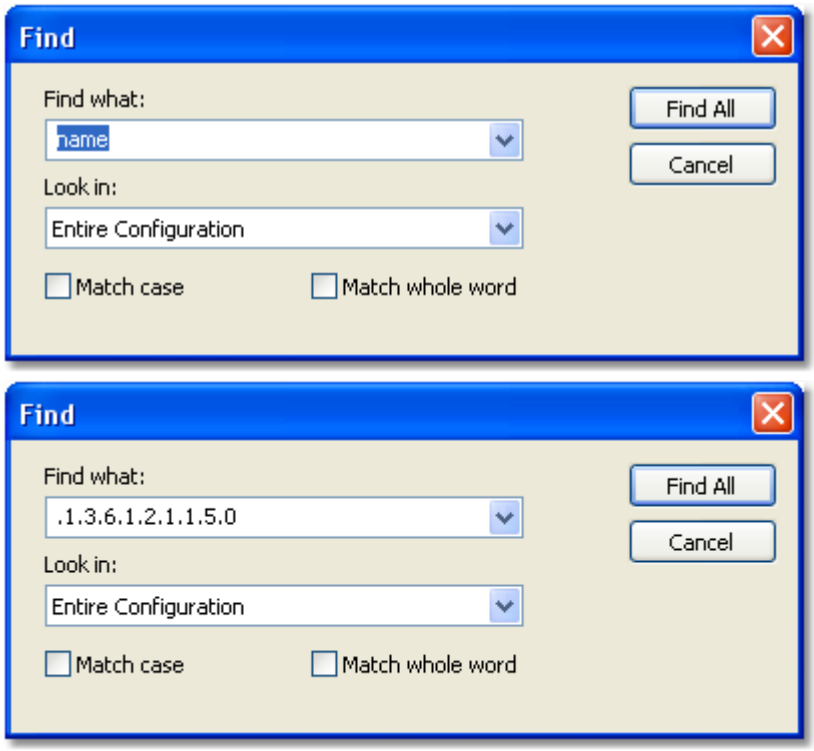


Figure: *Two examples of the Find dialog box.*

The Find dialog box provides several standard search options to help you improve the accuracy of your search. It allows you to search entire configuration or only part of configuration.

Find what
Enter the text for which you intend to search. Select the drop-down list to display the last 10 items entered.

Look in
It allows you to search for in entire configuration or only in part of configuration. You can select a pre-defined scope from the drop-down list. These scopes include Entire Configuration, Data Items and Script Items.

Match case
When selected, the search operation looks only for occurrences that match the uppercase and lowercase characters you enter in the Find what box.

Match whole word
When selected, the search operation looks only for occurrences that match whole words.

All Find results are always displayed in the Find Results tab, which is included in Output View. The Find Results provides a list of all occurrences of the specific text within the current configuration and then interactively review matches.

Note that: The Find Results tab allows you to review each individual search occurrences directly in the main Tree view and also the item details in Dialog view.

To **review** individual search occurrences please **Double Click** on an item directly in **Find Results**. Then, the item details will be shown as in the figure below.

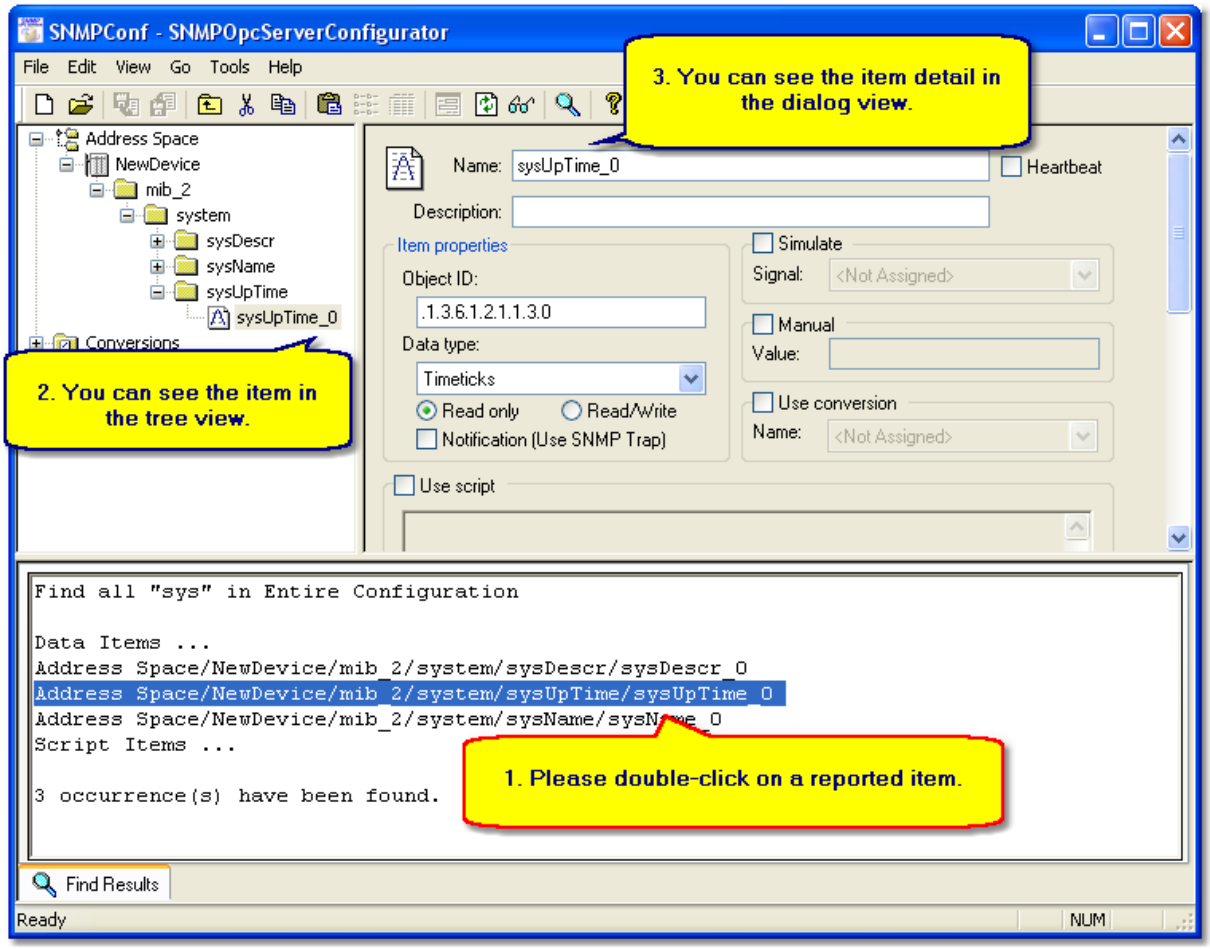


Figure: *The Find Results tab and review of individual items in associated views.*

See Also
Find

2.4.6.2.4.1 Find Results

All Find results are always displayed in the Find Results tab, which is included in Output View. The Find Results provides a list of all occurrences of the specific text within the current configuration and then interactively review matches.

Note that: The Find Results tab allows you to review each individual search occurrences directly in the main Tree view and also the item details in Dialog view.

To **review** individual search occurrences please **Double Click** on an item directly in **Find Results**. Then, the item details will be shown as in the figure below.

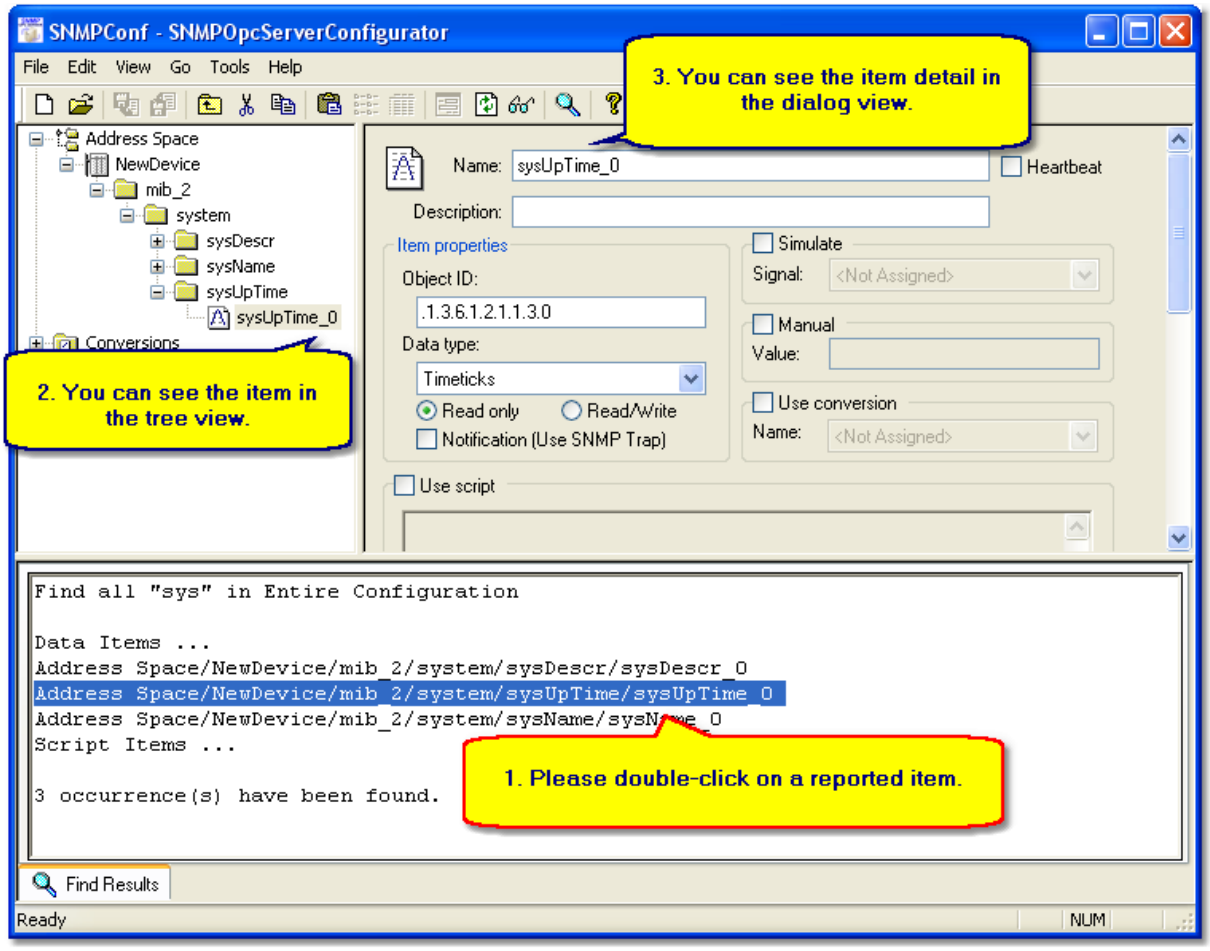


Figure: *The Find Results tab and review of individual items in associated views.*

See Also

Find

2.4.6.3 View menu

Commands in this menu provide the possibility to change the view of the configurator due to user's requirements. You can display two types of toolbars, than turn-on or turn-off the status bar, change the item presentation in detail view

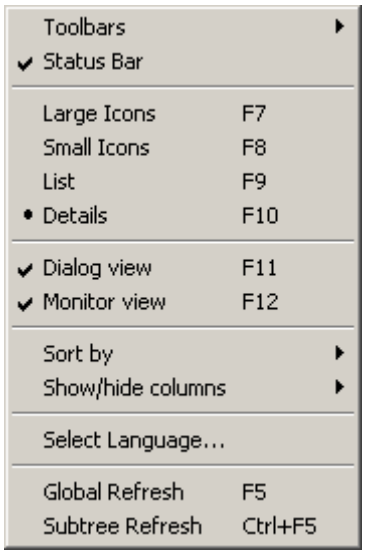


Figure: *View menu*

- Toolbars - hides or shows the Standard toolbar and Data manipulation toolbar
- Status bar - hides or shows the Status bar
- Next group of commands Large Icons, Small Icons, List and Details - change the look of the Details table
- Dialog view - hides or shows Dialog View
- **Monitor view** - starts or stops the **internal OPC client application** and shows or hides the Monitor view
- Sort by, Show/Hide columns - these commands enable sorting in Details and show or hide columns
- Select language - here you can select the language of the application
- Global Refresh - makes global refresh of the whole Item list control
- Subtree Refresh - makes refresh of some part of Item list control

2.4.6.4 Go menu

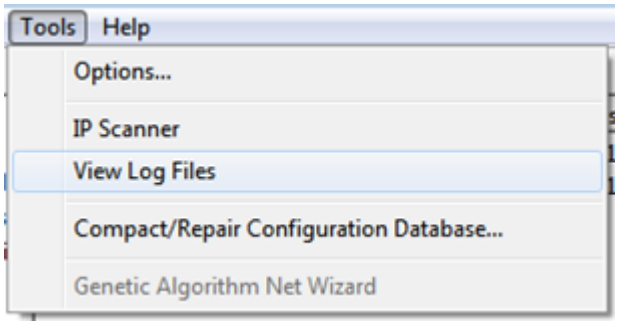
Commands in this menu item allow user to move through the Item list control.

With these commands you can go through the items

- Back - moves one step back
- Forward - moves one step forward
- Up One level - moves from item to its parent item
- Next Item - moves to the next item
- Previous Item - moves to the previous item
- Expand Item - expands device or folder item
- Collapse Item - collapses device or folder item
- Page Up - moves one page up
- Page Down - moves one page down
- Home - moves at the beginning of the list
- End - moves at the end of the list
- Next Pane - moves to the next dialogs pane
- Previous Pane - moves to the previous dialog pane

2.4.6.5 Tools menu

In this menu you can find some special tools of the SNMP OPC Server.



2.4.6.5.1 Options

This dialog view enables setting of different options for configurator in sections :

- *Workspace settings*
- *Monitor view settings*

and for SNMP OPC Server Runtime in sections:

- *Log the SAEAUT SNMP OPC Server activity*
- *OPC Server settings*

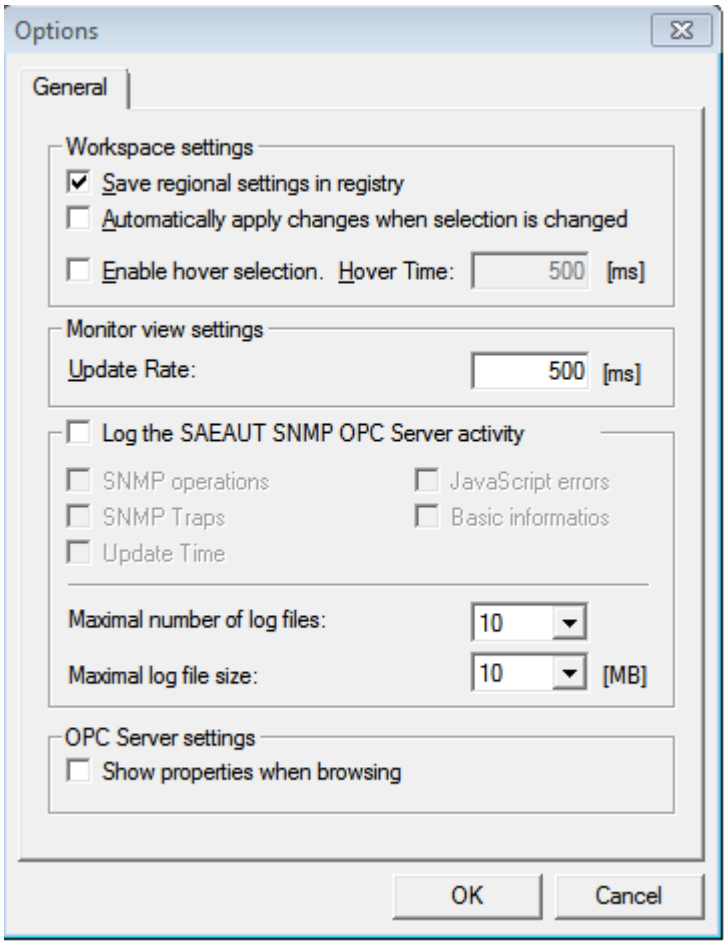


Figure: *Dialog box Options*

Workspace settings

Save regional settings in registry
enables/disables the configurator to save active language chosen from the Select Language dialog into registry and set it up during initialization (not used in this version)

Automatically apply changes when selection is changed.
If checked, the configurator itself tries to update the edited data without requiring to click on Apply button, and displaying the confirmation dialog.

Enable hover selection, Hover time
all configurator support automatic selection of the item above which the mouse is hovering. Enter Hover time parameter in milliseconds.

Monitor view settings

Update rate
specifies the update frequency of Monitor View items.

Log the SAEAUT SNMP Server activity

If not checked then by start of the OPC Server runtime only head with system information is written to log file
If checked then all information generated in the regime LOG_ALWAYS is written to the log file

SNMP Operations
Results of all GET and SET SNMP Operations

SNMP TRAPs
Errors by SNMP Traps receiving
Update Time
Time for scanning of every connected device
Java Script errors
Errors by processing of JScript functions
Basic information
Associating of OIDs to OPC items required by an OPC client

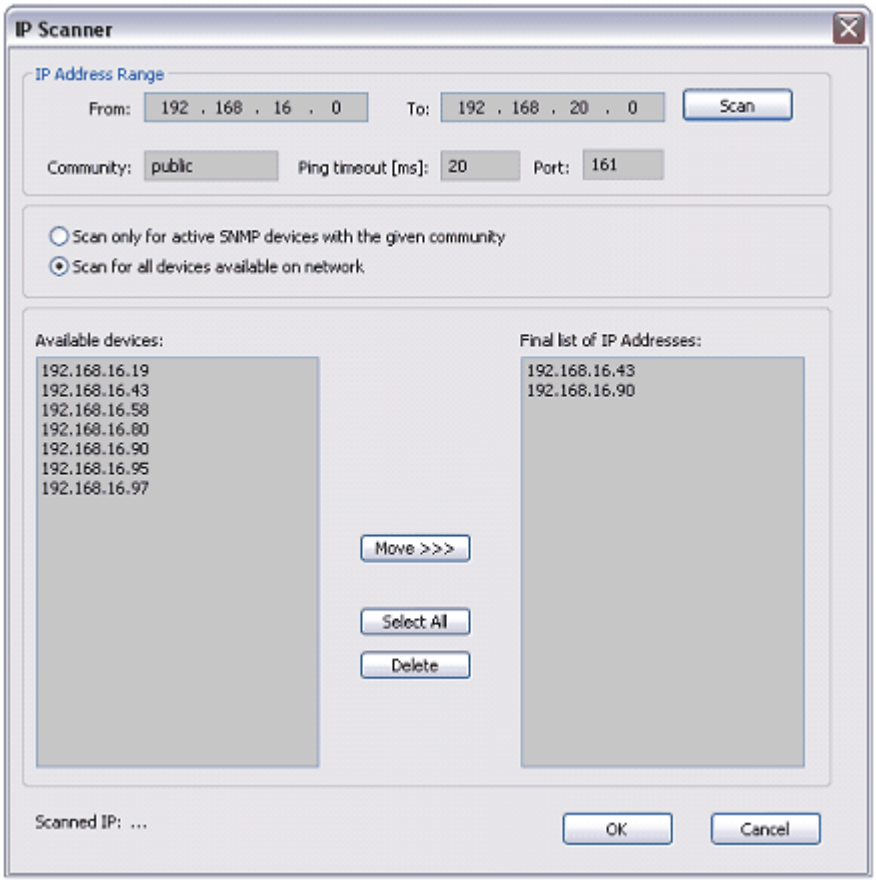
Maximal number of log files
Maximal number of log files that creates SNMP OPC server in the log directory.

Maximal log file size [MB]
When the OPC server runtime is started and running, information is added to an log file till it has defined max. size. After that, the new file is created (in case that less than maximal number of files is in the log file directory).

OPC Server settings
Show properties when browsing
if checked OPC clients will be able browse not only OPC items but also their properties in the address space of the OPC server.

2.4.6.5.2 IP Scanner

IP Scanner enables to scan the network in given range and find connected SNMP devices.



Please see about IP scanning also in the "How to"

2.4.6.5.3 View Log Files

It enables view all log files in log file directory. Log files are created according to defined options.

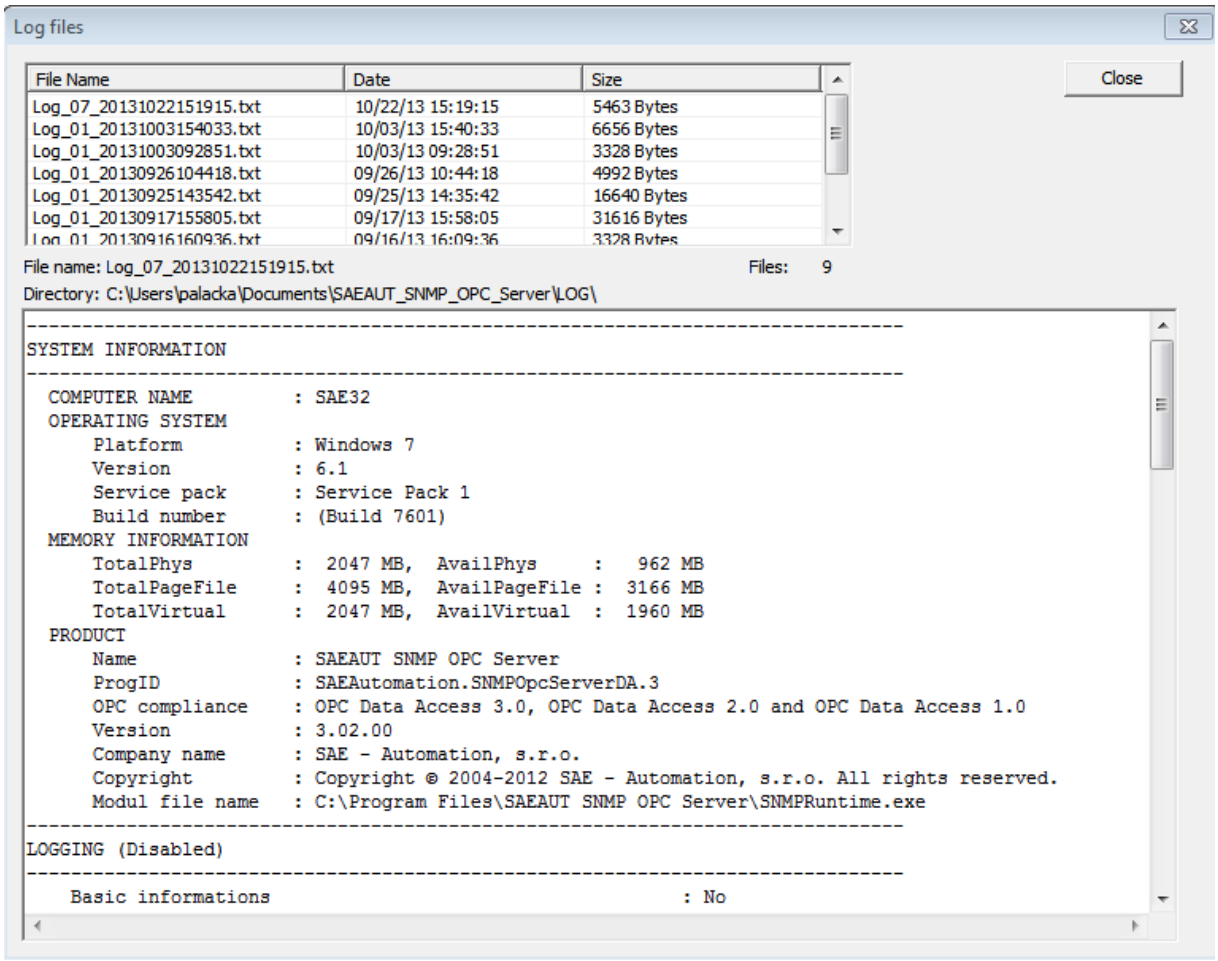


Figure: *Log files viewer.*

2.4.6.5.4 Compact / Repair Configuration database

In this dialog box you can check your connected active configuration database for the errors and repair it. Or you can check some other configuration database. The following dialog will display after command Compact/Repair Configuration Database...

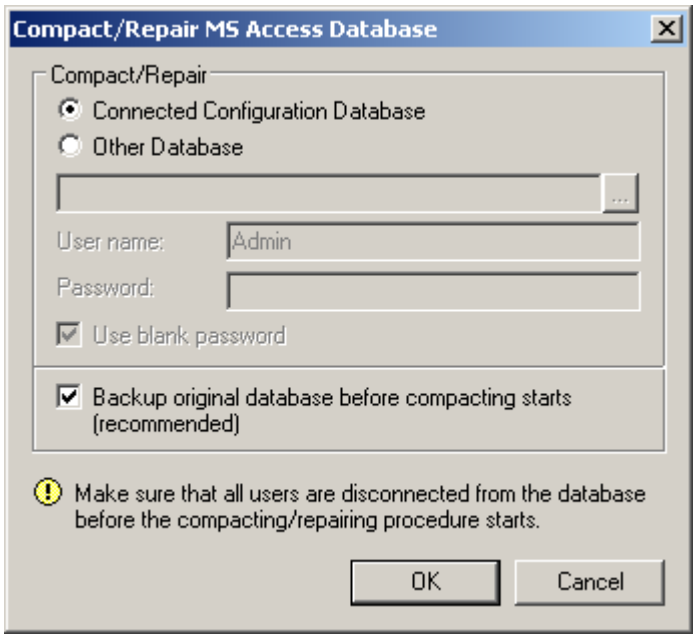
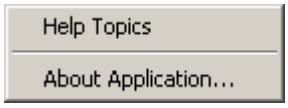


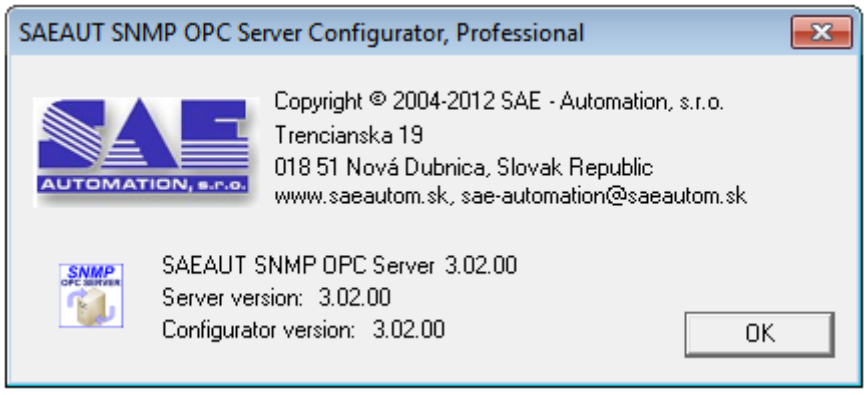
Figure: *Dialog box to compact/repair configuration database.*

2.4.6.6 Help menu

Here can be found information about the software application, and also command for displaying this help file.



About Application dialog...



3 How to

To work with SAEAUT SNMP OPC Server, you will need an OPC client application. Probably, you have an own application with OPC client interface for example a SCADA system. However to start working with SAEAUT SNMP OPC Server runtime, you can use monitor view of the SAEAUT SNMP OPC Server configurator as described in the chapter „The first start of SAEAUT SNMP OPC Server".

Within the SAEAUT SNMP OPC Server product package, you can find and install a few OPC client applications (as described in „Installed software and examples"):

- OPC DA and XML DA OPC Client - it is necessary to install OPC client itself and also to install configure and start XML DA wrapper to experiment with OPC DA and OPC XML DA interface.
- OPC UA client – it is installed from installation package common with OPC UA wrapper. After starting OPC UA wrapper you can use it to test OPC UA interface.
- OPC DA client projects with source codes – to experiment with them you will need to compile them using proper version of the Microsoft Visual Studio.

Useful possibility to watch changing values of MIB variables also in graphics offers OPC DA client application – OPCAdapter (not delivered with installation package, but demo version can be downloaded cost free).

Using above mentioned OPC client applications you will be able to start SNMP OPC server running with delivered demo configuration immediately. To adapt SNMP OPC server functionality to your needs, you will need to create your own configuration. Methods for creating of configurations are described in the chapter „Methods how to configure SAEAUT SNMP OPC Server effectively".

If you configure MIB OIDs for your OPC items by hand, there is useful possibility to test their correctness using SNMP GET and SET commands directly from configurator.

To gain first experiences, we suggest trying to use standard SNMP agent running on Windows operating systems. Using on line MIB browsing, you will be able to import hundreds of MIB variables offered by this agent to the OPC server address space. For the first experiments, also delivered SAEAUT SNMP Agent is very useful. It is delivered with own demo configuration and you can add its functionality also to your application easily using on line MIB browsing. SAEAUT SNMP Agent can be used e.g. to learn working with SNMP TRAPS.

3.1 Methods how to configure SAEAUT SNMP OPC Server effectively

Possibilities and methods how to configure address space of SAEAUT SNMP OPC Server from version 2.09 effectively

Introduction

Manual configuration of the address space of SNMP OPC Server can be, for many SNMP variables and many SNMP devices, really time consuming. The SAEAUT SNMP OPC Server provides various methods how to create configurations easy, effective and really fast. At the time of creation of a configuration, you can use single or even combination of the following methods:

- On-line browsing.
- Import from MIB files (Off-line browsing).
- Import from CSV files.
- Export to CSV files.
- Import from XML files.
- Manual configuration.

On-line browsing

If we have a possibility to connect SNMP devices which we would like to monitor or control then we can use a method called On-line browsing for searching of all available SNMP variables directly from connected devices. Using this simple method, we can transfer on one-click not only one SNMP variable but even entire tree multi-level hierarchical structure to address space of SAEAUT SNMP OPC Server. Advantage of this method is that all obtained SNMP variables are really defined in device and in time of monitoring and controlling of device will be definitely available. Small disadvantage of this method is a limited volume of the information transferred about SNMP variables from the device. It means, we cannot obtain for instance description of a SNMP variable this way. Of course, all important parameters for functionality are available.

To enable the On-Line browsing in the SAEAUT SNMP OPC Server Configurator, please do the following:

1. Create a new device or select an existing device.
2. Right-click on the device and choose MIB Browse (On-line) (see Figure 1).
3. Click on the Load MIB (On-line) button (see Figure 2).
4. Select the SNMP variables of folder in the tree.
5. Click on the Transfer object(s) to configuration button (see Figure 2).
6. Click on the Close button.
7. The SNMP variables mapped to OPC items (see Figure 3).

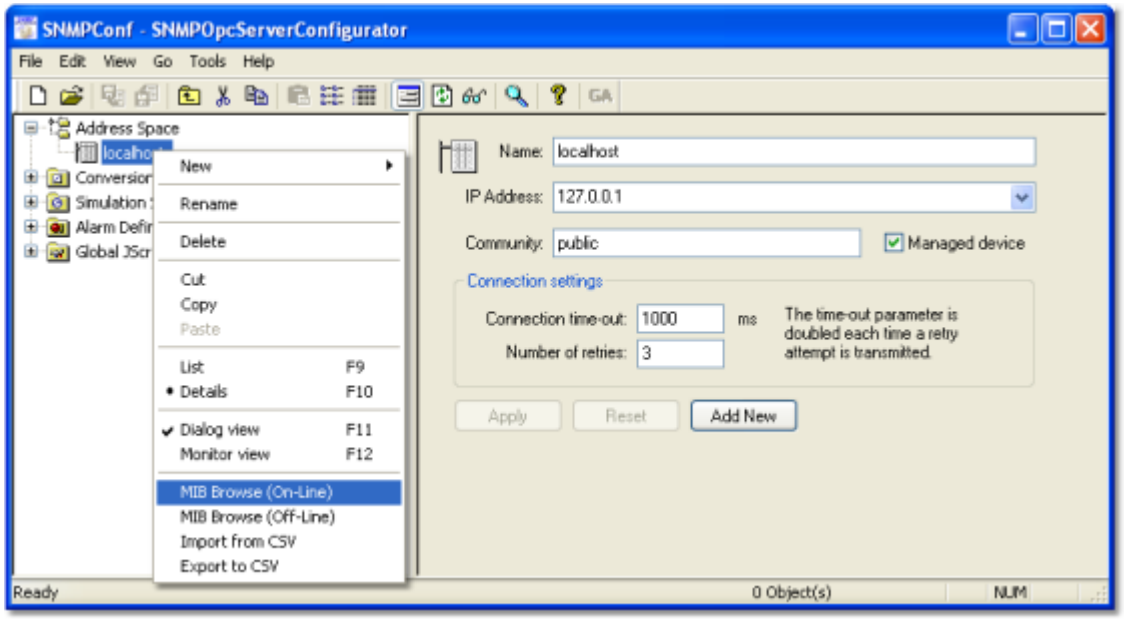


***Figure 1**: The MIB Browse (On-line): The start from the device menu.*

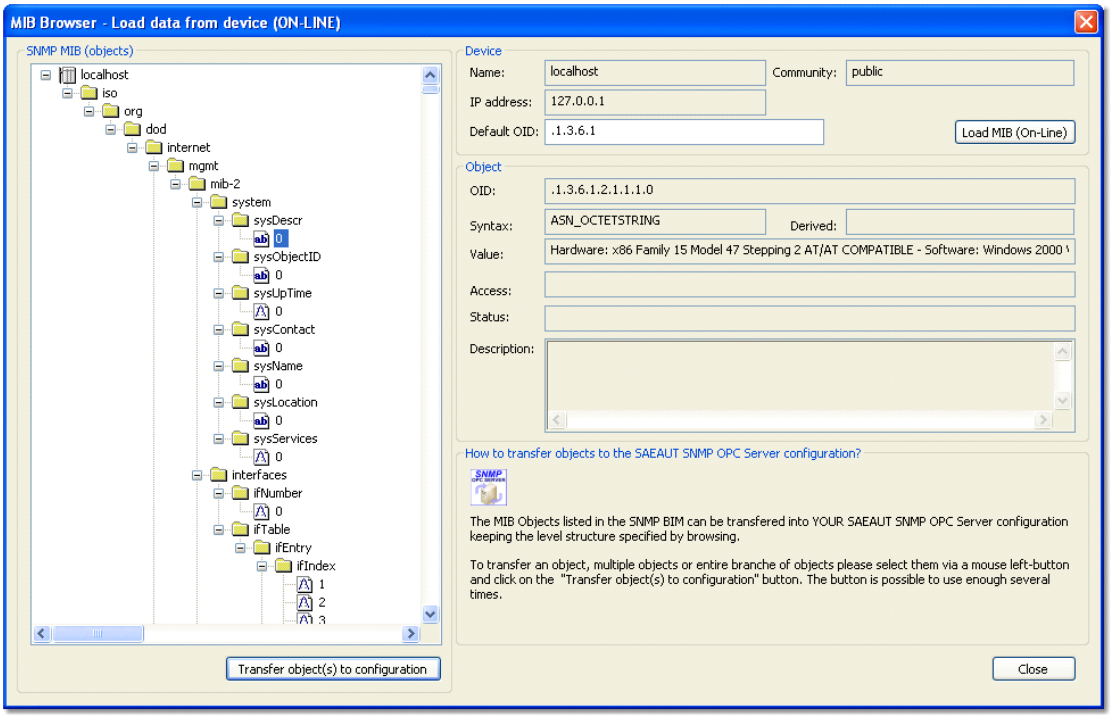


***Figure 2**: The MIB Browse (On-line): The tree structure of available SNMP variables from connected device.*

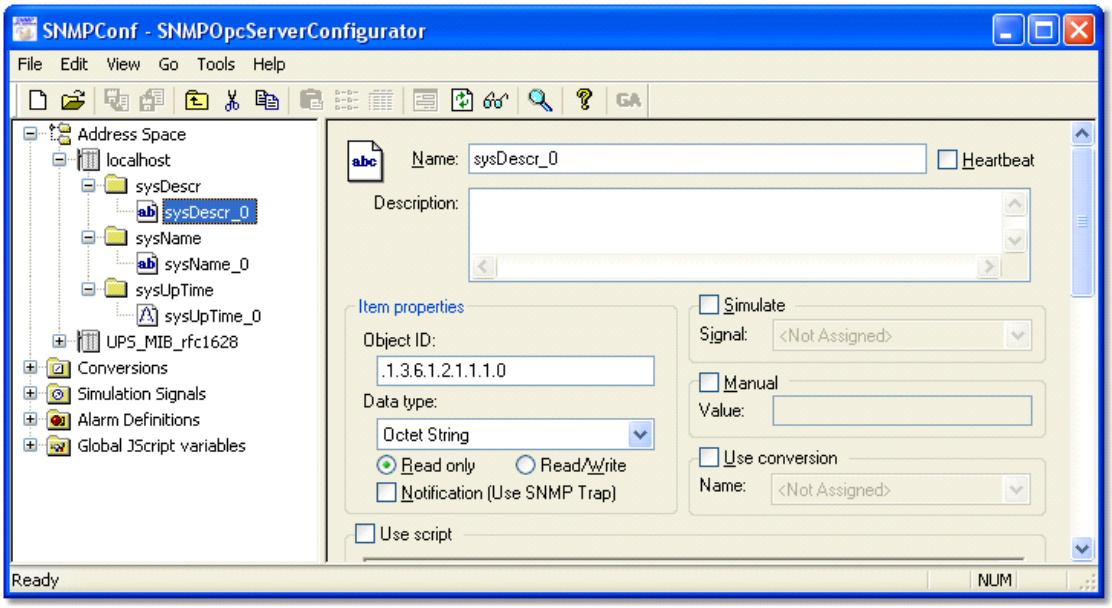


***Figure 3**: The MIB Browse (On-line): The SNMP variables transferred to OPC items.*

Import from MIB file

We need very often to prepare a configuration although we have no available SNMP device yet. In this case, we can use one of the following methods: Import from MIB file or Import from CSV file.

A MIB file is a text file which enables to organize SNMP variables in well-known tree structure. The MIB file provides complex information about available SNMP variables (i.e. description of SNMP variable). The MIB file can even include references to other MIB files and then the content of these MIB files can be also included. The number of defined SNMP variables in one MIB file can be large and different for each device type. Therefore, the SAEAUT SNMP OPC Server configurator brings possibility of Off-line browsing for searching of SNMP variables directly from MIB files. Using this simple method, we can transfer not only one SNMP variable but even entire tree multi-level hierarchical structure to address space of SAEAUT SNMP OPC Server on one-click. A small disadvantage of this method is that not all SNMP variables defined in the MIB file have to be available in a specific SNMP device type.

To enable the Off-Line browsing (Import MIB file) in the SAEAUT SNMP OPC Server Configurator, please do the following:

1. Create a new device or select an existing device.
2. Right-click on the device and choose MIB Browse (Off-line) (see Figure 4).
3. Click on the Load MIB (Off-line) button (see Figure 5).
4. Select the SNMP variables of folder in the tree.
5. Click on the Transfer object(s) to configuration button (see Figure 5).
6. Click on the Close button.
7. The SNMP variables mapped to OPC items (see Figure 6).

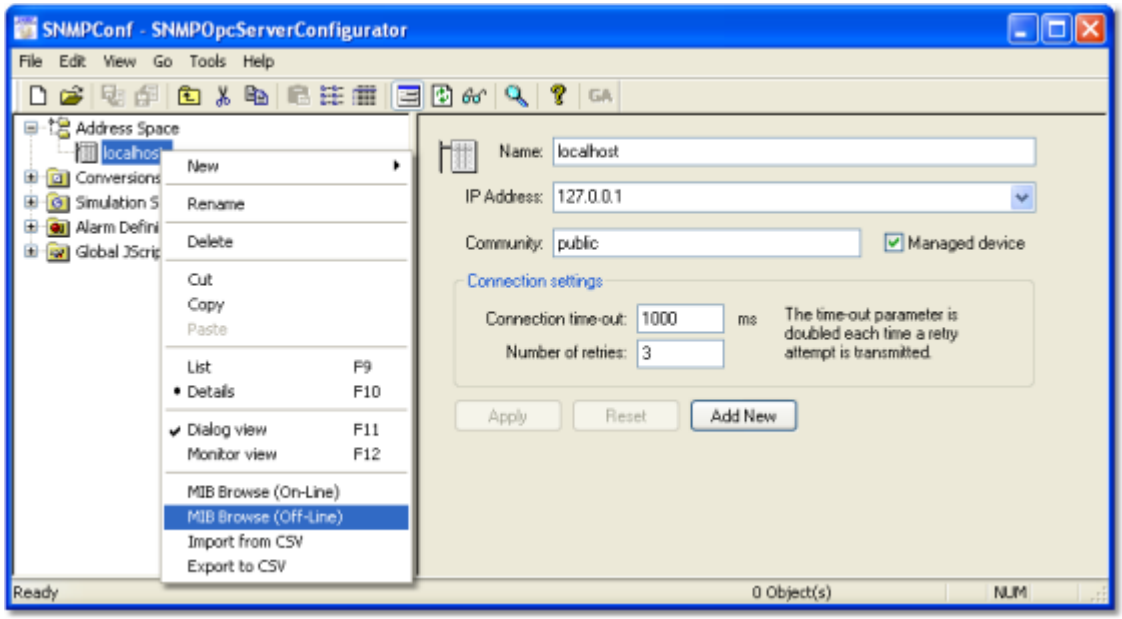


***Figure 4**: The MIB Browse (Off-line): The start from the device menu.*

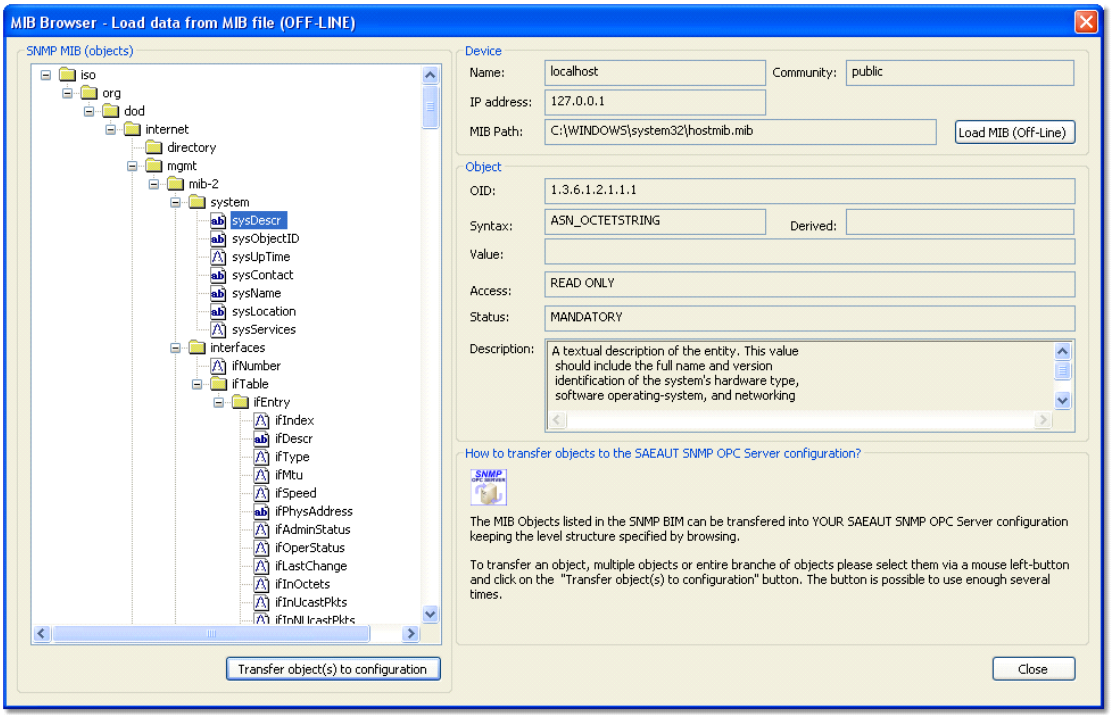


***Figure 5**: The MIB Browse (Off-line): The tree structure of available SNMP variables from MIB file.*

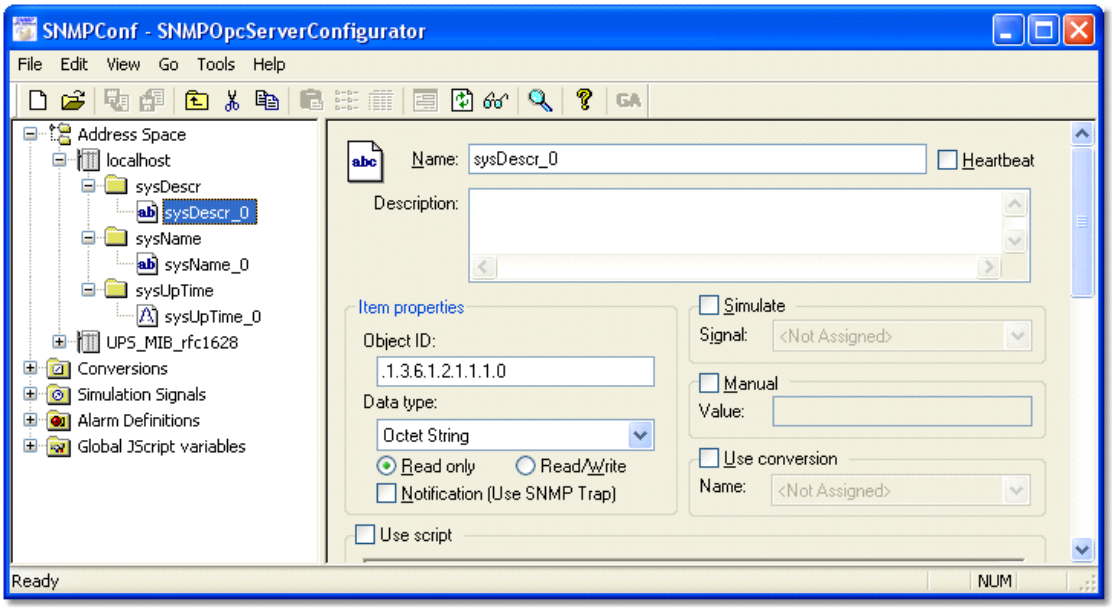


***Figure 6**: The MIB Browse (Off-line): The SNMP variables transferred to OPC items.*

Import from CSV file

The CSV file is also textl file which structure is very similar to tables. The SNMP variable in the MIB file is presented as one row and its individual parameters (e.g. name or OID) are columns separated by comma or semi-colon. Each SNMP variable starts at the new line

(CR+LF) of CSV file. The CSV files are created e.g. by providers of devices or by integrators. Import of SNMP variables from CSV files to SAEAUT SNMP OPC Server is fast and easy (on one-click). As a small disadvantage of this method can be perceived that SNMP variables are not organized in a tree hierarchical structure. But, this feature is not important for functionality because it defines only logic "virtual" organization of the items.

To enable the Import from CSV file in the SAEAUT SNMP OPC Server Configurator, please do the following:

1. Create a new device or select an existing device.
2. Right-click on the device and choose Import from CSV (see Figure 7).
3. Select the CSV file definition in the combo-box (see Figure 8).
4. Click on the OK button (see Figure 8).
5. The SNMP variables mapped to OPC items (see Figure 9).

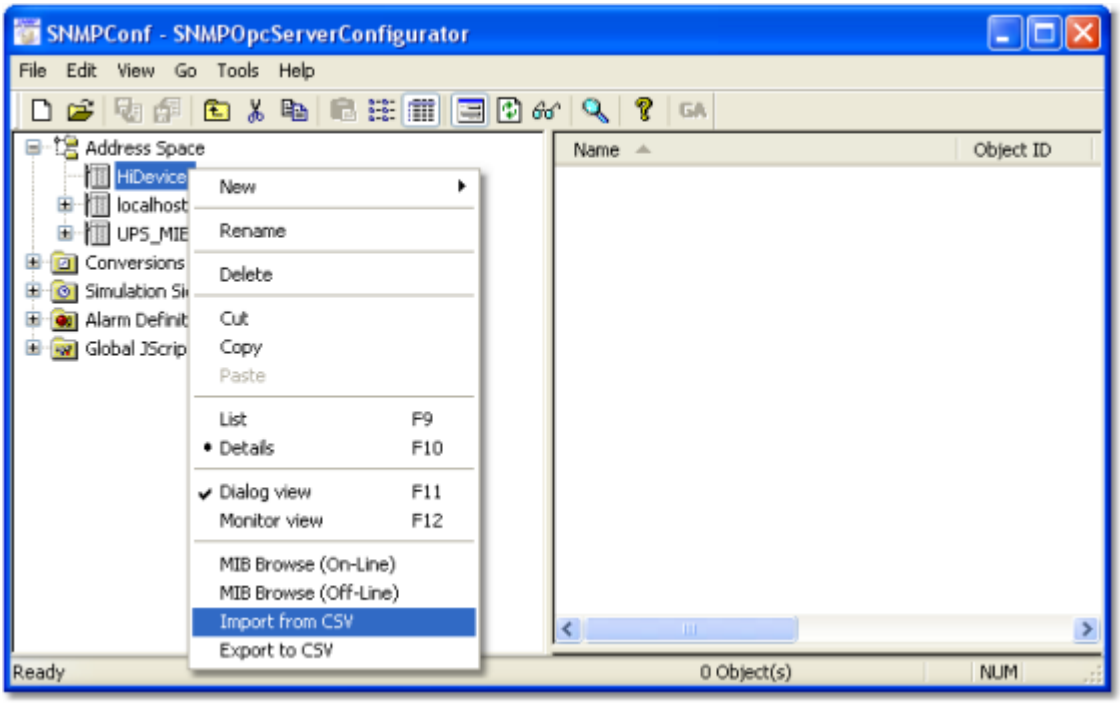


***Figure 7**: Import from CSV: The start from the device menu.*

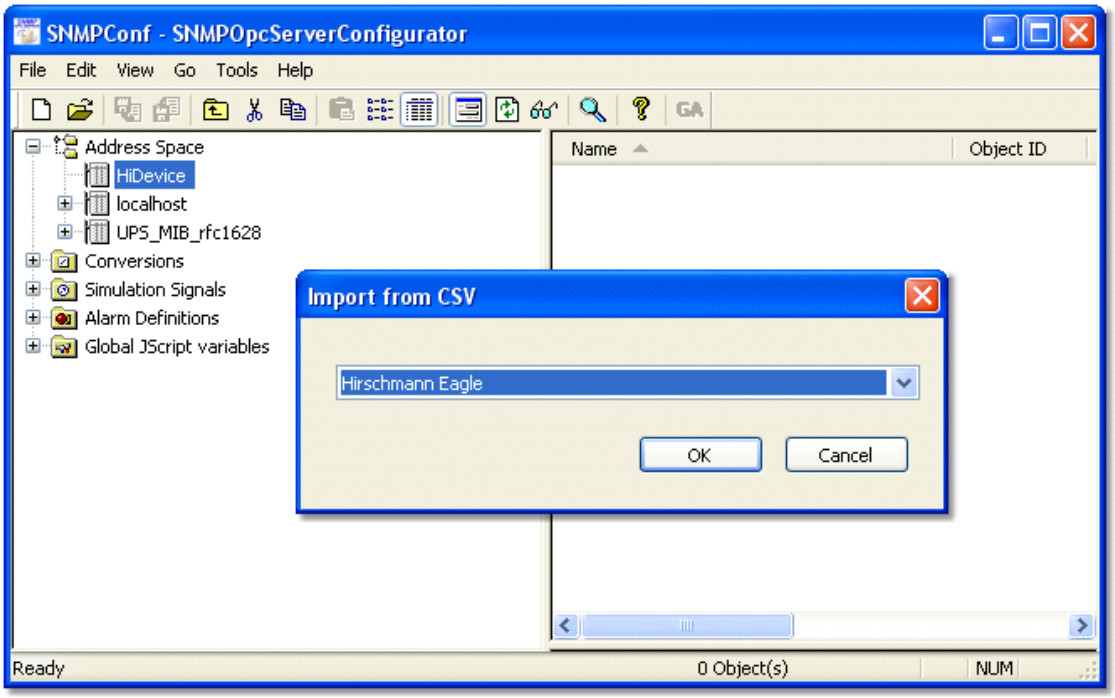


***Figure 8**: Import from CSV: The dialog displays the list of available devices for which are defined CSV files.*

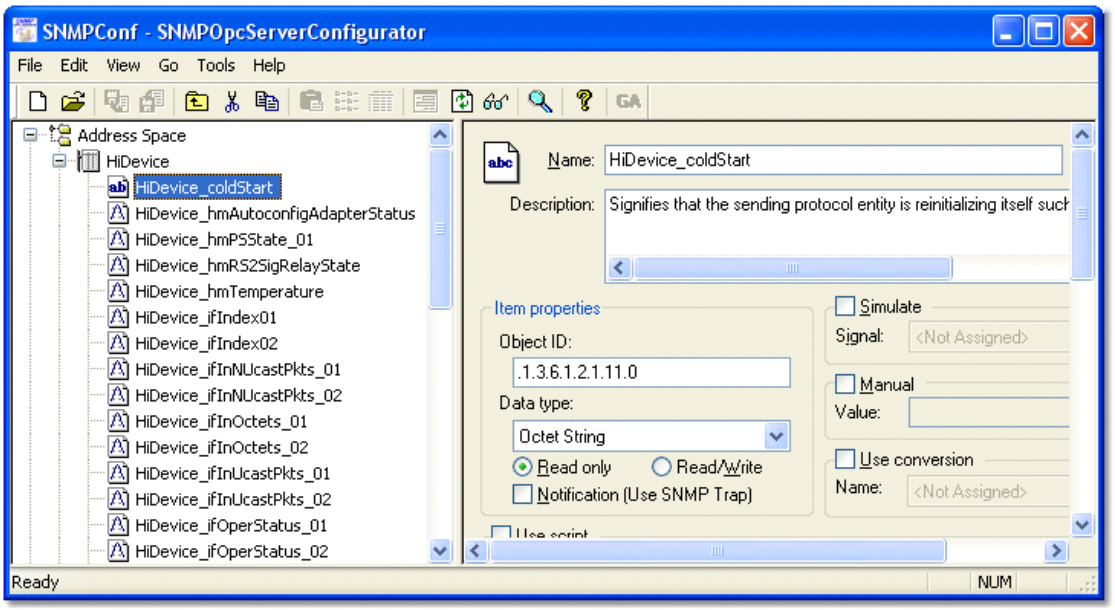


***Figure 9**: Import from CSV: The SNMP variables transferred to OPC items.*

Export to CSV file

The SAEAUT SNMP OPC Server Configurator enables to export SNMP items from the open configuration to a CSV file. The CSV file is possible to create on the level of devices. It means that for each device, from the configuration, it is possible to store all relevant SNMP

items to one CSV file. The structure of the CSV file is the same as it was already described in the section "Import from CSV file". The same CSV file structure gives possibility of data transfer between defined devices and even between various configurations. A little disadvantage of this data transfer is that during exporting data to CSV file can be changed data structure from tree to flat structure. But, this structure is not important for functionality because it defines only logic "virtual" organization of the items. If you want to copy SNMP items between different devices or configurations then we recommend to you use as a destination folder for your CSV file the following application folder ..\SAEAUT SNMP OPC Server\CSV\

Note that: If you want to copy SNMP items from one device to another device in the same configuration then using functionality "Copy" and "Past" is more effective. In addition, in this case the structure of transferred data is unchanged.

To enable the Export to CSV file in the SAEAUT SNMP OPC Server Configurator, please do the following:

1. Create a new device or select an existing device.
2. Right-click on the device and choose Export to CSV (see Figure 10).
3. Select the destination folder. It is recommended to use the application folder ..\SAEAUT SNMP OPC Server\CSV\ (see Figure 11).
4. Write the CSV file name.
5. Click on the Save button (see Figure 11).

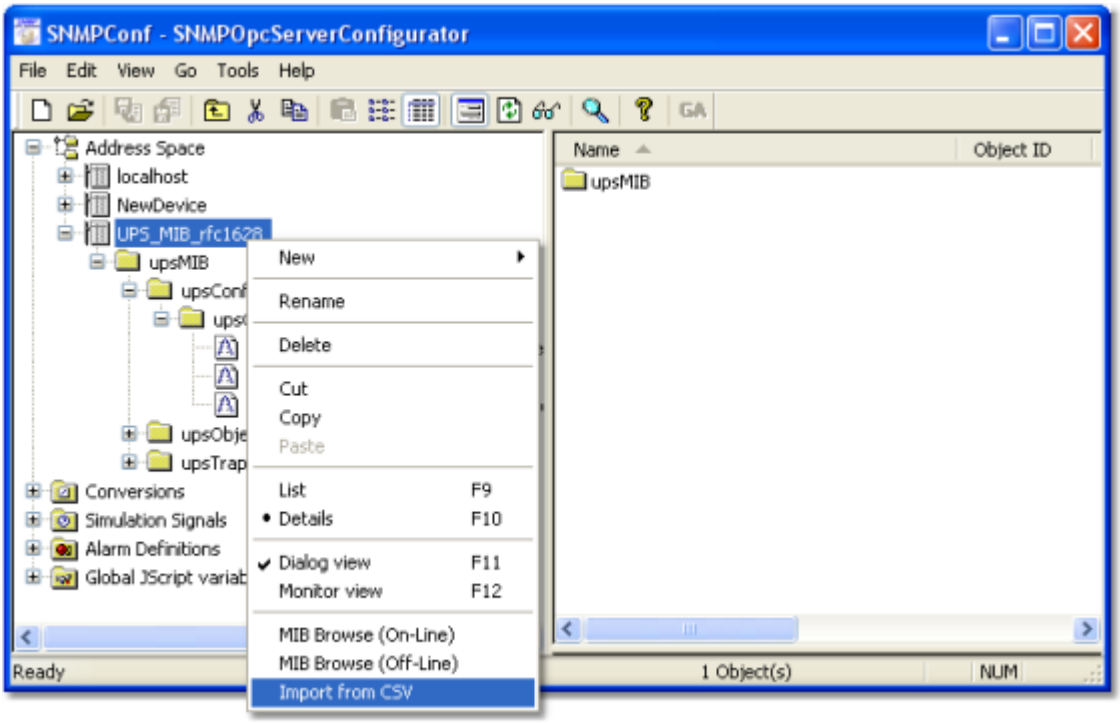


***Figure 10**: Export to CSV: The start from the device menu.*

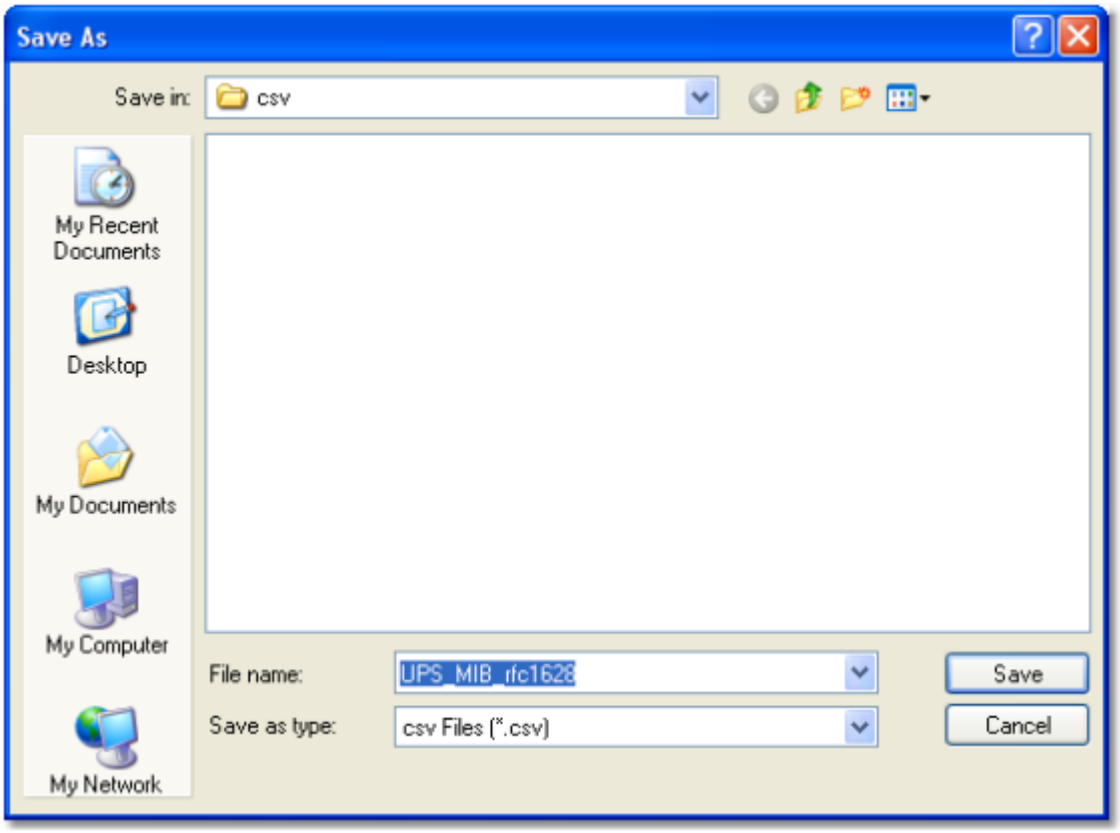


***Figure 11**: Export to CSV: The start from the device menu.*

Import from XML file

The SAEAUT SNMP OPC Server provides also another possibility how to configurate address space. The configuration of the SAEAUT SNMP OPC Server is stored in the Microsoft Access MDB file. There is possibility in the configurator tool to export entire configuration to a XML file. This XML file can be modified in an arbitrary xml or text editor and imported to a configuration of SAEAUT SNMP OPC Server.

To enable the Import from XML file in the SAEAUT SNMP OPC Server Configurator, please do the following:

1. Click on the File ⇨ XML Import... (see Figure 12).
2. Select a XML file.
3. Click on OK button.

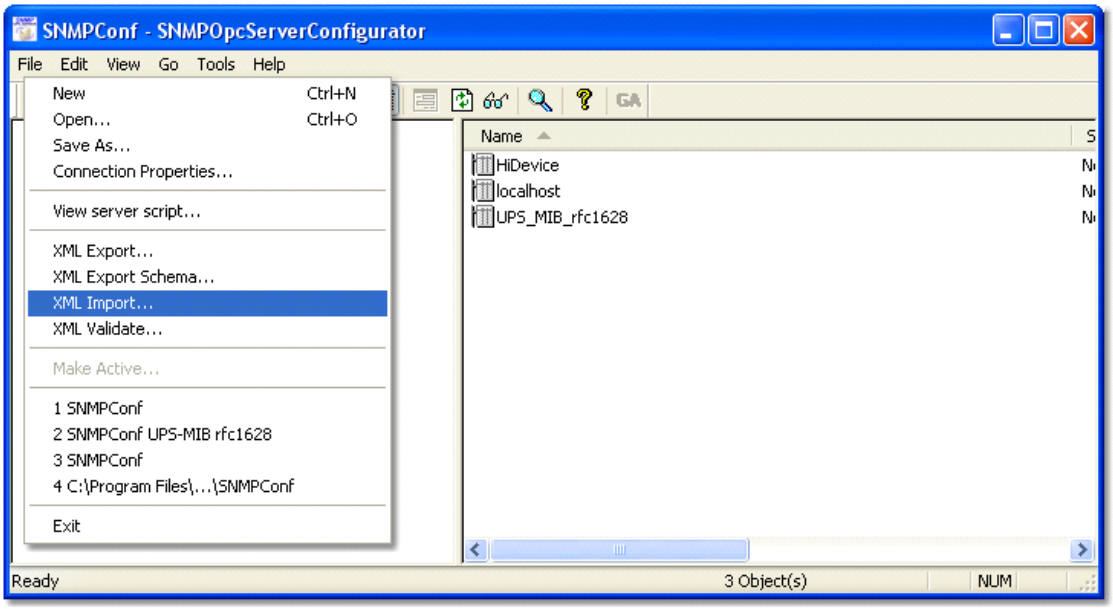


***Figure 12**: Import from XML: The start from application menu.*

Manual configuration of OPC item

The SAEAUT SNMP OPC Server enableses also a manual creation of configuration. You can set manually all parameters of OPC item. Between the most important parameters belong following:

- Name.
- Description.
- Object OID (associated to SNMP variable).
- Data Type.
- Access Rights.
- SNMP Trap notification.
- Etc.

To enable the manual configuration of OPC item in the SAEAUT SNMP OPC Server Configurator, please do the following:

1. Create a new or select existing OPC item (see Figure 13).
2. Set the required parameters.
3. Click on the Apply button.

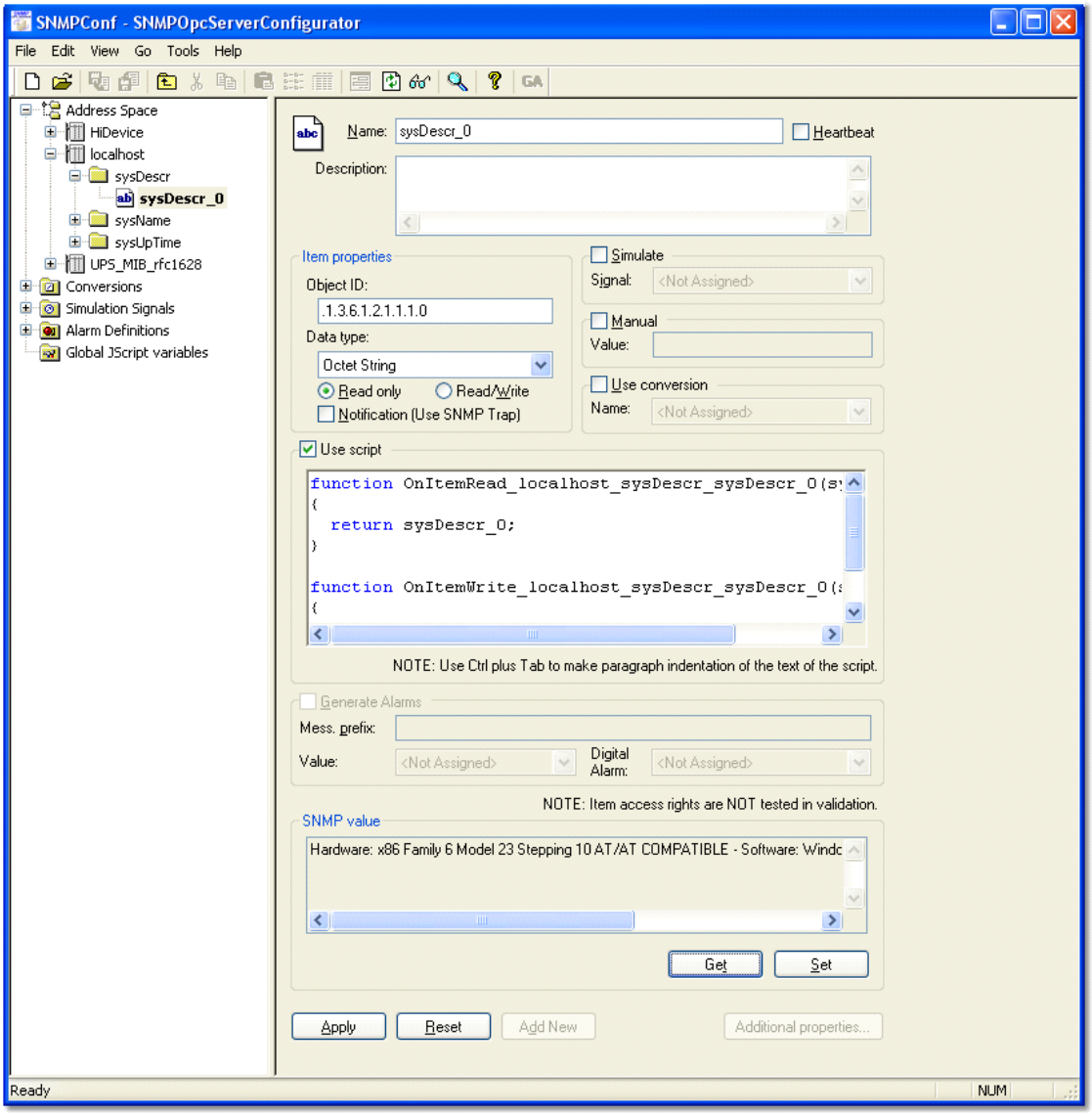


***Figure 13**: Manual configuration: The dialog for manual configuration of an OPC item.*

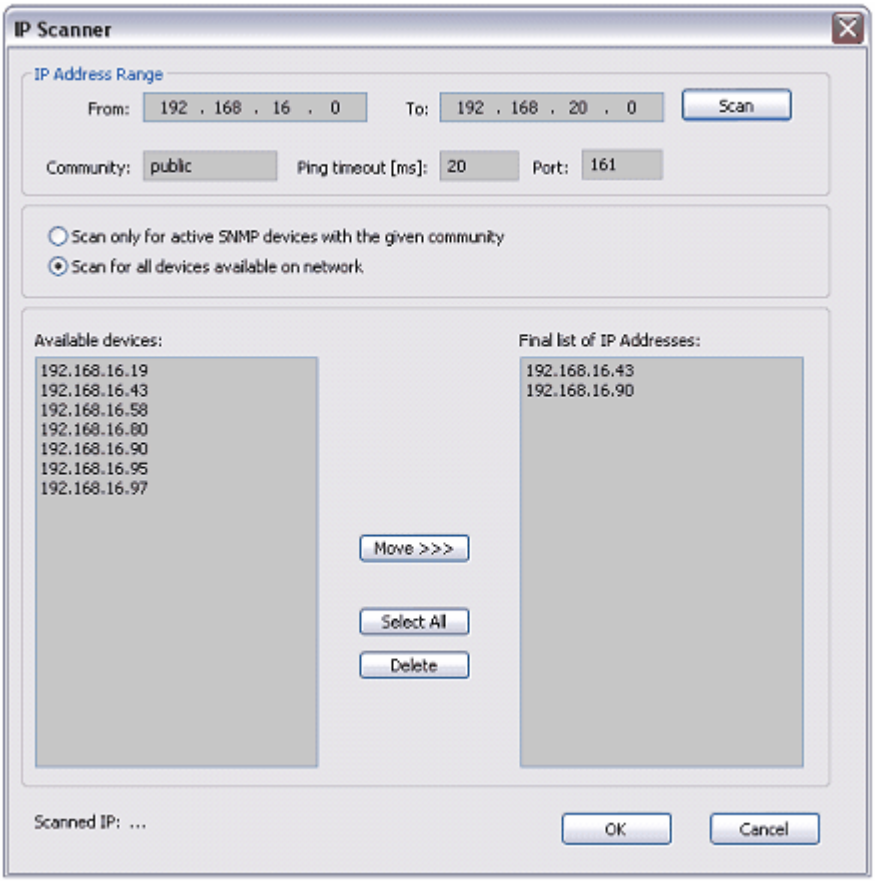
Related articles

How to browse available SNMP variables?
MIB Browser (On-Line) - browsing SNMP variables from a connected Device
MIB Browser (Off-Line) - browsing SNMP variables a MIB file that describe Device

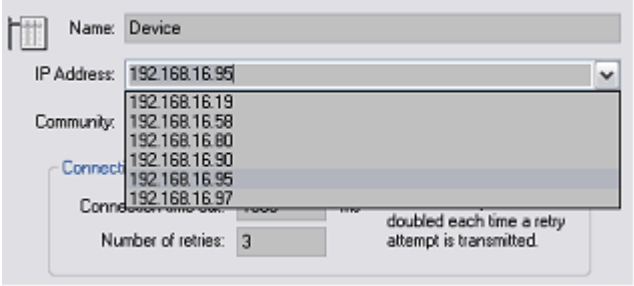
3.1.1 IP Scanner

To open IP Scanner choose *Tools ŕ IP Scanner* from main menu.

IP Scanner enables to scan the network in given range and find connected SNMP devices.



After scanning, IP addresses of all found and selected devices are visible on Device panel. To set the IP address of device, just select the address from the list.



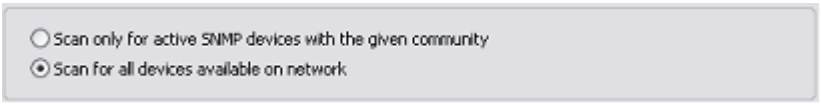
How to use IP scanner?

First you need to set scanning parameters :

- *IP Range*
- *Community*
- *Ping timeout*
- *Port*

As default values are used *public* community, ping timeout = 20ms and standard SNMP port 161.

Than, choose what type of devices do you want to scanning for:



- You can choose to scan only for active SNMP devices with the given community.
- The second possibility, scanner will find all devices connected to network and not only SNMP devices. In this case, the given community is ignored.

Now you can press Scan and start the scanning. Bottom left is displayed the currently scanned IP address. The scanning you can stop at every moment with button Stop.

The list left contains the currently scanned and found IP addresses. This list is always cleared after you press Scan. The list box right contains the final list of IP addresses. This is the list what you can see on device panel. You must manually create this list with moving the addresses from the left list to this final list. To learn to work with this lists read following notes :

- First you need to select the addresses and than you can operate with them (move or delete)
- To select more items hold <Ctrl> or <Shift> and use mouse button or standard arrow keys
- To select all IP addresses click to the list and press Select All
- To move the selected addresses from the left list to the final list, press Move >>>
- To delete selected devices press Delete

Final, you need to confirm the changes pressing OK, or cancel it with Cancel.

3.1.2 MIB Browser (On-Line) - browsing SNMP variables from a connected Device

In order to know desired object MIB Objects, the SAEAUT SNMP OPC Server™ implements the **MIB Browser (On-Line)**, whose task is to request a **SNMP device** for its object identifiers (OID) of all the variables that can consecutively be used.

On-Line MIB browsing can be invoked on a device specified directly in the Address Space of SNMP OPC Server Configurator where settings are overtaken from this configuration. By right-clicking on a wished device, user chooses the MIB Browser (On-Line) entry from a popup menu.

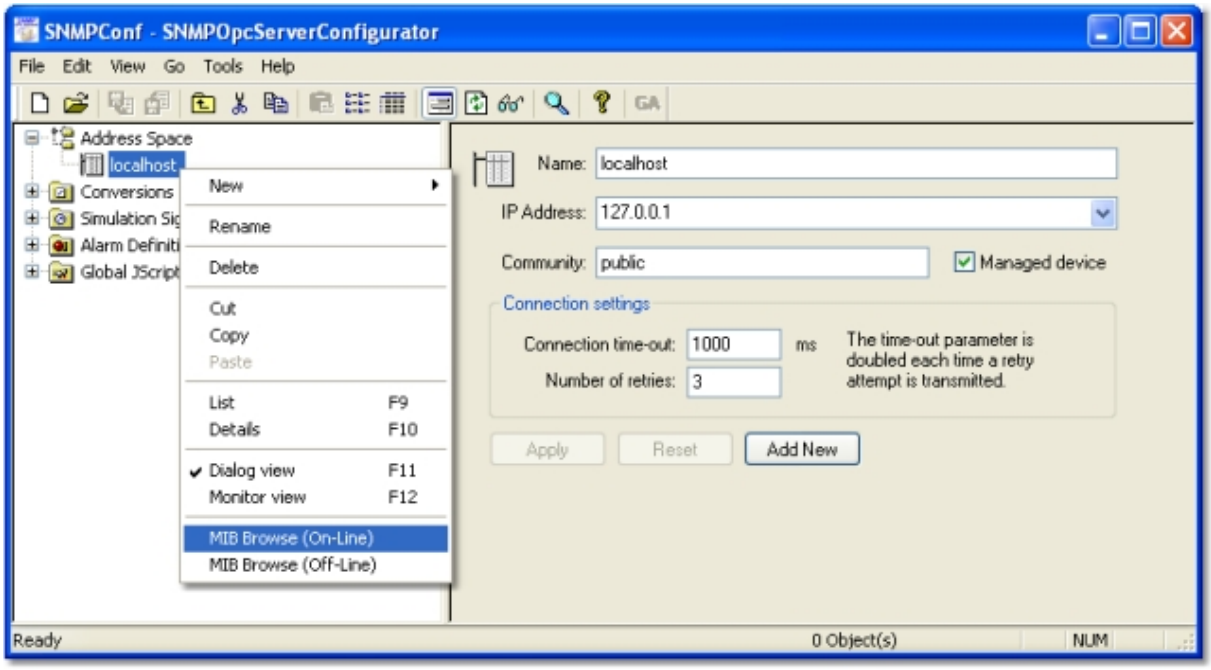


Figure A: *MIB Browser (On-Line), open dialog.*

MIB Browser is implemented as a new dialog window. It contains controls filled with Name, IP address and Community values of device going to be browsed. There is an edit control containing the Default object ID from which the device is started to be browsed. Its value can be changed according to the user needs. By clicking the **Load MIB (On-Line)** button, user invokes browsing of device from the specified Default Object ID.

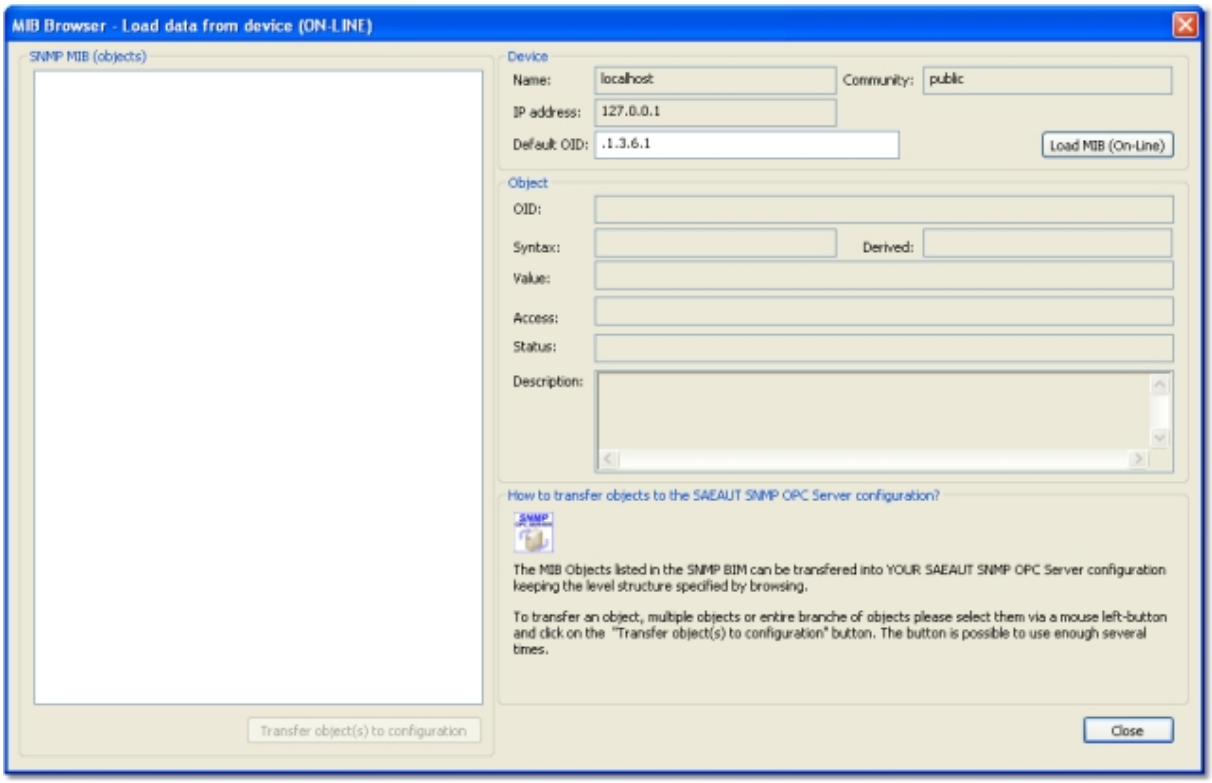


Figure B: *MIB Browser (On-Line) dialog.*

Browsed **MIB Objects** are logically structured and displayed in a tree view. They contain object ID (OID), value and data type (Syntax) associated with each of them.

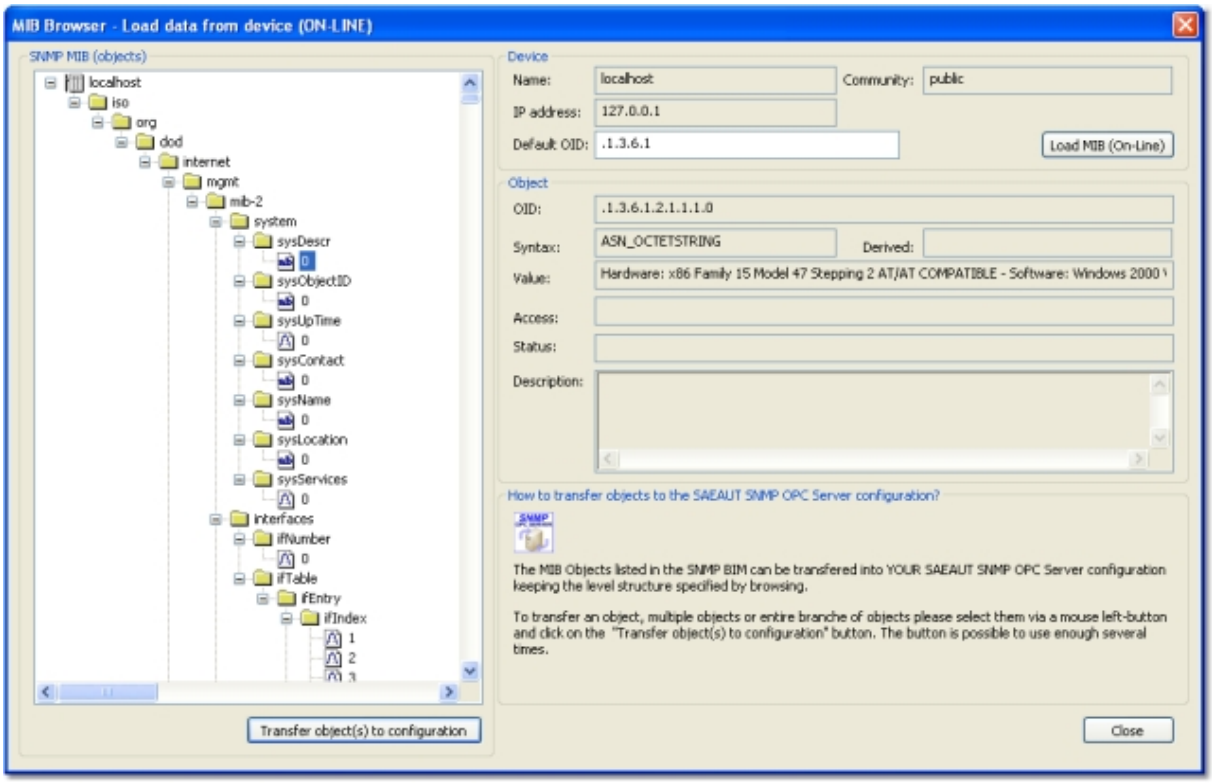


Figure C: *MIB Browser (On-Line) shows all available SNMP variables from localhost computer.*

The items listed in the tree view can be added into the configuration of SAEAUT SNMP OPC Server™ keeping the level structure specified by browsing. SAEAUT SNMP OPC Server™ takes over the Name of the variable, its object ID (OID) and data type (Syntax).

Because Access rights of particular variables are not SNMP attributes receivable from the device, these rights are defaultly set to Read-Only. It is user's task to change these access rights and user responsibility for misusing them. Because of, the Name of the variable read from device can contain dot characters and such names are not allowed to be used in SAEAUT SNMP OPC Server™ , when transfering in the database all the dots characters in the names are replaced by underline characters.

User can add specified items into SAEAUT SNMP OPC Server™ configuration one by one or a group of them at once by selecting wished item or folder in the tree view and clicking **Tranfer object(s) to configuration** button. When choosing the folder, all the subfolders and items are added into configurator database keeping the structure created by browsing.

Description of dialog controls

Control Name	Control Type	Description
Load MIB (On-Line)	Button	The button starts browsing of MIB Objects from device.
Transfer object(s) to configuration	Button	Transfering MIB object (s) to configuration database of SAEAUT SNMP OPC Server™ . It is possible to choose a single item or multiple items at once. When choosing the folder, all the subfolders and items are added into configurator database keeping the structure created by browsing.
Close	Button	Close dialog.
Name	static-box (Read-only)	Symbolic device name.
Community	static-box (Read-only)	SNMP community name to which belongs items.
IP address	static-box (Read-only)	IP Address of Device.
Default OID	edit-box (Writable)	The object identifier from which will start browsing items.
OID	static-box (Read-only)	Identifier of MIB Object.
Syntax	static-box (Read-only)	Syntax of MIB Object.
Derived	static-box (Read-only)	NA
Value	static-box (Read-only)	Value of MIB Object.
Access	static-box (Read-only)	NA
Status	static-box (Read-only)	NA
Description	static-box (Read-only)	NA

Related articles

MIB Browser (Off-Line) - browsing SNMP variables a MIB file that describe Device
How to browse available SNMP variables?

3.1.3 MIB Browser (Off-Line) - browsing SNMP variables a MIB file that describe Device

In order to know desired object MIB Objects, the SAEAUT SNMP OPC Server™ implements the **MIB Browser (Off-Line)**, whose task is to load all SNMP variables from a MIB file that is provided for a device or computer. All object identifiers (OID) of all the variables can consecutively be used.

Off-Line MIB browsing can be invoked on a device specified directly in the Address Space of SNMP OPC Server Configurator where settings are overtaken from this configuration. By right-clicking on a wished device, user chooses the MIB Browser (Off-Line) entry from a popup menu.

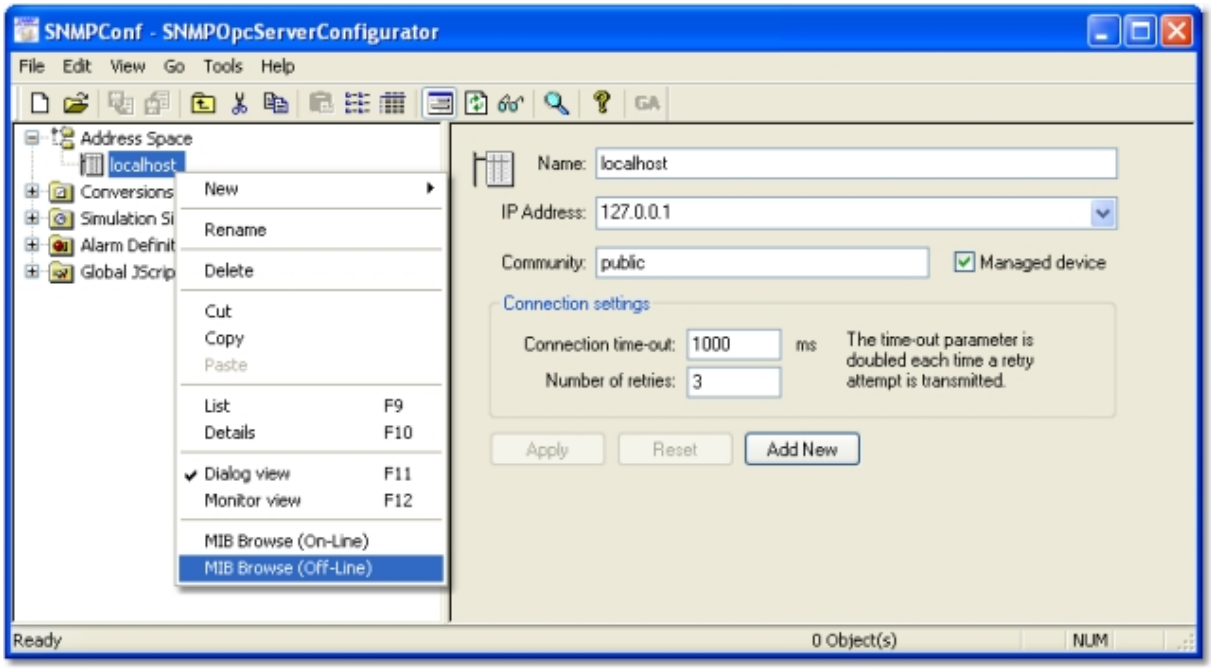


Figure A: *MIB Browser (Off-Line), open dialog.*

MIB Browser is implemented as a new dialog window. It contains controls filled with Name, IP address and Community values of device going to be browsed. There is an edit control containing the Default object ID from which the device is started to be browsed. Its value can be changed according to the user needs. By clicking the **Load MIB (On-Line)** button, user invokes browsing of device from the specified Default Object ID.

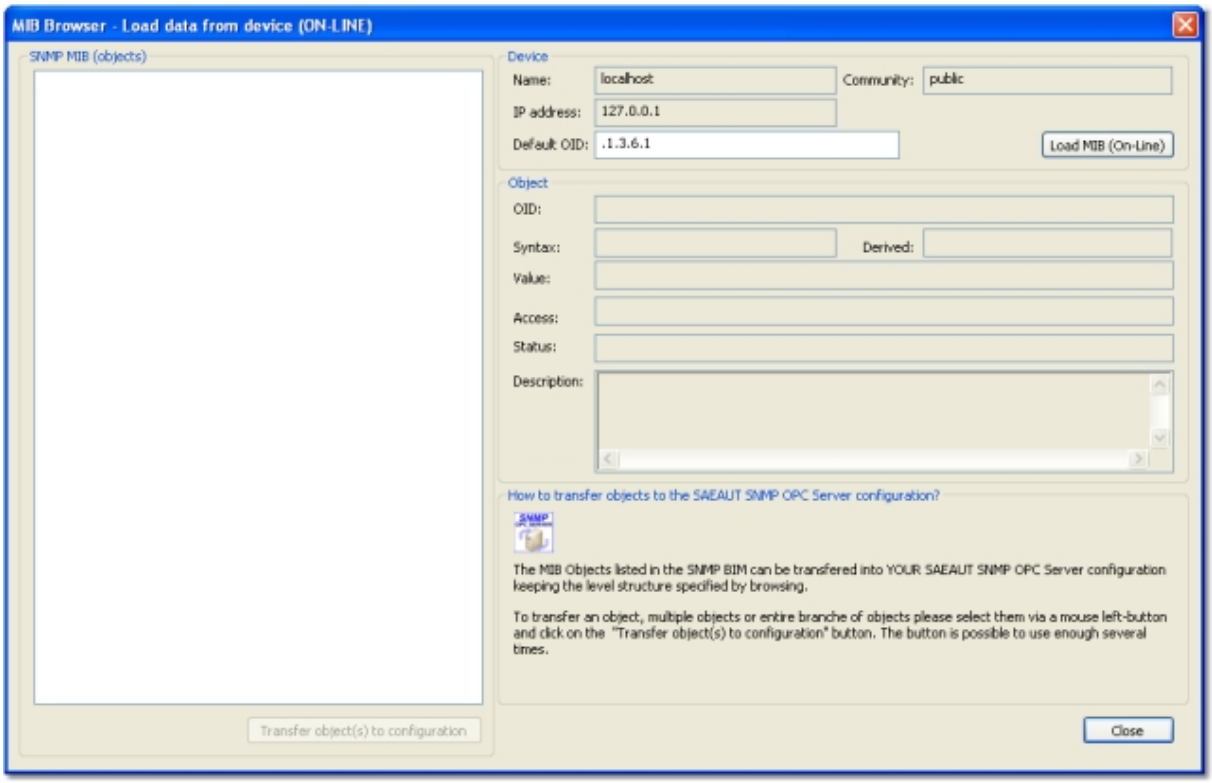


Figure B: *MIB Browser (Off-Line) dialog.*

Browsed **MIB Objects** are logically structured and displayed in a tree view. They contain object ID (OID), value and data type (Syntax) associated with each of them.

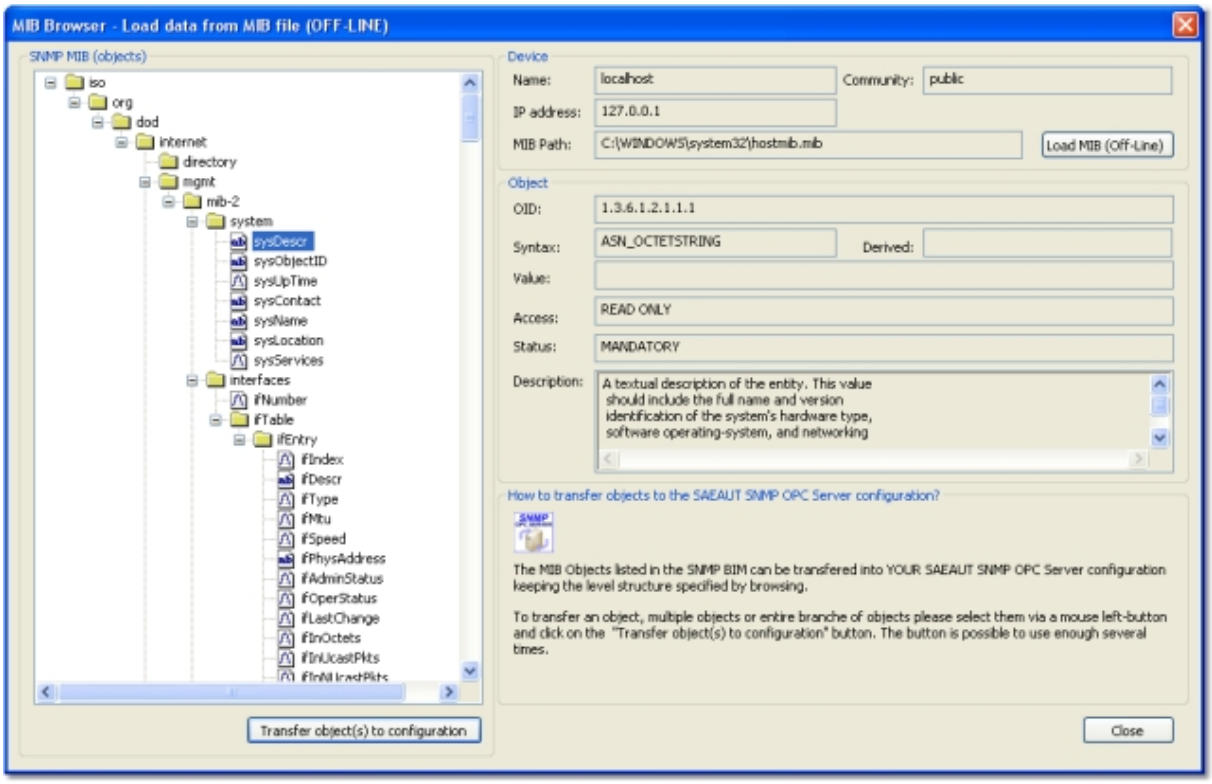


Figure C: *MIB Browser (On-Line) shows all available SNMP variables from localhost computer.*

The items listed in the tree view can be added into the configuration of SAEAUT SNMP OPC Server™ keeping the level structure specified by browsing. SAEAUT SNMP OPC Server™ takes over the Name of the variable, its object ID (OID) and data type (Syntax).

Because of, the Name of the variable read from device can contain dot characters and such names are not allowed to be used in SAEAUT SNMP OPC Server™ , when transfering in the database all the dots characters in the names are replaced by underline characters.

User can add specified items into SAEAUT SNMP OPC Server™ configuration one by one or a group of them at once by selecting wished item or folder in the tree view and clicking **Tranfer object(s) to configuration** button. When choosing the folder, all the subfolders and items are added into configurator database keeping the structure created by browsing.

Description of dialog controls

Control Name	Control Type	Description
Load MIB (On-Line)	Button	The button shows the open dialog for choosing of a MIB file. After selecting the MIB file and clicking on the open button, all defined device MIB Objects from MIB file will be loaded.
Transfer object(s) to configuration	Button	Transfering MIB object (s) to configuration database of SAEAUT SNMP OPC Server™ . It is possible to choose a single item or multiple items at once. When choosing the folder, all the subfolders and items are added into configurator database keeping the structure created by browsing.
Close	Button	Close dialog.
Name	static-box (Read-only)	Symbolic device name.
Community	static-box (Read-only)	SNMP community name to which belongs items.
IP address	static-box (Read-only)	IP Address of Device.
MIB path	static-box (Read-only)	The full path to a MIB file which is loaded.
OID	static-box (Read-only)	Identifier of MIB Object.
Syntax	static-box (Read-only)	Syntax of MIB Object.
Derived	static-box (Read-only)	Specific syntax of MIB Object. The specific syntax will be converted to type in the field "Syntax".
Value	static-box (Read-only)	Value of MIB Object.
Access	static-box (Read-only)	Access rights of MIB Object.
Status	static-box (Read-only)	Status of MIB Object.
Description	static-box (Read-only)	Description of MIB Object.

Related articles

MIB Browser (On-Line) - browsing SNMP variables from a connected Device
How to browse available SNMP variables?

3.2 How to verify whether your SNMP device is available? How to use GET, SET operations from the server configurator?

The SAEAUT SNMP OPC Server™ Configurator was enhanced about the possibility to retrieve (GET operation) or set (SET operation) a value of SNMP object even in the time of configuration creation. Both operations are executed **ON-LINE** directly on an available device without using of OPC interface.

It means, this functionality brings possiblity to test a pure SNMP communication. The operations GET and SET enable also to verify important information if a device is available or if a data item is available.

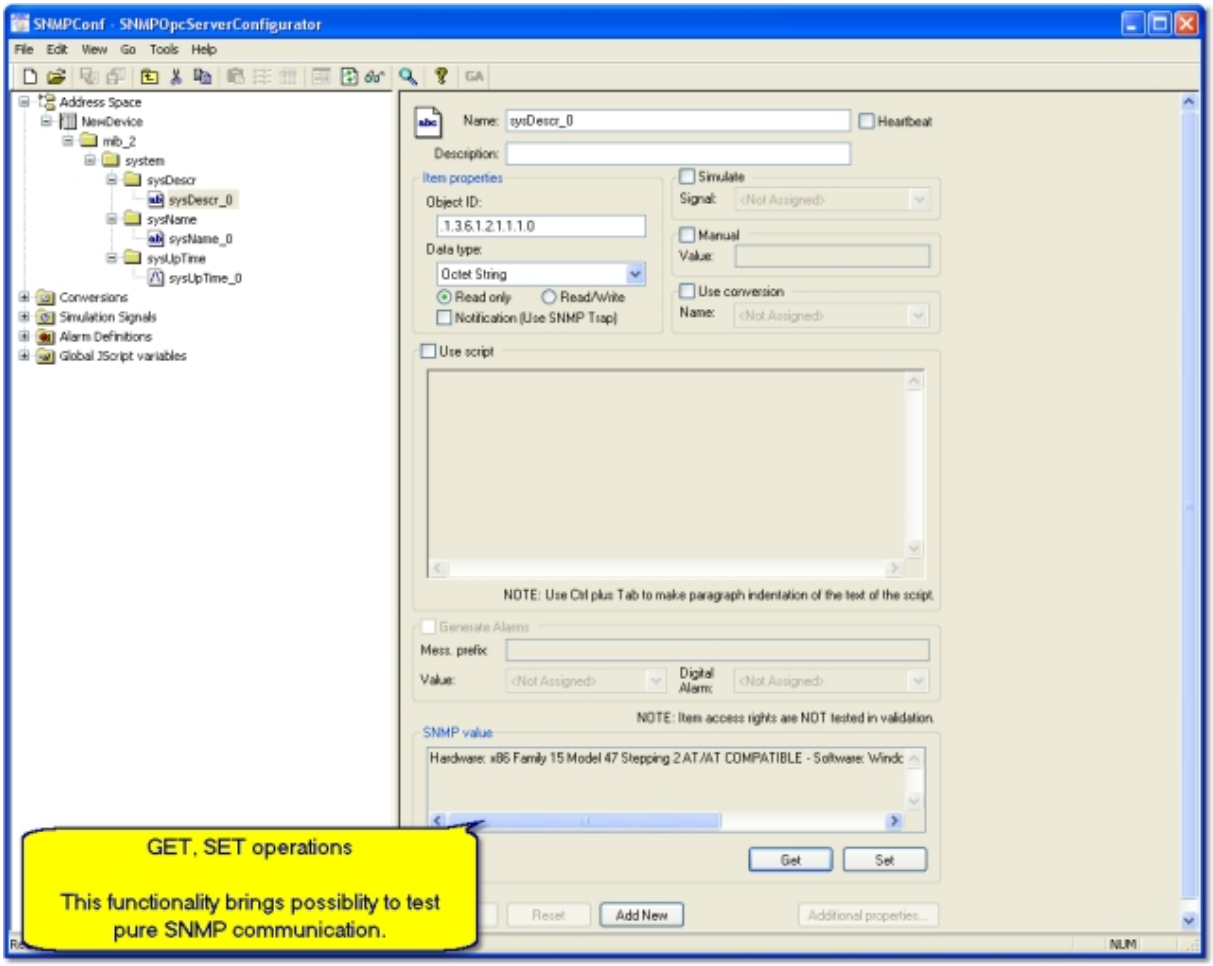
The SAEAUT SNMP OPC Server™ implements two following SNMP operations in the configurator:

- The GET operation retrieves a value from a SNMP device. This operation retrieves a value of a

SNMP object (associated by Object ID).

- The SET operation sets a new value in a SNMP device. This operation sets a new value of a SNMP object (associated by Object ID).

The mentioned functionality is implemented in the Data Item dialog. More details are available in the associated sub-topics.



Related articles

The GET operation retrieves a value from a SNMP device.
The SET operation sets a new value in a SNMP device.

3.2.1 The GET operation retrieves a value from a SNMP device.

The **GET** operation retrieves the current value of a SNMP object (associated by Object ID). The value is retrieved **ON-LINE** from a connected SNMP device. To start this opeation please click on the **Get** button.

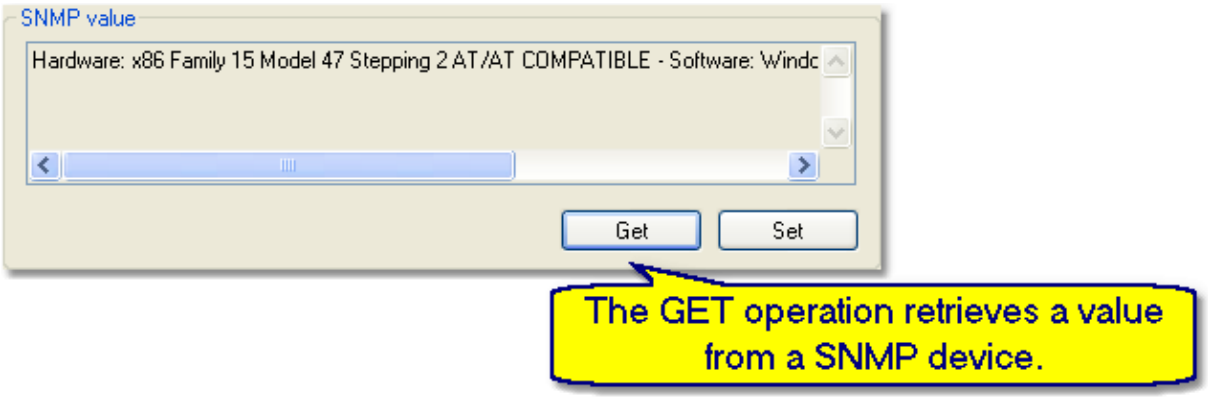
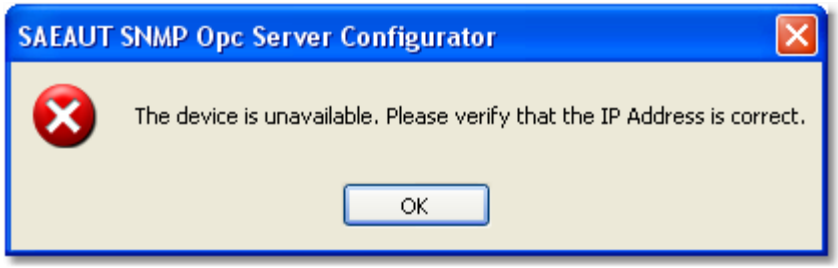


Figure: *SNMP value is retrieved ON-LINE from device.*

The obtained value is presented in scroll-able field. Information that **GET** operation was successful is presented by the following dialog:

In the case, that **GET** opearion failed, it is presented by one of following dialogs:

1. The SNMP device is unavailable. In this case, please verify or change the IP Address of the SNMP device.



2. The SNMP object with associated Object ID is unavailable. In this case, please verify or change the SNMP item associated Object ID.

Related articles

How to verify whether your SNMP device is available? How to use GET, SET operations from the server configurator?
The SET operation sets a new value in a SNMP device.

3.2.2 The SET operation sets a new value in a SNMP device.

The **SET** operation sets a new value of a SNMP object (associated by Object ID). The value is set **ON-LINE** to a connected SNMP device. To start this opeation please click on the **Set** button.

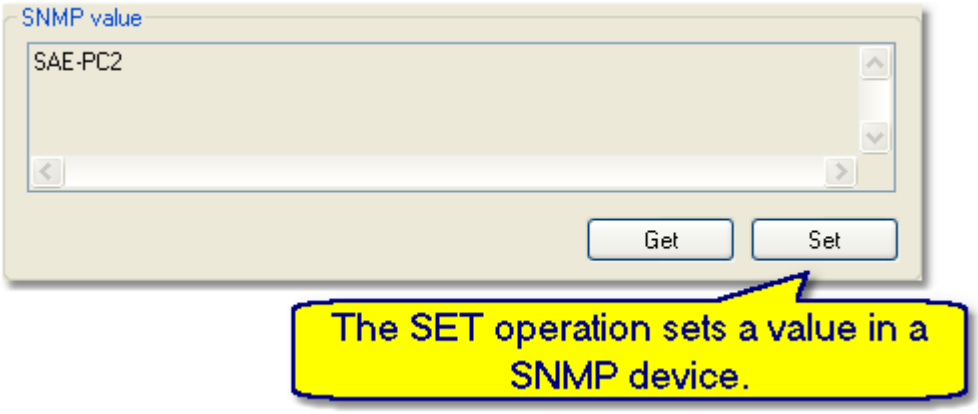
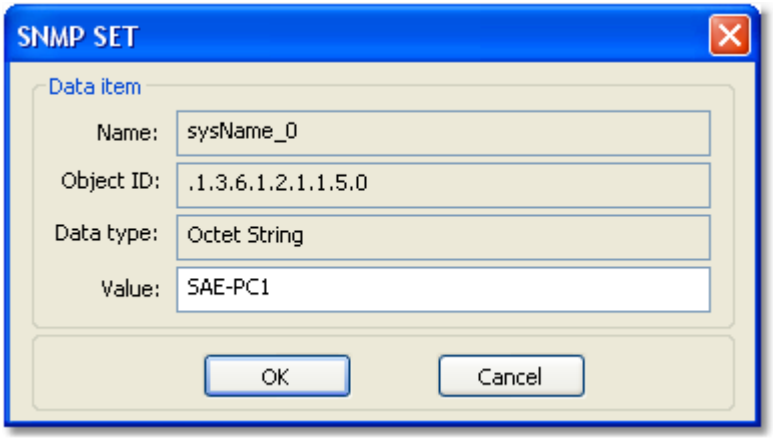


Figure: *SNMP value is retrieved ON-LINE from device.*

After it, the SNMP SET dialog is shown (see picture below). To set a new value (e.g. SAE-PC1), fill the Value field and click on the **OK** button.

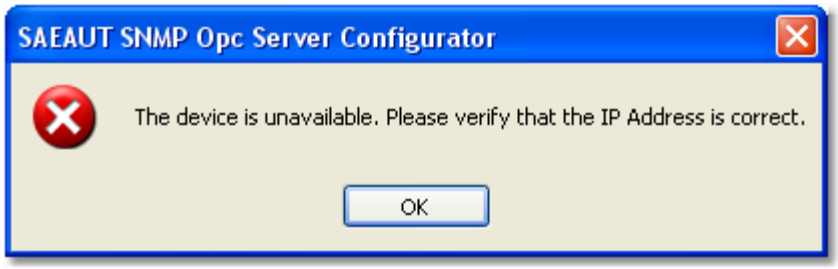


Information that **SET** operation was successful is presented by the following dialog:

In addition, it is possible to use the GET operation to verify that your new value was set.

In the case, that **SET** opearion failed, it is presented by one of following dialogs:

1. The SNMP device is unavailable. In this case, please verify or change the IP Address of the SNMP device.



2. The SNMP object with associated Object ID is unavailable. In this case, please verify or change the SNMP item associated Object ID.

Related articles

How to verify whether your SNMP device is available? How to use GET, SET operations from the server configurator?
The GET operation retrieves a value from a SNMP device.

3.3 How to access SAEAUT SNMP OPC Server data through Internet

The data from **SAEAUT SNMP OPC Server™** is possible very elegant way to acces through **Internet**. Then, the data may be presented directly in Internet browser (e.g. Internet Explorer). The snapshot of an example application implemented in this way is shown on figure below.

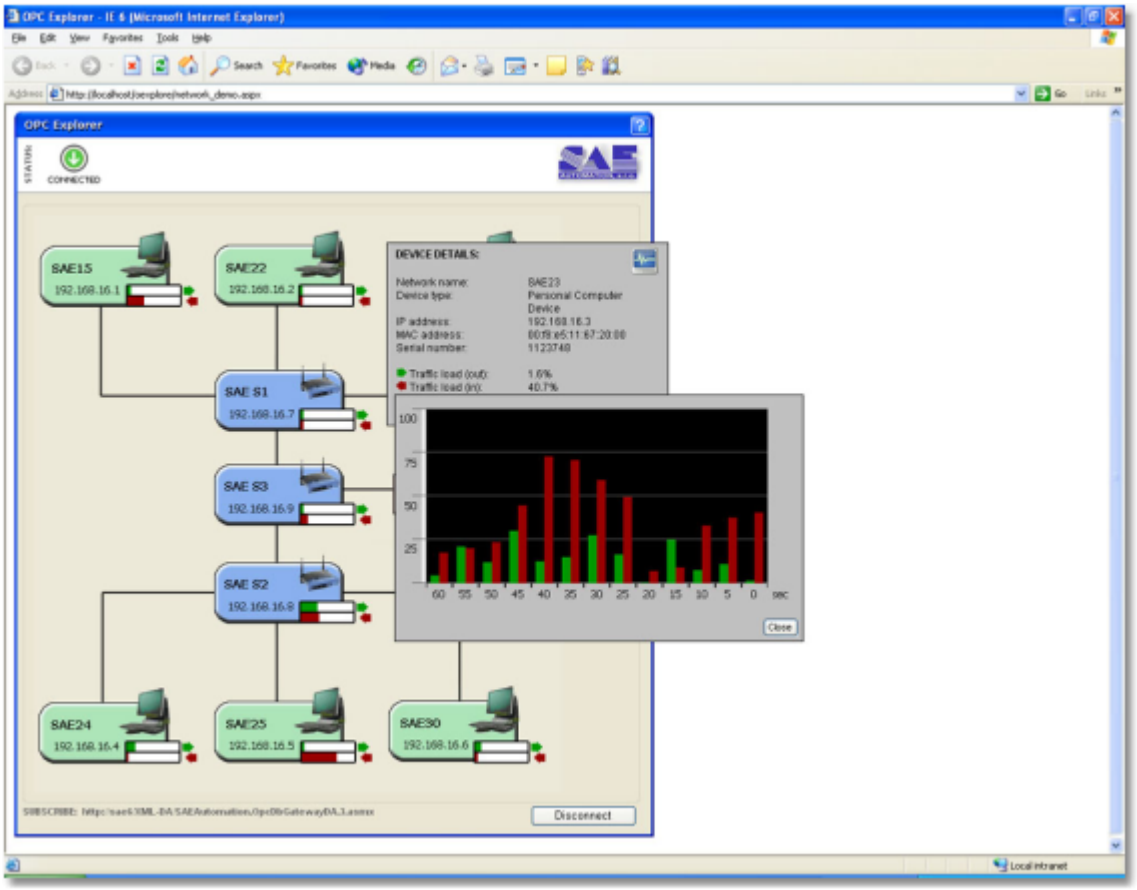


Figure: *Example of accessing data from SAEAUT SNMP OPC Server via Internet*

SAE - Automation, s.r.o. delivers the **XmlDaSnmpOpcServerWrapper** to make **SAEAUT SNMP OPC Server™** available through from **Internet**. The used wrapper is implemented as Web Service and needs for running the Internet Information Services (IIS) server to be installed on the PC. IIS server is accesible from **Control Panel** → **Administrative Tools** → **Internet Information Services**.

The **XmlDaSnmpOpcServerWrapper** is possible to install during **SAEAUT SNMP OPC Server™** installation as optional item. In addition, that wrapper installation package is located in the application directoty ..\SAEAUT SNMP OPC Server\XML-DA Wrapper Setup\ and may be installed also additionally.

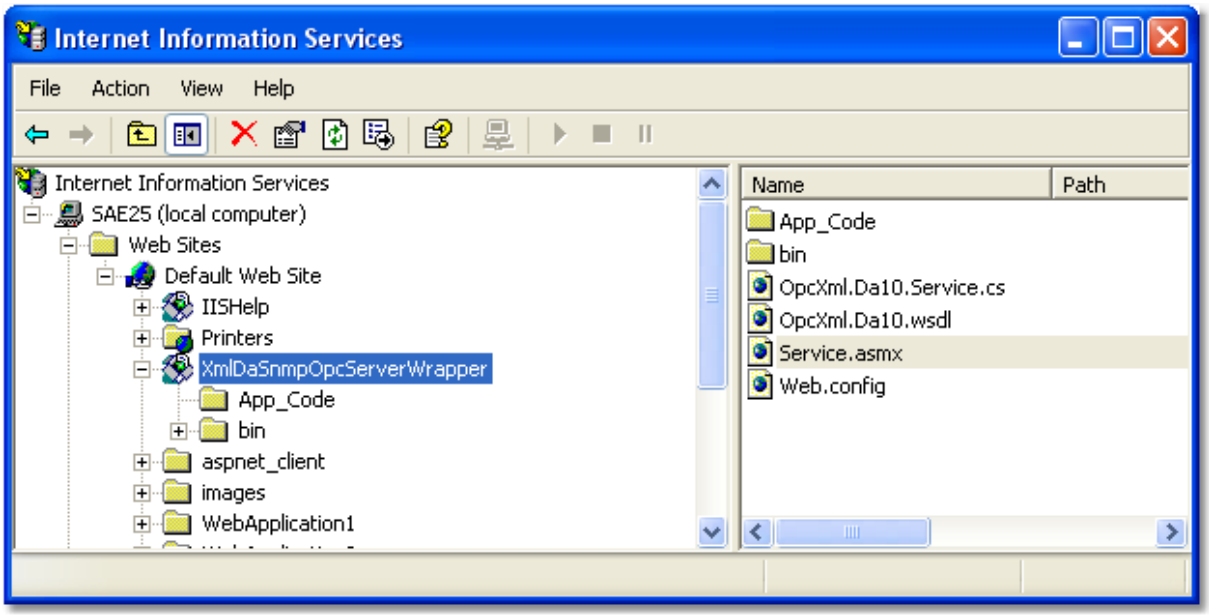


Figure: *Internet Information Services*

Related articles

How to set the Access Rights for OPC XML-DA Wrapper
SAEAUT SNMP OPC Server available from Internet Explorer
How to use SAEAUT SNMP OPC Client

3.3.1 How to set the Access Rights for OPC XML-DA Wrapper

If a **XML-DA client** is having problems with accessing the **SAEAUT SNMP OPC Server**, then the **COM security** of your computer might be required to be modified. To do it, please follow the steps below:

1. Click on **start** → **Control Panel** → **Administrative Tools** → **Component Services** → **Computers** → **My Computer**.
2. Right-click on the **My Computer** item and select the **Properties** item.

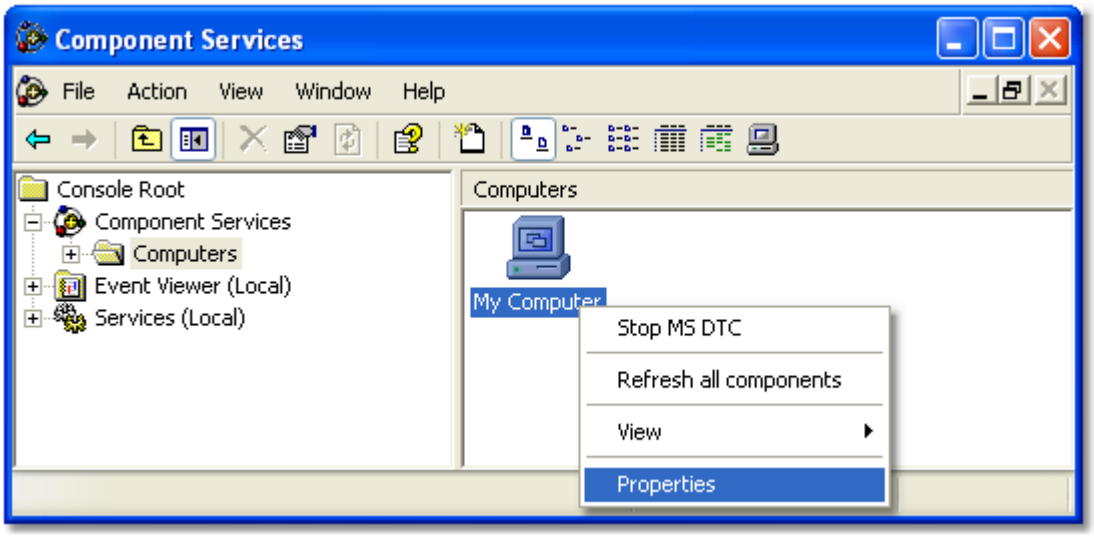


Figure A: *Component Services, My Computer Properties*

3. Click the tab **COM Security** and click **Edit Default** button under **Access Permissions** group.

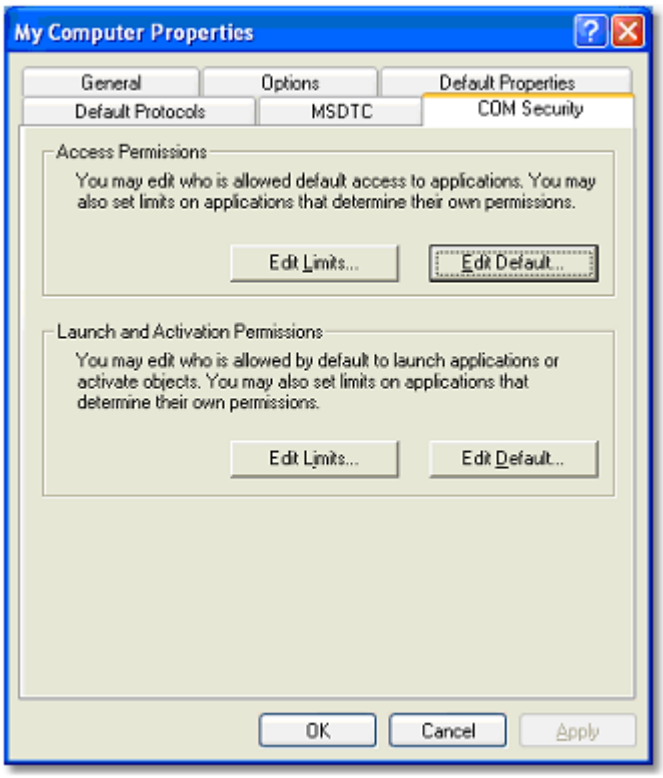


Figure B: *My Computer Properties*

4. You need to set the **Local Access** and **Remote Access** for the ASP.NET user.

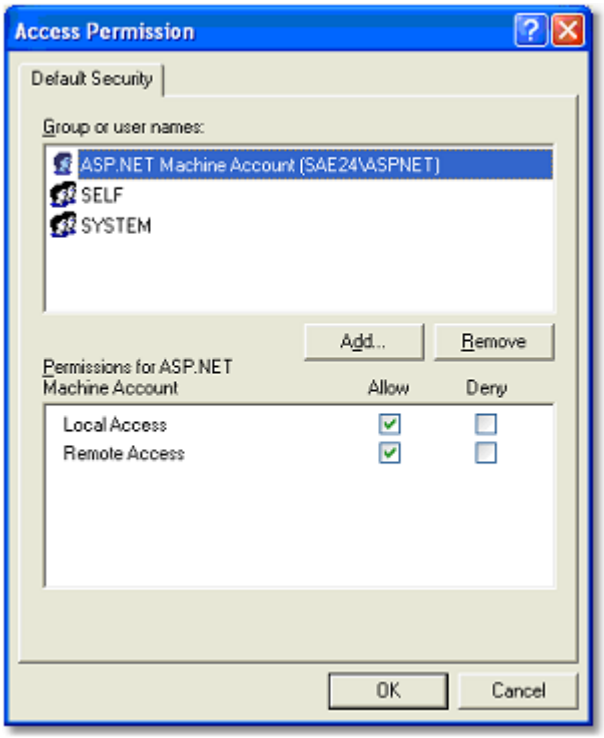


Figure C: *Access Permission*

5. If ASP.NET user is not in the user list, click the **Add** button and make sure that the location where you search for users is the name of your computer (**Locations** → "**PC NAME**").

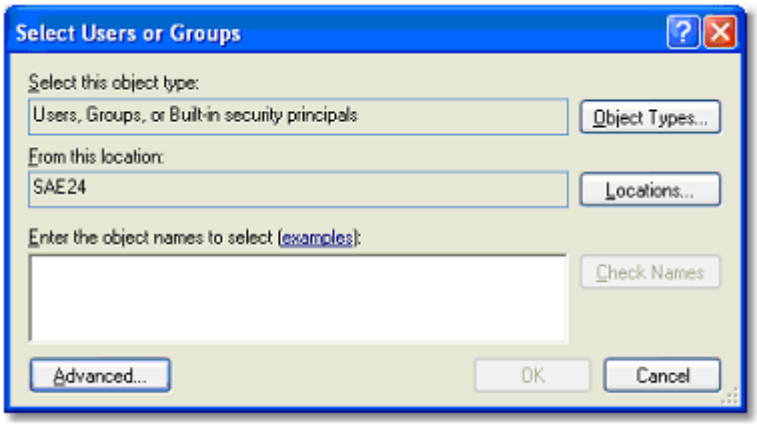


Figure D: *My Computer Properties*

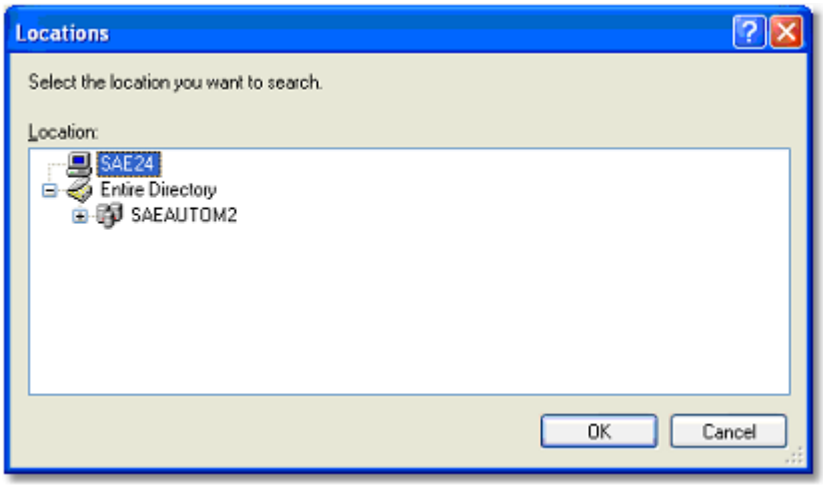


Figure E: *Locations*

6. Then click **Advanced** → **Find Now**, choose ASPNET user and add it to the user list.

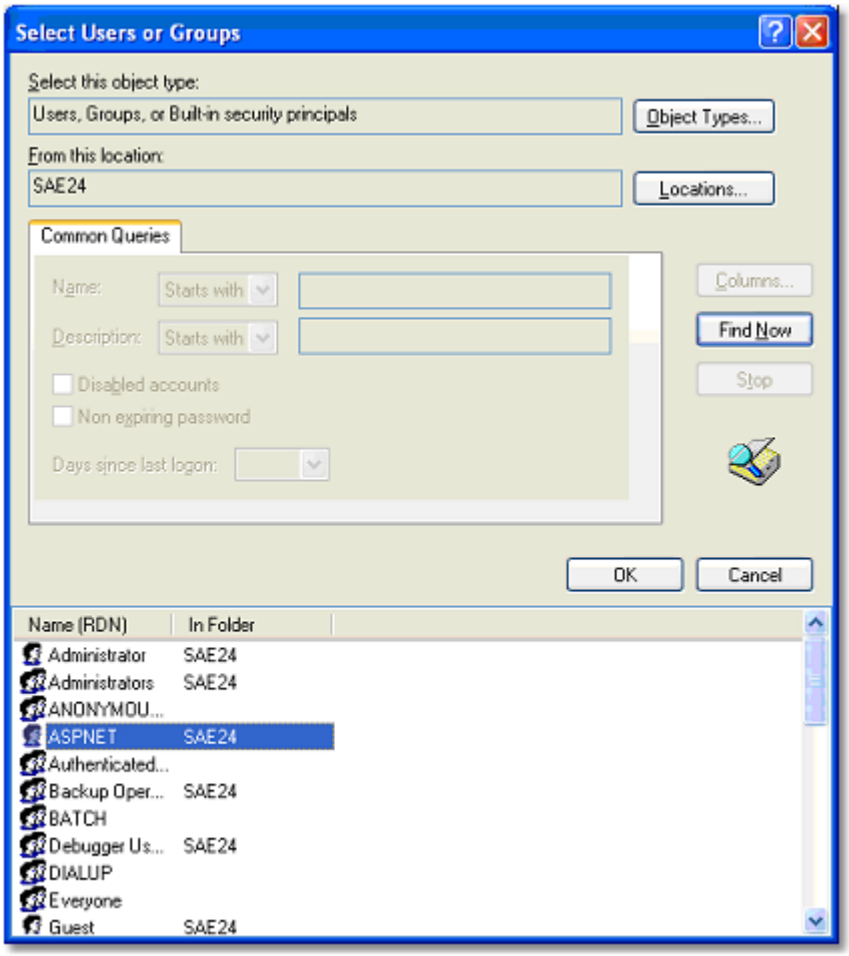


Figure F: *Select Users or Groups*

7. OK. The settings for **Access Permissions** are setted. Now, go back to Step 3 and adjust the same settings under **Launch and Activation Permissions** group. Then

restart your computer.

Related articles

How to access SAEAUT SNMP OPC Server data through Internet
SAEAUT SNMP OPC Server available from Internet Explorer
How to use SAEAUT SNMP OPC Client

3.3.2 SAEAUT SNMP OPC Server available from Internet Explorer

To explore all available methods supported by **SAEAUT SNMP OPC Server™** Web Service type the URL in the internet browser as follows:
http://localhost/XmlDaSnmpOpcServerWrapper/Service.asmx

Description: http://node/<virtual directory>/Service.asmx

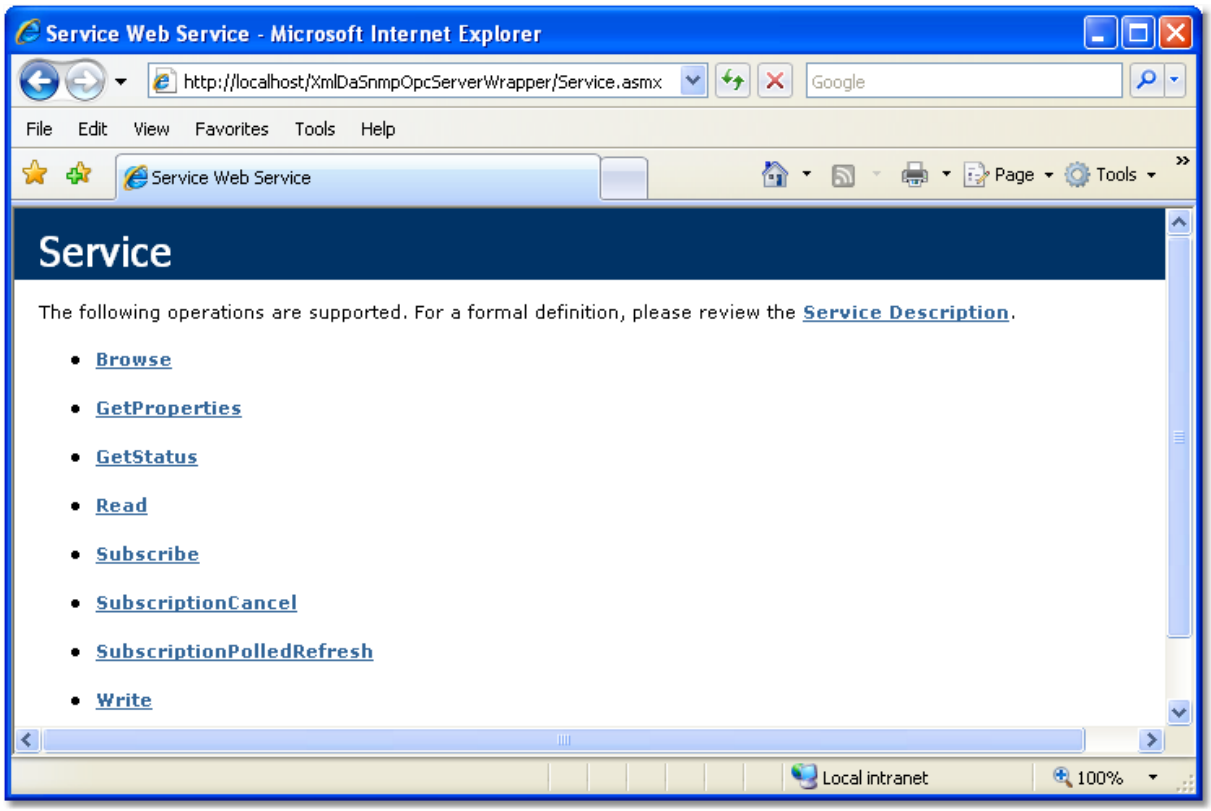


Figure: *http://localhost/XmlDaSnmpOpcServerWrapper/Service.asmx*

Related articles

How to access SAEAUT SNMP OPC Server data through Internet
How to set the Access Rights for OPC XML-DA Wrapper
How to use SAEAUT SNMP OPC Client

3.4 How to use SAEAUT SNMP OPC DA and XML DA Client

In this example the **SAEAUT SNMP OPC Client** connects to the **SAEAUT SNMP**

OPC Server through **OPC XML-DA 1.01** interface (**Web Service**).

The first start of SAEAUT SNMP OPC Client with simple sample project, which monitors three system SNMP variables:

1. Click on **start** → **Programs** → **SAEAUT SNMP OPC Server™** → **SAEAUT SNMP OPC Client** → **SAEAUT SNMP OPC Client**.
2. Select the the URL **http://localhost/XmlDaSnmpOpcServerWrapper/Service.asmx.** It is Web Service enabling conecting to **SAEAUT SNMP OPC Server**.
3. Click on the **Connect** button. You can use for the same purpose also the toolbar **Connect** item or the menu **Server** → **Connect** item.

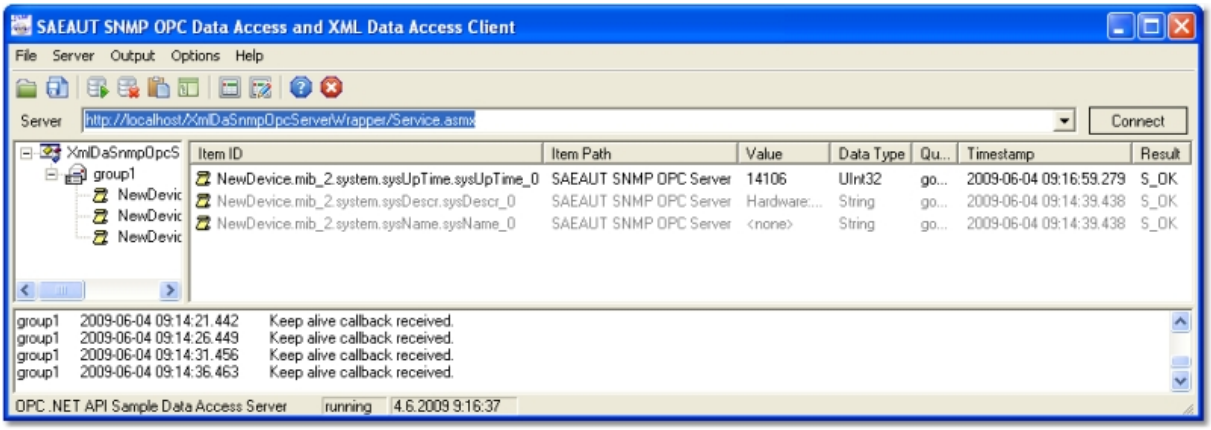


Figure 88: *SAEAUT SNMP OPC Data Access and XML Data Access Client.*

4. Click on **start** → **Programs** → **SAEAUT SNMP OPC Server™** → **SAEAUT SNMP OPC Client** → **SAEAUT SNMP OPC Client**.
5. Select the the URL **http://localhost/XmlDaSnmpOpcServerWrapper/Service.asmx.** It is Web Service enabling conecting to **SAEAUT SNMP OPC Server**.
6. Click on the **Connect** button. (You can use for the same purpose also the toolbar **Connect** item or the menu **Server** → **Connect** item.)
7. Select the **XmlDASnmpOpcServiceWrapper-Service** item in the application main tree and via right-click select the **Create Subscription...** item.

Figure 89: *Create Subscription menu item.*

8. Write a group name (e.g. group1) and click on the **Next** button.

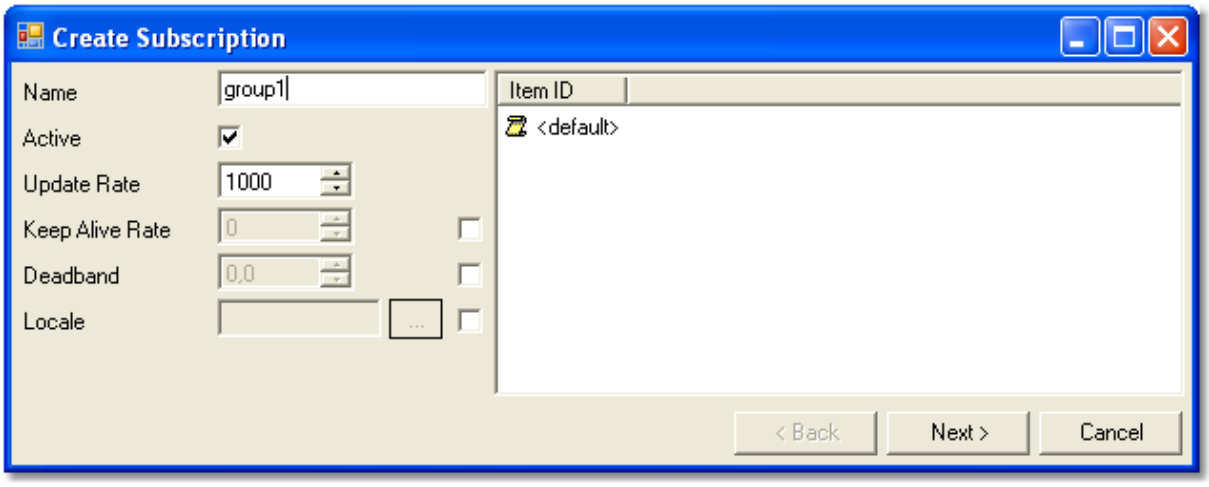


Figure 90: *Create Subscription dialog (page A).*

9. Browse all required items and select them via dbl-click. Then on the **Next** button.

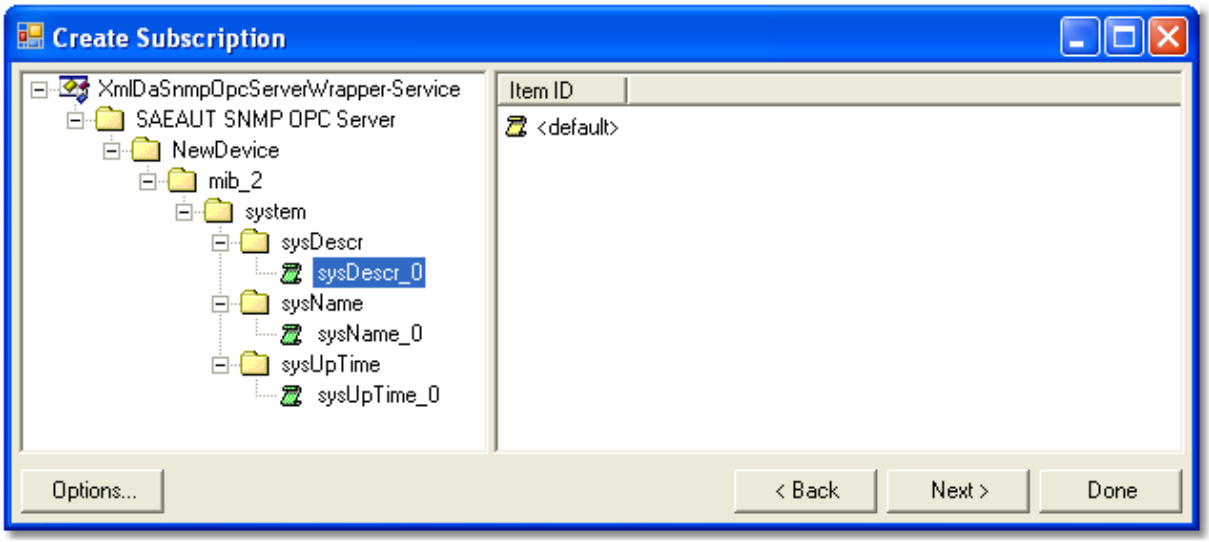


Figure 90: *Create Subscription dialog (page B).*

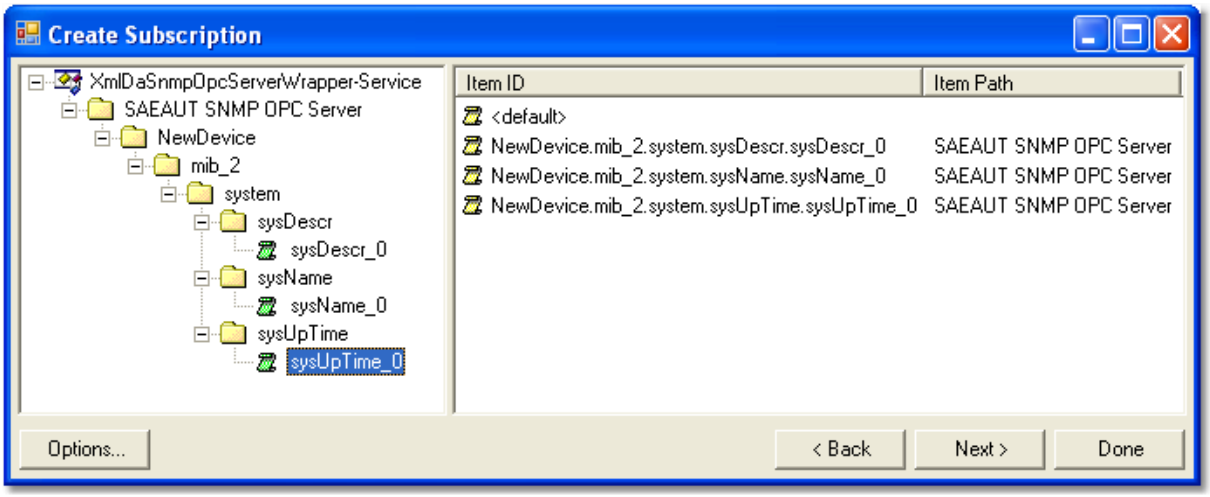


Figure 90: *Create Subscription dialog (page C).*

10. In the next page click on Then on the **Done** button.
11. **!!! CONGRATULATION !!!** Very good. You have just started **SAEAUT SNMP OPC Server™** via OPC XML-DA 1.01 interface.
    Note that: If the item Quality is "Bad" and the item Subquality is "Comm Failure" then please see the following Installation of the SNMP Service topic.

By clicking on the **Disconnect** button the server becomes disconnected and thus unavalaible. The current status of the server is displayed on the status bar of the application on the left bottom of the window.

Related articles

Connection to SAEAUT SNMP OPC Server through OPC DA 3.0
Connection to SAEAUT SNMP OPC Server through OPC XML-DA 1.01
How to access SAEAUT SNMP OPC Server data through Internet
How to set the access rights for OPC XML-DA Wrapper
SAEAUT SNMP OPC Server available from Internet Explorer

3.4.1 Connection to SAEAUT SNMP OPC Server through OPC XML-DA 1.01

In the topic How to use SAEAUT SNMP OPC Client is example where the **SAEAUT SNMP OPC Client** is connected to the **SAEAUT SNMP OPC Server** through **OPC XML-DA 1.01** interface (**Web Service**).

Related articles

How to use SAEAUT SNMP OPC Client
Connection to SAEAUT SNMP OPC Server through OPC DA 3.0

3.4.2 Connection to SAEAUT SNMP OPC Server through OPC DA 3.0

In this example the **SAEAUT SNMP OPC Client** connects to the **SAEAUT SNMP**

OPC Server through **OPC DA 3.0** interface (**DCOM**).

The start of SAEAUT SNMP OPC Client with simple sample project, which monitors three system SNMP variables:

Please repeat steps from the main topic The first start of SAEAUT SNMP OPC Client. Only diffrence is in the **Step 2**, whre is necessary to select the second item from combo-box **SAEAutomation.SNMPOpcServerDA.3**.

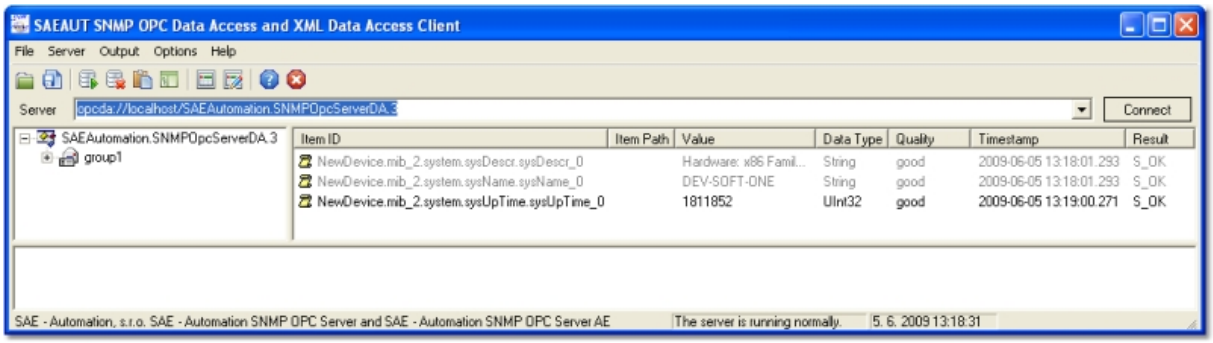


Figure A: *SAEAUT SNMP OPC Data Access and XML Data Access Client.*

Related articles
How to use SAEAUT SNMP OPC Client
Connection to SAEAUT SNMP OPC Server through OPC XML-DA 1.01

3.5 How to simulate SNMP device functionality on YOUR computer

SAEAUT SNMP Agent version 1.00.00 (FREE) - Solution how to simulate SNMP devices.

We bring new software product called **SAEAUT SNMP Agent version 1.00.00**. If you need to simulate **SNMP devices** or generate the **SNMP Trap** messages then this product will be very useful for you.

To read more details about how to use it you can download special white paper SAEAUT SNMP Agent - User's Guide.

To install that product go to SAEAUT SNMP OPC Server directory ..\SAEAUT SNMP OPC Server\SAEAUT SNMP Agent Setup\ or download the latest version of product from the following link http://www.saeautom.sk/download/products/snmpagent/saeaut-snmp-agent.zip.

3.6 How to work with SNMP TRAPs

Working with SNMP TRAPs is described in following white papers:

SAEAUT SNMP OPC Server receives Trap messages
SAEAUT SNMP Agent

The SAEAUT SNMP Agent can generate traps, if the item StartStopSendTraps (.1.3.6.1.4.1.33.0.3.17)

is set to 1. User can specify a time limit for sending traps by setting the item TrapsTimeoutMs (.1.3.6.1.4.1.33.0.3.18). The trap message includes a new value of the following three items:

- TrapCounter (.1.3.6.1.4.1.33.0.2.3),
- IntRandom (.1.3.6.1.4.1.33.0.2.5),
- Gauge32Random (.1.3.6.1.4.1.33.0.2.7).

Settings necessary for working with TRAPs please see in SAEAUT SNMP Agent.

4 FAQ

This section is regularly updated on the company web page, please the link:
http://www.saeautom.sk/products/snmpopcserver/faq.htm

1. What SNMP protocols are implemented in SAEAUT SNMP OPC Server?

- SNMPv2c.
- SNMPv1.

2. What OPC interfaces are implemented in SAEAUT SNMP OPC Server?

- OPC Data Access 3.0, 2.05 and 1.0.
- OPC Alarm and Events 1.0.
- OPC XML Data Access 1.01 *(Part of installation package is the OPC XML-DA Wrapper which provides an OPC XML-DA Web Service interface as a front-end to one or more OPC COM DA 2.x and 3.0 servers.)*

3. The first start of SAEAUT SNMP OPC Server.

Recommendation: Please read more about this issue in User's Guide topic "*The first start of SAEAUT SNMP OPC Server application*".

4. The first start of SAEAUT SNMP OPC Server passed successfully, but Quality of items is "Bad" and the item Subquality is "Comm Failure".

Recommendation: It is recommended to download the latest white paper which addresses this issue from link link http://www.saeautom.sk/download/install_snmp_service.pdf. The white paper is called Installation & Activation of the SNMP Service and SNMP Trap Service.

5. Writing the value on data item doesn't work. Why?

- Data item is read only: Check the rights of data items you are using. Open SAEAUT SNMP Server Configurator and choose data item. Change the rights to Read/Write.

- Community of the device is read only: Check the rights of the community you are using. When the device is PC, in administrative tools choose services and SNMP service. Open SNMP service Properties dialog and choose Security tab. Check Accepted community names and choose the community you are using. Change the rights to READ WRITE. You can add your own communities with desired rights and use them when configuring the device.

6. Which communication ports does the SAEAUT SNMP OPC Server exploit?

SNMP communication (between SNMP OPC Server and SNMP device):

- SNMP (**UDP** 161)
- SNMP Trap (**UDP** 162)

OPC communication (between SNMP OPC Server and OPC Client):

- OPC (**TCP** 135)

XML-DA communication (between SNMP OPC Server and XML-DA Client):

- XML-DA (**HTTP/SOAP** 80)

Heartbeat communication (between SNMP OPC Server and SNMP device):

- Heartbeat (**ICMP** Echo (ping) request; **ICMP** Echo (ping) reply). ICMP is Internet Control Message Protocol.

Be aware that according to required communication is necessary to permit a port in your firewalls. Settings of the standard operating system firewall are made automatic during installation.

7. Which ports are used in the SNMP communication?

SNMP uses the default UDP port 161 for general SNMP messages and UDP port 162 for SNMP trap messages. If these ports are being used by another protocol or service, you can change the settings by modifying the local *Services* file on the agent. The *Services* file is located in *\%SystemRoot%\System32\Drivers\Etc*

8. The SAEAUT SNMP OPC Server doesn't receive any traps? Why?

Please try to check the Windows Firewall whether the SNMP trap messages use allowed. The SNMP trap messages use default UDP port 162.

To enable SNMP trap messages in Windows Firewall, please do the following:

1. Click on the Windows Start ⇨ Control Panel ⇨ Windows Firewall.
2. In the Exceptions tab click on Add Port and in the associated dialog fill out the fields as follows:
   - Name: SNMP Trap
   - Port number: 162
   - Select the UDP radio button.

Note that: The SNMP trap messages may be received on another UDP port as well. Please see more in the next point: Which ports are used in the SNMP communication?

9. How to configure OPC and DCOM?

Please refer to the document Configuring OPC and DCOM for OPC server and client applications from SAE – Automation, s.r.o. that describes OPC and DCOM settings in detail - available in Windows Start ⇨ SAEAUT SNMP OPC Server ⇨ Configuring OPC and DCOM.

10. How to make SAEAUT SNMP OPC Server data available via Internet/Intranet?

Recommendation: Please read more about this issue in User's Guide topics "*How to access SAEAUT SNMP OPC Server data through Internet.*" and associated sub-topics.

11. How is it possible to verify that XML-DA wrapper has been installed correctly?

Recommendation: Please type the URL in the internet browser as follows: http://localhost/XmlDaSnmpOpcServerWrapper/Service.asmx. If the XML-DA wrapper is working correctly you will see a web service test page which will inform you about all operations which are supported (it is a standard test page for all ASP.NET web services).

12. If the XML-DA wrapper is installed successfully and working, how should we get the related web services' WSDL?

Recommendation: If the web service test page is working, just click on "Service Description" link on the top of the screen to display web service's WSDL or visit the following link http://localhost/XmlDaSnmpOpcServerWrapper/Service.asmx?WSDL.

13. Why is it not possible to overwrite the data items browsed and added by MIB Browser?

SNMP variables browsed from device do not contain information about access rights of variable and by default all the items added to configurator by browsing have access rights set to read only to avoid misusing. Such variables are not possible to overwrite from the client and it is user's task to change access rights and all desired properties of the data item. Properties of data items including access rights are possible to change from user interface of configurator. Please read more about this issue in User's Guide topic "*Data Item*".

14. In data item definition: Why does the data item validation fail?
Validation of data item can fail in following cases: device supposed to have SNMP agent with desired SNMP variable is not connected or is incorrectly defined. Check IP address and community of device. Or: desired SNMP variable is not a leaf variable of a MIB Tree. Only leaf variables are readable from the device and valid able. Check the Object ID of the SNMP variable. To be sure about Object ID, you can browse all the SNMP variables of the device from a specified default Object ID. If you do not wish to browse all the SNMP variables of the device, specify different default Object ID that is closely to the desired you are looking for. For example, if you are not sure about OID: .1.3.6.1.2.1.25.3.2.1.3, if it is a leaf node, put it into Default OID and press Get button for SNMP request. If it is a branch node, all the nodes below will be browsed and you can access wished Object ID. See MIB Browse help.

15. Why OPC client cannot read Script items or Data items that use scripting?
Reading of Script items or Data items that use scripting fails when any of the used scripts fails to be parsed. If any script fails to be parsed, no script is executed for any item. Check the scripts that you defined in the configurator, if there are no illegal characters or programming errors.

16. When does adding of MIB browser items into configurator throw an error?
If adding of browse items into configurator fails and throws an error, it is usually because items supposed to be browsed would not be unique in a project file. It happens when attempting to write to the project file that is not active. Make sure that the project file is set to active and try browsing again. Please read more about this issue in User's Guide topic "*Make Active*".

17. How to activate product to full version?
In order to activate your software product to full version you will need to enter a name and the license key. Please start the product you want to activate and click Enter key when asked about product registration. You will be presented with a dialog window that shows hardware fingerprint. Please e-mail us this fingerprint and tell us the Name under which you'd like to activate your product. Based on this information we will send you back the license key that can be used to activate your product.

18. How to use data type SNMP opaque data type
Please see in the article The Domestication of the Opaque Type for SNMP.

5 Known issues

1. The http://localhost/XML-DA/SAEAutomation.SNMPOpcServerDA.3.asmx test page is not available.

Recommendation A: Please make sure that COM Security for ASP.NET is set correctly.

Recommendation B: Please make sure that the SAEAUT SNMP OPC Server is installed on your computer correctly.

Recommendation C: Please make sure that your Web Service link is written right.

Recommendation D: Please make sure that the Internet Information Services (IIS) is started.

Recommendation E: Please make sure that .asmx file extension is registered in IIS server.

Recommendation F: Please make sure that Microsoft .NET Framework 1.1 or higher is installed on your computer correctly (you can see if .NET Framework is installed via Administrative Tools panel). If so, try to reinstall .NET Framework. You can download it at: http://www.microsoft.com/downloads/details.aspx?FamilyID=262d25e3-f589-4842-8157-034d1e7cf3a3&displaylang=en

2. A MIB file is not possible to load through MIB Browser (Off-Line).

This feature is available only in the version SAEAUT SNMP OPC Server, Professional.

There are various mal-formed MIB files which are used in the SNMP devices all over the world. Therefore, we cannot warrant that each available MIB file will be parsed and loaded successfully by MIB Browser (Off-Line).

There is a possibility to contact us and send your existing projects to our company. We can try to convert these existing projects to new structure.

4. The SAEAUT SNMP OPC Server data are not available via OPC UA COM Wrapper interface.

Please refer to the document Configuring DCOM for using of OPC UA COM Wrapper with OPC servers from SAE-Automation, Ltd. that describes DCOM settings in detail - available in Windows Start ⇨ SAEAUT SNMP OPC Server ⇨ Configuring OPC UA COM Wrapper for SAE products.

You can download the latest version of this white paper from the following link http://www.saeautom.sk/download/opcuaforsaeproducts.pdf.

5. Disconecting from SNMPRuntime when working with OPC DA and XML DA Client

It is not enough to disconect from SNMP OPC server by running OPC DA and XML DA client. It is necessary to stop the client. Other way SNMPRuntime.exe process continues to run.

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6 Support & Contacts

Support

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Index

- A -

access rights 102

- C -

config 78
configuration 78
configuration methodes 78
contact 114
CSV 78
CSV import 78

- F -

FAQ 111
first start 37

- K -

known issues 113

- M -

MIB 78
MIB import 78

- O -

Off-line browsing 78
On-line browsing 78

- S -

sample 37
simple sample 37
support 114

- X -

XML-DA 102