

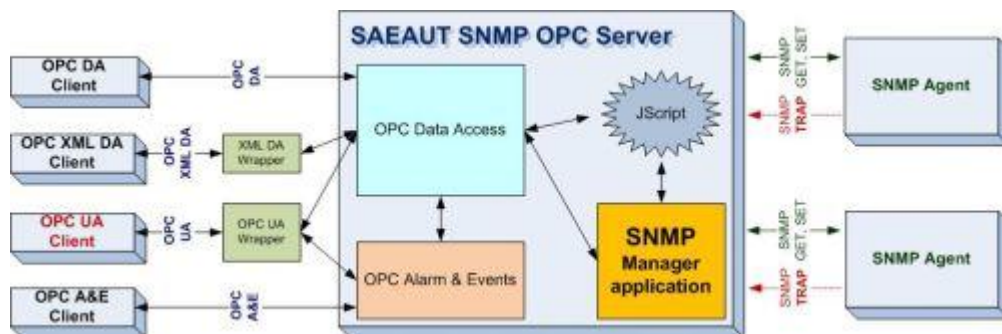
## Introduction

In typical SNMP usage, there are some devices to be managed, and one or more devices managing them. A software component called **agent** runs on each **managed device** and reports information via SNMP communication protocol to the **managing application**. Data contained in the agent database depends on the specific functionality of the devices. Communication with a device can be initiated by **SNMP manager** by sending of **SNMP commands SET or GET** or by the **SNMP agent** using a **SNMP TRAP** command.

Product SAEAUT SNMP OPC Server (*Figure 1*) contains a SNMP manager. It intermediates data from/to this manager SNMP to systems containing an **OPC client** – for example to different SCADA systems. Variables from SNMP agent databases can be mapped OPC items placed in address space of the OPC server.

**SAEAUT SNMP Agent is a companion software product to the SAEAUT SNMP OPC Server<sup>1</sup>.**

It was designed to enable learning and testing of the configuring SNMP/OPC software applications without having real devices with running SNMP agents. It was also used for the compliance testing of the SAEAUT SNMP OPC Server with OPC DA2.05A and OPC DA3.0 specifications from OPC Foundation.



*Figure 1: Simple block schema of usage manager and agent application.*

SAEAUT SNMP Agent provides a set of SNMP variables. Part of them are passive – it means that they are not changed by SNMP Agent itself but only from outside, part of them is

<sup>1</sup> However, it can be used for testing by any SNMP manager communicating according to the SNMP v2c protocol

changing directly in the agent according to a given algorithm. Some variables are periodically sent within a TRAP message.

Together with SAEAUT SNMP Agent, a configuration for SAEAUT SNMP OPC Server is installed. There are all variables accessible on the agent mapped to the OPC items. You can open the configuration and see the communication of the SNMP agent with the OPC client built into the configuration application of the SAEAUT SNMP OPC Server (Figure 5). However, you can create also your own configuration by using of on-line MIB browsing functionality (Figure 4) in the configuration application of the SAEAUT SNMP OPC Server.

SAEAUT SNMP Agent uses SNMP Service and SNMP Trap Service which are delivered with MS Windows operating systems. They are not automatically installed by standard OS installation. Therefore, both services must be installed and activated on the same computer as that agent.

## Traps

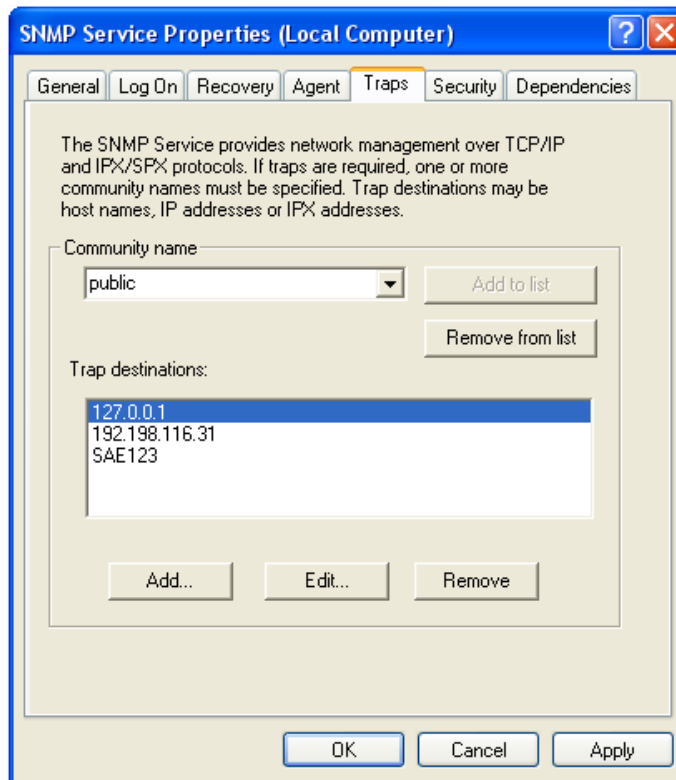
SAEAUT SNMP Agent generates trap messages that are then sent to a trap destination. Trap destinations are identified by a computer name, IP address, or IPX address of the "host" in LANt.

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:

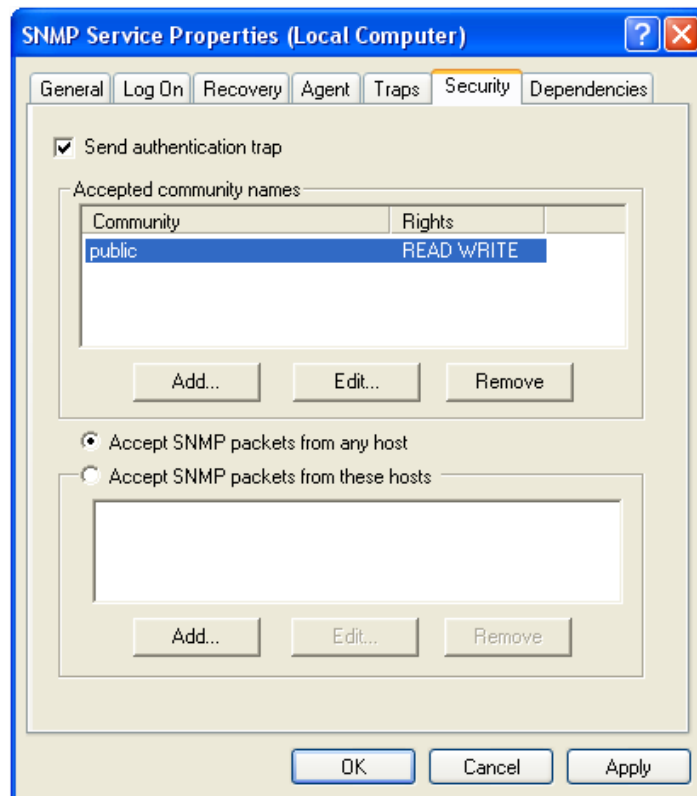
- TrapCounter (.1.3.6.1.4.1.33.0.2.3),
- IntRandom (.1.3.6.1.4.1.33.0.2.5),
- Gauge32Random (.1.3.6.1.4.1.33.0.2.7).

To ensure that the SAEAUT SNMP Agent will send traps to right destination, please do the following:

1. Click on the Windows Start ⇒ Control Panel ⇒ Administrative tools ⇒ Services.
2. Scroll through the right frame to locate SNMP Service.
3. Right-click on SNMP Service and choose Properties.
4. Choose the Traps tab.
5. Add a new Community name if needed; The community "public" is the default.
6. Add to the Trap destination a host or hosts.
7. Choose the Security tab.
8. Check the Send authentication trap.
9. Add any new names under Accepted Community Names.
10. Click on OK button.



**Figure 2:** The SNMP Service Properties dialog – Traps tab.



**Figure 3:** The SNMP Service Properties dialog – Security tab.

## Description of the SNMP variable in agent

SNMP variables are identified by OID identifiers which are ordered in a hierarchical namespace. Each OID identifies a variable that can be read or set via SNMP commands. All OIDs defined in the SAEAUT SNMP Agent start with predefined prefix **.1.3.6.1.4.1.33**. Their descriptions are in tables below.

<b>.1.3.6.1.4.1.33.0.2.1</b>	
Name	<b>ProductName</b>
OID	.1.3.6.1.4.1.33.0.2.1
Syntax	Octet String
Access	Read-only
Description	The product name: SAEAUT SNMP Agent

<b>.1.3.6.1.4.1.33.0.2.2</b>	
Name	<b>CompanyName</b>
OID	.1.3.6.1.4.1.33.0.2.2
Syntax	Octet String
Access	Read-only
Description	The company name: SAE-Automation, s.r.o.

<b>.1.3.6.1.4.1.33.0.2.3</b>	
Name	<b>TrapCounter</b>
OID	.1.3.6.1.4.1.33.0.2.3
Syntax	Integer32
Access	Read-only
Description	The number of Traps fired from agent.
Trap	This item will every 3 seconds generate a new value. The value will be sent from agent to manager as TRAP.

<b>.1.3.6.1.4.1.33.0.3.4</b>	
Name	<b>IntVar</b>
OID	.1.3.6.1.4.1.33.0.3.4
Syntax	Integer32
Access	Read-write
Description	The item for testing of "Integer32" values.

<b>.1.3.6.1.4.1.33.0.2.5</b>	
Name	<b>IntRandom</b>
OID	.1.3.6.1.4.1.33.0.2.5
Syntax	Integer32
Access	Read-only
Description	The item values are randomly generated.
Trap	This item will generate a new value every 3 seconds. The value will be sent from agent to manager as TRAP.

<b>.1.3.6.1.4.1.33.0.2.6</b>	
Name	<b>GetReqCounter</b>
OID	.1.3.6.1.4.1.33.0.2.6
Syntax	Counter32
Access	Read-only
Description	The number of GET requests.

<b>.1.3.6.1.4.1.33.0.2.7</b>	
Name	<b>Gauge32Random</b>

OID	.1.3.6.1.4.1.33.0.2.7
Syntax	Gauge32
Access	Read-only
Description	The item values are randomly generated.
Trap	This item will generate a new value every 3 seconds. The value will be sent from agent to manager as TRAP.

<b>.1.3.6.1.4.1.33.0.2.8</b>	
Name	<b>Time</b>
OID	.1.3.6.1.4.1.33.0.2.8
Syntax	Timetick
Access	Read-only
Description	The number of milliseconds that have elapsed since the system was started.

<b>.1.3.6.1.4.1.33.0.3.9</b>	
Name	<b>UIntVar</b>
OID	.1.3.6.1.4.1.33.0.3.9
Syntax	Unsigned32
Access	Read-write
Description	The item for testing of "Unsigned32" values.

<b>.1.3.6.1.4.1.33.0.3.10</b>	
Name	<b>StringVar</b>
OID	.1.3.6.1.4.1.33.0.3.10
Syntax	Octet String
Access	Read-write
Description	The item for testing of "Octet string" values. E.g. "Hello world!"

<b>.1.3.6.1.4.1.33.0.3.11</b>	
Name	<b>ObjectVar</b>
OID	.1.3.6.1.4.1.33.0.3.11
Syntax	Object Identifier
Access	Read-write
Description	The item for testing of "Object Identifier" values. E.g. "1.3.6.1.4.1.33"

<b>.1.3.6.1.4.1.33.0.3.12</b>	
Name	<b>IPAddressVar</b>
OID	.1.3.6.1.4.1.33.0.3.12
Syntax	IP Adress
Access	Read-write
Description	The item for testing of "IP Address" values. E.g. "127.0.0.1"

<b>.1.3.6.1.4.1.33.0.3.13</b>	
Name	<b>OpaqueVar</b>
OID	.1.3.6.1.4.1.33.0.3.13
Syntax	Opaque
Access	Read-write
Description	The item for testing of "Opaque" values. E.g. "opaque"

<b>.1.3.6.1.4.1.33.0.3.14</b>	
Name	<b>BitsVar</b>
OID	.1.3.6.1.4.1.33.0.3.14
Syntax	Bits
Access	Read-write
Description	The item for testing of "Bits" values.

.1.3.6.1.4.1.33.0.2.15	
Name	<b>IntVarReadOnly</b>
OID	.1.3.6.1.4.1.33.0.2.15
Syntax	Integer32
Access	Read-only
Description	The item for testing of "Integer32" value for read-only.

.1.3.6.1.4.1.33.0.2.16	
Name	<b>UIntVarReadOnly</b>
OID	.1.3.6.1.4.1.33.0.2.16
Syntax	Unsigned32
Access	Read-only
Description	The item for testing of "Unsigned32" value for read-only.

.1.3.6.1.4.1.33.0.3.17	
Name	<b>StartStopSendTraps</b>
OID	.1.3.6.1.4.1.33.0.3.17
Syntax	Integer32
Access	Read-write
Description	The value of the item can be set only to 0 or 1.
Trap	The item for start or stop sending traps. If is set to 1 traps are sent. If is set to 0 traps are not sent.

.1.3.6.1.4.1.33.0.3.18	
Name	<b>TrapsTimeoutMs</b>
OID	.1.3.6.1.4.1.33.0.3.18
Syntax	Unsigned32
Access	Read-write
Description	You can specify a time limit for sending traps. The value of the item must be greater than 100.
Trap	You can specify a time limit for sending traps.

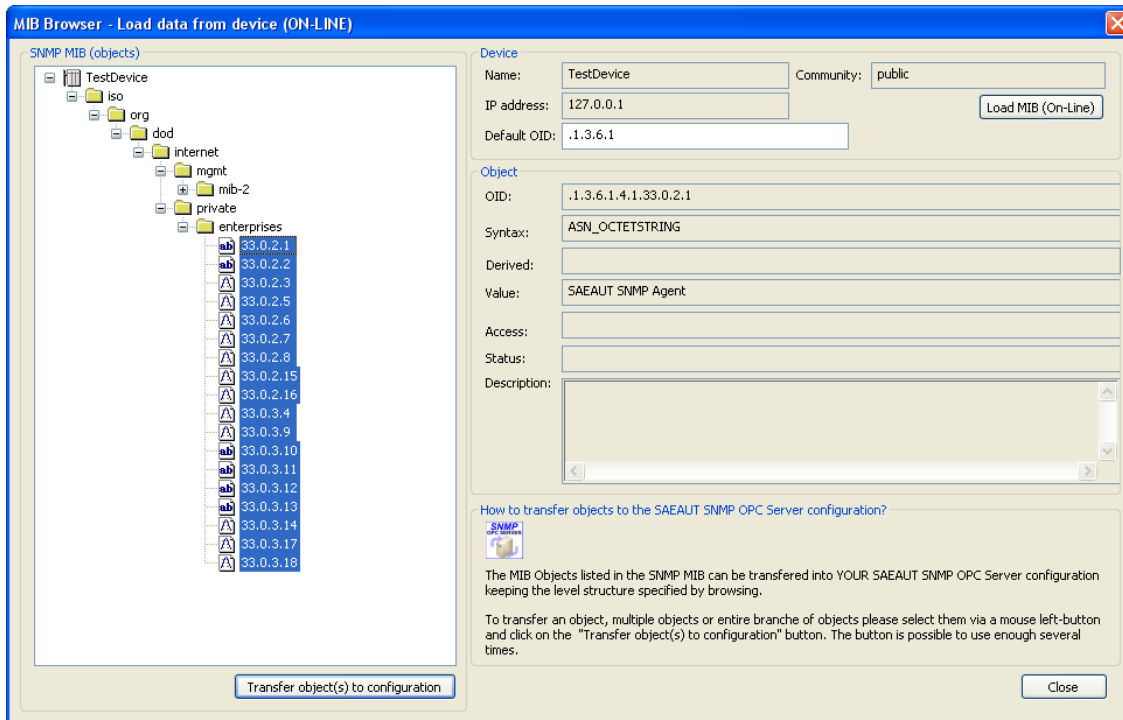
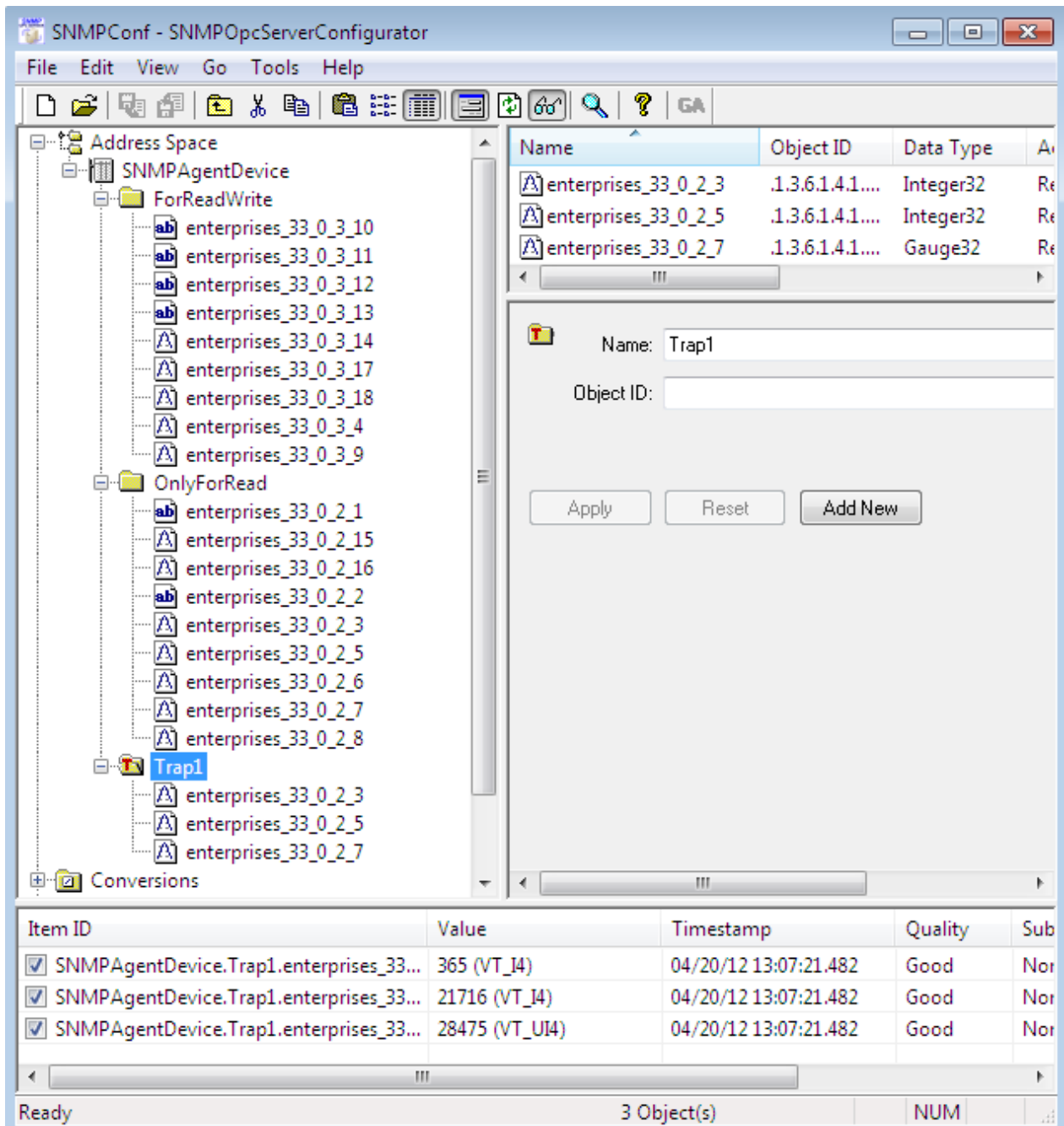


Figure 4: Adding of MIB items to an existing configuration file.



**Figure 5:** The SAEAUT SNMP OPC Server communicates with SAEAUT SNMP Agent.

In the demo configuration (Figure 5), variables TrapCounter (.1.3.6.1.4.1.33.0.2.3), IntRandom (.1.3.6.1.4.1.33.0.2.5), and Gauge32Random (.1.3.6.1.4.1.33.0.2.7) are mapped to the OPC items 2 times. One set of these variables is put in the folder "OnlyForRead" and the second in the folder "Trap1". The second set differs from the first by the check on setting of the checkbox "Notification (Use SNMP TRAPS)". This way, it is provided that the OPC items are actualized according to the incoming TRAPS instead of periodical sending of the SNMP GET to the SNMP agent.

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