SIEMENS

SIMATIC NET

Network management Diagnostics and configuration with SNMP

Diagnostics Manual

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Preface

Validity of the documentation

The following SIMATIC NET devices support SNMP:

- SIMATIC NET Industrial Ethernet switches SCALANCE X, Industrial Ethernet ESM / OSM
- RuggedCom Industrial Ethernet switches
- SIMATIC NET Industrial Wireless LAN components SCALANCE W
- SIMATIC NET Industrial Ethernet Security components SCALANCE S
- SIMATIC NET modems and routers SCALANCE M
- SIMATIC NET Industrial Ethernet S7-300/400-CP, S7-1500-CM/CP
- SIMATIC NET S7-1200-CP with Ethernet interface
- SIMATIC NET Industrial Ethernet PC CP

Other Siemens devices that support SNMP are for example:

- PROFINET devices such as ET 200S
- SIMATIC CPUs

The following are some of the applications that use SNMP:

- SIMATIC NET IE SNMP OPC Server
- SINEMA Server
- SIMATIC STEP 7 uses SNMP for topology discovery (LLDP)

Purpose of the manual

This manual contains basic information on the topics Simple Network Management Protocol (SNMP) and Management Information Base (MIB) as well as details on the MIB files used with the SIMATIC NET devices.

Required experience

To be able to use this manual the following experience is required:

- Basic knowledge of network administration
- Basic knowledge of SNMP (purpose and operating principle, OIDs etc.)

New in this issue

- Information on the AUTOMATION-SN-FO-MIB
- Information on the AUTOMATION-SN-AUTH-MIB

- Information on the AUTOMATION-SN-SYSTEM-MIB
- Information on the LLDP-EXT-SN-FMP-MIB

Current manual release on the Internet

You will also find the current version of this manual on the Internet pages of Siemens Industry Online Support below the directory with the following entry ID:

10806025 (http://support.automation.siemens.com/WW/view/en/10806025)

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SNMP

1

1.1 Overview of SNMP

1.1.1 Basics

Functions and tasks of SNMP

The Simple Network Management Protocol (SNMP) is a UDP/IP-based, open protocol for the monitoring, control and administration of networks. SNMP was developed to simplify management functions and to allow a transparent exchange of data between different network components. UDP/IP is a simple, connectionless and unreliable protocol of the Internet Protocol Suite.

With the help of SNMP, the following management functions can be performed:

- Monitoring of network components
- Diagnostics of network components
- Error detection and error notification
- Remote configuration of network components

Uses of SNMP

SNMP allows central network management for many network components such as switches, controllers, communications modules, routers, PCs, printers etc.

With SNMP, information about network components can be called up or their parameters changed by a remote Network Management System (NMS). With SNMP, for example, instructions for controlling the devices are possible. This means that a port of a network component can be activated or deactivated using SNMP.

Advantages of SNMP

The advantages of SNMP are as follows:

- Open protocol supported by many vendors.
- Widespread in Ethernet networks
- Many different network components are supported.
- Also supports event-driven communication with traps. This means less network load due to SNMP communication.

Management Information Base (MIB)

The Management Information Base (MIB) plays an important role in SNMP. An MIB is a data structure written in a language that does not depend on the target system.

The term MIB is used by various bodies both for the specification of an individual data structure as well as for the entire collection of specifications and also for the current values of a management information system.

In the context of this document the term MIB is use for a defined specification with a defined set of parameters. Here, MIB is not used for the entire collection of specifications on a device or in the network.

Larger MIBs can be divided into modules for different function groups.

MIBs are stored on network components capable of SNMP.

1.1.2 SNMP versions

SNMP versions

SNMP is defined in 3 versions:

- SNMPv1
- SNMPv2c
- SNMPv3

SNMPv1

SNMPv1 provides 4 protocol interactions with which MIB variables can be called up or modified, refer also to the section Datagram types (Page 12):

Get, GetNext, Set, Trap

SNMPv1 has few security mechanisms. Any user in the network who knows the community string can access data and change it with suitable software. The community string is like a password that is sent unencrypted with the request from the SNMP manager to the SNMP agent, refer also to the section Access rights and security aspects (Page 15):

SNMPv2c

When SNMPv2 is mentioned, this normally means SNMPv2c, the community-based SNMP version 2. Like SNMPv1, SNMPv2c also has no security mechanisms. Each user in the network can access and change data using suitable software.

Compared with SNMPv1, SNMPv2c was expanded by the following functions:

- With the "GetBulk" command, several data records can be called up at once.
- Management stations can communicate with each other.

- With the Notification command, the agent warns the manager about events that occur.
- With the Inform command, the agent sends a message to the manager that must be confirmed by the manager.

SNMPv3

SNMPv3 was developed by the Internet Engineering Task Force (IETF). In contrast to SNMPv1 and SNMPv2, in this version the security mechanisms were significantly expanded.

The security functions are implemented by the following mechanisms:

- Fully encrypted user authentication
- Encryption of the entire data traffic
- Access control of the MIB objects at the user/group level

Community strings with SNMPv3

With SNMPv3, the community string-based access system of SNMPv1/v2c can also be used as an option.

As described in RFC 3548, this access system is also reproduced in the View-based Access Control Model (VACM).

1.2 How SNMP works

1.2.1 Participants in SNMP communication

Client-server model

SNMP works according to the client-server model.

According to the SNMP architecture model, the network consists of the following functional components:

- **Managing unit / Network Management Station (NMS) - Client**

  Synonym: **Manager**

- **Managed devices / Managed Network Entities (MNE) - Server**

  Synonym: **Agent** (with MIB)

- **Protocol**

  The network management protocol SNMP

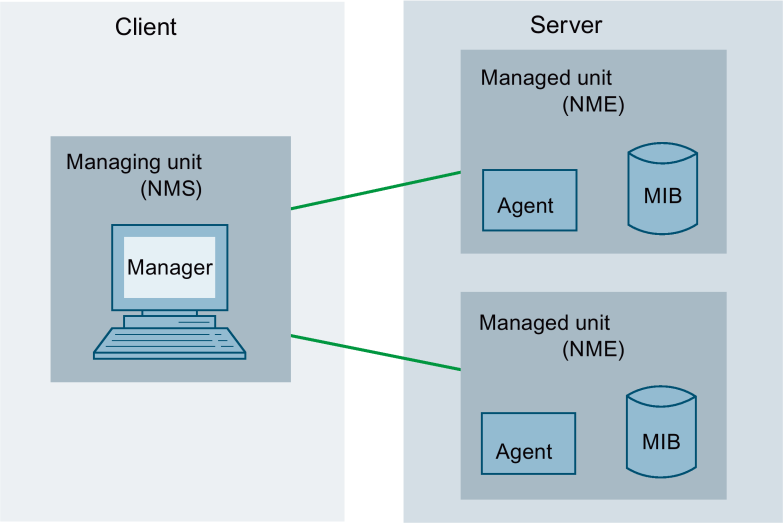


Figure 1-1 Client-server model

Managing unit (manager/client)

The managing unit is at the center of the network management activities. It requests information about the network components and can change their values. The SNMP manager (client) runs on the managing unit.

Managed devices (agent/server)

Managed devices are network components including their software. Agents (servers) are installed on the managed devices and can detect the status of the device and change values.

Communications principle

The SNMP agent and SNMP manager send their requests and responses to the communications partner. SNMP agents respond to requests of an SNMP manager only if the SNMP functionality is enabled on the devices receiving the request. For SIMATIC NET security modules, SNMP communication can be disabled in the configuration.

For information on how traps work, refer to the section Traps and notifications (Page 13).

How does SNMP access data?

The SNMP agent manages the objects in an MIB. Using SNMP commands, the SNMP manager can read out the MIB of the agent and therefore access its diagnostics data.

1.2.2 Communication

Communication with UDP

SNMP is implemented using the connectionless UDP (User Datagram Protocol).

Interaction between the SNMP agent and SNMP manager

The SNMP manager sends a request to the SNMP agents with a datagram of the Get group: "Get", "GetNext" or "GetBulk".

The SNMP agent reacts with a response datagram that contains either the requested data or an error message.

Request datagram

The request datagram from the Get group is the query of an SNMP manager to an SNMP agent.

Response datagram

The response datagram is a reply from the SNMP agent to the SNMP manager that contains either the requested data or an error message.

Set datagram

With the "Set" datagram, the SNMP manager changes the values of parameters on the managed device. The SNMP agent also replies to this command with a response datagram. See also section Datagram types (Page 12).

Polling

The periodic querying of the status of the device is known as polling. Errors/faults that have occurred become known only with the next poll from the SNMP manager.

Traps and notifications

If the SNMP manager as registered as a trap receiver, the SNMP agent sends a trap datagram unsolicited to the SNMP manager if an error/fault occurs to inform the manager immediately that an error/fault has occurred. See also section Traps and notifications (Page 13).

Ports 161 and 162

SNMP uses the following two ports:

- **Port 161**

  Port 161 is used for normal (not event related) communication; in other words, for request and response datagrams.

  When an SNMP manager sends a request datagram to an SNMP agent, it specifies port 161 as the destination port. The response datagram is also sent to port 161 by the SNMP agent.

- **Port 162**

  Port 162 is the trap port.

  Trap datagrams are sent and received via port 162 both by the SNMP manager and the SNMP agent.

1.2.3 Datagram types

Which datagram types are available with SNMP?

For the communication between an SNMP manager and an SNMP agent, SNMP provides the following datagram types:

Datagram type	Explanations	Available as of
Get	The manager requests managed objects of an MIB. With Get, the network management station requests the status of a monitored device.	V1
GetNext	With this operation, the manager queries and object identifier and its value that is located lexicographically behind the object identifier specified in the "Get". GetNext is often used to search tables for managed objects.	V1
GetBulk	The manager requests several data records. GetBulk is similar to GetNext Burton with the additional option of repeating requests. This makes the analysis of object tables easier.	V2c
Response	The agent responds to the request of the manager. Response returns the answer to a request. If access was possible, the response contains the data requested by the manager.	V1

Datagram type	Explanations	Available as of
Set	Set is used for configuration. The manager changes data on a managed device. With Set, the manager can assign a value to an MIB variable or change its value.	V1
Trap	The agent warns the manager if there are special events. Since errors or faults on a managed device can only be made known to the manager with the next request, in some situations a trap message can be sent by the agent to the manager. A trap is a notification triggered by a special event. If such an event occurs, the agent immediately sends a message to the manager without waiting for the next request from the manager. The end of an error/fault can also be transferred to the SNMP manager with a trap. Traps are not confirmed. Traps are sent via port 162.	V1
Notification	The agent warns the manager of events that occur often. Notification is a generalized trap mechanism.	V2c
Inform	Datagram of an agent requesting a response from the manager. Inform is a datagram that needs to be confirmed by the recipient. It was introduced to eliminate the problem of lost datagrams occurring due to the unreliability of UDP. Corresponds to a trap with confirmation of receipt.	V2c
Report	Communication between managed devices. Report can also be used for the exchange of error information between managed devices. Report was already defined in SNMPv2 but not used prior to SNMPv3. Report is not used by SIMATIC NET modules.	V2c

1.2.4 Traps and notifications

Trap datagrams

If certain events occur, SNMP agents can generate datagrams and send them to various management stations. The traps can be displayed on the management station if the corresponding MIB files can be evaluated by the management station.

The events can be configured for devices that support SNMPv3.

Generating traps

If the trap function is enabled, traps are generated by agents if particular events occur. Examples of traffic generation by SIMATIC NET devices:

- Standard traps (RFC 1157)
  - After turning on the power supply or restart
  - When changing the network connection; in other words, when the valid connection to the end device on a port is interrupted or re-established
  - If there is an SNMP authentication error; in other words, when a network management station or the Internet browser attempts to access an agent using SNMP requests with the wrong access right (community).
- RMON traps (RFC 1757)
  - When values fall below or exceed certain limit values configured previously on the agent by a network management station.
- Product-specific traps
  - When the redundancy manager opens/closes a ring topology with a switch, this sends a trap.
  - When there is a failover between a standby master and standby slave on a redundant link
  - When the error status changes
  - When the power supply of an agent is turned on or off during operation

Enabling and disabling the trap function

The sending of traps by the SNMP agents can be enabled and disabled using the management software or, for example using the WBM (see section Diagnostics and configuration (Page 27)). Individual traps can also be enabled and disabled by the agent's own MIB objects.

Disadvantages of traps

- Traps are unreliable when sent because SNMP is based on UDP and the recipient of a trap does not send confirmation of receipt.
- A flood of traps increases network load and can, for example, make the problems indicated by the traps even worse.
- There is no standardized method of configuring trap recipients with SNMPv1 and SNMPv2c.

  This deficiency was eliminated only with SNMPv3.

It is therefore recommended that OIDs requiring monitoring should be queried by a network management station. If traps are supported by a network management station, a short agent query interval should also be configured to avoid loss of messages due to unreliable transfer.

1.2.5 Access rights and security aspects

Depending on the SNMP version, there are different procedures relating to access rights and security aspects.

- SNMPv1 and SNMPv2c

  Formation of device groups as SNMP communities and simple control of access rights using community strings.

- SNMPv3

  Expanded options for implementing security measures.

SNMP communities with SNMPv1 and SNMPv2c

For the simple control of access rights without security aspects, in SNMPv1 and SNMPv2c, SNMP devices are grouped together in SNMP communities. SNMP communities are groups of devices that include at least one SNMP agent and one SNMP manager. The name of a group is known as the community string. The community string is transferred as plain text and is used to inform the recipient of the community for which the message is intended. By accepting or rejecting the SNMP message, a managed network component indicates whether or not it belongs to the message's community.

There are two types of community strings:

- Read access; default: "public"
- Read and write access; default "private"

Note

Changing a community string

When setting up the devices, make sure that you change the default community string for security reasons!

The default community string is generally known and provides no protection against writing since it is usually set to "public" in the factory.

SNMPv3

As of SNMPv3, security during communication is implemented with user names, keywords and keys.

SNMPv3 introduced the User-based Security Model (USM). This expands SNMP with the following security functions:

- Trustworthiness

  Ensures that only messages from permitted sources are evaluated.

- Intactness

  Ensures that messages are not damaged.

- Confidentiality

  Ensures that datagrams cannot be read by unauthorized recipients. This is achieved by appending a character string calculated from the user name and password.

- Punctuality

  Ensures that messages are processed within a defined time.

1.2.6 SNMP in SIMATIC NET

SIMATIC NET provides management systems for network management using SNMP and supports the SNMP agent function with many devices.

The following SIMATIC NET components and device families are used:

- **Management end (clients)**
  - SINEMA Server

    SINEMA Server is Web-based network management software for monitoring, diagnostics and management of devices and their statuses in Industrial Ethernet networks.

  - IE SNMP OPC-Server

    The SNMP OPC server allows diagnostics and configuration of any devices capable of SNMP. The data exchange with these devices is handled by the OPC server using the SNMP protocol. All the information can be integrated in OPC-compatible systems, for example in the HMI system WinCC. This makes combined process and network diagnostics possible in the HMI system.

- **Agent end (server)**
  - SIMATIC S7 with connection via the CPU or a SIMATIC NET CM/CP
  - PCs WITH SIMATIC NET CP
  - SCALANCE X / M / W, OSM / ESM
  - SCALANCE S security module
  - Siemens RuggedCom switches

SNMP data exchange

The figure below and the following descriptions provide an overview of the interaction of the components in SNMP communication.

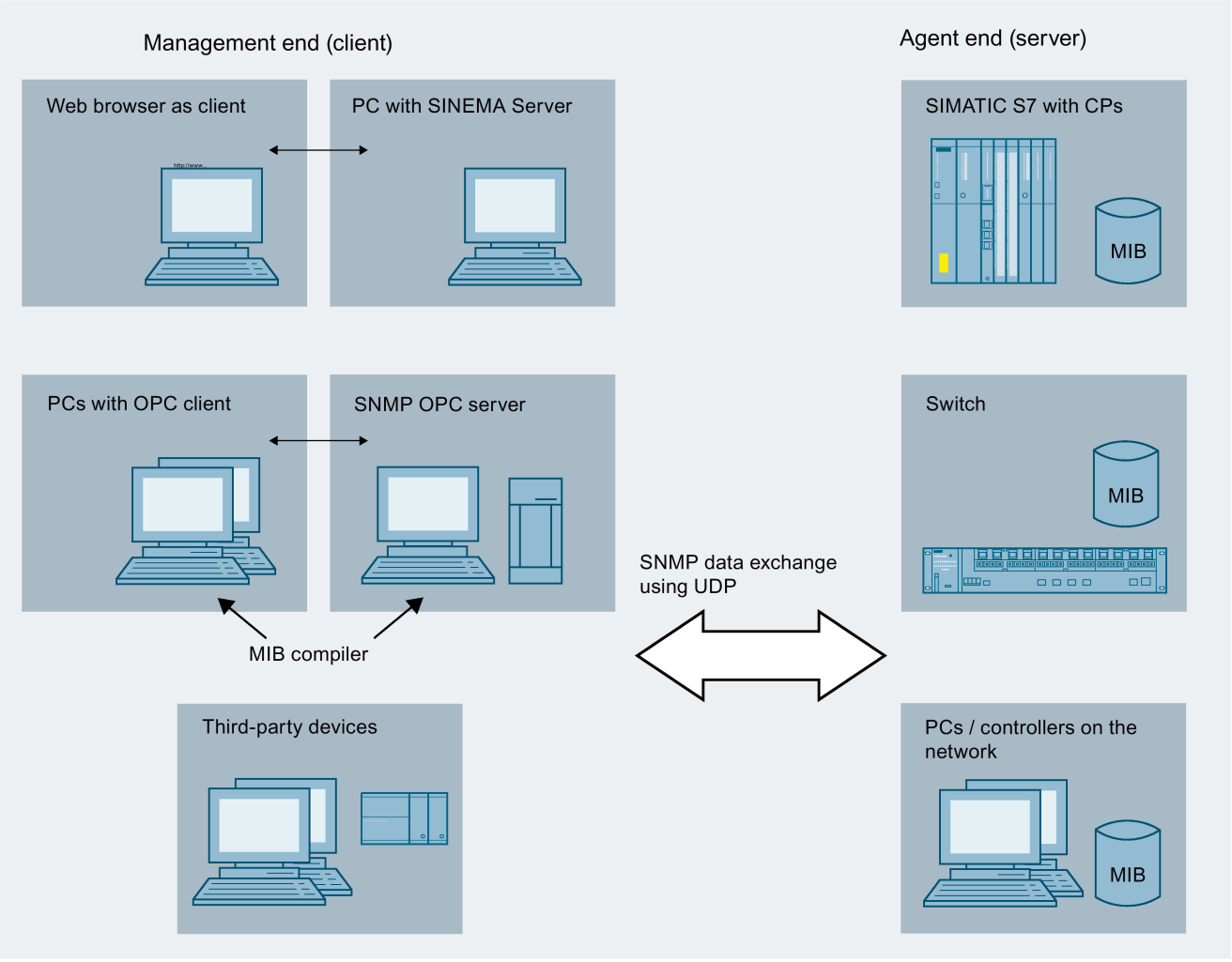


Figure 1-2 Data exchange with SNMP

Management end

- **SINEMA Server as SNMP client**

  In its function as server, SINEMA Server includes network management software. This is used to monitor and manage devices and their status in Industrial Ethernet/PROFINET networks.

- **SNMP OPC server as SNMP access for OPC clients**

  Via the SNMP OPC server of SIMATIC NET, OPC client applications have access to SNMP network management functions. To make device-specific MIB data records accessible and interpretable via OPC variables, an MIB compiler is available.

  A typical OPC client application that also uses the SNMP network management functions is, for example, the OPC client of the process visualization system SIMATIC WinCC.

- **NMS systems of other vendors with SNMP management functionality**

  NMS systems of other vendors have access to the reachable Siemens devices in the network with SNMP server functionality.

Agent end

Depending on the device type, SIMATIC NET devices support the SNMP standards SNMPv1, SNMPv2 or SNMPv3.

Information about the properties of devices that can be addressed as SNMP agents is stored in the MIB files of the particular device. A distinction is made between standardized MIBs defined in RFCs (refer to the appendix of the manual) and private MIBs. Private MIBs contain product-specific data that is not included in standard MIBs.

You will find information about the supported standards and MIBs of SIMATIC NET devices in the relevant device documentation.

- **SIMATIC S7-200/300/400/1200/1500**

  Depending on the device type, the interfaces of the CPU or of the S7 CP/CM support management information via SNMP.

- **SIMATIC NET SCALANCE M / X / W OSM/ESM and the security module SCALANCE S**

  The SCALANCE devices support the transfer of management information using the Simple Network Management Protocol (SNMP). To allow this, an SNMP agent is installed on the module that receives and responds to SNMP queries.

Management Information Base (MIB) 2

2.1 Basics

2.1.1 The Management Information Base (MIB) and Object Identifier (OID)

Management Information Base

In the context of the SNMP model, the Management Information Base (MIB) is a collection of all MIB objects that can be called up or modified by the SNMP manager. It manages individual system aspects such as information about the managed nodes or statistical information about the throughput of packets, established connections, error messages etc. The variables to be used for the request from the SNMP manager are written in a language that is independent of the target system. The MIB is managed by an SNMP agent. The SNMP agent is an application implemented on every device to be managed. When requested by the SNMP manager, the MIB objects can be queried and modified by the SNMP agent.

Identification of MIB objects with the Object Identifier (OID)

The MIB objects are organized in a tree structure and formulated uniformly in an "Abstract Syntax Notation One"-based collection of rules, the Structure of Management Information (SMI). The MIB objects are identified by a unique Object Identifier (OID). The OID describes the path through the hierarchically structured MIB tree to the required MIB object.

With standardized MIB objects, the OID is fixed.

Private MIB objects are kept in the "enterprises" subdirectory. Within the private structure, the addresses are left up to the manufacturer. Only the manufacturer number needs to be registered. The OID can be represented as an ASCII character string.

Example: The OID 1.3.6.1.2.1.1.1 is the path to the "sysDescr" object.

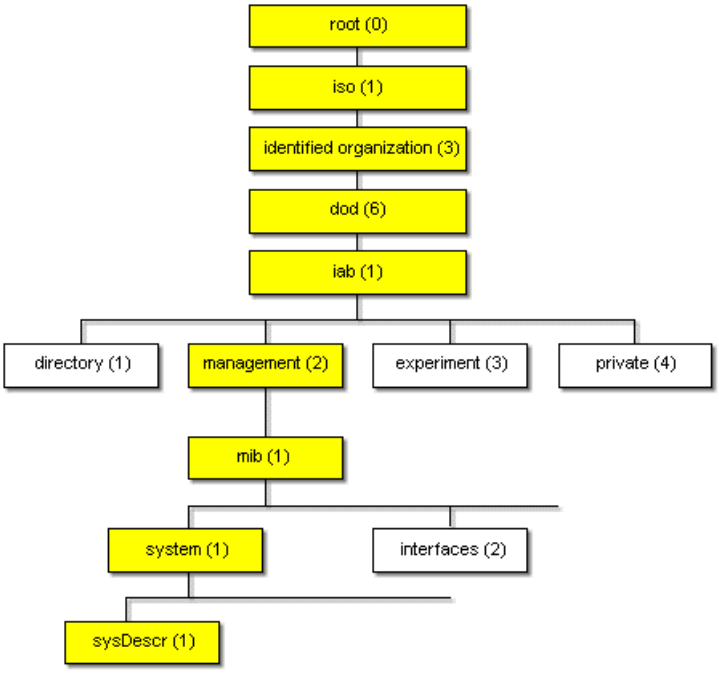


Figure 2-1 OID path to the "sysDescr" object

Structure of an MIB object

Each MIB object consists of the following:

- A name, the object identifier
- A syntax that defines the abstract data structure of the MIB object
- A coding as a representation of the abstract syntax

Syntax of an MIB

Example of the syntax for an MIB object:

```
system OBJECT IDENTIFIER ::= { mib-2 1 }
sysDescr OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"A textual description of the entity. This value should include the full name and
version
identification of the system's hardware type, software operating-system, and
networking
software. It is mandatory that this only contain printable ASCII characters."
::= { system 1 }
```

Structure of an MIB

The individual objects of a MIB are arranged in groups. These groups can relate to the entire system or to individual protocols in different network layers.

It is not necessary to implement all groups because only the groups relevant in the particular system are required. If a group is implemented, all objects of this group must exist in their entirety.

RFC

The basics of the MIB for network management were specified in the Internet community based on SMIv1 in RFC 1213 as MIB-II. Today, MIB-II defines the basic structure of the MIB. All the definitions of the groups were revised and converted to the SMIv2 representation. To allow further development of the individual groups, their definitions were rewritten in separate RFCs.

2.1.2 Structure of Management Information (SMI)

Structure of Management Information (SMI)

SMI forms the framework for the MIB. Within this framework, the "Structure of Management Information" describes the type of representation of objects and the type of exchange by the protocol in detail.

The SMI specifies the definition of the management data to be converted by SNMP. The SMI describes the syntax of the managed objects and their names and coding. MIB documents written based on SMIv1 can be used with SNMPv1, SNMPv2c and SNMPv3 protocols. SMIv2 defines the "modern" syntax of an MIB document. MIB documents written based on SMIv2 can be used with SNMPv1, SNMPv2c and SNMPv3 protocols.

The SMI contains:

- The usual structures and the identification scheme for the definition of management information used for management of the TCP/IP-based networks.
- The description of the object information model for network management.
- The set of generic types that needs to be used to describe network management information.

The formal description of the structures can be found in the specification "Abstract Syntax Notation One" (ASN. 1). The representation of the data on the network corresponds to the Basic Encoding Rules (BER) of ASN. 1.

RFC 1155 and RFC 1212 contain the requirements for SMI from SNMP Framework V1 (SMIv1).

The SMI of SNMPv2 was defined in RFC 1902 and expanded for SMI-specific data types. SNMPv3 uses the SMI of SNMPv2.

2.1.3 MIB variables and groups

Arrangement of the MIB objects

MIB variables are defined by scalar values or by strings. They can be read out from the MIB using SNMP.

MIB variables are organized in groups. The MIB groups of MIB-II are listed below.

MIB groups of MIB -II

MIB group	Description
system	Configuration information (sysDescr, sysLocation, sysUpTime, ...)
interfaces	Maximum number of interfaces and table with information on the interfaces
at	Information on address mapping Is not supported by MIB-II.
ip	Internet protocol-specific information of the network component
icmp	Statistical information about the ICMP services.
tcp	Statistical information about the transport layer TCP
udp	Information about the User Datagram Protocol (UDP)
egp	Information about the Exterior Gateway Protocol (EGP)
cmot	
transmission	Reserved for media-specific information by the test branch (objectidentifier 1.3.6.1.3)
snmp	Information on the SNMP network data

2.1.4 Variables of MIB-II

Variables

Below, you will find a list with some of the SNMP variables from the MIB-II set for monitoring device status. MIB-II describes all the SNMP variables that are supported by most devices capable of SNMP.

Variables in the "System" directory

Variable	Access rights	Description
sysDescr	Read only	Vendor-specific identification of the device. String with up to 255 characters.
sysObjectID	Read only	Address (object identifier) under which the device-specific SNMP variables can be reached: 1.3.6.1.4.1.4329.6.1.2.nnn.mmm
sysUpTime	Read only	Time since the last reset (for example, after restarting). Specified in hundredths of seconds.
sysContact	Read and write	Optional entry of a contact person. Possible value: String with a maximum of 255 characters. Default setting: Empty string

Variable	Access rights	Description
sysName	Read and write	Name of the device. Possible value: String with a maximum of 255 characters. Default setting: Empty string
sysLocation	Read and write	Location of the device. Possible value: String with a maximum of 255 characters. Default setting: Empty string
sysService	Read only	Total functions (services) provided by the component according to the ISO/OSI model. 1. Physical (for example repeater) 2. Datalink/subnet (for example bridges, switches) 3. Internet (for example IP gateways, routers) 4. End to end (for example IP hosts) 5. - 6. - 7. Applications (for example e-mail servers), data type: Integer For the calculation, refer to RFC 1213.

Variables in the "Interface" directory

Variable	Access rights	Description
ifNumber	Read only	Number of different interfaces available in the component.
ifDescr	Read only	Description and optional additional information for an interface. Possible values: String with a maximum of 255 characters
ifType	Read only	For Ethernet ports: csmacd(6)
ifSpeed	Read only	Transmission speed [bps]
ifOperStatus	Read only	Status of Ethernet interfaces or ports. Most important values: • up(1): Connection to Ethernet • down(2): No connection to Ethernet
ifLastChange	Read only	Time since system startup that an interface is in its current status. Specified in hundredths of seconds.
ifInErrors	Read only	Number of received frames that were not forwarded to higher protocol layers because of an error.
ifOutErrors	Read only	Number of frames that were not sent because of an error.

2.2 Standardized and private MIBs

2.2.1 Classification of MIBs

Overview

Due to the cross-vendor standardization of the MIBs and the access mechanisms, a heterogeneous network with components from different vendors can be monitored and controlled.

If non-standardized data is necessary for component-specific network monitoring, this can be written in private MIBs by the vendors.

Standardized MIBs are defined in RFCs and other standards.

In terms of content and organization, private MIBs are based on the structure of the standardized MIBs. They can therefore be incorporated in the entire SNMP model without problems.

2.2.2 Standardized MIBs

Standardized MIBs

Two of the most important standardized MIBs are:

- MIB-II
- LLDP-MIB

MIB-II

MIB-II was defined in RFC 1213.

The objects defined in MIB-II have the following OID prefix:

mib-2 OBJECT IDENTIFIER ::= { 1.3.6.1.2.1 }

2.2.3 Private MIBs

Private MIBs

Private MIBs are MIBs defined by vendors with product-specific expansions that are not included in the standard MIBs. They are based on RFC 1213.

To allow a management station to read private MIBs, these must be made known to the management station.

The options for this are as follows:

- Reading out the MIB from the WBM of the device reachable via the network
- Downloading the MIB from the Internet pages of Siemens Industry Online Support

Note

MIB versions

Make sure that you use the latest MIBs. You will find these on the Internet pages of Siemens Industry Online Support, refer to the section Saving the MIB file of a device (Page 63).

2.3 Representation and integration of MIBs

2.3.1 MIB browser

Representation of the MIB objects with the device view

Using device views, the MIB objects can be represented graphically in a management system.

Representation of the MIB objects with MIB browser

If no device view is available for the network component, the objects are represented row-oriented using an MIB browser. MIB browsers are often included in the standard range of network management applications.

The following functions can be performed with an MIB browser:

- Loading an MIB and viewing the MIB objects
- Browsing the nodes of an MIB structure for definitions of objects specified in the MIB
- Calling up values of selected MIB objects of an MIB structure
- Viewing and analysis of incoming traps when using the trap viewer
- Execution of the basic SNMP protocol interactions such as GET, GETNEXT, GETBULK (SNMPv2 and SNMPv3 only) and SET
- Saving the protocol interactions in a text file
- Representation of real-time recordings of SNMP data in a diagram (line and bar diagrams)
- Representation of SNMP data in table form (SNMP table cell)

2.3.2 MIB compiler for SNMP OPC server

What is the MIB compiler used for?

The MIB compiler is used to integrate an MIB in the network. With the MIB compiler of SIMATIC NET OPC servers, SIMATIC NET devices and third-party devices can be integrated. This integration is only possible with an MIB description of the relevant device.

The MIB compiler of SIMATIC NET requires MIB files according to the SMIv1 standard. Although the SMIv2 format is not supported there, most SNMP components provide both MIB formats.

Device profiles

A device profile describes the extent of the variables of the device that are mapped on the OPC server. Only variables that are contained in the device profile can also be integrated in an application.

The SNMP OPC server includes an MIB compiler with which existing device profiles can be adapted or new device profiles created. This is achieved by entering the required SNMP variables from the public and, if applicable, private MIBs in the profile.

Diagnostics and configuration 3

3.1 Requirements for SNMP communication

Enabling SNMP in the device configuration

For some SIMATIC NET devices, SNMP communication must be enabled explicitly during configuration using the standard configuration tools (e.g. STEP 7). Only then are the ports on these devices enabled for SNMP communication.

Requirement for SNMP communication

For the recognition and use of SNMP, the minimum requirement is that the IP address of the device is configured.

3.2 Configuration of SIMATIC NET devices for SNMP communication

Configuration of devices for operative mode

Before using most SIMATIC NET devices, they first need to be configured for the intended application. During configuration, the properties that the devices will use at their location in the plant are specified. For communications modules, these include, for example, the address, the communications partners, special protocol properties etc. The configuration data is created in various standard configuration tools. Depending on the device type, the configuration data needs to be loaded on the device itself or on the CPU of the station before the device starts up.

Depending on the device type, the following standard configuration tools are available:

- SIMATIC STEP 7
  - STEP 7 V5.5
  - STEP 7 Professional / Basic
- Web Based Management (WBM)
- Command Line Interface (CLI)

Configuring SNMP parameters

Several basic parameters such as the SNMP version or the permitted community strings can be specified in the configuration tools listed above.

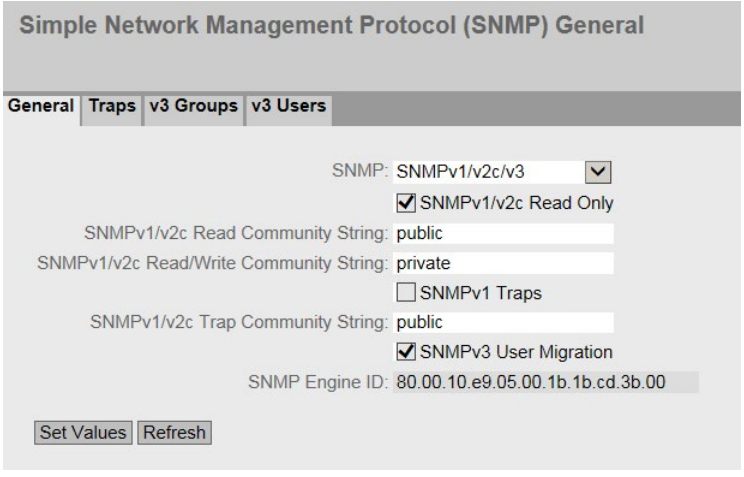


Figure 3-1 SNMP configuration of an agent with the WBM

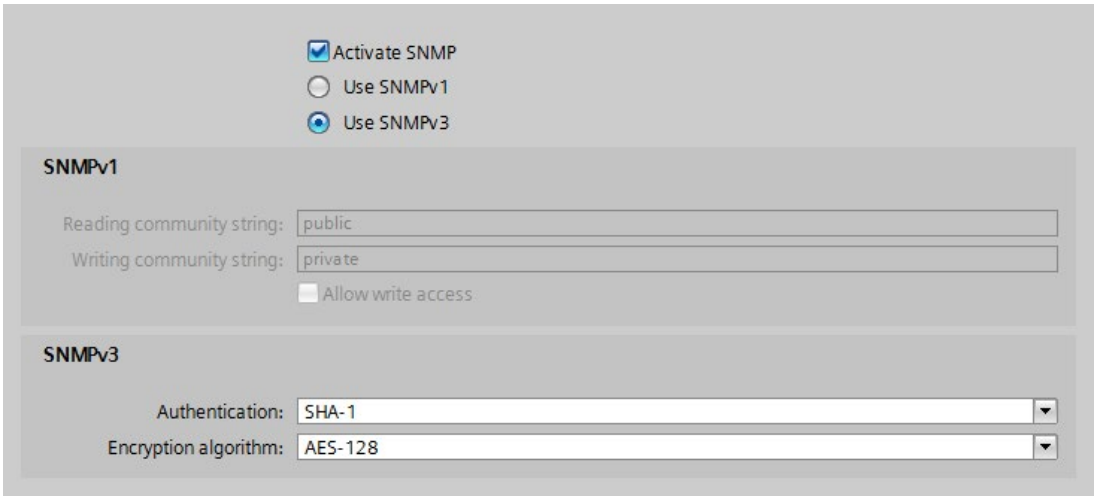


Figure 3-2 Configuration of the SNMP properties of an agent in STEP 7

Depending on the device type, other special parameters for SNMP communication can be configured using the WBM or CLI during the basic configuration.

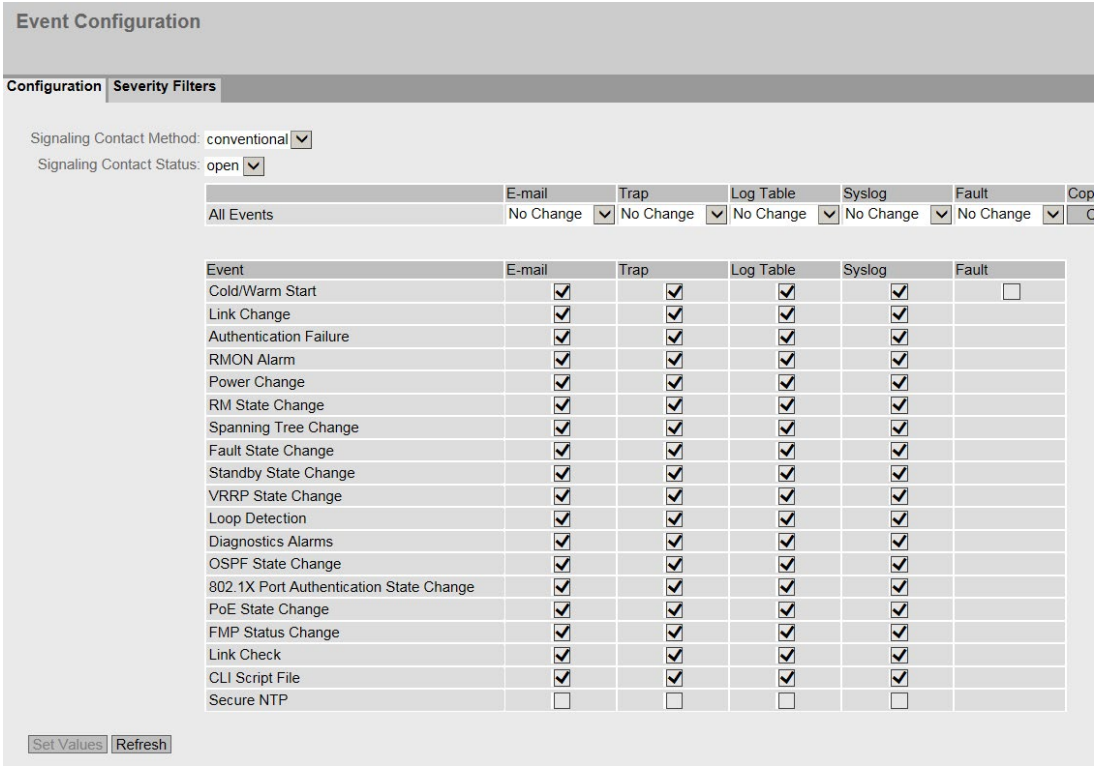


Figure 3-3 Example: SNMP event configuration of an agent with the WBM

Using SNMP itself, only a limited selection of parameters can be configured following device startup. You will find detailed information on this in the following sections.

3.3 Configuring SNMP users

Configuring users

With SIMATIC NET devices, you can configure users and groups for SNMPv3 with the WBM, CLI or by direct access to the MIB objects (recommended only for experts).

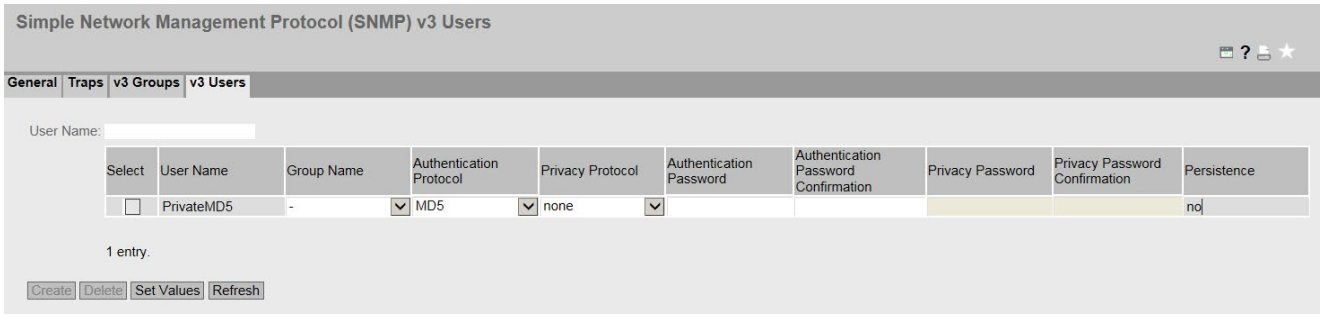


Figure 3-4 Configuration of an SNMPv3 user for an agent with the WBM

You will find details of the options and access rights for SNMPv1/v2 or SNMPv3 in the section Access rights and security aspects (Page 15).

3.4 Reading out and setting SNMP objects with management systems

Modifying SNMP parameters

Most SNMP parameters can only be read.

Only some SNMP parameters can be configured; in other words, written:

- You will find the writable parameters of MIB-II in the section Variables of MIB-II (Page 22). There, they are marked "Read and write".
- You will find the objects of the Siemens Automation MIB in the section Siemens Automation MIB (Page 35). Writable parameters are marked "read/write".

Parameters are written using the "SET" command, refer to the section Datagram types (Page 12).

Network management systems for SNMP

Various tools are available for configuring SNMP objects and parameters.

The following SIMATIC NET tools are suitable for diagnostics and configuration using SNMP:

- SIMATIC NET SINEMA Server
- SIMATIC NET IE SNMP OPC Server Basic

Information on the products can be found on the Internet pages of Siemens Industry Online Support under the following entry ID:

22592211 (http://support.automation.siemens.com/WW/view/en/22592211)

Reading out and setting SNMP parameters

Below, you will find screenshots of several examples of reading out and setting SNMP parameters in SINEMA Server.

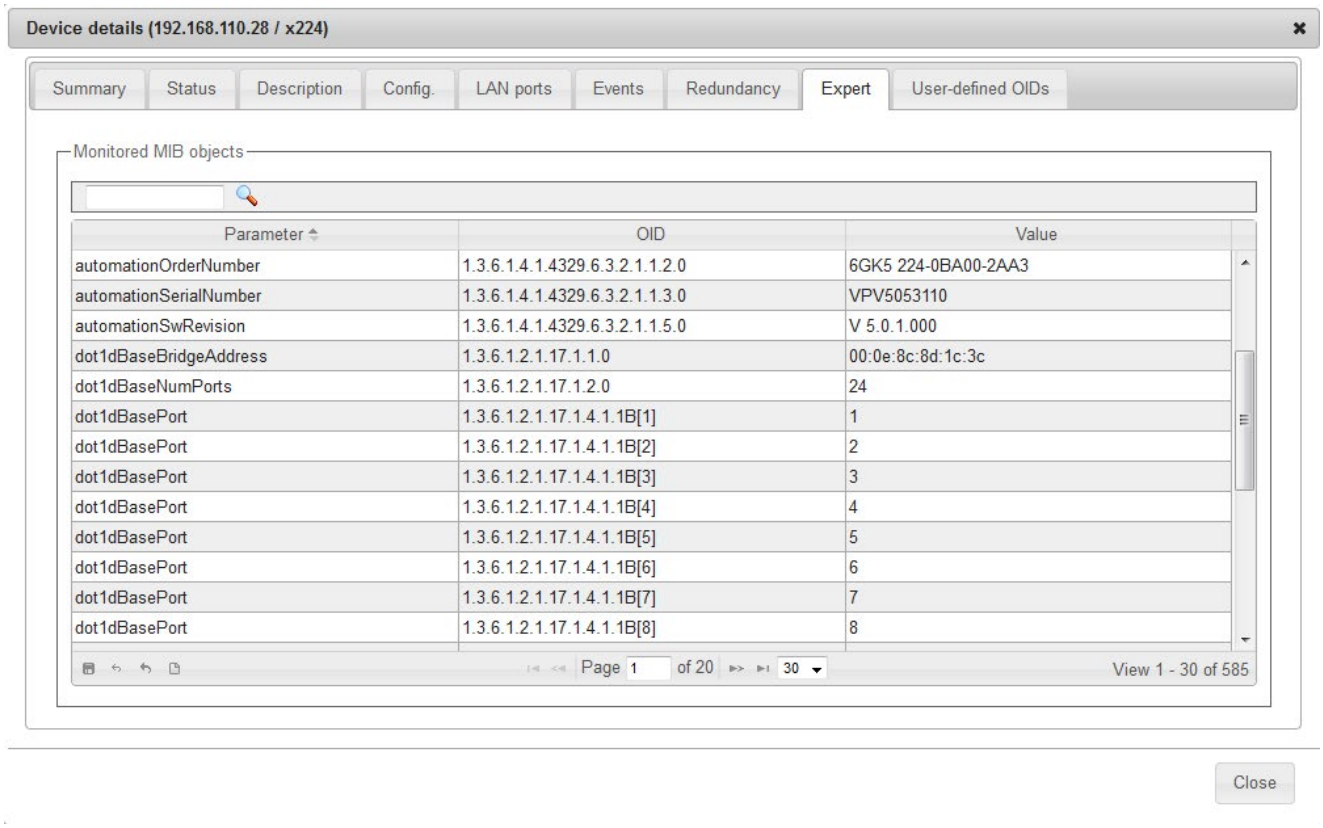


Figure 3-5 Reading out OIDs

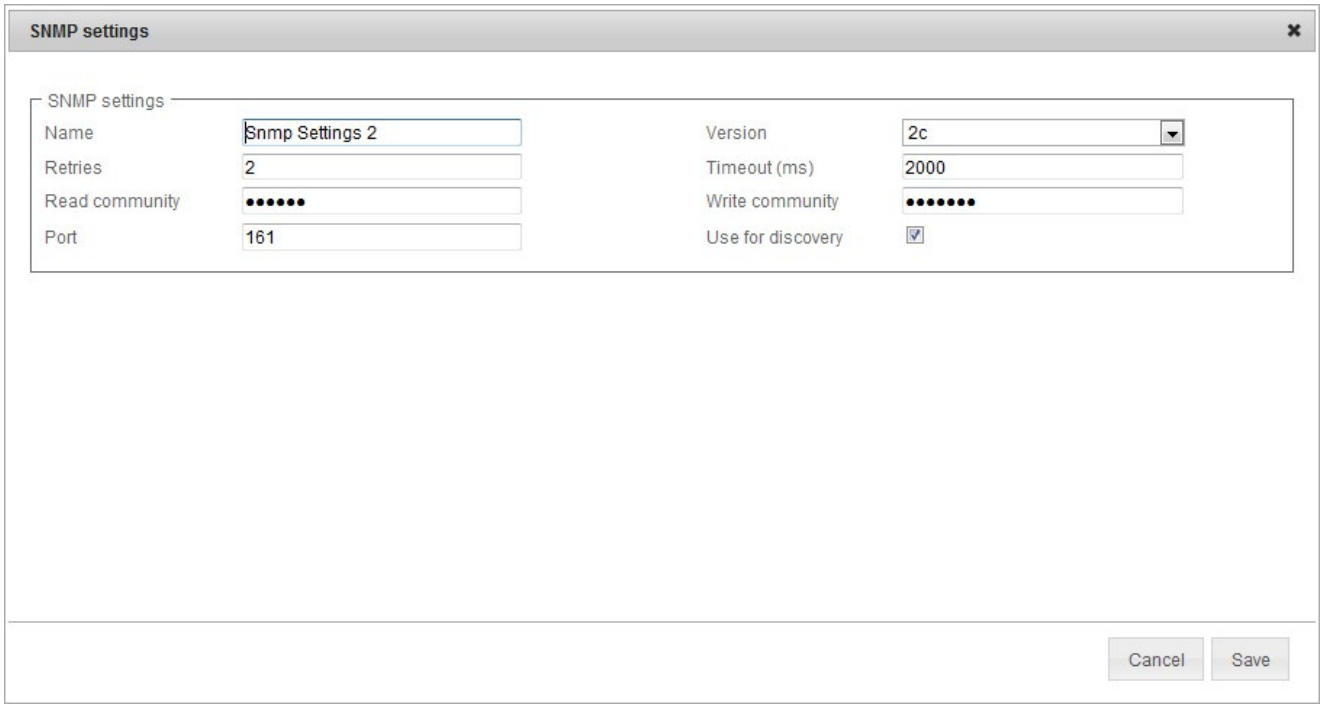


Figure 3-6 Specifying community strings for an SNMP profile

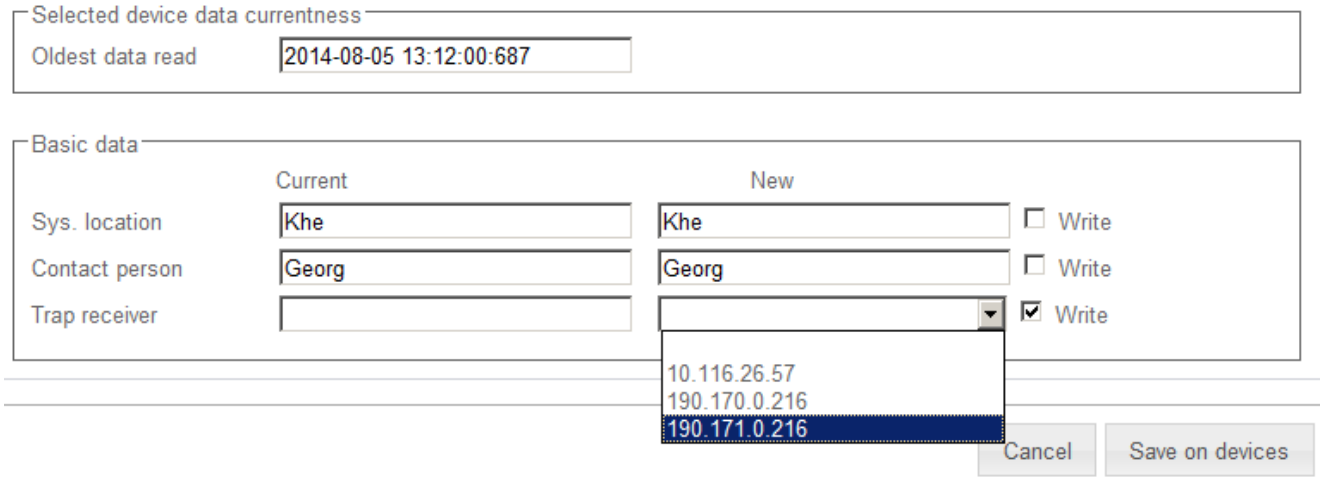


Figure 3-7 Specifying a trap recipient

Siemens Automation MIB

4

4.1 MIB files of Siemens Automation MIB

OID of the Automation MIB

The MIB objects of the Automation MIB are maintained under the following OID:

iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).siemens(4329).automation(6).

MIB files

The MIB files of the Siemens Automation MIB are listed in the following table. They are available on the Internet as an archive file for downloading, refer to the section Saving the MIB file of a device (Page 63).

Which Siemens devices support SNMP can be found in the relevant product documentation.

File name	Description
siemensSmi.mib	Object identifier node of Siemens
automationSmi.mib	Object identifier node of the Siemens Automation MIB
automationSimaticNet.mib	Object identifier node for the product-specific sub branches for SIMATIC NET products. In addition this MIB contains the node snMgmt for functions implemented in several product groups.

Modules below the OIDs

- automationModules (...4329.6.2)
- automationMgmt (...4329.6.3)

are no longer further developed. Support for these modules can therefore not be assumed with all products. Some of the modules affected by this are listed in the following table.

File name	Description
automationTc.mib	Definitions of the general textual rules for the Siemens Industry sector
automationSystem.mib	Definition of the general management objects that describe a Siemens product
automationTime.mib	Definition of management objects to display and modify the system time of an automation product and to manage the Sync mechanisms
automationPS.mib	Definition of management objects to manage power supply products
automationBootDhcp.mib	Definitions of the management objects for configuring the parameters of OOTP / DHCP clients
automationTelnet.mib	Definition of management objects to describe the parameters of the Telnet unit

File name	Description
automationSmtp.mib	Definition of management objects to describe SMTP parameters
automationSntp.mib	Definition of management objects to describe SNTP parameters

Automation-SMI

This module contains the basis of the Automation MIB. The structure of the object identifiers for the automation framework is defined here. It contains the definition of the starting point of the Automation MIB, the main groups and the product groups. This module is purely administrative; it contains no definitions of object identifiers that can be read out via the network.

Automation-SIMATIC-NET

This module defines the subgroups in the product-specific part of the SIMATIC NET products. The administrator of the Automation MIB can specify responsibilities for the sub branches of this module. The administrator can, for example, transfer the responsibility for the sub branches of a product family to the project manager.

If the SNMP agent of a product behaves unusually, for example due to restrictions in the extent of the values of an object, due to other access rights or due to the use of product-specific MIBs, the creation of a private branch in the product registration requires an equivalent branch under Capability. The capability area must be structured in exactly the same way as the product registration so that the user can find the properties of a product quickly.

The node snMgmt contains objects for fiber-optic cable diagnostics (SnFOMIB), objects for system description (SNSystemMIB) and objects for authentication (SnAuthMIB). The expansion SnFOMIB in the Automation MIB is necessary because the standard MIB does not provide any objects for fiber-optic cable diagnostics according to SFF-8472 and the FMP (Fiber Monitoring Protocol).

The fiber-optic cable diagnostics is achieved by the cyclic exchange of diagnostic data based on LLDP. For this the LLDP MIB expansion is necessary. As the criterion for the quality of a fiber-optic cable connection the difference between the transmit and receive power is used. Below the SnFOMIB node there are objects for the fiber type and the cable type. There are also objects for the three limit values of the power loss "Maintenance Required, "Maintenance Demanded" and "Error".

The following section describes modules that are not supported by new devices.

Automation TC (Textual Convention)

It is often practical to create separate syntax definitions for example to represent addresses or version formats. To ensure that the specifications are unique for the entire private Automation MIB, the textual conventions are grouped in a single module. The module is located under the automationModules branch and is a purely administrative module.

Automation System

The Status area contains an error flag that represents the operational status of the entire system. Here, there is a light signal that distinguishes between the "OK", "maintenance required" and "Problem" status.

Some systems allow a restart by SNMP and can reset their configuration to default values. The trigger for such actions, the counter for restart statistics and similar objects are put together in one group as generic parameters.

A device capable of SNMP automatically has an IP configuration. Some systems allow the user to modify this configuration using SNMP. The objects that allow this are put together in the agent configuration group. The parameters for configuration of an out-band connection are also stored in this group if an out-band connection exists. If an out-band connection exists and parameters have been assigned for it, the system can be reached both via the in-band IP address and via the out-band IP address. If a system supports VLANs and this influences the configuration of the agent, this group is not suitable for the entire parameter transfer (assignment) of the agent. Instead the system must make other objects available for the transfer of the VLANs to the IP subnets and for similar functions. It can, however, be assumed that systems with VLAN support do this anyway.

In the last area, the MIB module makes notifications available with which changes to the operational status of a system and configuration changes can be indicated.

The systems located in the Automation area support SNMP to a varying extent. For this reason, different compliance requirements were formulated.

The main requirement (automationSystemBasicCompliance) that all components must meet is conformity with I&M 0. The parameters of the classes I&M 1 and I&M 2 that map the hardware and software configuration of a system can be made available by a system as options. The ability to reset the counters of a system is also optional.

The extended requirement (automationSystemExtCompliance) contains the main requirement [basic compliance] and optional parameters for the configuration of the SNMP agent. These can be made available by systems that allow the configuration of the agent with SNMP. The other functionalities of the MIB such as the remote restart of a system or the distribution of notifications are optional parameters of this requirement.

Automation-Time

In the standard MIBs, there is only the sysUpTime object that returns the timeticks since the last system start. For systems within an automation network, this is normally inadequate (they often require absolute times, for example to be able to save the time of the last system modification etc.). This makes synchronization with a manager necessary, for which there are a number of different methods that can be used.

To achieve the greatest possible flexibility, two-phase access was selected. The Automation-Time module (in the automationMgmt branch) represents the central point to display the system time and to control time synchronization. It contains a table that lists all synchronization mechanisms. The table is made available by a component via which the mechanisms can be enabled and disabled. The protocols and methods with which synchronization is achieved are managed in separate MIB modules and the agent implements only the ones that are necessary. Systems not intended to synchronize the time of day using SNMP only need to meet the basic conformity of the modules and to make the time available for reading out.

Automation-PS (Power Supply)

The power supply units of a system are managed in this module (under the automationMgmt branch). It consists of a table containing all PSUs of the system and a notification that signals the status change of one or more units. The conformity of the module requires at least information about the existing power supplies and their status. Enabling the monitoring and support of the event is optional

Automation-BootDHCP

Since there are currently no standard MIBs for DHCP/Bootp clients, this MIB module was created and inserted in the automationMgmt branch. Since not only the functions required for layer 2 components should be covered, but also the future layer 3 components, the module contains a table in which a row is reserved for each layer 3 interface of the system. The index of every row is the same as the index in the ifTable so that an interface is uniquely recognizable. There is also a control flag that controls the client.

Automation-Telnet

This group of the automationMgmt branch currently contains two variables with which the administrator can control a timeout of a Telnet session. Conformity requires the support of all objects of the module.

Automation-SMTP

Network components are often in a position to exchange information about certain system events. The settings of the parameters required for this are integrated in the automationMgmt branch. It contains the address of the SMTP server and the corresponding port, the value of the From box of the address and the recipient of the mail. The component that decides whether or not an e-mail is triggered is located in a different module.

Automation-SNTP

The model in the Automation MIB for time-of-day synchronization specifies that the control of the synchronization paths should be created in the Automation-Time MIB. The configuration of the access method is in a separate MIB group. One of the possible synchronization methods is SNTP. The parameters of this protocol are managed by using the Automation-SNTP module in the automationMgmt branch. This includes the address and the port of the SNTP server, the time difference between server and client and the test interval of the client.

4.2 The framework - structure and organization

Structure of the framework

The structure of the framework is defined in the automationSMI. Due to the size, the individual modules of the Automation MIB are organized in separate files. This means that you need to download several files, e.g. using the Web page. If you do not require the entire MIB, you only need to download the MIB files that you actually require.

SMIv2 is used to describe the MIBs. Over and above this, SMIv2 provides options for representing relationships between tables syntactically. SMIv2 specifies conformity reports that describe which objects are obligatory and which are optional. These reports are also used in the Automation Framework. They can always be found at the end of each MIB module.

The MIB files contained in the Siemens Automation MIB describe a framework for SNMP diagnostics and configuration of many Siemens Industry components with network capability.

The Automation MIB can be downloaded from Siemens Industry Online Support, refer to the section Saving the MIB file of a device (Page 63).

Structure of the framework

The automation framework is divided into 4 branches:

- **automationProducts**
- **automationModules**
  (This module is no longer further developed. Support for this module can therefore not be assumed with all products.)
- **automationMgmt**
  (This module is no longer further developed. Support for this module can therefore not be assumed with all products.)
- **automationAgentCapability**

automationProducts

The first of these branches, automationProducts, forms the product-specific part. This branch is divided into the following MIBs according to the product families:

- automationPlc
- automationSimaticNet
- automationMotionControl
- automationHmi

The structure in the individual product families is organized in corresponding files. The OID node of such branches is used as the value for the sysObjectID.

automationModules
(This module is no longer further developed. Support for this module can therefore not be assumed with all products.)

Administrative modules are inserted in the automationModules branch; in other words, modules without their own management objects.

The automationModules branch contains the following MIBs:

- automationTC

automationMgmt
(This module is no longer further developed. Support for this module can therefore not be assumed with all products.)

The core of the automation framework is the automationMgmt branch. This group contains the current management information provided by the device. Objects that belong together in function terms are managed in separate modules in a flat hierarchy under automationMgmt. The automationNotify and automationSystem modules form a general, generic system description. Over and above this, there are files for special protocols for which no standard MIB exists up to now (e.g. IGMP) or special functions of SIMATIC NET devices (e.g. C-PLUG).

The automationMgmt branch contains the following MIBs:

- automationSystem
- automationPS
- automationTime
- automationSMTP

automationAgentCapabilities

An SNMP agent can save its profile in the fourth group. This means that here an agent can specify the MIBs that it matches and also whether and which deviations exist. Since the agents were developed for specific products, this part is also product-specific and therefore corresponds to the first MIB group automationProducts in terms of structure.

The automationAgentCapabilities branch contains the following MIBs:

- automationPlcAgentCapability
- automationSimaticNetAgentCapability
- automationMotionControlAgentCapability

4.3 AUTOMATION-SMI

This module contains the basis of the Automation MIB. The structure of the object identifiers for the automation framework is defined here. It contains the definition of the starting point of the Automation MIB, the main groups and the product groups. This module is purely administrative. It contains no definitions of object identifiers that can be read out via the network.

The following access path structure is defined:

Object identity	OID	Description
Automation	1.3.6.1.4.1.4329.6	automationMIB starting point
automationProducts	1.3.6.1.4.1.4329.6.1	Product-specific sub branches. The root OIDs of the product sub branches are also used as sysObjectID.
• automationPlc • automationSimaticNet • automationMotionControl • automationHmi • automationSitopPower	• 1.3.6.1.4.1.4329.6.1.1 • 1.3.6.1.4.1.4329.6.1.2 • 1.3.6.1.4.1.4329.6.1.3 • 1.3.6.1.4.1.4329.6.1.4 • 1.3.6.1.4.1.4329.6.1.5	• SIMATIC S7 PLC products • SIMATIC NET products • Motion Control products • SIMATIC HMI products • Sitop Power products
automationModules (This module is no longer further developed. Support for this module can therefore not be assumed with all products.)	1.3.6.1.4.1.4329.6.2	Object identifiers assigned administratively (e.g. textual conventions, ...)
automationMgmt (This module is no longer further developed. Support for this module can therefore not be assumed with all products.)	1.3.6.1.4.1.4329.6.3	Sub branch containing the MIB modules for managing a Siemens automation system.
automationAgentCapability • automationPlcAgentCapability • automationSimaticNetAgentCapability • automationMotionControlAgentCapability • automationHmiAgentCapability • automationSitopPowerAgentCapability	1.3.6.1.4.1.4329.6.4 • 1.3.6.1.4.1.4329.6.4.1 • 1.3.6.1.4.1.4329.6.4.2 • 1.3.6.1.4.1.4329.6.4.3 • 1.3.6.1.4.1.4329.6.4.4 • 1.3.6.1.4.1.4329.6.4.5	SIMATIC S7 agent profile: • SIMATIC S7 PLC agent profile • SIMATIC NET agent profile • Motion Control agent profile • SIMATIC HMI agent profile • Sitop Power agent profile

4.4 AUTOMATION-SIMATIC-NET

This module defines the subgroups in the product-specific part of the SIMATIC NET products.

This module is purely administrative; it contains no definitions of object identifiers that can be read via the network.

The following access path structure is defined for the SIMATIC NET product sub branch:

Object identity	OID	Description
snScalanceX	1.3.6.1.4.1.4329.6.1.2.1	Product-specific sub-branch for SCALANCE X products
snScalanceX200	1.3.6.1.4.1.4329.6.1.2.1.2	Product-specific sub-branch for SCALANCE X200 products
snScalanceX300	1.3.6.1.4.1.4329.6.1.2.1.3	Product-specific sub-branch for SCALANCE X300 products
snScalanceX400	1.3.6.1.4.1.4329.6.1.2.1.4	Product-specific sub-branch for SCALANCE X400 products
snScalanceX500	1.3.6.1.4.1.4329.6.1.2.1.5	Product-specific subbranch for SCALANCE X500 products
snScalanceW	1.3.6.1.4.1.4329.6.1.2.2	Product-specific subbranch for SCALANCE W products
snScalanceS	1.3.6.1.4.1.4329.6.1.2.3	Product-specific subbranch for SCALANCE S products
snScalanceM	1.3.6.1.4.1.4329.6.1.2.4	Product-specific subbranch for SCALANCE M products
snS7CP	1.3.6.1.4.1.4329.6.1.2.5	Product-specific sub-branch for S7 CPs
snS7CP300	1.3.6.1.4.1.4329.6.1.2.5.1	Product-specific sub-branch for S7-300 CPs
snS7CP400	1.3.6.1.4.1.4329.6.1.2.5.2	Product-specific sub-branch for S7-400 CPs
snS7CP1200	1.3.6.1.4.1.4329.6.1.2.5.3	Product-specific sub-branch for S7-1200 CPs
snS7CP1500	1.3.6.1.4.1.4329.6.1.2.5.4	Product-specific subbranch for S7-1500 CPs
snPCCP	1.3.6.1.4.1.4329.6.1.2.6	Product-specific subbranch for PC CPs
snIdent	1.3.6.1.4.1.4329.6.1.2.7	Product-specific sub-branch for SIMATIC Ident products
snMgmt	1.3.6.1.4.1.4329.6.1.2.100	Sub-branch for general modules
automationSnFOMIB	1.3.6.1.4.1.4329.6.1.2.100.1	Sub-branch for the diagnostics and configuration of FO ports according to SFF-8472 and FMP.
snFOObjects	1.3.6.1.4.1.4329.6.1.2.100.1.1	Diagnostics data
snFONotifications	1.3.6.1.4.1.4329.6.1.2.100.1.2	Definition of notifications.
snFOConformance	1.3.6.1.4.1.4329.6.1.2.100.1.3	Data according to SFF-8472.
automationSnSystemMIB	1.3.6.1.4.1.4329.6.1.2.100.2	Sub-branch for data objects from the area Installation & Maintenance
snSystemObjects	1.3.6.1.4.1.4329.6.1.2.100.2.1	Contains the subgroup snSystemIdent with five tables for I&M data and the subgroup snSystemInterface.
snSystemNotifications	1.3.6.1.4.1.4329.6.1.2.100.2.2	Empty group because no notifications are defined.
snSystemConformance	1.3.6.1.4.1.4329.6.1.2.100.2.3	Contains general information such as version of hardware and software

Object identity	OID	Description
automationSnAuthMIB	1.3.6.1.4.1.4329.6.1.2.100.3	Sub-branch for the authentication (MAC based, RADIUS)
snMacAuthObjects	1.3.6.1.4.1.4329.6.1.2.100.3.1.1	Data for MAC authentication.
snAuthFailVlanObjects	1.3.6.1.4.1.4329.6.1.2.100.3.1.2	Data for the AuthFail VLAN functionality.
snRadiusSrvObjects	1.3.6.1.4.1.4329.6.1.2.100.3.1.3	Data for the RADIUS configuration.
snUserAuthObjects	1.3.6.1.4.1.4329.6.1.2.100.3.1.4	Information about the authentication procedure, function rights, roles and user groups of the device.
snAuthNotifications	1.3.6.1.4.1.4329.6.1.2.100.3.2	Empty group because no notifications are defined.
snAuthConformance	1.3.6.1.4.1.4329.6.1.2.100.3.3	Optional information about the various authentication procedures.
snScalanceXCapability	1.3.6.1.4.1.4329.6.4.2.1	Capability sub-branch for SCALANCE X products
snScalanceX200Capability	1.3.6.1.4.1.4329.6.4.2.1.2	Capability sub-branch for SCALANCE X200 products
snScalanceX300Capability	1.3.6.1.4.1.4329.6.4.2.1.3	Capability sub-branch for SCALANCE X300 products
snScalanceX400Capability	1.3.6.1.4.1.4329.6.4.2.1.4	Capability sub-branch for SCALANCE X400 products
snScalanceX500Capability	1.3.6.1.4.1.4329.6.4.2.1.5	Capability subbranch for SCALANCE X500 products
snScalanceWCapability	1.3.6.1.4.1.4329.6.4.2.2	Capability subbranch for SCALANCE W products
snScalanceSCapability	1.3.6.1.4.1.4329.6.4.2.3	Capability subbranch for SCALANCE S products
snScalanceMCapability	1.3.6.1.4.1.4329.6.4.2.4	Capability subbranch for SCALANCE M products
snS7CPCapability	1.3.6.1.4.1.4329.6.4.2.5	Capability sub-branch for S7 CPs
snS7CP300Capability	1.3.6.1.4.1.4329.6.4.2.5.2	Capability sub-branch for S7-300 CPs
snS7CP400Capability	1.3.6.1.4.1.4329.6.4.2.5.3	Capability sub-branch for S7-400 CPs
snS7CP1200Capability	1.3.6.1.4.1.4329.6.4.2.5.4	Capability sub-branch for S7-1200 CPs
snS7CP1500Capability	1.3.6.1.4.1.4329.6.4.2.5.5	Capability subbranch for S7-1500 CPs
snPCCPCapability	1.3.6.1.4.1.4329.6.4.2.6	Capability sub-branch for PC CP products

4.5 AUTOMATION-TC

Note

This section describes a module that will not be further developed. Support for this module can therefore not be assumed with all products.

Textual conventions

It is often practical to create separate syntax definitions for example to represent addresses or version formats. To ensure that the specifications are unique for the entire private Automation MIB, the textual conventions are grouped in a single module. The module is located under the automationModules branch and is a purely administrative module.

The following textual conventions are defined:

Name	Syntax	Screen display	Description
AutomationOrderNumberTC	OCTET STRING (SIZE (16..32))	"1a"	Format of the article number of Siemens products
AutomationSerialNumberTC	OCTET STRING (SIZE (32))	"1a"	Format of the serial numbers of the SIMATIC NET products
AutomationVersionNumberTC	OCTET STRING (SIZE (0..32))	"1a"	Version format of the Siemens products in a simplified OSLO format: [RCSTBPVKD][0-9]{1,2}\.[0-9]{1,2}\.[0-9]{1,2}
AutomationMacAddressTC	OCTET STRING (SIZE (6))	"1x:"	48-bit string using the hexadecimal display in authorized order, specified by the IEEE standard 802 (overview and architecture, previously IEEE standard 802.1a). With MAC addresses that are shorter than 48 bits, the unused higher eight bits be set to 0. The 16-bit address AAFF, for example should be represented as 00000000AAFF.
AutomationIpAddressTC	OCTET STRING	"1a"	8-bit string for an IPv4 address, an IPv6 address or a DNS name.
AutomationStatusTC	INTEGER { invalid(0), enable(1), disable(2) }	---	Uniform representation of a status value
AutomationTriggerTC	INTEGER { trigger(1), notTriggered(2) }	---	Uniform representation of trigger value

Name	Syntax	Screen display	Description
AutomationFunctionStringTC	OCTET STRING (SIZE (32))	"32a"	The format of function IDs according to IEC 61158-6-10, section 6.2.6.13 IM_Tag_Function. The value should be filled with spaces if it contains less than 32 characters. Non-printable characters are not permitted:
AutomationLocationStringTC	OCTET STRING (SIZE (22))	"22a"	The format of the function IDs according to IEC 61158-6-10, section 6.2.6.14 IM_Tag_Location. The value should be filled with spaces if it contains less than 32 characters. Non-printable characters are not permitted:

4.6 AUTOMATION SYSTEM

Note

This section describes a module that will not be further developed. Support for this module can therefore not be assumed with all products.

This module represents an expansion of the system group of MIB-II and contains the general system description of a SIMATIC NET component. It is assigned to the automationMgmt branch. The structure of this module is divided into the following subareas:

- System identification
- System status
- Parameters for generic control of the system
- Configuration of the SNMP agent
- General events

automationSystemObjects

automationSystemIdent group

The area of system identification is oriented mainly on the I&M definitions for PROFINET and contains the most important parameters of the I&M classes 0 to 2.

Since the character set for files with ASN.1 notation does not contain the ASCII character 248 "degree" (°), this is replaced by the permitted ASCII character 30 "record separator" (^) in the 'DESCRIPTIONS of the objects for location information'.

The following objects are defined in the automationSystemIdent group:

Name OID	Syntax Range of values	Access	Status	Description
automationManufacturerId 1.3.6.1.4.1.4329.6.3.2.1.1.1	Unsigned32 (0..65535)	read only	current	A code that identifies the sender of the component.
automationOrderNumber 1.3.6.1.4.1.4329.6.3.2.1.1.2	AutomationOrderNumberTC	read only	current	Article number of the system
automationSerialNumber 1.3.6.1.4.1.4329.6.3.2.1.1.3	AutomationSerialNumberTC	read only	current	The serial number of the system.
automationHwRevision 1.3.6.1.4.1.4329.6.3.2.1.1.4	AutomationVersion-NumberTC	read only	current	The hardware version of the system
automationSwRevision 1.3.6.1.4.1.4329.6.3.2.1.1.5	AutomationVersion-NumberTC	read only	current	The firmware version of the system

Name OID	Syntax Range of values	Access	Status	Description
automationRevisionCounter 1.3.6.1.4.1.4329.6.3.2.1.1.6	Counter32	read only	current	This counter is always incremented by 1 if a value of automation-IM0Group or automationTM1Group changes. Default setting: 1 For PROFINET IO devices the value 0 is permitted permanently.
automationRevisionDate 1.3.6.1.4.1.4329.6.3.2.1.1.7	DateAndTime	read only	current	The time since the last change to a value of automationRevisionCounter. The value starts with the date of the default configuration. If a system does not support absolute time, it must not support the value. If the system supports the Entity MIB, the value of this entry corresponds to entLastChangeTime.
automationFunctionTag 1.3.6.1.4.1.4329.6.3.2.1.1.8	AutomationFunctionStringTC	read only	current	A code that describes the function of the component within the system. *This value is specified by project planning.* It is comparable with 'sysName' of MIB-II but from an automation perspective.
automationLocationTag 1.3.6.1.4.1.4329.6.3.2.1.1.9	AutomationLocationStringTC	read only	current	A code that describes the location of the installed component within the system. *This value is specified by project planning.* It is comparable with 'sysLocation' of MIB-II but from an automation perspective.
automationGeoLatitude 1.3.6.1.4.1.4329.6.3.2.1.1.10	DisplayString	read/write	current	Geographical latitude of the system displayed in one of the following formats: • DD.DDDDDD^ • DD^MM.MMMM' • DD^MM'SS.SS. A leading '+' or the appended letter 'N' indicates a northern latitude, a leading '-' character or the appended letter 'S' indicates a southern latitude. The geodetic reference system is WGS84. There should only be enough written to achieve the required accuracy. Example: 49.025^, 49^01.5224', 49^01'31.343 N, +49^01'31.343 or 49^01'31.343

Name OID	Syntax Range of values	Access	Status	Description
automationGeoLongitude 1.3.6.1.4.1.4329.6.3.2.1.1.11	DisplayString	read/write	current	Geographical latitude of the system displayed in one of the following formats: • DDD.DDDDD^ • DDD^MM.MMMM' • DDD^MM'SS.SS A leading '+' character or the appended letter 'O' or "E" indicates an eastern latitude, a leading '-' character or the appended letter 'W' indicates a western latitude. The geodetic reference system is WGS84. There should only be enough written to achieve the required accuracy. Example: 8.3498^, 8^20.986', 8^20'59.2 E, +8^20'59.2 or 8^20'59.2
automationGeoHeight 1.3.6.1.4.1.4329.6.3.2.1.1.12	DisplayString	read/write	current	Geographical height of the system in the following format: • dddddd m (higher order zeros are suppressed) A leading '-' character indicates a height below zero. Example: 158 m , - 20 m
automationTimeZoneOffsetHours 1.3.6.1.4.1.4329.6.3.2.1.1.13	Integer32 (-23...23)	read/write	current	Offset (hours) of the local time from the UTC time zone
automationTimeZoneOffsetMinutes 1.3.6.1.4.1.4329.6.3.2.1.1.14	Integer32 (-59...59)	read/write	current	Offset (minutes) of the local time from the UTC time zone
automationSwUser 1.3.6.1.4.1.4329.6.3.2.1.1.15	DisplayString	read only	current	The name of the user who performed the last firmware update. If the user is not known, the value "unknown" can be assigned.
automationSwDate 1.3.6.1.4.1.4329.6.3.2.1.1.16	DateAndTime	read only	current	The time since the last firmware update. The value starts with the date of the default configuration. If a system does not support absolute time, it must not support the value.

automationSystemStatus group

The status area contains objects that represent the operational status of the application and the system.

The following objects are defined in the automationSystemStatus group:

Name OID	Syntax Range of values	Access	Status	Description
automationOperState 1.3.6.1.4.1.4329.6.3.2.1.2.1	INTEGER { ok(0), maintenanceRequired(1), maintenanceDemanded(2), fault(3) }	read only	current	Diagnostics status of the component. **ok(0)** means that the component is working and no errors have occurred. **maintenanceRequired(1)** means that there are currently no problems. Maintenance is, however, recommended the, for example because a service interval has elapsed or the component detected a software update etc. **maintenanceDemanded(2)** means that the component is working, however there are problems that could lead to errors. **fault(3)** means that a fault has occurred on the component. If an error LED is reachable on the front panel, the error display should be synchronized with the error value of automationOperState. If automationOperState indicates an error, the error LED must light up (ON). In all other statuses of automationOperState, the error LED is off.
automationApplicationOperState 1.3.6.1.4.1.4329.6.3.2.1.2.2	INTEGER { noControl(1), run(2), stop(3) }	read only	current	Operating status of the application within the automation system. This status indicates whether the device context part of an automation system is in operation (run or stop) or not (noControl).

automationSystemGeneric group

Some systems allow a restart by SNMP and can reset their configuration to default values. The trigger for such procedures, the counter for restart statistics and similar objects are put together in one group as generic parameters.

The following objects are defined in the automationSystemGeneric group:

Name OID	Syntax Range of values	Access	Status	Description
automationSystemRestart 1.3.6.1.4.1.4329.6.3.2.1.3.1	INTEGER { noOperation(0), coldstart(1), warmstart(2), restartBasicDefaults(3), restartCompleteDefaults(4) }	read/write	current	Restart of the system. Setting the value to 1 causes a cold restart, the value 2 a hot restart. The different reactions to cold restart and hot restart depend on the component and are described in the user manual of the relevant component. If a hot restart is triggered by the values 3 or 4, the settings of the component will be reset to the factory settings. The value 3 means that only the basic parameters are reset, the value 4 causes a complete reset. Which parameters are influenced by this action is described in the manual of the component.
automationPowerUpCount 1.3.6.1.4.1.4329.6.3.2.1.3.3	Counter32	read only	current	Number of system starts
automationResetCounters 1.3.6.1.4.1.4329.6.3.2.1.3.4	AutomationTriggerTC	read/write	current	Resets all the statistical counters of the component. With write access only a trigger value is accepted (and causes a reset by the counter of the system); all other values are rejected.
automationConfigId 1.3.6.1.4.1.4329.6.3.2.1.3.5	OCTET STRING (SIZE(64))	read only	current	Signature of the values of all configuration parameters. The value 0x00 of all bytes shows a temporary status in which no current signature is available, for example while loading the data.
automationConfigUser 1.3.6.1.4.1.4329.6.3.2.1.3.6	DisplayString	read only	current	The name of the user who made the last change to a parameter of the configuration parameter group. If the user is not known, the value "unknown" can be assigned.
automationConfigDate 1.3.6.1.4.1.4329.6.3.2.1.3.7	DateAndTime	read only	current	The time since the last change to a value of the configuration parameter group. The value starts with the date of the default configuration. If a system does not support absolute times, the value must not be supported.

automationSystemIP group

A device capable of SNMP automatically has an IP configuration. Some systems allow the user to modify this IP configuration with SNMP. The objects that allow this are put together in the IP configuration group.

The parameters for configuration of an out-band port are also stored in this group if they exist. If an out-band port exists and has transferred IP parameters, the system can be reached via the in-band IP address and the out-band IP address.

If a system supports VLAN and this influences the configuration of the agent, this group is not suitable for the entire parameter transfer of the agent. Instead the system must make other objects available for the transfer of the VLAN to the IP subnet and for similar functions. It is, however assumed that systems with VLAN also support this.

The objects of this branch will be replaced by the IP address objects of the ipMIB of RFC 4293 that are not dependent on the IP version.

automationSystemNotifications

In this area, the MIB module makes notifications available that indicate changes to the operational system status or changes to the configuration.

Name OID	Objects	Status	Description
automationOper-StateChanged 1.3.6.1.4.1.4329.6.3.2.2.0.1	automationOperState	current	The system triggers this event if the value of automationOperState changes.
automationRevisionChanged 1.3.6.1.4.1.4329.6.3.2.2.0.2	-	current	The system triggers this event if there is a change in the configuration, for example when the hardware configuration is changed or firmware is updated.

4.7 AUTOMATION-TIME

Note

This section describes a module that will not be further developed. Support for this module can therefore not be assumed with all products.

In MIB-II, there is only the sysUpTime object that returns the time ticks since the last system start. For systems within an automation network, this is, however, inadequate. They often request absolute time values, for example to save the time since the last system change. This requires synchronization with a time master. A number of different methods are available in a network for time-of-day synchronization.

The AUTOMATION-TIME MIB module is located under the automationMgmt branch. It provides the central point for displaying the system time and for controlling time-of-day synchronization.

The following structure of the access paths defines the automationTimeMIB module:

Object Identity	OID	Description
automationTimeMIB	1.3.6.1.4.1.4329.6.3.3	Sub branch for the automationTime MIB
automationTimeObjects	1.3.6.1.4.1.4329.6.3.3.1	Sub branch for the automationTime objects
automationTimeNotifications	1.3.6.1.4.1.4329.6.3.3.2	Sub branch for the automationTime messages
automationTimeNotifica-tionsV2	1.3.6.1.4.1.4329.6.3.3.2.0	Sub branch for SNMPv2 messages
automationTimeConformance	1.3.6.1.4.1.4329.6.3.3.3	Sub branch for automationTime conformity definitions

automationTimeObjects

The automationTimeObjects group contains the absolute system time object. It also contains a table that lists all the synchronization mechanisms supported by a component. These mechanisms can be activated and deactivated via an object from this table.

The synchronization protocols and methods are managed in separate MIB modules that are not part of the automationMIB.

The following objects are defined in the automationTimeObjects sub branch:

Name OID	Syntax / Range of values	Access	Status	Description
automationTime 1.3.6.1.4.1.4329.6.3.3.1.1	DateAndTime	read only	current	System time (not the operating time)
automationTimeLastSync 1.3.6.1.4.1.4329.6.3.3.1.2	OBJECT IDENTIFIER	read only	current	A link in the sync table. Identifies the mechanism that was used for the last synchronization.
automationTimeSyncTable 1.3.6.1.4.1.4329.6.3.3.1.3	Sequence of Automation-TimeSyncEntry		current	The table allows control of the sync mechanism.

The following objects represent a row in the automationTimeSync table:

Name OID	Syntax / Range of values	Access	Status	Description
automationTimeSyncIndex 1.3.6.1.4.1.4329.6.3.3.1.3.1.1	Unsigned32	No access	current	Unique value that identifies this entry.
automationTimeSyncName 1.3.6.1.4.1.4329.6.3.3.1.3.1.2	DisplayString	read only	current	Name of the sync mechanism
automationTimeAdminStatus 1.3.6.1.4.1.4329.6.3.3.1.3.1.3	AutomationStatusTC	read/write	current	This mechanism specifies whether the system accepts synchronization events. Only one TimeSync mechanism can be active at any one time. Attempting to activate a second mechanism causes the error message 'badValue'. This means that changing the TimeSync mechanism requires the two following steps: 1. Disabling the active mechanism 2. Enabling the new mechanism

automationTimeNotifications

In this area, the MIB module provides messages indicating changes to automationTime.

The following objects are defined in the automationTimeNotificationsV2 group:

Name OID	Objects	Status	Description
automationTimeChanged 1.3.6.1.4.1.4329.6.3.3.2.0.1	automation-TimeSyncName, automationTime	current	The system triggers this event if the value of automationTime was changed. The event contains the new time of the system and the mechanism used to change the value.

4.8 AUTOMATION-PS

Note

This section describes a module that will not be further developed. Support for this module can therefore not be assumed with all products.

The AUTOMATION-PS MIB module is located below the automationMgmt branch. The network devices of a system are managed in this module.

The following structure of the access paths is defined in the AUTOMATION-PS MIB modules:

Object identity	OID	Description
automationPSMIB	1.3.6.1.4.1.4329.6.3.5	Sub branch for automationPS MIB
automationPSObjects	1.3.6.1.4.1.4329.6.3.5.1	Sub branch for automationPS objects
automationPSNotifications	1.3.6.1.4.1.4329.6.3.5.2	Sub branch for automationPS notifications
automationPSNotificationsV2	1.3.6.1.4.1.4329.6.3.5.2.0	Sub branch for SNMPv2 notifications
automationPSConformance	1.3.6.1.4.1.4329.6.3.5.3	Sub branch for automationPS conformance definitions

automationPSObjects

The automationPSObjects group consists solely of a table with all the PSUs of the system.

The following object is defined in the automationPSObjects sub branch:

Name OID	Syntax / range of values	Status	Description
automationPSTable 1.3.6.1.4.1.4329.6.3.5.1.1	Sequence of AutomationPSEntry	current	A row in the power supply unit table. Entries cannot be created or deleted using SNMP operations.

The following objects form a row in the automationPSTable:

Name OID	Syntax / range of values	Access	Status	Description
automationPSIndex 1.3.6.1.4.1.4329.6.3.5.1.1.1.1	Unsigned32	No access	current	The unique value that identifies this entry.
automationPSStatus 1.3.6.1.4.1.4329.6.3.5.1.1.1.2	INTEGER { inactive(1), active(2) }	read only	current	The status of the corresponding PSU.
automationPSMask 1.3.6.1.4.1.4329.6.3.5.1.1.1.3	INTEGER { notChecked(1), checked(2) }	read/write	current	Enables / disables monitoring of the corresponding PSU.
automationPSVoltageOutput 1.3.6.1.4.1.4329.6.3.5.1.1.1.4	DisplayString	read only	current	The nominal voltage output of the power supply units as shown on the front panel, e.g. 24 VDC, 220 VAC.

automationPSNotifications

In this area, the MIB module provides a message that indicates a status change of one or more power supply units.

The following objects are defined in the automationPSNotificationsV2 group:

Name OID	Objects	Status	Description
automationHwPSStatusChanged 1.3.6.1.4.1.4329.6.3.5.2.0.1	automationPSStatus	current	The system triggers this event if the status of a PSU changes. The VariableBindings contain the status of the PSU affected and the PSIndex.

4.9 AUTOMATION-BOOTDHCP

Note

This section describes a module that will not be further developed. Support for this module can therefore not be assumed with all products.

The AUTOMATION BOOTDHCP module is located below the automationMgmt branch. The bootp/DHCP clients of a system are managed in this module.

The following structure of the access paths defines the automationBootDhcpMIB module:

Object Identity	OID	Description
automationBootDhcpMIB	1.3.6.1.4.1.4329.6.3.7	Sub branch for the automationBootDhcp MIB
automationBootDhcpObjects	1.3.6.1.4.1.4329.6.3.7.1	Sub branch for the automationBootDhcp objects
automationBootDhcpConform-ance	1.3.6.1.4.1.4329.6.3.7.3	Sub branch for the automationBootDhcp conformity defini-tions

automationBootDhcpObjects

The automationBootDhcpObjects group consists solely of a table for all Bootp/DHCP clients of a system.

The following object is defined in the automationBootDhcpObjects sub branch:

mib-2-Name OID	Syntax / range of values	Status	Description
automationBootDhcpTable 1.3.6.1.4.1.4329.6.3.7.1.1	Sequence of Automa-tionBootDhcpEntry	current	Row in a power supply unit table. Entries cannot be created or deleted using SNMP commands.

The automationBootDhcpTable contains a row for each layer 3 interface of the system. The index of each row is the same index as in the ifTable, so that each interface can be assigned uniquely. Each row contains an identifier and a client ID that control the behavior of the client.

The following objects form a row in the automationBootDhcpTable:

mib-2-Name **OID**	**Syntax / range of values**	**Access**	**Status**	**Description**
ifIndex 1.3.6.1.2.1.2.2...	InterfaceIndex	No access	current	The unique value that identifies the entry.
automationBootDhcpControl 1.3.6.1.4.1.4329.6.3.7.1.1.1.1	INTEGER { disabled(0), bootp(1), dhcpViaMa-caddress(2), dhcpViaClientid(3), dhcpViaSys-name(4)}	read/write	current	This object enables or disables BOOTP/DHCP for the interface that belongs to the 'ifIndex' value for this entry.
automationBootDhcpClientId 1.3.6.1.4.1.4329.6.3.7.1.1.1.2	DisplayString	read/write	current	The client ID that the agent should use.

4.10 AUTOMATION-TELNET

Note

This section describes a module that will not be further developed. Support for this module can therefore not be assumed with all products.

The AUTOMATION-TELNET MIB module is located below the automationMgmt branch.

The following structure of the access paths is defined in the automationTelnetMIB module:

Object Identity	OID	Description
automationTelnetMIB	1.3.6.1.4.1.4329.6.3.8	Sub branch for the automationTelnet MIB
automationTelnetObjects	1.3.6.1.4.1.4329.6.3.8.1	Sub branch for the automationTelnet objects
automationTelnetConformance	1.3.6.1.4.1.4329.6.3.8.3	Sub branch for the automationTelnet conformity definitions

automationTelnetObjects

This sub branch contains variables to control the timeout of the Telnet sessions.

The following objects are defined in the automationTelnetObjects sub branch:

Name OID	Syntax / range of values	Access	Status	Description
automationTelnetAdminStatus 1.3.6.1.4.1.4329.6.3.8.1.1	AutomationSta-tusTC	read/write	current	Enables / disables the Telnet unit.
automationTelnetTimeOutStatus 1.3.6.1.4.1.4329.6.3.8.1.2	AutomationSta-tusTC	read/write	current	Enables or disables the timeout for the console session.
automationTelnetTimeOut 1.3.6.1.4.1.4329.6.3.8.1.3	Unsigned32 (60..600)	read/write	current	Timeout value for the console session.

4.11 AUTOMATION-SMTP

Note

This section describes a module that will not be further developed. Support for this module can therefore not be assumed with all products.

The AUTOMATION-SMTP MIB module is located below the automationMgmt branch. Network components are often capable of receiving or sending messages if certain system events occur. This functionality can be configured in automationSmtpMIB.

The following list of access paths is defined for the automationSmtpMIB module:

Object Identity	OID	Description
automationSmtpMIB	1.3.6.1.4.1.4329.6.3.9	Sub branch for the automationSmtp MIB
automationSmtpObjects	1.3.6.1.4.1.4329.6.3.9.1	Sub branch for the automationSmtp objects
automationSmtpConformance	1.3.6.1.4.1.4329.6.3.9.3	Sub branch for the automationSmtp conformity definitions

automationSmtpObjects

This sub branch contains the address of the SMTP server, the corresponding port and the value of the sender box of the e-mail address. Several recipients of the e-mail can be specified in a recipient table. The instance that decides whether or not an event triggers an e-mail is located in a different module.

The following objects are defined in the automationSmtpObjects sub branch:

mib-2-Name OID	Syntax / range of values	Access	Status	Description
automationSmtpSender 1.3.6.1.4.1.4329.6.3.9.1.1	DisplayString	read/write	current	Sender box of the e-mail address
automationSmtpIpAddress 1.3.6.1.4.1.4329.6.3.9.1.2	AutomationIpAd-dressTC	read/write	current	IP address or host name of the SMTP server
automationSmtpPort 1.3.6.1.4.1.4329.6.3.9.1.3	Unsigned32 (1..65535)	read/write	current	TCP port
automationSmtpReceiverTable 1.3.6.1.4.1.4329.6.3.9.1.3	Sequence of Automa-tionSmtpReceiverEntry	No access	current	Table that contains all recipient addresses for e-mails.
automationSmtpReceiverIndex 1.3.6.1.4.1.4329.6.3.9.1.3.1.1	Unsigned32	No access	current	The index of the entries
automationSmtpReceiv-erAddress 1.3.6.1.4.1.4329.6.3.9.1.3.1.2	DisplayString	read/write	current	E-mail address to which messages are sent.

4.12 AUTOMATION-SNTP

Note

This section describes a module that will not be further developed. Support for this module can therefore not be assumed with all products.

The model in the for controlling time-of-day synchronization in the Automation MIB specifies that the control of the synchronization paths should be created in the Automation-Time MIB. The configuration of the access method is in a separate MIB group. One of the possible synchronization methods is SNTP. The parameters of this protocol are managed by using the Automation-SNTP module in the automationMgmt branch. This includes the address and the port of the SNTP server, the time difference between server and client and the test interval of the client.

The following structure of the access path is defined for the automationSntpMIB module.

automationSntpObjects

This sub branch contains the address and the port of the SNTP server, the time difference between server and client and the sampling interval of the client.

The following objects are defined in the automationSntpObjects sub branch:

Name OID	Syntax / range of values	Access	Status	Description
automationSntpIpAddress 1.3.6.1.4.1.4329.6.3.11.1.1	AutomationIpAddressTC	read/write	current	SNTP Server IP Address
automationSntpPortNumber 1.3.6.1.4.1.4329.6.3.11.1.2	Unsigned32	read/write	current	Port of the SNTP server host. The default value is 123.
automationSntpTimeShift 1.3.6.1.4.1.4329.6.3.11.1.3	INTEGER { timeSNTPminus 12h (1),… }	read/write	obsolete	Time difference between SNTP server and the system time is 'obsolete' because the granularity is too coarse. Time change is possible with 'automationTimeZoneOffsetHours' and 'automationTimeZoneOff-setMinutes' of the AUTOMATION-SYSTEM MIB
automationSntpInitSamplingIn-terval 1.3.6.1.4.1.4329.6.3.11.1.4	Unsigned32 (10..10000)	read/write	current	Sampling interval of the SNTP queries in seconds before a reply is received. Only if 'automa-tionSntpIpAddress' is set.
automationSntpSamplingInterval 1.3.6.1.4.1.4329.6.3.11.1.5	Unsigned32 (10..10000)	read/write	current	Sampling interval of the SNTP queries in seconds. Only if 'auto-mationSntpIpAddress' is set and if there was ever a reply from the SNTP server.

LLDP-FMP-Extension

5

5.1 Expansion of the LLDP MIB for the Fiber Monitoring Protocol

OID of the LLDP-FMP-Extension MIB

The MIB objects of the LLDP-FMP-Extension MIB are available under the following OID:

1.0.8802.1.ieee802dot1mibs(1).lldpMIB(2).lldpObjects(1).lldpExtensions(5).lldpXSimaticNet MIB(6939).lldpXSnObjects(1)

How it works

The data exchange in the Fiber Monitoring Protocol is achieved with LLDP-TLVs (Type Length Value). The transmit interval for these TLVs is five seconds. The timeout interval id FMP support is missing is 25 seconds.

Object structure

The LLDP-FMP-Extension MIB has three areas: Objects for the configuration and objects for data of the local device and data of the remote devices.

Object identity	OID	Description
lldpXSnConfig	1.0.8802.1.1.2.1.5.6939.1.1	Objects for the configuration.
lldpXSnLocalData	1.0.8802.1.1.2.1.5.6939.1.2	Data of the local device.
lldpXSnRemoteData	1.0.8802.1.1.2.1.5.6939.1.3	Data of remote devices.

Configuration

This branch is empty. Activate the Monitoring Protocols for every FO port using the object snFOFmpEnable (OID 1.3.6.1.4.1.4329. 6.1.2.100.1.1.4.1.2) from the module automationSimaticNet > snMgmt.

Local data

Object identity	OID	Description
lldpXSnfmpLocPortTable	1.0.8802.1.1.2.1.5.6939.1.2.1	Table for the local FO ports.
lldpXSnfmpLocPortEntry	1.0.8802.1.1.2.1.5.6939.1.2.1.1	Entry for each port. Every entry contains the following data: • Port number • Module temperature • Power supply • TX closed-circuit current • Transmit power • Received power

Data of remote ports

Object identity	OID	Description
lldpXSnfmpRemPortTable	1.0.8802.1.1.2.1.5.6939.1.3.1	Table for the FO ports of remote devices.
lldpXSnfmpRemPortEntry	1.0.8802.1.1.2.1.5.6939.1.3.1.1	Entry for each port. Every entry contains the following data: • Port number • Module temperature • Power supply • TX closed-circuit current • Transmit power • Received power

Saving the MIB file of a device

6

Saving a MIB file using the WBM

If you want to use the private MIB file of a device independently of the device, you must first save this outside the device. This can, for example, be necessary if you want to open the MIB file with a MIB browser.

Follow the steps below to save the private MIB file of the device externally:

1. Open the WBM page System > Load&Save. In the HTTP tab, a table with several entries for the file type is displayed.
2. In the table row for the file type "MIB" click the "Save" button. The dialog box of the operating system for saving a file is opened.
3. Select a suitable directory and click the "Save" button.

Modules and parameters of the Siemens Automation MIB

A

A.1 AUTOMATION-SMI

```
-------------------------------------------------------------------------
-- automationSmi.mib
--
-- SIEMENS AG
-- Industry Sector
--
-- Industry Automation Division Structure of Management Information
--
-- Copyright (c) 2005-2013 Siemens AG
-- All rights reserved.
-- -----------------------------------------------------------------------

AUTOMATION-SMI                  DEFINITIONS ::= BEGIN
IMPORTS
    siemens                     FROM SIEMENS-SMI
    MODULE-IDENTITY,
    OBJECT-IDENTITY             FROM SNMPv2-SMI;
automation                      MODULE-IDENTITY
    LAST-UPDATED                "201306250000Z"
    ORGANIZATION                "Siemens AG"
    CONTACT-INFO                "
                                Siemens AG
                                Industry Sector
                                I IA AS CTO SYA
                                SNMP Automation Registration Authority
                                Postal: Gleiwitzer Strasse 555
                                        Nuremberg-Moorenbrunn
                                        D-90475
                                Tel:    +49 911 895 0
                                E-mail: automation-mib.industry@siemens.com
                                "
    DESCRIPTION                 "
                                The root object identifier of Siemens automation MIB.
                                The MIB module provides the structure of
                                management information of Siemens AG,
                                Industry Sector
                                Industry Automation Division
                                "
  REVISION                      "201306250000Z"
  DESCRIPTION                   "added SitopPower branch"
  REVISION                      "201207270000Z"
  DESCRIPTION                   "Bugfixes and corrections"
  REVISION                      "200811100000Z"
  DESCRIPTION                   "Update the contact information"
  REVISION                      "200806020000Z"
```

```
  DESCRIPTION                   "declaration of siemens node will be imported
                                 now from SIEMENS-SMI"
  REVISION                      "200804290000Z"
  DESCRIPTION                   "declaration of siemens node moved into
                                 declaration of MODULE IDENTITY."
  REVISION                      "200501120000Z"
  DESCRIPTION                   "Initial Version of the MIB module."
  ::= { siemens 6 }
automationProducts              OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "
                                automationProducts is the product specific
                                subtree. The root OIDs of the product
                                subtrees are used as sysObjectID as well.
                                "
automationPlc                   OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "Subtree for SIMATIC S7 PLC products."
    ::= { automationProducts 1 }
automationSimaticNet            OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "Subtree for SIMATIC NET products."
    ::= { automationProducts 2 }

automationMotionControl         OBJECT-IDENTITY
    STATUS                      current
                                Siemens."
    ::= { automationProducts 3 }
automationHmi                   OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "Subtree for SIMATIC HMI products."
    ::= { automationProducts 4 }
automationSitopPower            OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "Subtree for Sitop Power products."
    ::= { automationProducts 5 }
automationModules               OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "
                                This subtree is reserved for
                                administratively assigned
                                OBJECT IDENTIFIERS, i.e. those which
                                are not associated with MIB objects.
                                These could be TEXTUAL CONVENTIONS,
                                module registration and so on.
                                "
    ::= { automation 2 }
automationMgmt                  OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "The subtree which contains the MIB
                                modules to manage a Siemens
                                automation system."
```

```
    ::= { automation 3 }
automationAgentCapability       OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "Subtree for agent profiles."
    ::= { automation 4 }
automationPlcAgentCapability    OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "Subtree for SIMATIC S7 agent profiles."
    ::= { automationAgentCapability 1 }
automationSimaticNetAgentCapability OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "Subtree for SIMATIC NET agent profiles."
    ::= { automationAgentCapability 2 }
automationMotionControlAgentCapability OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "Subtree for motion control agent profiles."
    ::= { automationAgentCapability 3 }
automationHmiAgentCapability    OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "Subtree for HMI agent profiles."
    ::= { automationAgentCapability 4 }
automationSitopPowerCapability  OBJECT-IDENTITY
    STATUS                      current
    DESCRIPTION                 "Subtree for Sitop Power agent profiles."
    ::= { automationAgentCapability 5 }
END
```

A.2 AUTOMATION-SIMATIC-NET

```
-- ------------------------------------------------------------------
-- automationSimaticNet.mib
--
-- SIEMENS AG
-- Industry Sector
--
-- entry into SIMATIC NET product specific subtrees
--
-- Copyright (c) 2005-2013 Siemens AG
-- All rights reserved.
-- ------------------------------------------------------------------
AUTOMATION-SIMATIC-NET-MIB      DEFINITIONS ::= BEGIN
IMPORTS
  automationModules,
  automationSimaticNetAgentCapability,
  automationSimaticNet          FROM AUTOMATION-SMI
  MODULE-IDENTITY,
  OBJECT-IDENTITY               FROM SNMPv2-SMI;
automationSimaticNetModule      MODULE-IDENTITY
  LAST-UPDATED                  "201307030000Z"
  ORGANIZATION                  "Siemens AG"
  CONTACT-INFO                  "
                                 Siemens AG
                                 Industry Sector
                                 I IA AS CTO SYA
                                 SNMP Automation Registration Authority
                                 Postal: Gleiwitzer Strasse 555
                                         Nuremberg-Moorenbrunn
                                         D-90475
                                 Tel:    +49 911 895 0
                                 E-mail: automation-mib.industry@siemens.com
                                 "
  DESCRIPTION                   "
```

```
                                Provides the root OBJECT IDENTIFIER to the product
                                specific subtrees for SIMATIC NET products. The
                                root OIDs of the subtrees are used as sysObjectID
                                values as well.
                                "
  REVISION                      "201307030000Z"
  DESCRIPTION                   "Indentation adjusted."
  REVISION                      "201207270000Z"
  DESCRIPTION                   "Added further SIMATIC NET products."
  REVISION                      "201206010000Z"
  DESCRIPTION                   "Bugfixes and corrections."
  REVISION                      "200811100000Z"
  DESCRIPTION                   "Update the contact information."
  REVISION                      "200501120000Z"
  DESCRIPTION                   "Initial Version of the MIB module."
    ::= { automationModules 3 }
--
-- scalanceX line switches
--
snScalanceX                     OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for ScalanceX products."
  ::= { automationSimaticNet 1 }
snScalanceX200                  OBJECT IDENTIFIER ::= { snScalanceX 2 }
snScalanceX300                  OBJECT IDENTIFIER ::= { snScalanceX 3 }
snScalanceX400                  OBJECT IDENTIFIER ::= { snScalanceX 4 }
snScalanceX500                  OBJECT IDENTIFIER ::= { snScalanceX 5 }
snScalanceXCapability           OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for ScalanceX agent capability statements."
  ::= { automationSimaticNetAgentCapability 1 }
snScalanceX200Capability        OBJECT IDENTIFIER ::= { snScalanceXCapability 2 }
snScalanceX300Capability        OBJECT IDENTIFIER ::= { snScalanceXCapability 3 }
snScalanceX400Capability        OBJECT IDENTIFIER ::= { snScalanceXCapability 4 }
snScalanceX500Capability        OBJECT IDENTIFIER ::= { snScalanceXCapability 5 }
--
```

```
-- scalanceW components
--
snScalanceW                     OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for ScalanceW products."
  ::= { automationSimaticNet 2 }
snScalanceWCapability           OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for ScalanceW agent capability statements."
  ::= { automationSimaticNetAgentCapability 2 }
--
-- scalanceS components
--
snScalanceS                     OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for ScalanceS products."
  ::= { automationSimaticNet 3 }
snScalanceSCapability           OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for ScalanceS agent capability statements."
  ::= { automationSimaticNetAgentCapability 3 }
--
-- scalanceM components
--
snScalanceM                     OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for ScalanceM products."
  ::= { automationSimaticNet 4 }
snScalanceMCapability           OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for ScalanceM agent capability statements."
  ::= { automationSimaticNetAgentCapability 4 }
--
-- S7 CP product line
--
```

```
snS7CP                          OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for S7 CP products."
  ::= { automationSimaticNet 5 }
snS7CP300                       OBJECT IDENTIFIER ::= { snS7CP 1 }
snS7CP400                       OBJECT IDENTIFIER ::= { snS7CP 2 }
snS7CP1200                      OBJECT IDENTIFIER ::= { snS7CP 3 }
snS7CP1500                      OBJECT IDENTIFIER ::= { snS7CP 4 }
snS7CPCapability                OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for S7 CP agent capability statements."
  ::= { automationSimaticNetAgentCapability 5 }
snS7CP300Capability             OBJECT IDENTIFIER ::= { snS7CPCapability 2 }
snS7CP400Capability             OBJECT IDENTIFIER ::= { snS7CPCapability 3 }
snS7CP1200Capability            OBJECT IDENTIFIER ::= { snS7CPCapability 4 }
snS7CP1500Capability            OBJECT IDENTIFIER ::= { snS7CPCapability 5 }
--
-- PC CP product line
--
snPCCP                          OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for PC CP products."
  ::= { automationSimaticNet 6 }
snPCCPCapability                OBJECT-IDENTITY
  STATUS                        current
  DESCRIPTION                   "Subtree for PC CP agent capability statements."
  ::= { automationSimaticNetAgentCapability 6 }
END
```

A.3 AUTOMATION TC (Textual Convention)

```
-- ------------------------------------------------------------------

-- automationTc.mib

--

-- SIEMENS AG

-- Industry Sector

--

-- general textual conventions

--

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-- All rights reserved.

-- ------------------------------------------------------------------

AUTOMATION-TC                   DEFINITIONS ::= BEGIN

IMPORTS

  automationModules             FROM AUTOMATION-SMI

  MODULE-IDENTITY               FROM SNMPv2-SMI

  TEXTUAL-CONVENTION            FROM SNMPv2-TC;

automationTcModule              MODULE-IDENTITY

  LAST-UPDATED                  "201306300000Z"

  ORGANIZATION                  "Siemens AG"

  CONTACT-INFO                  "

                                Siemens AG

                                Industry Sector

                                I IA AS CTO SYA

                                SNMP Automation Registration Authority

                                Postal: Gleiwitzer Strasse 555

                                        Nuremberg-Moorenbrunn

                                        D-90475

                                Tel:    +49 911 895 0

                                E-mail: automation-mib.industry@siemens.com

                                "

  DESCRIPTION                   "Definition of general TEXTUAL CONVENTIONS
                                for Siemens Industry Sector."

  REVISION                      "201306300000Z"

  DESCRIPTION                   "correction of DISPLAY-HINTs."
```

```
    REVISION                    "201209190000Z"
    DESCRIPTION                 "correction of length for AutomationVersionNumberTC."
    REVISION                    "201207270000Z"
    DESCRIPTION                 "Bugfixes and corrections.
                                 Update contact information"
    REVISION                    "200811100000Z"
    DESCRIPTION                 "Update the contact information."
    REVISION                    "200804290000Z"
    DESCRIPTION                 "textual convention for AutomationLocationString
                                 and AutomationFunctionString added according
    REVISION                    "200501120000Z"
    DESCRIPTION                 "Initial Version of the MIB module."
    ::= { automationModules 1 }
    DISPLAY-HINT                "1a"
    STATUS                      current
    DESCRIPTION                 "The format of type identification / order
                                numbers of Siemens I IA products."
    SYNTAX                      OCTET STRING (SIZE (16..32))
    DISPLAY-HINT                "1a"
                                Siemens I IA products."
    SYNTAX                      OCTET STRING (SIZE (32))
    DISPLAY-HINT                "1a"
    STATUS                      current
    DESCRIPTION                 "The version format of Siemens I IA in a
    SYNTAX                      OCTET STRING (SIZE (0..32))
AutomationMacAddressTC          ::= TEXTUAL-CONVENTION
    DISPLAY-HINT                "1x:"
                                formerly IEEE Std 802.1a).
AutomationIpAddressTC           ::= TEXTUAL-CONVENTION
    STATUS                      current
    DESCRIPTION                 "
    SYNTAX                      OCTET STRING
AutomationStatusTC              ::= TEXTUAL-CONVENTION
    STATUS                      current
    DESCRIPTION                 "A uniform representation of status values."
    SYNTAX                      INTEGER { invalid(0), enable(1), disable(2) }
```

```
AutomationTriggerTC             ::= TEXTUAL-CONVENTION
  STATUS                        current
  SYNTAX                        INTEGER { trigger(1), notTriggered(2) }
AutomationFunctionStringTC      ::= TEXTUAL-CONVENTION
  DISPLAY-HINT                  "32a"
  STATUS                        current
  DESCRIPTION                   "
                                The format of function tags according
                                IEC 61158-6-10, chapter 6.2.6.13 IM_Tag_Function.
                                The value shall be filled with blanks
                                if it is shorter than 32.
                                Non-printable characters and
                                control sequences are not allowed.
                                Adopted from DisplayString; see description
                                in SNMPv2-TC for additional information.
  SYNTAX                        OCTET STRING (SIZE (32))
AutomationLocationStringTC      ::= TEXTUAL-CONVENTION
  DISPLAY-HINT                  "22a"
  STATUS                        current
  DESCRIPTION                   "
                                IEC 61158-6-10, chapter 6.2.6.14 IM_Tag_Location.
                                The value shall be filled with blanks
                                Adopted from DisplayString; see description
                                in SNMPv2-TC for additional information.
END
```

A.4 AUTOMATION-SYSTEM

```
-- ------------------------------------------------------------------------

-- automationSystem.mib

--

-- SIEMENS AG

-- Industry Sector

--

-- general object definitions to identify

-- an Industry Automation Division system

--

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-- All rights reserved.

-- ------------------------------------------------------------------------

AUTOMATION-SYSTEM-MIB           DEFINITIONS ::= BEGIN

IMPORTS

    automationMgmt              FROM AUTOMATION-SMI

    AutomationSerialNumberTC,

    AutomationVersionNumberTC,

    AutomationTriggerTC,

    AutomationOrderNumberTC,

    AutomationFunctionStringTC,

    AutomationLocationStringTC  FROM AUTOMATION-TC

    DisplayString,

    DateAndTime                 FROM SNMPv2-TC

    Counter32,

    IpAddress,

    Unsigned32,

    Integer32,

    OBJECT-TYPE,

    NOTIFICATION-TYPE,

    MODULE-IDENTITY             FROM SNMPv2-SMI

    MODULE-COMPLIANCE,

    OBJECT-GROUP,

    NOTIFICATION-GROUP          FROM SNMPv2-CONF;

automationSystemMIB             MODULE-IDENTITY
```

```
LAST-UPDATED                "201308270000Z"
ORGANIZATION                "Siemens AG"
CONTACT-INFO                "
                            Siemens AG
                            Industry Sector
                            I IA AS CTO SYA
                            SNMP Automation Registration Authority
                            Postal: Gleiwitzer Strasse 555
                                    Nuremberg-Moorenbrunn
                                    D-90475
                            Tel:    +49 911 895 0
                            E-mail: automation-mib.industry@siemens.com
                            "
DESCRIPTION                 "
                            Definition of generic management objects
                            which describe a general I IA product.
                            "
REVISION                    "201308270000Z"
DESCRIPTION                 "
                            Assignment of snmp-path for 'automationSwDate' was
                            adjusted.
                            "
REVISION                    "201306250000Z"
DESCRIPTION                 "
                            Added automationSwUser, automationSwDate,
                            automationConfigId, automationConfigUser,
                            automationConfigDate.
                            IpAddress objects are deprecated."
REVISION                    "201207010000Z"
DESCRIPTION                 "time shift added."
REVISION                    "201206010000Z"
DESCRIPTION                 "Bugfixes and corrections according to SPH V1.2."
REVISION                    "200903100000Z"
DESCRIPTION                 "geographical coordinates added."
REVISION                    "200811100000Z"
```

```
  DESCRIPTION                   "Update the contact information."
  REVISION                      "200804290000Z"
  DESCRIPTION                   "Bugfixes, no changes regarding content."
  REVISION                      "200501120000Z"
  DESCRIPTION                   "Initial Version of the MIB module."
  ::= { automationMgmt 2 }
-- ------------------------------------------------------------------------
-- groups of mib module
-- ------------------------------------------------------------------------
automationSystemObjects         OBJECT IDENTIFIER ::= { automationSystemMIB 1 }
automationSystemNotifications   OBJECT IDENTIFIER ::= { automationSystemMIB 2 }
-- ------------------------------------------------------------------------
-- system identification
-- ------------------------------------------------------------------------
automationSystemIdent           OBJECT IDENTIFIER
    ::= { automationSystemObjects 1 }
automationManufacturerId        OBJECT-TYPE
    SYNTAX                      Unsigned32 (0..65535)
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                A code which identifies the vendor of the
                                component (e. g. the specific department
                                or OEM).
                                "
    ::= { automationSystemIdent 1 }
automationOrderNumber           OBJECT-TYPE
    SYNTAX                      AutomationOrderNumberTC
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "The type / order number of the system."
    ::= { automationSystemIdent 2 }
automationSerialNumber          OBJECT-TYPE
    SYNTAX                      AutomationSerialNumberTC
    MAX-ACCESS                  read-only
```

```
    DESCRIPTION                 "The serial number of the system."
    ::= { automationSystemIdent 3 }
automationHwRevision            OBJECT-TYPE
    SYNTAX                      AutomationVersionNumberTC
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "The hardware version of the system."
    ::= { automationSystemIdent 4 }
automationSwRevision            OBJECT-TYPE
    SYNTAX                      AutomationVersionNumberTC
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "The firmware version of the system."
    ::= { automationSystemIdent 5 }
automationRevisionCounter       OBJECT-TYPE
    SYNTAX                      Counter32
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                This value will be incremented every time
                                one of the other values of
                                automationIM0Group or automationIM1Group
                                (cp. conformance statements) changes.
                                The counter starts with 1
                                (default configuration).
                                "
    ::= { automationSystemIdent 6 }
automationRevisionDate          OBJECT-TYPE
    SYNTAX                      DateAndTime
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                The time of the last change of the value of
                                automationRevisionCounter. The value starts
                                with the date of the default configuration.
```

```
                                If a system doesn't support an absolute time
                                it must not support the value
                                (cp. conformance statements).
                                If the system supports the ENTITY-MIB the
                                value of this entry correlates to
                                entLastChangeTime.
                                "
    ::= { automationSystemIdent 7 }
automationFunctionTag           OBJECT-TYPE
    SYNTAX                      AutomationFunctionStringTC
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                A code which describes the function of the
                                component within the plant. This value will
                                be set by the engineering system. It is
                                comparable to the 'sysName'of MIB-II
                                "
    DEFVAL                      {""}
    ::= { automationSystemIdent 8 }
automationLocationTag           OBJECT-TYPE
    SYNTAX                      AutomationLocationStringTC
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                A code which describes the location where
                                the component is installed within the plant.
                                This value will be set by the engineering
                                system. It is comparable to the
                                'sysLocation' of MIB-II but from the
                                automation point of view.
                                "
    DEFVAL                      {""}
    ::= { automationSystemIdent 9 }
automationGeoLatitude           OBJECT-TYPE
```

```
    SYNTAX                      DisplayString
    MAX-ACCESS                  read-write
    STATUS                      current
    DESCRIPTION                 "
                                geographical latitude of the equipment site
                                - DD.DDDDDD^
                                - DD^MM.MMMM'
                                - DD^MM'SS.SS.
                                a leading '+' sign or the trailing letter 'N'
                                a leading '-' sign or the trailing letter 'S'
                                The geodesic reference system is WGS84.
                                Only so many shall be written for fractional
    ::= { automationSystemIdent 10 }
automationGeoLongitude          OBJECT-TYPE
    SYNTAX                      DisplayString
    MAX-ACCESS                  read-write
    STATUS                      current
    DESCRIPTION                 "
                                geographical longitude of the equipment site
                                - DDD.DDDDD^
                                - DDD^MM.MMMM'
                                - DDD^MM'SS.SS
                                'O' or 'E' indicates eastern longitude,
                                a leading '-' sign or the trailing letter 'W'
                                indicates western longitude,
                                The geodesic reference system is WGS84.
                                Only so many shall be written for fractional
                                Examples:  8.3498^,
                                           8^20.986',
                                           8^20'59.2 E,
                                          +8^20'59.2
                                        or 8^20'59.2
                                "
    ::= { automationSystemIdent 11 }
automationGeoHeight             OBJECT-TYPE
```

```
    SYNTAX                      DisplayString
    MAX-ACCESS                  read-write
    DESCRIPTION                 "
                                geographical height of the equipment site
                                - dddddd m (high-order zeros are suppressed)
                                a leading sign '-' indicates a height
                                The geodesic reference system is WGS84.
                                Examples: 158 m, - 20 m
                                "
     ::= { automationSystemIdent 12 }
automationTimeZoneOffsetHours   OBJECT-TYPE
    SYNTAX                      Integer32 (-23..23)
    MAX-ACCESS                  read-write
    STATUS                      current
    DESCRIPTION                 "
                                The offset hours of the time zone group's
                                time zone from UTC.
                                "
     ::= { automationSystemIdent 13 }
automationTimeZoneOffsetMinutes OBJECT-TYPE
    SYNTAX                      Integer32 (-59..59)
    MAX-ACCESS                  read-write
    STATUS                      current
    DESCRIPTION                 "
                                The offset minutes of the time zone group's
                                time zone from UTC.
                                "
     ::= { automationSystemIdent 14 }
automationSwUser                OBJECT-TYPE
    SYNTAX                      DisplayString
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                The name of the user who made the last
                                firmware update.
```

```
                                The value 'unknown' shall be
                                given, if the user is not known.
                                "
    ::= { automationSystemIdent 15 }
automationSwDate                OBJECT-TYPE
    SYNTAX                      DateAndTime
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                The time of the last firmware update.
                                The value starts with the date of the
                                default configuration.
                                If a system doesn't support an absolute time
                                it must not support the value.
                                "
    ::= { automationSystemIdent 16 }
-- ------------------------------------------------------------------------
-- system status
-- ------------------------------------------------------------------------
automationSystemStatus          OBJECT IDENTIFIER
    ::= { automationSystemObjects 2 }
automationOperState             OBJECT-TYPE
    SYNTAX                      INTEGER {
                                ok(0),
                                maintenanceRequired(1),
                                maintenanceDemanded(2),
                                fault(3)
                                }
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                General operational status of the component.
                                ok(0) indicates that the component works,
                                    no errors.
                                maintenanceRequired(1) indicates, that at
```

```
                                    the moment there aren't any problems
                                    but maintenace is required e. g.
                                    because a service interval has expired
                                    or the component determined a software
                                    update and so on.
                                maintenanceDemanded(2) indicates,
                                    that the component works, but there are
                                    problems which could lead to fault
                                    situations.
                                fault(3) indicates a failure condition on
                                    the component.
                                    If a fault-LED is available (on front panel),
                                    the fault-LED indication shall be synchronized
                                    with the fault value of automationOperState.
                                    If the automationOperState signals a fault,
                                    the fault-LED must be lit (ON).
                                    In all other states of automationOperState
                                    the fault-LED is off.
                                "
    ::= { automationSystemStatus 1 }
automationApplicationOperState  OBJECT-TYPE
    SYNTAX                      INTEGER {
                                noControl(1),
                                run(2),
                                stop(3)
                                }
    MAX-ACCESS                  read-only
    STATUS                      current
                                Operating status of the application within the
                                automation system.
                                This status indicates whether the device
                                context is part of an automation system that is
                                in operation (run or stop) or not (no_control).
                                "
    ::= { automationSystemStatus 2 }
```

```
-- ------------------------------------------------------------------------
-- system generics
-- ------------------------------------------------------------------------
automationSystemGeneric         OBJECT IDENTIFIER
    ::= { automationSystemObjects 3 }
automationSystemRestart         OBJECT-TYPE
    SYNTAX                      INTEGER {
                                noOperation(0),
                                coldstart(1),
                                warmstart(2),
                                restartBasicDefaults(3),
                                restartCompleteDefaults(4)
                                }
    MAX-ACCESS                  read-write
    STATUS                      current
    DESCRIPTION                 "
                                Restart the system. Setting the value to 1
                                causes a coldstart, a value of 2 causes a
                                warmstart. The different behaviour of
                                coldstart and warmstart depends on the
                                component and is described in the user
                                manual of the component.
                                If a warmstart is triggered by the values
                                of 3 or 4 the settings of the component will
                                be reseted to factory defaults. The value of
                                3 means that only the basic parameters will
                                be reseted, the value of 4 causes a complete
                                reset. Which parameters are affected by this
                                action is described in the components
                                manual.
                                If write access is not allowed, no matter what reason
                                must be rejected with error 'noSuchName' (SNMPv1
agents) or
                                'notWriteable' (SNMPv2 and SNMPv3 agents)
respectively.
                                "
```

```
    ::= { automationSystemGeneric 1 }
automationPowerUpCount          OBJECT-TYPE
    SYNTAX                      Counter32
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "Number of system starts."
    ::= { automationSystemGeneric 3 }
automationResetCounters         OBJECT-TYPE
    SYNTAX                      AutomationTriggerTC
    MAX-ACCESS                  read-write
    STATUS                      current
    DESCRIPTION                 "
                                Reset all statistic counters of the
                                component. On write access only a value of
                                of the counters of the system), all other
                                values will be rejected.

                                If write access is not allowed, no matter what reason
                                must be rejected with error 'noSuchName' (SNMPv1
agents) or
                                'notWriteable' (SNMPv2 and SNMPv3 agents)
respectively.
                                "
    ::= { automationSystemGeneric 4 }
automationConfigId              OBJECT-TYPE
    SYNTAX                      OCTET STRING(SIZE(64))
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                Signature of all configuration parameter
                                values.
                                The special value of all bytes 0x00 denotes the
                                situation of a temporarily not available
                                signature, what might happen during a
                                configuration download while the signature
                                is under construction.
```

```
                                If the ConfigId cannot be built, no matter what
reason
                                (e.g. incompatibilities between parameter layout and
                                build algorithm, out of resources, ...), get
requestes
                                must be responded with error 'noSuchInstance'.
                                "
    ::= { automationSystemGeneric 5 }
    SYNTAX                      DisplayString
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                The name of the user who made the last
                                change to any parameter of the configuration
                                parameter set. The value 'unknown' shall be
                                given, if the user is not known.
                                "
    ::= { automationSystemGeneric 6 }
automationConfigDate            OBJECT-TYPE
    SYNTAX                      DateAndTime
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                The time of the last change to a parameter
                                of the configuration parameter set.
                                The value starts with the date of the
                                default configuration.
                                If a system doesn't support an absolute time
                                it must not support the value
                                (cp. conformance statements).
                                "
    ::= { automationSystemGeneric 7 }
-- ---------------------------------------------------------------------
-- agent configuration of the system
--
-- Note that if write access is not allowed, no matter what reason (e.g. an active
```

```
-- PROFINET configuration), write requests must be rejected with error 'noSuchName'
-- (SNMPv1 agents) or 'notWriteable' (SNMPv2 and SNMPv3 agents) respectively.
--
-- ------------------------------------------------------------------------
automationSystemIp              OBJECT IDENTIFIER
    ::= { automationSystemObjects 4 }
-- ------------------------------------------------------------------------
-- The objects of this branch have been deprecated in favor of the IP
-- version neutral ip address objects of the ipMIB of RFC 4293
-- ------------------------------------------------------------------------
automationSystemIpAddress       OBJECT-TYPE
    SYNTAX                      IpAddress
    MAX-ACCESS                  read-write
    DESCRIPTION                 "
                                This object contains the IP address of the
                                system (which is used to connect to the SNMP
                                agent, the web entity etc.). If the
                                component features an outbandport, this
                                object contains the inband IP address.
                                "
    DEFVAL                      { '0000'H }
    ::= { automationSystemIp 1 }
automationSystemIpSubnetMask    OBJECT-TYPE
    SYNTAX                      IpAddress
    MAX-ACCESS                  read-write
    STATUS                      deprecated
    DESCRIPTION                 "
                                This object contains the subnet mask of
                                the system (which is used to connect to
                                the SNMP agent, the webentity etc.).
                                If the component features an outbandport,
                                this object contains the inband subnet mask.
                                "
    DEFVAL                      { '0000'H }
    ::= { automationSystemIp 2 }
```

```
automationSystemIpGateway       OBJECT-TYPE
    SYNTAX                      IpAddress
    MAX-ACCESS                  read-write
    STATUS                      deprecated
    DESCRIPTION                 "
                                The default gateway of the system.
    DEFVAL                      { '0000'H }
    ::= { automationSystemIp 3 }

automationSystemOutbandIp       OBJECT-TYPE
    SYNTAX                      IpAddress
    MAX-ACCESS                  read-write
    STATUS                      deprecated
    DESCRIPTION                 "
                                If the system features an outband port, this
                                object contains its IP address.
                                "
    DEFVAL                      { '0000'H }
    ::= { automationSystemIp 4 }
automationSystemOutbandSubnetMask   OBJECT-TYPE
    SYNTAX                      IpAddress
    MAX-ACCESS                  read-write
    STATUS                      deprecated
    DESCRIPTION                 "
                                If the system features an outband port,
                                this object contains its subnet mask.
                                "
    DEFVAL                      { '0000'H }
    ::= { automationSystemIp 5 }
-- ------------------------------------------------------------------------
-- general event definitions
-- ------------------------------------------------------------------------
automationSystemNotificationsV2 OBJECT IDENTIFIER
    ::= { automationSystemNotifications 0 }
automationOperStateChanged      NOTIFICATION-TYPE
```

```
    OBJECTS                     { automationOperState }
    STATUS                      current
    DESCRIPTION                 "The system triggers this event in case the
                                value of automationOperState changed."
    ::= { automationSystemNotificationsV2 1 }

automationRevisionChanged       NOTIFICATION-TYPE
    STATUS                      current
    DESCRIPTION                 "
                                The system triggers this event in case the
                                configuration changed (e. g. the hardware
                                configuration, a firmware update or IP
                                parameter).
                                "
    ::= { automationSystemNotificationsV2 2 }
-- ----------------------------------------------------------------------
-- conformance statements
-- ----------------------------------------------------------------------
--
-- MIB groupings
--
automationSystemGroups          OBJECT IDENTIFIER
    ::= { automationSystemConformance 1 }
automationIM0Group              OBJECT-GROUP
    OBJECTS                     {
                                automationManufacturerId,
                                automationOrderNumber,
                                automationSerialNumber,
                                automationHwRevision,
                                automationSwRevision,
                                automationRevisionCounter
                                }
    STATUS                      current
    DESCRIPTION                 "
                                This group collects the named parameters
```

```
                                according to the referenced guideline.
                                "
    REFERENCE                   "
                                I&M parameters are described in the
                                PROFIBUS Guideline, Profile Guidelines
                                Part 1:
                                Identification & Maintenance Functions,
                                Version 1.2, October 2009
                                "
    ::= { automationSystemGroups 1 }
automationIM1Group              OBJECT-GROUP
    OBJECTS                     {
                                automationFunctionTag,
                                automationLocationTag
                                }
    STATUS                      current
    DESCRIPTION                 "
                                This group collects the named parameters
                                according to the referenced guideline.
                                "
    REFERENCE                   "
                                I&M parameters are described in the
                                PROFIBUS Guideline, Profile Guidelines
                                Part 1:
                                Identification & Maintenance Functions,
                                Version 1.2, October 2009
                                "
    ::= { automationSystemGroups 2 }
automationIM2Group              OBJECT-GROUP
    OBJECTS                     { automationRevisionDate }
    STATUS                      current
    DESCRIPTION                 "
                                This group collects the named parameters
                                according to the referenced guideline.
                                The revision date is only available if
```

```
                                the system supports an absolute time,
                                therefore this group must be only
                                supported if the absolute time is
                                available.
                                "
    REFERENCE                   "
                                I&M parameters are described in the
                                PROFIBUS Guideline, Profile Guidelines
                                Part 1:
                                Identification & Maintenance Functions,
                                Version 1.2, October 2009
                                "
    ::= { automationSystemGroups 3 }
automationStatusGroup           OBJECT-GROUP
    OBJECTS                     { automationOperState,
                                  automationApplicationOperState
    STATUS                      current
    DESCRIPTION                 "Generic status information."
    ::= { automationSystemGroups 4 }
automationRemoteRestartGroup    OBJECT-GROUP
    OBJECTS                     {
                                automationSystemRestart,
                                automationPowerUpCount
                                }
    STATUS                      current
    DESCRIPTION                 "Allows restart via SNMP."
    ::= { automationSystemGroups 5 }
automationResetCounterGroup     OBJECT-GROUP
    OBJECTS                     { automationResetCounters }
    STATUS                      current
    DESCRIPTION                 "Allows reset of all counters."
    ::= { automationSystemGroups 6 }
automationIpGroup               OBJECT-GROUP
    OBJECTS                     {
                                automationSystemIpAddress,
```

```
                                automationSystemIpSubnetMask,
                                automationSystemIpGateway
                                }
    STATUS                      deprecated
    DESCRIPTION                 "IP configuration of the agent."
    ::= { automationSystemGroups 7 }
automationOutbandGroup          OBJECT-GROUP
    OBJECTS                     {
                                automationSystemOutbandIp,
                                automationSystemOutbandSubnetMask
                                }
    STATUS                      deprecated
    DESCRIPTION                 "Configuration of the outband port."
    ::= { automationSystemGroups 8 }
automationStatusEvents          NOTIFICATION-GROUP
    NOTIFICATIONS               { automationOperStateChanged }
    STATUS                      current
    DESCRIPTION                 "Notifications about status changes."
    ::= { automationSystemGroups 9 }
automationConfigurationEvents   NOTIFICATION-GROUP
    NOTIFICATIONS               { automationRevisionChanged }
    STATUS                      current
    DESCRIPTION                 "Notifications about configuration changes."
    ::= { automationSystemGroups 10 }
automationGeoLocation           OBJECT-GROUP
    OBJECTS                     {
                                automationGeoLatitude,
                                automationGeoLongitude,
                                automationGeoHeight
                                }
    STATUS                      current
    DESCRIPTION                 "
                                This group collects the named parameters
                                according to the geographical coordinates.
                                "
```

```
    ::= { automationSystemGroups 11 }
automationGeoLocationTimeShift  OBJECT-GROUP
    OBJECTS                     {
                                automationGeoLatitude,
                                automationGeoLongitude,
                                automationGeoHeight,
                                automationTimeZoneOffsetHours,
                                automationTimeZoneOffsetMinutes
                                }
    STATUS                      current
    DESCRIPTION                 "
                                This group collects the named parameters
                                according to the geographical coordinates
                                and the location dependent time shift.
                                "
    ::= { automationSystemGroups 12 }
automationConfigIdGroup         OBJECT-GROUP
    OBJECTS                     {
                                automationConfigId,
                                automationConfigUser,
                                automationConfigDate
                                }
    STATUS                      current
    DESCRIPTION                 "
                                This group collects the named parameters
                                for the suppport of a config signature.
                                "
    ::= { automationSystemGroups 13 }
automationSwDownloadGroup       OBJECT-GROUP
    OBJECTS                     {
                                automationSwUser,
                                automationSwDate
                                }
    STATUS                      current
    DESCRIPTION                 "
```

```
                                This group collects the named parameters
                                for a firmware download.
                                "
    ::= { automationSystemGroups 14 }
--
--  compliance specifications
--
automationSystemCompliances     OBJECT IDENTIFIER
    ::= { automationSystemConformance 2 }
automationSystemBasicCompliance MODULE-COMPLIANCE
    STATUS                      current
    DESCRIPTION                 "Minimum implementation requirements for all
                                Industry Automation Division systems
    MODULE                      -- compliance to the containing MIB module
    MANDATORY-GROUPS            { automationIM0Group }
    GROUP                       automationIM1Group
    DESCRIPTION                 "Required if the system provides I&M 1."
    GROUP                       automationIM2Group
    DESCRIPTION                 "Required if the system provides I&M 2."
    GROUP                       automationStatusGroup
    DESCRIPTION                 "Required if the system provides a
                                collective status information."
    GROUP                       automationResetCounterGroup
    DESCRIPTION                 "
                                Required for systems which provide a
                                reset of all their counters.
                                "
    ::= { automationSystemCompliances 1 }
automationSystemExtCompliance   MODULE-COMPLIANCE
    STATUS                      deprecated
    DESCRIPTION                 "Extended requirements for
                                Industry Automation Division systems."
    MODULE                      -- compliance to the containing MIB module
    MANDATORY-GROUPS            { automationIM0Group }
    GROUP                       automationIM1Group
```

```
DESCRIPTION             "Required if the system provides I&M 1."
GROUP                   automationIM2Group
DESCRIPTION             "Required if the system provides I&M 2."
GROUP                   automationIpGroup
DESCRIPTION             "Required if the system allows configuring of
                        the IP parameters via SNMP and no other MIBs
                        are implemented which support management of
                        this parameters."
GROUP                   automationOutbandGroup
DESCRIPTION             "Required if the system provides an outband
                        port and management of this port is allowed
                        via SNMP and no other MIBs are implemented
                        which support management of the outband
                        port."
GROUP                   automationRemoteRestartGroup
DESCRIPTION             "Required if restart of the system via
                        SNMP allowed."
GROUP                   automationStatusGroup
DESCRIPTION             "Required if the system provides a
                        collective status information."
GROUP                   automationResetCounterGroup
DESCRIPTION             "Required for systems which provide a
                        reset of all their counters."
GROUP                   automationConfigurationEvents
DESCRIPTION             "Required for systems which provide
                        notifications."
GROUP                   automationStatusEvents
DESCRIPTION             "Required for systems which provide
                        notifications."
GROUP                   automationGeoLocation
DESCRIPTION             "Required for systems which provide
                        geographical coordinates."
GROUP                   automationGeoLocationTimeShift
DESCRIPTION             "Required for systems which provide
                        geographical coordinates and time shift."
```

```
    ::= { automationSystemCompliances 2 }

automationSystemExtCompliance2  MODULE-COMPLIANCE
    STATUS                      current
    DESCRIPTION                 "Extended requirements for
                                Industry Automation Division systems."
    MANDATORY-GROUPS            { automationIM0Group }
    GROUP                       automationIM1Group
    DESCRIPTION                 "Required if the system provides I&M 1."
    DESCRIPTION                 "Required if the system provides I&M 2."
    GROUP                       automationRemoteRestartGroup
    DESCRIPTION                 "Required if restart of the system via
                                SNMP allowed."
    GROUP                       automationStatusGroup
    DESCRIPTION                 "Required if the system provides a
                                collective status information."
    GROUP                       automationResetCounterGroup
    DESCRIPTION                 "Required for systems which provide a
                                reset of all their counters."
    GROUP                       automationConfigurationEvents
    DESCRIPTION                 "Required for systems which provide
                                notifications."
    GROUP                       automationStatusEvents
    DESCRIPTION                 "Required for systems which provide
                                notifications."
    GROUP                       automationGeoLocation
    DESCRIPTION                 "Required for systems which provide
                                geographical coordinates."
    GROUP                       automationGeoLocationTimeShift
    DESCRIPTION                 "Required for systems which provide
                                geographical coordinates and time shift."
    GROUP                       automationConfigIdGroup
    DESCRIPTION                 "Required for systems which provide
                                configuration signatures."
    GROUP                       automationSwDownloadGroup
    DESCRIPTION                 "Required for systems which support
```

```
                                    firmware download."

    ::= { automationSystemCompliances 3 }

END
```

A.5 AUTOMATION-TIME

```
-- ------------------------------------------------------------------------
-- automationTime.mib
--
-- SIEMENS AG
-- Industry Sector
--
-- object definitions to manage the
-- system time and time sync
--
-- Copyright (c) 2005-2013 Siemens AG
-- All rights reserved.
-- ------------------------------------------------------------------------
AUTOMATION-TIME-MIB             DEFINITIONS ::= BEGIN
IMPORTS
    automationMgmt              FROM AUTOMATION-SMI
    AutomationStatusTC          FROM AUTOMATION-TC
    DateAndTime,
    DisplayString               FROM SNMPv2-TC
    Unsigned32,
    OBJECT-TYPE,
    NOTIFICATION-TYPE,
    MODULE-IDENTITY             FROM SNMPv2-SMI
    MODULE-COMPLIANCE,
    OBJECT-GROUP,
    NOTIFICATION-GROUP          FROM SNMPv2-CONF;
automationTimeMIB               MODULE-IDENTITY
  LAST-UPDATED                  "201307030000Z"
  ORGANIZATION                  "Siemens AG"
  CONTACT-INFO                  "
                                Siemens AG
                                Industry Sector
                                I IA AS CTO SYA
                                SNMP Automation Registration Authority
                                Postal: Gleiwitzer Strasse 555
```

```
                                        Nuremberg-Moorenbrunn
                                        D-90475
                                    Tel:    +49 911 895 0
                                    E-mail: automation-mib.industry@siemens.com
                                    "
  DESCRIPTION                       "
                                    Definition of management objects to
                                    display and change the system time
                                    of an automation product and to manage
                                    the sync mechanisms.
                                    "
  REVISION                          "201307030000Z"
  DESCRIPTION                       "Typo corrections."
  REVISION                          "201207270000Z"
  DESCRIPTION                       "Bugfixes and corrections."
  REVISION                          "200811100000Z"
  REVISION                          "200804290000Z"
                                     automationTimeChanged instead
                                    "
  REVISION                          "200511010000Z"
  DESCRIPTION                       "Initial Version of the MIB module."
  ::= { automationMgmt 3 }
-- ------------------------------------------------------------------------
-- groups of mib module
-- ------------------------------------------------------------------------
automationTimeObjects           OBJECT IDENTIFIER ::= { automationTimeMIB 1 }
automationTimeNotifications     OBJECT IDENTIFIER ::= { automationTimeMIB 2 }
automationTimeConformance       OBJECT IDENTIFIER ::= { automationTimeMIB 3 }
-- ------------------------------------------------------------------------
-- time objects
-- ------------------------------------------------------------------------
automationTime                  OBJECT-TYPE
  SYNTAX                        DateAndTime
  MAX-ACCESS                    read-only
  STATUS                        current
```

```
  DESCRIPTION                   "
                                The systems absolute time
                                (not the uptime !).
                                "
  ::= { automationTimeObjects 1 }
automationTimeLastSync          OBJECT-TYPE
  SYNTAX                        OBJECT IDENTIFIER
  MAX-ACCESS                    read-only
  STATUS                        current
  DESCRIPTION                   "
                                A link into the sync table. Identifies the
                                mechanism which was used for the last
                                synchronization.
                                "
  ::= { automationTimeObjects 2 }
automationTimeSyncTable         OBJECT-TYPE
  SYNTAX                        SEQUENCE OF AutomationTimeSyncEntry
  MAX-ACCESS                    not-accessible
  STATUS                        current
  DESCRIPTION                   "
                                The table allows controlling of the sync
                                "
automationTimeSyncEntry         OBJECT-TYPE
  SYNTAX                        AutomationTimeSyncEntry
  MAX-ACCESS                    not-accessible
  STATUS                        current
  DESCRIPTION                   "
                                A row in the time sync table. Each row
                                represents a sync mechanism and contains
                                objects to monitor and control this
                                mechanism.
                                Entries cannot be created or deleted
                                via SNMP operations.
                                "
  INDEX                         { automationTimeSyncIndex }
```

```
  ::= { automationTimeSyncTable 1 }
AutomationTimeSyncEntry ::=     SEQUENCE
  automationTimeSyncIndex       Unsigned32,
  automationTimeSyncName        DisplayString,
  automationTimeAdminStatus     AutomationStatusTC
                                }
automationTimeSyncIndex         OBJECT-TYPE
  SYNTAX                        Unsigned32
  MAX-ACCESS                    not-accessible
  STATUS                        current
  DESCRIPTION                   "
                                The unique value which identifies this
                                entry.
                                "
  ::= { automationTimeSyncEntry 1 }
automationTimeSyncName          OBJECT-TYPE
  SYNTAX                        DisplayString
  MAX-ACCESS                    read-only
  STATUS                        current
  DESCRIPTION                   "The name of the sync mechanism."
  ::= { automationTimeSyncEntry 2 }
automationTimeAdminStatus       OBJECT-TYPE
  SYNTAX                        AutomationStatusTC
  MAX-ACCESS                    read-write
  STATUS                        current
  DESCRIPTION                   "
                                Controls whether the system shall accept If write
                                access is not allowed, no matter what reason must
                                be rejected with error 'noSuchName' (SNMPv1 agents)
                                or 'notWriteable' (SNMPv2 and SNMPv3 agents)
                                respectively.
                                Only one TimeSync mechanism can be active at a time.
                                Changing the TimeSync mechanism thus requires the two
                                steps: disable active mechanism first,
                                then enable new mechanism.
```

```
  ::= { automationTimeSyncEntry 3 }
-- ------------------------------------------------------------------------
-- events
-- ------------------------------------------------------------------------
automationTimeNotificationsV2   OBJECT IDENTIFIER
  ::= { automationTimeNotifications 0 }
automationTimeChanged           NOTIFICATION-TYPE
  OBJECTS                       { automationTimeSyncName, automationTime }
  STATUS                        current
  DESCRIPTION                   "
                                The system triggers this event in case
                                the value of automationTime was changed.
                                The event contains the new time of the
                                system and the mechanism used to change it.
                                "
  ::= { automationTimeNotificationsV2 1 }
-- ------------------------------------------------------------------------
-- conformance statements
-- ------------------------------------------------------------------------
--
-- MIB groupings
--
automationTimeSyncGroups        OBJECT IDENTIFIER
  ::= { automationTimeConformance 1 }
automationTimeInfoGroup         OBJECT-GROUP
  OBJECTS                       { automationTime }
  STATUS                        current
  DESCRIPTION                   "The system time."
  ::= { automationTimeSyncGroups 1 }
automationTimeSyncControlGroup  OBJECT-GROUP
  OBJECTS                       {
                                automationTimeLastSync,
                                automationTimeSyncName,
                                automationTimeAdminStatus
                                }
```

```
  STATUS                        current
  DESCRIPTION                   "Controlling of the time synchronization."
  ::= { automationTimeSyncGroups 2 }
automationTimeSyncEvents        NOTIFICATION-GROUP
  NOTIFICATIONS                 { automationTimeChanged }
  STATUS                        current
  DESCRIPTION                   "Notifications about time changes of
                                 the system."
  ::= { automationTimeSyncGroups 3 }
--
--  compliance specifications
--
automationTimeCompliances       OBJECT IDENTIFIER
    ::= { automationTimeConformance 2 }
automationTimeInfoCompliance    MODULE-COMPLIANCE
  STATUS                        current
  DESCRIPTION                   "Basic requirements, displays only time."
  MODULE                        -- compliance to the containing MIB module
  MANDATORY-GROUPS              { automationTimeInfoGroup }
  ::= { automationTimeCompliances 1 }
automationTimeSyncCompliance    MODULE-COMPLIANCE
  STATUS                        current
  DESCRIPTION                   "
                                Enables controlling of the time
                                synchronization.
                                Support of notifications is required.
                                "
  MODULE                        -- compliance to the containing MIB module
  MANDATORY-GROUPS              {
                                automationTimeInfoGroup,
                                automationTimeSyncControlGroup,
                                automationTimeSyncEvents
                                }
  ::= { automationTimeCompliances 2 }
END
```

A.6 AUTOMATION-PS

```
-- ------------------------------------------------------------------------

-- automationPS.mib

--

-- SIEMENS AG

-- Industry Sector

--

-- object definitions to manage the

-- power supplies of Industry Automation Division

--

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-- All rights reserved.

-- ------------------------------------------------------------------------

AUTOMATION-PS-MIB DEFINITIONS ::= BEGIN

IMPORTS

    automationMgmt              FROM AUTOMATION-SMI

    DisplayString               FROM SNMPv2-TC

    Unsigned32,

    OBJECT-TYPE,

    NOTIFICATION-TYPE,

    MODULE-IDENTITY             FROM SNMPv2-SMI

    MODULE-COMPLIANCE,

    OBJECT-GROUP,

    NOTIFICATION-GROUP          FROM SNMPv2-CONF;

automationPSMIB                 MODULE-IDENTITY

  LAST-UPDATED                  "201307030000Z"

  ORGANIZATION                  "Siemens AG"

  CONTACT-INFO                  "

                                Siemens AG

                                Industry Sector

                                I IA AS CTO SYA

                                SNMP Automation Registration Authority

                                Postal: Gleiwitzer Strasse 555

                                        Nuremberg-Moorenbrunn

                                        D-90475
```

```
                                Tel:    +49 911 895 0
                                E-mail: automation-mib.industry@siemens.com
                                "
  DESCRIPTION                   "
                                Definition of management objects to
                                manage the power supply products.
                                "
  REVISION                      "2013070300000Z"
  DESCRIPTION                   "Typo correction and indentation."
  DESCRIPTION                   "Description for automationPSMask updated."

  REVISION                      "2012072700000Z"
  DESCRIPTION                   "Bugfixes and corrections."
  REVISION                      "2008111000000Z"
  DESCRIPTION                   "Update the contact information."
  REVISION                      "2008042900000Z"
  DESCRIPTION                   "Bugfixes, automationPSIndex not in
                                 automationHwPSStatusChanged anymore."
  REVISION                      "2005110100000Z"
  DESCRIPTION                   "Initial Version of the MIB module."
  ::= { automationMgmt 5 }
-- ------------------------------------------------------------------------
-- groups of mib module
-- ------------------------------------------------------------------------
automationPSObjects             OBJECT IDENTIFIER ::= { automationPSMIB 1 }
automationPSNotifications       OBJECT IDENTIFIER ::= { automationPSMIB 2 }
automationPSConformance         OBJECT IDENTIFIER ::= { automationPSMIB 3 }
-- ------------------------------------------------------------------------
-- status of the power supply units
-- ------------------------------------------------------------------------
automationPSTable               OBJECT-TYPE
    SYNTAX                      SEQUENCE OF AutomationPSEntry
    MAX-ACCESS                  not-accessible
    STATUS                      current
    DESCRIPTION                 "A table which contains information about
```

```
                                the system's power supplies."
    ::= { automationPSObjects 1 }
automationPSEntry               OBJECT-TYPE
    SYNTAX                      AutomationPSEntry
    MAX-ACCESS                  not-accessible
    STATUS                      current
    DESCRIPTION                 "
                                A row in the power supply table. Entries
                                cannot be created or deleted via SNMP
                                operations.
                                "
    INDEX                       { automationPSIndex }
    ::= { automationPSTable 1 }
AutomationPSEntry ::=           SEQUENCE {
    automationPSIndex           Unsigned32,
    automationPSStatus          INTEGER,
    automationPSMask            INTEGER,
    automationPSVoltageOutput   DisplayString
}
automationPSIndex               OBJECT-TYPE
    SYNTAX                      Unsigned32
    MAX-ACCESS                  not-accessible
    STATUS                      current
    DESCRIPTION                 "The unique value which identifies this
    ::= { automationPSEntry 1 }
automationPSStatus              OBJECT-TYPE
    SYNTAX                      INTEGER { inactive(1), active(2) }
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "The status of the corresponding PSU."
    ::= { automationPSEntry 2 }
automationPSMask                OBJECT-TYPE
    SYNTAX                      INTEGER { notChecked(1), checked(2) }
    MAX-ACCESS                  read-write
    STATUS                      current
```

```
    DESCRIPTION                 "
                                Enables or disables monitoring of the
                                corresponding PSU.
                                "
    DEFVAL                      { notChecked }
    ::= { automationPSEntry 3 }
automationPSVoltageOutput       OBJECT-TYPE
    SYNTAX                      DisplayString
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION                 "
                                The nominal voltage output of the
                                power supply as marked at
                                front panel, e. g. DC24V, AC220V
                                "
    ::= { automationPSEntry 4 }
-- ------------------------------------------------------------------------
-- events
-- ------------------------------------------------------------------------
automationPSNotificationsV2     OBJECT IDENTIFIER
    ::= { automationPSNotifications 0 }
automationHwPSStatusChanged     NOTIFICATION-TYPE
    OBJECTS                     { automationPSStatus }
    STATUS                      current
    DESCRIPTION                 "
                                The system triggers this event in case the
                                status of a PSU changes.
                                The variable bindings contain the status
                                of of the affected PSU.
                                "
    ::= { automationPSNotificationsV2 1 }
-- ------------------------------------------------------------------------
-- conformance statements
-- ------------------------------------------------------------------------
--
```

```
-- MIB groupings
--
automationPSGroups              OBJECT IDENTIFIER
    ::= { automationPSConformance 1 }
automationPSInfoGroup           OBJECT-GROUP
    OBJECTS                     {
                                automationPSStatus,
                                automationPSVoltageOutput
                                }
    STATUS                      current
    DESCRIPTION                 "Status and voltage of a PSU."
    ::= { automationPSGroups 1 }
automationPSMonitorGroup        OBJECT-GROUP
    OBJECTS                     { automationPSMask }
    STATUS                      current
    DESCRIPTION                 "Enable monitoring of power supplies."
    ::= { automationPSGroups 2 }
automationPSStatusEvents        NOTIFICATION-GROUP
    NOTIFICATIONS               { automationHwPSStatusChanged }
    STATUS                      current
    DESCRIPTION                 "Notifications about status changes of
                                 the PSUs."
    ::= { automationPSGroups 8 }
--
--  compliance specifications
--
automationPSCompliances         OBJECT IDENTIFIER
    ::= { automationPSConformance 2 }
automationPSInfoCompliance      MODULE-COMPLIANCE
    STATUS                      current
    DESCRIPTION                 "Basic requirements. Contains
                                read-only objects."
    MODULE                      -- compliance to the containing MIB module
    MANDATORY-GROUPS            { automationPSInfoGroup }
    ::= { automationPSCompliances 1 }
```

```
automationPSMonitorCompliance   MODULE-COMPLIANCE
    STATUS                      current
    DESCRIPTION                 "Enables monitoring of power supplies.
                                Support of notifications required."
    MODULE                      -- compliance to the containing MIB module
    MANDATORY-GROUPS            { automationPSInfoGroup,
                                  automationPSMonitorGroup,
                                  automationPSStatusEvents }
    ::= { automationPSCompliances 2 }
END
```

A.7 AUTOMATION-BOOTDHCP

```
-- ------------------------------------------------------------------------------

-- automationBootDhcp.mib

--

-- SIEMENS AG

-- Industry Sector

--

-- BOOTP / DHCP client parameters

--

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-- ------------------------------------------------------------------------------


AUTOMATION-BOOTDHCP-MIB         DEFINITIONS ::= BEGIN

IMPORTS

  automationMgmt                FROM AUTOMATION-SMI

  ifIndex                       FROM IF-MIB

  DisplayString                 FROM SNMPv2-TC

  OBJECT-GROUP,

  MODULE-COMPLIANCE             FROM SNMPv2-CONF

  OBJECT-TYPE,

  MODULE-IDENTITY               FROM SNMPv2-SMI;

automationBootDhcpMIB           MODULE-IDENTITY

  LAST-UPDATED                  "201307030000Z"

  ORGANIZATION                  "Siemens AG"

  CONTACT-INFO                  "

                                Siemens AG

                                Industry Sector

                                I IA AS CTO SYA

                                SNMP Automation Registration Authority

                                Postal: Gleiwitzer Strasse 555

                                        Nuremberg-Moorenbrunn

                                        D-90475

                                Tel:    +49 911 895 0

                                E-mail: automation-mib.industry@siemens.com
```

```
                                "
  DESCRIPTION                   "
                                Definition of management objects to configure
                                BOOTP / DHCP client parameters.
                                "
  REVISION                      "201307030000Z"
  DESCRIPTION                   "Bugfixes and typo corrections."
  REVISION                      "201207270000Z"
  DESCRIPTION                   "Bugfixes and corrections."
  REVISION                      "200811100000Z"
  DESCRIPTION                   "Error corrections of formal faults."
  REVISION                      "200501180000Z"
    ::= { automationMgmt 7 }

-- ------------------------------------------------------------------------
-- object definitions
-- ------------------------------------------------------------------------
automationBootDhcpObjects       OBJECT IDENTIFIER ::= { automationBootDhcpMIB 1 }
automationBootDhcpConformance   OBJECT IDENTIFIER ::= { automationBootDhcpMIB 3 }

automationBootDhcpTable         OBJECT-TYPE
  SYNTAX                        SEQUENCE OF AutomationBootDhcpEntry
  STATUS                        current
  DESCRIPTION                   "
                                A table of client BOOTP/DHCP enable/disable
                                parameters per swEND interface.  There is an entry
                                available for each possible in-band
                                'L2/L3 hybrid VLAN' and/or 'L3 only NIC interface'.
                                "
  ::= { automationBootDhcpObjects 1 }

automationBootDhcpEntry         OBJECT-TYPE
  SYNTAX                        AutomationBootDhcpEntry
  MAX-ACCESS                    not-accessible
  STATUS                        current
```

```
  DESCRIPTION                   "
                                A row in the BOOTP / DHCP table. Entries cannot be
                                created or deleted via SNMP operations.
                                "
  INDEX                         { ifIndex }
  ::= { automationBootDhcpTable 1 }
                                          automationBootDhcpControl     INTEGER,
                                        }
automationBootDhcpControl       OBJECT-TYPE
  SYNTAX                        INTEGER {
                                          disabled(0),
                                          bootp(1),
                                          dhcpViaMacaddress(2),
                                          dhcpViaClientid(3)
                                          dhcpViaSysname(4)
                                        }
  MAX-ACCESS                    read-write
  STATUS                        current
  DESCRIPTION                   "
                                This object enables/disables BOOTP / DHCP for the
                                swEND interface associated with the 'ifIndex'
                                value for this entry.

                                A value of disabled(0) disables both BOOTP and DHCP,
                                dhcp-via-macaddress(2) runs DHCP in a simple mode.
                                The values dhcp-via-clientid(3)and
                                dhcp-via-sysname(4) run DHCP with option client id,
                                the former uses the value of
                                automationBootDhcpClientId as client id,
                                the latter uses sysname as client id.

                                If write access is not allowed, no matter what reason
                                must be rejected with error 'noSuchName'
                                (SNMPv1 agents) or 'notWriteable'
                                (SNMPv2 and SNMPv3 agents) respectively.
```

```
                                "
  ::= { automationBootDhcpEntry 1 }

automationBootDhcpClientId      OBJECT-TYPE
  SYNTAX                        DisplayString
  MAX-ACCESS                    read-write
  STATUS                        current
  DESCRIPTION                   "
                                The client ID the agent shall use.
                                If write access is not allowed, no matter what reason
                                must be rejected with error 'noSuchName'
                                (SNMPv1 agents) or 'notWriteable'
                                (SNMPv2 and SNMPv3 agents) respectively.
                                "
  DEFVAL                        { "" }
  ::= { automationBootDhcpEntry 2 }
-- ------------------------------------------------------------------------------
-- conformance statements
-- ------------------------------------------------------------------------------
automationBootDhcpGroups        OBJECT IDENTIFIER ::= { automationBootDhcpConformance
1 }
automationBootDhcpGroup         OBJECT-GROUP
  OBJECTS                       { automationBootDhcpControl,
automationBootDhcpClientId }
  STATUS                        current
  DESCRIPTION                   "Controlling the BOOTP / DHCP client."
  ::= { automationBootDhcpGroups 1 }
automationBootDhcpCompliances   OBJECT IDENTIFIER ::= { automationBootDhcpConformance
2 }
automationBootDhcpCompliance    MODULE-COMPLIANCE
  STATUS                        current
  DESCRIPTION                   "
                                If controlling of the BOOTP / DHCP client via SNMP
                                is supported the agent must provide all objects of
                                this module.
                                "
```

```
  MODULE                          -- compliance to the containing MIB module
  MANDATORY-GROUPS                { automationBootDhcpGroup }
  ::= { automationBootDhcpCompliances 1 }
END
```

A.8 AUTOMATION-TELNET

```
-- ------------------------------------------------------------------

-- automationTelnet.mib

--

-- SIEMENS AG

-- Industry Sector

--

-- telnet parameters

--

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-- ------------------------------------------------------------------


AUTOMATION-TELNET-MIB           DEFINITIONS ::= BEGIN

IMPORTS

  automationMgmt                FROM AUTOMATION-SMI

  AutomationStatusTC            FROM AUTOMATION-TC

  OBJECT-GROUP,

  MODULE-COMPLIANCE             FROM SNMPv2-CONF

  Unsigned32,

  OBJECT-TYPE,

  MODULE-IDENTITY               FROM SNMPv2-SMI;


automationTelnetMIB             MODULE-IDENTITY

  LAST-UPDATED                  "201307030000Z"

  ORGANIZATION                  "Siemens AG"

  CONTACT-INFO                  "

                                Siemens AG

                                Industry Sector

                                I IA AS CTO SYA

                                SNMP Automation Registration Authority

                                Postal: Gleiwitzer Strasse 555

                                        Nuremberg-Moorenbrunn

                                        D-90475

                                Tel:    +49 911 895 0
```

```
                                E-mail: automation-mib.industry@siemens.com
                                "
  DESCRIPTION                   "
                                Definition of management objects to describe
                                the parameters of the telnet entity.
                                "
  REVISION                      "201307030000Z"
  DESCRIPTION                   "Indentation adjusted."
  REVISION                      "201207270000Z"
  DESCRIPTION                   "Bugfixes and corrections."
  REVISION                      "200811100000Z"
  DESCRIPTION                   "Error corrections of formal faults."
  REVISION                      "200501180000Z"
  DESCRIPTION                   "Initial Version of the MIB module."
  ::= { automationMgmt 8 }
-- ------------------------------------------------------------------------
-- object groups of telnet mib module
-- ------------------------------------------------------------------------
automationTelnetObjects         OBJECT IDENTIFIER ::= { automationTelnetMIB 1 }
automationTelnetConformance     OBJECT IDENTIFIER ::= { automationTelnetMIB 3 }
automationTelnetAdminStatus     OBJECT-TYPE
  SYNTAX                        AutomationStatusTC
  MAX-ACCESS                    read-write
  STATUS                        current
  DESCRIPTION                   "Enables or disables the telnet entity."
  DEFVAL                        { enable }
  ::= { automationTelnetObjects 1 }
automationTelnetTimeOutStatus   OBJECT-TYPE
  SYNTAX                        AutomationStatusTC
  MAX-ACCESS                    read-write
  STATUS                        current
  DESCRIPTION                   "
                                Enables or disables the time out for a console
                                session.
                                "
```

```
  DEFVAL                        { enable }
  ::= { automationTelnetObjects 2 }
automationTelnetTimeOut         OBJECT-TYPE
  SYNTAX                        Unsigned32 (60..600)
  MAX-ACCESS                    read-write
  STATUS                        current
  DESCRIPTION                   "Time out value for the console session."
  DEFVAL                        { 300 }
  ::= { automationTelnetObjects 3 }
-- ------------------------------------------------------------------------
-- conformance statements
-- ------------------------------------------------------------------------
automationTelnetGroups          OBJECT IDENTIFIER ::= { automationTelnetConformance 1
}
automationTelnetGroup           OBJECT-GROUP
  OBJECTS                       {
                                automationTelnetAdminStatus,
                                automationTelnetTimeOutStatus,
                                automationTelnetTimeOut
                                }
  STATUS                        current
  DESCRIPTION                   "Controlling telnet sessions."
  ::= { automationTelnetGroups 1 }
automationTelnetCompliances   OBJECT IDENTIFIER ::= { automationTelnetConformance 2 }
automationTelnetCompliance     MODULE-COMPLIANCE
  STATUS                        current
  DESCRIPTION                  "Requirements for Siemens Industry telnet
                               implementations."
  MODULE                        -- compliance to the containing MIB module
  MANDATORY-GROUPS              { automationTelnetGroup }
  ::= { automationTelnetCompliances 1 }
END
```

A.9 AUTOMATION-SMTP

```
-- ------------------------------------------------------------------

-- automationSmtp.mib

--

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-- Industry Sector

--

-- SMTP parameters

--

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-- ------------------------------------------------------------------


AUTOMATION-SMTP-MIB             DEFINITIONS ::= BEGIN

IMPORTS

  automationMgmt                FROM AUTOMATION-SMI

  AutomationIpAddressTC         FROM AUTOMATION-TC

  DisplayString                 FROM SNMPv2-TC

  OBJECT-GROUP,

  MODULE-COMPLIANCE             FROM SNMPv2-CONF

  Unsigned32,

  OBJECT-TYPE,

  MODULE-IDENTITY               FROM SNMPv2-SMI;


automationSmtpMIB               MODULE-IDENTITY

  LAST-UPDATED                  "201307030000Z"

  ORGANIZATION                  "Siemens AG"

  CONTACT-INFO                  "

                                Siemens AG

                                Industry Sector

                                I IA AS CTO SYA

                                SNMP Automation Registration Authority

                                Postal: Gleiwitzer Strasse 555

                                        Nuremberg-Moorenbrunn

                                        D-90475
```

```
                                Tel:    +49 911 895 0
                                E-mail: automation-mib.industry@siemens.com
                                "
  DESCRIPTION                   "
                                Definition of management objects to describe SMTP
                                "
  REVISION                      "201307030000Z"
  DESCRIPTION                   "Typo corrections."
  REVISION                      "201207270000Z"
  DESCRIPTION                   "Bugfixes and corrections."
  REVISION                      "200811100000Z"
  DESCRIPTION                   "Error corrections of formal faults."
  REVISION                      "200501180000Z"
  DESCRIPTION                   "Initial Version of the MIB module."
  ::= { automationMgmt 9 }
-- ------------------------------------------------------------------------
-- object groups of SMTP mib module
-- ------------------------------------------------------------------------
automationSmtpObjects           OBJECT IDENTIFIER ::= { automationSmtpMIB 1 }
automationSmtpConformance       OBJECT IDENTIFIER ::= { automationSmtpMIB 3 }
automationSmtpSender            OBJECT-TYPE
  SYNTAX                        DisplayString
  MAX-ACCESS                    read-write
  STATUS                        current
  DESCRIPTION                   "First part of the from field in the E-mail address."
  DEFVAL                        { "Not Defined Yet" }
  ::= { automationSmtpObjects 1 }
automationSmtpIpAddress         OBJECT-TYPE
  SYNTAX                        AutomationIpAddressTC
  MAX-ACCESS                    read-write
  STATUS                        current
  DESCRIPTION                   "IP address or host name of SMTP server."
  DEFVAL                        { "0.0.0.0" }
  ::= { automationSmtpObjects 2 }
automationSmtpPort              OBJECT-TYPE
```

```
  SYNTAX                        Unsigned32 (1..65535)
  MAX-ACCESS                    read-write
  STATUS                        current
  DESCRIPTION                   "TCP port to which the SMTP server will listen."
  DEFVAL                        { 25 }
  ::= { automationSmtpObjects 3 }
automationSmtpReceiverTable     OBJECT-TYPE
  SYNTAX                        SEQUENCE OF AutomationSmtpReceiverEntry
  MAX-ACCESS                    not-accessible
  STATUS                        current
  DESCRIPTION                   "
                                A table which contains all receiver addresses
                                "
  ::= { automationSmtpObjects 4 }
automationSmtpReceiverEntry     OBJECT-TYPE
  SYNTAX                        AutomationSmtpReceiverEntry
  MAX-ACCESS                    not-accessible
  STATUS                        current
  DESCRIPTION                   "Each entry contains one address."
  INDEX                         { automationSmtpReceiverIndex }
  ::= { automationSmtpReceiverTable 1 }
AutomationSmtpReceiverEntry ::= SEQUENCE {
                                        automationSmtpReceiverIndex   Unsigned32,
                                        automationSmtpReceiverAddress DisplayString
                                        }
automationSmtpReceiverIndex     OBJECT-TYPE
  SYNTAX                        Unsigned32
  MAX-ACCESS                    not-accessible
  STATUS                        current
  DESCRIPTION                   "The index of the entries."
  ::= { automationSmtpReceiverEntry 1 }
automationSmtpReceiverAddress   OBJECT-TYPE
  SYNTAX                        DisplayString
  MAX-ACCESS                    read-write
  STATUS                        current
```

```
  DESCRIPTION                   "E-mail address to which messages will be sent."
  DEFVAL                        { "Not Defined Yet" }
  ::= { automationSmtpReceiverEntry 2 }
-- ------------------------------------------------------------------------
-- conformance statements
-- ------------------------------------------------------------------------
--
--  object groups
--
automationSmtpGroups            OBJECT IDENTIFIER ::= { automationSmtpConformance 1 }
automationSmtpGroup             OBJECT-GROUP
  OBJECTS                       {
                                automationSmtpSender,
                                automationSmtpIpAddress,
                                automationSmtpPort,
                                automationSmtpReceiverAddress
                                }
  STATUS                        current
  DESCRIPTION                   "Controlling the SMTP entity of the system."
  ::= { automationSmtpGroups 1 }
--
--  compliance specifications
--
automationSmtpCompliances       OBJECT IDENTIFIER ::= { automationSmtpConformance 2 }
automationSmtpCompliance        MODULE-COMPLIANCE
  STATUS                        current
  DESCRIPTION                   "Implementation requirements for SMTP."
  MODULE                        -- compliance to the containing MIB module
  MANDATORY-GROUPS              { automationSmtpGroup }
  ::= { automationSmtpCompliances 1 }
END
```

A.10 AUTOMATION-SNTP

```
-- ------------------------------------------------------------------

-- automationSntp.mib

--

-- SIEMENS AG

-- Industry Sector

--

-- SNTP parameters

--

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-- ------------------------------------------------------------------

AUTOMATION-SNTP-MIB             DEFINITIONS ::= BEGIN

IMPORTS

  automationMgmt                FROM AUTOMATION-SMI

  AutomationIpAddressTC         FROM AUTOMATION-TC

  OBJECT-GROUP,

  MODULE-COMPLIANCE             FROM SNMPv2-CONF

  Unsigned32,

  OBJECT-TYPE,

  MODULE-IDENTITY               FROM SNMPv2-SMI;


automationSntpMIB               MODULE-IDENTITY

  LAST-UPDATED                  "201307030000Z"

  ORGANIZATION                  "Siemens AG"

  CONTACT-INFO                  "

                                Siemens AG

                                Industry Sector

                                SNMP Automation Registration Authority

                                Postal: Gleiwitzer Strasse 555

                                        Nuremberg-Moorenbrunn

                                        D-90475

                                Tel:    +49 911 895 0

                                E-mail: automation-mib.industry@siemens.com

                                "
```

```
  DESCRIPTION                  "
                               Definition of management objects to describe
                               SNTP parameters.
                               "
  DESCRIPTION                  "Indentation adjusted."
  DESCRIPTION                  "automationSntpTimeShift obsoleted."
  REVISION                     "201206010000Z"
  DESCRIPTION                  "Bugfixes and corrections."
  REVISION                     "200811100000Z"
  DESCRIPTION                  "Error corrections of formal faults."
  REVISION                     "200501180000Z"
  DESCRIPTION                  "Initial Version of the MIB module."
  ::= { automationMgmt 11 }
-- ------------------------------------------------------------------------
-- object groups of SNTP mib module
-- ------------------------------------------------------------------------
automationSntpObjects          OBJECT IDENTIFIER ::= { automationSntpMIB 1 }
automationSntpConformance      OBJECT IDENTIFIER ::= { automationSntpMIB 3 }

automationSntpIpAddress        OBJECT-TYPE
  SYNTAX                       AutomationIpAddressTC
  MAX-ACCESS                   read-write
  STATUS                       current
  DESCRIPTION                  "IP Address of the SNTP server (x.y.z.w)."
  DEFVAL                       { "0.0.0.0" }
  ::= { automationSntpObjects 1 }
automationSntpPortNumber       OBJECT-TYPE
  SYNTAX                       Unsigned32
  MAX-ACCESS                   read-write
  STATUS                       current
  DESCRIPTION                  "Port of the SNTP server host. Default value is 123."
  DEFVAL                       { 123 }
  ::= { automationSntpObjects 2 }
automationSntpTimeShift        OBJECT-TYPE
  SYNTAX                       INTEGER {
```

```
                                        timeSNTPminus12h (1),
                                        timeSNTPminus11h (2),
                                        timeSNTPminus10h (3),
                                        timeSNTPminus09h (4),
                                        timeSNTPminus08h (5),
                                        timeSNTPminus07h (6),
                                        timeSNTPminus06h (7),
                                        timeSNTPminus05h (8),
                                        timeSNTPminus04h (9),
                                        timeSNTPminus03h (10),
                                        timeSNTPminus02h (11),
                                        timeSNTPminus01h (12),
                                        timeSNTPplusminus00h (13),
                                        timeSNTPplus01h (14),
                                        timeSNTPplus02h (15),
                                        timeSNTPplus03h (16),
                                        timeSNTPplus04h (17),
                                        timeSNTPplus05h (18),
                                        timeSNTPplus06h (19),
                                        timeSNTPplus07h (20),
                                        timeSNTPplus08h (21),
                                        timeSNTPplus09h (22),
                                        timeSNTPplus10h (23),
                                        timeSNTPplus11h (24),
                                        timeSNTPplus12h (25),
                                        timeSNTPplus13h (26)
                                      }
  MAX-ACCESS                  read-write
  STATUS                      obsolete
  DESCRIPTION                 "
                              Time difference between SNTP server and system time.


                              obsolete because granularity is too coarse.
                              Time shift is available with
'automationTimeZoneOffsetHours'
```

```
                                and 'automationTimeZoneOffsetMinutes' from
AUTOMATION-SYSTEM-MIB,
                                added near geographical information.
                                "
  DEFVAL                        { timeSNTPplusminus00h }
  ::= { automationSntpObjects 3 }
  SYNTAX                            Unsigned32 (10..10000)
  MAX-ACCESS                        read-write
  STATUS                            current
  DESCRIPTION                   "
                                Sampling interval of the SNTP Requests in sec before
                                any response received.
                                Only if the 'automationSntpIpAddress' is set.
                                "
  ::= { automationSntpObjects 4 }
automationSntpSamplingInterval  OBJECT-TYPE
  SYNTAX                        Unsigned32 (10..10000)
  MAX-ACCESS                    read-write
  STATUS                        current
  DESCRIPTION                   "
                                'automationSntpIpAddress' is set and there was a
                                response.
                                "
  DEFVAL                        { 3600 }
  ::= { automationSntpObjects 5 }
-- ------------------------------------------------------------------------
-- conformance statements
-- ------------------------------------------------------------------------
--
--  object groups
--
automationSntpGroups            OBJECT IDENTIFIER ::= { automationSntpConformance 1 }
automationSntpGroup             OBJECT-GROUP
  OBJECTS                       {
                                  automationSntpPortNumber,
```

```
                                    automationSntpTimeShift,
                                    automationSntpInitSamplingInterval,
                                    automationSntpSamplingInterval
                                  }
  STATUS                          obsolete
  DESCRIPTION                     "
                                  Controlling the SNTP entity of the system.
                                  Obsoleted because automationSntpTimeShift
                                  is obsolete now.
                                  "
  ::= { automationSntpGroups 1 }

automationSntpGroupV1             OBJECT-GROUP
  OBJECTS                         {
                                    automationSntpIpAddress,
                                    automationSntpPortNumber,
                                    automationSntpInitSamplingInterval,
                                    automationSntpSamplingInterval
                                  }
  STATUS                          current
  DESCRIPTION                     "
                                  Controlling the SNTP entity of the system
                                  without time shift.
                                  "
  ::= { automationSntpGroups 2 }
--
--  compliance specifications
--
automationSntpCompliances         OBJECT IDENTIFIER ::= { automationSntpConformance 2 }
automationSntpCompliance          MODULE-COMPLIANCE
  STATUS                          obsolete
  DESCRIPTION                     "
                                  Implementation requirements for SNTP.
                                  obsoleted because automationSntpTimeShift
                                  is obsolete now.
```

```
                                "
  MODULE                        -- compliance to the containing MIB module
  MANDATORY-GROUPS              { automationSntpGroup }
  ::= { automationSntpCompliances 1 }

automationSntpComplianceV1      MODULE-COMPLIANCE
  STATUS                        current
  DESCRIPTION                   "Implementation requirements for SNTP."
  MODULE
  MANDATORY-GROUPS              { automationSntpGroupV1 }
  ::= { automationSntpCompliances 2 }
END
```

A.11 LLDP-FMP-Extension

```
-- ------------------------------------------------------------------
-- LLDP-EXT-SN-FMP-MIB.mib
--
-- SIEMENS AG
-- Process Industries and Drives
--
-- LLDP extension for SimaticNet fiber monitoring information
--
-- Copyright (c) 2005-2014 Siemens AG
-- All rights reserved.
-- ------------------------------------------------------------------

LLDP-EXT-SN-FMP-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, Integer32
        FROM SNMPv2-SMI
    MODULE-COMPLIANCE, OBJECT-GROUP
        FROM SNMPv2-CONF
    lldpExtensions, lldpLocPortNum,
    lldpRemTimeMark, lldpRemLocalPortNum, lldpRemIndex
        FROM LLDP-MIB;

lldpXSimaticNetMIB  MODULE-IDENTITY
    LAST-UPDATED    "2014040200000Z"
    ORGANIZATION    "Siemens AG"
    CONTACT-INFO    "
                    Siemens AG
                    Process Industries and Drives
                    PD PA CI R&D SYS
                    Postal: Gleiwitzer Strasse 555
                            Nuremberg-Moorenbrunn
                            D-90475
                            Tel:    +49 911 895 0
                            E-mail: automation-mib.industry@siemens.com
                    "
    DESCRIPTION     "
                    The LLDP Management Information Base extension module for
                    the organizationally defined Simatic Net fiber monitoring
                    protocol (fmp) information.
                    "
  REVISION          "2014040200000Z"
  DESCRIPTION       "Initial Version of the MIB module."
-- OUI for Siemens I IA SC is 6939 (00-1B-1B)
   ::= { lldpExtensions 6939 }

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
--
-- Organizationally Defined Information Extension - Simatic Net FMP
--
```

```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

lldpXSnObjects    OBJECT IDENTIFIER ::= { lldpXSimaticNetMIB 1 }

-- LLDP Simatic Net extension MIB groups
lldpXSnConfig     OBJECT IDENTIFIER ::= { lldpXSnObjects 1 }
lldpXSnLocalData  OBJECT IDENTIFIER ::= { lldpXSnObjects 2 }
lldpXSnRemoteData OBJECT IDENTIFIER ::= { lldpXSnObjects 3 }

-- textual conventions


-------------------------------------------------------------------------------
-- FMP - Configuration
-------------------------------------------------------------------------------

-- the fmp lldp extension is enabled when fmp is enabled
-- there is no further configuration

-------------------------------------------------------------------------------
-- FMP - Local Device Information
-------------------------------------------------------------------------------
---
--- lldpXSnfmpLocPortTable: Fiber Optic Port Local Information Table
---
---
lldpXSnfmpLocPortTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF LldpXSnfmpLocPortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "This table contains one row per fiber optic port of
            information (as a part of the LLDP FMP organizational
            extension) on the local system known to this agent."
    ::= { lldpXSnLocalData 1 }

lldpXSnfmpLocPortEntry OBJECT-TYPE
    SYNTAX      LldpXSnfmpLocPortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "Information about a particular fiber optic port component."
    INDEX   { lldpLocPortNum }
    ::= { lldpXSnfmpLocPortTable 1 }

LldpXSnfmpLocPortEntry ::= SEQUENCE {
              lldpXSnfmpLocPortTemperature          Integer32,
              lldpXSnfmpLocPortSupplyVoltage        Integer32,
              lldpXSnfmpLocPortBiasCurrent          Integer32,
              lldpXSnfmpLocPortTxPower              Integer32,
              lldpXSnfmpLocPortRxPower              Integer32
}

lldpXSnfmpLocPortTemperature OBJECT-TYPE
    SYNTAX      Integer32(-32768..32767)
 MAX-ACCESS  read-only
```

```
    STATUS      current
    DESCRIPTION "Internally measured module temperature in increments of 1/256
                 degree Celsius in the range: -128C to +128C"
    REFERENCE   "SFF-8472 (Rev. 11.3), Table 3.17"
    ::= { lldpXSnfmpLocPortEntry 1 }

lldpXSnfmpLocPortSupplyVoltage  OBJECT-TYPE
    SYNTAX      Integer32(0..65535)
 MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "Internally measured supply voltage in increments of 100 uVolt
                 in the range: 0 to +6,55V"
    REFERENCE   "SFF-8472 (Rev. 11.3), Table 3.17"
    ::= { lldpXSnfmpLocPortEntry 2 }

lldpXSnfmpLocPortBiasCurrent OBJECT-TYPE
    SYNTAX      Integer32(0..65535)
 MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "Internally measured TX bias current in increments of 2 uA
                 in the range: 0 to 131mA"
    REFERENCE   "SFF-8472 (Rev. 11.3), Table 3.17"
    ::= { lldpXSnfmpLocPortEntry 3 }

lldpXSnfmpLocPortTxPower  OBJECT-TYPE
    SYNTAX      Integer32(0..65535)
 MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "Measured TX output power in increments of 0,1 uW in the
                 range: 0 to 6,5535mW (-40 to +8,2dBm)"
    REFERENCE   "SFF-8472 (Rev. 11.3), Table 3.17"
    ::= { lldpXSnfmpLocPortEntry 4 }

lldpXSnfmpLocPortRxPower  OBJECT-TYPE
    SYNTAX      Integer32(0..65535)
 MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "Measured RX input power in increments of 0,1 uW in the
                 range: 0 to 6,5535mW (-40 to +8,2dBm)"
    REFERENCE   "SFF-8472 (Rev. 11.3), Table 3.17"
    ::= { lldpXSnfmpLocPortEntry 5 }

--------------------------------------------------------------------------------
-- FMP - Remote Devices Information
--------------------------------------------------------------------------------
---
---
--- lldpXSnfmpRemTable: Fiber Optic Port Remote Information Table
---
---
lldpXSnfmpRemTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF LldpXSnfmpRemEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
```

```
            "This table contains one row per fiber optic port of
            information (as a part of the LLDP FMP organizational
            extension) on the remote system known to this agent."
    ::= { lldpXSnRemoteData 1 }

lldpXSnfmpRemEntry OBJECT-TYPE
    SYNTAX      LldpXSnfmpRemEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "Information about a particular fiber optic connection."
    INDEX   { lldpRemTimeMark,
              lldpRemLocalPortNum,
              lldpRemIndex }
    ::= { lldpXSnfmpRemTable 1 }

LldpXSnfmpRemEntry ::= SEQUENCE {
              lldpXSnfmpRemPortTemperature          Integer32,
              lldpXSnfmpRemPortSupplyVoltage        Integer32,
              lldpXSnfmpRemPortBiasCurrent          Integer32,
              lldpXSnfmpRemPortTxPower              Integer32,
              lldpXSnfmpRemPortRxPower              Integer32
}

lldpXSnfmpRemPortTemperature OBJECT-TYPE
    SYNTAX      Integer32(-32768..32767)
 MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "Internally measured module temperature on the given port
                 associated with the remote system in increments of 1/256
                 degree Celsius in the range: -128C to +128C"
    REFERENCE   "SFF-8472 (Rev. 11.3), Table 3.17"
    ::= { lldpXSnfmpRemEntry 1 }

lldpXSnfmpRemPortSupplyVoltage  OBJECT-TYPE
    SYNTAX      Integer32(0..65535)
 MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "Internally measured supply voltage on the given port
                 associated with the remote system in increments of 100 uVolt
                 in the range: 0 to +6,55V"
    REFERENCE   "SFF-8472 (Rev. 11.3), Table 3.17"
    ::= { lldpXSnfmpRemEntry 2 }

lldpXSnfmpRemPortBiasCurrent OBJECT-TYPE
    SYNTAX      Integer32(0..65535)
 MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "Internally measured TX bias current on the given port
                 associated with the remote system in increments of 2 uA
                 in the range: 0 to 131mA"
    REFERENCE   "SFF-8472 (Rev. 11.3), Table 3.17"
    ::= { lldpXSnfmpRemEntry 3 }
```

```
lldpXSnfmpRemPortTxPower  OBJECT-TYPE
    SYNTAX      Integer32(0..65535)
 MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "Measured TX output power on the given port associated
                 with the remote system in increments of 0,1 uW in the
                 range: 0 to 6,5535mW (-40 to +8,2dBm)"
    REFERENCE   "SFF-8472 (Rev. 11.3), Table 3.17"
    ::= { lldpXSnfmpRemEntry 4 }

lldpXSnfmpRemPortRxPower  OBJECT-TYPE
    SYNTAX      Integer32(0..65535)
 MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION "Measured RX input power on the given port associated
                 with the remote system in increments of 0,1 uW in the
                 range: 0 to 6,5535mW (-40 to +8,2dBm)"
    REFERENCE   "SFF-8472 (Rev. 11.3), Table 3.17"
    ::= { lldpXSnfmpRemEntry 5 }


-- ------------------------------------------------------------------------
-- Conformance Information
-- ------------------------------------------------------------------------
lldpXSnConformance OBJECT IDENTIFIER ::= { lldpXSimaticNetMIB 2 }
lldpXSnCompliances OBJECT IDENTIFIER ::= { lldpXSnConformance 1 }
lldpXSnGroups      OBJECT IDENTIFIER ::= { lldpXSnConformance 2 }

-- compliance statements

lldpXSnfmpCompliance MODULE-COMPLIANCE
    STATUS  current
    DESCRIPTION
            "The compliance statement for SNMP entities which implement
            the LLDP Simatic Net FMP organizational extension MIB."
    MODULE  -- this module
        MANDATORY-GROUPS { lldpXSnfmpLocSysGroup,
                           lldpXSnfmpRemSysGroup
        }
    ::= { lldpXSnCompliances 1 }

-- MIB groupings

lldpXSnfmpLocSysGroup  OBJECT-GROUP
    OBJECTS {
        lldpXSnfmpLocPortTemperature,
        lldpXSnfmpLocPortSupplyVoltage,
        lldpXSnfmpLocPortBiasCurrent,
        lldpXSnfmpLocPortTxPower,
        lldpXSnfmpLocPortRxPower
    }
    STATUS  current
    DESCRIPTION
            "The collection of objects which are used to represent LLDP
            FMP organizational extension Local Device Information.
```

```
            This group is mandatory for agents which implement the
            LLDP Simatic Net FMP organizational extension."
    ::= { lldpXSnGroups 1 }

lldpXSnfmpRemSysGroup  OBJECT-GROUP
    OBJECTS {
        lldpXSnfmpRemPortTemperature,
        lldpXSnfmpRemPortSupplyVoltage,
        lldpXSnfmpRemPortBiasCurrent,
        lldpXSnfmpRemPortTxPower,
        lldpXSnfmpRemPortRxPower
    }
    STATUS  current
    DESCRIPTION
            "The collection of objects which are used to represent LLDP
            FMP organizational extension Remote Device Information.
            This group is mandatory for agents which implement the
            LLDP Simatic Net FMP organizational extension."
    ::= { lldpXSnGroups 2 }

END
```

Requests for Comments (RFCs) B

SNMPv1 was specified in 1988 in the following RFCs:

- RFC 1155 - Structure and Identification of Management Information for TCP/IP-based Internets
- RFC 1156 - Management Information Base for Network Management of TCP/IP-based Internets
- RFC 1157 - A Simple Network Management Protocol
- RFC 1212 - Concise MIB Definitions

SNMPv2c was specified by the following RFCs:

- RFC 1901 - Introduction to Community-based SNMPv2
- RFC 1905 - Protocol Operations for version 2 of the Simple Network Management Protocol
- RFC 1906 - Transport Mappings for version 2 of the Simple Network Management Protocol

SNMPv3 was specified by the following RFCs:

- RFC 3410 - Introduction and Applicability Statements for Internet-Standard Management Framework
- RFC 3411 - An Architecture for Describing Simple Network Management Protocol
- RFC 3412 - Message Processing and Dispatching for the Simple Network Management Protocol
- RFC 3413 - Simple Network Management Protocol Applications
- RFC 3414 - User-based Security Model (USM) for version 3 of the Simple Network Management Protocol
- RFC 3415 - View-based Access Control Model (VACM) for the Simple Network Management Protocol
- RFC 3416 - Version 2 of the Protocol Operations for the Simple Network Management Protocol
- RFC 3417 - Transport Mappings for the Simple Network Management Protocol
- RFC 3418 - Management Information Base (MIB) for the Simple Network Management Protocol

Glossary

Management Information Base

→ *MIB*

MIB

Management Information Base

Standardized data structure written in a language not dependent on the target system. Elements of this data structure are known as MIB objects. Is used for example by SNMP

MIB browser

Program for displaying MIB objects. Is normally included in network management applications.

MIB variable

Placeholder for a scalar value or a value defined as a string that is read out of or written to the MIB using SNMP.

Object Identifier

→ *OID*

OID

Object Identifier

Describes a unique path through the hierarchical MIB structure to the relevant MIB object.

SMI

Structure of Management Information

A definition for the presentation of the data transferred using SNMP based on Abstract Syntax Notation One (ASN1). SMI describes the syntax of the managed objects and their names and coding.

SNMP

UDP-based open network management protocol for monitoring, diagnostics, control and administration of networks.

SNMP agent

Software installed on a managed device that can detect and signal the status of the device. At the request of a manager, the software can also change values on the device.

SNMP manager

Requests information about the connected network components and manages it. The SNMP manager can change some values on SNMP agents with write access (SET datagram).

Structure of Management Information

→ *SMI*

VACM

Viewbased Access Control Model

Defines views with access rights to the object tree that can be assigned to users.

The SNMPv1/v2 read/write community represents 2 views with read or write permission.

Viewbased Access Control Model

→ *VACM*

WBM

Web Based Management

Web pages integrated in SIMATIC NET devices for configuration and diagnostics using a Web browser. Entries are sent to the device using HTTP or HTTPS and passed on to the user by the device.

Web Based Management

→ *WBM*

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