SIEMENS

SIMATIC

Process Control System PCS 7 Network Diagnostics with the SNMP OPC Server

Function Manual

Safety Guidelines

This manual contains notices intended to ensure personal safety, as well as to protect the products and connected equipment against damage. These notices are highlighted by the symbols shown below and graded according to severity by the following texts:

Danger
indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

Warning
indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

Caution
indicates that minor personal injury can result if proper precautions are not taken.

Caution
indicates that property damage can result if proper precautions are not taken.

Notice
draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

Qualified Personnel

Only **qualified personnel** should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Correct Usage

Note the following:

Warning
This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

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Preface

Purpose of the Manual

This manual informs you of the basic functions and most important configurations when using the SNMP OPC server with the process control system SIMATIC PCS 7. The necessary steps in configuration in all required modules of the process control system PCS 7 are introduced. You should pay particular attention to the conditions that relate specifically to PCS 7 in Chapter 2.

If information relates directly to handling individual components, we will refer you to the manuals of the products where you will find more detailed information.

Required Experience

To understand the manual, you require a working knowledge of automation engineering and should be familiar with the basics of PCS 7. You also require knowledge of working with computers or PC-type tools (for example programming devices) with the Windows 2000 operating system.
The basics of working with PCS 7 are explained in the Configuration Manual and in Getting Started.

Validity of the Manual

The manual is valid for the software package SIMATIC PCS 7 V6.0.

Further Documentation and Sources of Information

You will find further information on the topics of OPC and SNMP and on working with the individual components in the following documentation and in the WinCC Information System. The Manual CD "Process Control System PCS 7 V6.0, Electronic Manuals also contains detailed information.

Manual	Content
Getting Started Process Control System PCS 7; Part 1 - Newcomers	Part 1: Creating Projects Working with the CFC Editor Working with the Import/Export Assistant Working with the SFC Editor Compiling, Downloading and Testing Working with the Operator Station
Configuration Manual Process Control System PCS 7; Engineering System	Basics of PCS 7 Creating Projects Configuring Hardware Configuring Networks
Configuration Manual Process Control System PCS 7; Operator Station.	Configuring SIMATIC Connections Interconnecting OS Blocks Configuring an Operator Station Compiling an OS Installation Guidelines
Configuration Manual WinCC	Getting Started How WinCC Redundancy Works User Archives Creating a Sample Project "Project_Redundancy_Server" Description of WinCC Projects Server Project
Manual WinCC Hardware Options, Part 3 Redundancy	Structure of a Redundant WinCC System How WinCC Redundancy Works Configuring the OS Server Pair Guidelines for Setting Up a Redundant System Entering the Servers in Windows 2000
Manual SIMATIC NET Commissioning PC Stations - Instructions and Quick Start	SIMATIC PC – Configuring Stations Configuring the OPC Server SNMP Communication with OPC
SIMATIC NET Industrial Ethernet OSM/ESM Network Management User Manual	OSM/ESM Functions Web Based Management

Guide to the Manual

This manual is divided into the following topics.

- Chapter 1 explains the basics of the SNMP OPC server.

- Chapter 2 describes the integration of the SNMP OPC servers in PCS 7.

- Chapter 3 describes the configurations of the various components of the SNMP OPC server in PCS 7.

- Chapters 4 and 5 provide you with examples of settings on an OSM/ESM and for testing and diagnostics.

- Chapter 6 lists the most commonly required Variables of the OSM/ESM family.

- The glossary contains terminology important for understanding this documentation.

- The index helps you to locate text passages with important key words.

Further Support

If you have questions about the use of the products described in the manual, and you cannot find the answers here, please contact your Siemens representative in your local Siemens office.

You will find your contact person at:

http://www.siemens.com/automation/partner

Training Center

To familiarize you with the Process Control System SIMATIC PCS 7 and the S7 programmable controllers, we offer a range of courses. Please contact your regional training center or the main training center in D 90327 Nuremberg.

Phone: +49 (911) 895-3200.

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The languages of the SIMATIC Hotlines and the authorization hotline are generally German and English.		

Service & Support on the Internet

In addition to our documentation services, you can also make use of all our knowledge on the Internet.

www.siemens.de/snmp-opc-server

Here, you will find:

- The Newsletter that keeps you constantly up to date with the latest information on the products you use.

- The documents you need using our Search engine in Service & Support.

- Examples and applications, in particular a complete WinCC example.

- A forum in which users and specialists exchange worldwide experience.

- Your local representative for Automation & Drives.

- Information on on-site service, repair and spares. You will find far more in "Services".

Contents

1 Basics of the SNMP OPC Server

1.1 Motivation for the Use of the SNMP OPC Server

The SNMP OPC server makes data available for the diagnostics of TCP/IP networks.

Errors and faults and even the failure of the Ethernet plant network can be detected early and downtimes reduced or even prevented.

This increases the reliability and improves the availability of your plant.
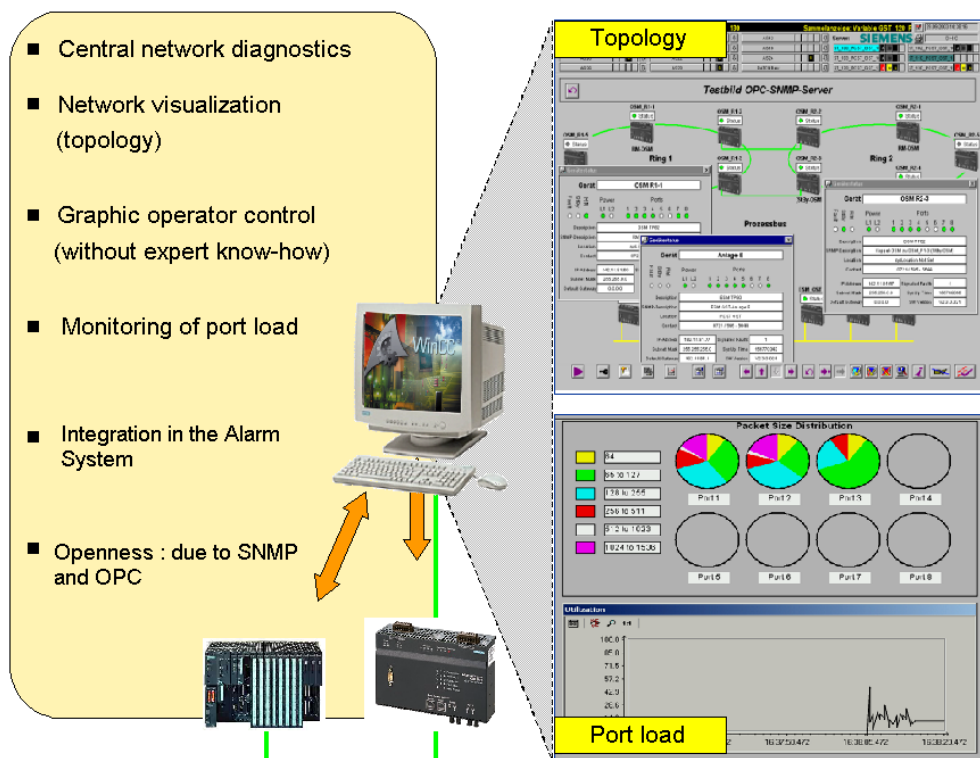
SNMP (Simple Network Management Protocol) is a protocol specially designed to administer TCP/IP networks and has been used for years in the IT world for diagnostics in TCP/IP networks. Switches such as the OSM/ESM also support SNMP. The network components and/or DTEs in Ethernet make their status available with the **SNMP OPC server**.

Apart from detailed diagnostics of SNMP-enabled devices, simple status monitoring of IP devices can be integrated into your plant concept. This means that in addition to the existing system and process diagnostics, diagnostics of the complete IP network infrastructure can be integrated.

The visualization of this information (represented as information in topological and/or table form) can be individually designed and adapted to the particular requirements of the customer plant.

Apart from simple device diagnostics, detailed information such as the status monitoring of redundant network structures (for example, an OSM ring) or port load can be indicated depending on the user's requirements.

More detailed information (for example application samples, FAQs and white paper) is available from the following Web site www.siemens.de/snmp-opc-server

1.2 Functional Description of the SNMP OPC Server

Using the SNMP OPC server, SNMP-enabled network components and IP devices such as the SIMATIC NET OSM / ESM can also be monitored in plants. The SNMP OPC server adopts the role of translator of SNMP on the OPC interface of your PCS 7 application. The device information can be read and to some extent also written. This allows diagnostics of individual devices and even the complete network infrastructure as well as the control (only with write access) of device properties.

The SNMP OPC server also includes a MIB compiler with which other SNMP-enabled devices can be integrated at a later time. Using the MIB compiler, existing device profiles can be adapted and new device profiles created.

A device profile describes the range of variables of a device, for example OSM, that can be mapped on the OPC server. Only variables included in the device profile can be integrated in your application.

SIMATIC devices that have special SNMP agents, such as switches (OSM, ESM, ELS) and Industrial Ethernet communications processors CP 1613 and the CPs 343-1 /443-1 are already included with their device profiles. Devices with an IP address but without an SNMP agent can be monitored using the ping mechanism. The user can add device information such as a contact person, location and device description.

All SNMP-enabled devices provide a certain range of standardized and partly device-specific variables (see Section 6) by means of an SNMP agent. The data exchange between an SNMP client, for example the SNMP OPC server, and its assigned agents (for example OSM) generally takes place within a certain cycle. The range of variables and the cycle time is generally specified in the configuration. The agents do, however, have the capability of reporting certain events such as the failure of a port to the SNMP OPC server unsolicited using an SNMP trap.

Cyclically queried SNMP variables are accessible to the OPC client application (for example PCS 7) over the OPC and Data Access interface. Acyclic data of the network components resulting from SNMP traps are mapped both on the Data Access and on the OPC Event interface. OPC client applications that do not yet support the "Alarms and Events" OPC Standard can therefore also evaluate SNMP traps.

Note

The use of SNMP traps or OPC events is optional. Generally, the information transferred with traps is polled using SNMP get requests. As default, WinCC makes OPC Data Access available for this.

2 PCS 7 Integration of the SNMP OPC Server

The following information relates to OSM/ESM since these are the only devices currently released for PCS 7 V6.0 SP3.

2.1 Runtime Model

The SNMP OPC server runs on an OS server. The SNMP interface is the interface to the network. This is included in the standard components of Windows 2000. If you only use OPC Data Access, no additional operating system functionality needs to be installed.

The following schematic shows the configuration of the SNMP OPC server on one or more OS servers:
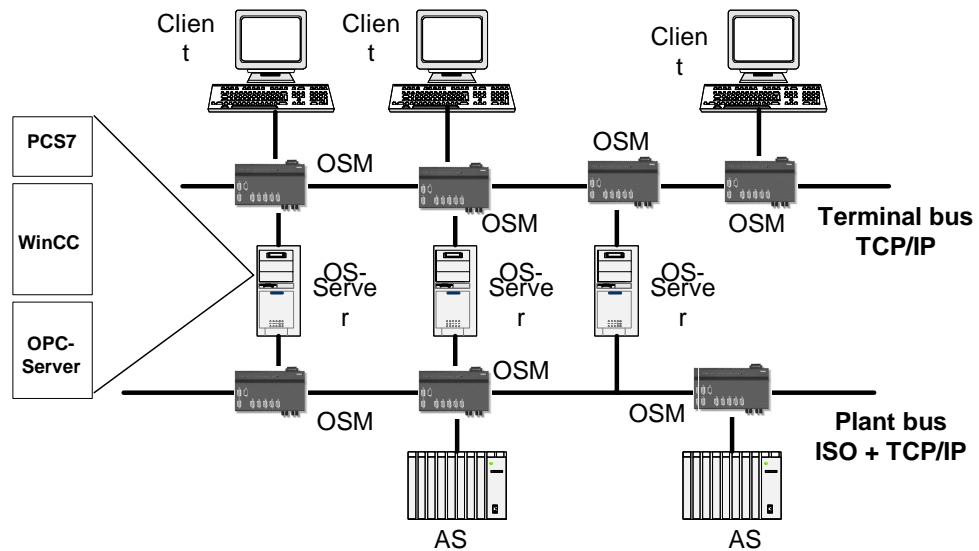
Communication with the SNMP-enabled devices is over IP and Ethernet. This means that the devices must also be reachable over IP. This can be checked quickly, for example with a "ping" from the server.

The SNMP-enabled devices such as the OSM/ESM must be assigned an IP address to use SNMP. This is possible with all devices using the following mechanisms:

- RS-232 terminal

- BOOTP

and as of firmware version 2.3.0 also with

- DHCP server

- PST Tool (see download www4.ad.siemens.de/view/cs/en/14929629)

- STEP7/NCM PC

When using the SNMP OPC server, make sure that the IP address configured in PCS 7 and the existing online IP address match.

Note

To monitor the Ethernet switches OSM/ESM, the OS server on which the SNMP OPC server runs must be capable of TCP/IP not only on the terminal bus but also on the plant bus. Since the ISO protocol is used for communication on the network adapter (for example CP 1613) of the plant bus in PCS 7 plants, a separate network adapter must be planned on the OS for communication over the TCP/IP protocol on the plant bus to avoid mixed operation of the network protocols on one adapter.

In total, the OS server therefore requires three network adapters: Apart from the network adapter for the plant bus (for example a CP 1613), a network adapter for TCP/IP communication on the terminal bus and a network adapter for monitoring the OSM/ESM on the plant bus must be installed.

The interface of the SNMP OPC server to PCS 7 is the OPC client channel of the WinCC data manager. The SNMP variables are therefore maintained in the data management of the data manager and can be further processed with WinCC tools.

2.2   Configuring

To use the SNMP OPC server in the PCS 7 runtime environment described above, it must be configured in terms of the network configuration, device profile, and WinCC integration in the engineering phase:

Initially, the IP addresses of the SNMP-enabled devices must be configured for the SNMP OPC server with STEP7/NCM PC and the appropriate profile selected. The device profile that describes the range of SNMP variables already exists for the OSM/ESM in the configuration.

- There is exactly one entry for each SNMP-enabled device (for example OSM/ESM) in the properties dialog of the configuration of the SNMP OPC server. The configured IP addresses must match those of the devices (see Chapter 4).

- A device profile is a table of variables that can, when necessary, be modified with a MIB compiler or created individually for other devices.
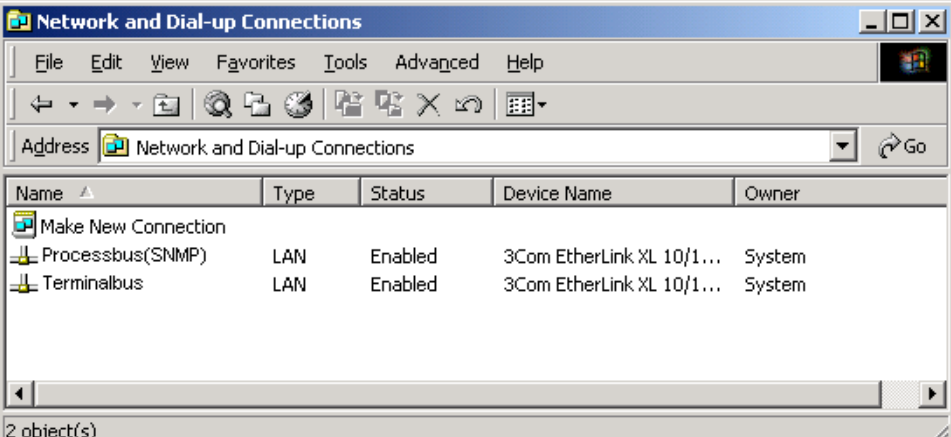
The variables specified by means of the profile are available in the OPC client application. Here, the required variables are included in the data management WinCC in a further step. For each OPC item to be monitored, the user creates a variable in the WinCC tag manager and, if required, creates control system messages in WinCC Alarm Logging.
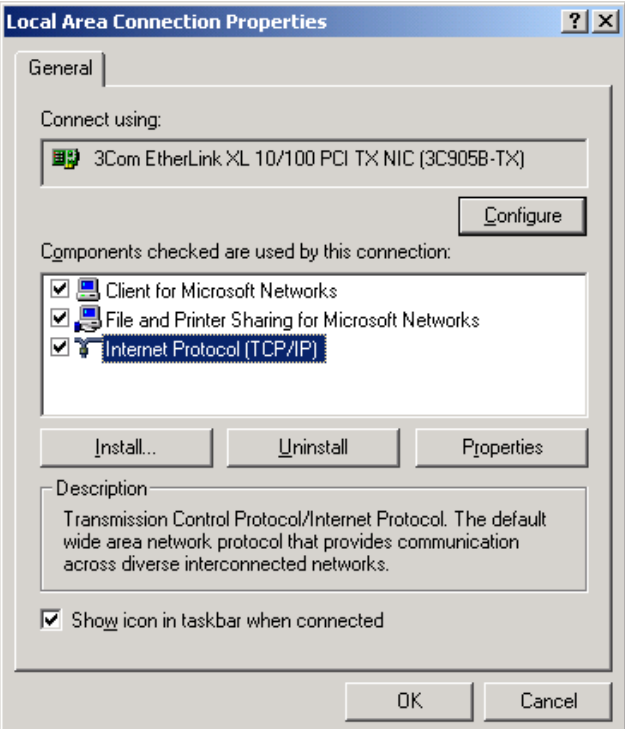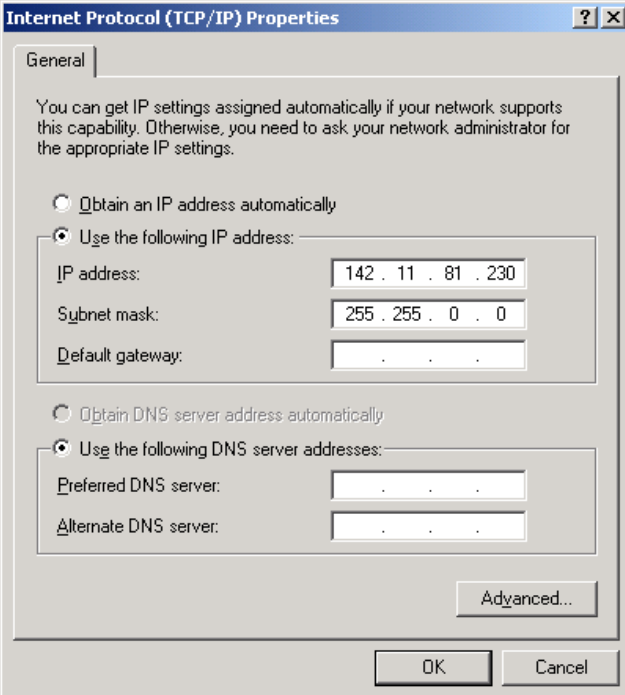
For further details of configuring the SNMP OPC server, refer to Chapter 3, Configuring the SNMP OPC Server in PCS 7.
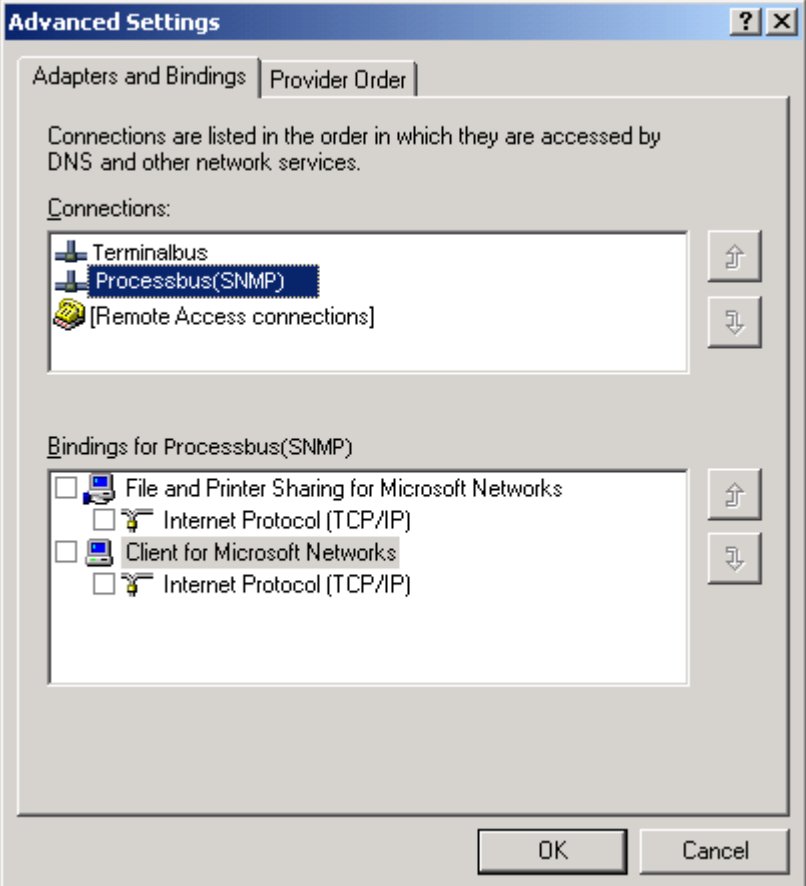
2.3   Settings of the OS Server in the PCS 7 Environment

To be able to operate the OS server as an additional SNMP OPC server correctly in the PCS 7 environment, special settings are necessary compared with the configuration in the simple SIMATIC NET environment:

Since the ISO protocol is used for communication on the network adapter (for example CP 1613) of the plant bus in PCS 7 plants, a separate network adapter must be planned on the OS for communication over the TCP/IP protocol on the plant bus to avoid mixed operation of the network protocols on one adapter. As a result, a different TCP/IP network identifier must be set on the TCP/IP adapter of the terminal bus compared with that on the TCP/IP adapter of the plant bus to avoid address space overlaps on both TCP/IP adapters (for example 192.11.81.xxx on the terminal bus and 142.11.81.xxx on the plant bus). After installing an additional network adapter for communication between the SNMP OPC server and the OSMs/ESMs connected to the plant bus, the following network settings must be made on the OS server:

Step	Procedure
1	First activate the network connection:

Step	Procedure
2	Set the protocols. Deactivate all protocols and services except for the TCP/IP protocol:
3	Set the IP address:

| Step	Procedure
4	In the "Advanced -> Advanced Settings" menu in the Network and Dial-up Connections dialog, set the bindings: The network connection for the terminal bus must be first in the list to avoid communication problems between server and clients in runtime mode. No "Client for Microsoft Networks" must be set:

3 Configuring the SNMP OPC Server in the PCS 7 Environment

The following section describes the configuration of the SNMP OPC server in the PCS 7 environment in greater detail, based on an example. The configuration work is done on an engineering station (ES).

3.1 HW Config Configuring in the PCS 7 Project

To operate an SNMP OPC server on an OS server, the SIMATIC PC station of the OS server must be configured in the PCS 7 project. Select an empty row in the hardware configuration of the SIMATIC PC station and add the OPC server. You will find the OPC server in the "Standard" profile under "SIMATIC PC Station – OPC Server – SW V6.1...":

Editing the Hardware Configuration:
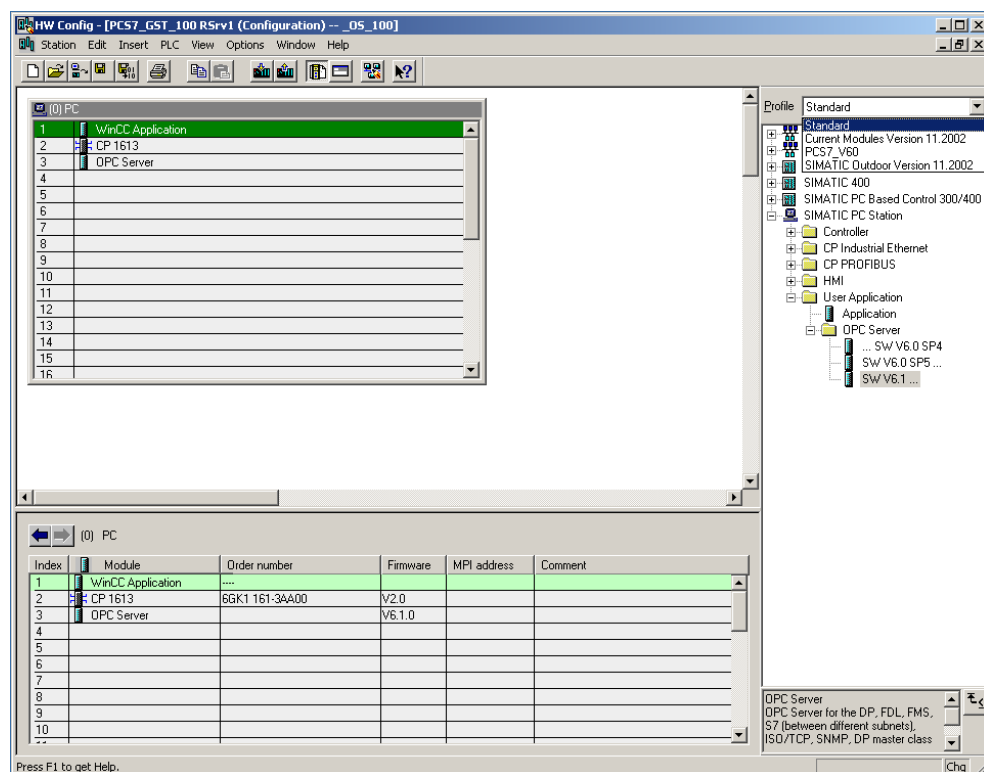
To configure the OPC server, double-click on the "OPC Server" row. The properties dialog of the OPC server opens. Select the "SNMP" tab. The following page is displayed:
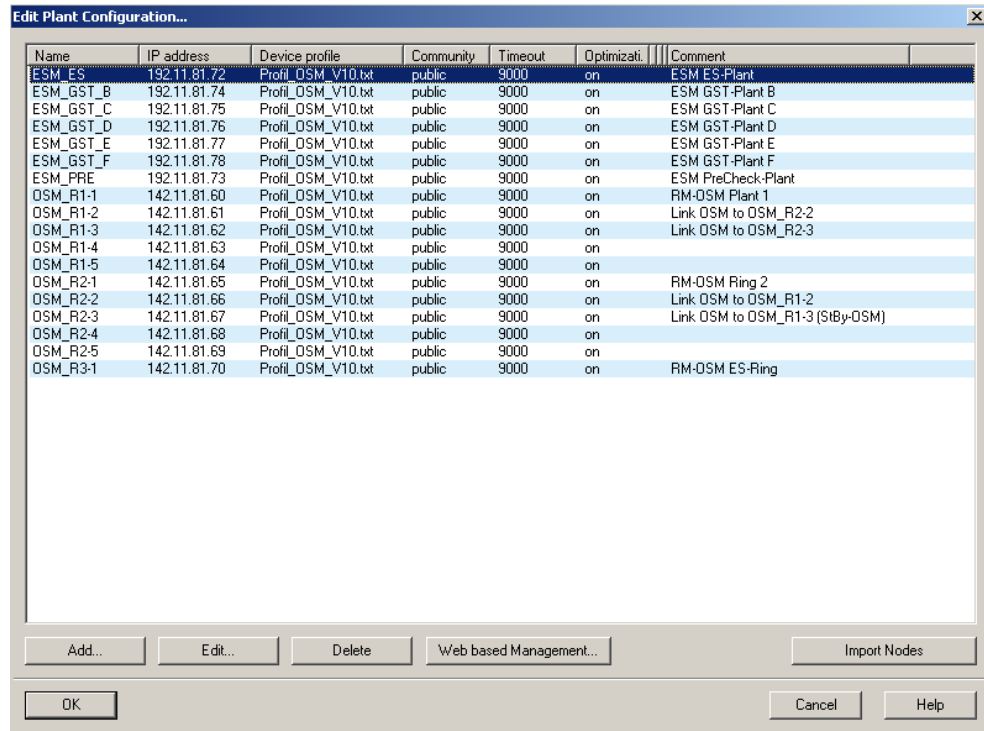
Editing Properties of the OPC Server:
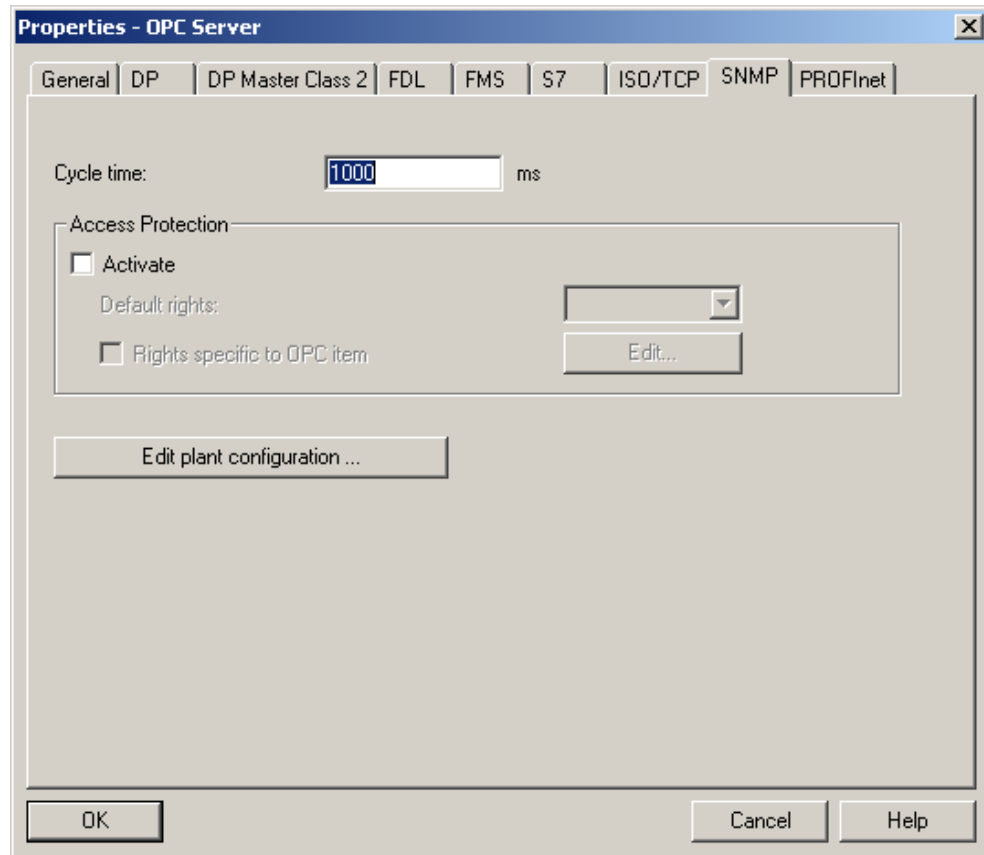
If necessary, the cycle time can be changed in the first box. The cycle time specifies the minimum time in which the variables of the SNMP OPC server can be polled. With the "Access Protection" option, variable access can be controlled (read, write).

Note

The cycle time specifies the interval at which the variables of the SNMP OPC server are polled. To achieve good general performance in the PCS 7 project, this time should not be selected unnecessarily shorter than the update time of the SNMP variables configured on the OS. In general, the value "1000 ms" should be suitable for most situations.

If you click on "Edit plant configuration ...", the SNMP-enabled devices to be monitored are inserted and configured. The following screen appears:

Editing the Plant Configuration:

Name	IP address	Device profile	Community	Timeout	Optimizati.	Comment
ESM_ES	192.11.81.72	Profil_OSM_V10.txt	public	9000	on	ESM ES-Plant
ESM_GST_B	192.11.81.74	Profil_OSM_V10.txt	public	9000	on	ESM GST-Plant B
ESM_GST_C	192.11.81.75	Profil_OSM_V10.txt	public	9000	on	ESM GST-Plant C
ESM_GST_D	192.11.81.76	Profil_OSM_V10.txt	public	9000	on	ESM GST-Plant D
ESM_GST_E	192.11.81.77	Profil_OSM_V10.txt	public	9000	on	ESM GST-Plant E
ESM_GST_F	192.11.81.78	Profil_OSM_V10.txt	public	9000	on	ESM GST-Plant F
ESM_PRE	192.11.81.73	Profil_OSM_V10.txt	public	9000	on	ESM PreCheck-Plant
OSM_R1-1	142.11.81.60	Profil_OSM_V10.txt	public	9000	on	RM-OSM Plant 1
OSM_R1-2	142.11.81.61	Profil_OSM_V10.txt	public	9000	on	Link OSM to OSM_R2-2
OSM_R1-3	142.11.81.62	Profil_OSM_V10.txt	public	9000	on	Link OSM to OSM_R2-3
OSM_R1-4	142.11.81.63	Profil_OSM_V10.txt	public	9000	on	
OSM_R1-5	142.11.81.64	Profil_OSM_V10.txt	public	9000	on	
OSM_R2-1	142.11.81.65	Profil_OSM_V10.txt	public	9000	on	RM-OSM Ring 2
OSM_R2-2	142.11.81.66	Profil_OSM_V10.txt	public	9000	on	Link OSM to OSM_R1-2
OSM_R2-3	142.11.81.67	Profil_OSM_V10.txt	public	9000	on	Link OSM to OSM_R1-3 (StBy-OSM)
OSM_R2-4	142.11.81.68	Profil_OSM_V10.txt	public	9000	on	
OSM_R2-5	142.11.81.69	Profil_OSM_V10.txt	public	9000	on	
OSM_R3-1	142.11.81.70	Profil_OSM_V10.txt	public	9000	on	RM-OSM ES-Ring

Buttons: Add... | Edit... | Delete | Web based Management... | Import Nodes | OK | Cancel | Help

Here, all the devices are made known to the SNMP OPC server.
(In this example, several entries have already been configured.)

By clicking on "Add...", a new node is added to the plant configuration. A new dialog "Edit nodes" opens with default parameters.

By clicking on "Delete", the currently selected node is deleted from the plant configuration.

If you click on "Edit...", you can modify the parameters of the currently selected node. A new dialog "Edit nodes" opens with the current parameters.

As supplied today, the use of the SNMP OPC server on OSMs/ESMs is restricted. The "Import Nodes" function is therefore currently not relevant and is reserved for a later version in which the node list will be extended by all the devices in the current project that have their own IP address.

If the device supports Web Based Management, clicking on "Web based Management ..." opens the Internet Explorer with the corresponding URL.

For more detailed information on Web Based Management of the OSM/ESM, refer to the OSM / ESM documentation. (SIMATIC NET Industrial Ethernet OSM/ESM Network Management User Manual).

The "Edit nodes" dialog appears after you click on "Add..." or "Edit...".

Edit Nodes:

In this dialog box, you edit the following entries:

- Name:

  Enter a node name (for example Test_OSM_1) to identify the node uniquely throughout the entire PCS 7 project.

- IP address:

  Enter the IP address of the device here.

- Device profile:

  Select a device profile. The device profile describes the mapping of SNMP variables and traps on the OPC interface. With the "Create Profile..." button, you can create your own profile from MIB files. The "Profil_OSM_V10.txt" profile is recommended for this.

- Community:

  Enter the "SNMP community" of the device here. This is a type of password with which it is possible to access the device (either read-only or read access).

- Timeout:

  Here you enter the maximum interval within which it is attempted to read a value from the Microsoft stack before the quality of the variable is set to "bad" on the OS.

- Optimization of SNMP access

  Select "Optimization" if you want several objects of the same type to be requested in a frame to reduce network load. Do not select optimization if the agent does not support this functionality. This saves the automatic initial query and correction when the variable is registered.

- Comment:

  Enter any relevant text as the comment.

All the parameters entered here are stored internally and can be visualized during runtime.

Close the "Edit nodes" dialog by clicking "OK"; you return to editing the plant configuration.

Close the "Editor Plant Configuration..." dialog once you have created/modified all the nodes by clicking on "OK"; you return to editing the properties of the OPC server.

Close the "Properties – OPC Server" dialog by clicking on "OK"; you return to hardware configuration.

Save and compile the SIMATIC PC station.

Finally, copy the fully configured OPC server to the SIMATIC PC station of the ES station:

Copying the OPC Server:
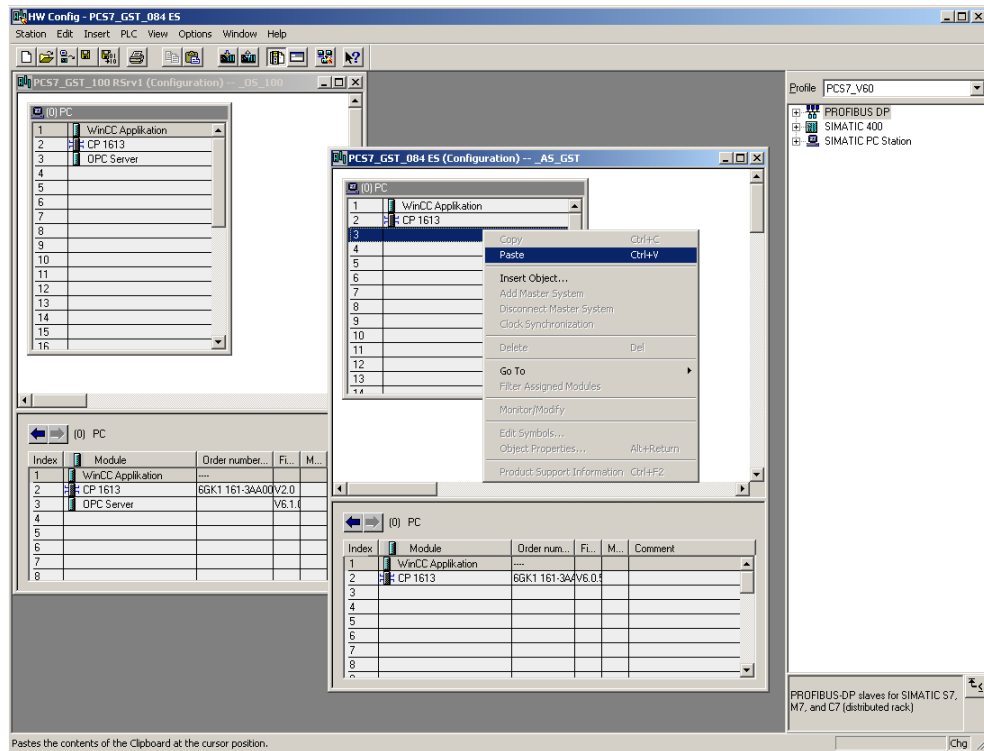
Note

If you need to use a redundant system, the partner station should also be configured appropriately. To do this, copy the previously configured OPC server to the partner station. Then save and compile this partner station as well.

Downloading to the Target System:

Download the configuration of modified PC stations to the target computer(s). The OS server computer and the redundant OS server computer (if it exists) can also be downloaded before the actual commissioning of the server:
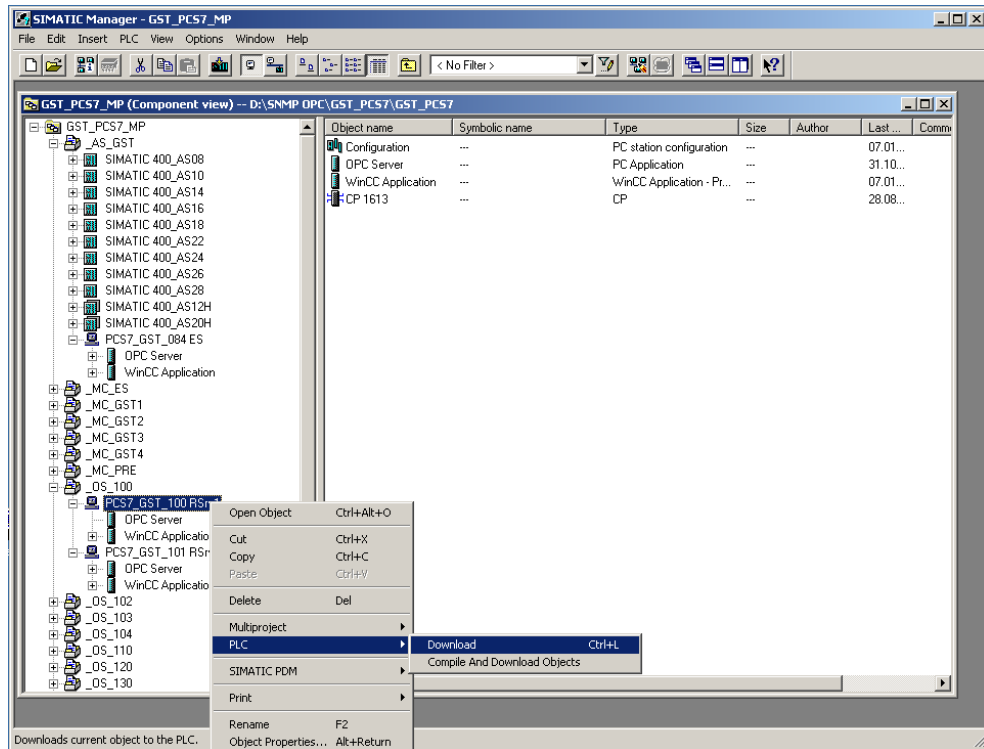
Note

In PCS 7 V6.0 SP3, SIMATIC NET CD V6.2 is used. In this case it is necessary to run the Station Configuration Editor and to insert the same applications in the same way as the PC station including address adaptation for the network adapter in the PCS 7 project:
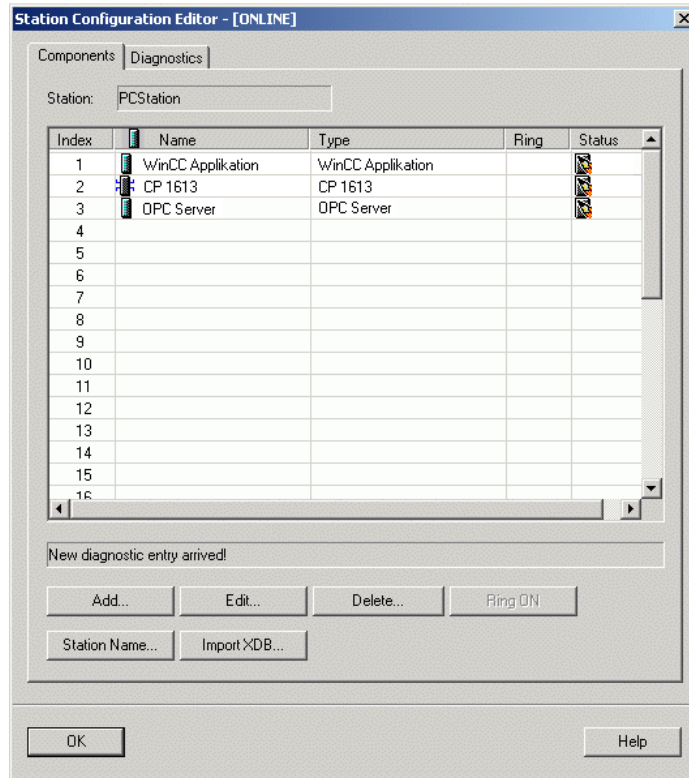
3.2   WinCC Configuration

To visualize the values provided by the SNMP OPC server on an OS server, the WinCC tag management and the alarm system must be suitably configured. First open the OS project in the PCS 7 project (WinCC application):
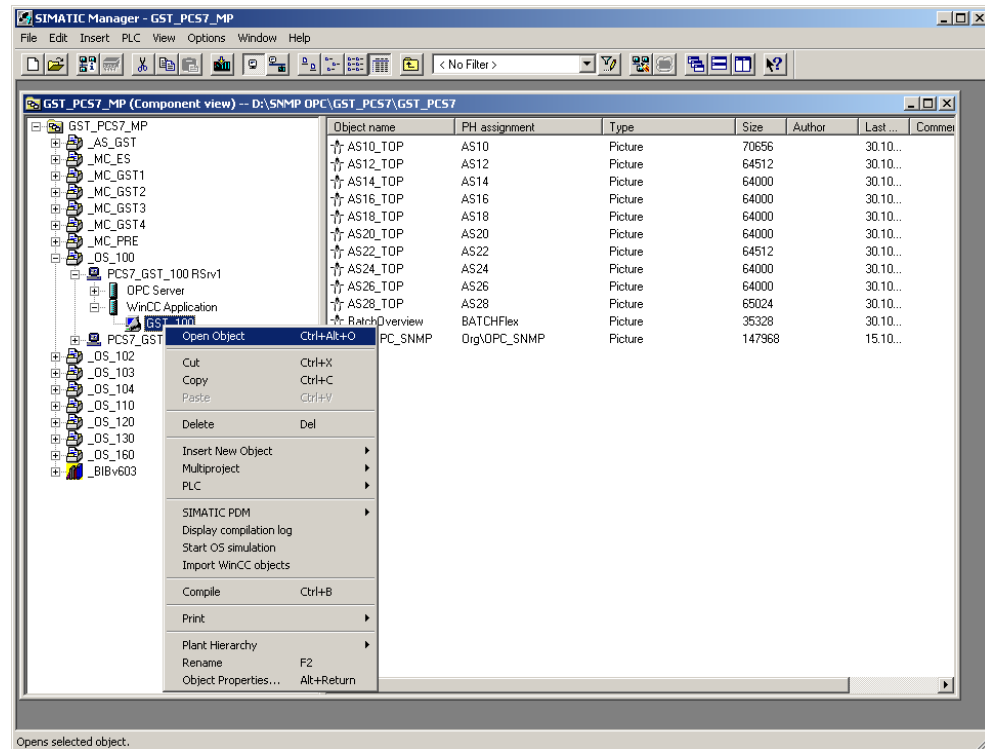
Expanding the WinCC Tag Management:

First expand the WinCC tag management with variables from the SNMP OPC server. Then, when this is complete, configure the pictures and Alarm Logging. To be able to create this configuration on the ES computer (required for PCS 7), the SIMATIC PC station of the ES station must also be set up in the PCS 7 project as an SNMP OPC server. This is achieved by copying the OPC server in the PC configuration. Then download the configuration to the ES computer (see Section 4.1). Only then is it possible to create an OPC connection to the SIMATIC NET OPC server on the local computer, and to insert the required variables into the WinCC tag management using the tag browser.

Note

In a redundant OS server pair, there is only one ("master") OS project that needs to be edited or configured. This OS project is automatically adapted (computer name, redundancy settings,...) when you download to the redundant target computer.

To expand the WinCC tag management, first insert the OPC channel and the OPC connection. You can do this by right-clicking on the OPC channel and selecting the properties:
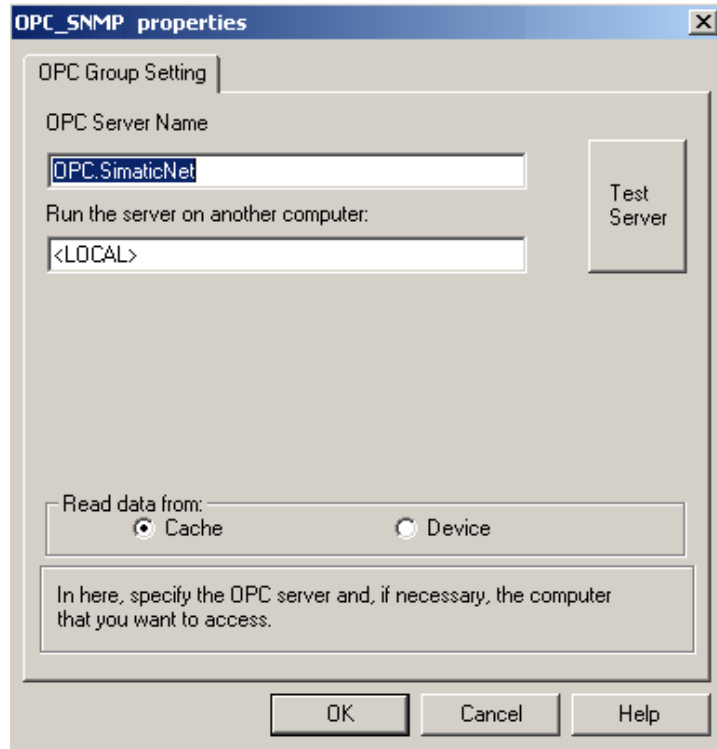
Note

Enter "OPC.SimaticNet" as the OPC server name. Specify only <LOCAL> as the OPC server to access the local computer later. For a redundant server pair, the actual computer name must not be entered here under any circumstances. Otherwise, later in runtime, the standby server that has no OS project in its own would access the master server remotely!

Now create the variables using the tag browser. You will find a list of suitable or practical variables belonging to the OSM/ESM family along with a description in Chapter 6.
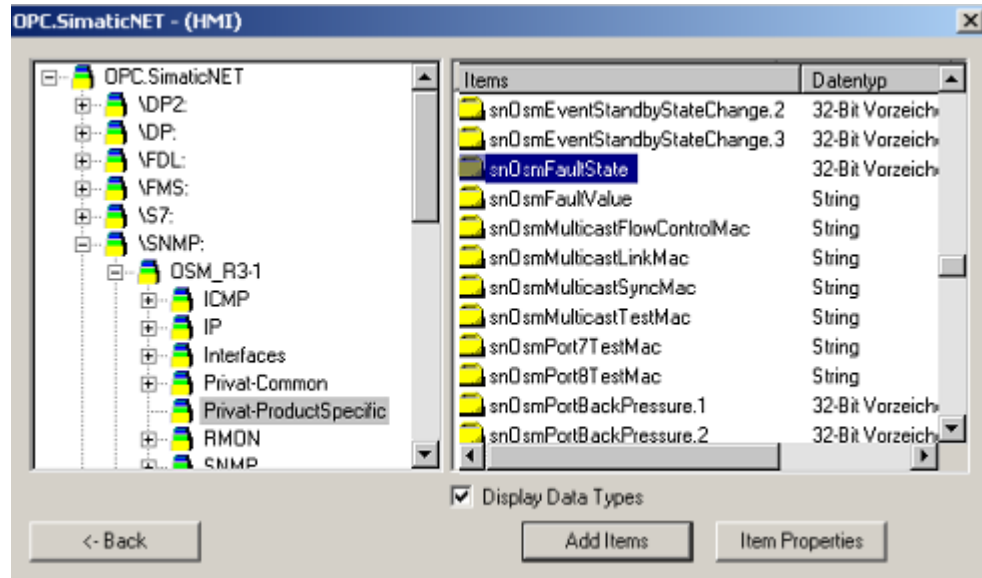
Create a variable in the data manager for each OPC item to be monitored. In the case of the OSM/ESM, the variables "&statepathval()" for connection monitoring and "snOsmFaultState" for fault state monitoring are suitable because error information compression can be used on the device with these variables. In the simplest situation, create a variable in the data manager manually for each OSM/ESM in the network:
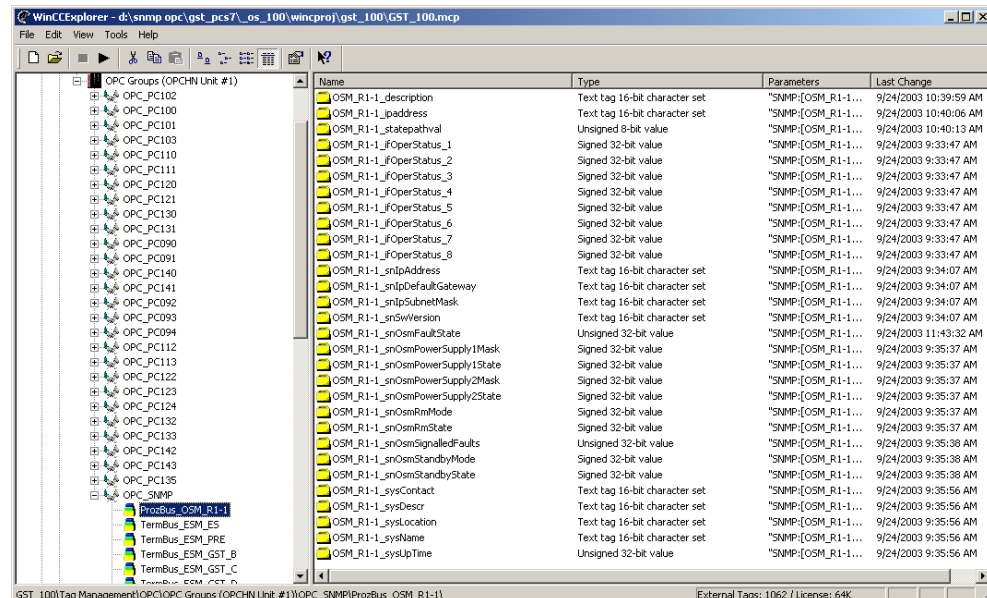
Then adapt the data types of all variables that will be configured later in Alarm Logging (for example ,..._snOsmFaultState'), where necessary from signed to a signed to allow bit-by-bit evaluation of the alarms in WinCC.
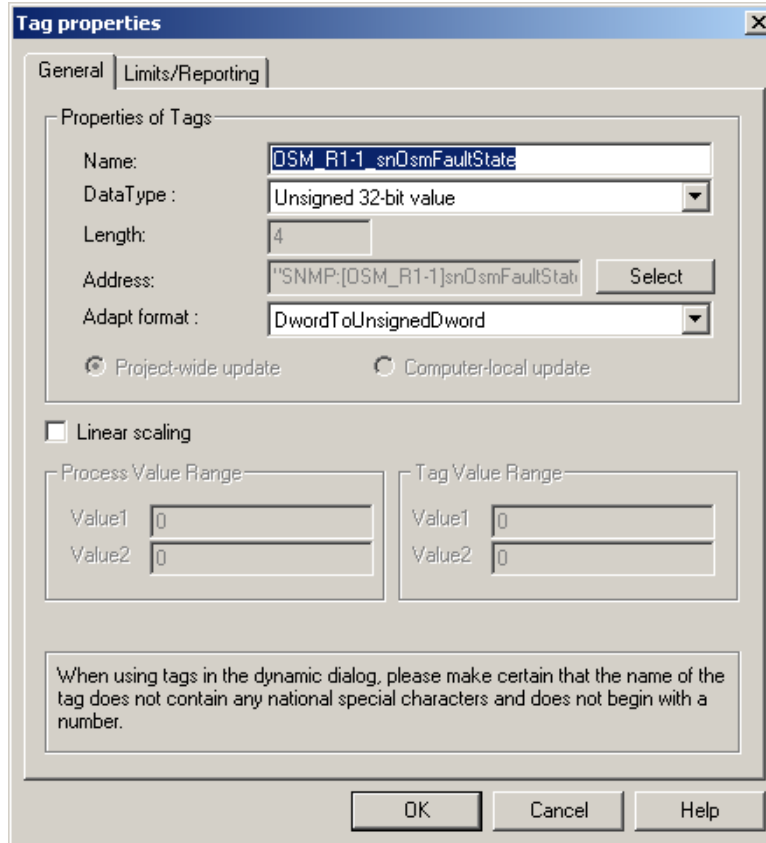
You do this with the "DwordToUnsignedDword" entry in the format adaptation for the example of a 32-bit variable shown above.

Note

The messages or their numbers must not be located in the number range reserved for system messages and AS messages !

When you have created all the variables, configure Alarm Logging as follows:

Configuring WinCC Alarm Logging
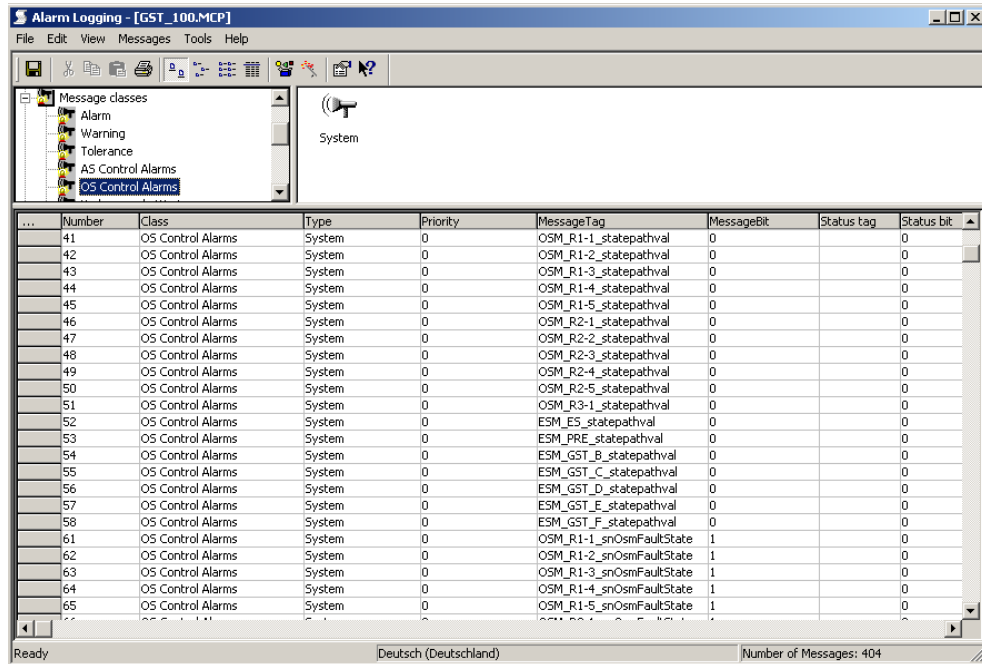
Configuring all the alarms with the data type adapted variables created in the tag management. Assign suitable message texts for control system messages to specific value changes of the variables or create the message texts manually. These message texts then appear during runtime in WinCC Alarm Logging when the corresponding value change occurs. The user on the OS then receives a control system message automatically as soon as a value changes (for example signaling contact signals fault).

Configuring WinCC Pictures

Now configure the WinCC pictures and install them in the plant hierarchy (PH) in the PCS 7 project or in the Picture Tree Manager (PTM) in the OS project as required. The following schematic is an example of using the picture window technique in runtime mode:
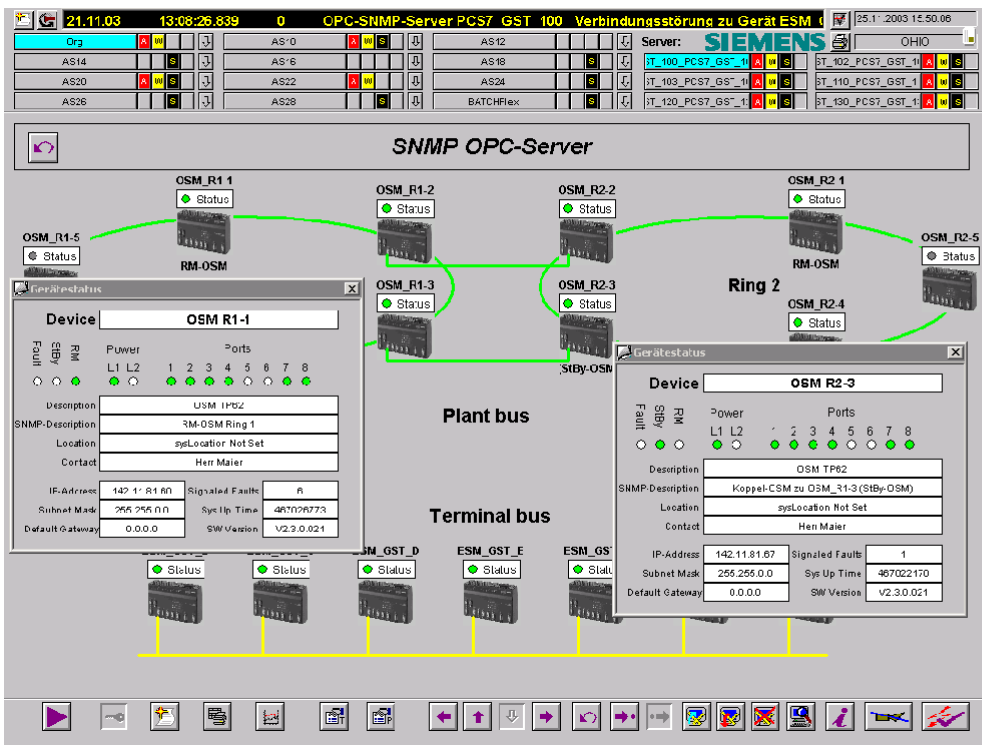
Downloading to the Target System

Save and close the project after completing the configuration and download the project to the target computer (if you are using redundancy, also to the redundant partner station):
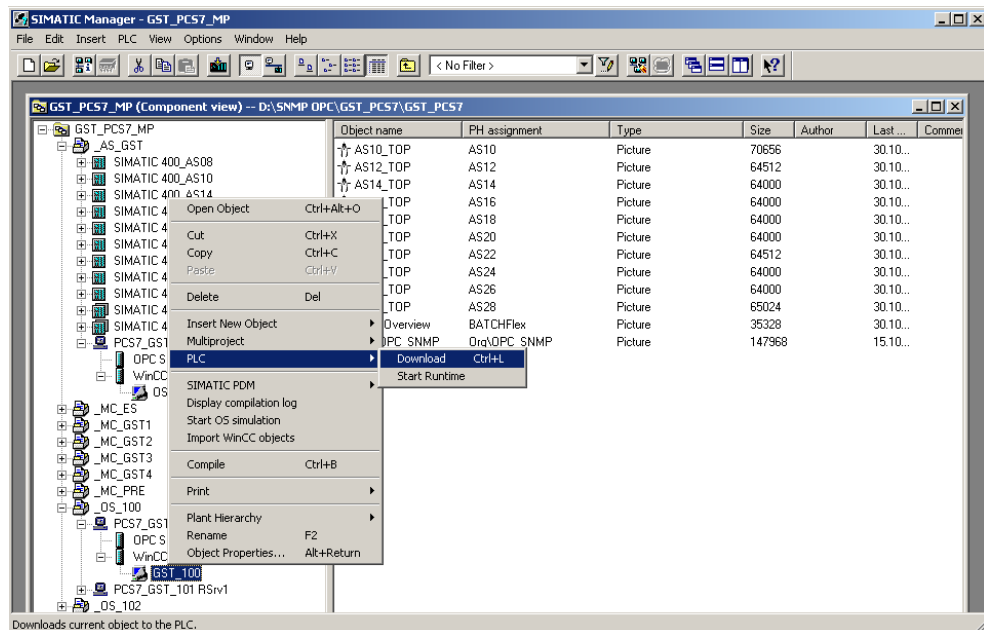
4   Settings on a Switch Based on the Example of an OSM / ESM

To access OSMs / ESMs over SNMP, they must be configured. The assignment of an IP address is absolutely necessary. When using other devices, refer to the product manual supplied. The following screenshot shows an example of a setting for the IP address, subnet mask, and, if necessary, default gateway.
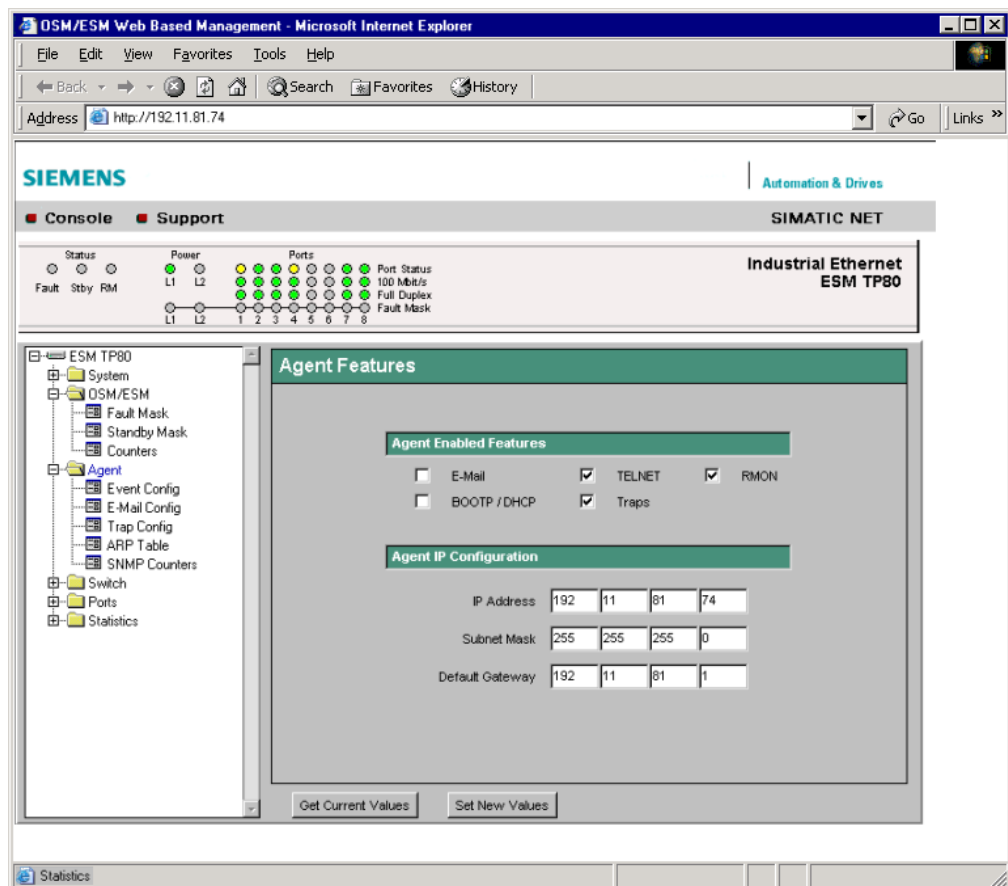
Note on Setting the Fault Mask:
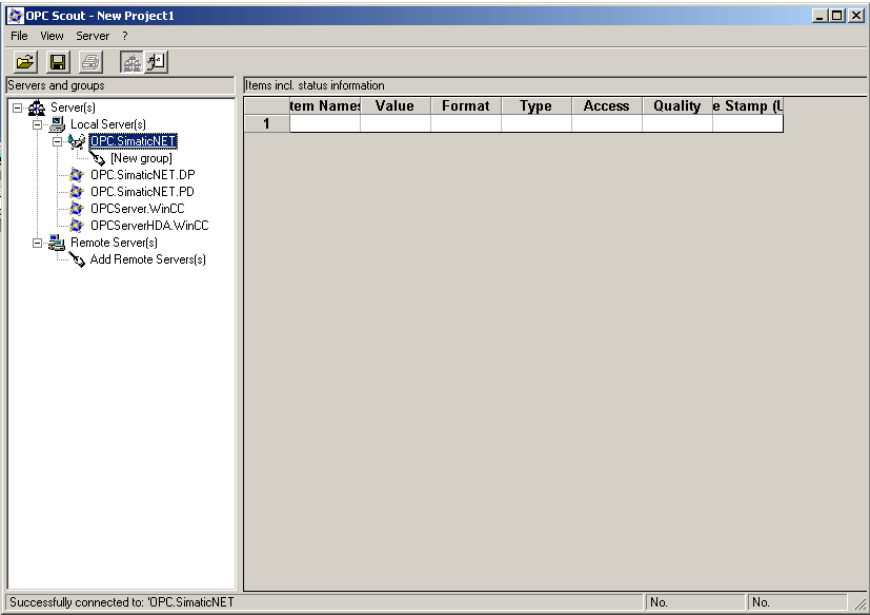
In a ring structure, it is advisable not only to monitor the power supply is also ports 7 and 8. This allows a cable break in the ring to be detected. The changeover of the redundancy manager to the active state, for example when there is a cable break in the ring, does not necessarily lead to an OSM/ESM error state and corresponding message if no additional messages from the redundancy manager status variables are configured.
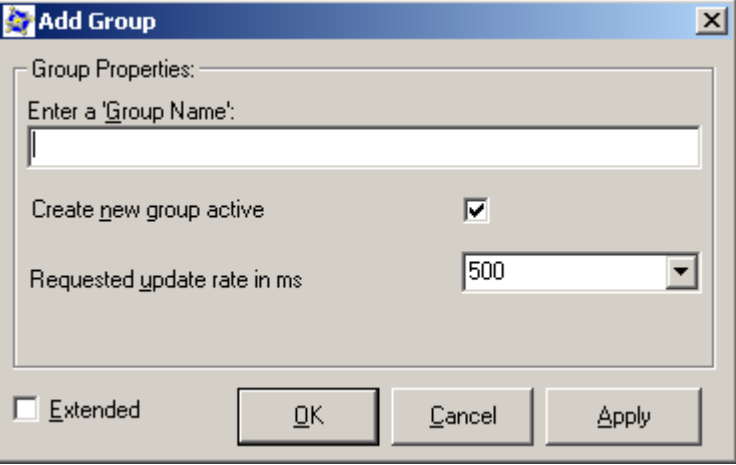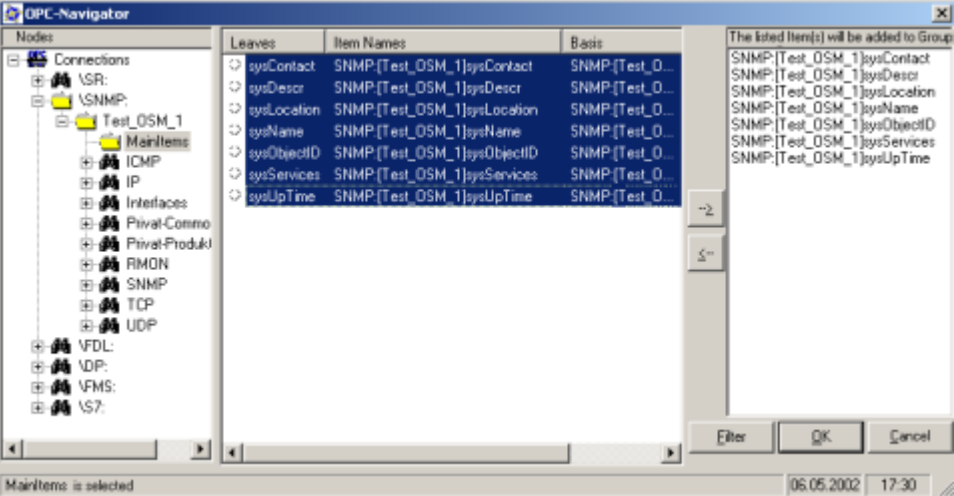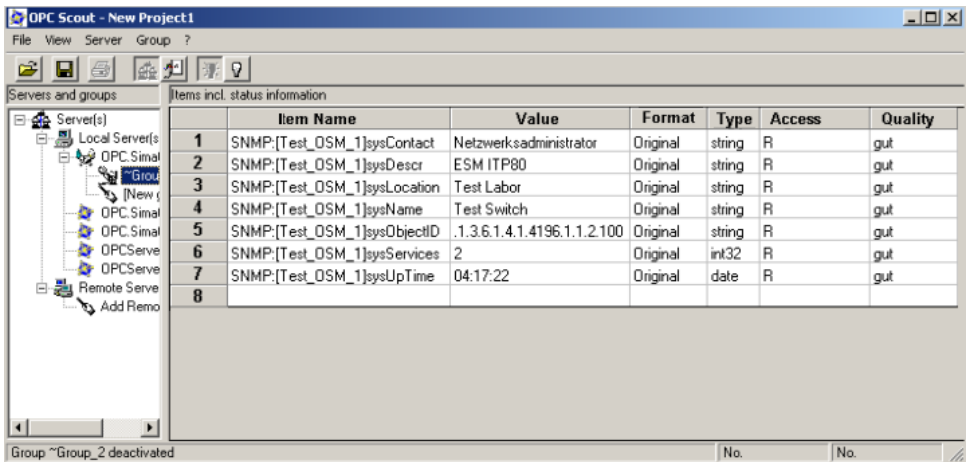
5   Diagnostics and Test Support

With the OPC Scout, you can establish a connection to the OPC server and test your configuration without a client. The OPC Scout for browsing the mapped SNMP information is supplied along with the SNMP OPC server.

The OPC Scout for Commissioning and Testing

You can access the objects of previously configured network components using any OPC client. Follow the steps below to read or write objects with the OPC Scout.

Step	Procedure
1	Start the OPC Scout: Double-click on the entry "OPC.SimaticNET" to connect the OPC Scout with the OPC server.

Step	Procedure
2	Enter a group name.
	If you do not enter a group name, a group with the default name "~Group1" is created or "Groupn" (n>1) if Group1 already exists.
	Confirm with OK.
3	Double-click on the group entry you just created to open the OPC browser. In the left-hand pane, you will see the hierarchically arranged name space of the OPC variables:
	When you click on an element in the tree, the OPC items defined for the element appear in the middle pane.
	In the middle pane, select OPC items from the relevant branches and enter them in the right-hand pane using the arrow button. The structure displayed depends on the previously selected names (for example SNMP:[Test_OSM_1]sysContact).
	Confirm the dialog with "OK" to enter the items in the group.

Step	Procedure
4	
	The table of the main window displays the selected variables with the following additional information:
	The current value of the item.
	Access rights
	Information on the integrity of the data
	Time stamp

6 Important SNMP Variables

6.1 MIB II Standard Variables

Below, you will find a list with several SNMP variables from the MIB II range for monitoring the device status. MIB II describes the range of SNMP variables that are normally supported by SNMP-enabled devices.

For more detailed information on MIBs, refer to the following FAQ

Link : www4.ad.siemens.de/view/cs/en\15177711

Note:

The variables listed here are part of the existing profile "Profil_OSM_V10.txt" of STEP 7/NCM PC. The variables from the "Interface" folder can be indexed according to port (1 through n) . **"ifDescr.2"**, for example, describes the name of the second port.

Table 1: Variables in the System Folder

Variable	Access rights	Description
sysDescr	Read-only	A string of up to 256 characters is used. This value contains a vendor-specific identification of the device. An OSM TP62 is identified here as "OSM TP62".
sysObjectID	Read-only	This displays the address (object identifier) at which the device-specific SNMP variables can be accessed: "**1.3.6.1.4.1.4329.6.2**.nnn.mmm" If no private OIDs have yet been declared, the object identifier is [0,0]. Here, the default value is 0.
sysUpTime	Read-only	Counter in hundredths of seconds since the last reset (for example after power up). This value is set by the system.
sysContact	Read and write	Here, the person responsible for the network can enter a contact person. (Default: empty). A string up to 256 characters long can be entered.
sysName	Read and write	Here, the network administrator can enter any name for the device. Default: empty A string up to 256 characters long can be entered.

Variable	Access rights	Description
sysLocation	Read and write	Here, the network administrator can enter the location of the device Default: empty A string up to 256 characters long can be entered.
sysService	Read-only	Displays the functions (services), that the component provides according to the ISO/OSI model. Layer functionality: 1. physical (for example repeater) 2. datalink/subnetwork (for example bridges, switches) 3. internet (for example IP gateways, router) 4. end to end (for example IP hosts) 5. applications (for example E-mail server) The value is a 32-bit integer supplied by the system.

Table 2: Variables in the Interface Folder

Variable	Access rights	Description
ifNumber	Read-only	Number of different interfaces available in the component. For an OSM with 8 ports, the number 8 is displayed.
		The value is a 32-bit integer supplied by the system.
ifDescr	Read-only	This value includes the name and possibly further information about the particular port. Ethernet port of a CP 343-1 as an example: SIEMENS SIMATIC NET CP343-1 6GK7343-1EX20-0XE0 HW: Version 1 FW: Version 1.1.10 Fast Ethernet Port 1 Rack 0 Slot 4
		A string of up to 256 characters is used.
ifType	**Read-only**	For SIMATIC NET, the value "ethernet-csmacd(6)" is entered. Other possible values: other(1), -- none of the following regular1822(2), hdh1822(§), ddh-x25(4), rfd977-x25(5), ethernet-xsmacs(6), iso88023-csmacd(7), iso88024-tokenBus(8), iso88025-tokenRing(9), iso88026-man(10), starLan(11), proteon-10Mbit(12), hyperchannel(14), fddi(15), lapb(16), sdlc(17), dsl(18), -- T-1 el(19), -- the European version of T-1 basicISDN(20), primaryISDN(21), -- system serial interface propPointToPointSerial(22), ppp(23), softwareLoopback(24), con(25), -- CLNP over IP ethernet-3Mbit(26), nsip(27), -- KNS over IP slip(28), -- generic SLIP ultra(29), -- ULTRA Technologies ds3(30), -- T-3 sip(31), -- SMDS frame-relay(32)
		The value is an integer supplied by the system.
ifSpeed	Read-only	Estimated value of the nominal bandwidth of the Ethernet port in bits per second. In SIMATIC NET either 10 Mbps or 100 Mbps is displayed.
		The value is of the data type "Gauge".

Variable	Access rights	Description
ifOpenStatus	Read-only	Value from the list: up(1), down(2), testing(3), Here, the current operating state of the Ethernet port is displayed. The "testing(3)" state indicates that no user data is being transported. The value is an integer supplied by the system.
ifLastChange	Read-only	Counter in hundredths of seconds. Counts how long the selected port has been in the current state. If the state was reached before the last reinitialization by the SNMP manager, the value is zero. The value is of the data type "TimeTicks" and is set by the system.
ifInErrors	Read-only	Counter of received packets not passed on to the higher protocol layers due to detected errors. The value is of the data type "Counter" and is set by the system.
ifOutErrors	Read-only	Counter for the packets not sent due to an error. The value is of the data type "Counter" and is set by the system.

6.2 Other Variables of the OSM/ESM Family

In addition to the variables named in the previous sections, the OSM/ESM family includes other important variables. You can insert these variables in the OPC server or in the WinCC tag management as described in Chapter 3. Below, you will find a list of these variables that can be queried by the SNMP OPC server when used in a PCS 7 plant and can be made dynamic in the OS project. Apart from these variables, there are numerous other variables in the device profile "Profil_OSM_V10.txt" whose description can be read out of the corresponding MIB file.

Variable	Access rights	Description
snOsmFault State	Read and write	Shows the status of the signaling contact. Possible values: Integer 1 = no error Integer 2 = error.

snOsmFault Value	Read and write	If an error occurs, this shows which error it is.
		The 4-byte variable is bit-coded!
		If all four bytes are set to 0, there is no error.
		Possible values:
		bit 0 = Redundant power supply failed
		bit 1 = Connection to monitored port interrupted
		bit 2 = Internal error
		bit 3 = Standby configuration error
		bit 4 = More than one redundancy manager in ring
		bit 5 = Redundancy manager DIP switch was changed
		    As a result, the current operating state is inconsistent with the device configuration
		    The modified device configuration is adopted only after a restart
		bit 6 = STBY DIP switch was changed. As a result, the current operating state is inconsistent with the device configuration. The modified device configuration is adopted only after a restart.
		bit 7 = Error loading the firmware with NCM
		bit 8 = Port 1 segmented
		. . .
		bit 15 = Port 8 segmented
		bit 16 = Observer error
		bit 17 = Unrecoverable ring error
		bit 18 = The factory setting was restored. As a result, the current operating state is inconsistent with the device configuration. The modified device configuration is adopted only after a restart.

Variable	Access rights	Description
snOsmRm State	Read-only	This shows whether the redundancy manager is active or passive.
		Possible values:
		Integer 1 = Redundancy manager is passive. The OSM/ESM is operating as the redundancy manager and has opened the ring; in other words, the line of OSMs/ESMs connected to it is working without errors. The "passive" state is also displayed when the redundancy manager - mode is disabled.
		Integer 2 = Redundancy manager is active. The OSM/ESM is operating as the redundancy manager and has closed the ring; in other words, the line of OSMs/ESMs connected to it is interrupted (error). The redundancy manager activates the connection between the ring ports and therefore reestablishes a functioning bus configuration .
snOsmRm StateChanges	Read-only	Shows how often the redundancy manager switched to active.
		Possible values:
		Counter (unsigned integer)
snOsmStandB yState	Read-only	This shows whether the standby status is active or passive.
		Possible values:
		Integer 1 = The standby status of the OSM/ESM is passive; in other words, it does not pass on any packets via the standby ports.
		Integer 2 = The standby status of the OSM/ESM is active; in other words, it passes on packets via the standby ports.
		Integer 10 = Standby functionality is not supported (only with mini switches).
snOsmStandb yStateChanges	Read-only	Shows how often the standby status was active.
		Possible values:
		Counter (unsigned integer)

Glossary

Below, you will find explanations of important terminology that is necessary or helpful in understanding this documentation.

10BASE-T

Standard for 10 Mbps Ethernet transmission on twisted pair cables

100BASET

Fast Ethernet Standard (100 Mbps) for data transmission on twisted pair cables

Automation system (programmable controller)

The automation system is made up of various hardware components and integrated system functions depending on the target system. In PCS 7, the components are as follows:

- Rack with 9 or 18 slots, also separate for redundant systems
- CPU 414-3, 416-2, 416-3 or 417-4 and the redundant CPU 414-4H and 417-4H
- Power supply 24 V DC or 120/230 V AC
- Work memory of 768 to 20 MB
- Memory card with 1 to 8 MB RAM
- Runtime license for the libraries, driver blocks / technological blocks
- Attachment to Industrial Ethernet for example CP 443-1
- Attachment to PROFIBUS as DP master or for S7 communication

IA

See Automation system

Bus

Common transmission path on which all nodes are connected; has two defined ends.

CPU

Central Processing Unit = central module of the S7 automation system with control unit and arithmetic logic unit, memory, operating system and interface for programming device.

Diagnostics

Diagnostics is the detection, localization, classification, display, evaluation of errors, faults and messages. Diagnostics provides monitoring functions that run automatically during operation of the plant. This increases the availability of plants by reducing the commissioning times and downtimes.

ESM

ESMs (Electrical Switch Modules) allow the structuring of switched networks with 100 Mbps. Electrical rings are set up with 2 twisted pair ports of the ESM. The data rate in the ring is 100 Mbps; up to 50 ESMs can be used per ring.

Management level

The entire system used for automation consists of the management, process and field levels. The management level is represented by PCs in the role of client, multiclient and server with which the process can be operated and monitored.

Control system

A unit of components that can be used to monitor and control (open and closed loop) industrial production.

MIB

Management Information Base. In network management, the database (tree structure) in which all objects and variables that can be managed are entered.

MIB object

Management Information Base objects are the communication objects of SNMP. They are made available by SNMP agents. Each SNMP-enabled device has an SNMP agent.

OPC

OLE for Process Control is a world-wide communications standard for components in automation. Based on Windows technology, OPC provides an open interface that allows straightforward standardized data exchange between controllers, operator control and monitoring systems and office applications of different vendors

OPC Scout

Tool for commissioning and testing the OPC SNMP server.

OSM

OSMs (Optical Switch Modules) allow the structuring of switched networks with 100 Mbps. OSMs with two fiber-optic ports are required to set up an optical ring. The data rate in the ring is 100 Mbps; up to 50 OSMs can be used per ring.

Process level

The entire system used for automation consists of the management, process and field levels. The process level is represented by automation systems (AS) and interface modules.

Redundancy

Existence of more than one resource in a unit to perform a required function. In automatic controls, these resources are generally a device or a software program.

Redundancy in PCS 7 means that a subsystem (master system) handles processing of the process and the other subsystem (reserve system) operates as a reserve in case the other system fails. Reserve does not, however, mean that this subsystem has no function.

RFC

Request for Comment, standardization document of the research and development group of the Internet, for example definition of protocols, procedures and services.

SNMP

Simple Network Management Protocol is a special protocol for administration of TCP/IP networks. The individual nodes on the network (network components or DTEs) have an SNMP agent that provides information in structured form.

SNMP OPC server

The SNMP OPC server makes data available for the administration of TCP/IP networks of any OPC client systems.

SWITCH

Switches are connectivity devices that transfer data packets by evaluating the source and destination addresses of incoming data packets and then forward the data packets.

WinCC

The Windows Control Center is the process visualization system and the platform for IT and business integration within the PCS 7 family.

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