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SIMATIC

Process Control System PCS 7 Compendium Part A - Configuration Guidelines (V7.1/V8.0)

Configuration Manual

Valid for PCS 7 V8.0 (updated for V8.0 SP1)
Valid for PCS 7 V7.1

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

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

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

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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1 Preface

Subject of the manual

SIMATIC PCS 7, as a distinctly open system, can be flexibly adapted to a wide range of customer needs. The system software provides the project engineer with a great deal of freedom in terms of project configuration, as well as in the design of the program and visualization.

Experience has shown that subsequent modernization or plant expansion work is made much easier if the project is configured "in conformance with PCS 7" as far as possible right from the start. This means users must adhere to certain basic rules to ensure that the provided system functions will offer optimum usability in the future.

This manual serves as a compendium to the product documentation covering SIMATIC PCS 7. The basic tasks for creating and configuring the project are described in the form of instructions with numerous illustrations.

The compendium directly reflects the recommended method for configuration, which is based on the results of a great deal of practical experience. The description relates to working with the project and the parameter settings of the components it contains but not the application itself.

The compendium is divided into the following parts:

- Configuration Guidelines including checklist
- Process Safety including two checklists
- Technical Functions with SFC Types
- Operation and Maintenance including checklist
- Hardware Installation including checklist
- Industrial Security

Validity

This documentation is valid for the software packages:

- SIMATIC PCS 7 V8.0 (updated for V8.0 SP1)
- SIMATIC PCS 7 V7.1

SIMATIC PCS 7 Manual Collection

The complete documentation of PCS 7 is available to you free of charge and in multiple languages in MyDocumentationManager as a *Manual Collection* from the website http://support.automation.siemens.com/WW/view/en/59538371 or in PDF format via www.siemens.com/pcs7-documentation.

Additional support

If this manual does not contain the answers to any questions you may have about how to use the products described, please contact your local Siemens representative.

You can locate your contact at http://www.siemens.com/automation/partner.

You can find a guide to the technical documentation available for individual SIMATIC products and systems at http://www.siemens.de/simatic-tech-doku-portal.

The online catalog and online ordering system are available at http://mall.automation.siemens.com/.

Training center

Siemens offers a number of training courses to familiarize you with the SIMATIC PCS 7 process control system. Contact your regional training center or the main training center in Nuremberg 90327, Germany (http://www.sitrain.com).

Technical support

You can contact technical support for all Industry Automation and Drive Technology products using the Support Request web form http://www.siemens.de/automation/support-request.

More information about our technical support services is available on the Internet at http://support.automation.siemens.com/WW/view/en/16604318.

Industry Online Support on the Internet

In addition to our documentation options, our expertise is also available to you online (http://support.automation.siemens.com).

Here you will find:

- An overview of the most important technical information and solutions for PCS 7 under http://www.siemens.com/industry/onlinesupport/pcs7.
- The newsletter that keeps you constantly up-to-date with the latest information about our products.
- The right documents for you via the search facility in our Industry Online Support portal.
- A forum in which users and experts from all over the world exchange ideas and experiences.
- Your local contact for Industry Automation and Drive Technology.
- Information about local service, repairs, spare parts. The "Services" section offers even more options.

2 What's new?

The following provides an overview of the expansions and changes to the content of the compendium for SIMATIC PCS 7 V8.0.

Preparation and administration

The following new and revised topics can be found in the "Preparation and Administration" section:

- Preparatory planning
  - Documentation: Information on the specifications and guidelines for a PCS 7 plant in the GMP environment (Good Manufacturing Practice)
  - Plant concept: Presentation of the plant concept which is used as an example for implementing the process automation described in this documentation.
  - Hardware selection: Information on the minimum requirements that must be met in order to implement the process automation described in this documentation.
  - Naming concept: Information on the rules for selecting and changing computer names
  - Workgroup and domain: Update to the contents for PCS 7 V8.0.
  - User administration: Information on the user concept
  - Backup management: Information on backup creation and on the use of backup software
  - Patch management and security updates: Information on the Windows Software Update Service and security patches
- Installation
  - Hardware configuration and BIOS settings
  - Hard disk distribution: Example of distribution of the hard disk in a PC station
  - Installation of the operating system: Information on the licensing mode and on setting up Internet time and virus scanners
  - PCS 7 installation: Notes on PCS 7 installation
  - Network settings: Notes on address administration and determining transmission rates and operating type
  - Configuring terminal and system bus: Update to the contents and the references for PCS 7 V8.0.
  - Setting up users and assigning rights: Notes on user and rights administration
  - License management: Information on the transmission of license packages

- Administration tasks
  - Tools for PC administration: Information on Microsoft Management Console (MMC), SIMATIC Diagnose Tool (SDT) and the enhanced diagnostics for PCS 7 plants
  - Documentation and inventories: Suggestions for creating documentation and inventories

Creating and managing a PCS 7 project

The contents of the "Creating and managing a PCS 7 project" section have been updated in accordance with the new functionalities and operating options in PCS 7 V8.0. The underlying procedure has changed slightly.

Configuration of the hardware (AS and I/O)

The contents of the "Configuration of the hardware (AS and I/O)" section have been updated in accordance with the new functionalities and operating options in PCS 7 V8.0. Attention must be paid to changes to the procedures and settings as well as any enhancements in the following sections in particular:

- Cycle/clock memory: Information on the size of the process picture for the inputs and outputs
- Cyclic interrupts: Settings in the "Execution" and "Partial process picture" columns
- Memory: Notes on local data and communications resources
- Special settings for H systems: Notes on updates
- Settings for CP 443-5 Ext as PROFIBUS master
- Configuration of the ET 200M (H system and standard AS)
- Integrating field devices

Configuration of the network connections

The contents of the "Configuration of the network connections" section have been updated in accordance with the new functionalities and operating options in PCS 7 V8.0. Attention must be paid to changes to the procedures and settings as well as any enhancements in the following sections in particular:

- NetPro view
- AS-OS communication: Notes on configuring an AS-OS connection
- AS-OS communication: Procedure and settings when setting up the AS-AS communication.

Configuring AS Functions

The contents of the "Configuring the AS Functions" section have been updated in accordance with the new functionalities and operating options in PCS 7 V8.0.

This section contains the following new sections:

- Control Module Type (CMT)
- PCS 7 Advanced Engineering

Attention must be paid to changes to the procedures and settings as well as any enhancements in the following sections in particular:

- Master Data Library: Notes on the adoption of existing base elements in the master data library
- Updating block types: Notes on updating block types
- AS resource utilization: Information on the cycle memory and communication utilization
- Creating process tags
- Requirements for configuration in CFC Editor
- Import/Export Assistant (IEA)

Compiling and downloading

The contents of the "Compiling and downloading" section have been updated in accordance with the new functionalities and operating options in PCS 7 V8.0. Attention must be paid to changes to the procedures and settings as well as any enhancements in the following sections in particular:

- Downloading the user program: Notes on downloading changes, read-back prior to complete download and comparing time stamps
- OS compilation: Notes on the OS compilation mode, procedure for OS compilation

Configuring OS Functions

The contents of the "Configuring the OS Functions" section have been updated in accordance with the new functionalities and operating options in PCS 7 V8.0.

This section contains the following new sections:

- OS resource utilization
- Process Historian

Attention must be paid to changes to the procedures and settings as well as any enhancements in the following sections in particular:

- Design of process pictures
- Block icons/User objects
- SIMATIC Logon

Changing projects in process mode

The contents of the "Changing projects in process mode" section have been updated in accordance with the new functionalities and operating options in PCS 7 V8.0. The underlying procedure has changed slightly.

Integrated asset management

The contents of the "Integrated asset management" section have been updated in accordance with the new functionalities and operating options in PCS 7 V8.0. Attention must be paid to changes to the procedures and settings as well as any enhancements in the following sections in particular:

- Characteristics for the MS server
- Single station system with Maintenance Station (MS)
- Tips on configuration

Note

In the overall document you will also receive notes on the increased availability as part of the Lifecycle agreements.

Preparation and administration 3

3.1 Overview

Introduction

Implementation of the required automation functions is often possible with PCS 7 in various ways. The work steps described in this document for project creation, configuration and parameter assignment provide the basis for the PCS 7 application to be created. The following aspects play an important role in this for the complete runtime of the system:

- Availability
  The availability of the overall system can be influenced by appropriate actions in the PCS 7 application starting in the planning phase.
- Expandability
  Expansions and/or changes will need to be made repeatedly following the initial commissioning of a PCS 7 system. Attention must be paid to this when creating the PCS 7 application so that these can be executed more efficiently.
- Maintainability
  According to the IEEE 610.12-1990 standard, software maintenance is understood to be "the modification of a software product after delivery to correct faults, to improve performance or other attributes, or to adapt the product to a modified environment".
- Legibility
  Among other things, one of the principles of programming in IT theory is that the software must be created legibly. The requirements are that the code is well formatted, corresponding identifiers are used and meaningful comments are inserted. The following points should be achieved or improved by adhering to these principles:
  – Options for reviewing the software in order to improve its correctness and robustness
  – Options for maintaining the software
  – Options for expanding the software

The following section provides an overview of the topics in this section.

Preparatory planning

You will find information about the following topics in this section:

- Documentation
- Plant concept
- Hardware selection
- Naming
- Workgroup or domain
- User rights
- Backup management
- Patch management and security updates

Installation

You will find information about the following topics in this section:

- Hardware configuration and BIOS settings
- Hard disk distribution
- Installation of the operating system
- PCS 7 installation
- Network settings
- Terminal bus set-up
- System bus set-up
- Setting up users and assigning rights
- License management

Administration tasks

You will find information about the following topics in this section:

- Tools for PC administration
- Documentation and inventories

See also

PCS 7 PC Configuration and Authorization
(http://support.automation.siemens.com/WW/view/en/68157327)

3.2 Preparatory planning

3.2.1 Documentation

Configuration guidelines for the PCS 7 application

Approved specifications are a prerequisite for configuring a PCS 7 plant in the GMP environment. Projects of this type generally follow the GAMP5 approach. The objectives in the GAMP5 documents include: "Guide aims to achieve process control systems that are fit for intended use and compliant with applicable regulations; providing recommended good practice based on a life cycle approach for the development, maintenance, and management of process control system.".

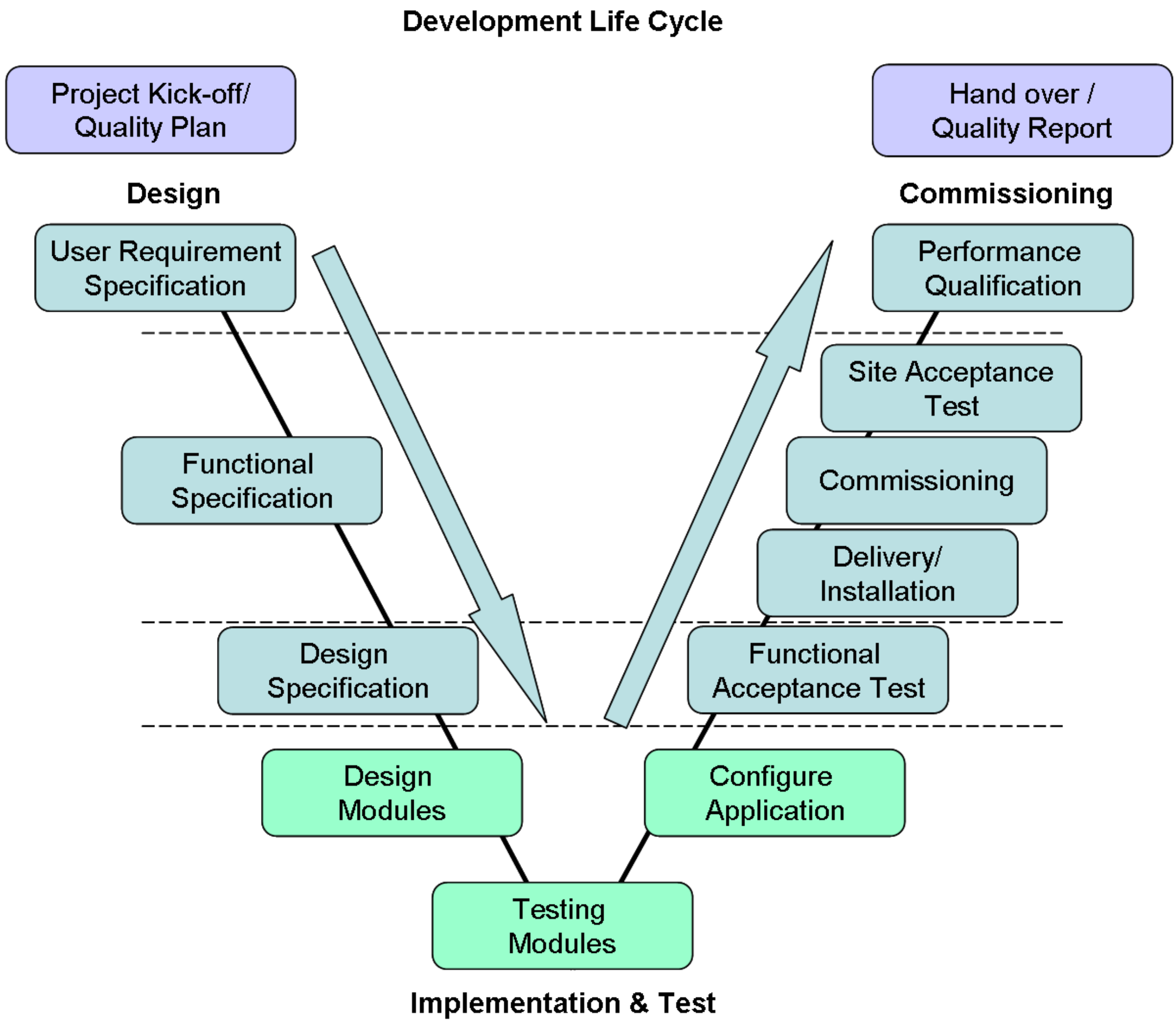
Adherence to the guidelines has a positive influence on the following aspects:

- Compliance with legal regulations
- Quality of the products
- Production efficiency
- Cost savings

Even in projects where there are less legal regulations to be complied with and not as many high requirements related to quality and efficiency, a similar approach (e.g. the so-called GAMP light) must be applied whereby only terms and phases from GAMP5 are used.

Specifications / guidelines

The following figure shows the specifications/guidelines that are meaningful at the start of a project:



The documents build on each other and become increasingly more detailed in accordance with the V model of the GAMP5 approach. However, it is not only creation of the PCS 7 solution that is defined and regulated with these guidelines. They also form a very good basis for all future work on a PCS 7 plant and provide consistent quality over the plant's entire lifecycle.

The following specifications must be observed:

- User Requirement Specification (URS)
- Functional Specification (FS)
- Design Specification (DS)

The test documents used for reviewing and documenting adherence to the specifications are just as important:

- Factory Acceptance Test (FAT), also known as Installation Qualification (IQ)
- Site Acceptance Test (SAT) also known as Operational Qualification (OQ)
- Performance Qualification (PQ)

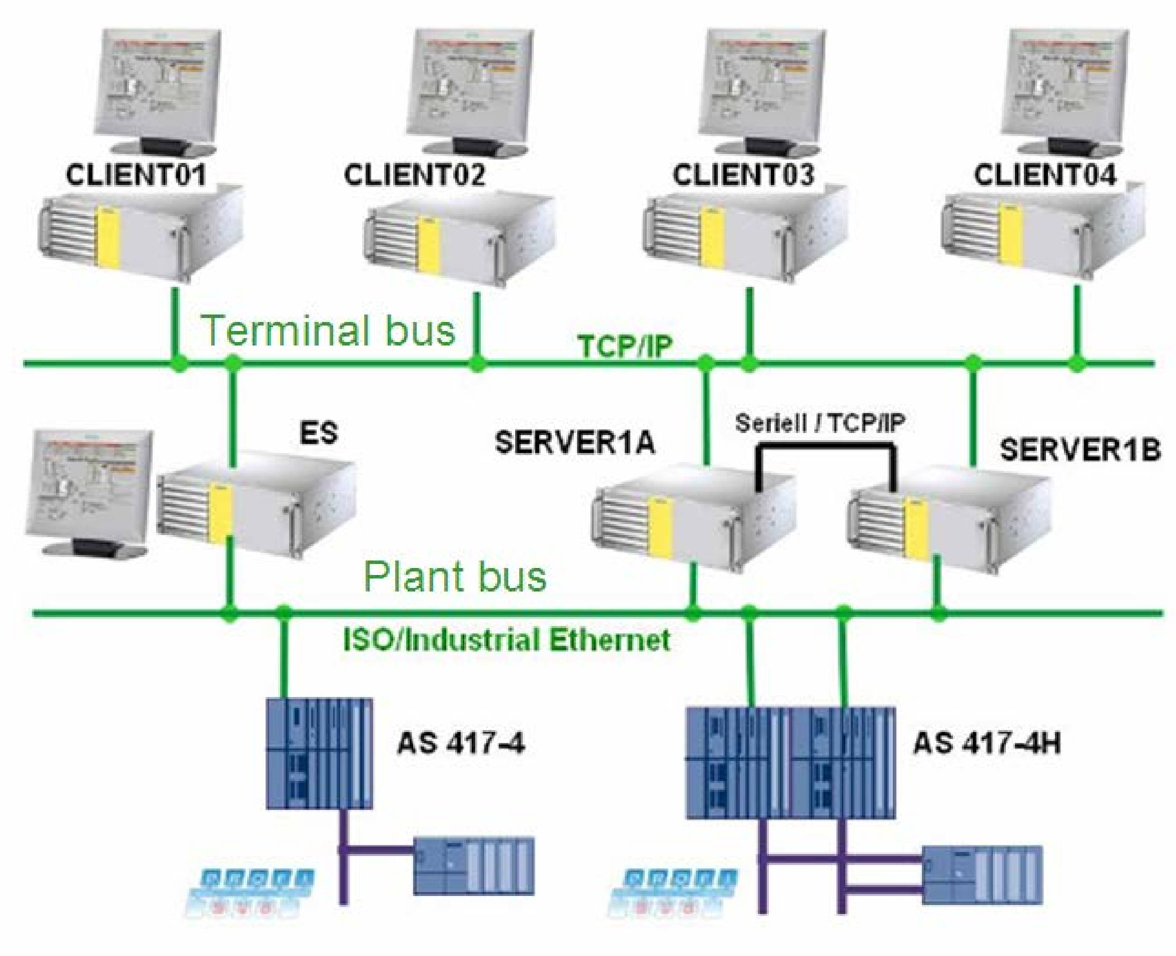
These documents are used for quality assurance purposes during a plant's entire lifecycle.

The PCS 7 compendia should be taken into account for the design guidelines and test specifications.

3.2.2 Plant concept

Introduction

The following plant concept is used in this documentation as an example for implementing process automation:



The concept presented consists of the following components:

- 1 engineering station (ES): Central station for configuring the complete automation solution.
- 2 automation systems (AS 417-4 und AS 417-4H): for example for automating two plant areas "Reactor 1" and "Reactor 2".
- 1 OS server with redundant OS server as a partner station for providing the process pictures and process data for operating the plant.
- 4 OS clients for centralized and decentralized process operation

This structure can be easily scaled to larger quantity structures by adding further automation systems or redundant OR server pairs.

Note

Derivation of the appropriate automation solution for a process plant is explained in more detail through an overview of typical questions in the "SIMATIC Process Control System PCS 7 Engineering System" manual. Taking this overview into account is recommended for effective planning of the plant.

3.2.3 Hardware selection

Recommended hardware configuration

The PC hardware should correspond to the recommended hardware configuration, which is described in the supplied "PCS 7 Readme" documentation for the PCS 7 version to be installed.

Above all, it should be ensured that there is sufficient RAM, fast hard drives and industrial compatibility for the place of use in order to avoid performance limitations at a later date.

Increased availability as part of Lifecycle agreements

Use SIMATIC PCS 7 industrial workstations based on SIMATIC IPC. These are system-tested and pre-installed with the relevant PCS 7 version. Expenditure from installation, maintenance and repair of the PC hardware is thereby reduced considerably.

Note

Special attention should be paid to hardware compatibility for the PCS 7 V8 operating systems Windows 7 and Windows Server 2008 R2 based on 64bit. For this pay attention to the hardware compatibility matrix in the "PCS 7 V8 Readme" document.

3.2.4 Naming concept

Rules for computer names

The selection of the computer name is crucial to the project configuration.

Select short and descriptive computer names that provide some information about the function of the PC station in the overall plant. Note the following rules:

- The computer name may only contain uppercase letters and numbers.
- The computer name must start with a letter.
- The computer name may only contain up to 15 characters (limited by the operating system).

Note

The following names must be identical when you configure an OS or BATCH Server and an Engineering Station:

- Computer name
- Name of the PC station

Note

You can find additional information about the naming conventions in the following documentation:

- PCS 7 Readme V8.0 SP1 (http://support.automation.siemens.com/WW/view/en/66807356) "Requirements" section, sub-section "Rules for computer names"
- "SIMATIC Process Control System PCS 7 Engineering System (http://support.automation.siemens.com/WW/view/en/68157345)" manual
- WinCC online help (search string "illegal characters")

Changing computer names

The computer name can no longer be changed after the installation of PCS 7. If you do change the computer name, you will have to install the computer again (Restore DVD). Changing computer names often leads to problems in practice (e.g. in the case of multi-station systems with the SQL server installed).

The following rules must be observed:

- If you want to change the computer name for a bundle PC, perform a new installation with the Restore DVD.
- If you want to change the computer name for a PC you have installed yourself, perform a new installation of Windows.

3.2.5 Workgroup and domain

Working environment

You have the option of operating the computers in your PCS 7 plant in a workgroup or domain environment.

The following tables present a comparison of the advantages and disadvantages (from a technical perspective) as well as scenarios (examples) and their use in workgroups and domains.

Note

This information is provided as a basis for discussion to assist you in the selection of the appropriate environment for your computers. In addition to the technical criteria, also consider organizational criteria (for example, plant-specific IT, Microsoft expertise, resources, workload and maintenance, etc.).

Advantages and disadvantages

	Domain (AD; Active Directory)	Workgroup (WG)
General information (in relation to Microsoft Windows)	The user information is stored centrally.	Standard user settings are required at each PC station.
	Central safety database	Local safety database
	Suitable for very large networks (scalability)	Suitable for short distances in the plant and a limited number of PC stations.
	Permissions for devices and files are managed in the AD.	Permissions for devices and files are managed by individual PC stations.
Administrator	The administrator must have comprehensive knowledge (substantially higher qualifications).	The administrator must be familiar with the setup and management of PC stations in the workgroup network.
User accounts, group policies, resources, security	Central administration in the AD.	Distributed administration on each PC station.
Planning	Comprehensive planning is required.	Less comprehensive planning is required.
Number of PC stations	Additional PC stations required to manage the AD. Windows server required to store central security information.	Windows server only required if this is used to set up the infrastructure, for example, as a DHCP server
Use with SIMATIC Logon	• The users set up for the AD are used. • High reliability through the use of redundant domain controllers.	• The users can be managed at a central PC station. • No redundancy is available for the central logon station to be set up.

DHCP server

Note

In PCS 7, the use of a DHCP server is only permitted with address reservation. All PC stations must work with reserved addresses.

DNS / WINS server

The recommended solution for name resolution is the use of a DNS / WINS server.

Scenarios

Scenarios (examples)	Domain (AD; Active Directory)	Workgroup (WG)
New user is added.	The new user is created centrally in the AD and is then available immediately on all PC stations.	The new user must be added on each PC station.
User password is changed.	The password is changed centrally in the AD.	The password must be changed on each PC station.
Add or replace computer	The settings are applied automatically in accordance with the group policies of the corresponding organizational unit.	The settings must be adapted locally on the PC station.
Modify security settings	The settings are changed centrally in the AD and distributed by means of group policies.	All settings must be changed locally.
Microsoft Updates are to be distributed.	The settings for the Microsoft Windows Software Update Service (WSUS) are made centrally in the domain.	The settings for the Microsoft Windows Software Update Service (WSUS) are made at each PC station.
Devices are added (e.g. printer, fax or scanner).	The devices are announced by AD.	Devices not announced. The information for connecting to the device must be known.
	The security settings can be made centrally for each device.	Each user that uses the device must be created locally at this PC station and log on with local user information.
One user uses multiple computers.	The user profile can be saved centrally. This applies the settings to all PC stations at logon.	The user has a local profile on each PC station.
	If the profile is not saved centrally, every user will have their own local profile.	

The lists above are not weighted in terms of importance; you must determine which advantage or disadvantage is the most significant for the PCS 7 plant in question.

Domain example

Changes can be made centrally, fast and conveniently in the domain structure. However, the administration of a domain requires know-how, experience and additional work.

Workgroup example

In the workgroup, the majority of settings have to be made on the local computer. If a PCS 7 plant is running with fixed settings, however, and few changes are expected, these settings only need to be made once. In this case, additional time for creating a domain and providing extra training for the operating personnel is not required.

Note

You can find more information in the following manuals:

- PCS 7 Security Concept, Recommendations and Notes (http://support.automation.siemens.com/WW/view/en/22229786)
- SIMATIC Process Control System PCS 7 Security concept PCS 7 & WinCC (Basic) (http://support.automation.siemens.com/WW/view/en/60119725)
- SIMATIC Process Control System PCS 7 Support and Remote Dialup (http://support.automation.siemens.com/WW/view/en/38621092)
- SIMATIC Process Control System PCS 7 Patch management and security updates (http://support.automation.siemens.com/WW/view/en/38621083)
- SIMATIC Process Control System PCS 7 Managing virus scanners (http://support.automation.siemens.com/WW/view/en/38625951)

Integration in a domain

All PCs in the PCS 7 product bundles are configured for a Windows workgroup. If you include preconfigured PC systems in a Windows domain, you must reactivate the security settings using the SIMATIC "Security Controller" software.

3.2.6 User administration

User concept

Using the following roles for a PCS 7 plant is recommended when planning the user concept:

- PCS 7 installation

  A user account which is a member of the local administrator group is required to start the PCS 7 set-up.
- Windows users for operator stations and engineering stations

  Working permanently with administrator rights on the PCS 7 system is not recommended once the installation is complete for security reasons. This means that at least one additional Windows user is required on each station. Membership of the "user" group suffices for Windows 7 and Windows Server 2008 R2
- Logging onto OS Runtime (using the SIMATIC logon)

  For each operator you can create a Windows user who logs on with the allocated user rights with activated OS runtime. For this a Windows user only needs rights in the corresponding groups that are also set up in the OS configuration. The same applies for the PCS 7 "SIMATIC BATCH" and "SIMATIC Route Control" options.
- Logging onto SIMATIC Manager

  For each project engineer you can create a Windows user in order to record configuration changes in the change log. Windows users only require rights in the corresponding SIMATIC logon groups.

Note

The following guidelines apply to creating a new user account in accordance with Microsoft Windows Help:

- A user name may not be the same as another user or group name on the computer being managed.
- The name may contain up to 20 small or upper case letters and figures.
- The characters " / \ [ ] : ; | = , + * ? < >" are not permitted in user names.
- A user name may not consist solely of periods (.) or spaces.

Increased availability as part of Lifecycle agreements

SIMATIC Logon can be used without an additional license as of PCS 7 V7.1. Logging on via SIMATIC logon groups is recommended for the OS runtime as well as for the PCS 7 "SIMATIC BATCH" and "SIMATIC Route Control" options.

3.2.7 Backup management

Introduction

Creating at least one backup of the operational system partition including the PCS 7 installation and storing this in case of any potential failure is required in order to increase availability of the plant and to reduce failure times.

In connection with this a restore DVD is also supplied with the SIMATIC PCS 7 industrial workstation (IPC). Further information can be found in your IPC operating instructions.

PCS 7 multiprojects are archived via a SIMATIC manager function, meaning that no backup needs to be created for a data partition.

Backup software

In selecting image software, ensure that it is suitable for the operating system in use.

"SIMATIC PC Image Creator" software is offered for data backups in Windows as a supplement to the SIMATIC PCS 7 industrial workstation. This software enables simple backup and fast recovery of complete compact flash and hard drive content as well as of individual partitions (images).

Further information can be found on this on the Internet at "Delivery release of the SIMATIC IPC Image & Partition Creator" (http://support.automation.siemens.com/DE/view/en/64804201).

Note

Please note that neither license keys nor authorizations can be backed up along with the data. Move authorizations and license keys to a different medium before creating the image, e.g. to a separate partition.

Increased availability as part of Lifecycle agreements

A current backup must be created and saved on the system path determined for this following each change to the system partition e.g. through a software update.

3.2.8 Patch management and security updates

Windows Software Update Service

Using an additional WSUS server is recommended for distributing Microsoft security patches in larger plants.

Note

Information on using the WSUS within PCS 7 plants can be found in the "SIMATIC Process Control System PCS 7 Patch management and security updates" (http://support.automation.siemens.com/WW/view/en/38621083) document.

Released security patches

Information on the Microsoft security patches for SIMATIC PCS 7 that have been tested for compatibility can be found on the Internet in the FAQ "Which Microsoft security patches have been tested for compatibility with SIMATIC PCS 7?" (http://support.automation.siemens.com/WW/view/en/18490004).

Additional information

Further information on installing security patches, hotfixes and service packs can be found in the "SIMATIC Process Control System PCS 7 PC configuration and authorization" (http://support.automation.siemens.com/WW/view/en/68157327) manual.

Increased availability as part of Lifecycle agreements

Update all PC stations with the released patches in a uniform manner and in good time.

3.3 Installation

3.3.1 Hardware configuration and BIOS settings

Connecting and expanding hardware

Pay attention to the operating instructions for the relevant PC hardware before unpacking. In particular compliance with the environmental conditions, the prescribed installation and correct connection of I/O and power supply devices helps to avoid faults and increase availability.

You can improve the security and stability of the PCS 7 plant by installing all PC stations in lockable control cabinets.

The following options are available to you as possible hardware expansions:

- Multiple monitors on one PC → Matrox Multi VGA
- Acoustic or visual signal transmitter → horn module
- Acoustic signal transmitter → sound card
- Time signal via DCF77 → time reception service
- Smart cards → smart card reader

Note

Setting up the relevant devices and drivers is described in the "SIMATIC Process Control System PCS 7 PC Configuration and Authorization" (http://support.automation.siemens.com/WW/view/en/68157327) manual.

BIOS Settings

You can improve the security and stability of the PCS 7 plant through the following measures within BIOS.

- Create a BIOS password. Change the existing default passwords.
- Deactivate disk, CD or DVD drives that are not required. This applies principally to the operator stations.
- Deactivate USB port functions that are not required. This applies principally to the operator stations.
- Deactivate the boot menu display and set the hard disk with system partition at the initial position of the boot sequence.

Note

You can find additional information in the document "PCS 7 Readme V8.0 SP1" (http://support.automation.siemens.com/WW/view/en/66807356).

3.3.2 Hard disk distribution

Introduction

The following chart shows an example of how a PC station hard disk can be distributed:

drive	Name	Size	Format	Note
C:	SYSTEM	Recommendation: > 100GB	NTFS	Installation of Operating System and PCS 7
D:	DATA	Recommendation: > 100GB	NTFS	PCS 7 project data
I:	IMAGES	Optional	NTFS	Backup files (including potentially via the network)

Note

The Microsoft SQL Server stores temporary files on the "C:" drive. Therefore, you should regularly check whether enough hard disk space is available, especially during the FAT.

You can find more information on the hard disk distribution in the SIMATIC Process Control System PCS 7 PC Configuration and Authorization (http://support.automation.siemens.com/WW/view/en/68157327) manual.

3.3.3 Installation of the operating system

Introduction

The operating system and SIMATIC PCS 7 software are preinstalled on the SIMATIC PCS 7 industrial workstation (IPC). Take note of the information in this section in order to complete their installation.

Note

If a computer installation is completed manually, the requirements and procedure needed for this in the "PCS 7 Readme" and described in detail in the "SIMATIC Process Control System PCS 7 PC Configuration and Authorization" (http://support.automation.siemens.com/WW/view/en/68157327) manual must be observed.

Licensing mode (Windows Server 2003)

Ensure that the operating systems are licensed correctly on all PCS 7 stations and that adequate Microsoft Client Access licenses (CAL) are available for accessing a Windows server operating system via the network.

All stations with a Windows server operating system installed are set to "Pro Server" licensing mode in their control panel as standard.

Select the "per device or per user" option button for the licensing mode if more than one server or more than five clients are present in one area.

You can use the "Licensing" tool (Folder start menu > Administrative Tools) to manage the CAL settings centrally from a Windows server in a network with multiple Windows servers.

Internet time

Ensure that the Windows system time is not automatically synchronized via the Internet where the PC stations are operated in a workgroup (Change date/time > Internet time). This allows you to avoid corresponding error messages from the Windows time service in the events display.

Virus scanners

By setting up a virus scan solution you can reduce the risk of plant faults occurring as a result of malware. Virus scanners approved for PCS 7 can be installed later.

Suitable virus scan software versions from manufacturers "Symantec", "McAfee" and "Trend Micro" have been tested and approved for each PCS 7 version. You can find the relevant approved software version in the "PCS 7 Readme" documentation. You can also find information on this in the FAQ "With what are SIMATIC PCS 7 V8.x, V 7.x etc. compatible?" (http://support.automation.siemens.com/DE/view/en/22761505).

Note

Information on installing and managing virus scanners within PCS 7 plants can be found in the "SIMATIC Process Control System PCS 7 Virus Scanner Administration" (http://support.automation.siemens.com/WW/view/en/38625951) document.

Additional software

Only install the software products mentioned in the documentation on a PCS 7 PC, e.g. MS Office components or burning software. This applies in particular to PC stations with process mode (OS, BATCH, Route Control).

Installing and simultaneously activating applications that are not approved by Siemens can adversely impact the PCS 7 system performance.

The user bears sole responsibility when third-party products are used. If you require third-party products, these should be installed before you install PCS 7. PCS 7 and the third-party products may not run at the same time.

Increased availability as part of Lifecycle agreements

Install a virus scanner solution for the terminal bus and supply this with current patterns.

Only install software approved by Siemens on all stations with process mode.

3.3.4 Installation of PCS 7

Introduction

PCS 7 software is installed automatically via a PCS 7 framework setup. Detailed information on this can be found in the "SIMATIC Process Control System PCS 7 PC Configuration and Authorization" (http://support.automation.siemens.com/WW/view/en/68157327) manual.

If a computer installation is being performed manually then the requirements and the procedure for this must be observed. Information on this can be found in the "PCS 7 Readme" documentation and in the "SIMATIC Process Control System PCS 7 PC PC Configuration and Authorization" (http://support.automation.siemens.com/WW/view/en/68157327) manual.

3.3.5 Network settings

Address management

Following the PCS 7 installation, check the addresses and make any settings which may be required. Systematic assignment of the addresses at the start of the project will make configuration, commissioning, plant expansion, and maintenance easier.

Record the assigned addresses in a table like the one shown below, for example, and keep them up to date:

Name Subproject	Name PC station/ AS station	Terminal bus IP address	Plant bus IP address	Plant bus CP1613 MAC address	Plant bus CP443-1 MAC address
25_ES	ES26	172.20.1.26	172.10.1.26	08-00-06-01-00-26	X
20_OS	SERVER1A	172.20.1.xx	172.10.1.xx	08-00-06-01-00-xx	X
20_OS	SERVER1B	172.20.1.xx	172.10.1.xx	08-00-06-01-00-xx	X
21_CL	CLIENT01	172.20.1.xx	X	X	X
21_CL	CLIENT02	172.20.1.xx	X	X	X
21_CL	CLIENT03	172.20.1.xx	X	X	X
21_CL	CLIENT04	172.20.1.xx	X	X	X
01_Plant_A	AS1_H	X	X	X	08-00-06-01-01-10
01_Plant_A	AS1_H	X	X	X	08-00-06-01-01-11
02_Plant_B	AS2	X	X	X	08-00-06-01-01-26
	Scalance20	172.20.1.xx	X	X	X
	Scalance10	X	172.10.1.xx	X	X

Setting the transmission rate and operating mode in the network

Siemens devices, including Industrial Ethernet switches (OSM/ESM, ScalanceX) and the Industrial Ethernet CPs (CP 443-1 as of version 1EX10) are factory set for automatic detection of the parameters for transmission rate and operating mode (autosensing, autonegotiation).

Autosensing describes the property of network components to automatically interpret an incoming transmission signal. In this case, the device independently determines if the signal has a data rate of 10 Mbps, 100 Mbps, or 1,000 Mbps. No explicit setting is required related to whether the device is being operated with a fast Ethernet connection or with a standard Ethernet connection.

Autonegotiation denotes the configuration protocol for a fast Ethernet connection. It makes it possible for all the devices involved to negotiate the transmission rules before sending any data packages. The transmission rate of 10 or 100 Mbps and the transmission method are negotiated. Half-duplex or full-duplex are the options for the transmission method.

The following applies as of PCS 7 V6.1: Retain the factory settings.

Note

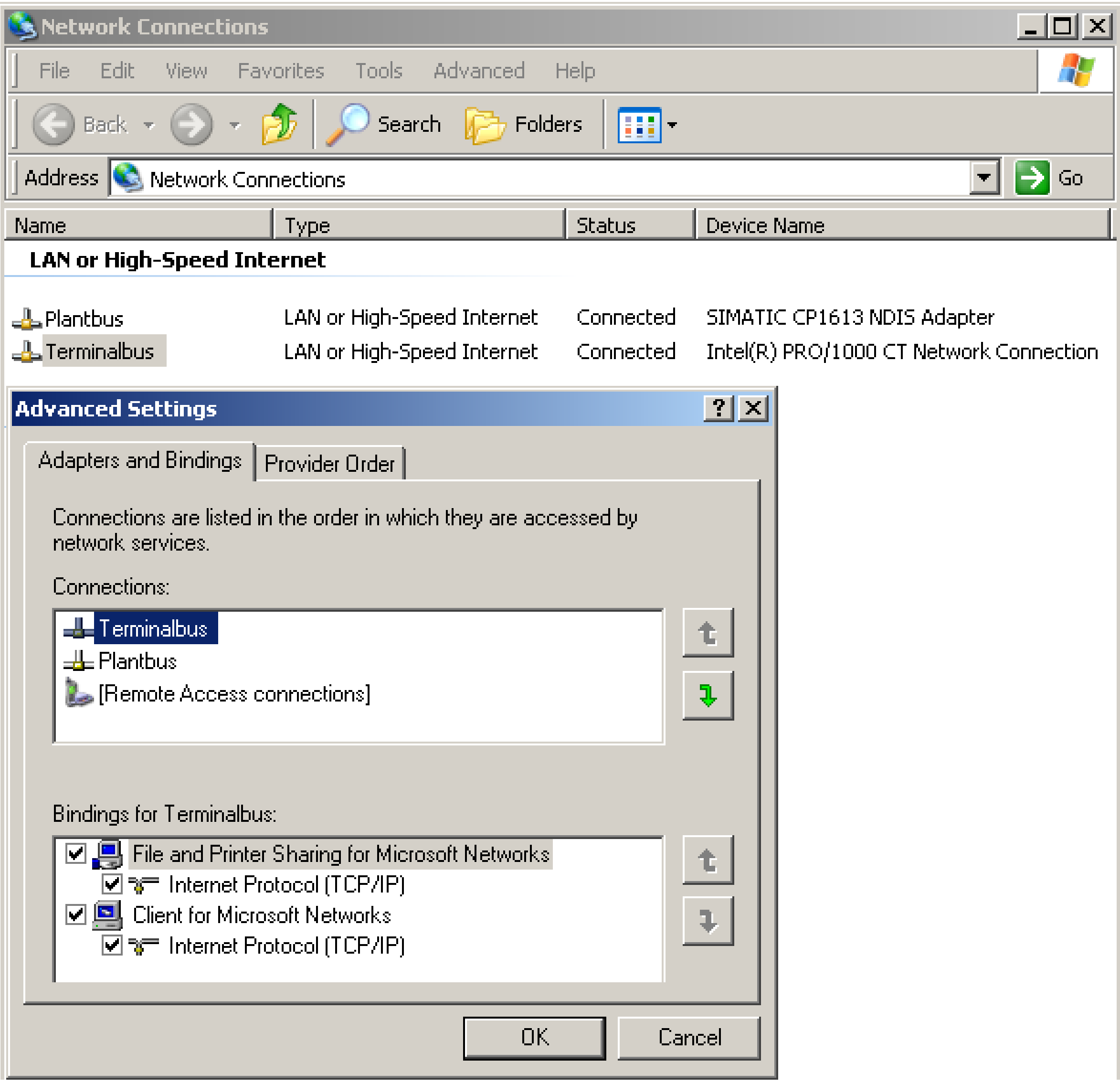
The only time you need to manually set the two components on the patch cable to a uniform transmission setting, for example 100 Mbps full-duplex, is when one of the components on the plant bus or terminal bus does not support the autonegotiation function. Deviating settings may lead to unpredictable error scenarios.

3.3.6 Configuring the terminal bus

Procedure

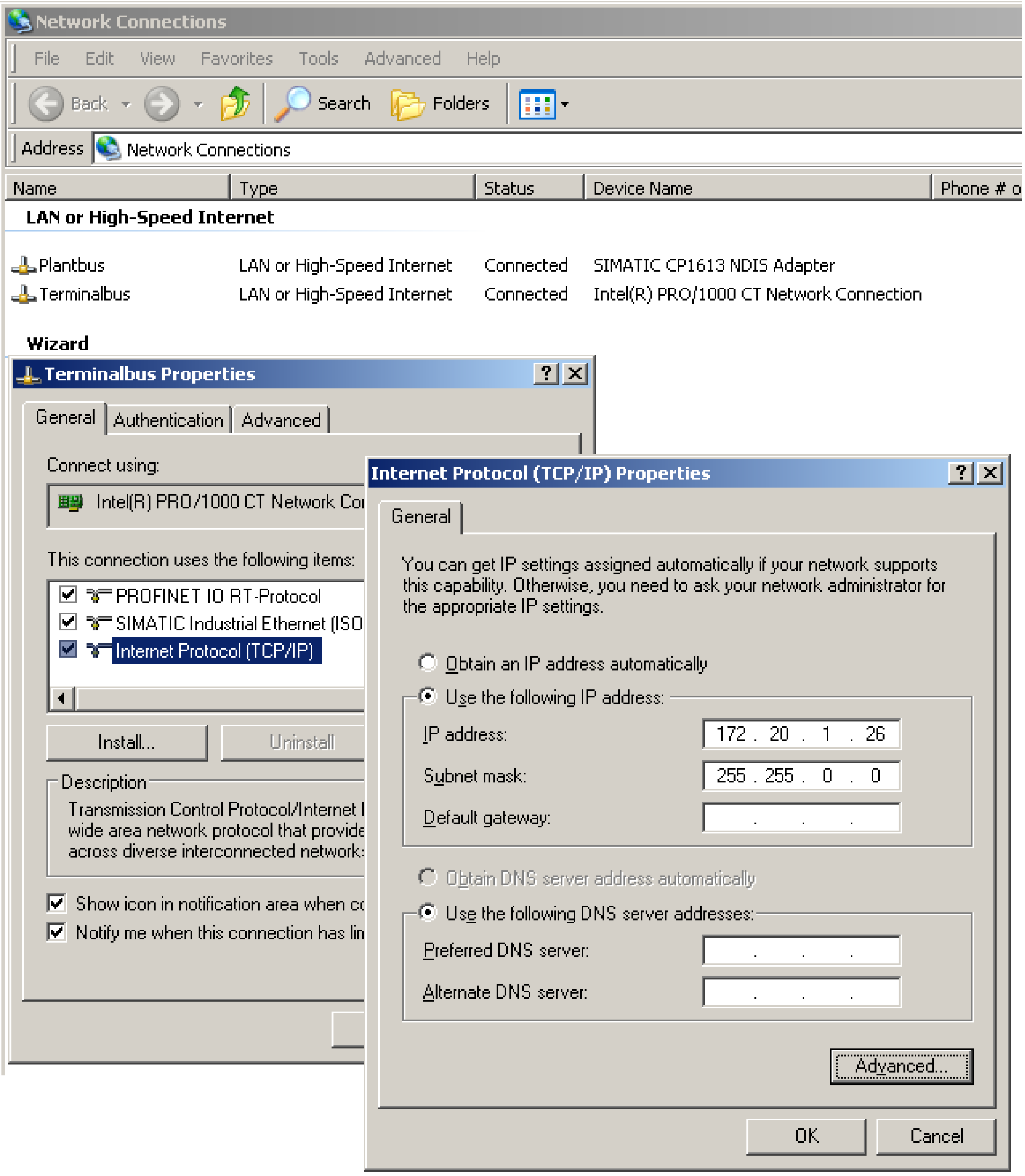
The following steps show how to configure the terminal bus for a PCS 7 plant:

1. Rename the compatible network connection, e.g. to "terminal bus".
2. Select the "Advanced -> Advanced Settings..." command via the "terminal bus" connection context menu in order to set the network adapters. In order to ensure fault-free communication via the terminal bus on all nodes (e.g. OS servers, OS clients), the relevant network card must be located in first position as regards the order in which the network services are accessed.



3. Set the settings for the "Internet (TCP/IP)" protocol inside the network connection in accordance with the project specifications.
4. Ensure that the energy-saving option is switched off in the network card properties.
5. Set the same work group for all PCS 7 stations where you are not using a domain structure.
6. If you are not using a WINS/DNS server, create the LMHOSTS and HOSTS files for TCP/IP name resolution and distribute these to all PCS 7 stations.

7. In the "LMHOSTS" file use the parameter #PRE for each computer name to be entered so that this name is entered into the so-called NETBIOS cache when the computer is booted up. (The cache can be displayed via the command line using the "nbtstat –c" command)

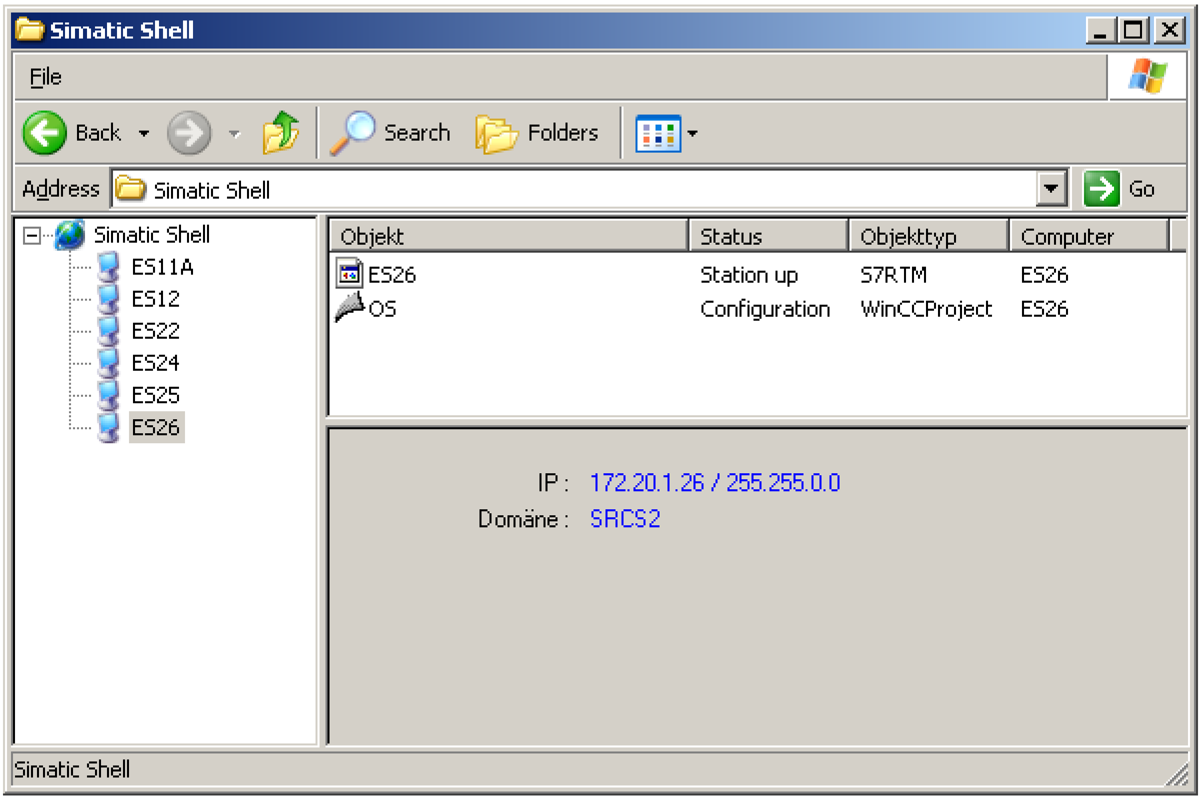


Note

Further information on setting up, managing and backing up network structures such as workgroups and domains can be found in the "Security Concept PCS 7 and WinCC – Basic Document” (http://support.automation.siemens.com/WW/view/en/60119725).

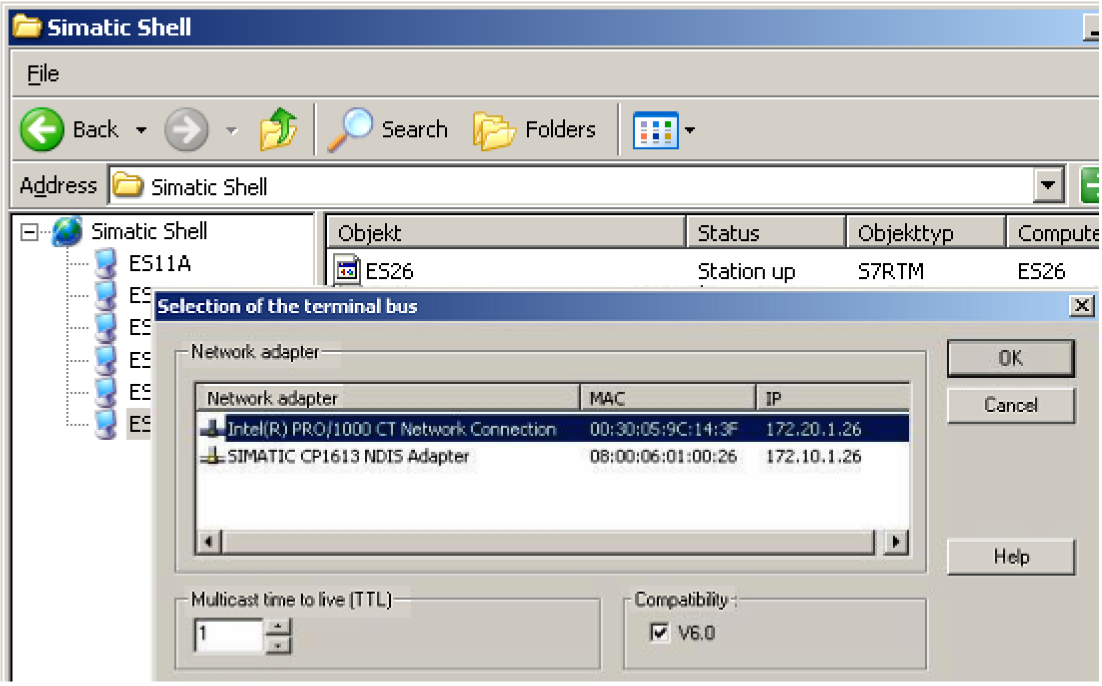
Checking the availability of communication partners

Once the network settings for the terminal bus are completed, you can use the SIMATIC Shell tool on each station to check if the required partner stations (ES, OS server, and OS clients) can be seen on the terminal bus. SIMATIC Shell is available as a folder in the workspace of the Windows Explorer.



If there is no required partner station in SIMATIC Shell, it may indicate that the TCP/IP name resolution is poorly set. There are several concepts for a TCP/IP network in this regard, beginning with the editing of the LMHOSTS and HOSTS files and continuing with the use of WINS/DNS servers.

You can trigger a refresh of the SIMATIC Shell using "Settings ..." in the shortcut menu. Select the network adapter for the terminal bus and click "OK".



If all stations are available you can manage all stations centrally via the network using the Microsoft Management Console (See "Tools for PC administration (Page 43)").

3.3.7 Configuring the plant bus

Communication of a PCS 7 ES via the plant bus

In SIMATIC PCS 7, the "S7 online" access point must be set to the "PC internal" interface. All access to the AS - in order to check the module information of an AS or to download S7 programs, for example - is performed via "PC internal". "PC internal" is a centrally configurable interface, which can be loaded with project-specific settings for all stations on the plant bus. The settings are made on the ES in the PCS 7 multiproject and downloaded from the ES. You can find the relevant procedure in Section "Engineering Station (Page 61)".

Communication is normally based on the plant bus on the ISO protocol.

Note

Use TCP/IP on the plant bus under the following conditions:

- Joint (combined) terminal and plant bus for smaller plants without an OS server
- Routing via subnets required
- Using an automation system with integrated Ethernet interface
- Using NTP (Network Time Protocol) for time synchronization
- Monitoring network components on the plant bus for asset management
- Operating gateways on the plant bus (external connection of an AS)

Use the ISO protocol on the plant bus under the following conditions:

- Configuring "Fault-tolerant S7 connection" for H systems (concerns CPU firmware less than V5)
- Time synchronization based on the SIMATIC procedure

Using CP1613/CP1623

Using a CP1613/CP1623 in the engineering station or OS server has the following benefits:

- More than eight AS can be connected.
- Fault-tolerant AS-OS connections with automatic communication switchover can be configured.
- The "OS simulation" function can also be used for a redundant automation system.
- The CP MAC address can have parameters assigned to it or be modified.

Note

If a BCE (Basic Communication Ethernet) module is being used for communication instead of the CP1613/CP1623, parameters cannot be assigned to the MAC address. In the event of a fault (e.g. defective module) this may mean that the connections have to be reconfigured by the new MAC address of the replacement module and the project documentation has to be changed.

The following two TCP/UP protocols can be operated in parallel in the CP1613/CP1623:

- Windows communication (via the NDIS adapter)
- Communication via the "S7 online" access point (can be configured in NetPro/HW config)

Note

Different TCP/IP addresses have to be set in both TCP/IP protocols of the CP1613/CP1623 for unique identification purposes.

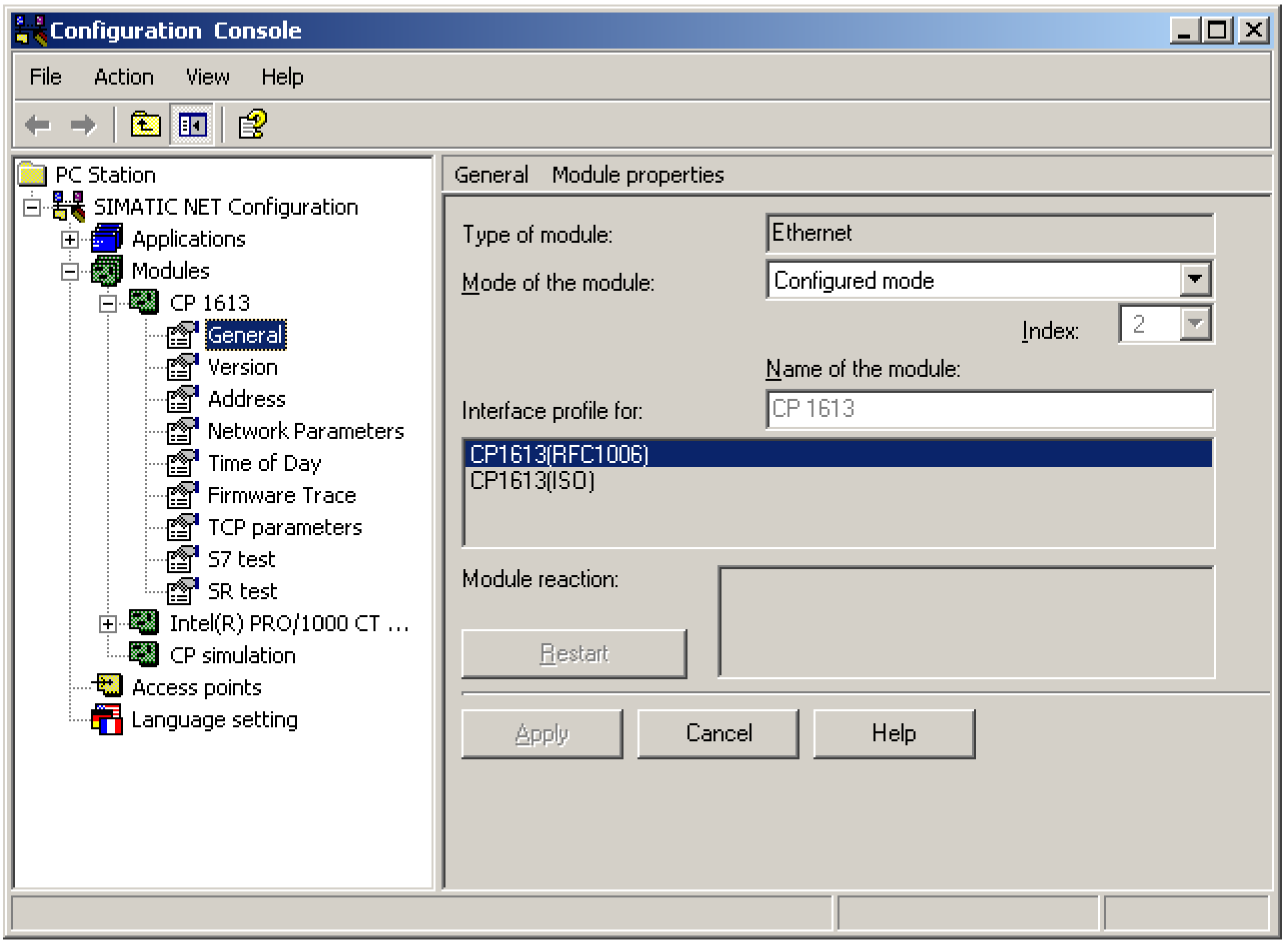
This applies in particular in PCS 7 V7.1 and above. From this version the NDIS adapter for CP1613/CP1623 is installed automatically through the PCS 7 setup and it cannot then be deactivated.

Procedure

The following steps demonstrate how to configure the plant bus:

1. If there is a network connection for CP1613/CP1623 in Windows, deactivate the "Client for Microsoft Networks" and "File and Printer Sharing for Microsoft Networks" protocols in this network connection, as these two Microsoft protocols are only required at the plant bus.

2. Check the current configuration of your installed network adapters using the "Configuration Console" tool ("Start > SIMATIC > SIMATIC NET > Set PC Station"). The plant bus is generally configured via the SIMATIC Manager of your ES and is described in the "Creating and managing a PCS 7 project (Page 45)" section.



3. Check that the MAC address and the TCP/IP addresses correspond with the planning.

Note

You can find detailed information about configuring the "Plant bus" connection in the Process Control System PCS 7; PC Configuration and Authorization (http://support.automation.siemens.com/WW/view/en/68157327) manual.

3.3.8 Setting up users and assigning rights

Introduction

The following tasks should be executed as part of configuring the computer:

- Creating the users for logging onto Windows for ES and OS station with main user rights and membership in the SIMATIC HMI group
- Providing SQL access authorization (for PCS versions less than V7.1 SP3)
- Adapting NTFS authorizations for the project directories

The following tasks should also be executed where SIMATIC Logon is used:

- Creating the "Logon_Administrator" user group for configuring SIMATIC Logon (for PCS 7 V7.x)
- Creating the user groups for SIMATIC Logon in accordance with the planned distribution of roles

Reference

You can find more information on the topic of "User rights" in the "SIMATIC Process Control System PCS 7 PC Configuration and Authorization" (http://support.automation.siemens.com/WW/view/en/68157327) manual.

3.3.9 License management

Introduction

A process for managing evidence of the existing licenses should be defined for all stages in the lifecycle of a PCS 7 plant. This management should cover all the licenses used in a plant. The following points must be taken into account:

- Storage location
- Person responsible
- Access
- Procedure in the event of loss or fault with a license

The serial number of each individual license should be listed in addition to the description and order number so that the license documents can be clearly matched with the licenses that are installed.

Use a defined station, e.g. the ES, in order to manage all license packages ordered centrally with the "Automation License Manager" program.

Procedure

1. Open the Automation License Manager on a PC station. Access protection is switched off as standard.
2. Connect all computers permanently via the "Connect computers" function.
3. Transfer all required license packages from the license disk or the license USB stick from PCS 7 V7.1 to the partitions provided for this.

Note

Managing the Automation License Manager and a description of the possible license types can be found in the "SIMATIC Process Control System PCS 7 PC Configuration and Authorization" (http://support.automation.siemens.com/WW/view/en/68157327) manual.

Reserves

There should be an overview of all licenses in use with the current reserves during the entire lifecycle of a PCS 7 plant.

Attention must be paid in particular to the reserves where the number is limited:

Components	Licensing levels	Remark
Engineering system (ES)	250 to unlimited PO	Number of configurable process objects (PO) in the CFC
Operator stations (OS)	250 to 8500 PO	PO per OS server
Automation system (AS)	100 to 3000 PO	PO per AS (depending on the CPU type)
Archiving (archive server and OS server)	<512 to 8x5000 tags	Archive tags
SIMATIC BATCH stations (batch processes)	1 to unlimited unit(s)	Units
Route Control stations (route control)	10 to 300 routes	Number of activated routes in process mode
Maintenance station	128 to unlimited tags	Number of hardware components monitored
PDM	4 to unlimited tags	Number of configurable devices
SIMATIC PCS 7 BOX	250 to 2000 PO	Process objects (PO)

3.4 Administration tasks

3.4.1 Tools for PC administration

Microsoft Management Console (MMC)

You can add the computer management for each PC station as a "Snap-In" in a Microsoft Management Console arranged by you. This allows you to manage all PC stations centrally from one computer (e.g. ES). For example you can check the event displays for all stations or add new users to all stations.

Further information on MMC can be found in the "Step-by-Step Guide to the Microsoft Management Console” (http://technet.microsoft.com/en-us/library/bb742442.aspx).

SIMATIC Diagnose Tool (SDT)

The SIMATIC Diagnose Tool provides you with the option of compiling diagnostics and system information. It gathers the information from a local computer or via remote access from multiple computers which can be reached via the network and files it scanned uniformly as a ZIP file for each computer.

You can find additional information on SDT in the FAQ "How do you use the "SIMATIC Diagnostics Tool" (SDT2012) to collect diagnostics and system data?" (http://support.automation.siemens.com/DE/view/en/65976202).

Expanded diagnostics for PCS 7 plants

The diagnostics available within the framework of PCS 7 plants should be collected and evaluated using preventive measures. Automated and uniform diagnostics are required to increase the quality of the diagnostics results and for comparison purposes.

Further information on this can be found in the document "How are uniform diagnostics completed for PCS 7 and WinCC plants?” (http://support.automation.siemens.com/DE/view/en/48698507).

Increased availability as part of Lifecycle agreements

Complete the configuration steps found in the "Diagnostics Configuration" section in the document "Expanded Diagnostics in PCS 7 and WinCC Plants" (http://support.automation.siemens.com/DE/view/en/48698507).

3.4.2 Documentation and inventories

Introduction

Once the installation is complete, document the actual status of the PC stations and of the software products in use. Determine the deviation from the setpoint separately.

The existing project documents, e.g. the plant overview plan, the network plan and the network address list should be controlled accordingly and updated as applicable.

Installation data storage media

A process for managing installation data storage media should be defined for all stages in the lifecycle of a PCS 7 plant. Among others the following points should be taken into account:

- Are there installation data storage media available for all software components?
- Who is responsible for maintaining the installation data storage media?
- Are the installation data storage media up-to-date?
- Where and how are the installation data storage media stored?
- How is access to the installation data storage media regulated?

In this regard all installation data storage media of all types must be considered that are required e.g. to reinstall software products or libraries.

Backups

Images are often created when PCs are installed in order to have restore points on the one hand in the event that faults occur later on in the installation, and so that any reinstallation can be completed more efficiently on the other.

Attention must be paid to the following points when managing images:

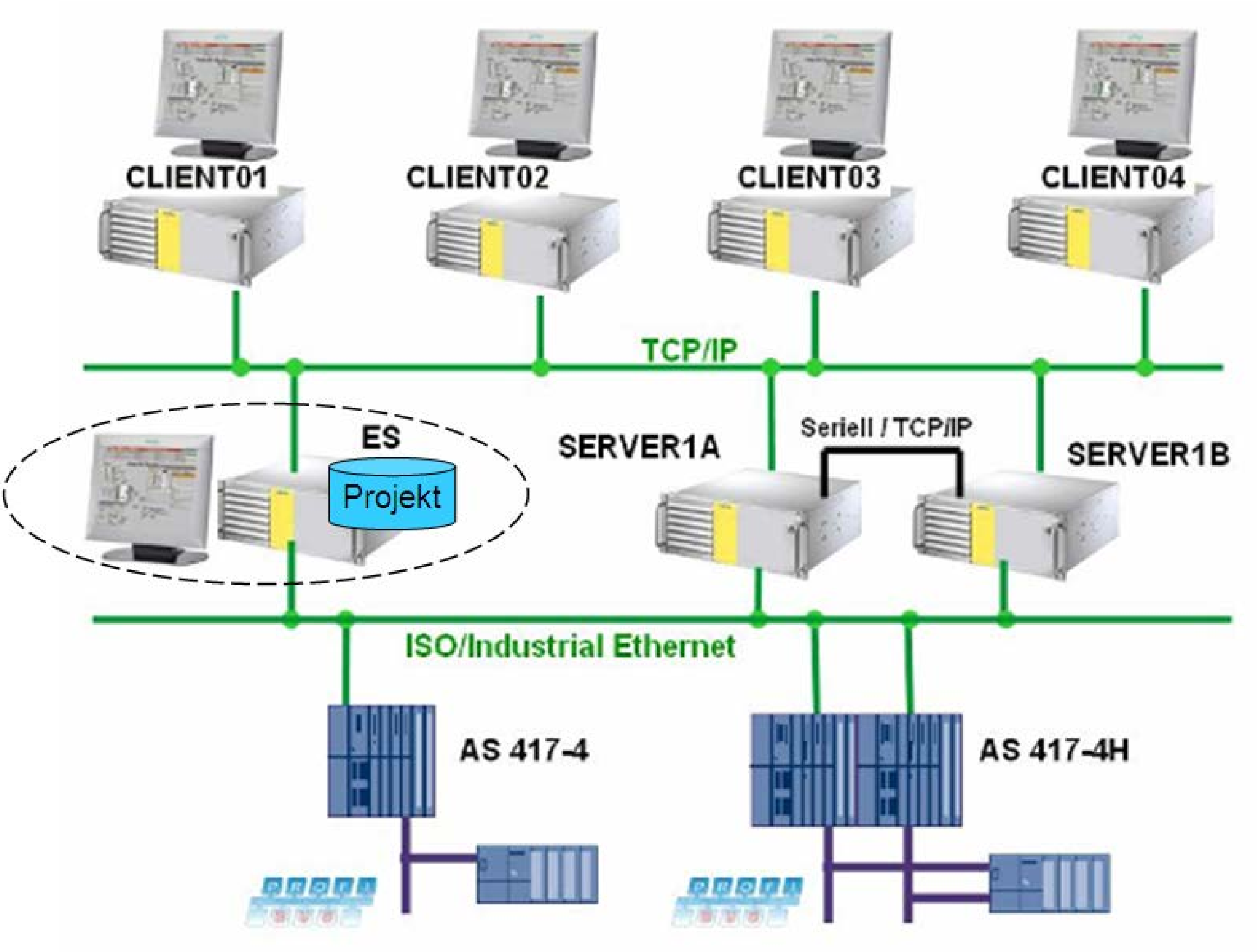
- Secure storage location
- Detailed description for each image

Recommendations

- Export a list of the SIMATIC software installed for each PC station. The list is created automatically by the SIMATIC Diagnose Tool.
- Export a list of the licenses installed for each PC station via the Automation License Manager.
- Use the export function of the Windows own system information program (msinfo32.exe) to determine the existing hardware and software installation.

4 Creating and managing a PCS 7 project

This section describes how to create a PCS 7 project as a so-called multiproject on the Engineering Station (ES). The description is based on the hardware architecture established in the previous section:



4.1 General configuration rules

Introduction

Before you create your own multiproject, you should be familiar with these important rules. This will help you to avoid carrying out certain tasks twice.

Central configuration

The entire configuration is performed on the ES in PCS 7 before the OS projects are loaded to the respective PCs.

Note

You can find information about distributing the configuration work across multiple engineering stations in the "Sharing out configuration work (Page 85)" section.

Archiving

Do not forget to archive the overall project along with the individual projects on a regular basis via the SIMATIC Manager, especially where it is being worked on by multiple individuals.

Master data library

Use the master data library for the complete multiproject and ensure that all project engineers use the blocks and process tag types from this library.

Multilingual capability

SIMATIC PCS 7 provides a large number of settings for texts and languages. The following application example provides a detailed description of how these are configured, adapted or amended:

- Configuring texts and languages in SIMATIC PCS 7 (http://support.automation.siemens.com/WW/view/en/56248153)

Time synchronization

Time synchronization is critically important for the interrupt and tag logging system. Make sure that only one (redundant) time server is active in the running system and that all stations (PCs and CPUs) use the correct time. In PCS 7 V7.0 and above the CPU always uses Coordinated Universal Time (UTC).

For information on time synchronization see the following manuals:

- "PCS 7 time synchronization" (http://support.automation.siemens.com/WW/view/en/75734232)
- "SIMATIC Process Control System PCS 7 Operator Station" (http://support.automation.siemens.com/WW/view/en/68157026)

Special characters

Using special characters (spaces, % . ' \ ? * : § €) is generally not recommended in PCS 7 for names such as tag and archive tag names. Project names and image names may only contain ASCII characters.

The following chart shows which additional characters are not permitted for the components in PCS 7:

Components	Illegal characters
Hierarchy folder	. " / \ %
Names for WinCC projects	. , ; : ! ? " ' + = / \ @ * % [ ] { } < > space
AS/OS connection names	. : ? " ' \ * % space

The characters [‘] [.] [%] [\ ] [*] [?] [:] [spaces] within a name are converted to the substitute character [$] when you compile an OS. The ES separator [\ ] is converted to the [/] character.

Example

If, for example, you assign the name "TICA:1" for a CFC chart (this becomes "TICA$1" on the OS) and use the name "TICA*1" for another CFC chart, (also becomes "TICA$1"), you will receive an error message with the OS compilation of the second chart because the chart name already exists.

4.2 Required settings in the SIMATIC Manager

Introduction

Before creating a multiproject, you should check the default settings of the SIMATIC Manager and adapt them to your requirements. The defaults settings can be edited in the SIMATIC Manager under "Options > Settings…".

The online help is available in every dialog to provide you with an exact description of the optional settings. Practical settings which can make configuration work easier are listed below.

General

Set the storage location for projects to a directory in a data partition.

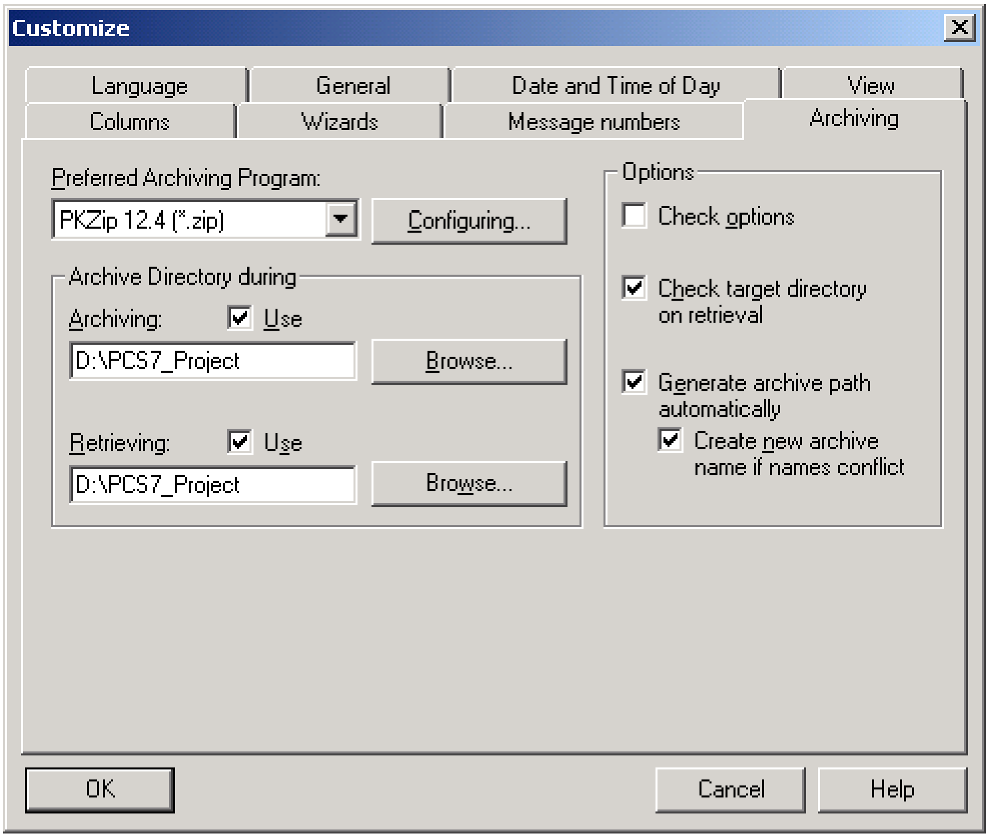
If you use another project path, you need to set the necessary access rights using the "SimaticRights.exe" application. The "SimaticRights.exe" application can be found on DVD 2 "Process Control System SIMATIC PCS 7" under "Additional_Products\SimaticRights\SimaticRights.exe".

Language

Once the country language has been set you can determine whether the I/O address concept for the multiproject to be created should be based on German (e.g. AW512) or English (e.g. QW512).

Archiving

Set both paths for archiving and retrieving to your chosen directory. The "PKZip" archiving program is the default setting for archiving a multiproject. You also need to set the "Archive spanning diskettes" option to "No" in the "Configure" dialog to shorten the archiving process.



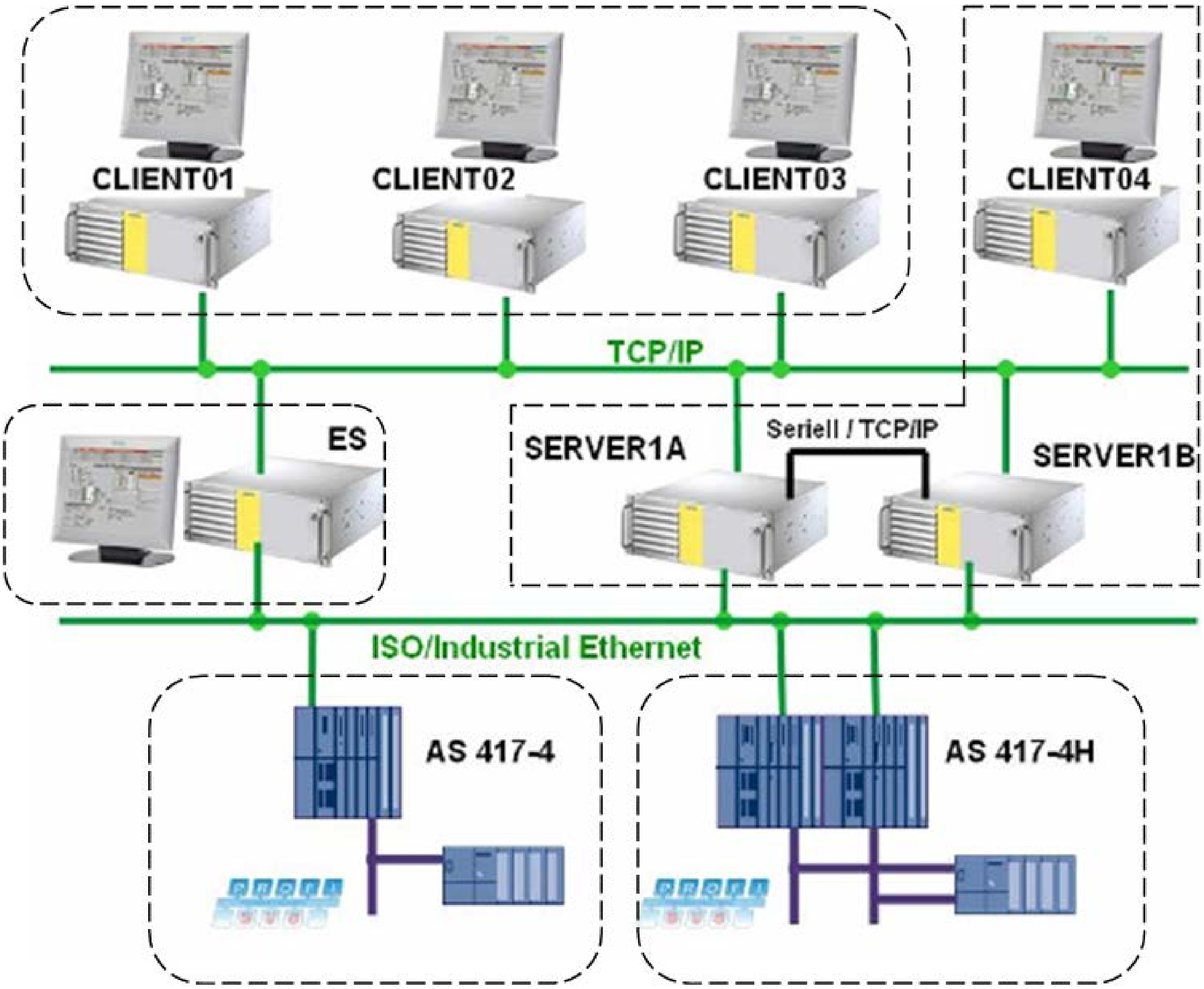
Message numbers

In PCS 7 V6.1 and above the "Assign CPU-oriented unique message numbers" option is the default setting. This ensures that S7 programs are copied without changes being made to the message numbers.

4.3 Creating the multiproject

Division into individual projects for multiproject engineering

Dividing the multiproject into functional units is recommended in principle in PCS 7 (e.g. one project per unit). This setup provides the maximum flexibility during the configuration and commissioning phase. This applies in particular to automation systems (AS). This way the project engineer responsible for one or more automation systems (AS) can e.g. display the appropriate project from the multiproject and configure this separately.



The multiproject ("Comp_MP" in the following example) should consist of the following parts:

- Project "01_PLANT_A" for a unit consisting of fault-tolerant AS
- Project "02_PLANT_B" for a unit consisting of standard AS
- Project "25_ES" for one or more engineering stations
- Project "20_OS" for the redundant OS server pair and an OS client
- Project "21_CL", for OS clients of the same type as typical operator stations
- Master data library "Comp_Lib"

The division of the multiproject into various projects is defined by technological and local conditions, as well as by project specifications such as the number of project engineers or the allocation of responsibilities.

Note

A redundant OS server pair must always be created in the same project. Referenced operator stations must be created in the same project as the reference.

Detailed information on distributed engineering can be found in the document "PCS 7 Multiproject/Multi-user Engineering" (http://support.automation.siemens.com/WW/view/en/22258951).

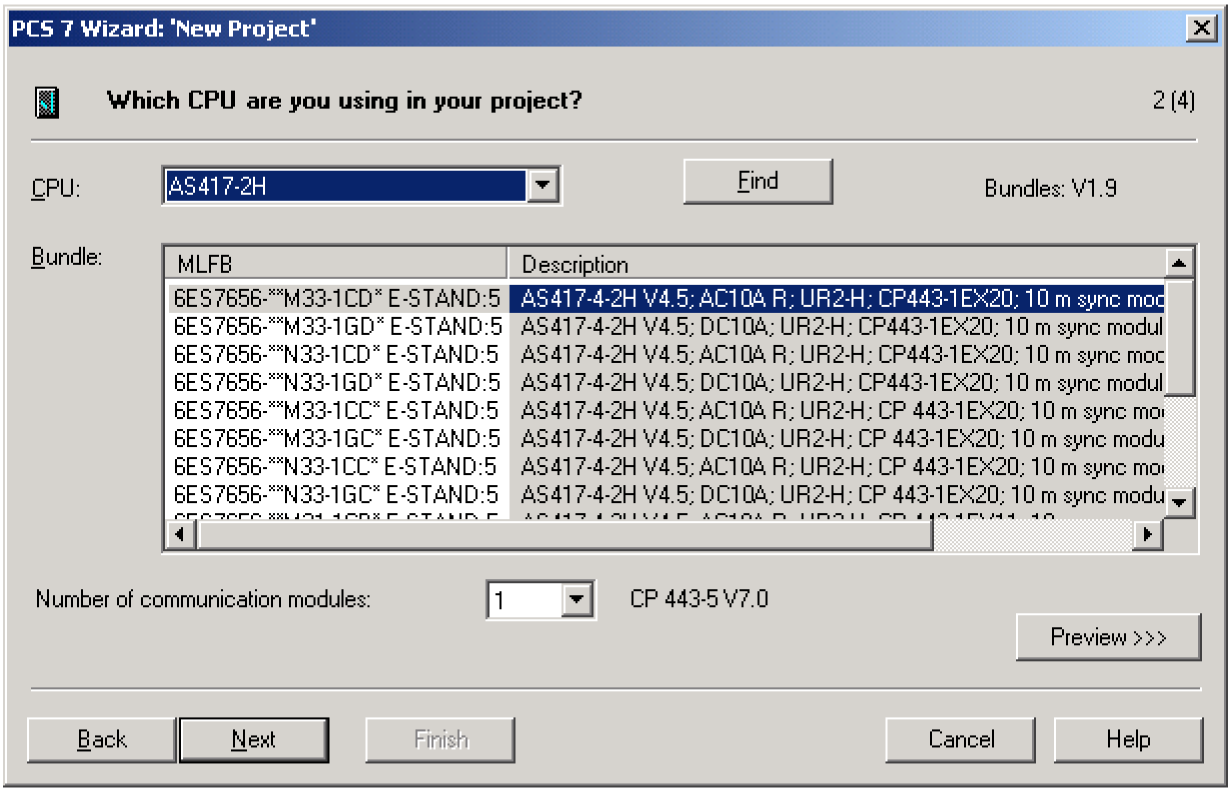
Procedure

The following steps show how to create the project "Comp_MP" for the first automation system and the standard library:

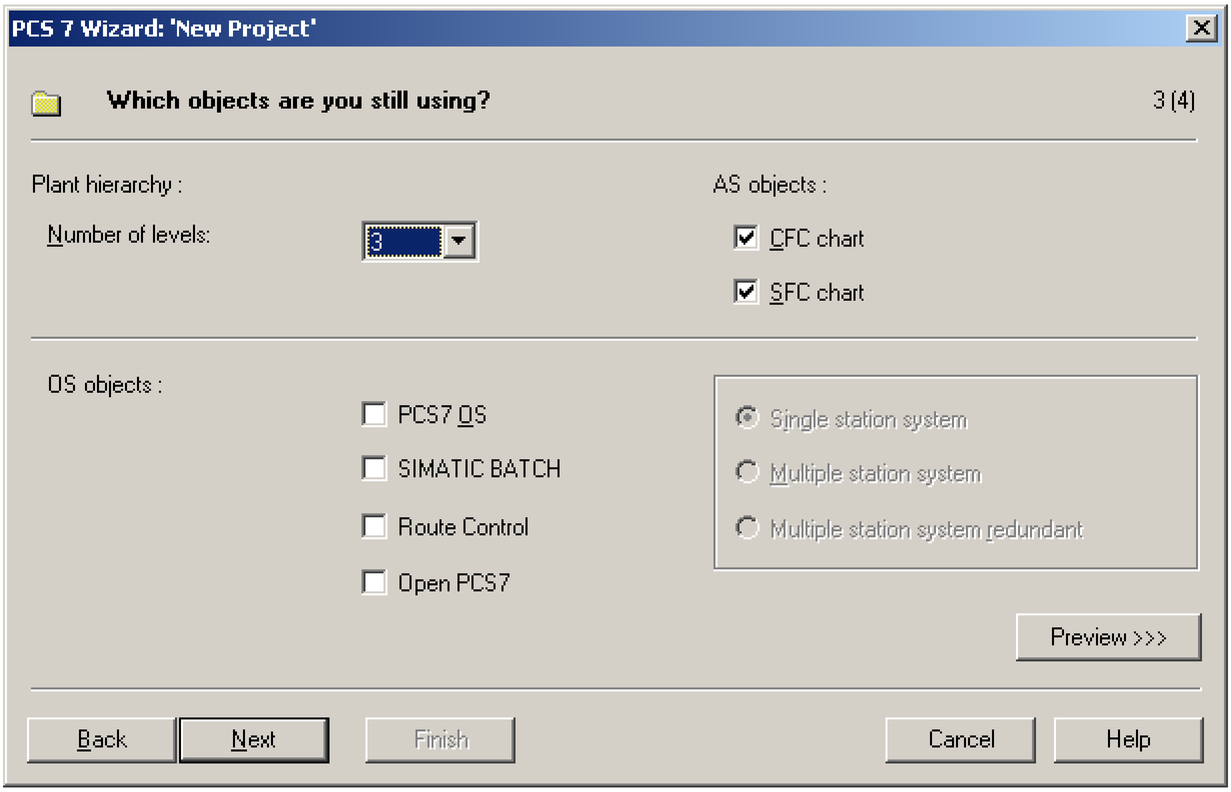
1. Select the "New Project Wizard" command in the "File" menu in SIMATIC Manager.

   The PCS 7 Wizard executes.

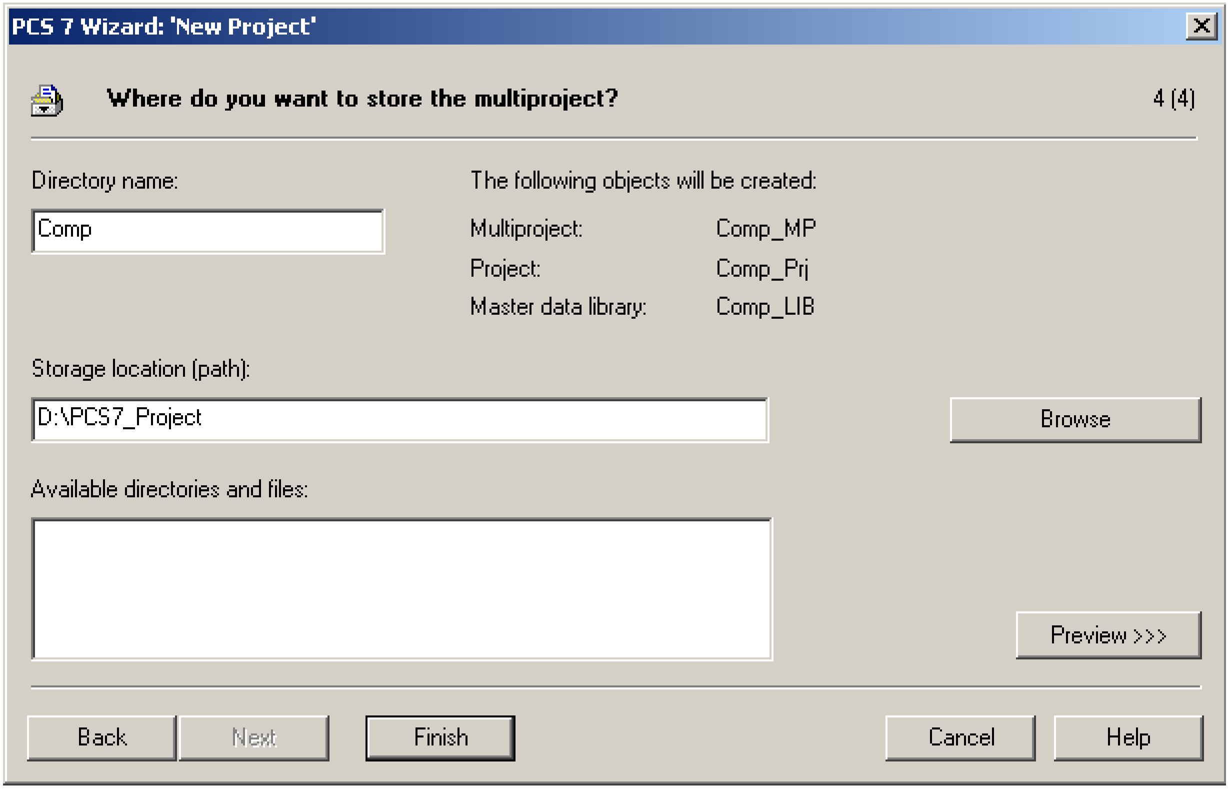
2. Select a 417-H system in the second dialog box that appears. You can enter an order number (MLFB) using the "Search" button.



3. Deactivate the possible OS objects in the third dialog box. This project component is created in a step described later in this guide.



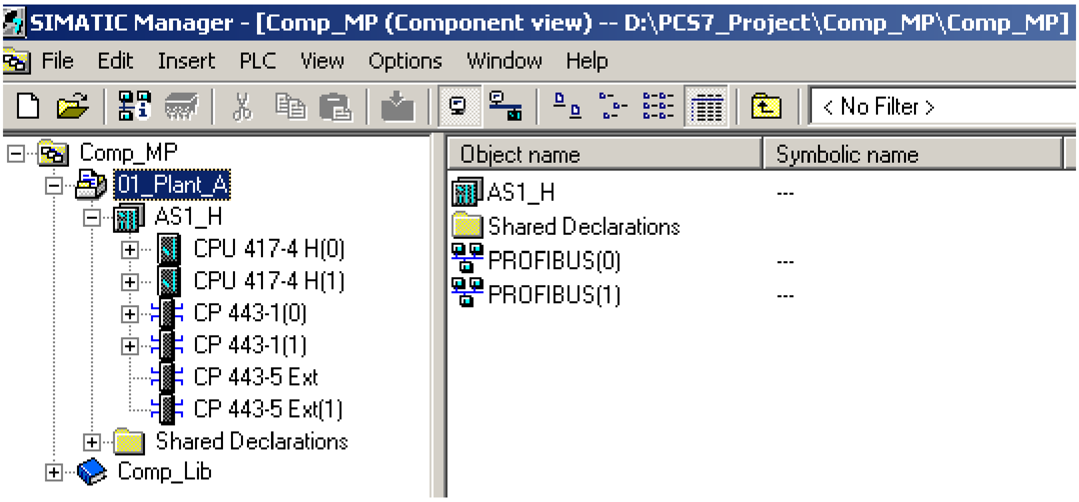
4. Adapt the project name and the storage location (path) in the fourth window. The project name matches the directory name.



5. Click "Make".

   The multiproject "Comp_MP" is created and opened in the SIMATIC Manager.

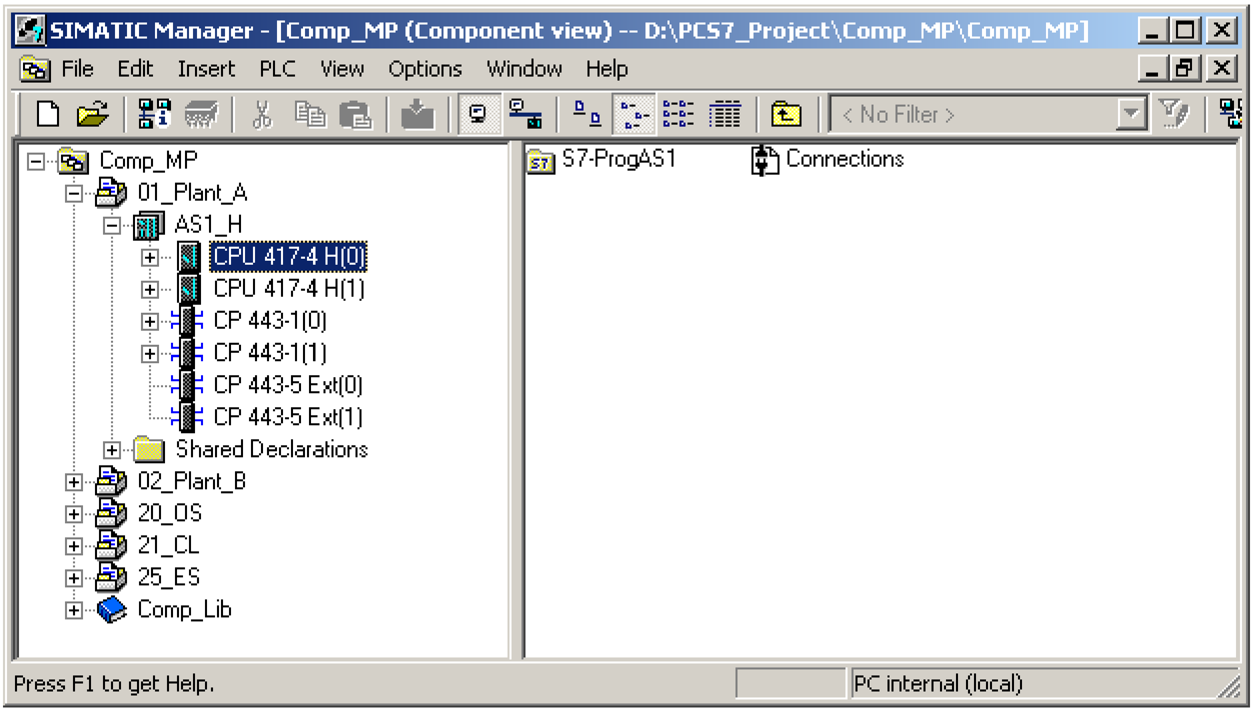
6. Change the project name "Comp_Prj" of plant A to "01_Plant_A".



Note

Project names for multiprojects and projects can be assigned freely. At Windows level, PCS 7 automatically creates the path where the data is to be stored. The path name may differ from the project name (shortened to eight characters). As PCS 7 data is only edited in the SIMATIC Manager, this path name is of no consequence to the user.

7. Change the name of "SIMATIC H station (1)" to "AS1_H".
8. Change the name of the S7 program of the station "AS1_H" (e.g. to "S7-ProgAS1").



Note

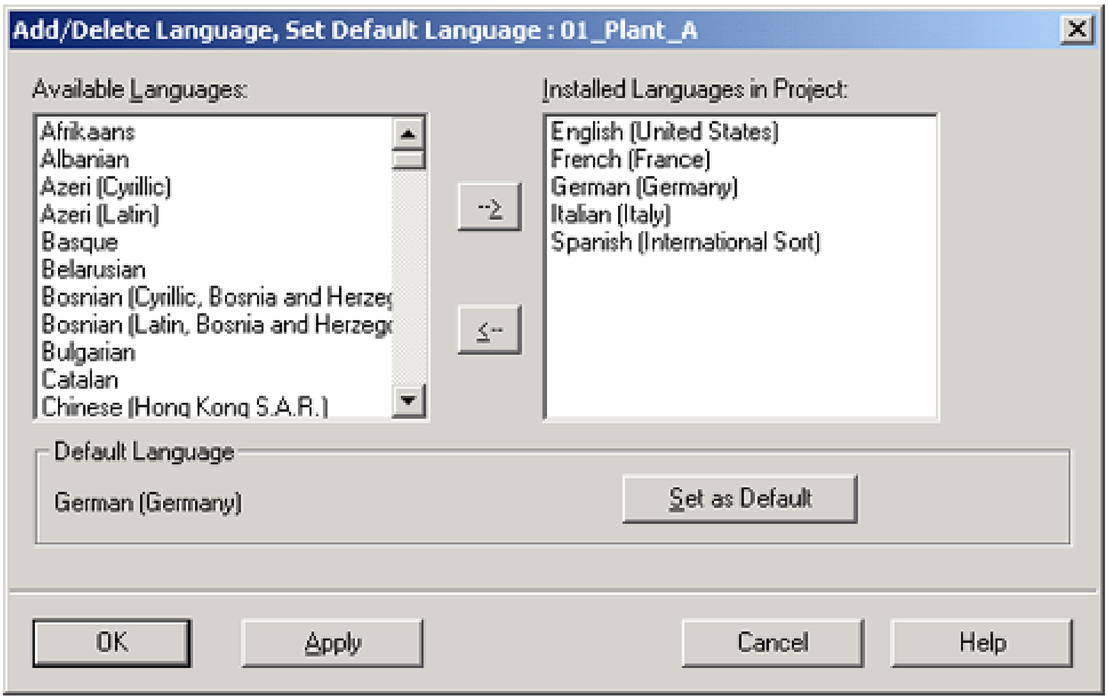
Assigning unique names to the S7 program files of different automation stations is recommended. S7 program names may not contain any blanks.

Language of the display devices

Check that the "Language of the display devices" setting is set uniformly across all projects for the entire multiproject. This setting is used to select the languages that are used for the OS configuration. This must be done before the first compilation of projects that contain an OS server so that the texts will be created in all languages on the OS.

To check the settings, select the respective project and then the "Options > Language for Display Devices" command.

The project "01_Plant_AS" has been created via the multiproject Wizard and therefore automatically contains the five PCS 7 standard languages. Only the relevant installation language is generally entered for new projects to be added.

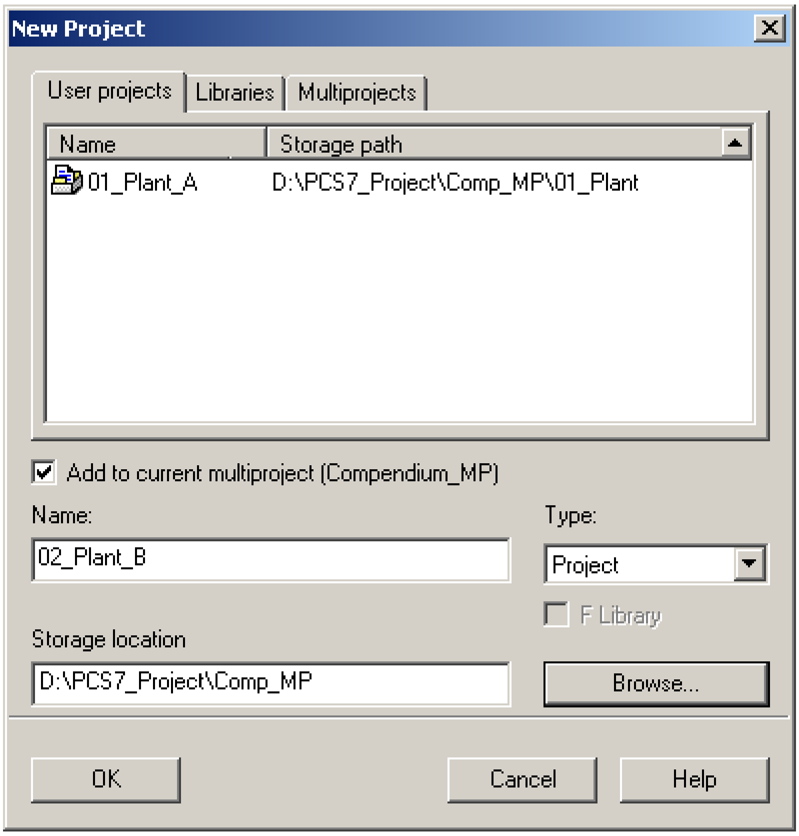


4.4 Adding additional projects

Procedure

The following steps demonstrate how to add an additional project:

1. Create a new project for Plant B. It will later contain a standard CPU.
2. Select the name "02_Plant_B" (Plant_B - name of the plant) and the storage location also where applicable.



3. Create a new project for the redundant OS server pair and the associated OS client. Select the name "20_OS" and the storage location.
4. Create a new project for the remaining OS clients. Select the name "21_CL" and the storage location.
5. Create a new project for the ES. Select the name "25_ES" and the storage location.

The "New Project" wizard has already generated the "Comp_Lib" master data library and added it to the project. It should contain all blocks and process tag types in the project as a template.

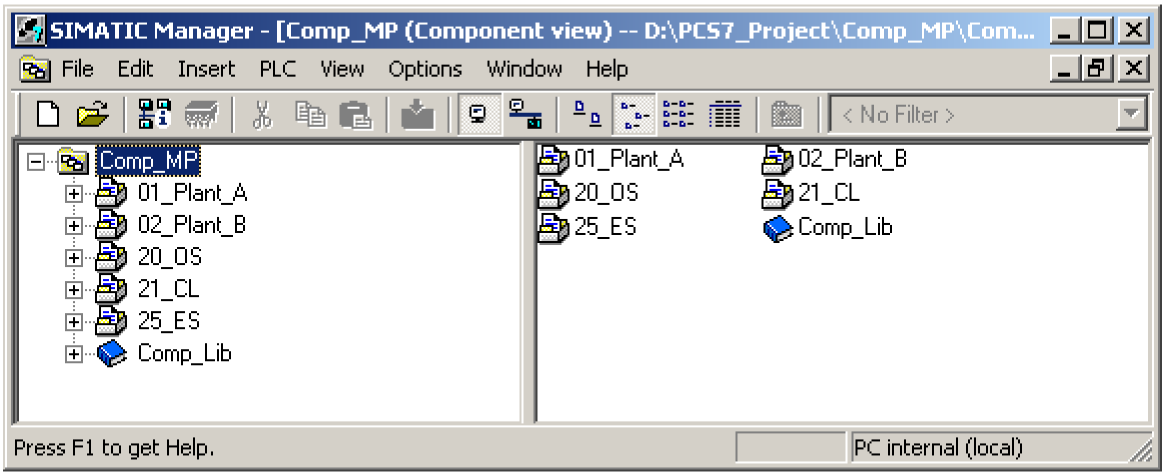
Note

A central data management in the master data library is a prerequisite for essential PCS 7 functions such as the Import Export Assistant or the automatic block update for all S7 programs in the multiproject.

Furthermore you can use the master data library to ensure that all project engineers are working on the same database. This facilitates coordination and organization during the configuration phase and during the later project expansions or upgrades.

Result

Once the projects are created the corresponding structure is displayed in the component view of the SIMATIC Manager.



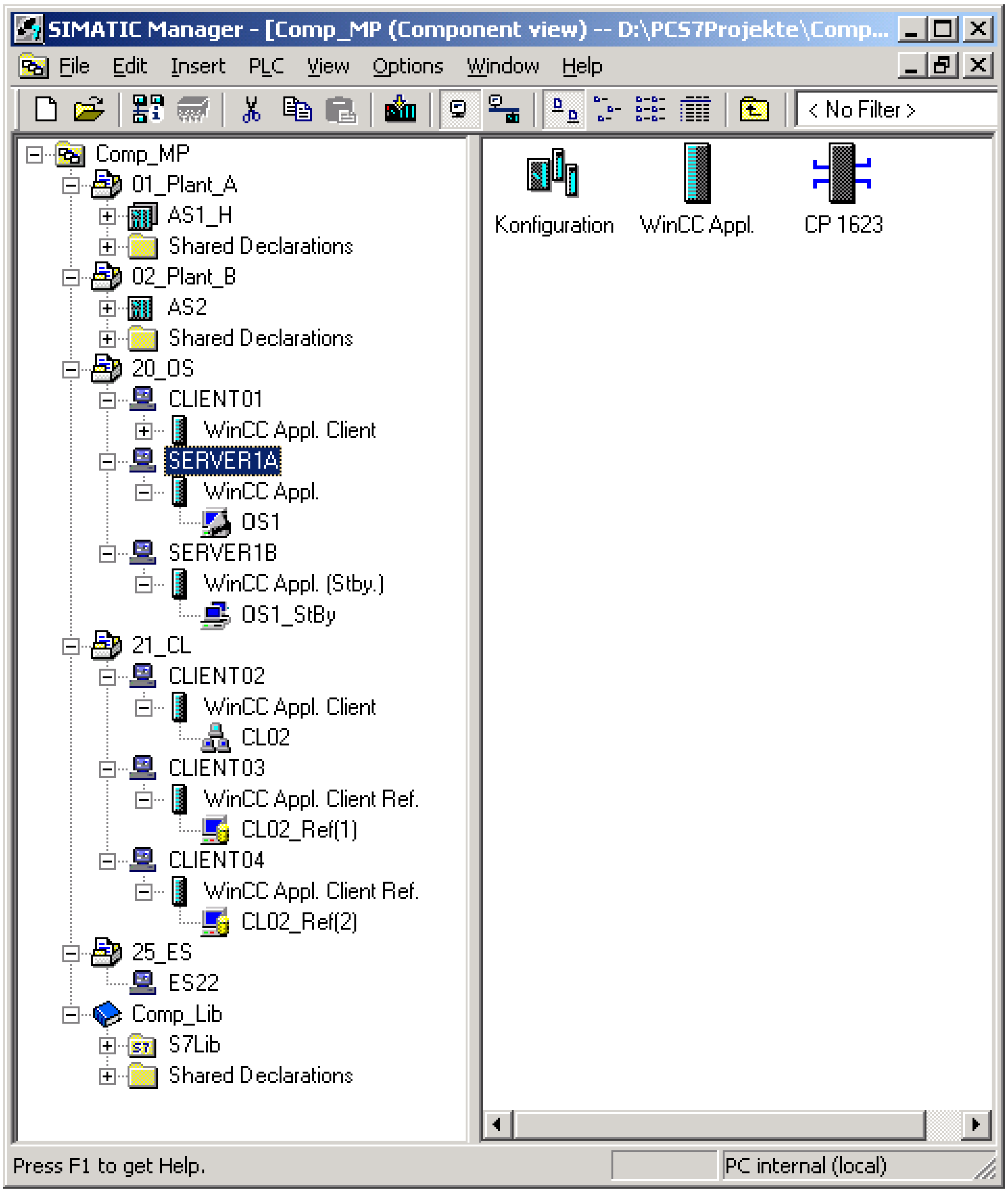
4.5 Adding Additional Stations

Once the projects have been created you will insert the automation systems (AS) and the PC stations in this section in accordance with your plant layout.

Note

The network adapters for the terminal bus are not configured.

You should use the following project structure as a template for creating these:



4.5.1 Engineering Station

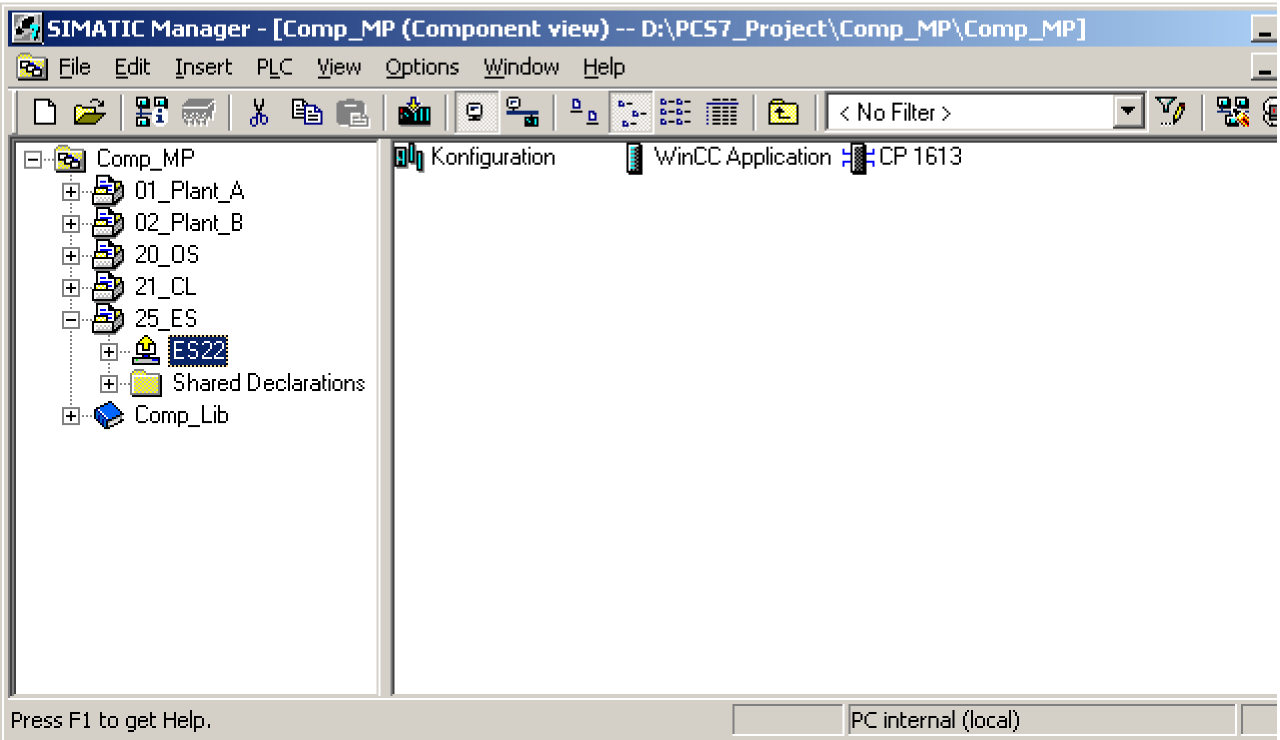
Procedure

The following steps show how to insert and configure an engineering Station (ES):

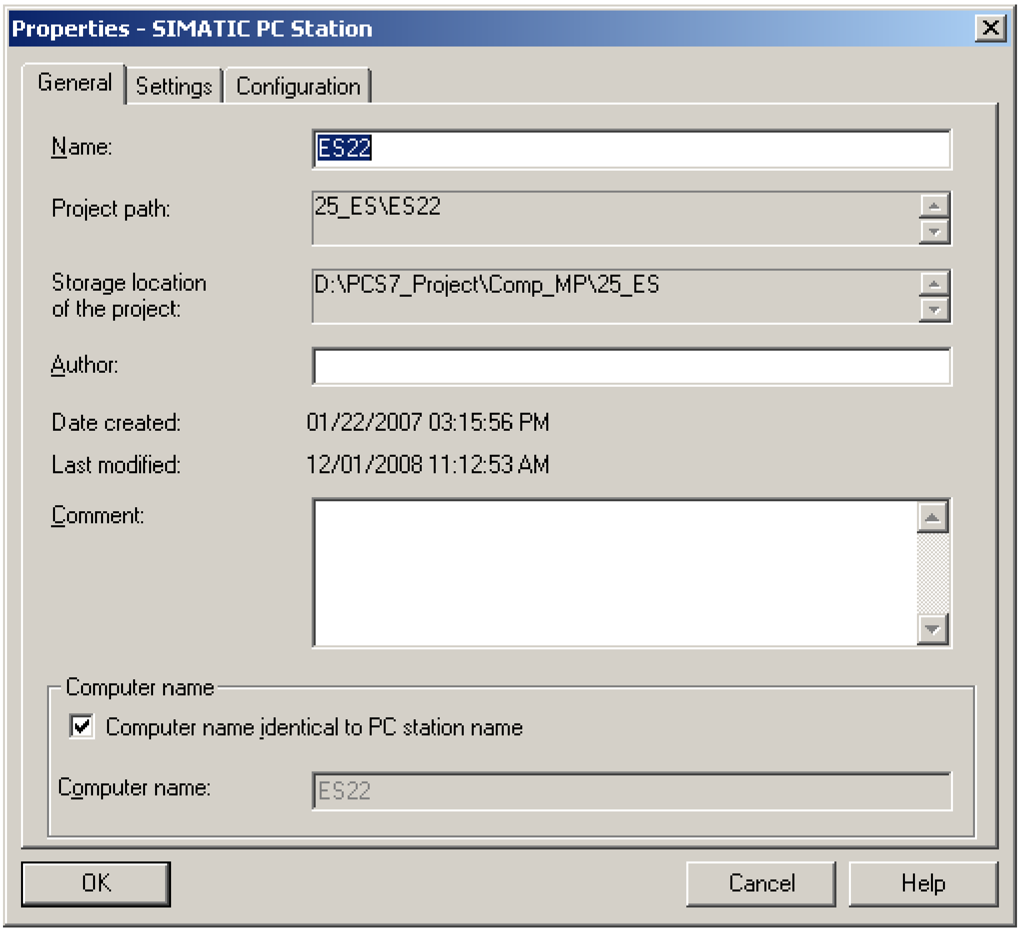
1. Insert a SIMATIC PC station into the project "25_ES" by selecting the project and selecting the "Insert New Object > SIMATIC PC Station" via the context menu.
2. Rename the PC station.

   The name of the PC station must match the station name in the Station Configuration Editor, which already has the default computer name. We recommend using the Windows computer name of the ES (for example, "ES22"). This applies to all PC stations.

   A yellow arrow then appears on the ES PC station icon in the SIMATIC Manager to indicate the capability of the ES to establish a connection to the plant bus via the "PC internal" interface.



3. Select the "Computer name identical to PC station name" option in the PC station object properties. The "Computer name" field cannot be empty as other functions such as "Configure PC Station" need to be able to access this name.

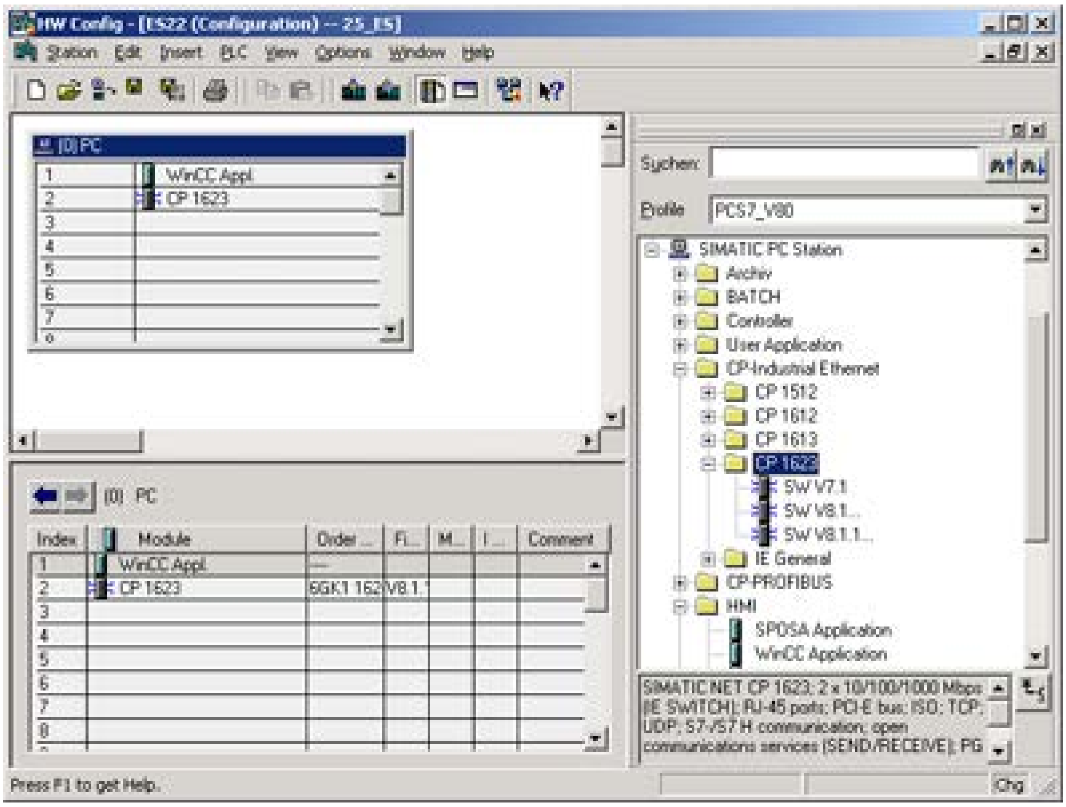


Note

When asset management is used, no computer name is entered for the PC station of the ES (yellow arrow). Detailed information is available in the section "Integrated Asset Management (Page 313)".

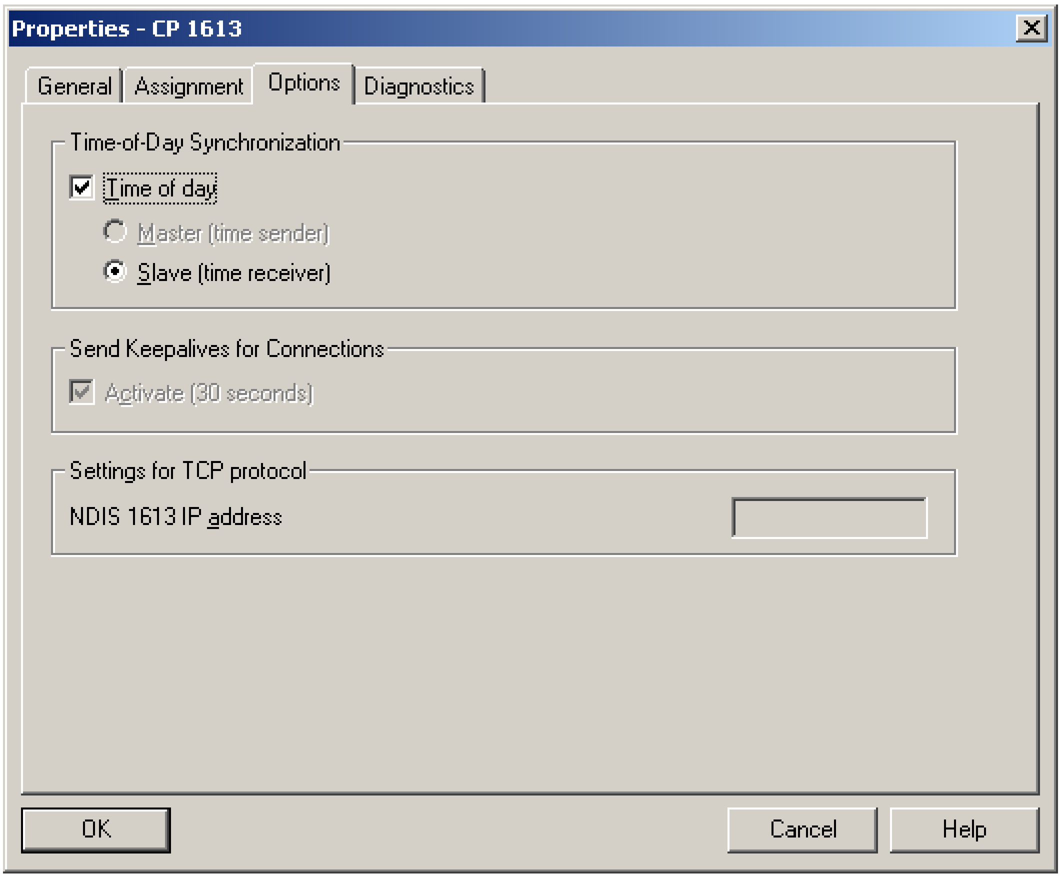
4. Open the PC station in HW Config.

5. Insert a CP1613/CP1623 for communication with the plant bus. As an option insert a "WinCC application" so that the OS runtime can be tested on the ES using the "OS Simulation" function.



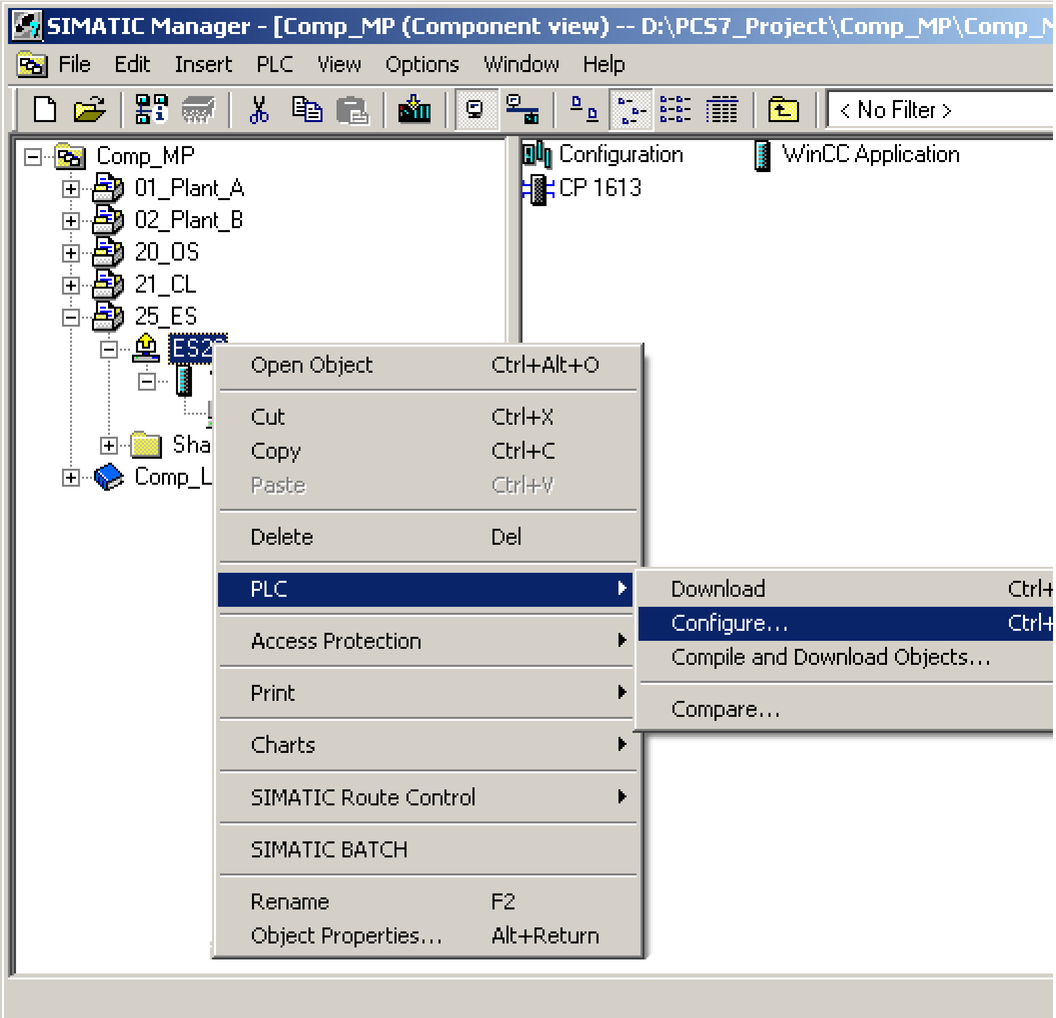
6. Create a new subnet for your plant bus in the object properties of the CP16x3 and assign the planned MAC address to the CP1613. Change the name of this e.g. to "Plant Bus".

7. Activate the "Time of day" option in the "Options" tab of the CP16x3 properties dialog so that the CP16x3 is generally capable of forwarding the time frames from and to the OS.



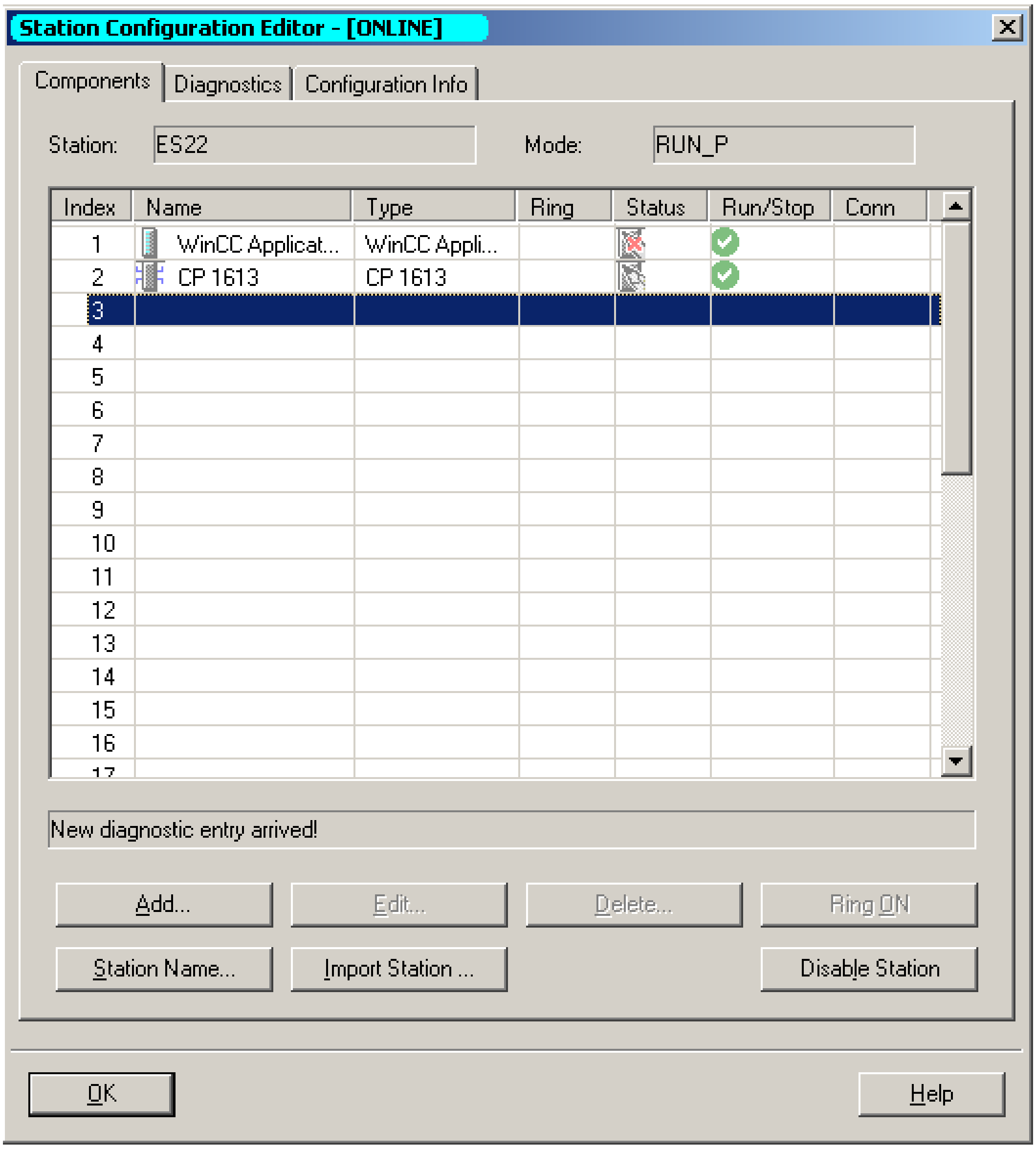
8. Execute the "Save and compile" command (CTRL+S).

9. Transfer the configured hardware to the plant bus interface of the ES via the "PLC > Configure…" in the context menu.



10. Load the configuration via the "PLC > Download…" command in the context menu in the program.

    Following a successful configuration the status and operating status of both the configured components is displayed in the Station Configuration Editor which starts automatically when Windows starts.

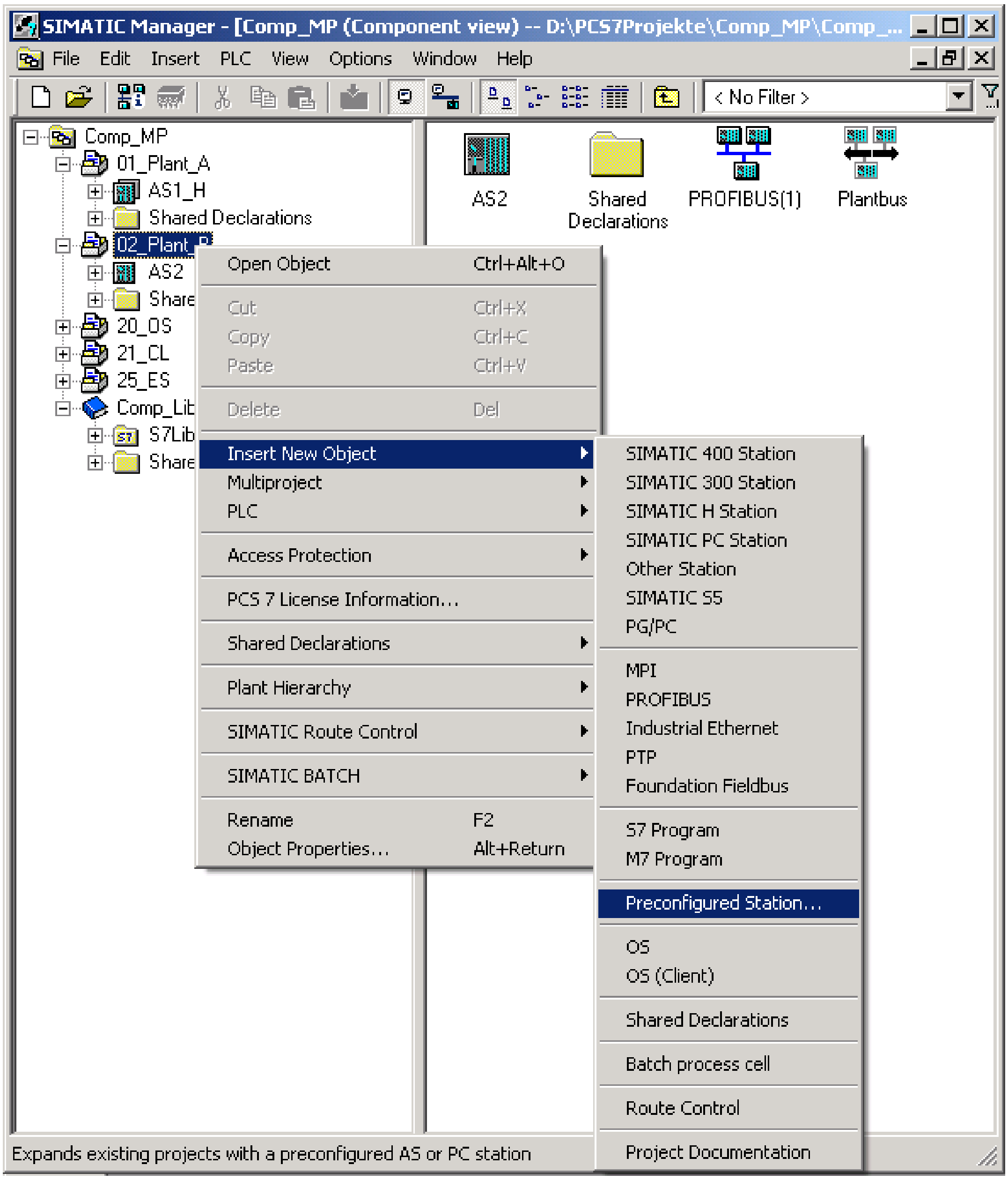


4.5.2 Automation system - Standard

Procedure

The following steps show how to insert a standard automation system (AS) into the project:

1. Insert a standard AS into the subproject "02_Plant_B" by selecting the subproject and selecting the "Insert New Object > Preconfigured Station" command via the context menu.



The PCS 7 wizard for inserting new objects runs.

2. Using the PCS 7 wizard select your standard AS in accordance with the order number and terminate the wizard without selecting any corresponding OS objects.

   Information on running the PCS 7 wizard can be found in the section "Creating the multiproject (Page 50)".

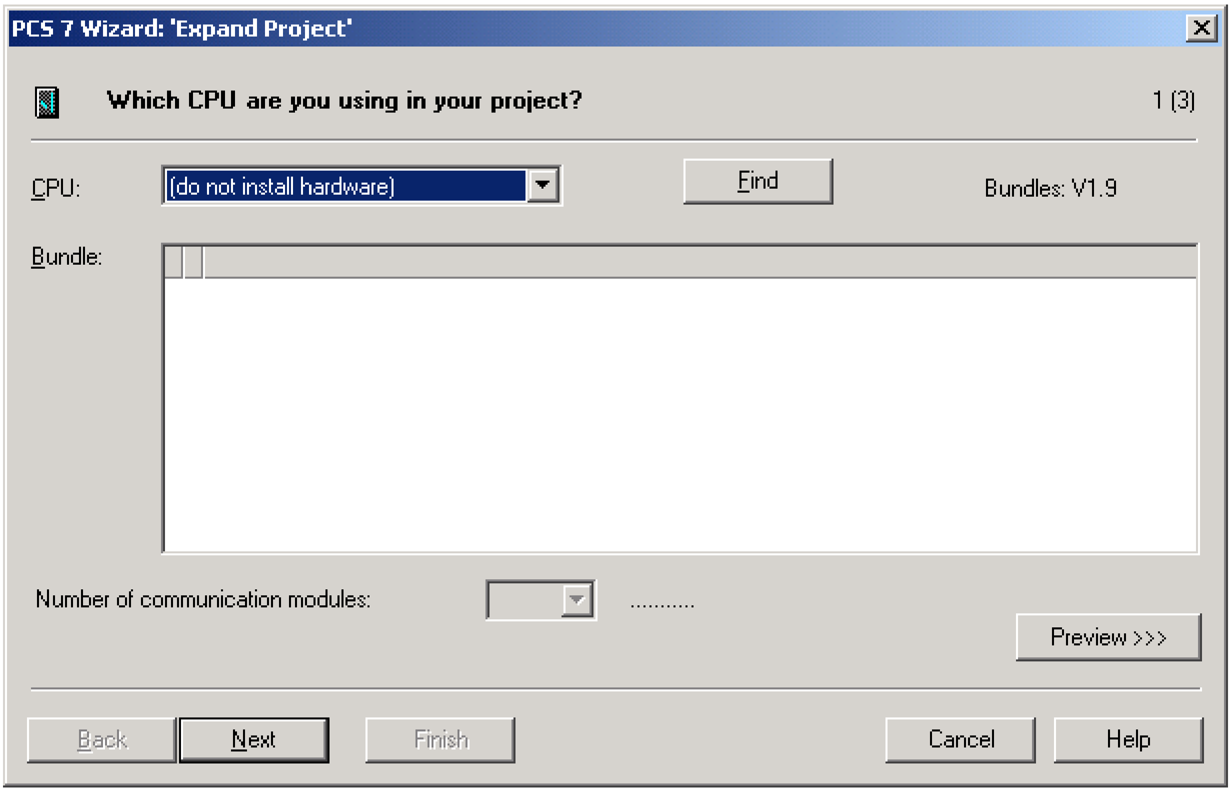
4.5.3 OS server

Procedure

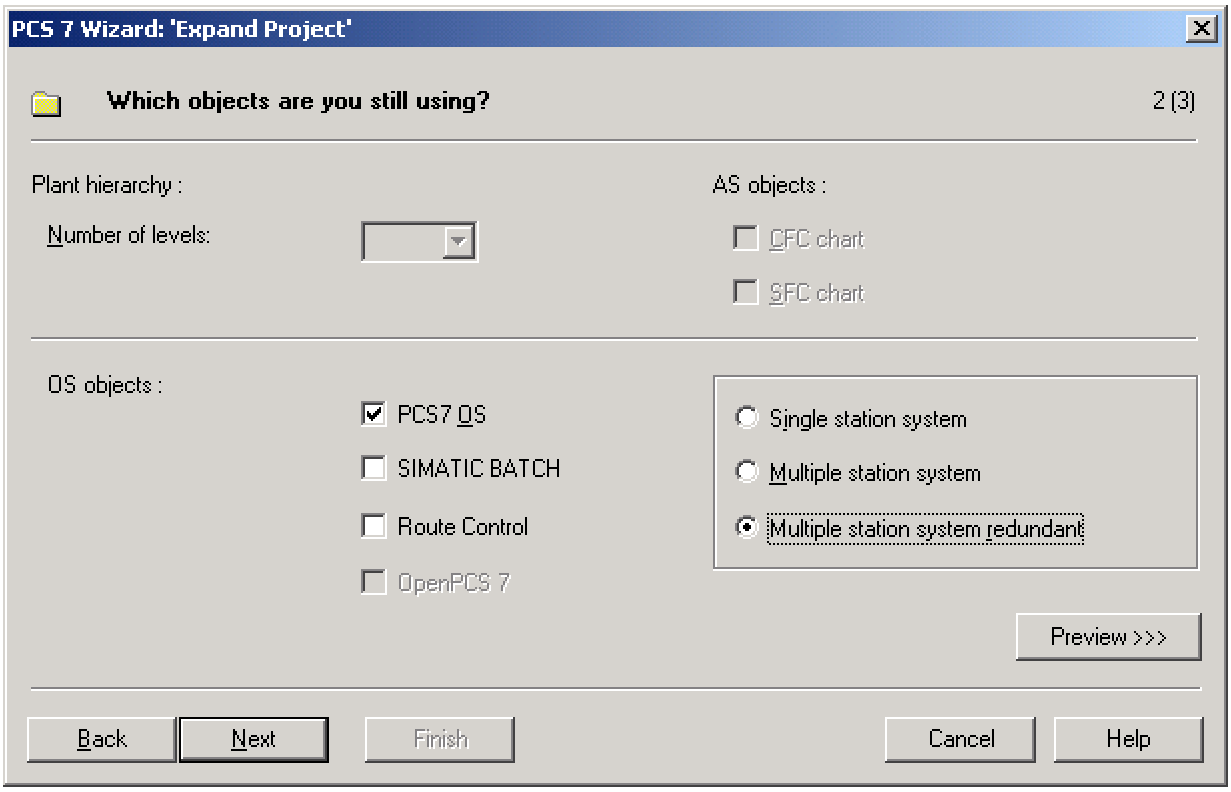
The following steps show how to insert and configure OS servers in the project:

1. Insert a new PC station into the subproject "20_0S" by selecting the project and selecting the "Insert New Object > Preconfigured Station" via the context menu.

   The PCS 7 Wizard executes.

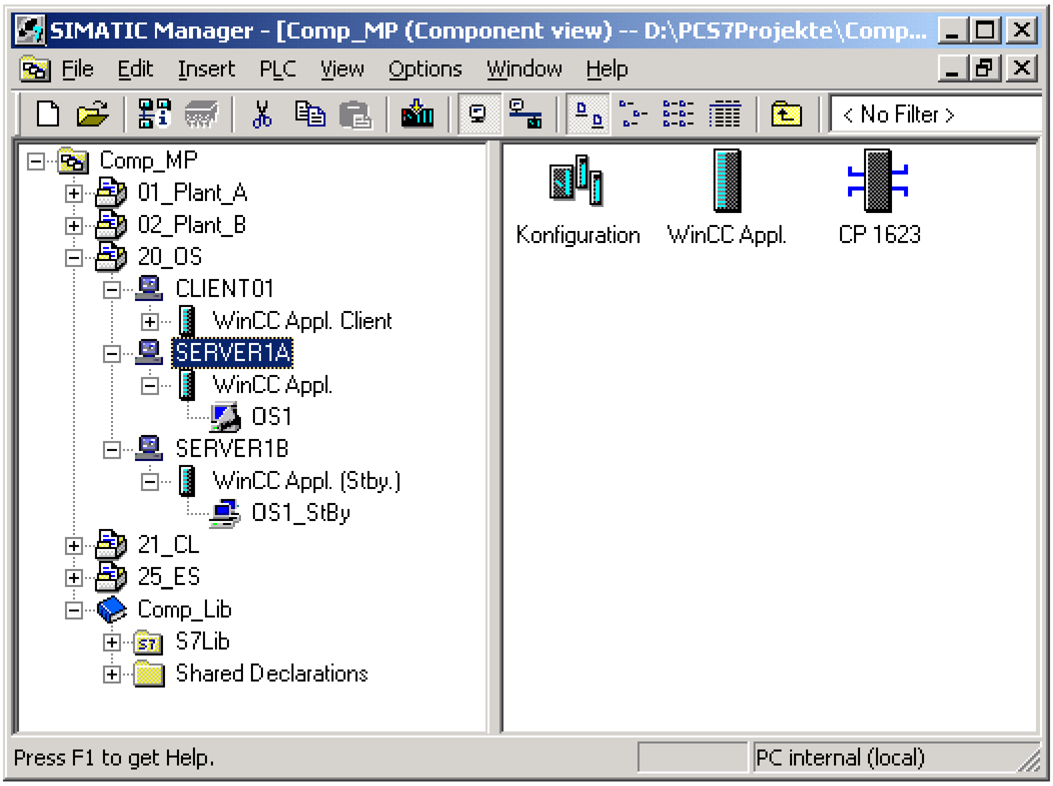


2. Click "Next" without selecting a CPU.
3. Select the "PCS 7 OS" option box and the "Multiple station system redundant" option.



4. Terminate the PCS 7 wizard.

   The following structure is created in the component view for project "20_OS":



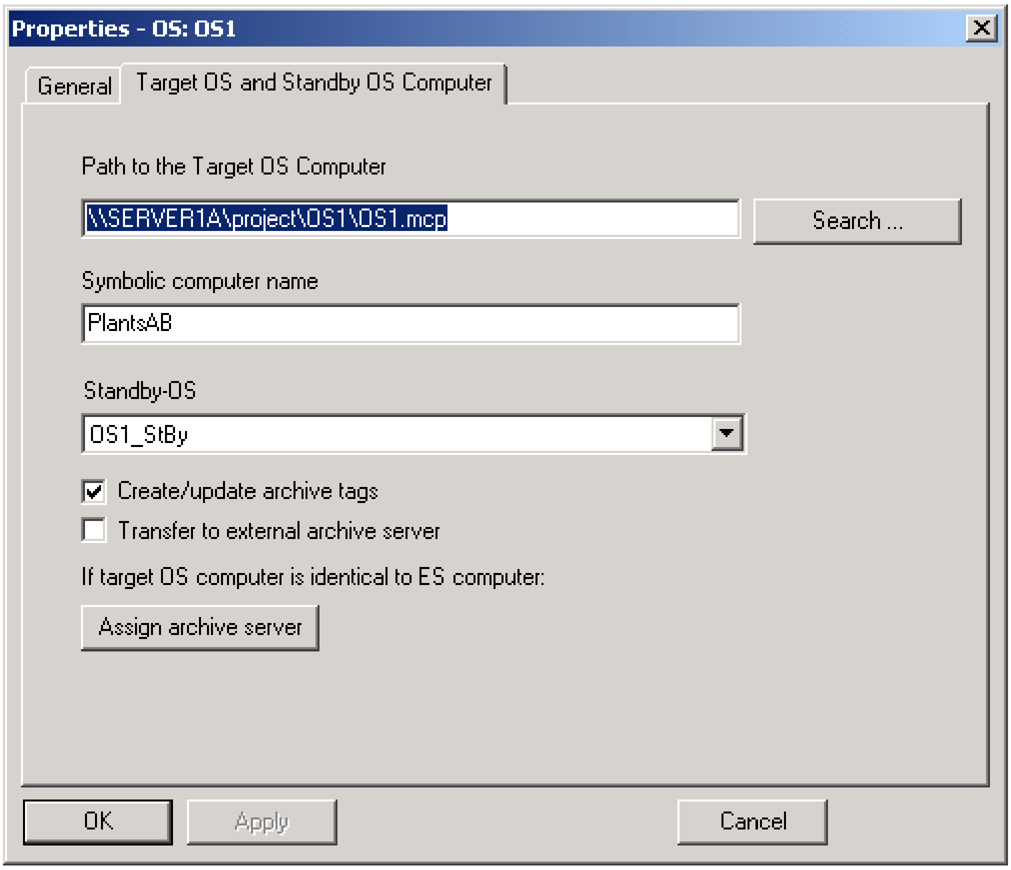
5. Rename the three new PC stations. The names "SERVER1A", "SERVER1B" and "CLIENT01" are used in the example project "Comp_MP".
6. Change the name of the OS object of station "SERVER1A" to "OS1".

7. Open the properties dialog of the "OS1" and click on the "Target OS and Standby OS" tab. Enter the following settings:
   – Enter the path for the target OS computer.

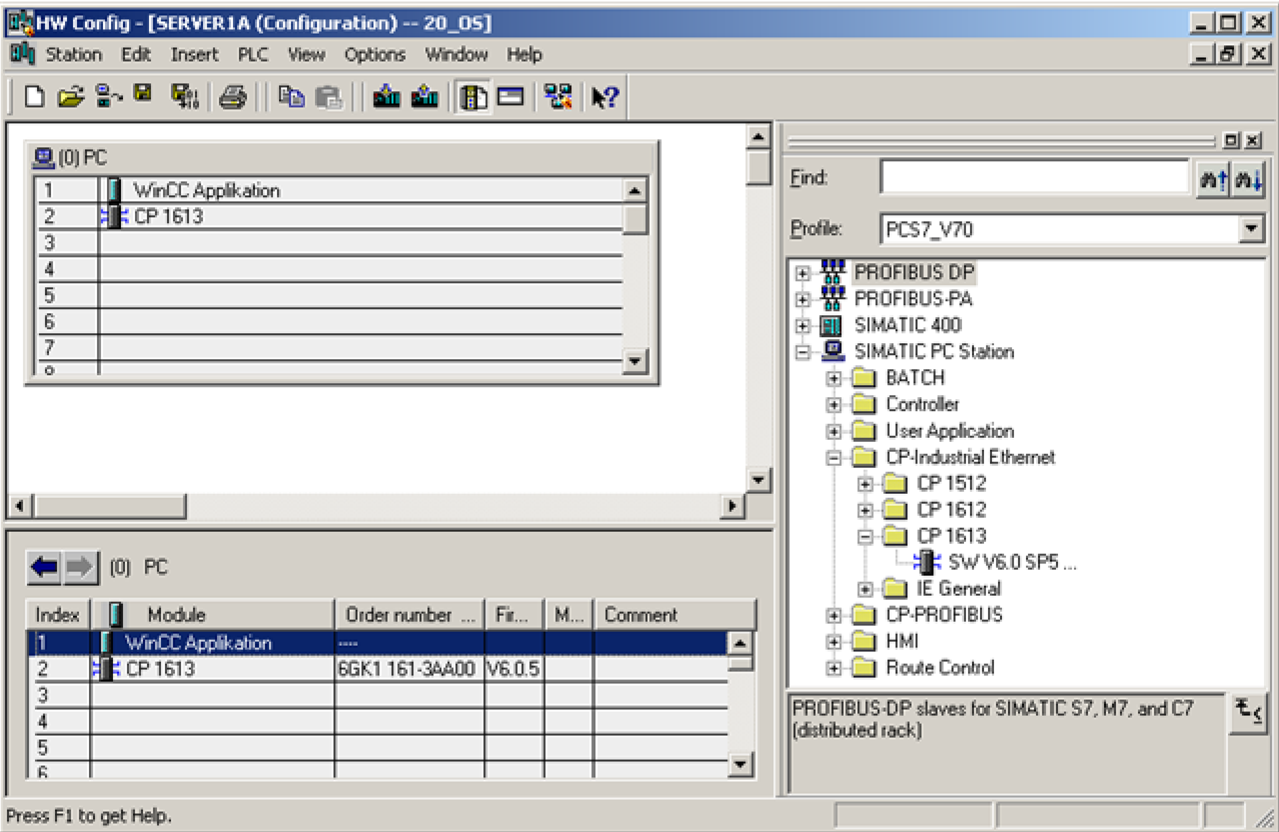
     A shared folder with write access must be available on the target OS.
   – Enter a meaningful name for the symbolic computer name.

     The symbolic computer name determines the server prefix and therefore the server data. It is decisive for the OS server-client communication. Avoid any special country-specific characters with this.

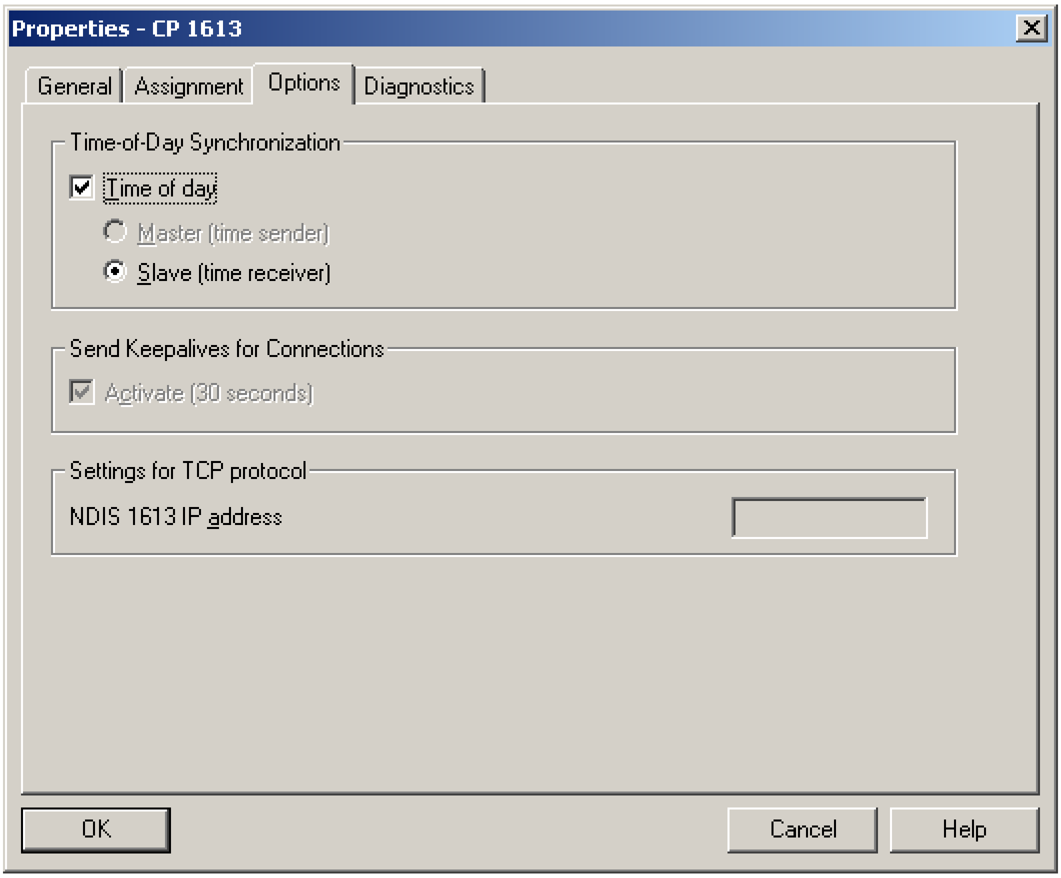
     This setting can only be entered with the initial configuration.
   – Select "OS1_Stby" from the selection menu in the "Standby OS" area.
   – Select the "Transfer to external archive server" check box if required.



8. Open the properties dialog for the assigned standby OS and enter the path for the corresponding target OS computer here as well.
9. Open the SERVER1A configuration dialog and configure the CP16x3 as a network adapter for the plant bus in a free row. Use unique MAC addresses for this and assign a subnet with the name "Plantbus".



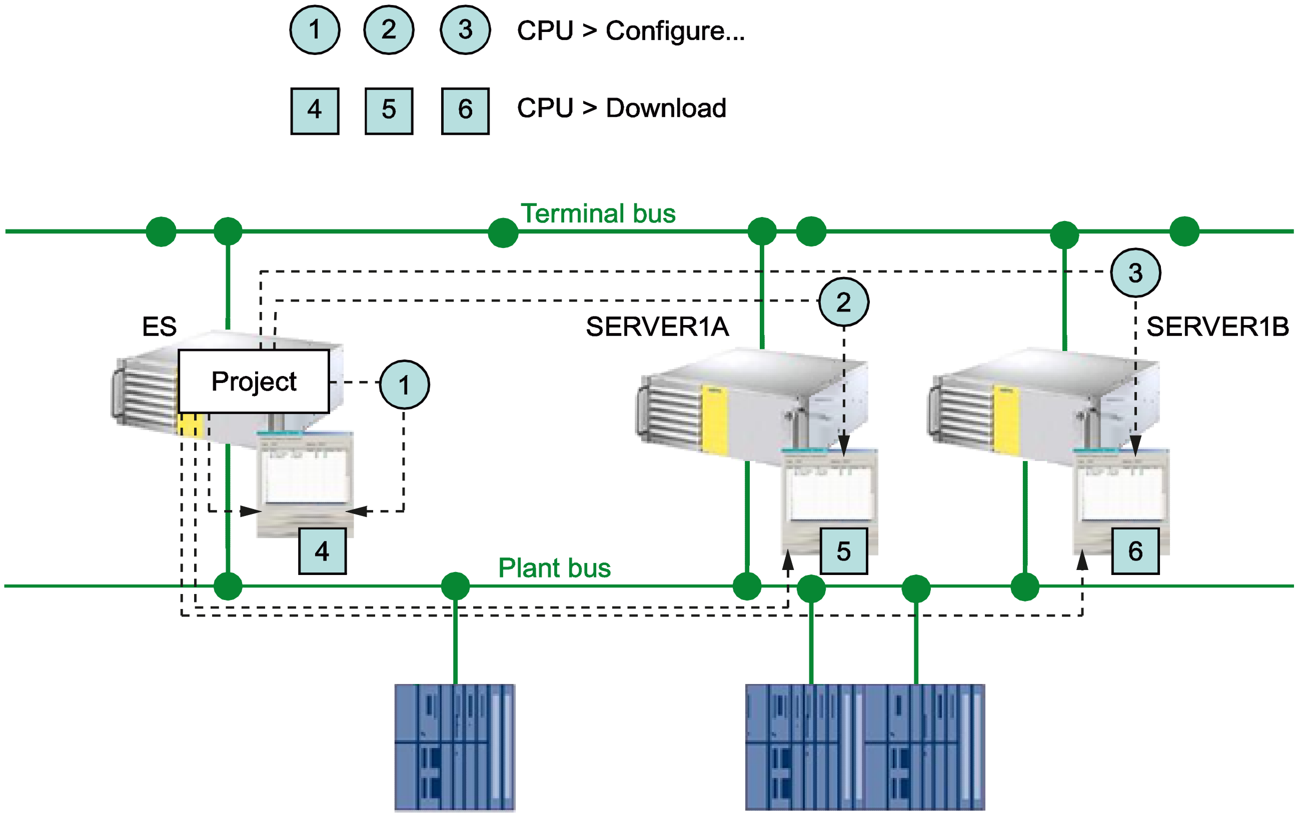
10. Select time of day mode in the "Options" tab of the CP16x3 properties dialog.



11. Configure SERVER1B in the same way as SERVER1A.
12. Transfer the PC station configurations from the SIMATIC Manager to both the OS servers via the "PLC > Configure …" command (See also Engineering Station (Page 61)).

13.Load the configuration via the "PLC > Download…" command in the program.

The following figure illustrates the configuration of the plant bus, whereby all tasks are performed from the central ES.



4.5.4 OS clients

Introduction

By creating the stations in the project "20_OS" an OS client station has already been created which is renamed to "CLIENT01" in the previous section.

This OS client can be configured and started accordingly in the later configuration stages. Furthermore the connection to OS servers already activated can also be tested.

The OS clients for the plant operator are created later once the configuration is complete in the separate project "21_CL".

Procedure

The following steps demonstrate how to create the station "CLIENT02" :

1. Copy the completed station "CLIENT01" from project "20_OS" to project "21_CL" and rename it to "CLIENT02".
2. Rename the OS client project in the SIMATIC Manager as "CL02".
3. Enter the path for the target OS in the object properties.

   A shared folder with write access must be available on the target OS.

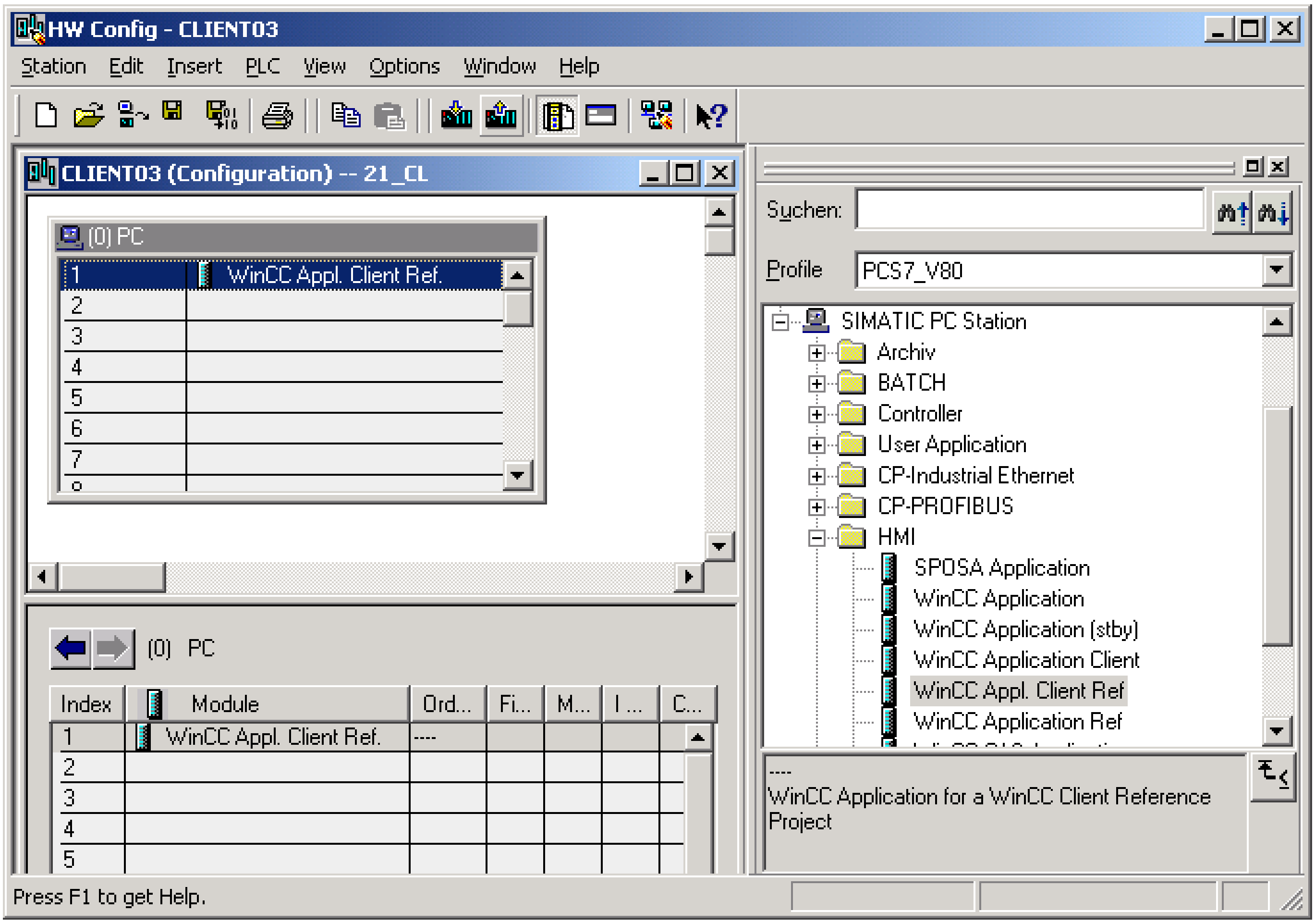
Using OS reference clients

OS reference clients are always used when all settings on several OS clients are identical. Each configured OS client can be used as a basis for further clients. Creation and maintenance efforts along with the project scope for operator stations are reduced considerably as a result.

In the example project, the stations "CLIENT03" and "CLIENT04" should be identical to station "CLIENT02".

The following steps demonstrate how to configure the stations "CLIENT03" und "CLIENT04":

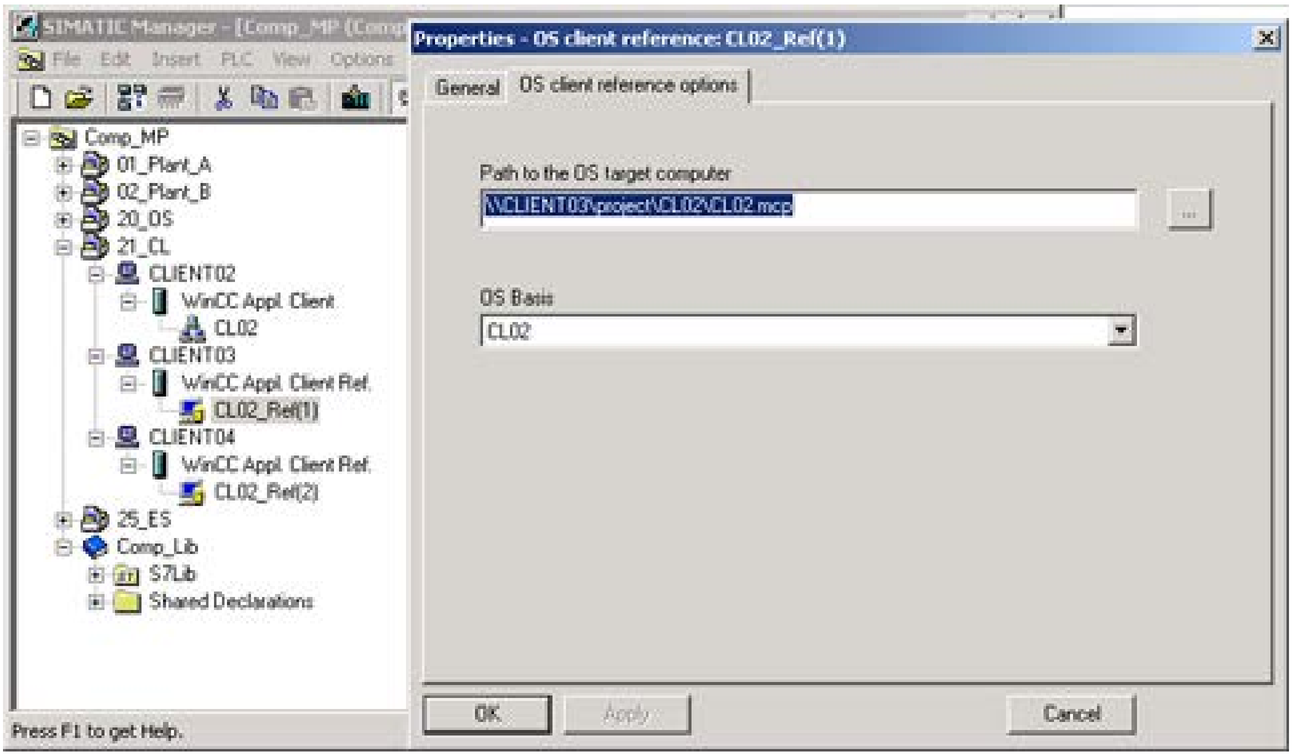
1. For the number of identical clients configure a PC station for each with "WinCC Appl. Client Ref".



2. Configure the OS basis and the path to the target OS computer in the object properties of the OS project created within "WinCC Appl. Client Ref".

   A shared folder with write access must be available on the target OS.

3. You can look for something suitable under the existing OS client projects in the "OS Basis" field.



The station "CLIENT03" is identical to station "CLIENT02" in project "Comp_MP". In this case the OS project "CL02" can be used as a basis for station "CLIENT03". The path to the target OS computer is set on the station "CLIENT03".

Note

If the settings for a referenced OS client change in relation to the base client, a new base client must be created. We do not recommend making changes on the OS client computer.

4.6 Creating the plant hierarchy

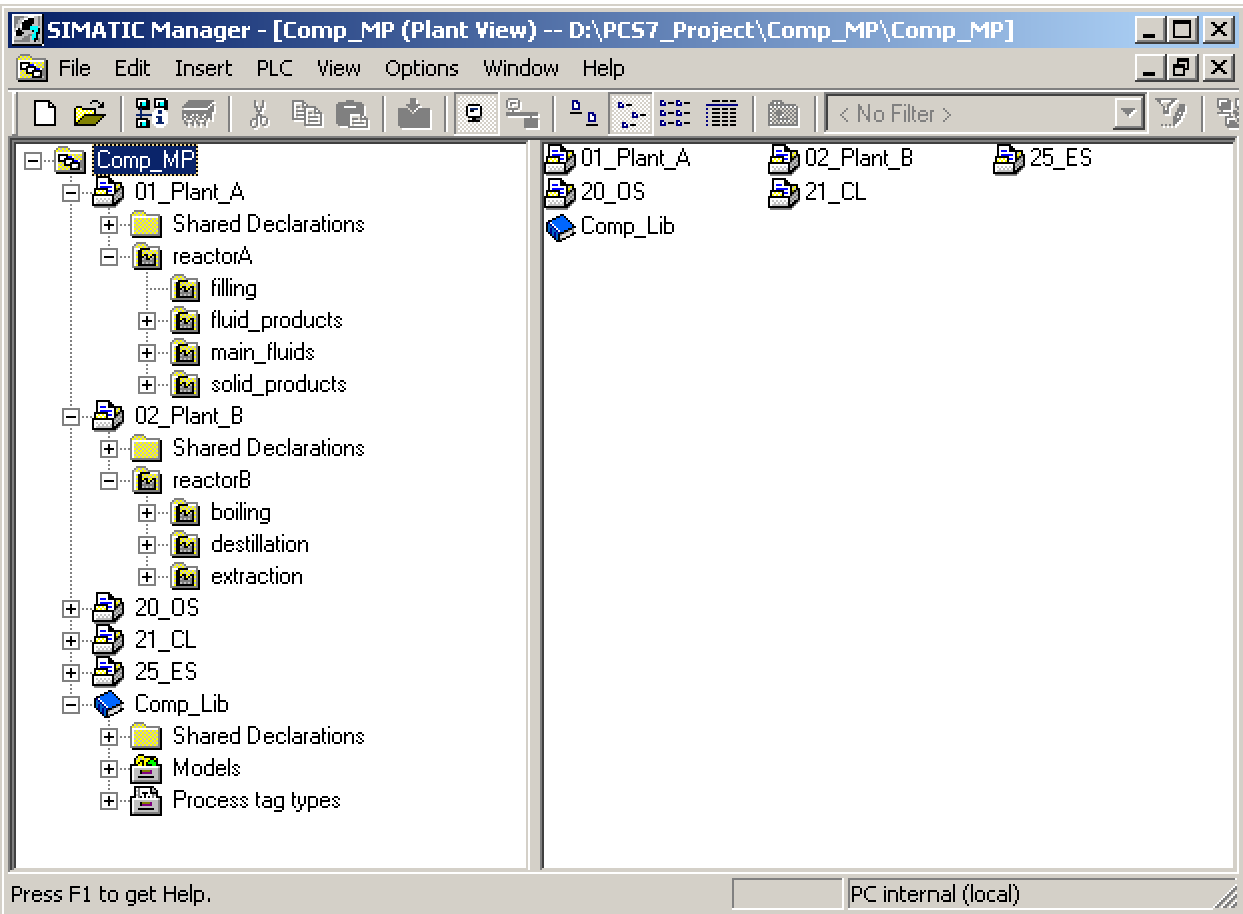
Introduction

The individual stations have been added and the configuration of the automation system has been stored in the SIMATIC Manager component view. The plant view is used to portray the hierarchy of the process structure in the project.

One of the first and most important tasks in a project is defining the plant hierarchy (PH). The PH is the basis for the outward appearance of the OS runtime or for the integration of SIMATIC BATCH.

Creating the PH

In the example project "Comp_MP" the PH of the AS projects is structured as shown below:



Create a PH in the "01_Plant_A" and 02_Plant_B" projects for the two automation systems. You can either create the individual hierarchy folders one by one or generate them automatically using a script file in the Import/Export Assistant (IEA).

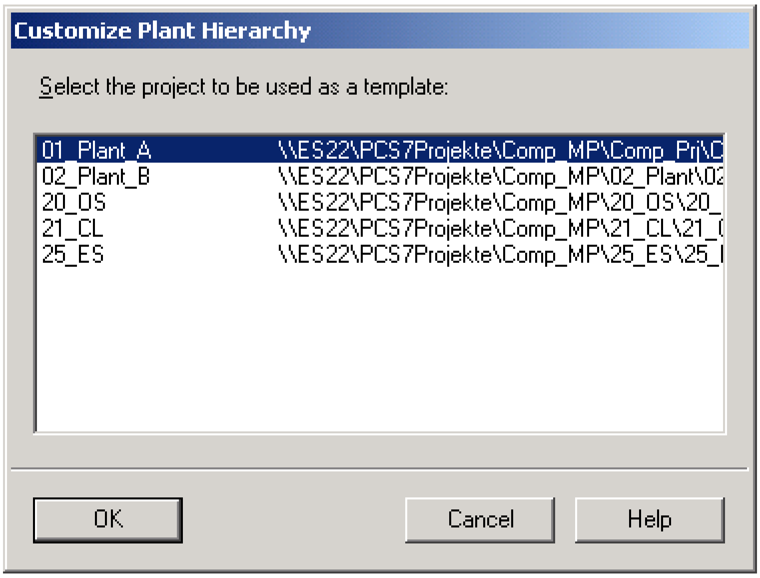
Note the following rules:

- The plant designation (HID) is composed of a block name, CFC chart name and sometimes a hierarchy folder name. In principle the HID should be kept as short as possible. We recommend using CFC chart names (process tag name) that are unique throughout the project. Incorporation of the hierarchical folder names can be avoided in the HID (see section "Make PH settings").

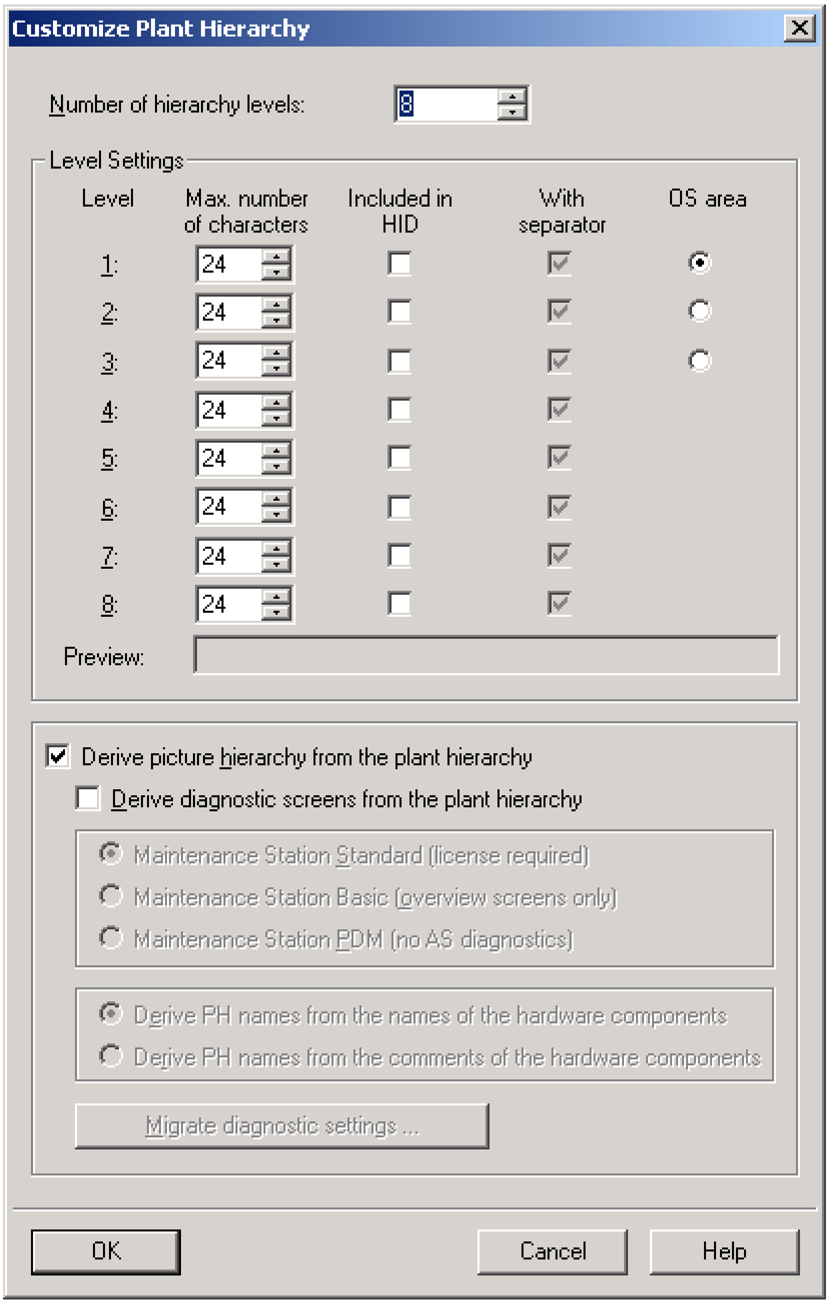
  If the plant naming convention is to be based on additional functional factors, the hierarchy folder names can still be integrated in the HID. The length of the HID should be limited to ensure that it can be fully displayed in all OS editing windows. The number of characters in the name of the hierarchy folders should not exceed this limit. Names with characters that exceed this limit will not be fully displayed in the HID.
- The following special characters may not be used in the name of a hierarchy folder: [.] [%] [/] [\ ] ["].

Making PH settings

1. Adapt the HID using the object properties of the PH by right-clicking on the multiproject and then selecting "Plant Hierarchy > Settings".



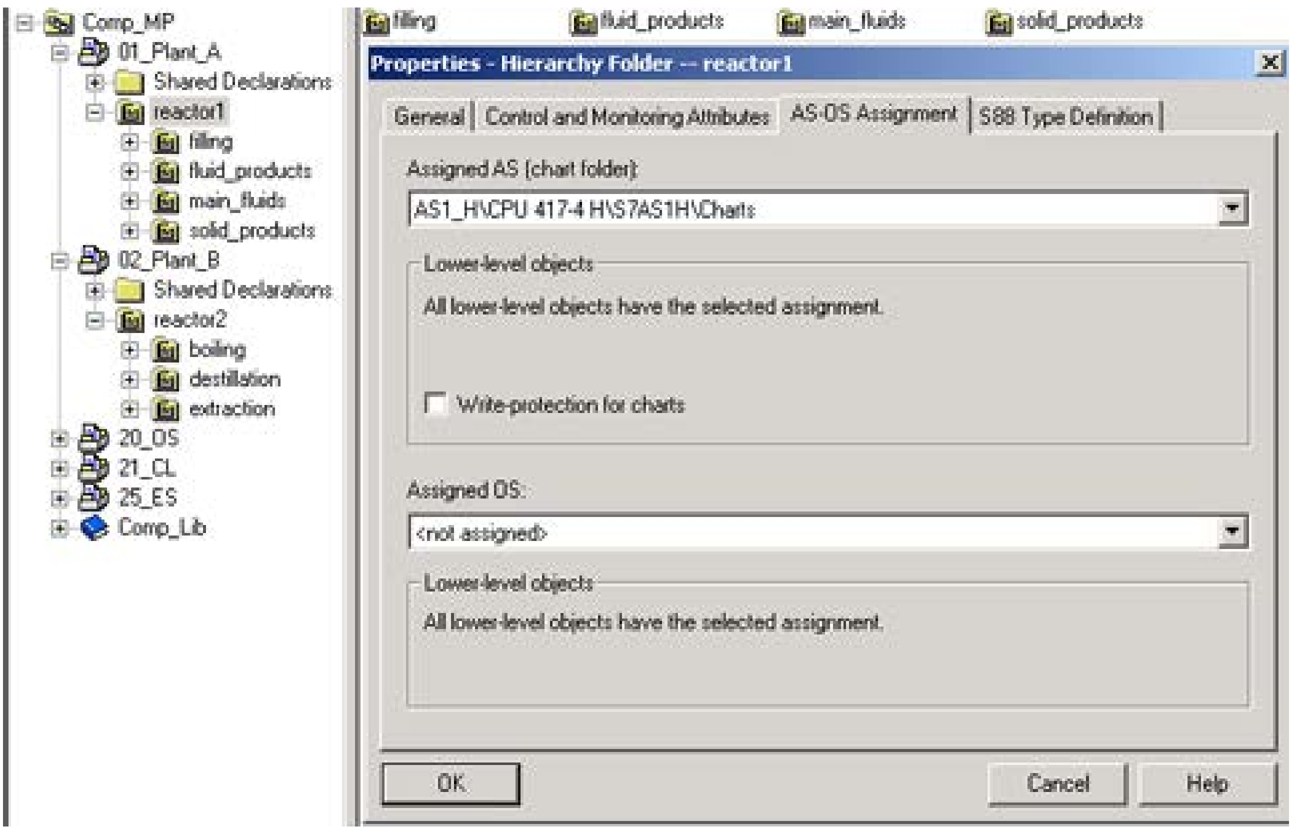
2. Select a subproject to serve as a template. The PH settings for the entire multiproject should be kept the same in PCS 7.



- The number of hierarchy levels should remain set to eight, since for example the optional "Derive diagnostic screens from the plant hierarchy" asset management function can automatically create up to eight levels.
- You can use the "OS area" option to determine the level from which the PH is displayed in the OS. The default setting is for the first level as in the example.
- The "Derive picture hierarchy from the plant hierarchy" setting is activated by default in PCS 7. The benefit with this is that the OS picture hierarchy is fully derived from the configured PH during the OS compilation and does not have to be configured and maintained separately.

Making the AS assignment

The object properties of a hierarchy folder play an important role in this regard. Using the "reactor1" folder as an example: On the "AS-OS Assignment" tab, assign the "reactor1" folder an automation system as a technical plant from the component view. In this case the charts from station "AS1_H" are assigned.



Each hierarchy folder then has an AS assigned as a technical plant, unit, or function in which the charts run after being downloaded.

All elements which you add to the hierarchy folder will be assigned to this AS. If you transfer the selected assignments to lower-level objects, the subordinate hierarchy folders adopt the same AS assignment. You can recognize this by the note "All lower-level objects have the selected assignment."

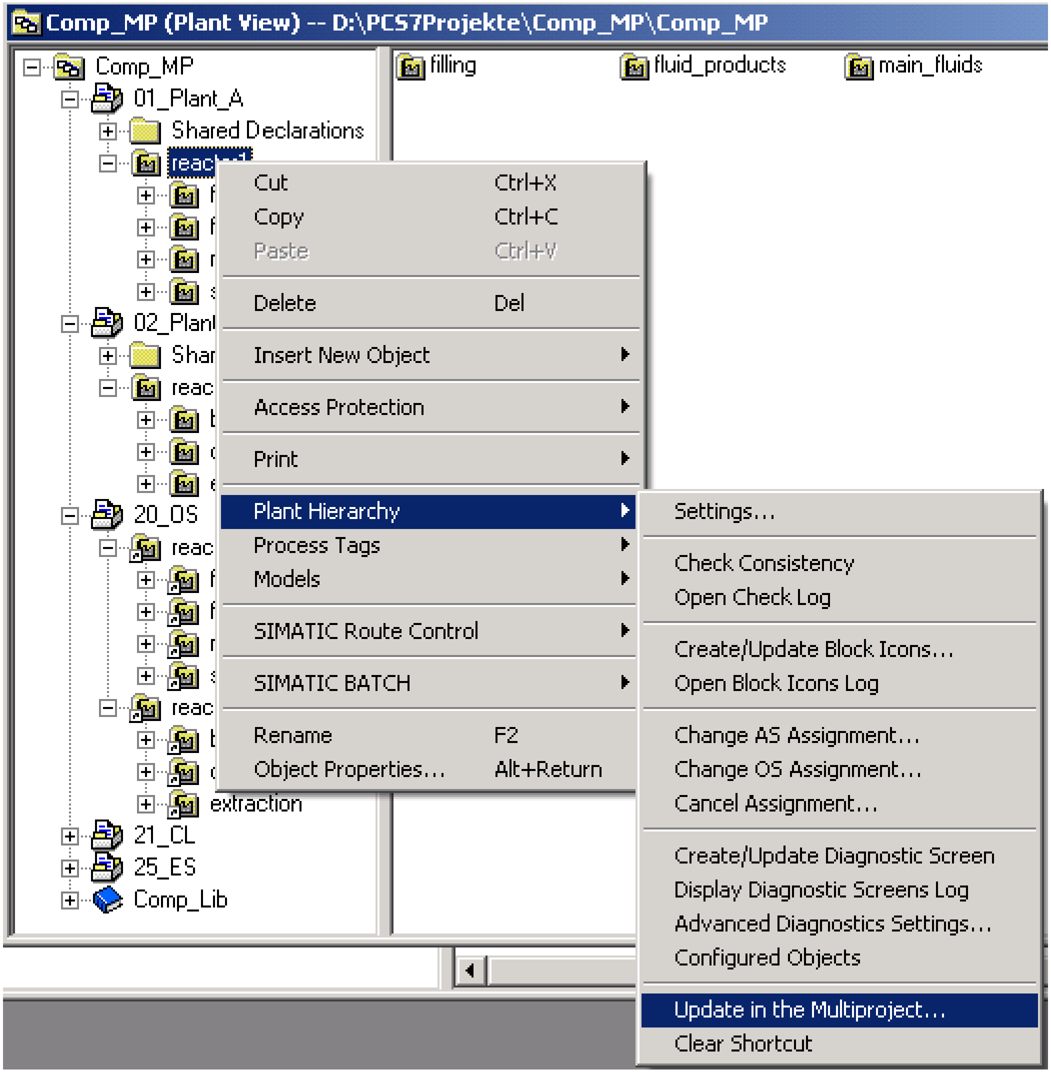
Synchronizing the PH

The PH of the "20_OS" project with the two OS server stations is generated by synchronizing the PH from the two projects for the automation systems.

To do this, use the command "Plant Hierarchy > Update in Multiproject".

Note

Additional information on this is available in the "SIMATIC Process Control System PCS 7 - Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.



Note

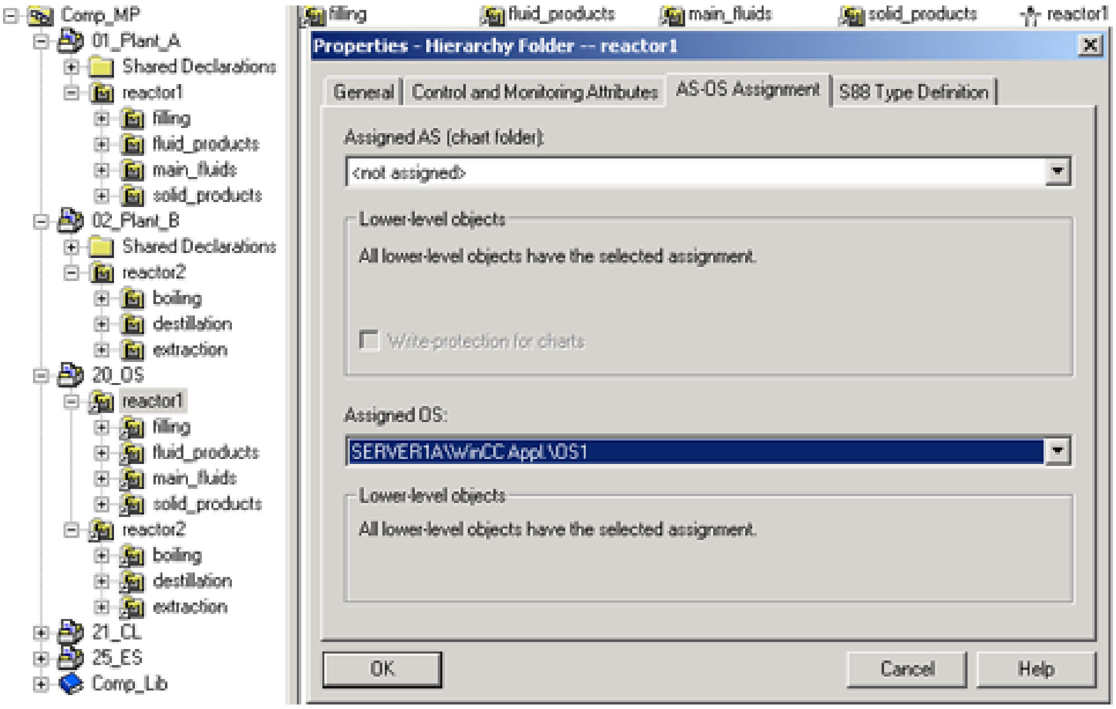
PCS 7 V7.0 or higher:

If e.g. the name of the hierarchy folder "reactor2" is changed in project "02_Plant_B", this change in name automatically follows in the linked hierarchy folder of project "20_OS".

Making the OS assignment

You need to make the OS assignment for the hierarchy folder before you can add process pictures.

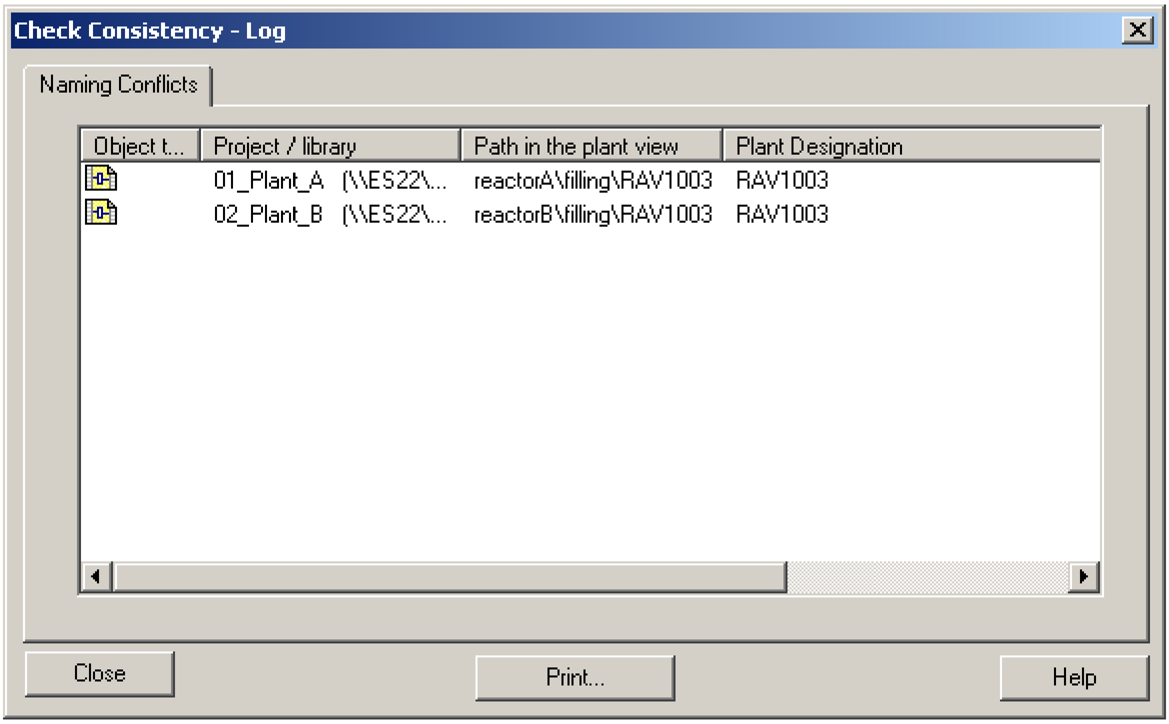
All elements which you add to the hierarchy folder will be assigned to this OS. If you transfer the selected assignments to lower-level objects, the subordinate hierarchy folders adopt the same OS assignment.



Checking the consistency of the PH

We recommend that you check the consistency of the plant hierarchy each time you have edited it. For this right-click on the multiproject and select the "Plant Hierarchy > Check Consistency" command in the context menu.

The screenshot below illustrates a naming conflict relating to CFC charts which are in different AS programs, but the same multiproject.



In the check log, all objects are displayed with their symbol, project name, and, if they exist, the paths of the plant view and the component view.

Note

We recommend that the consistency check is always performed for the entire multiproject, which will entail additional checks.

Additional information on this is available in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual or via the Help button in the log.

You can display the log without running the check again, via "Options > Plant Hierarchy > Open Check Log" command.

4.7 Sharing out configuration work

Introduction

Engineering management within a multiproject without any division of labor is a standard practice.

However, if the goal is to shorten the configuration time by working in parallel, as of PCS 7 Version 7.0 SP1 the question of the most suitable method arises, because multi-user engineering has now been introduced as well as multiproject engineering.

Multiproject engineering

Individual projects can be allocated to distributed engineering stations for rapid and flexible AS configuration. PCS 7 offers the appropriate system functions for managing, distributing and merging the projects. Projects can be separated from the multiproject in order for them to be processed on other engineering stations, e.g. in an office environment. Once they have been processed these projects are reintegrated into the central multiproject of the plant.

Note

Further information can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual and in the "PCS 7 Multiproject / Multi-user Engineering” (http://support.automation.siemens.com/WW/view/en/22258951) programming manual.

Multiproject engineering with SIMATIC BATCH

Information on multiproject engineering with SIMATIC BATCH can be found in the following documents:

- Multiproject engineering with SIMATIC BATCH (http://support.automation.siemens.com/WW/view/en/23785345)
- SIMATIC Process Control System PCS 7 SIMATIC BATCH (http://support.automation.siemens.com/WW/view/en/68154748)

Multi-user engineering

In addition to multiproject engineering, PCS 7 as of Version 7.0 SP1 also offers the possibility of working parallel on the same user program (CFC/SFC of an AS project). In this case the specific project can remain at its storage location. The multiproject is filed on the central engineering station. Using a Windows server operating system on the engineering server is recommended for performance reasons. The individual projects from multiple engineering stations are opened and processed via a network.

Parallel working on a project via a combined network is restricted to CFC and SFC. Specific improvements were implemented in CFC and SFC, including failsafe functions to safeguard system integrity and data consistency when several users access the same data at the same time.

Note

Additional information on this is available in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

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5 Configuration of the hardware (AS and I/O)

Introduction

This section describes the settings in the hardware configuration (HW Config) of the example project ("Comp_MP").

The screenshots provide an overview of the properties of an H system with CPU 417-4H and CP 443-1/CP 443-5 Ext as well as of a standard AS with CPU 417-4 and CP 443-1/CP 443-5 Ext. The properties dialogs of other CPUs or CPs may be slightly different.

Note the following when using SIMATIC PDM in the project:

S7-400 CPUs as of firmware version 5.1 support data record routing. The CPUs must also be configured with this firmware version for this purpose. For all other CPUs, the required routing functions must be implemented with a CP 443-5 Ext.

5.1 General CPU settings (H system and standard AS)

PCS 7 features optimized default settings for a CPU so that only a few parameters need to be set for a given project.

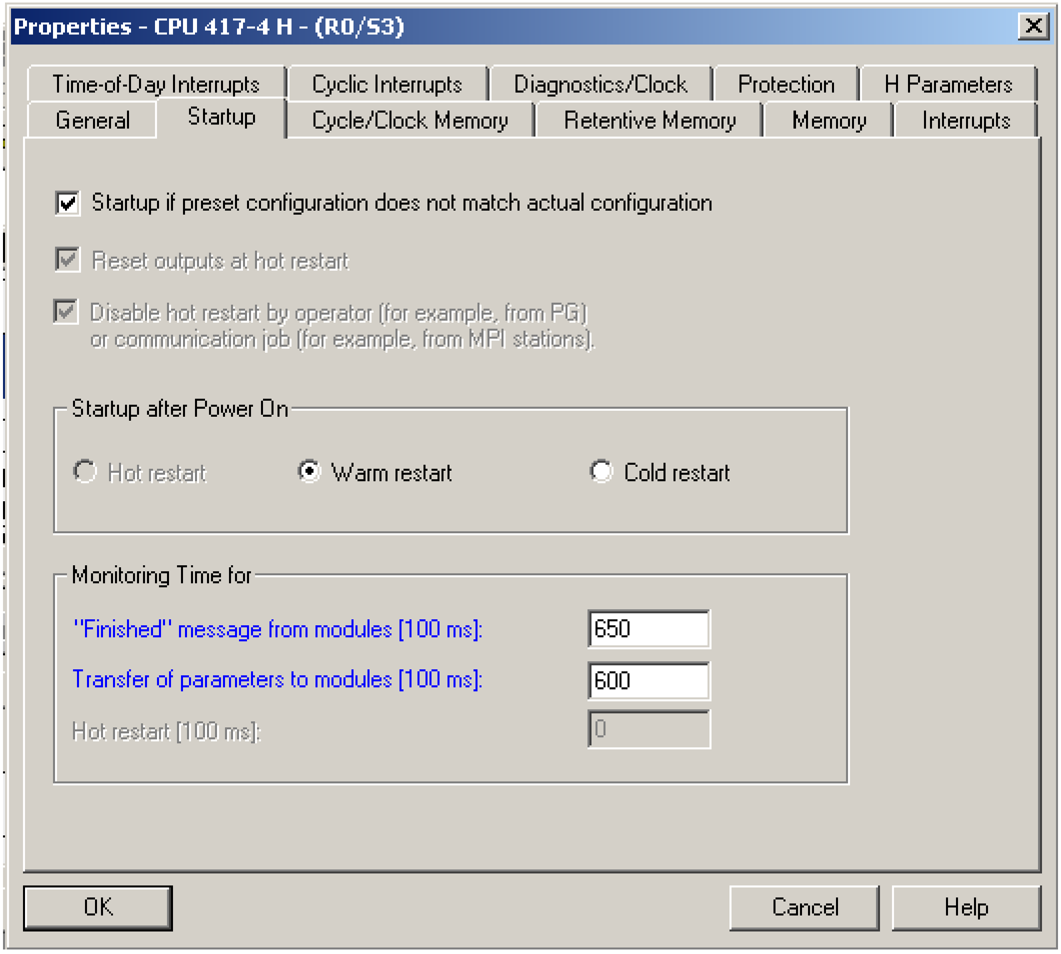
Detailed information on the parameters can be found in the HW Config online help. Special contexts for PCS 7 are explained in greater detail in the following sub-sections. These subsections also contain relevant recommendations, the parameters to be left at their default settings, and the parameters you may need to adapt to your particular project.

CPU parameters highlighted in blue can be changed during operation on an H system. All special information for the CPU settings in the H system is given in the section titled "Special settings for an H system".

The following settings are made in the object properties of the CPU in HW Config.

5.1.1 Startup

The parameters relating to the CPU startup characteristics can be checked on the "Startup" tab. We recommend that you retain the default settings.

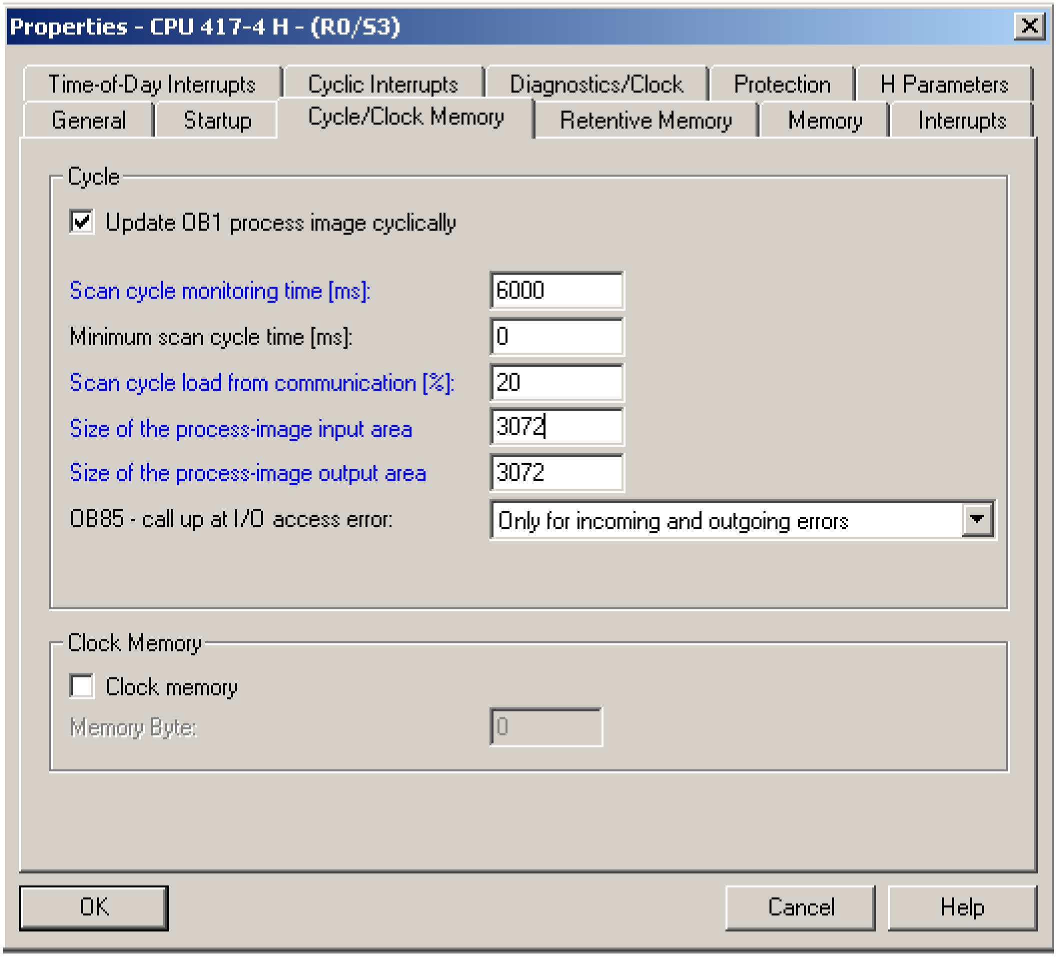


This relates particularly to the enabled setting for "Warm restart." In this case, the current process parameters are not reset to their initial values.

Another factor that plays a role in terms of startup characteristics is the fact that a PCS 7 AS is always equipped with a backup battery and a RAM memory card.

5.1.2 Cycle/Clock Memory

Settings on the "Cycle/Clock Memory" tab:



Scan cycle monitoring time

The scan cycle monitoring time should not be changed from the default value of '6000 ms' for PCS 7 projects to ensure the effectiveness of CPU performance monitoring and the emergency stop (shutdown prevention).

Size of the process image of the inputs/outputs

The size of the process image of the inputs/outputs depends on the I/O address space needed for the process signals. Adapt both values using the signal list from the plant planning where the default size set is not adequate. Factor in appropriate reserves where a standard AS is used and you wish to expand your plant while in operation. For H systems, the parameters highlighted in blue can be changed during operation.

Note that when you adjust the values, the amount of usable work memory for code or data blocks changes.

Note

A process image with the size of 1000 I/O bytes takes up 12 KBytes in the work memory. 20 KBytes are taken up in CPU firmware V6 and above.

You can see an overview of the I/O address space currently in use under the HW Config menu command "View > Address Overview…". The highest address for inputs or outputs listed (without diagnostic addresses) must be within the configured size of the process image.

The process image is required for the PCS 7 configuration because all channel blocks access a symbolic address from the process image and do not work with direct I/O access.

5.1.3 Process image partitions (PIP)

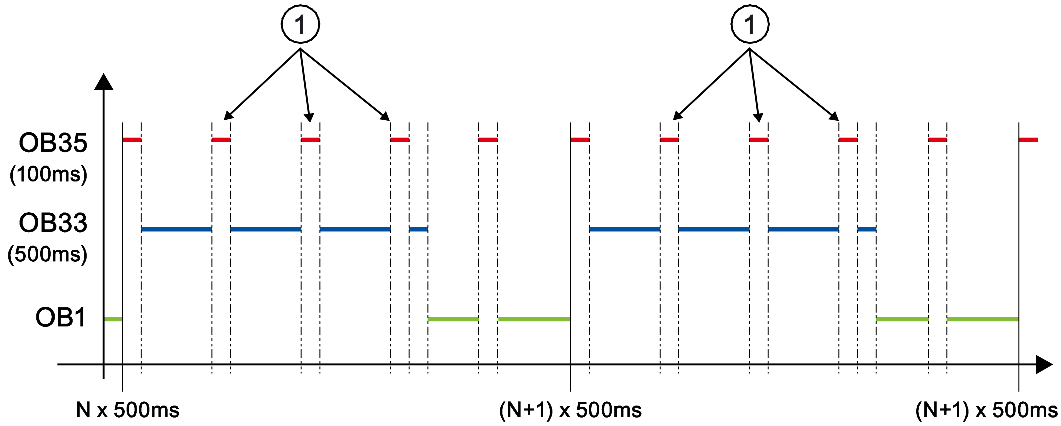
Using process image partitions

Note

The settings below are not required for fail-safe applications, as no process image partitions are used in them (see also "Compendium Part B - Process Safety").

The process image is generally updated by calling the OB1 (default setting). When process image partitions are used, they are updated by calling the respective associated cyclic interrupt OB.

As a rule, we recommend the use of process image partitions for PCS 7. Otherwise, "non-constant time response" will occur as a result of the free cycle of OB 1. This means that the process values are not processed and updated reliably in a temporal context. The graphic below is designed to illustrate this:



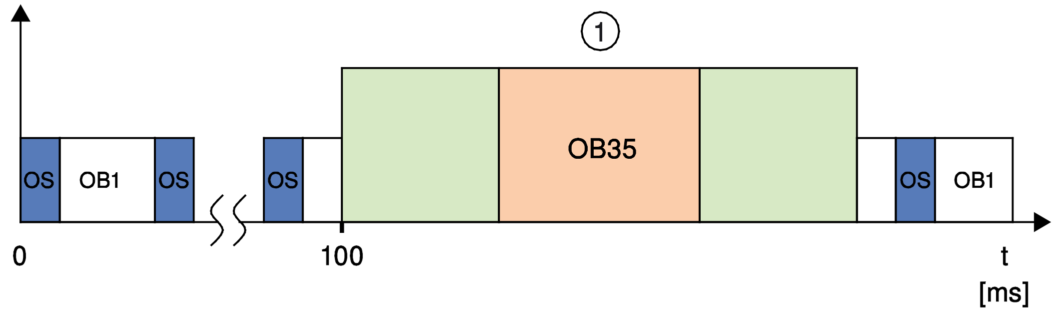
① If no process image partition is configured for OB 35 (the process image is updated in OB 1 only), OB 35 is executed three times with the "old" process values, without having direct influence on the process.

Configuration is performed in the following two steps:

1. CPU properties:
   Assign one of up to 15 free process image partitions to a cyclic interrupt OB
   (e.g. OB 35 – 100 ms)
2. Module properties:
   Assign the module addresses to a process image partition and thereby to the desired cyclic interrupt OB

The process image partition is automatically updated by the cyclic interrupt OB to which it was assigned.

This ensures that the inputs really are read at the start of a cyclic interrupt OB (for example, a controller is processed) and also that the outputs are written in accordance with the cycle (input – process – output: IPO).



① = Process image partition PIPx

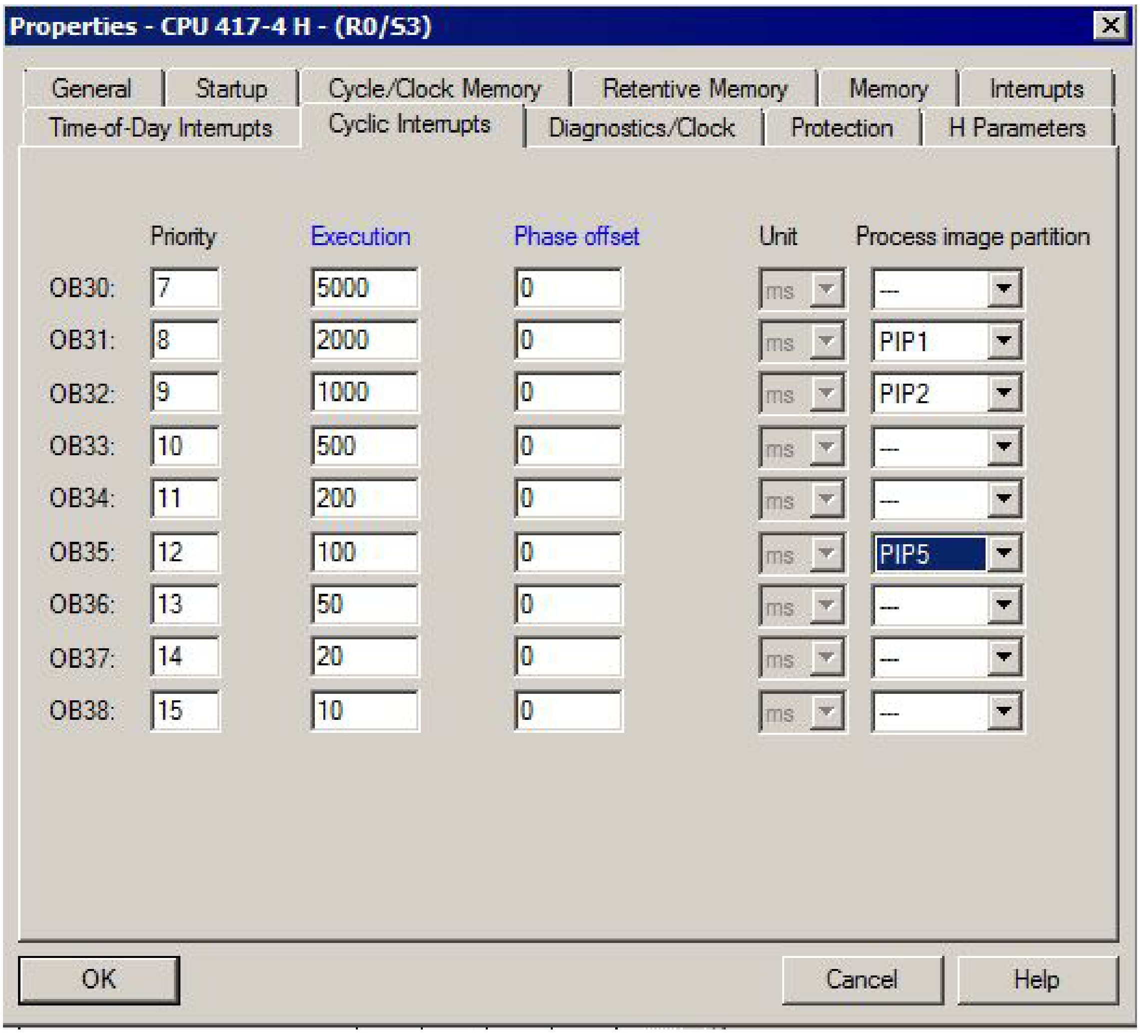
Note

You can find background information about the relationship between process images and process image partitions in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual, in the section "Setting the process image".

If redundant IO modules are used, TPAs must be used.

5.1.4 Cyclic interrupts

The following image shows the settings for cyclic interrupts:



"Execution" column

The executions for the 9 cyclic interrupts can be used directly in most processes. They also have the option of defining their own execution times.

The following process control distribution is a typical example for a PCS 7 plant:

- Main process with 500 ms or 1000 ms.
- Slower processes (2 s)
- Some fast processes (50 ms or 100 ms)

"Process image partition" column

You have the option of selecting a separate process image partition for each cyclic interrupt used in order to guarantee a fast signal update with the CPU at full load.

"Priority" and "Phase offset" columns

The "Priority" column should not be changed for standard applications.

With several cyclic interrupt OBs that are to be called at the same time, we recommend setting a phase offset for OBs with lower priority. For example, OB 38 to OB 32 are called in sequence at 1,000 ms. The execution time of the cyclic interrupts can be distributed beyond the cycle using the phase offset. The table below shows the parameter assignments for the example:

Cyclic interrupt OB	Execution (processing portion)	Phase offset
OB 32	1000 ms (150 ms)	100 ms (>70+20)
OB 33	500 ms (70 ms)	30 ms (>20)
OB 34	200 ms (20 ms)	0

5.1.5 Memory

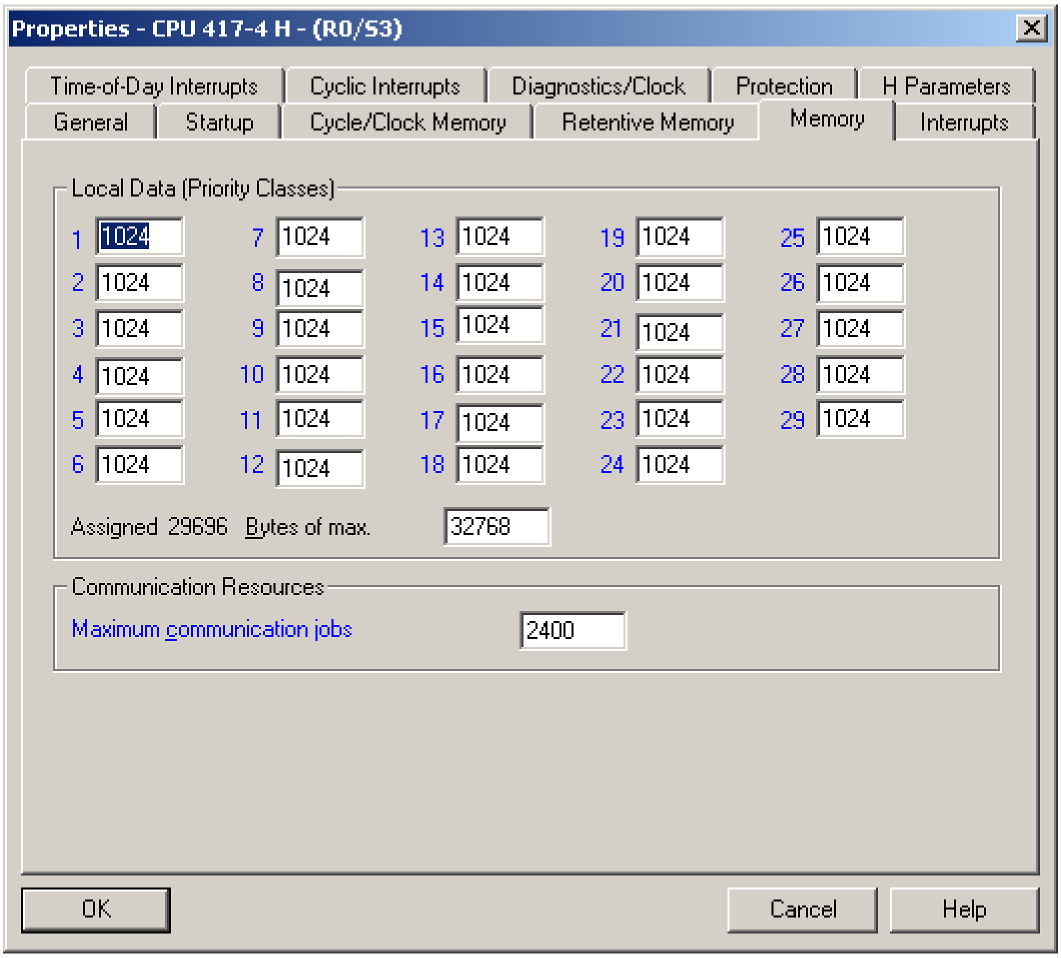
Local data (priority classes)

Local data is derived from the declaration section of the logic blocks and stored centrally in the local data storage area. The need for local data increases where new block types are installed in charts.

On the "Memory" tab, you can define the local data size in the work memory for each individual OB. This value must always be beyond the particular local data requirement.

Each cyclic interrupt OB is assigned a local data size by means of its priority. With this for example OB 30 has priority 7 and OB 38 priority 15. The default setting is 1024 bytes for each cyclic interrupt OB which is adequate for typical quantities of block types. A check is made when compiling the charts during the engineering phase as to whether a warning threshold has been crossed (with a default setting of 90%).

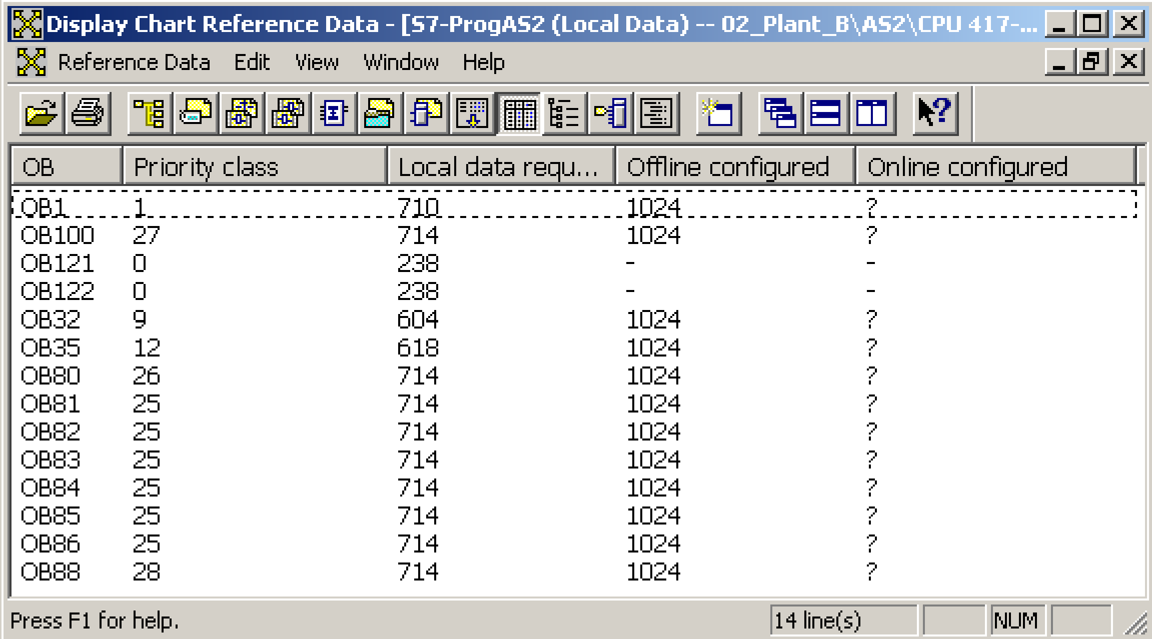
If the warning threshold is crossed through importing new block types in complex processes, first of all increase the maximum size of the local data area (which has a default setting of 32768) and then maximize the local data for the priority classes used.



It is also important to set the priorities 24 to 28 to a value of 1,024. These contain OB 100 and the asynchronous error OBs.

Checking the local data requirement

Use the CFC editor to compare the local data requirement and amount in the CPU. Use the "Options > Chart > Chart Reference Data" command to open the editor in which the "Local Data" can be viewed. An OB configured too low is shown in red in this view.



OB	Priority class	Local data requ...	Offline configured	Online configured
OB1	1	710	1024	?
OB100	27	714	1024	?
OB121	0	238	-	-
OB122	0	238	-	-
OB32	9	604	1024	?
OB35	12	618	1024	?
OB80	26	714	1024	?
OB81	25	714	1024	?
OB82	25	714	1024	?
OB83	25	714	1024	?
OB84	25	714	1024	?
OB85	25	714	1024	?
OB86	25	714	1024	?
OB88	28	714	1024	?

The maximum amount of local data depends on the CPU; for example, it is 65,536 for CPU 417–4HT14–0AB0 (V4.5).

Communication resources

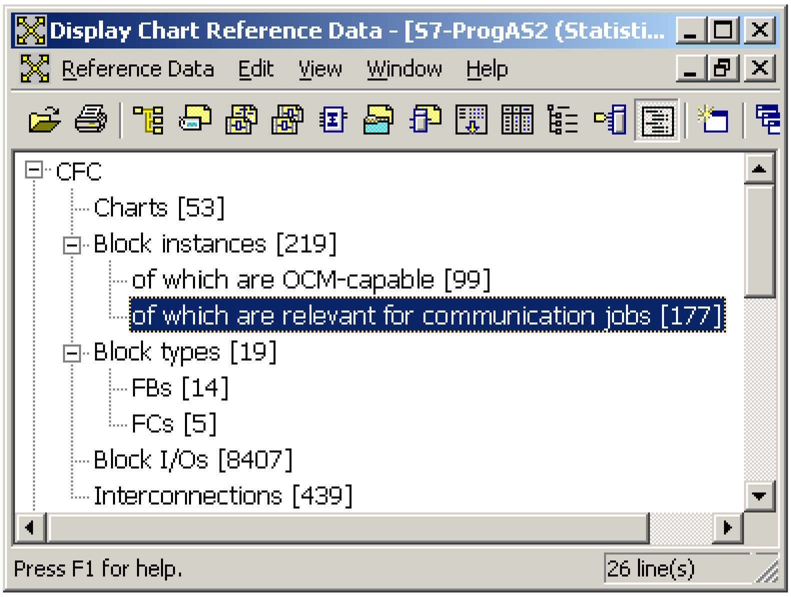
The maximum number of communication jobs also depends on the CPU and roughly corresponds to the maximum number of process objects (POs) for an AS.

A CPU 417–4HT14–0AB0 (V4.5) can e.g. manage a maximum of 10,000 communication jobs. Block instances from BSEND, BRCV, ALARM, ALARM_8, ALARM_8P, NOTIFY, and AR_SEND, for example, always need one communication job.

With this CPU the default setting is for 2400 communication jobs which is adequate for typical quantities of block instances. A check is made when compiling the charts during the engineering phase as to whether a warning threshold has been crossed (with a default setting of 90%).

Checking communication resources

Use the CFC editor to see the number of communication resources in the CPU. Use the "Options > Chart > Chart Reference Data" command to open the editor in which the "Statistics" can be viewed.



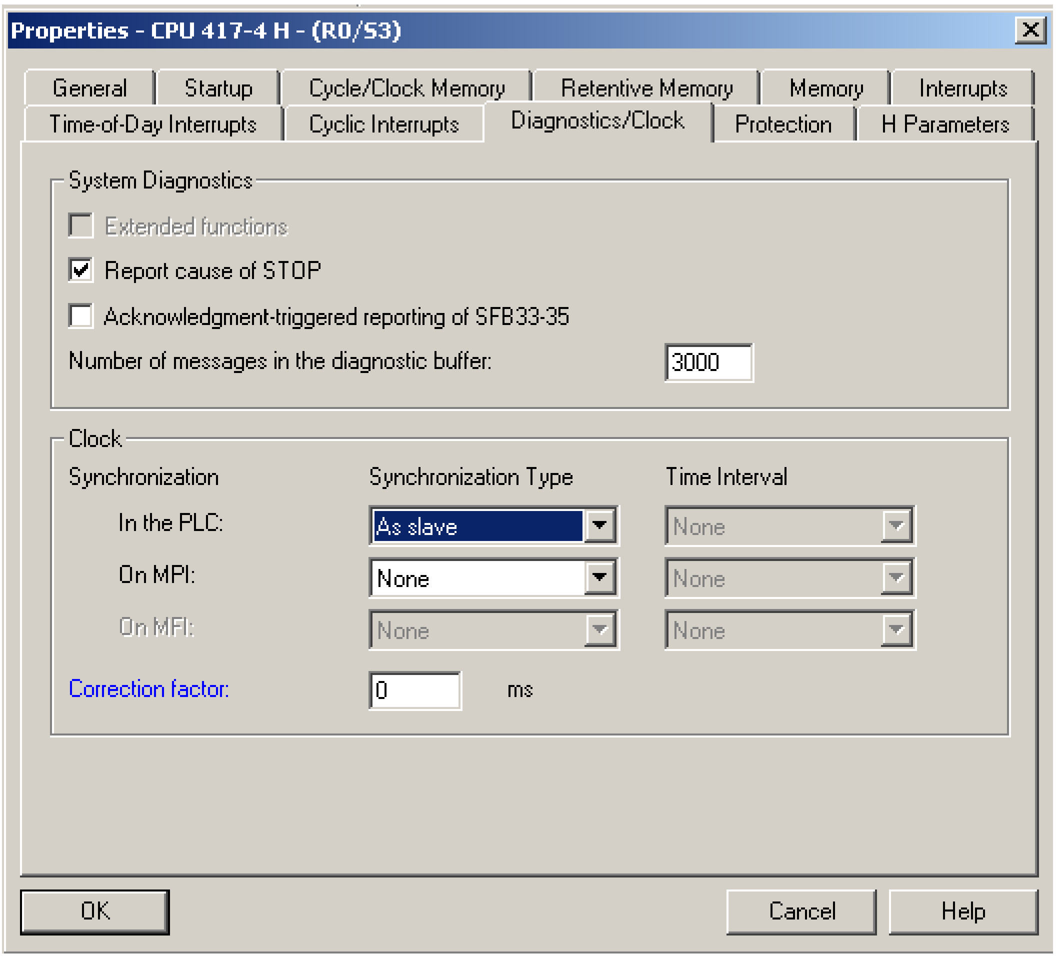
5.1.6 Diagnostics/clock

Time synchronization

For process data to be compatible for evaluation, all components of the process control system must work with the same time of day so that messages – regardless of the time zone in which they are generated – can be assigned correctly in terms of temporal sequence. This usually involves an OS server or an external time-of-day master ("SICLOCK" central plant clock) taking on the role of the time master. All other operator stations and automation systems on the plant bus then have the time from this master and, therefore, identical time.

As a result the synchronization type is set to: "As slave" for each AS in a time-synchronized PCS 7 plant in the SIMATIC mode.

Activate time synchronization in the CPU from the "Diagnostics/Clock" tab.



Set the CPUs of the automation systems to function as time slaves. They receive the time from the active time master on the plant bus.

Note

For the S7-400 CPU PN I/O with integrated Ethernet interface, the configuration information contained in the "SIMATIC Process Control System PCS 7 Time Synchronization" (http://support.automation.siemens.com/WW/view/en/75734232) manual applies:

Sections: "How to set time synchronization on an AS for NTP mode"

Acknowledgment-triggered reporting (ATR)

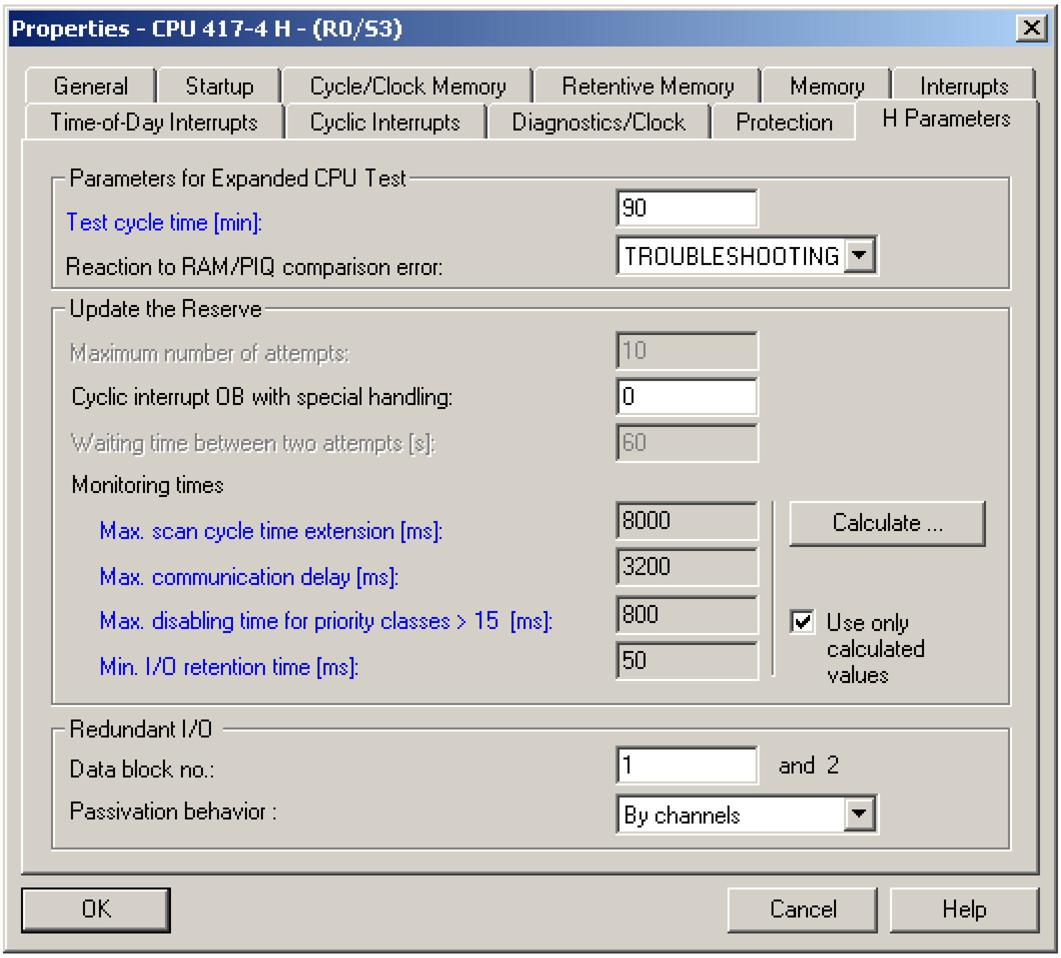
With the "Acknowledgment-triggered reporting of SFB 33-35" option, it is possible to suppress the repeated reporting of "fluttering" signals, until an acknowledgment has been issued. This can help to make the message list clearer, as well as to take some of the strain off the communication system.

However, we recommend that you leave ATR deactivated, for the following reasons:

- It can cause the plant operator to stop acknowledging messages, even those which are not "fluttering messages". If this is the case, the operator will not realize that the event causing the message is recurring.
- The ATR property is a property of the CPU, which must be explicitly set for each CPU. If this property is not set to the same value for all CPUs, this can result in varying message behavior for the operator.
- The ALARM (SFB 33), ALARM_8 (SFB 34), and ALARM_8P (SFB 35) blocks then only report a change of signal if the previous change of signal (the previous incoming message) has been acknowledged. This property applies to all signals on these blocks, irrespective of the "Acknowledgment required" property in PCS 7.
- The setting can only be subsequently changed by performing a complete CPU download.
- "Fluttering messages" which appear during commissioning or when a process tag is faulty can also be blocked using the "Acknowledge error" OS function.

5.2 Special settings for H systems

The following images shows the default settings on the "H Parameters" tab:



Parameters for the advanced CPU test

"Reaction to RAM/PAA comparison error" should remain set to the "TROUBLESHOOTING" operating mode. The H CPU offers a function for detecting a memory error, fixing simple memory errors, and automatically returning to the "RUN redundant" system mode.

Update of the reserve

The reserve CPU is updated each time an H system goes from the "RUN solo mode" to "RUN redundant" system mode. This process if often referred to as "link-up and update".

In the link-up phase, the CPU in RUN copies all blocks to the stopped CPU. In the update phase, the data block values that have changed since copying are updated.

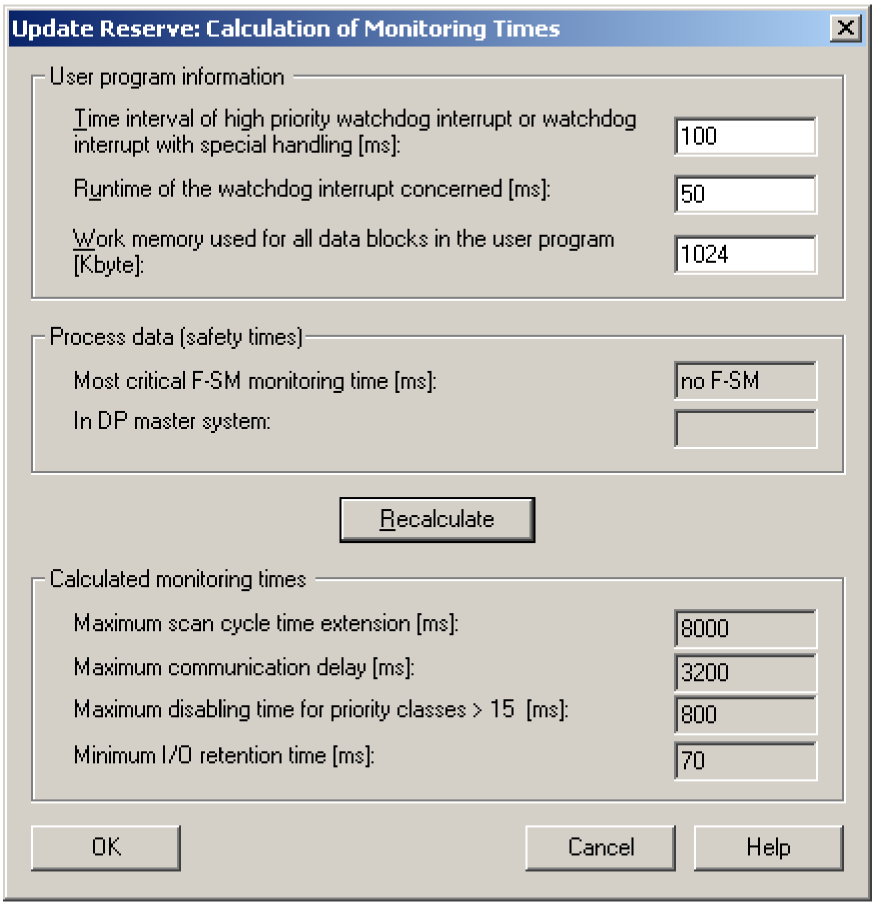
Note

Detailed information on linking up and updating can be found in the "SIMATIC S7-400H Fault-tolerant Systems" (http://support.automation.siemens.com/WW/view/de/60458386) manual.

Calculating monitoring times for updating the reserve CPU

To avoid influencing the ongoing process during the critical update phase, four monitoring times are provided that can cancel the update phase where a monitoring time is exceeded.

A dialog box is opened via the "Calculate" button where the monitoring times are calculated using the hardware configuration and the information on the user program. The minimum peripheral device hold time results in all cases from the quantity of DP slaves configured.



Information on the user program is described in the online help.

Note

The default user program value settings (0,0,1024) provide the default monitoring times (800ms, 2400ms, 8000ms) . These values are already optimized for typical user cases meaning that no new calculation is required.

In the event that monitoring times which are set too low prevent redundant operation during a plant conversion (e.g. through configured DP slaves that cannot be reached, the update will take longer than 800 ms), the times can be increased and updated during operation.

Ascertain the length of time for the monitoring time taken when updating

The period for the update phase for transition to redundant operation is adhered to each time in the CPU diagnostics buffer. Look for the following event for this:

- Event 7 of 3000
  - Event ID 16# 7303
  - H system (1of2) gone into redundant operation
  - Occurred in: Master CPU in rack no.: 0
- Start-up information:
  - Start with no change in system expansion
  - Update monitoring time in ms: 426

In order for the H system to transition to redundant operation the monitoring time displayed for updating must be less than the maximum inhibit time for priority classes >15.

Redundant I/O

If redundant I/O modules have been configured, ensure that the DB number set here does not conflict with the numbers of your user DBs.

Note

Detailed information on using and configuring redundant peripheral devices can be found in the "SIMATIC SH-400H Fault-tolerant Systems" (http://support.automation.siemens.com/WW/view/de/60458386) manual.

5.3 Settings for CP443-1 as a plant bus interface

5.3.1 CP 443-1 for plant A with H system

Introduction

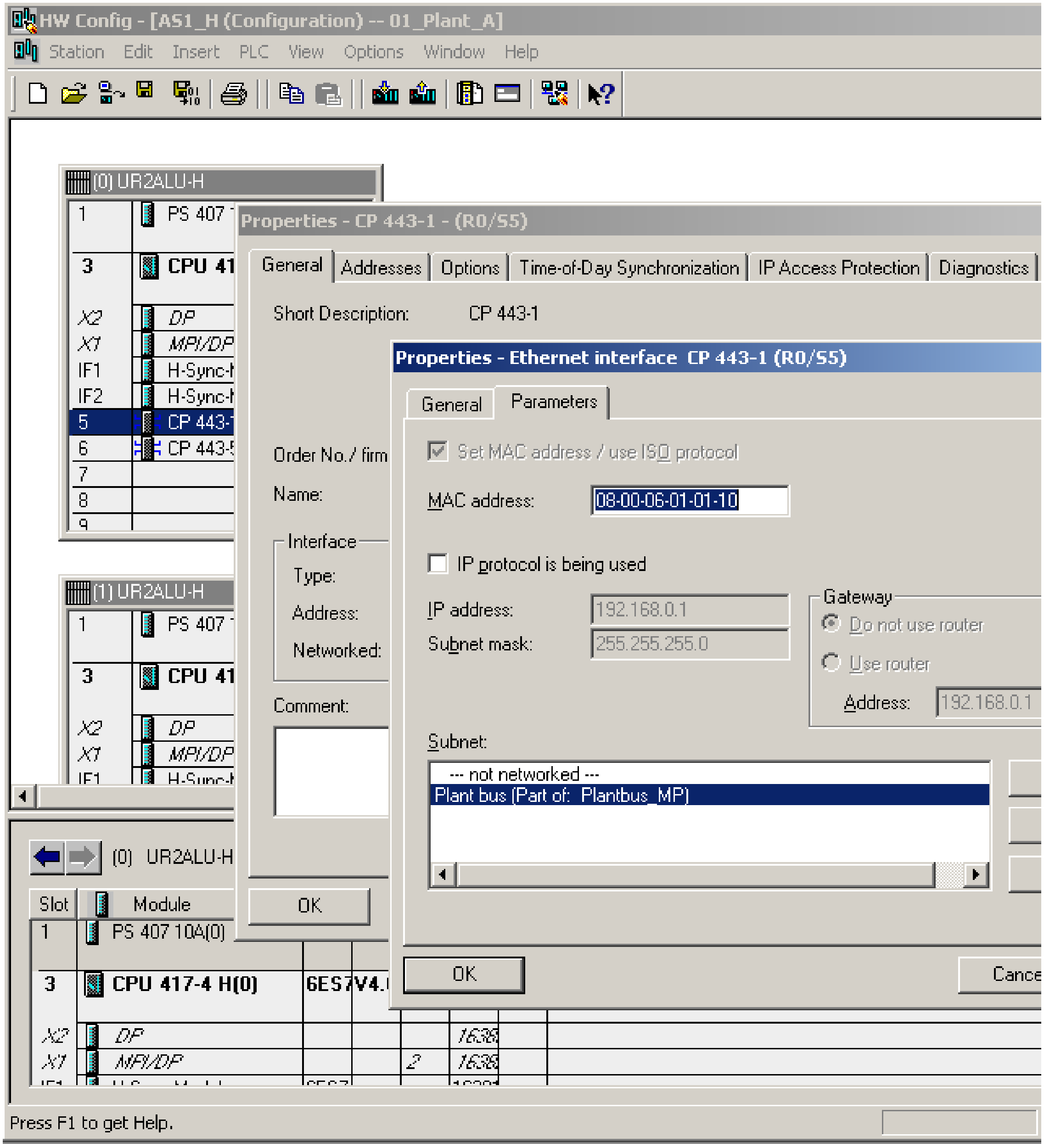
Once the project has been created two CP443-1 are available in both racks of the H system for a redundant connection of the H system (here Plant_A) to the plant bus.

Connecting the plant bus

Enter the correct MAC address for each CP and establish the connection to the plant bus.

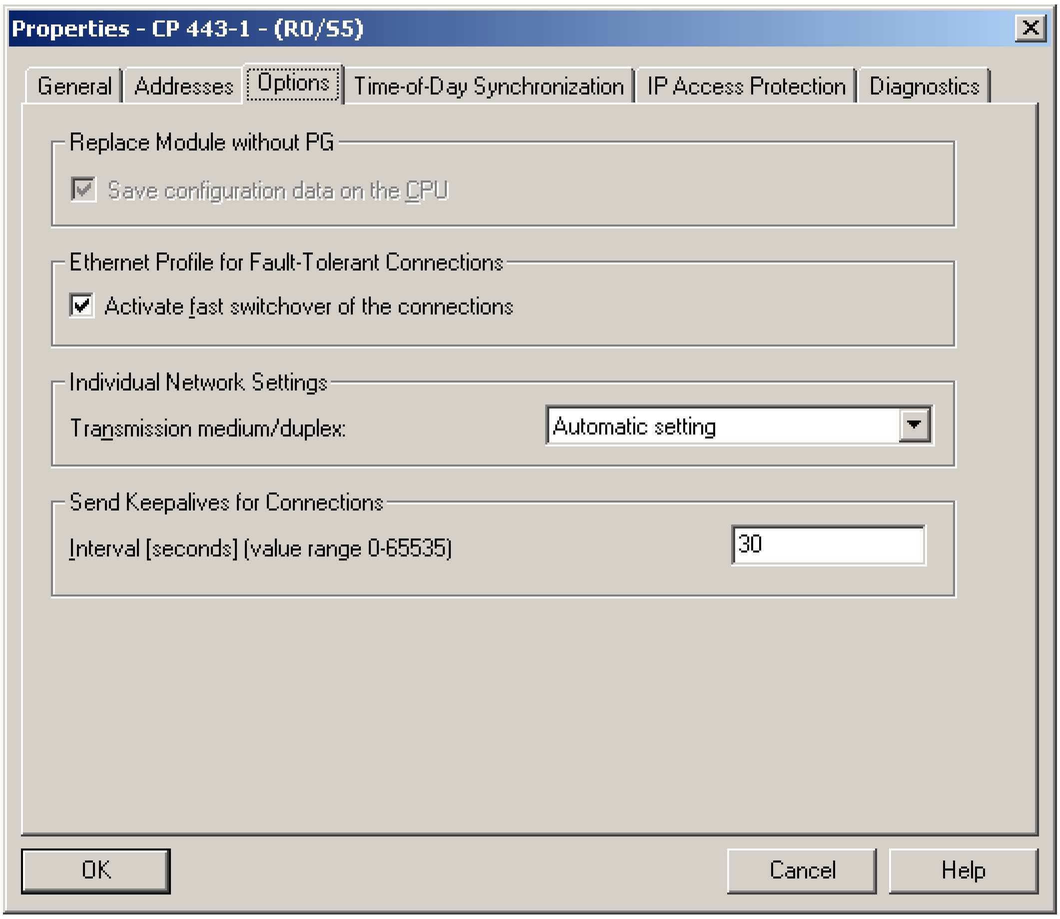
Note

Both CP443-1 units in the H system must always be configured with different MAC addresses.



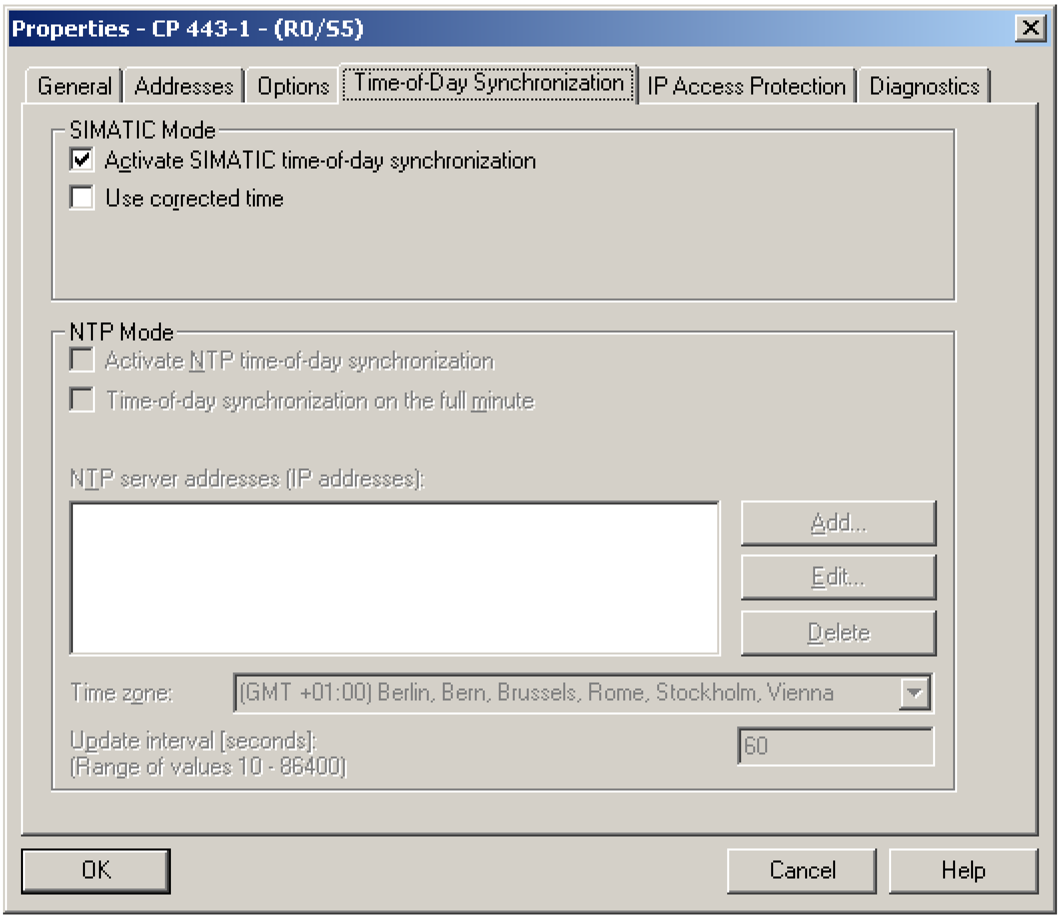
Network settings

1. "Automatic setting" is the recommended "Transmission medium/duplex" in the "Options" area.
2. Ensure that the option "Activate fast switchover of connection" is selected.



Time synchronization

Activate time synchronization for both CPs in the SIMATIC mode.



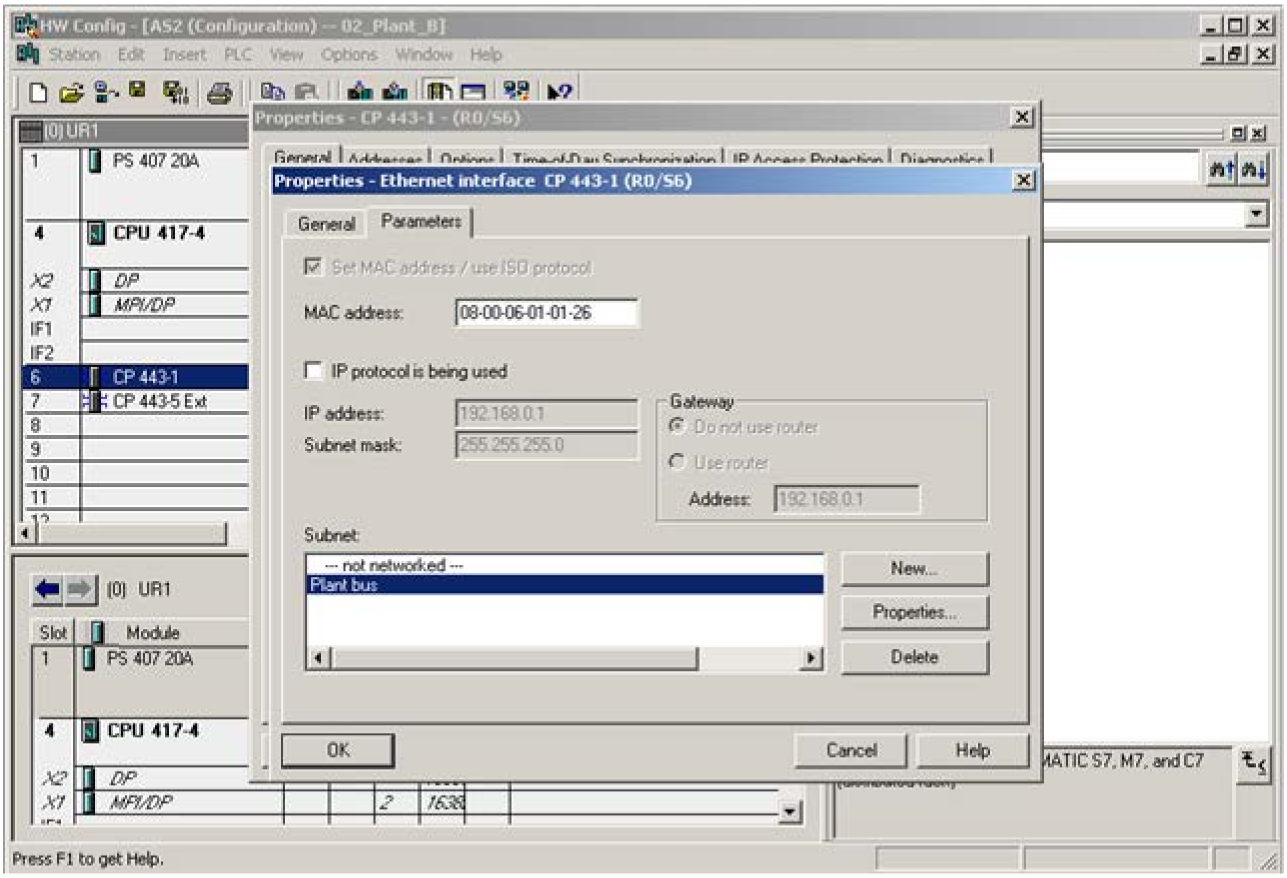
5.3.2 CP 443-1 for plant B with standard AS

Connecting the plant bus

Enter the correct MAC address and establish the connection to the plant bus.

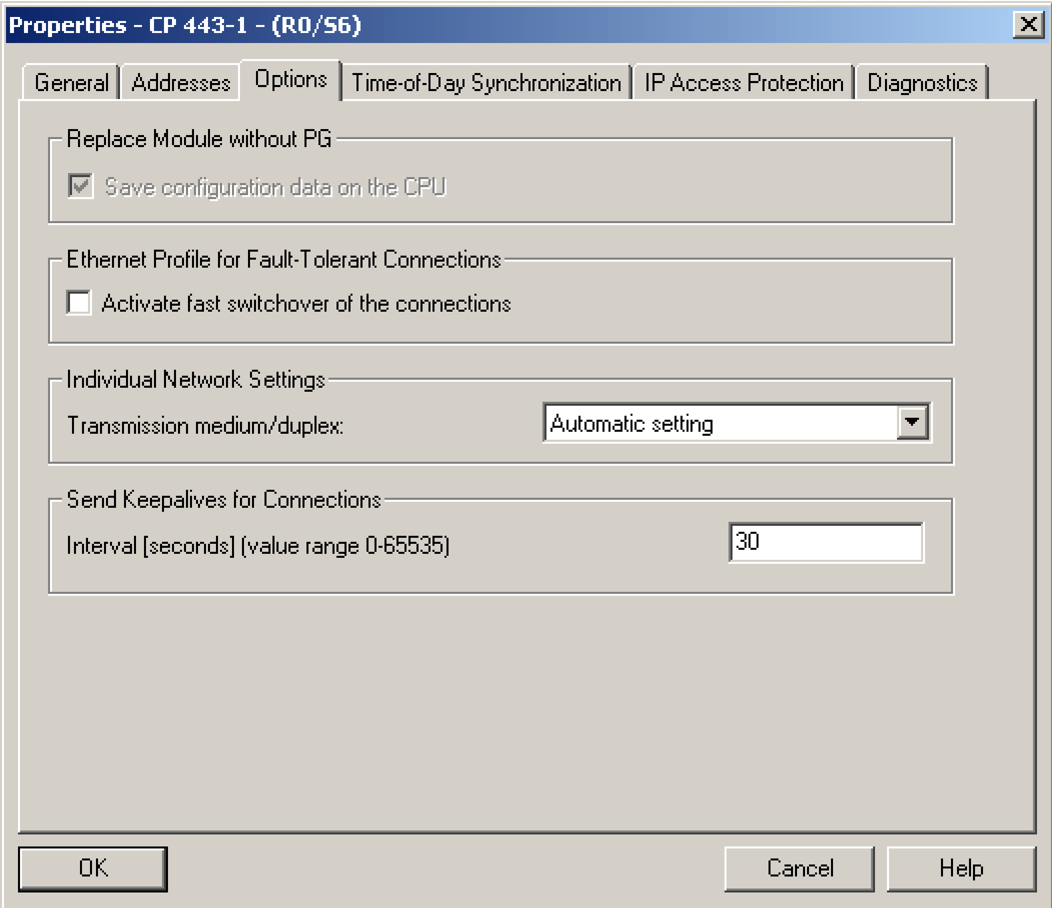
Note

A MAC address can only be used once on a plant bus operated with the ISO protocol.



Network settings

"Automatic setting" is the recommended "Transmission medium/duplex" in the "Options" area.



Time synchronization

Activate time synchronization in the SIMATIC mode.

NTP mode

S7-400 standard CPUs PN I/O with integrated Ethernet interface can only be synchronized via NTP. The H-CPUs in FW V6 and above support both NTP as well as SIMATIC mode.

NTP mode is not yet supported by all PCS 7 components. As a result, both modes must be used simultaneously in order to perform time synchronization with the IE bundles. If both time servers are operated on a single PC, poor priority settings can lead to a time offset. In this case, an effective remedy would be to use a central plant clock SICLOCK TC400 which supports both modes.

An NTP server such as a SICLOCK or a PC is required to synchronize the time of the S7-400IE. It only forwards the unadulterated GMT time to the connected NTP clients, with no time zone information.

Note

You can find more information about configuration in the "PCS 7 Time Synchronization" (http://support.automation.siemens.com/WW/view/en/75734232) manual.

5.4 Settings for CP 443-5 Ext as PROFIBUS master

Introduction

In PCS 7, each CP 443-5 Ext acting as a PROFIBUS master has its own PROFIBUS network and its own DP master system assigned (single master system).

Two Profibus masters in each case from both racks form a redundant master system in H systems.

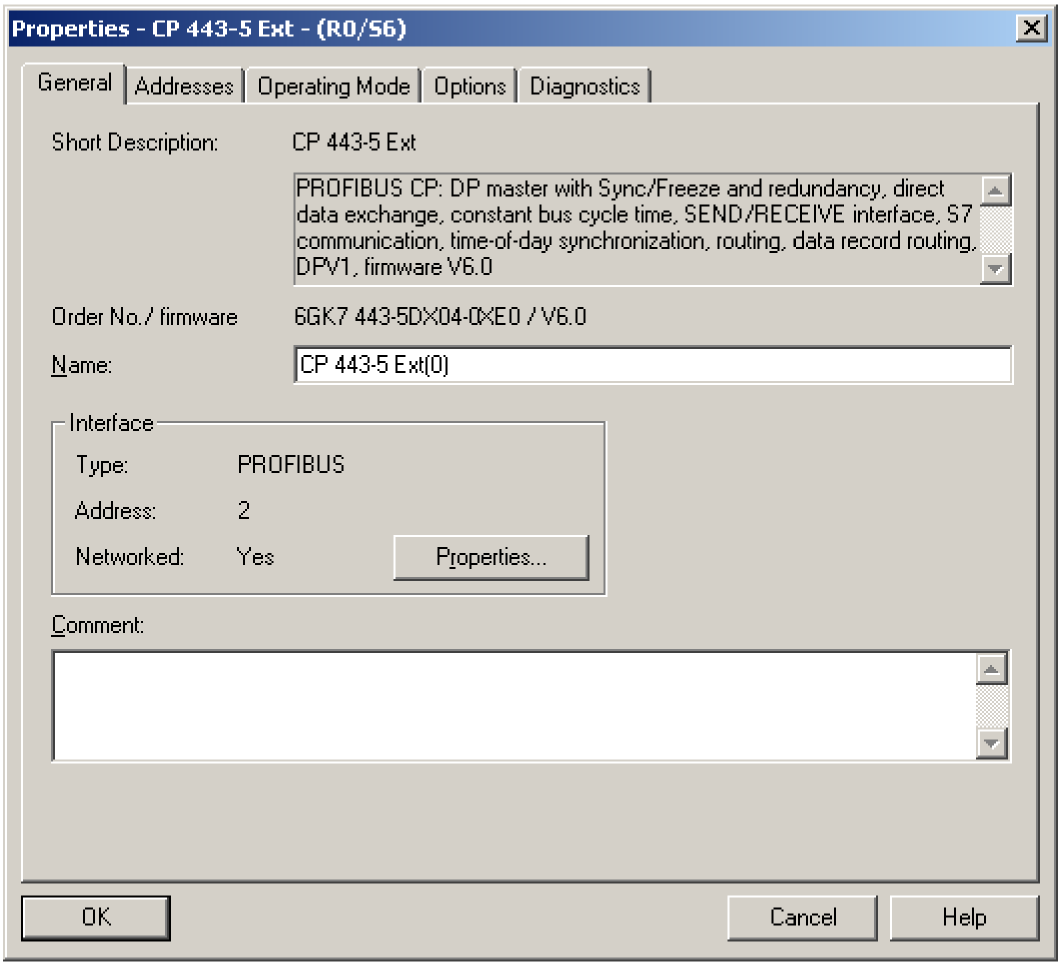
The settings shown below apply to both H systems and standard systems.

Note the following when using SIMATIC PDM in the project:

The integrated DP interfaces of a S7-400 CPU also support the "Data Record Routing" function in configured firmware version 5.1 and above, and can therefore also be used as a fully-fledged DP master. For all CPUs with lower firmware versions the "Data Record Routing" function must be established with a CP 443-5 Extended.

Settings in the "General" tab

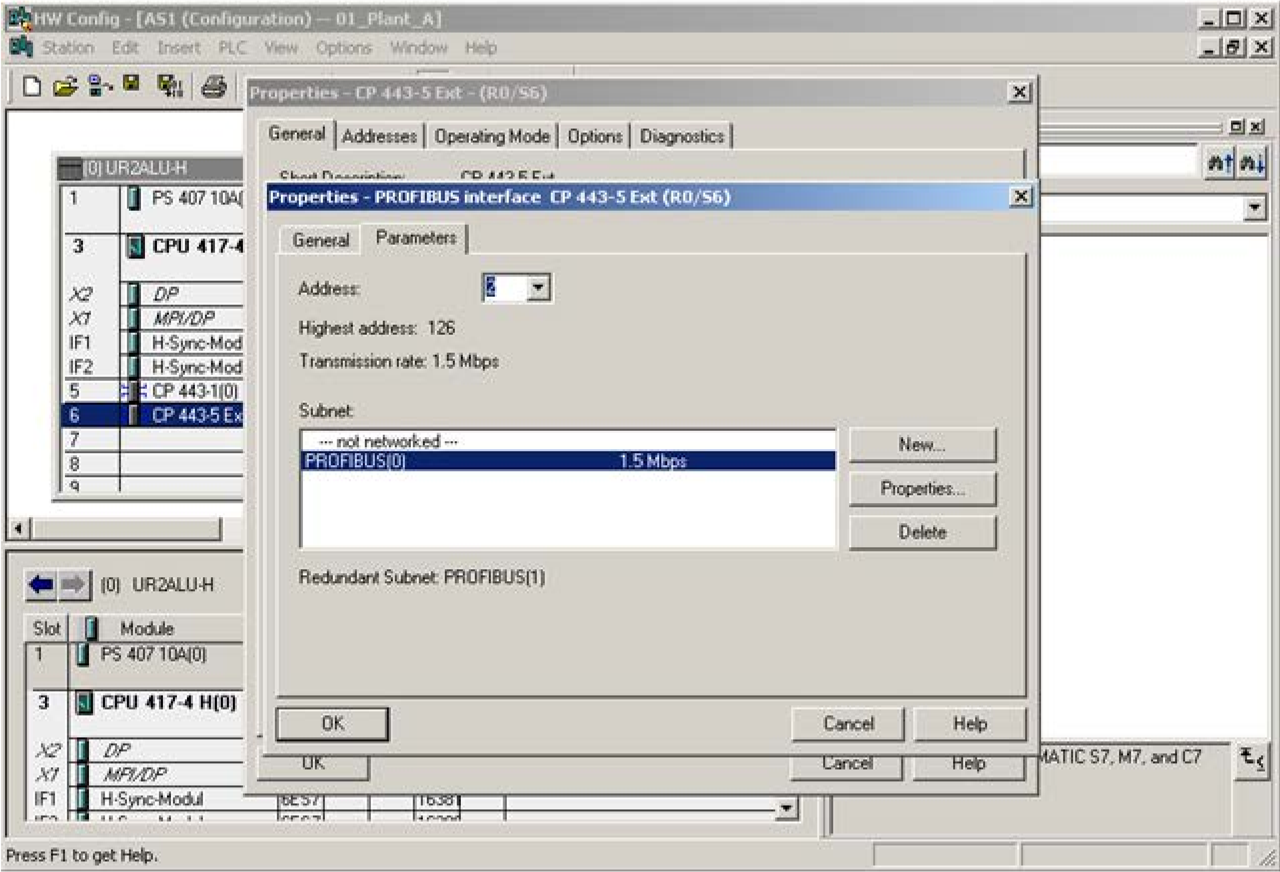
1. Open the properties dialog of the CP 443-5 Ext in HW Config.



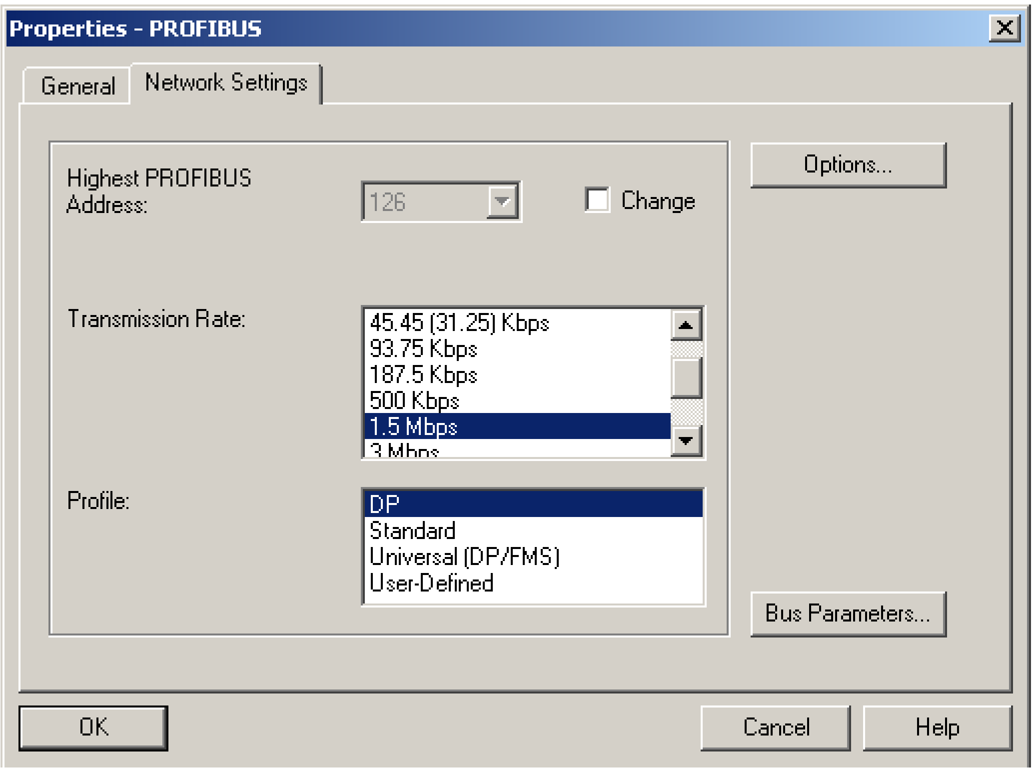
Note

Always assign address 2 to the CP 443-5 Extended as the PROFIBUS master. Address 1 should be reserved for connecting a programming device to the PROFIBUS for servicing purposes. Address 0 is reserved for connection of the ES to the PROFIBUS.

2. Establish a connection to the PROFIBUS network. Press "New" to create a new PROFIBUS network for each additional CP 443-5 Extended.



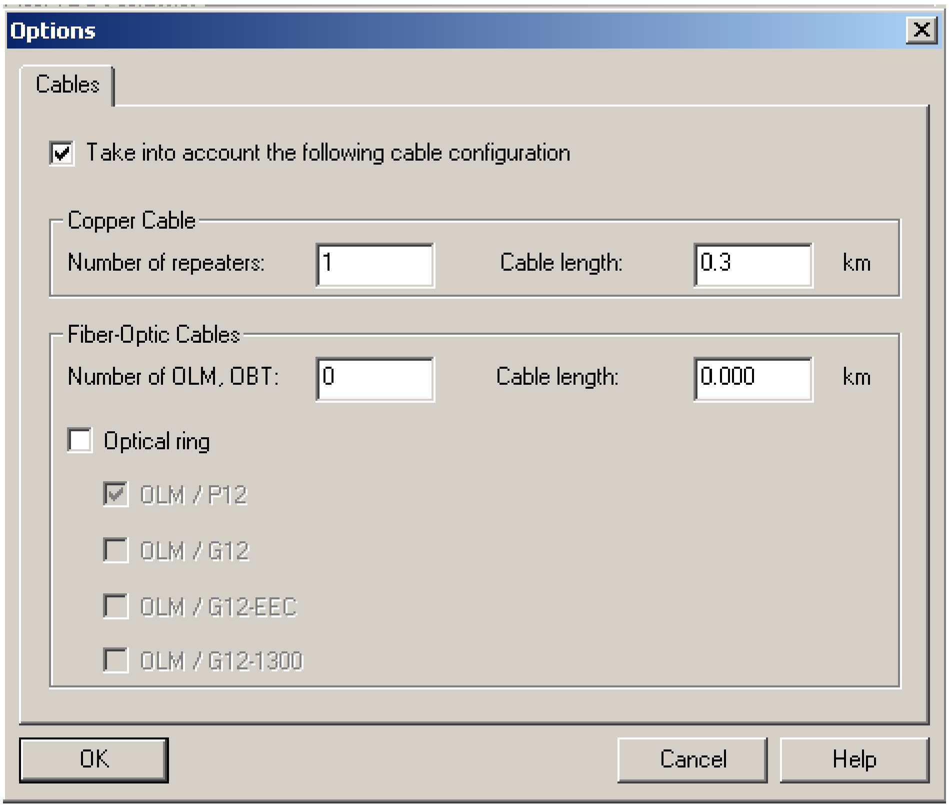
3. You can make the network settings for each PROFIBUS network.



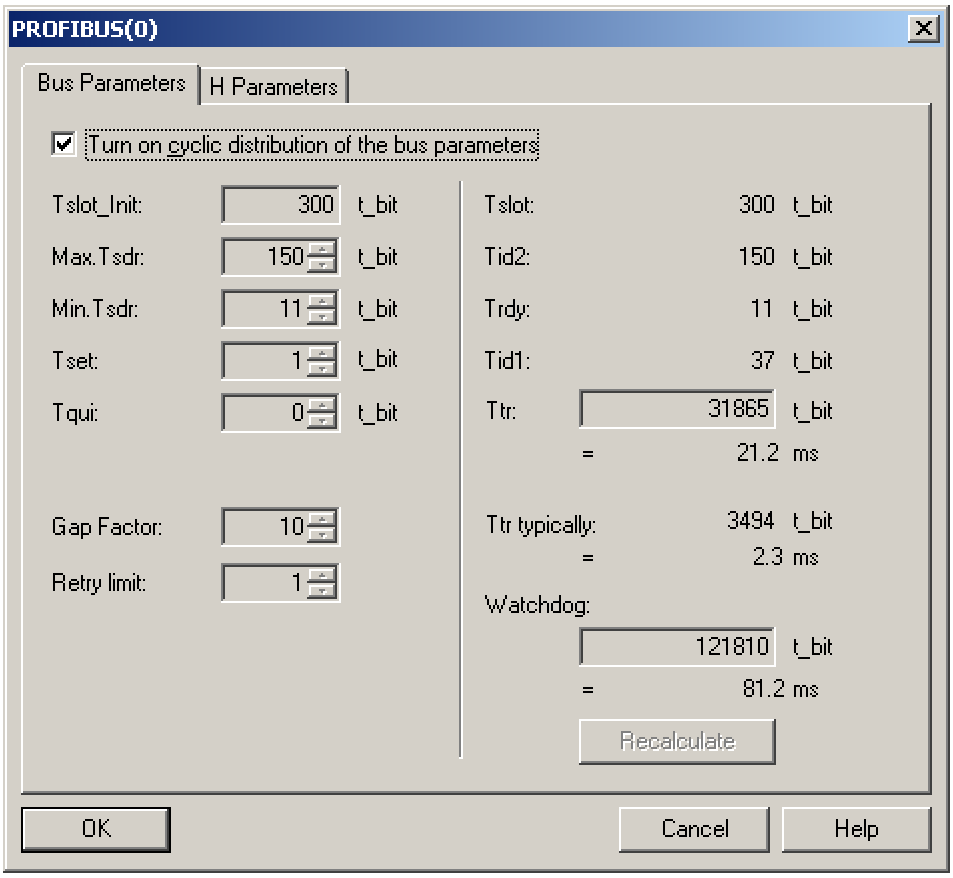
The default "DP" profile is suitable for most use cases, e.g. networks in line structures. A user-defined profile is required depending on the DP slaves used or the use of optical rings via Profibus OLM.

Set the transmission rate depending on the connected DP slaves and the length of the PROFIBUS segment. The default transmission speed of 1.5 Mbps can be adjusted in individual cases.

4. Use the "Options" and "Take into account the following cable configuration" buttons to add your bus architecture to the configuration and thereby optimize the DP bus parameters for your process.

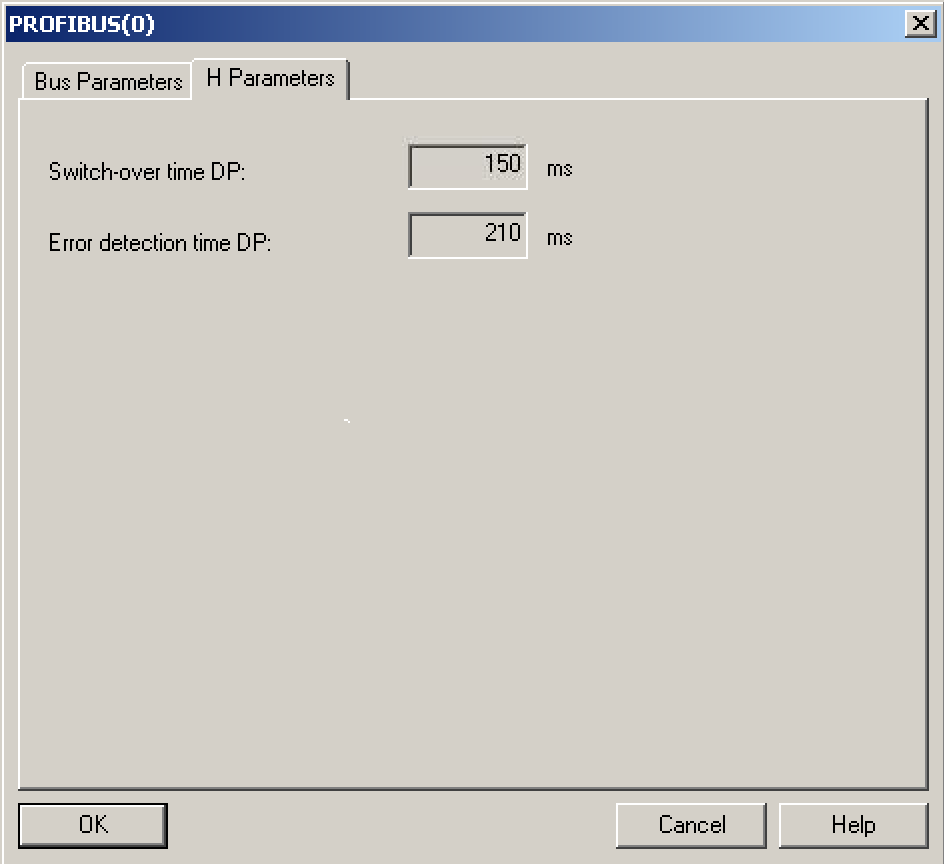


5. Using the "Bus parameter" button you can check the bus parameters for the PROFIBUS networks and adapt these as necessary once you are working with the user-defined profile. The parameters are updated each time you add another DP slave. The default option "Turn on cyclic distribution of the bus parameters" must be selected.



The "Ttr" (target rotation time) value is included in the calculation of the monitoring times for the H system. The parameter "Retry Limit" should be increased to 3 for ring structures with Profibus OLM.

6. The "H Parameters" tab is only available when a redundant system is used.



Note

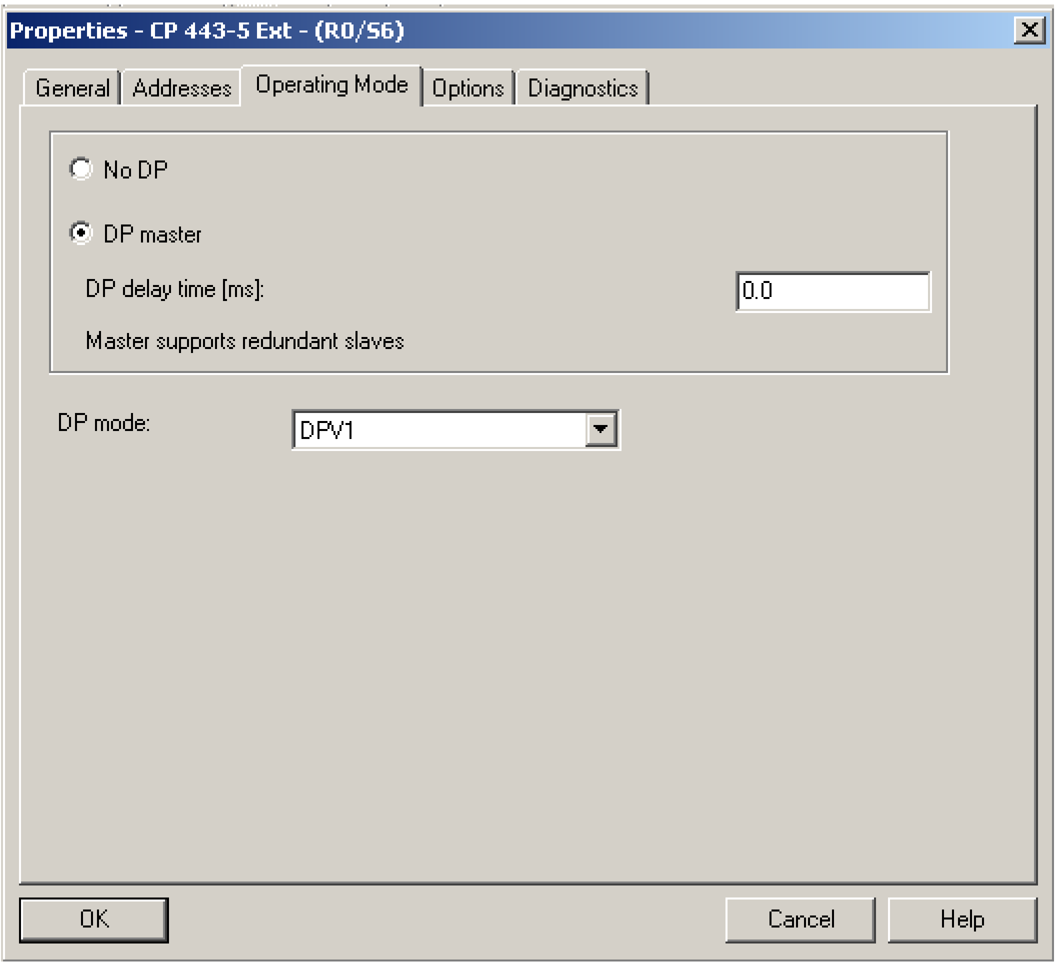
These H parameters for PROFIBUS are included in the calculation of the update monitoring times. The following principles apply: The more DP slaves that are configured on the bus, the higher these two H parameters and the longer your monitoring times for updating within the CPU parameters.

Note

The topic of "Planning the PROFIBUS hardware" is described in detail in the "SIMATIC NET PROFIBUS Networks" (http://support.automation.siemens.com/WW/view/en/35222591) manual.

Settings in the "Operating Mode" tab

Set the DP mode to "DPV1" in the “Operating Mode” tab of the CP443-5 properties dialog:



"DPV1" operating mode contains expansions for process automation. comprising acyclic data exchange in respect of the parameter assignment, operation, visualization, and interrupt control of intelligent programmable controllers, in parallel with cyclic data transmission.

In addition, DPV1 has three other interrupt types:

- Status interrupt
- Update interrupt
- Manufacturer-specific interrupt

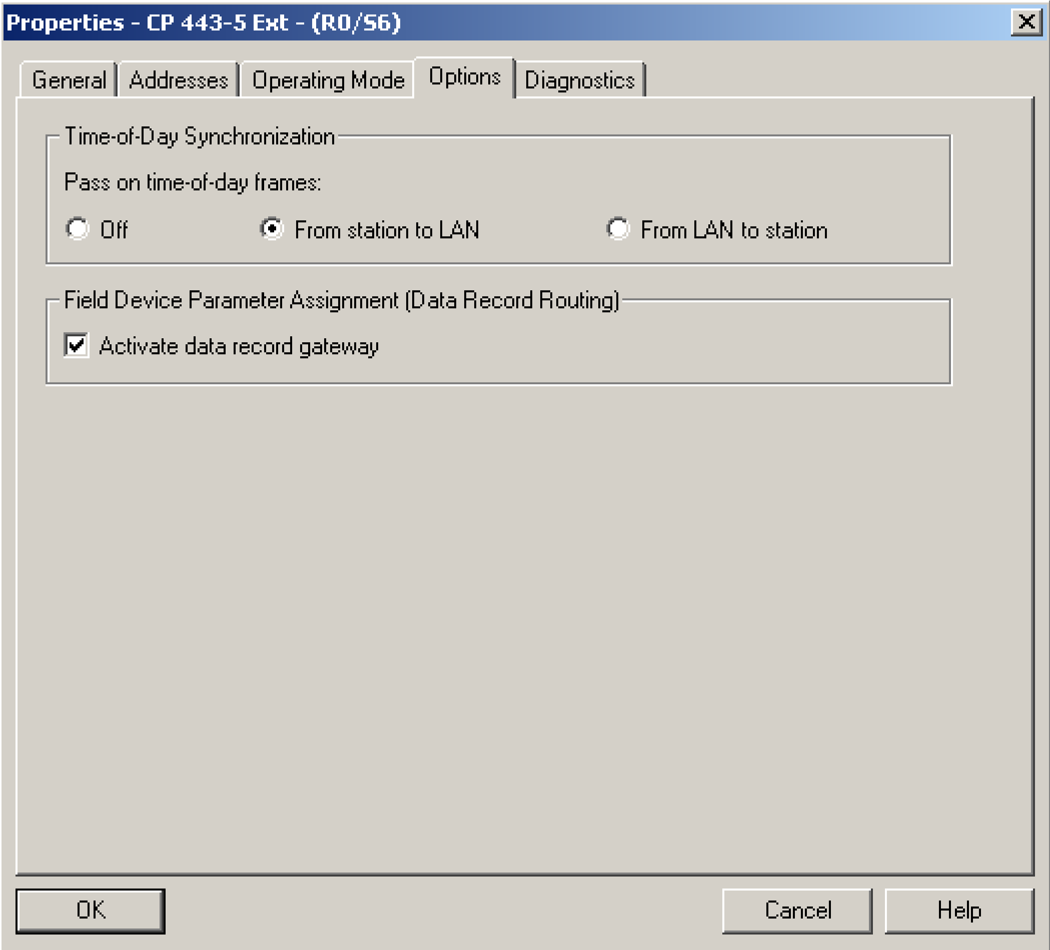
Note

The DPV1 setting lets you connect and operate DP slaves that do not support DPV1.

Settings in the "Options" tab

Use the following default settings in the "Options" tab:

- Forward time frames: "From station to LAN"
- Assign parameters of field devices (Data record routing): "Activate data record gateway"



Note

The "Data record gateway" option must be activated in order to use data routing with PDM.

5.5 Configuration of the I/O devices

Information on configuring peripheral devices can be found in the "Released PCS 7 Modules" manual. The components and modules listed in the manual have been tested with PCS 7 and are supported from the PCS 7 "Generate module drivers" function. These released PCS 7 modules can be selected inside the hardware configuration catalog from the "PCS 7 V7.0" or "PCS 7 V8.0" profile.

5.5.1 ET 200M as DP slave (H system and standard AS)

Introduction

The following describes the configuration of an ET 200M station as a typical DP slave. The name of the DP slave should be based on the naming conventions for a plant or plant network to allow you to quickly locate faults in case of servicing.

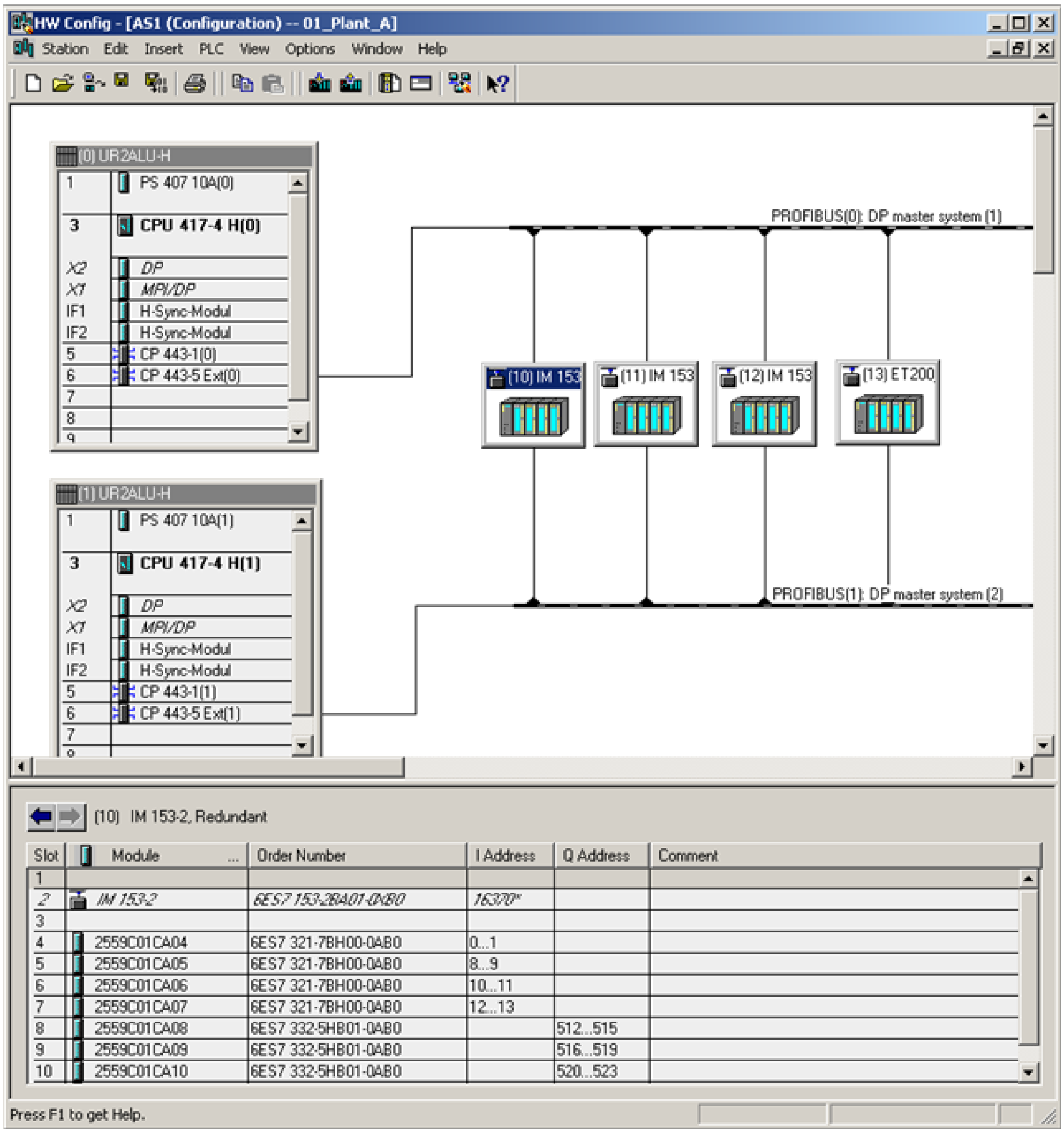
Note

The exact step-by-step description for configuring an ET 200M station can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

Example: 2550C01CA04

25:	Short designation of the production facility
50:	Name of the control room
C01C:	Name and position of the rack
A04:	Module slot

If an error occurs in the DP subnet, a message containing information about the position of the faulty slave is generated on the OS.



Slot	Module	Order Number	I Address	Q Address	Comment
1					
2	IM 153-2	6ES7 153-2BA01-0XB0	16370*		
3					
4	2559C01CA04	6ES7 321-7BH00-0AB0	0...1		
5	2559C01CA05	6ES7 321-7BH00-0AB0	8...9		
6	2559C01CA06	6ES7 321-7BH00-0AB0	10...11		
7	2559C01CA07	6ES7 321-7BH00-0AB0	12...13		
8	2559C01CA08	6ES7 332-5HB01-0AB0		512...515	
9	2559C01CA09	6ES7 332-5HB01-0AB0		516...519	
10	2559C01CA10	6ES7 332-5HB01-0AB0		520...523	

Note

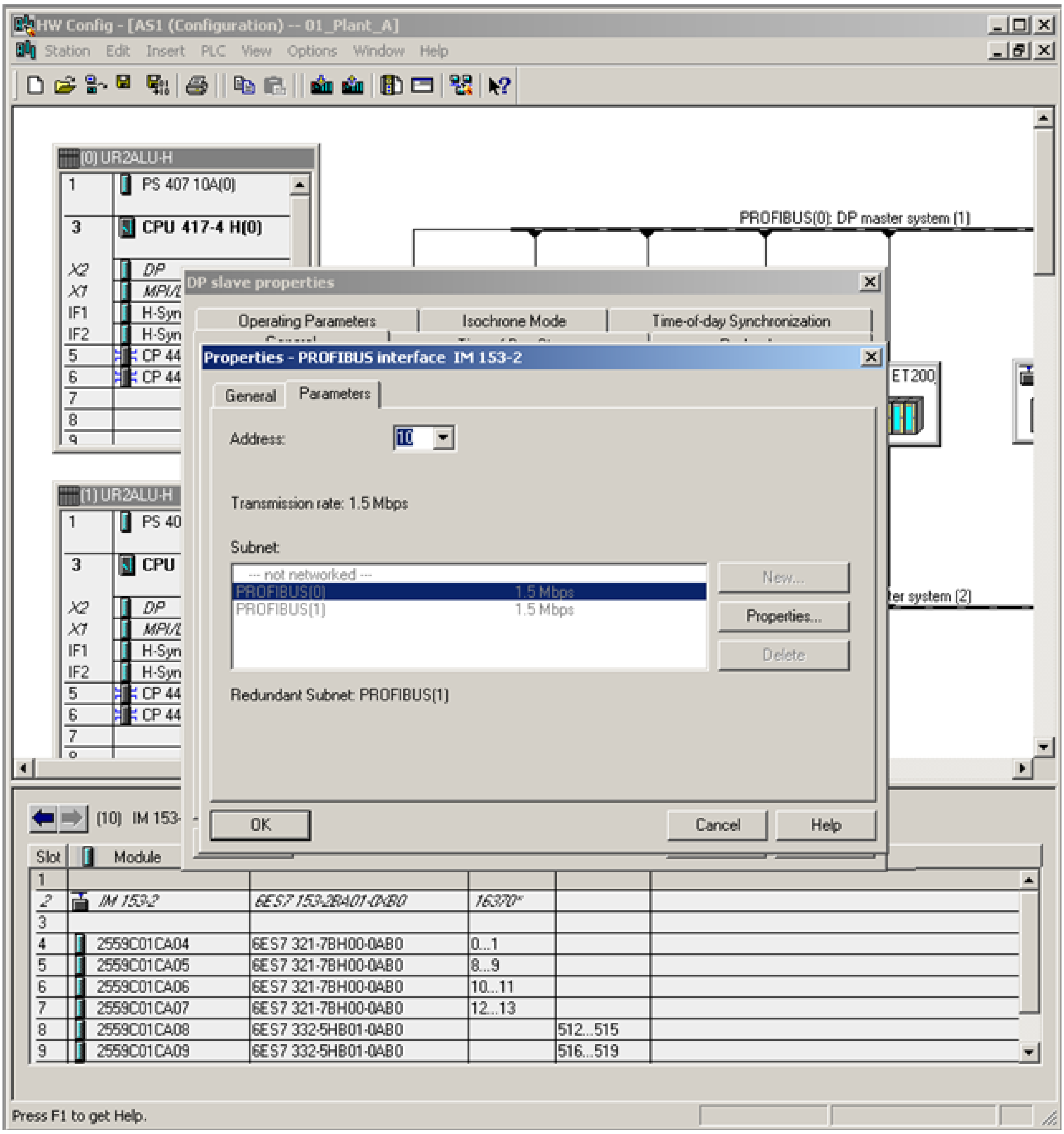
The following naming conventions apply to all components in HW Config:

The name should not exceed 14 characters. When generating the module drivers (CFC compilation), the names from HW Config are used for the CFC block instances. CFC blocks can have a maximum of 16 characters. The module driver wizard shortens the names from HW Config to 14 characters and always adds "_1".

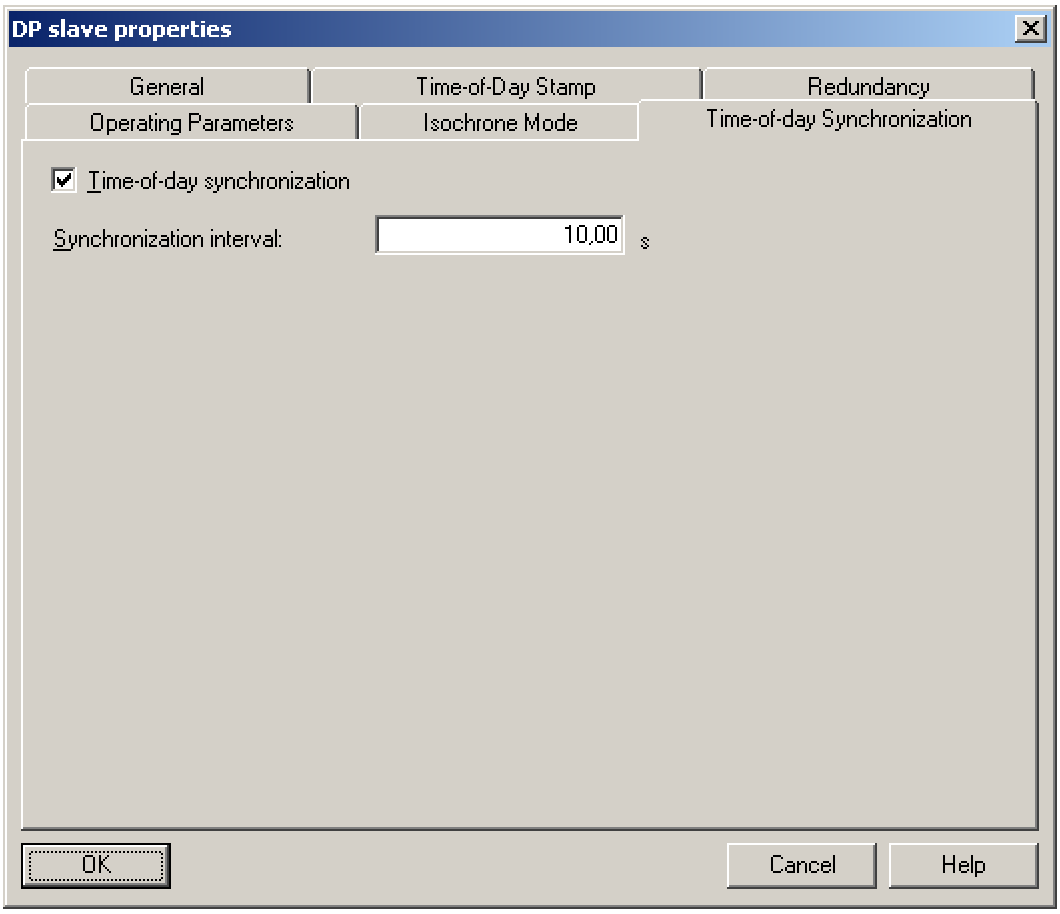
Make sure that the assigned names are unique. Simply changing the case of names does not make them unique, as the OS compilation procedure does not take case into account.

Procedure

1. Open the HW Config catalog (PCS 7 profile) and select the appropriate IM 153-2HF from the PROFIBUS DP/ET 200M folder.
2. Enter the DP address of the PROFIBUS DP slave in the DP slave properties. You can also select the subnet for the DP slave (here, PROFIBUS (0)). With an H system, the system automatically establishes the connection to the redundant subnet PROFIBUS (1).



3. The time synchronization must be activated in the properties of the ET 200M station where high-precision stamping is being used, with 10.00 s also used as the synchronization interval.



4. The "Replace modules during operation" option must be activated within the operating parameters where the ET 200 station is set up with an active backplane bus. This is the default option and is grayed out for connecting to a redundant Profibus as the active backplane bus is mandatory in this case.

5.5.2 ET 200M as PROFINET IO device

Introduction

In PCS 7 V8.0 and above it is also possible to connect the ET 200M via PROFINET IO as a field bus to a PCS 7 AS. PROFINET IO lends itself as a field bus for PCS 7 plants where hardware changes during operation, time stamp and module redundancy are not required.

In addition to the ET 200M the IE/PB link is also available as an additional IO device for connecting intelligent DP und PA field devices to a standard AS.

As hardware requirements with PCS 7 V8.0 Update 1 you need at least one CPU with firmware V6.0 and an IM153-4 HF V4.0. A CP443-1EX30 must be used as a PROFINET IO controller for standard CPU with firmware V5.3.

Note

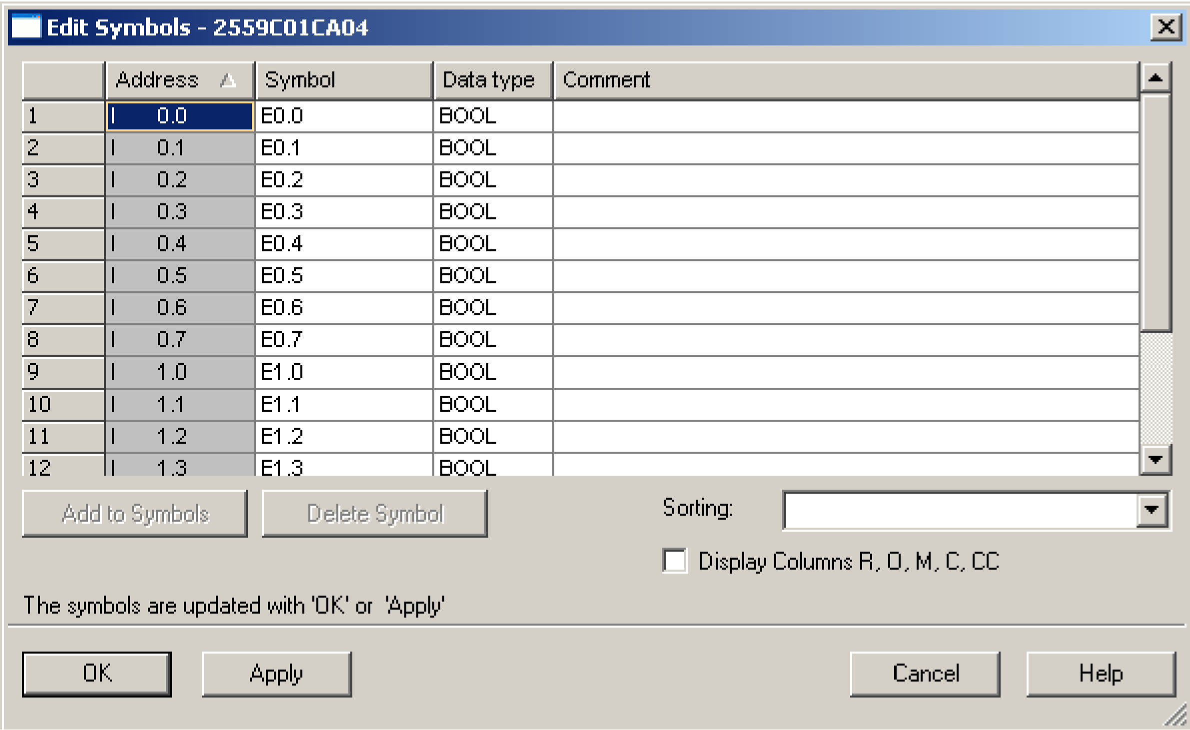
PROFIBUS DP continues to represent the preferred field bus solution for a PCS 7 plant.

Users should use the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual for planning PROFINET IO within PCS 7.

Information on configuring and commissioning can be found in the "SIMATIC PROFINET System Description" (http://support.automation.siemens.com/DE/view/en/19292127) manual.

5.5.3 Symbolic names of inputs and outputs

You can enter symbols directly in HW Config. The screenshot below shows a typical signal list for a chemical plant, as an example.



The symbols are added to the symbol table automatically and can then be used in the CFC.

Note

You can also import the list of hardware signals from an Excel file. This only works directly in the symbol table.

5.5.4 General rules for configuring I/O modules

Introduction

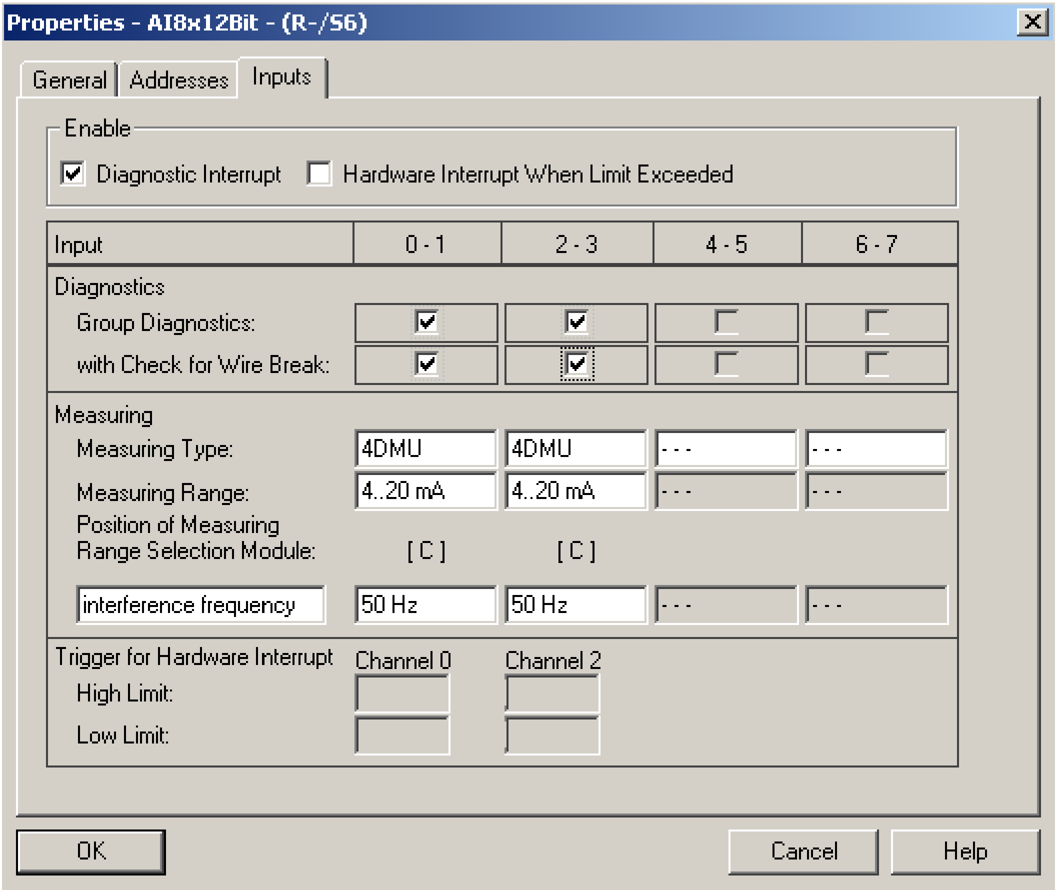
In general, a channel of a module is activated only after connection of the corresponding actuator, sensor or equivalent resistance. This approach avoids unnecessary diagnostic messages in the PCS 7 OS during runtime.

With some modules, channels are combined into channel groups (an AI8x12Bit module with 8 channels may be comprised, for example, of 4 channel groups, each made up of 2 channels). In this case, a group is activated as soon as one of the two channels is connected to a signal. At least one equivalent resistance must also be connected in this case.

Analog input (6ES7331-7KF02-0AB0 in the example)

The measuring type depends on whether a transducer which is supplied with power by the module (2-wire transducer) is operated on the AI module, or whether the transducer receives its power from an external supply (4-wire transducer).

The setting of the measuring range module is displayed according to the configuration. This setting must be suitable for the connected sensors and must be in place before voltage is applied for the first time in order to avoid damaging the module.



Messages for the module with diagnostics capability are automatically generated when diagnostic interrupts are enabled by the PCS 7 MOD_D1 driver block for compiling the OS.

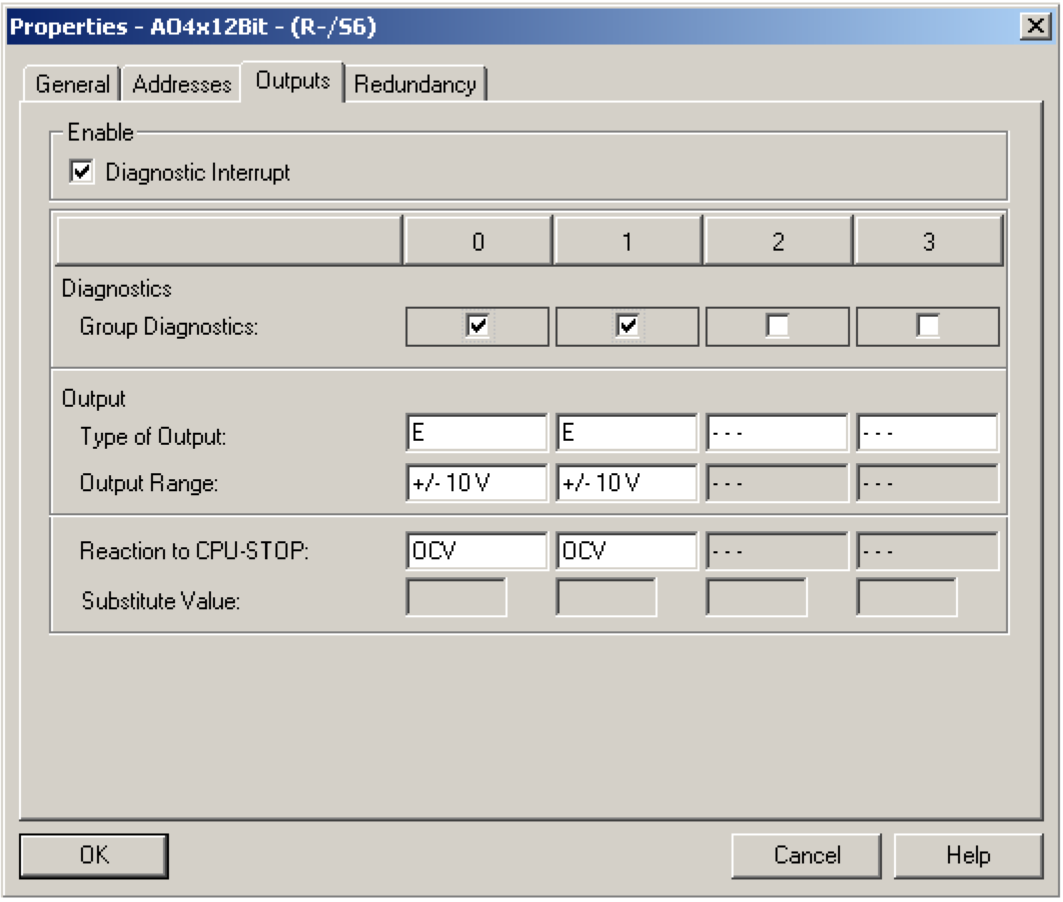
Note

For a description of the "MOD_D1" driver block including the available messages, see the "Process Control System PCS 7 Basis Library" (http://support.automation.siemens.com/WW/view/en/68113421) manual.

You should deactivate the "Hardware interrupt at limit violation" option. This is realized in PCS 7 with the channel block functionality in the charts.

Analog output (6ES7332-5HD01-0AB0 in the example)

You need to configure how the outputs are to respond to a CPU STOP. In this example, the outputs have no current or voltage (OCV setting).



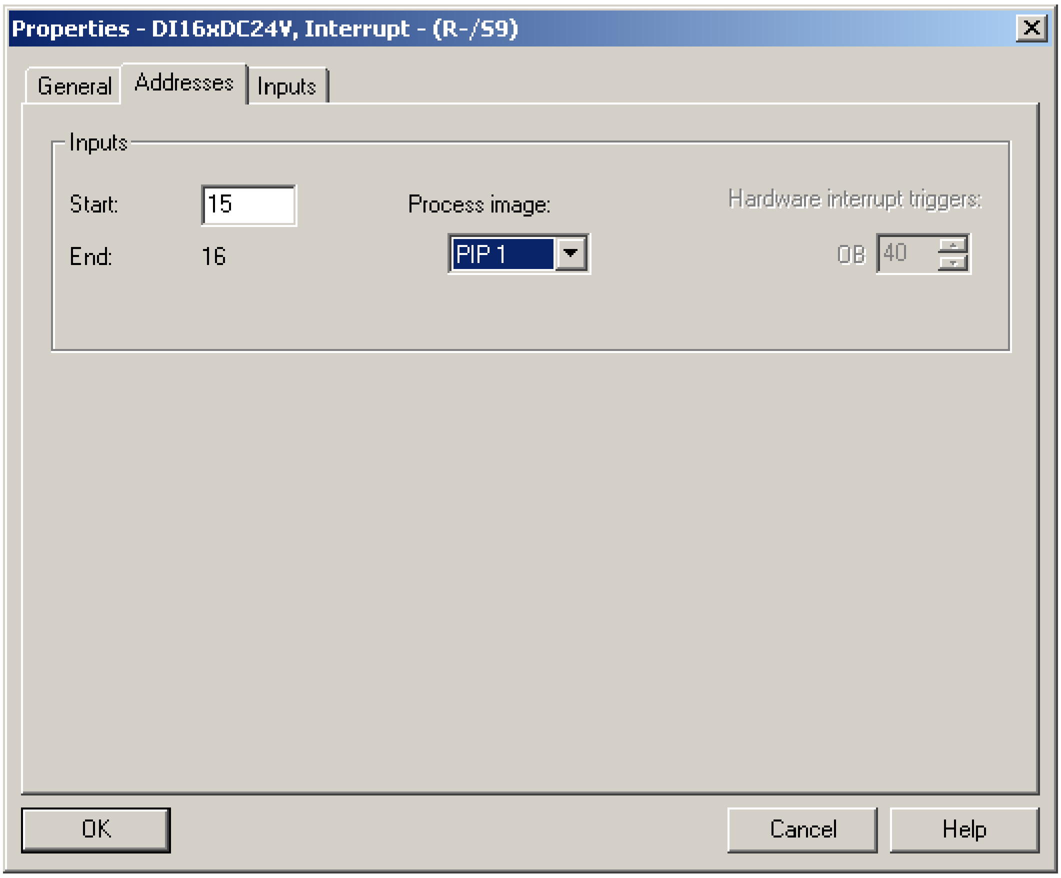
Note

The channel-specific setting "Reaction to CPU STOP" (OCV - No Output Current or Voltage, KLV - Keep Last Value and USV - Use Substitute Value) of a module (for example, analog output module with four channels) within the ET 200M distributed I/O must be set identically for all channels.

Process image partition (PIP)

Assign the process image partition to an I/O module you have previously defined in the CPU properties for a cyclic interrupt OB (see the section titled "Assigning parameters for process image partitions"). This step synchronizes the I/O values or signals of this module with the process image in the CPU before and after the cyclic interrupt OB.

To do this, open the properties of the module and the "Addresses" tab and set the desired process image partition (TPA1 in this case). The process image partition is therefore assigned for all I/O values or signals of this module.



Note

It is generally practical to initially assign all modules to a medium program cycle (e.g. 500ms or 1,000ms) for a complete process consisting of a few fast and slow parts.

You then only have to assign the appropriate process image partition of the given cyclic interrupt to the modules containing the signals for fast controlling or interlocking (e.g. 50ms or 100ms).

This procedure saves configuration time.

Redundant I/O modules

In PCS 7, fault tolerance is realized on the field level by means of the redundant distributed I/O, using ET 200M modules.

Note

Information on setting up, wiring and configuring can be found in the document "Configuring Redundant I/O Modules" (http://support.automation.siemens.com/WW/view/en/28430682).

5.6 Plant changes during operation

5.6.1 Changes to the hardware configuration of a standard AS

Introduction

The functionality described for a standard AS is available directly in the H system without any additional settings.

There are some process cells which must not be shut down during operation. This may be due to the complexity of the automated process or to the high cost of restarting. Nevertheless, it may be necessary to extend or modify the plant.

Use CiR (Configuration in RUN) to make certain configuration changes in the hardware configuration in RUN mode.

CiR can only be used when the function has been activated in HW Config and the AS has been loaded once with a STOP.

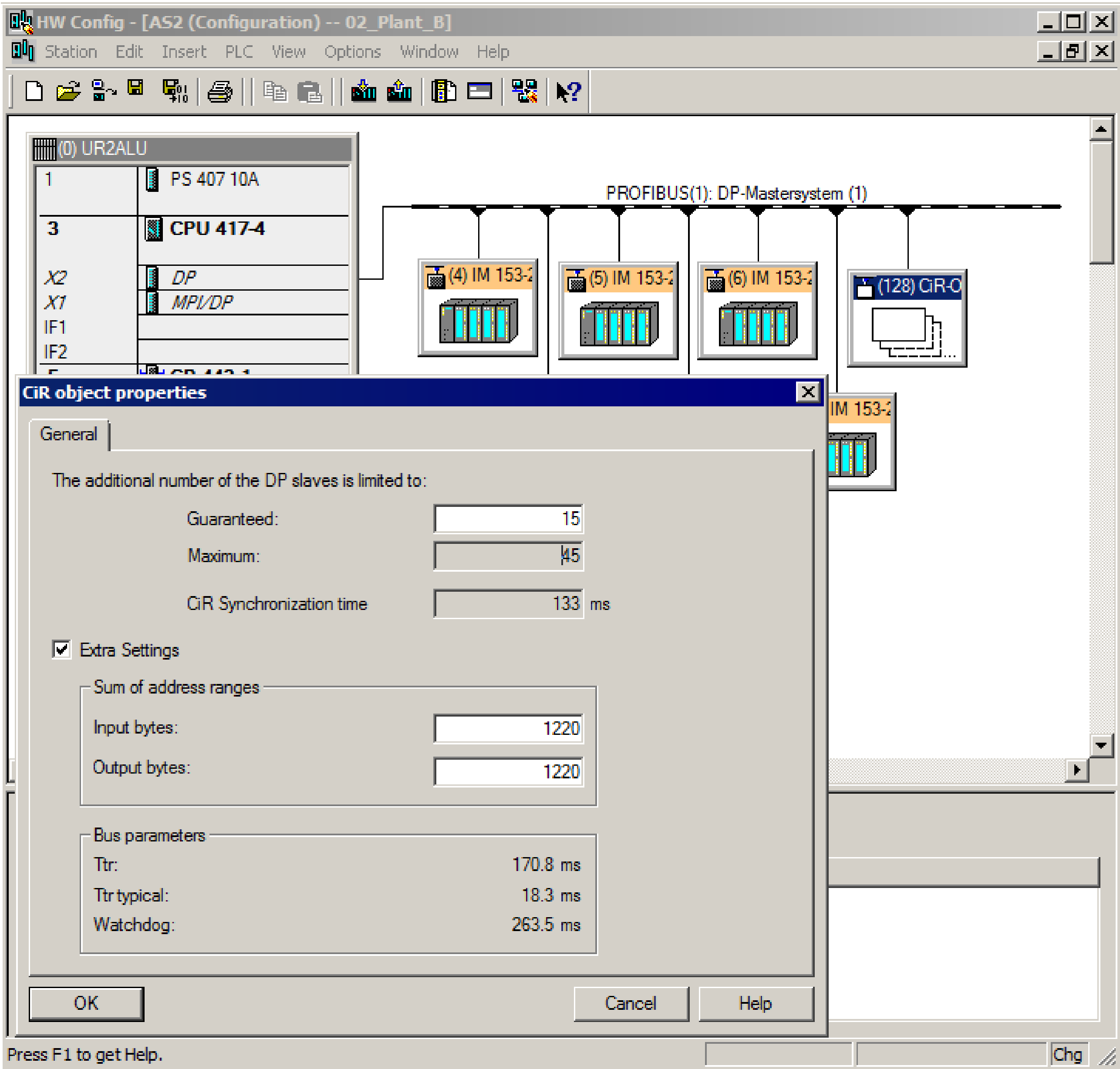
Note

A detailed description of possible hardware changes for an H system can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

Procedure

1. To activate CiR in HW Config, right-click on the subnet (DP master system) and select "Activate CiR capability" from the shortcut menu.

   This attaches a CiR object to the respective master system. It offers the possibility of configuring and loading an adjustable number of DP slaves in the future without any STOP in loading the CPU. Each existing DP slave automatically receives an orange colored title as a sign that it can be changed.



2. Adapt the object properties of the CiR object to your plans. If the guaranteed number of additional DP slaves has been exhausted then a planed STOP of the AS can be used to increase the number and to activate through a complete download.
3. When CiR is activated, you have a CiR module in the first free slot within ET 200M and ET 200isp. It offers the possibility of configuring and loading an adjustable number of modules in the future.

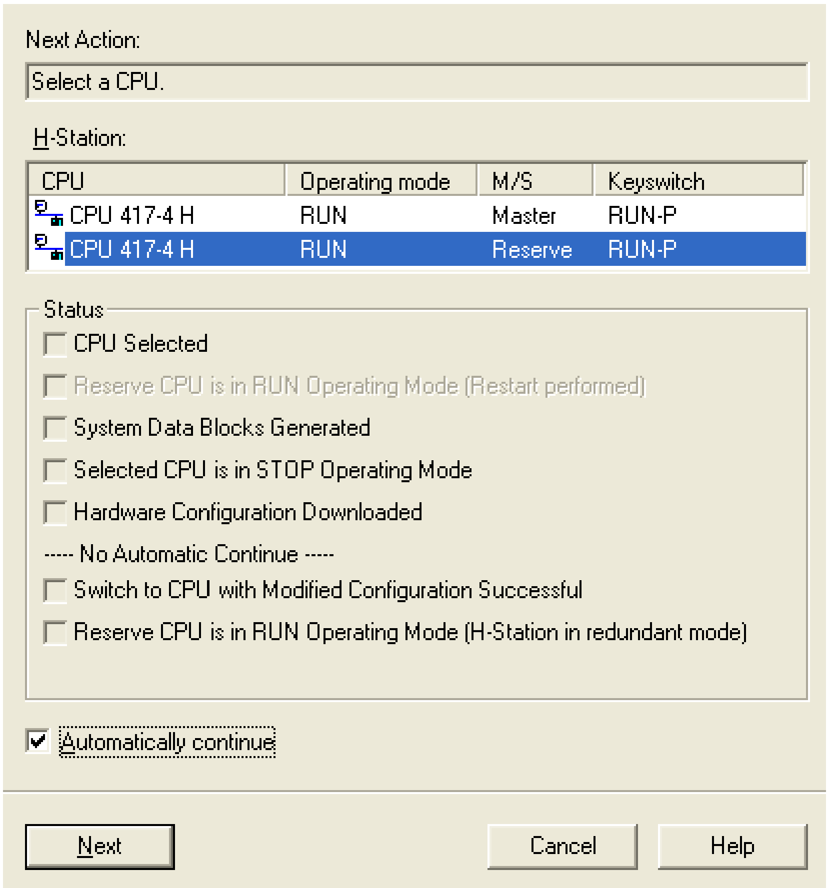
   Adapt the object properties of the CiR modules to your plans.
4. After activating CiR and checking the CiR settings in the CiR objects and CiR modules, save and compile the hardware configuration and download it to the automation system in the STOP operating mode.

Following this you can run the "Download in RUN mode" function in HW Config.

5.6.2 Changes to the hardware configuration of an H system

The CiR functionality described above is available in the H system without any special settings. There are no CiR objects or CiR modules in the H system and the function does not need to be explicitly activated.

You can use the "Download in RUN mode" function immediately. This opens an additional dialog, in which you can start the tasks required for changing the configuration.



In addition, all parameters marked in blue in the CPU properties dialog can be modified in RUN.

Note

You can find a more detailed description of CiR for H systems and the changes that are possible in the "SIMATIC S7-400H Fault-tolerant Systems" (http://support.automation.siemens.com/WW/view/de/60458386) manual.

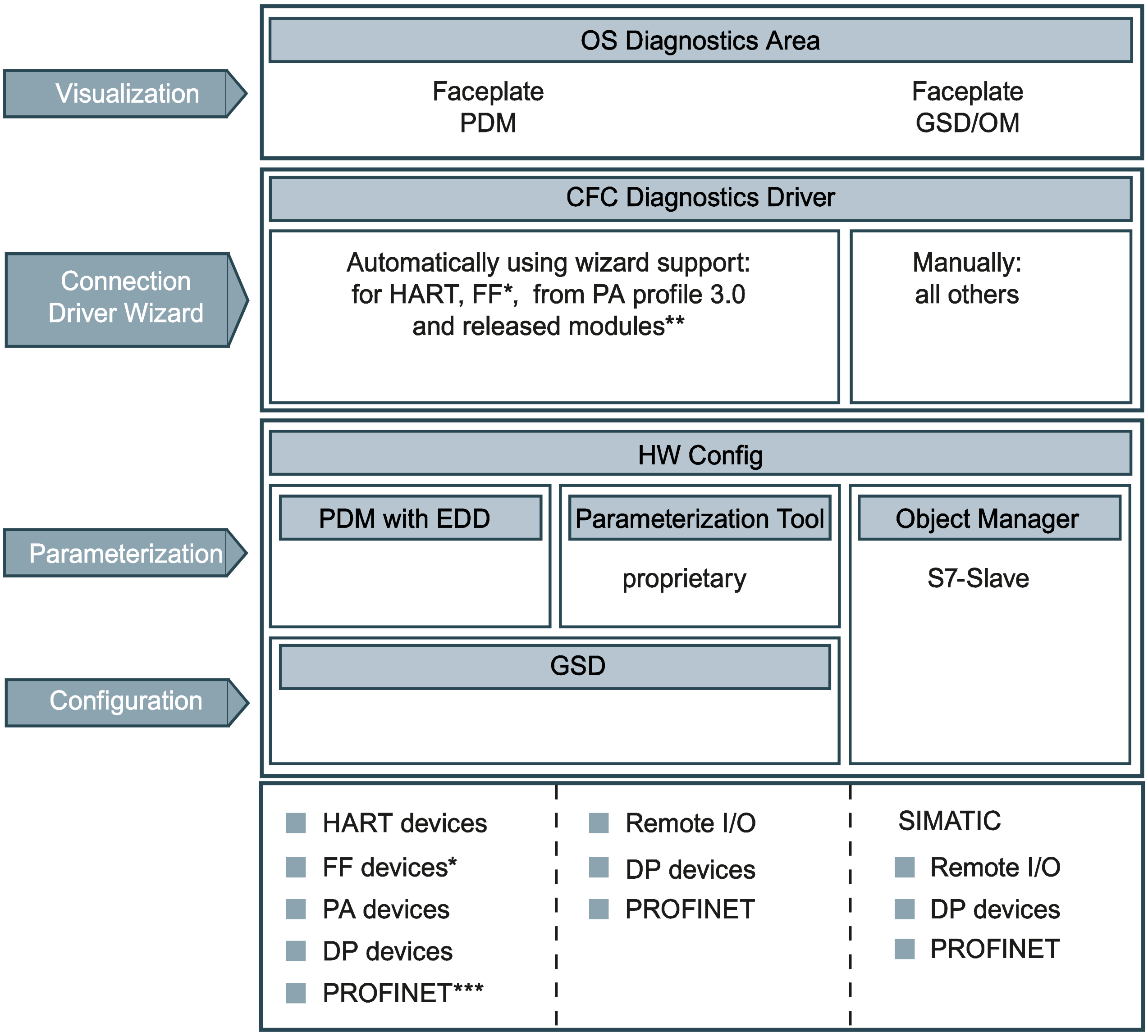
5.7 Integrating field devices

5.7.1 Basic information about device integration

Integrating field devices

The configuring of field devices is divided into two steps: configuration and parameter assignment.

The following image provides an overview of the ways in which a device can be integrated in PCS 7. In principle, all PROFIBUS DP, PROFIBUS PA, HART, and Foundation Fieldbus (FF) devices can be integrated in PCS 7 (as of PCS 7 V7.0).



* Valid for FF devices of the „SIMATIC PDM Device Library“

** The document „Process Control System PCS 7 Released Modules” contains an overview of modules and the necessary function. The identifier “W” means „Module wizard is supported“.

*** Valid for SIMATIC PCS 7 V8.0 Update 1 and SIMATIC PDM V8.1

Integration via the object manager

The object manager is available for many SIEMENS devices, such as the ET 200M. In this case, the correct terminology is "S7 slave". The project engineering for an S7 slave is performed via the dedicated STEP 7 object manager. Both the configuration and parameter assignment are executed in HW Config.

Integration via the generic station description (GSD) file 80 as a standard slave

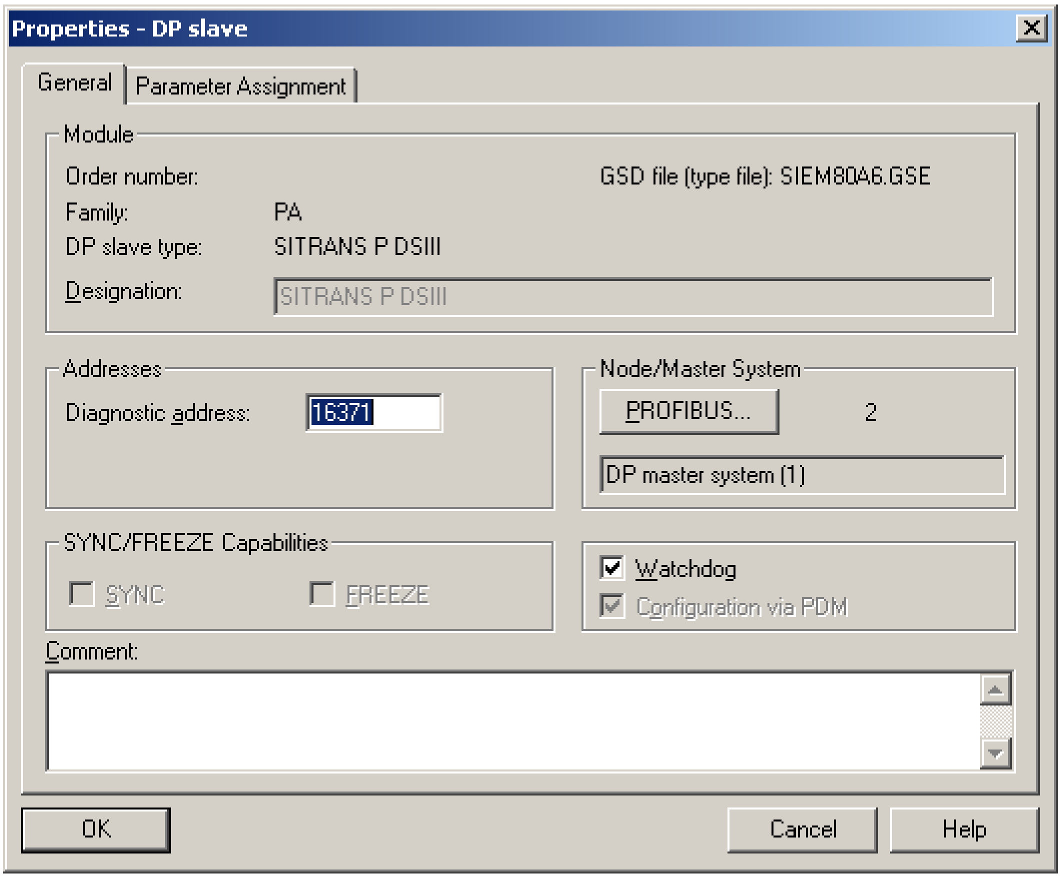
Field devices made by any manufacturer can be integrated via the standard GSD file (standard slaves). This type of integration is used for PROFIBUS DP, PROFIBUS PA, FF and HART devices. The configuration is set in HW Config. The default parameter assignment for the device is also defined in the GSD. Parameter adjustments must then be made using a proprietary tool; alternatively, in the case of devices with EDD (Electronic Device Description) the adaptations can be made using SIMATIC PDM.

Data can only be exchanged between the master and a field device if the master is aware of the device-specific parameters and data formats. The field device manufacturer supplies this "knowledge" in the form of a GSD file.

GSD files contain information about:

- Device manufacturer and identification number
- Transmission rate and bus parameters
- Volume and format of data for cyclic communication

In HW Config in the object properties of a device you can determine which revision level of the GSD is installed and used. For this right-click on the device after positioning the device and select "Object properties" in the context menu.

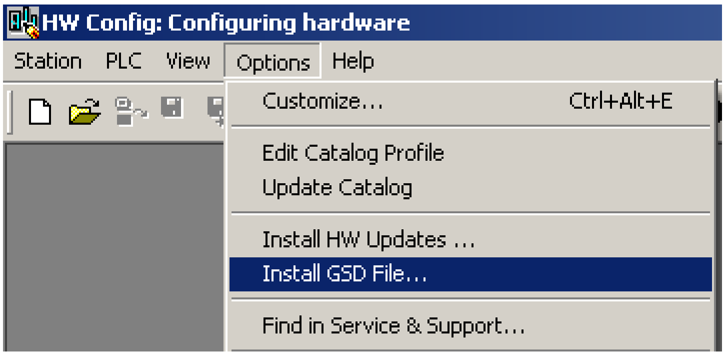


For S7 slaves which are integrated via the object manager, no GSD file is specified here.

You can occasionally procure a later GSD for a field device from the field device manufacturer. This GSD can be easily installed.

To install a GSD:

1. Open HW Config.
2. Close all open projects.
3. Select the "Install GSD File" command from the "Options" menu.



4. Select the GSD directory and install the selected GSD.

Note

If a new device for which parameters are to be assigned using SIMATIC PDM is integrated, the GSD and EDD files of the device must be imported using the "Manage Device Catalog..." PDM application (up to PDM V6.1), or with the "Device Integration Manager" application (in PDM V7.0 and above).

Assigning parameters using the SIMATIC Process Device Manager and EDD file

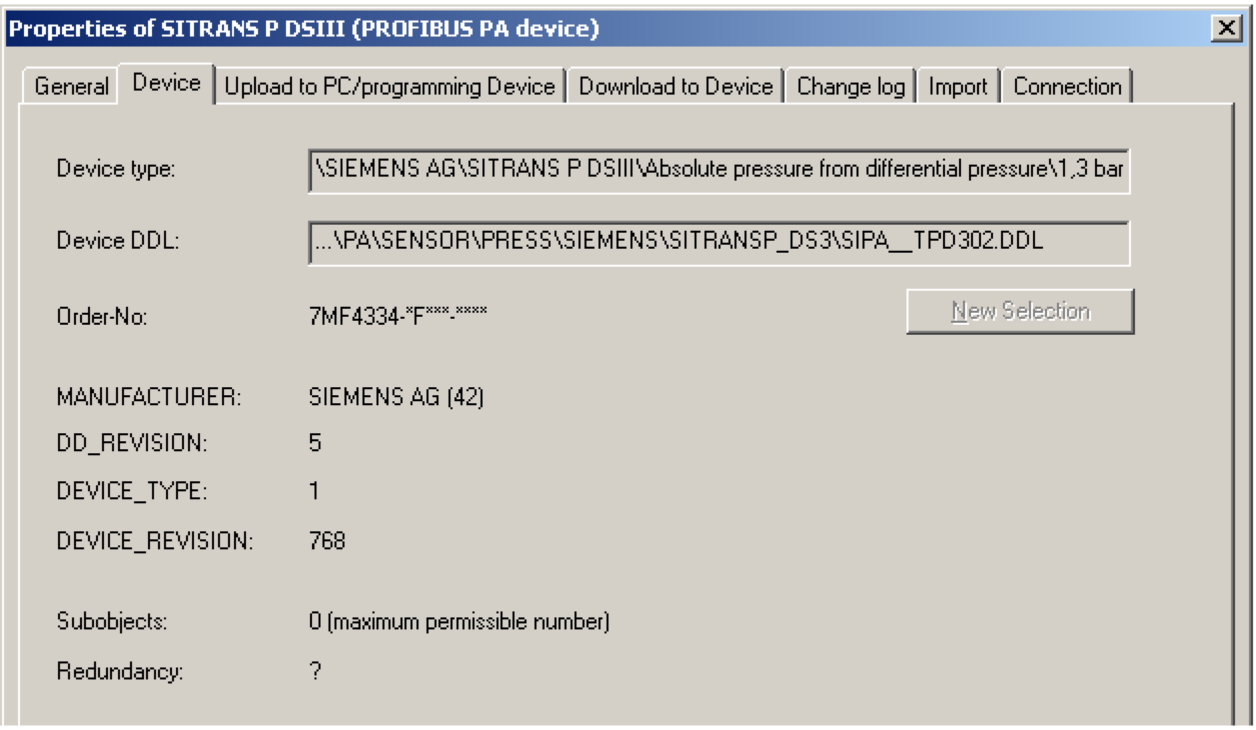
SIMATIC PDM can be used to assign the parameters for a field device (made by any manufacturer). The EDD (Electronic Device Description) provides the basic information such as device-specific parameters and information on acyclic communication.

The description language EDDL (Electronic Device Description Language) is used to create EDDs; this is also standardized in the IEC standard (IEC 61804).

This language can be used universally and facilitates the creation of cross-vendor device descriptions for field devices (sensors and actuators).

The device manufacturer provides the relevant descriptions for each device in electronic format. The EDD files describe the parameters and functions of a device and also contain elements used for operation and visualization.

Once SIMATIC PDM has been opened, on the "Device" tab found under "File > Object Properties" you can define the storage folder and revision level of the EDD file corresponding to the device.



You can occasionally procure later EDDs for field devices from the field device manufacturer. The EDDs can be imported easily via ""SIMATIC PDM/Manage Device Catalog" (up to PDM V6.1), or via "SIMATIC PDM/Device Integration Manager" (PDM V7.0 and above).

An EDD device description may contain the following components:

- Device description (EDD file)
- Lexicon/user languages
- Help files (relating to function and operation)
- Manuals (technical documentation)
- Communication description (GSD file)
- Images / graphics

Diagnostic support for field devices

PCS 7 automatically creates diagnostics drivers with the help of the module wizard for HART devices, PA devices with profile 3.0 and above, FF devices, PROFIBUS DP standard slaves and released modules.

Various add-ons are also supported, such as SIMOCODE PRO and DRIVE ES. When installed, these add-ons provide the action lists required to automatically create diagnostics drivers.

Diagnostics drivers can also be configured manually, but they must be created separately from the system charts.

5.7.2 Configuring and assigning parameters for field devices

Configuring field devices

Information on configuring field devices can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

Information on PDM functionality and operation can be found in the following manuals:

- SIMATIC The Process Device Manager (http://support.automation.siemens.com/WW/view/en/37565982)
- SIMATIC Process Control System PCS 7 Help for SIMATIC PDM (http://support.automation.siemens.com/WW/view/en/68125602)

PROFIBUS DP devices

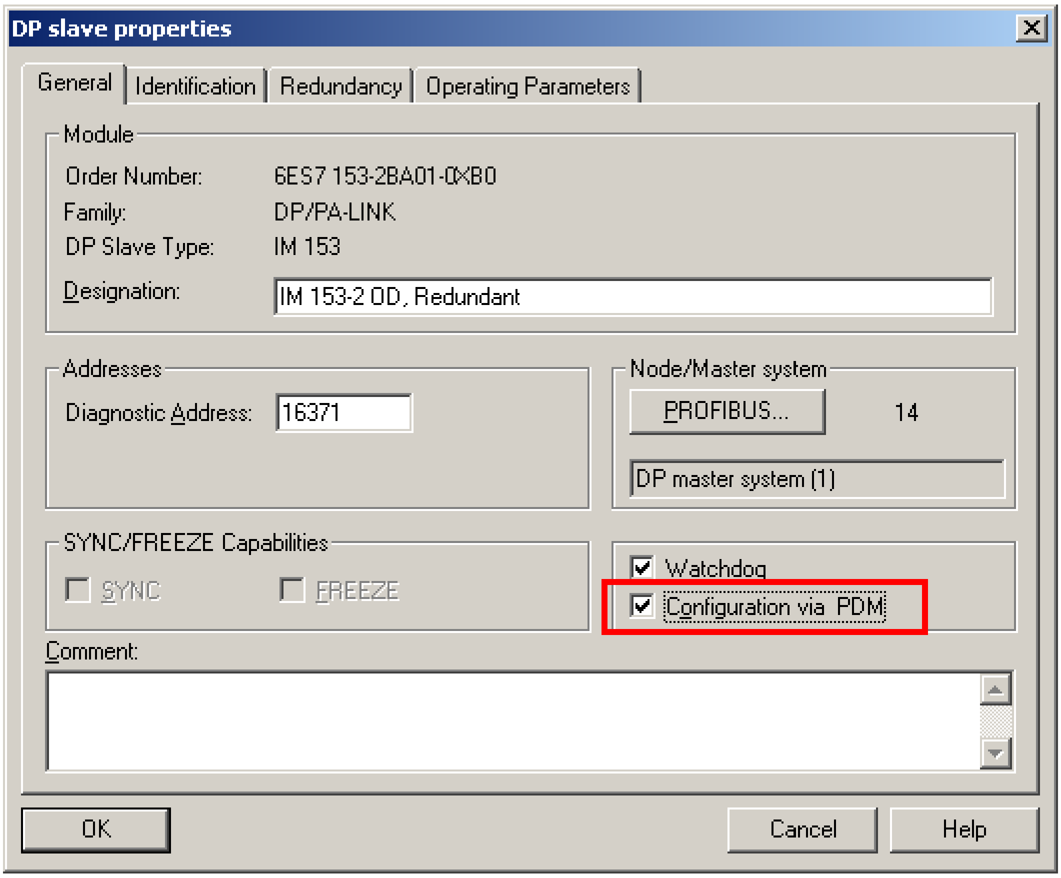
Configuring DP devices is described in section "Configuration of the I/O devices (Page 118)".

PROFIBUS PA devices

Information on configuring PA devices in HW Config can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

The PDM check box must be activated in the object properties of the DP/PA link in order to be able to use the Multiview and LifeList functions for the devices on the PA field bus:

The "Configuration via PDM" option is activated as standard for PA field devices.



FF devices

You can find information on configuration and parameter assignment of FF devices in the following manuals:

- SIMATIC Process Control System PCS 7 SIMATIC PDM 8.0 SP1
- FF Function Manual
- SIMATIC Bus links, FF Link bus link (http://support.automation.siemens.com/WW/view/en/47357205)

5.7.3 Information on configuring field devices on the H system

Redundant interface

DP devices which have access to a redundant interface are always configured and connected redundantly (e.g. ET 200M, ET 200iSP).

DP devices which do not have access to a redundant interface are connected downstream of the Y link. The number of field devices which can be configured downstream of the Y link is restricted here by the I/O range of 244 bytes that applies in each case.

PA devices are always connected redundantly downstream of a DP/PA link.

Variables which restrict the number of permissible devices per DP/PA link, with a redundant and a non-redundant connection:

- Feeding current of the DP/PA coupler (110 mA EX or 1,000 mA non-EX)
- Current consumption of the field devices (typically 12 mA)
- Address range of the field devices (max. 244 bytes of I/O data, 5 bytes per analog value)
- Cycle time on the PROFIBUS PA (if specific customer requirements need to be met)

Information on configuring Y-Link and DP/PA Link can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

5.7.4 Topics relating to the integration of field devices on the fieldbus

Fieldbus connection

As well as the configuration of field devices in the process control system, the layout of fieldbuses must be taken into consideration too. Detailed information on the following topics can be found in the Industry Online Support:

- PROFIBUS DP (RS 485)

  "SIMATIC NET PROFIBUS Network Manual" (http://support.automation.siemens.com/WW/view/en/35222591)
- PROFIBUS DP intrinsically safe (RS 485 iS)

  "SIMATIC ET 200iSP Distributed I/O" (http://support.automation.siemens.com/WW/view/en/28930789) manual
- PROFIBUS PA

  "SIMATIC DP/PA Couplers, Active Field Distributors, DP/PA Link and Y Link Bus Couplers" (http://support.automation.siemens.com/WW/view/en/1142696) manual
- Foundation Fieldbus

  "SIMATIC bus couplers, FF Link bus coupling" (http://support.automation.siemens.com/WW/view/en/47357205) manual

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Note

The installation guidelines for the PNO (PROFIBUS user organization) can be found under http://profibus.com/.

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6 Configuration of the network connections

Introduction

Once the stations have been arranged and configured, the connections between the ES/OS server and the automation systems, as well as those between the automation systems themselves, are configured and downloaded to the individual stations.

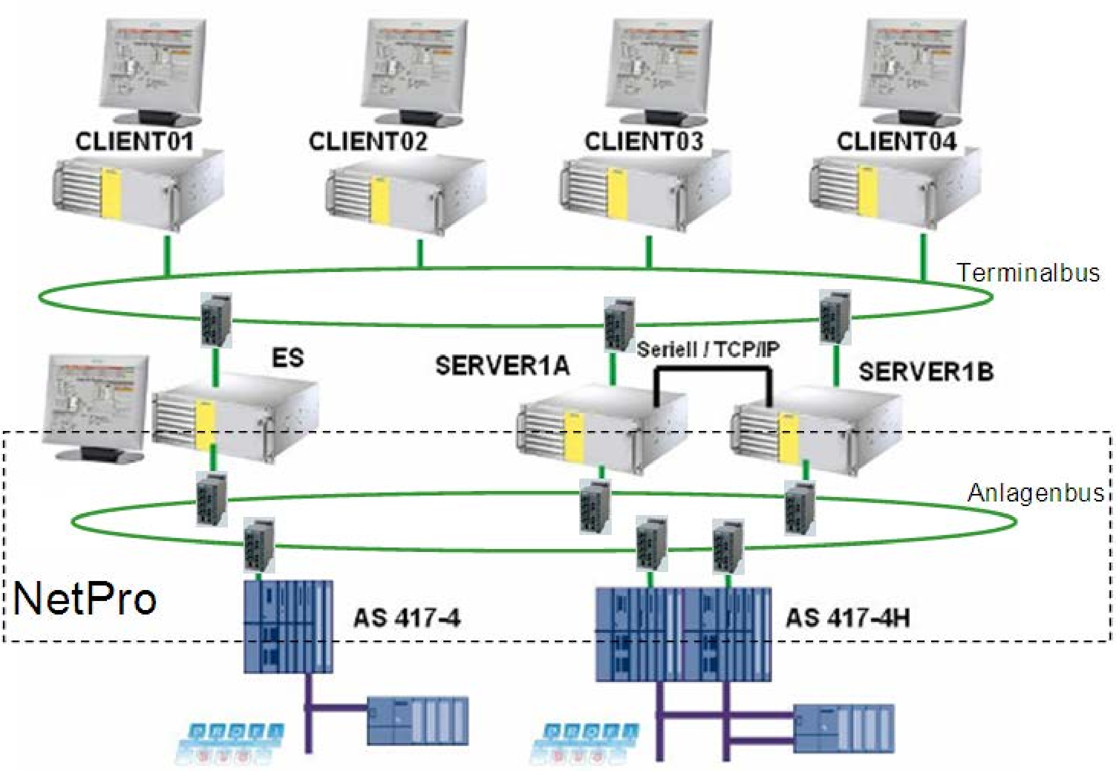
The CPs of the relevant stations must be connected to the plant bus for these connections to be loaded. The ISO protocol is used for process communication.

The OS clients are also connected to the terminal bus like the OS servers. The terminal bus is not configured in PCS 7 as it is already configured in full via the Windows control panel.

Example

For this example, the network configuration is as follows:

- 2 AS
- 1 ES
- 1 redundant OS server pair
- 4 OS clients



A ring structure from Scalance X Switches is recommended as the structure for the plant bus or terminal bus; this is also available in a redundant design as an option. For the ring structure a switch is set up as the redundancy manager (RM) in redundancy mode (HSR Manager). The remaining switches must support the ring redundancy as nodes and be configured as the HSR client in redundancy mode.

Note

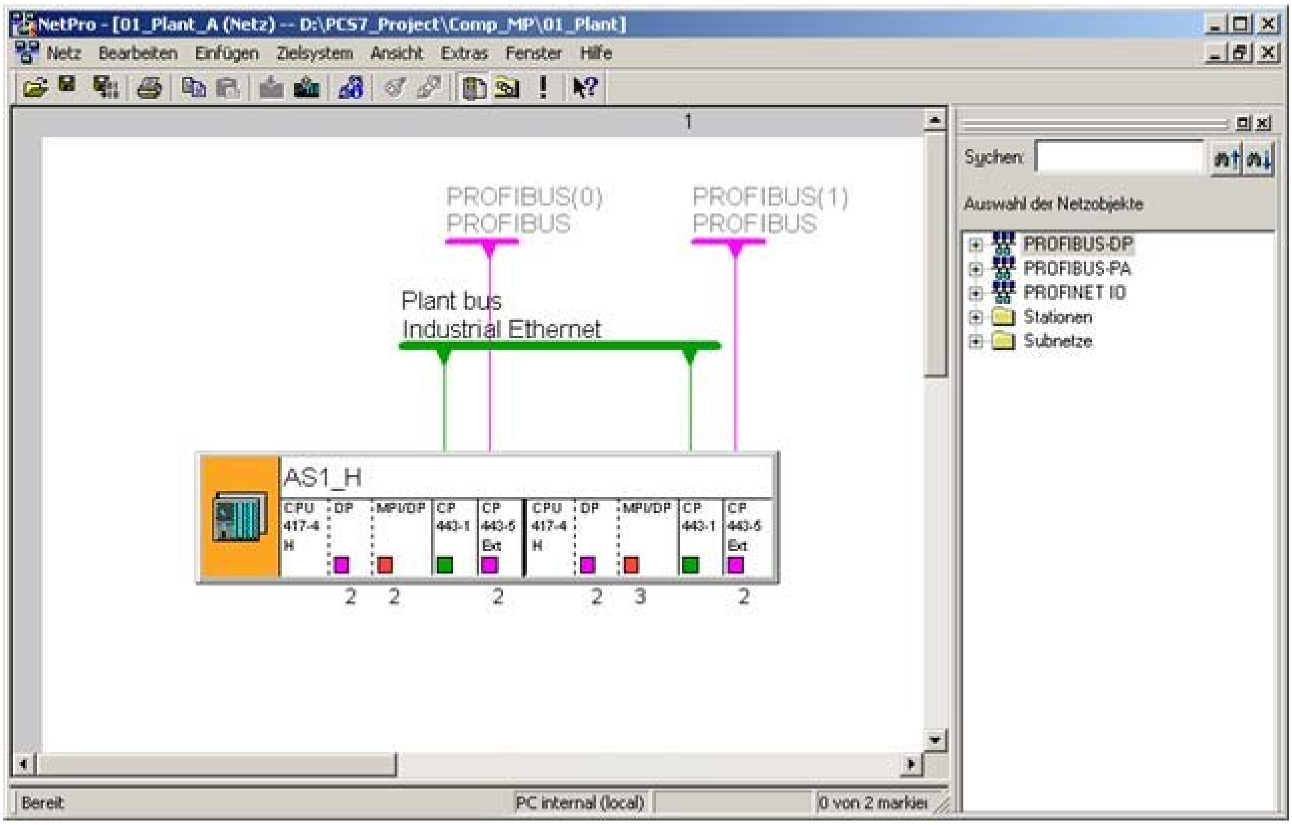
Connecting redundant stations to the bus via 2 different switches is recommended in order to guarantee the availability of the plant (affects H systems as well as a redundant OS server pair).

The required and optional settings for Scalance X Switches are described in the corresponding manual.

The Media Redundancy Protocol (MRP) which can also be set is not permitted at the plant bus or at the terminal bus in PCS 7.

NetPro view

In the NetPro view the following network structure for the project "01_Plant_A" with the H system is presented as the result of the existing configuration.



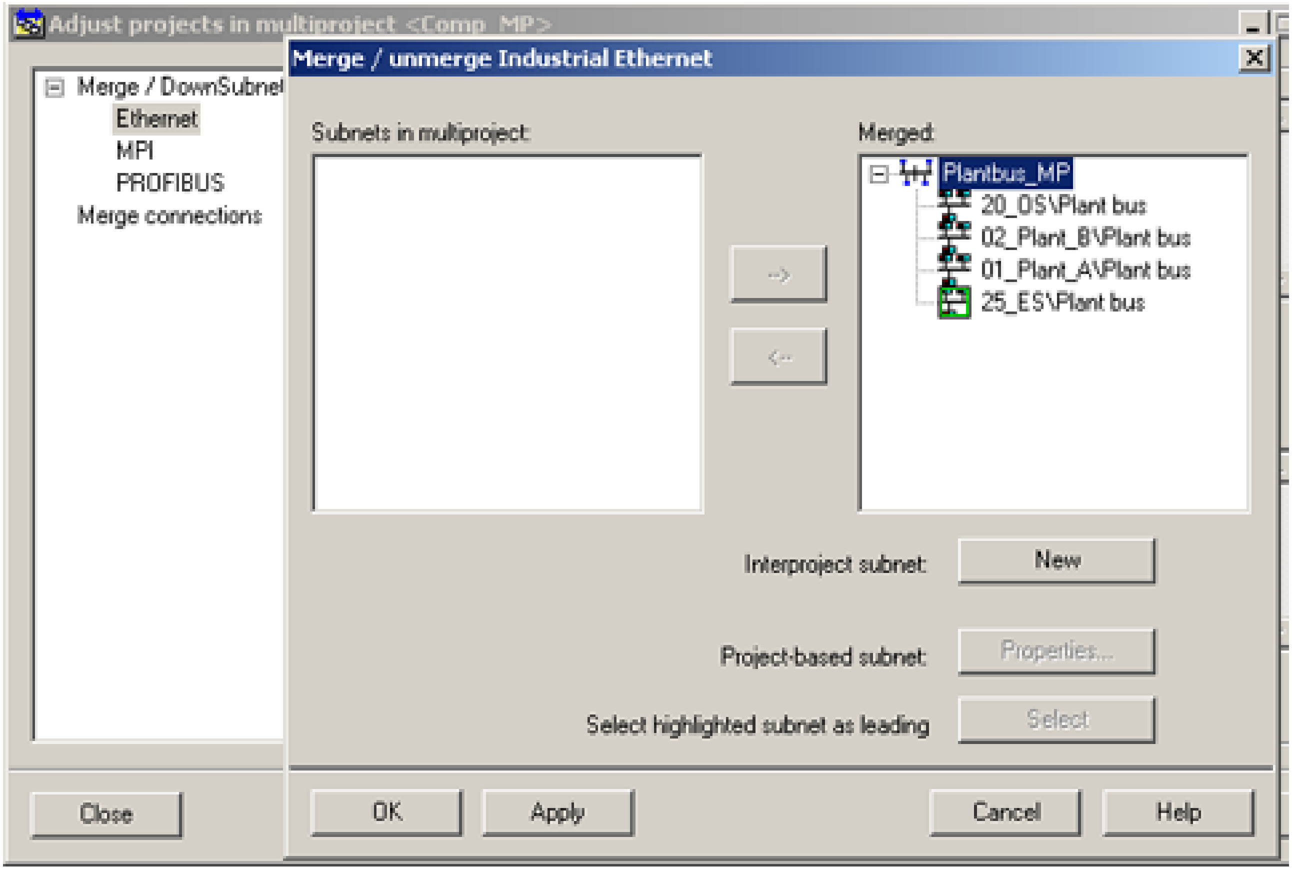
The station's orange color denotes pending changes that have not yet been compiled. Once the configuration described in this section has been completed in NetPro, all stations in the multiproject must be represented by an error-free compilation in white before the configuration is loaded into the automation systems.

With a station-selective configuration, as in this example, the networks (subnets) of the individual subprojects must also be merged.

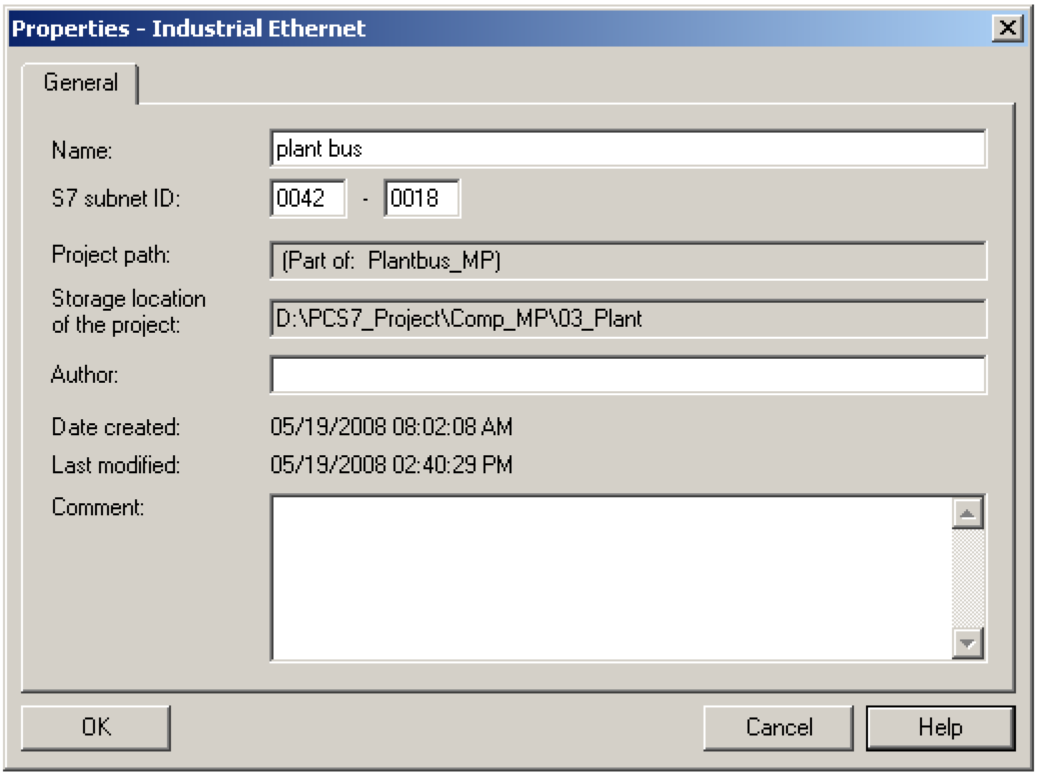
6.1 Merging networks in a multiproject

Procedure

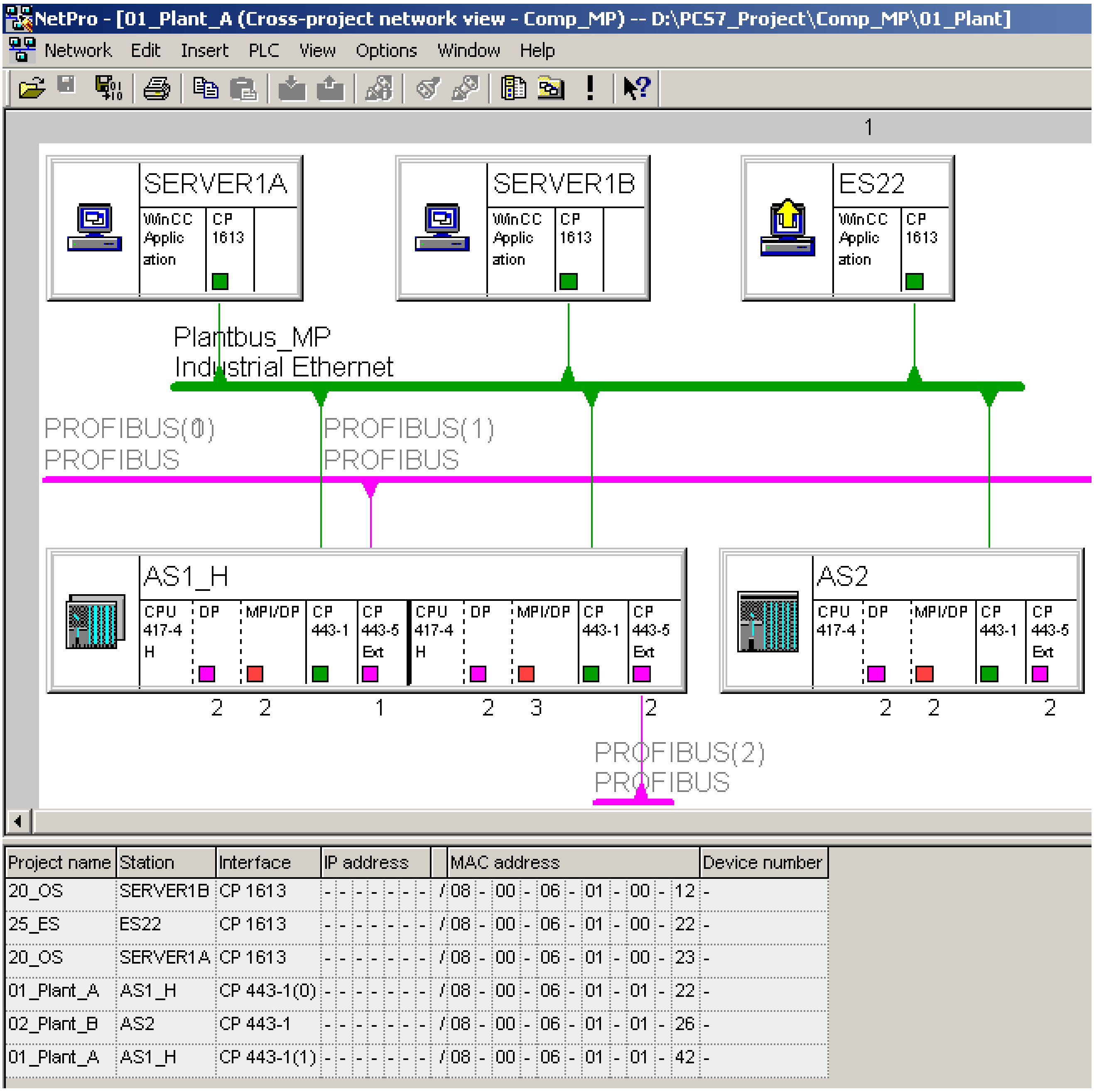
1. In the SIMATIC Manager, right-click on the multiproject and select "Multiproject > Update Projects".
2. Select "Ethernet" and click "Execute" to open the "Merge/Separate Industrial Ethernet" dialog box. You can select the individual subnets here.



The S7 subnet ID is displayed in the properties (this is the same for all plant bus components).



The cross-project network view can then be accessed in NETPRO.



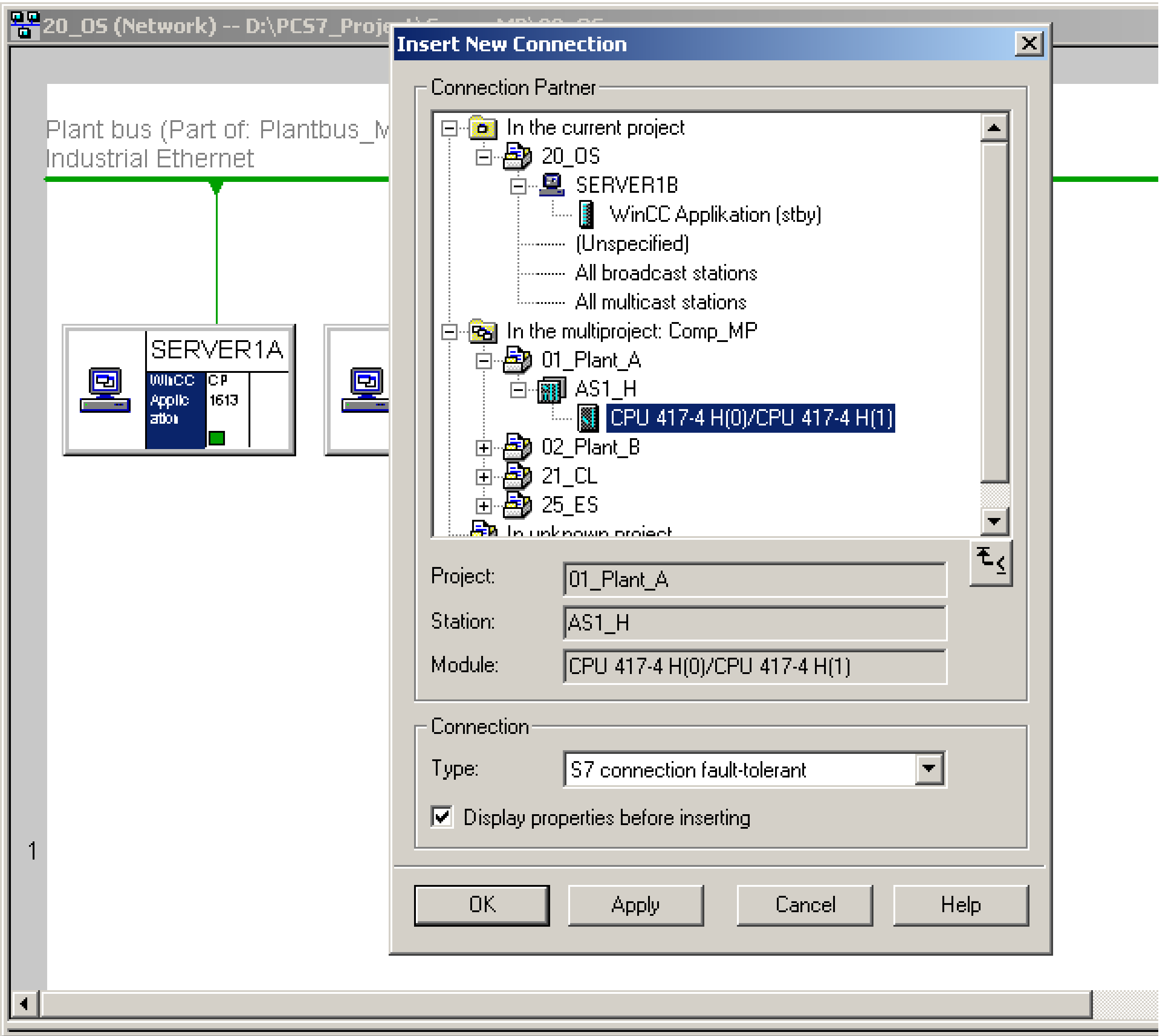
3. Click on the Industrial Ethernet plant bus in this view to obtain an overview of the MAC addresses of the PC stations and automation systems in the multiproject.

6.2 Configuration of connections

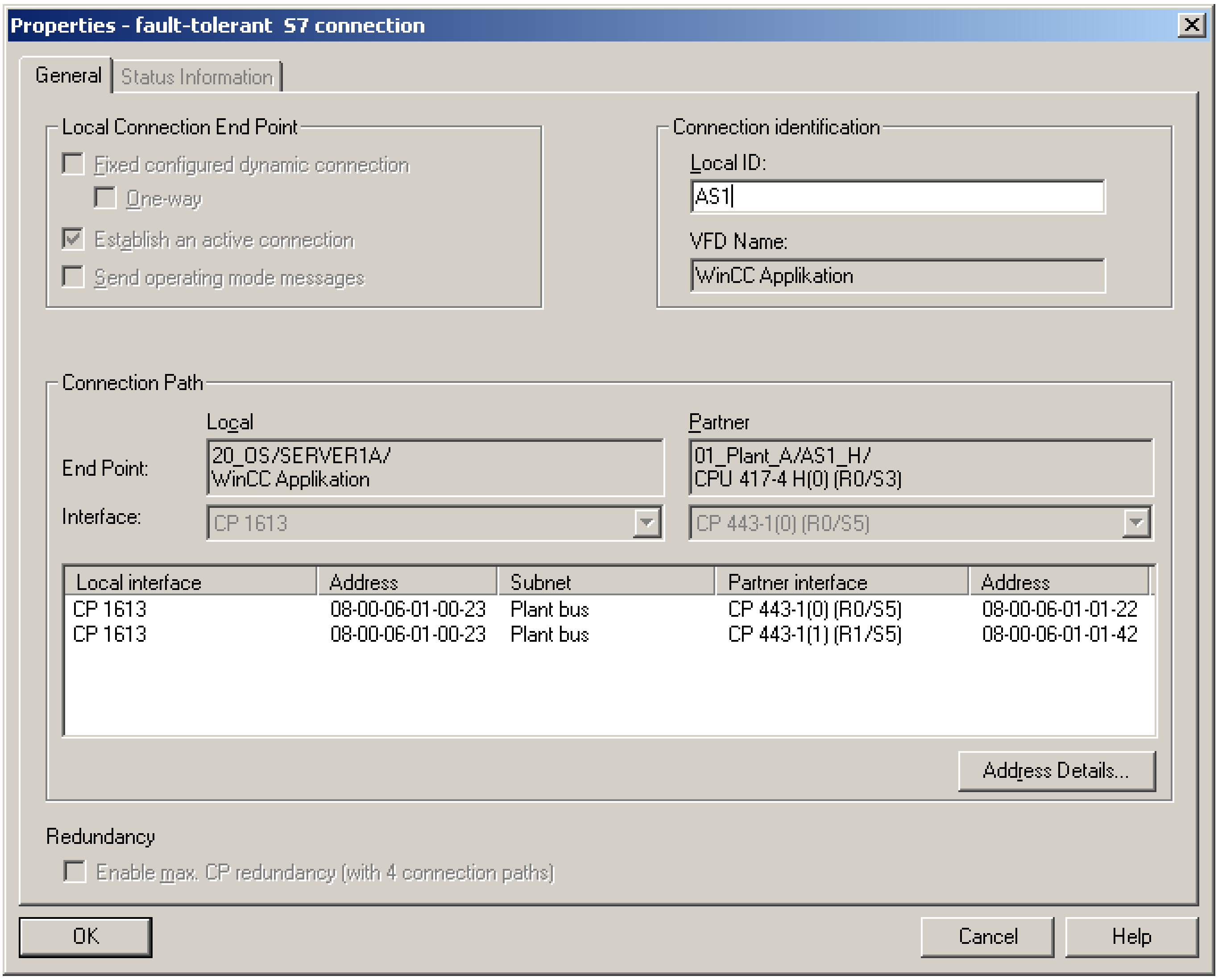
6.2.1 AS-OS communication

Procedure

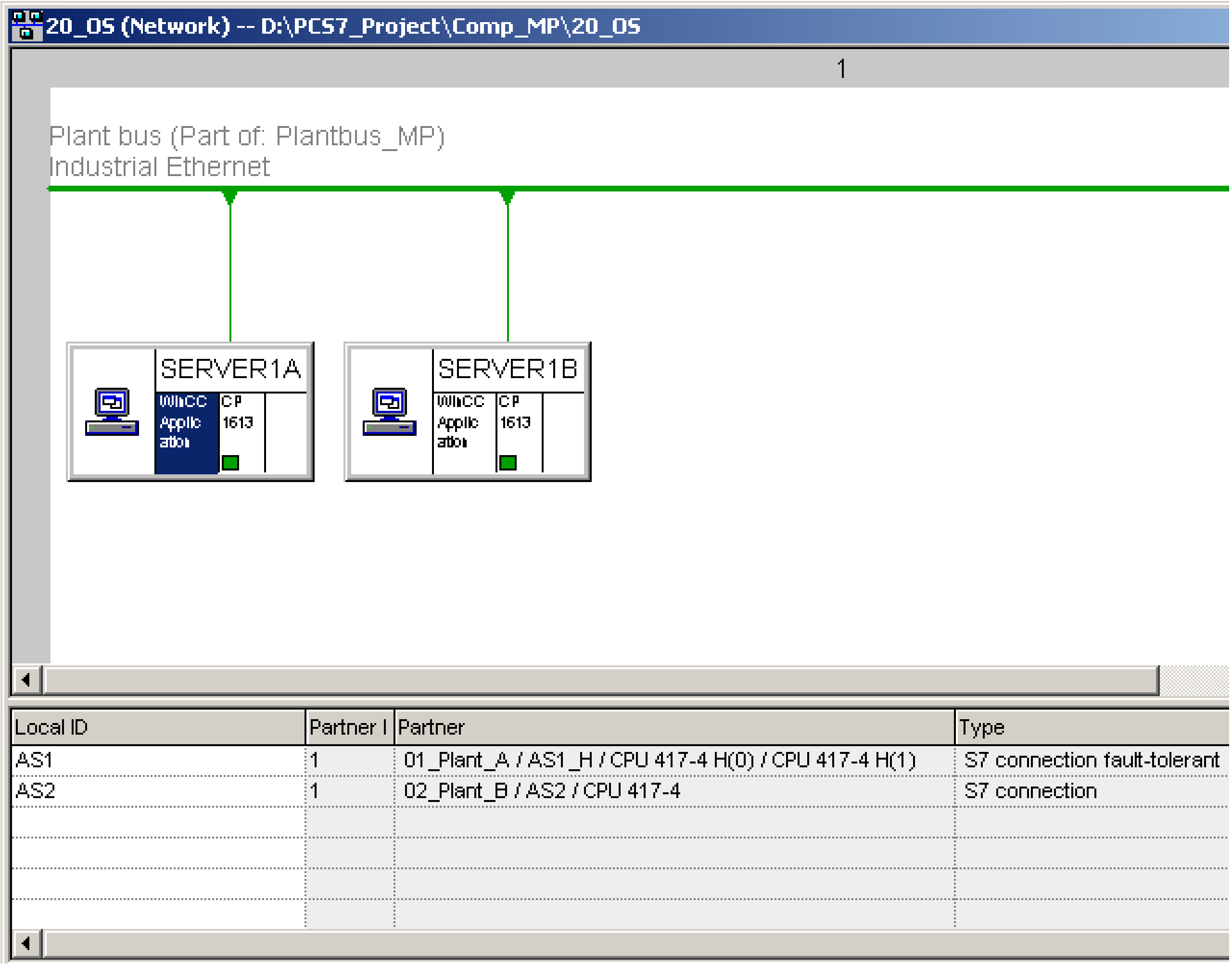
1. Open the NETPRO view in the OS subproject.
2. To add the S7 connection, right-click on the WinCC application of the OS and select the option "Insert New Connection".
3. Select the CPU of SIMATIC H station AS1.
4. Select "Fault-tolerant S7 connection" for the H system and then click "OK".



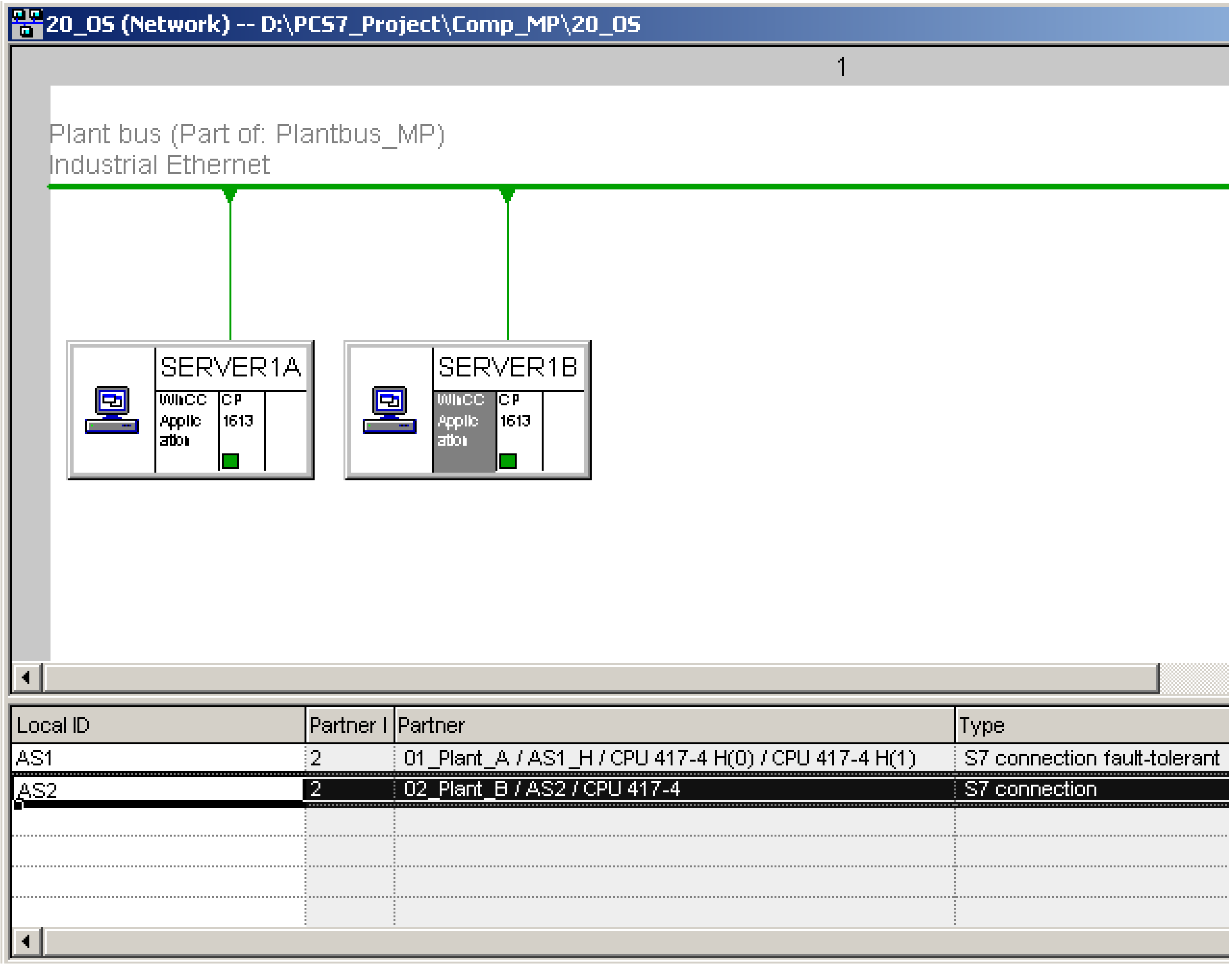
5. Name the connection for the AS.



6. Connect the AS2 in the same way with the "S7 connection" type (the S7 connection for AS2 is not fault-tolerant).



The connections for SERVER1B are made in the same way as for AS1 and AS2.



Note

Configuring an AS-OS connection for the ES is only required where the "OS Simulation" function is to be used on the ES. With "OS simulation" you can test the functions of the OS server project such as pictures or scripts on the ES before loading them to the OS server at a later time. In order to be able to use this simulation function, it is essential that the ES-AS connection has the same name as the OS-AS connection.

Note

The connections that lead from the two OS servers (as well as the ES) to the same automation system must have the same name, e.g. "AS1".

6.2.2 AS-OS communication

Introduction

In PCS 7 V7.1 and above you can use the "AS-wide interconnections between 2 charts" function from different AS. This function automatically inserts the correct S7 connection between the relevant AS in NetPro.

The possible S7 connections and the characteristics resulting from these are described below.

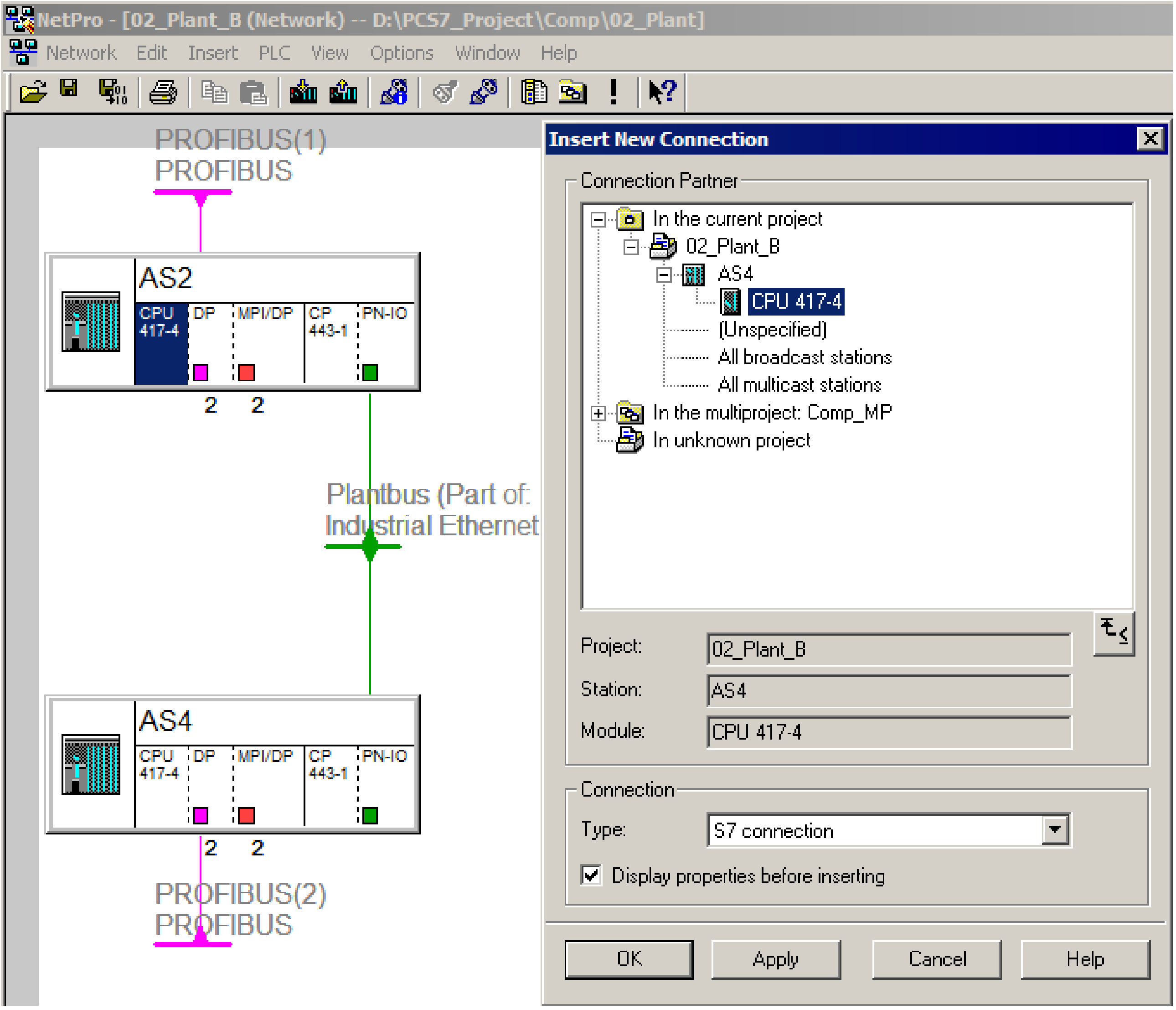
Note

You will find additional information on AS-wide interconnections in the

"SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

Communication between two standard AS

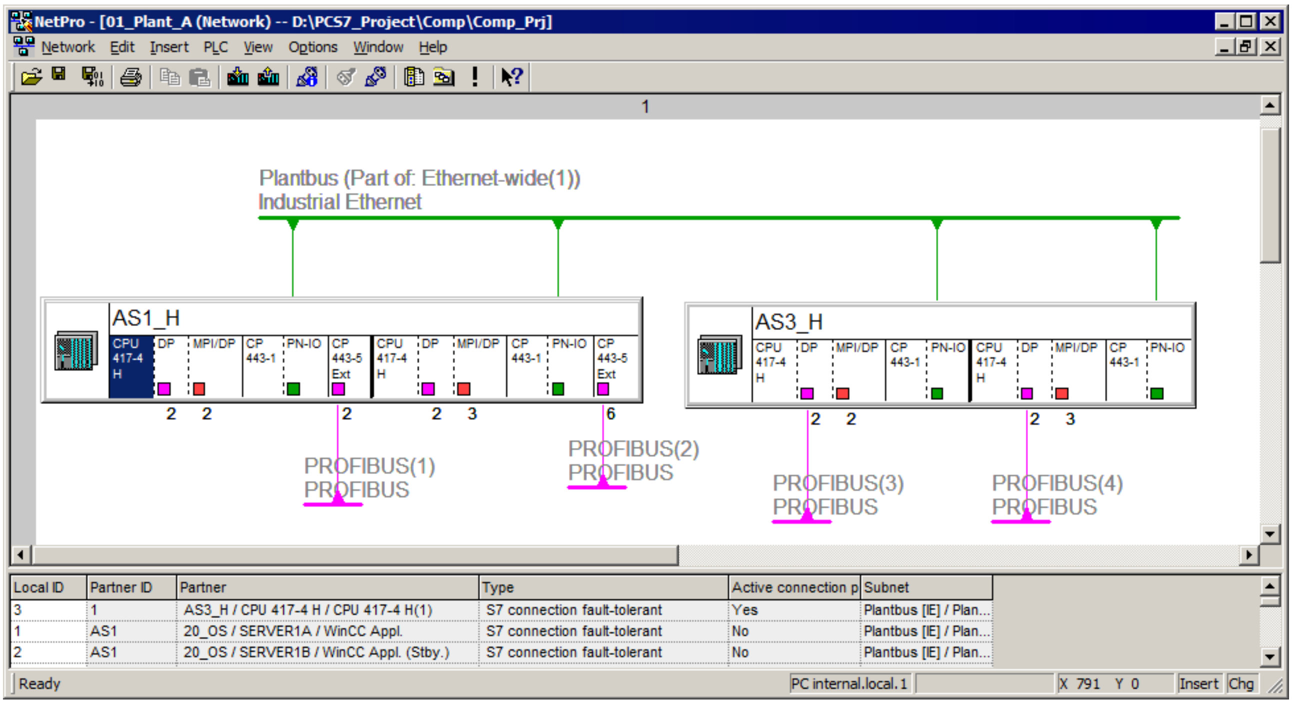
An additional standard AS must be configured for this section in addition to the AS1 in project "01_Plant_B" or in the multiproject.



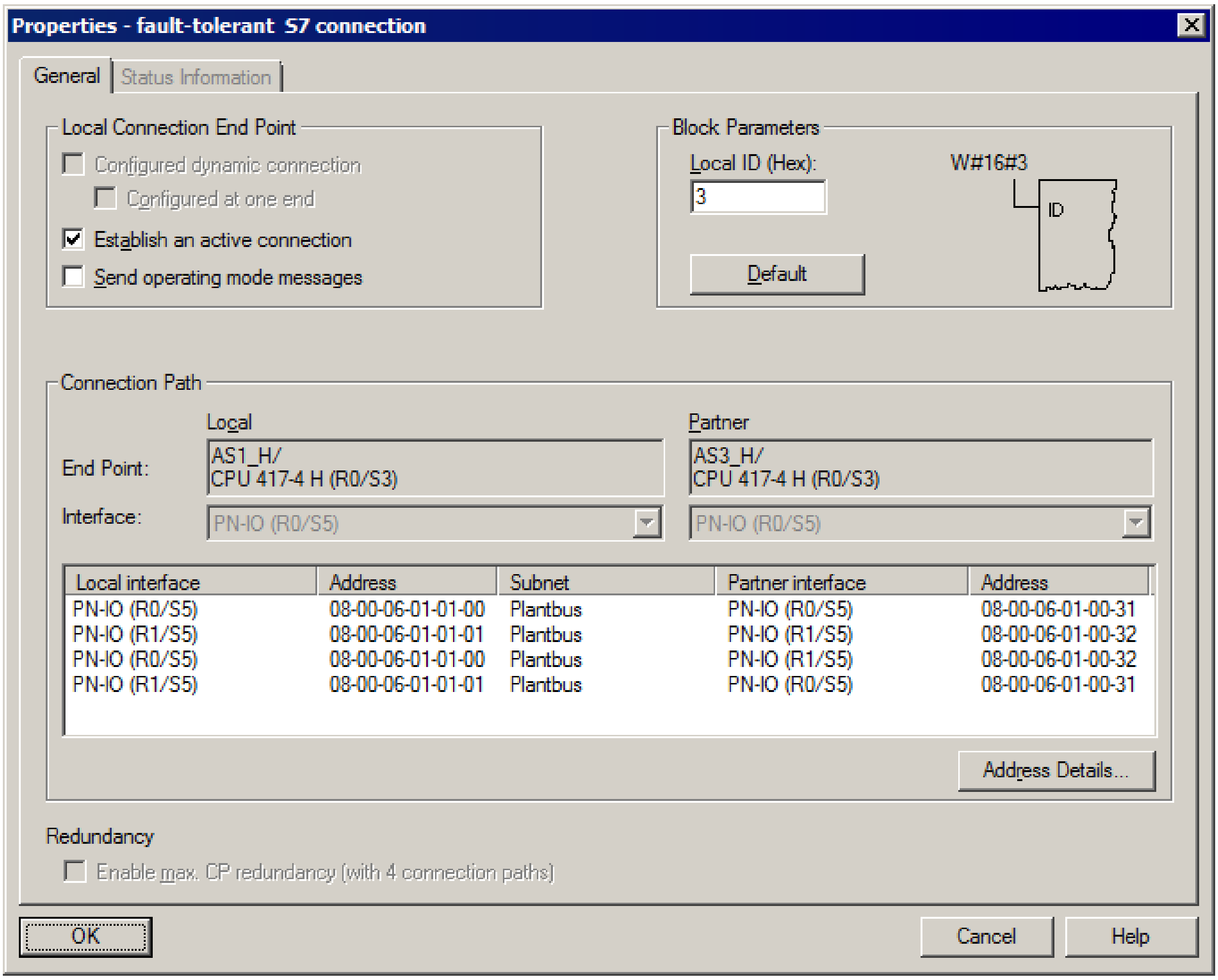
1. Right-click on the CPU 417-4 of the AS2 in order to insert the S7 connection.
2. Select the "Insert new connection" option.
3. Select the CPU of SIMATIC station AS4 as the connection's destination.
4. Select “S7 connection” as the connection type and click “OK”.

Communication between two H systems

Two H systems must be configured for this section in the project "01_Plant_A".



In this case a "Fault-tolerant S7 connection" can be configured between both H systems with four routes. The number of available routes is displayed via the connection's object properties, depending on the number of configured CP443-1 and the available networks.



This connection contains four routes internally from which the first is activated in operation. The second route is a reserve and it automatically takes on the active role in the event of a fault. The third and fourth routes are dismantled at the beginning.

Fault-tolerant communication (2-way or 4-way)

A "Fault-tolerant S7 connection" is always used for communication between fault-tolerant systems. The following connection partners are possible:

- For a simple plant bus:
  - Standard AS with CPU 41xH and 1x CP 443-1
  - H system with 2x CP 443-1
  - PC station with CP 1613
- For a redundant plant bus
  - Standard AS with CPU 41xH and 2x CP 443-1
  - H system with 2x or 4x CP 443-1
  - PC station with 2x CP 1613

Communication between H systems and standard AS

Note

Fault-tolerant AS-AS communication is not possible between fault-tolerant systems and standard systems in PCS 7 as standard, meaning that AS-wide interconnections also cannot be used.

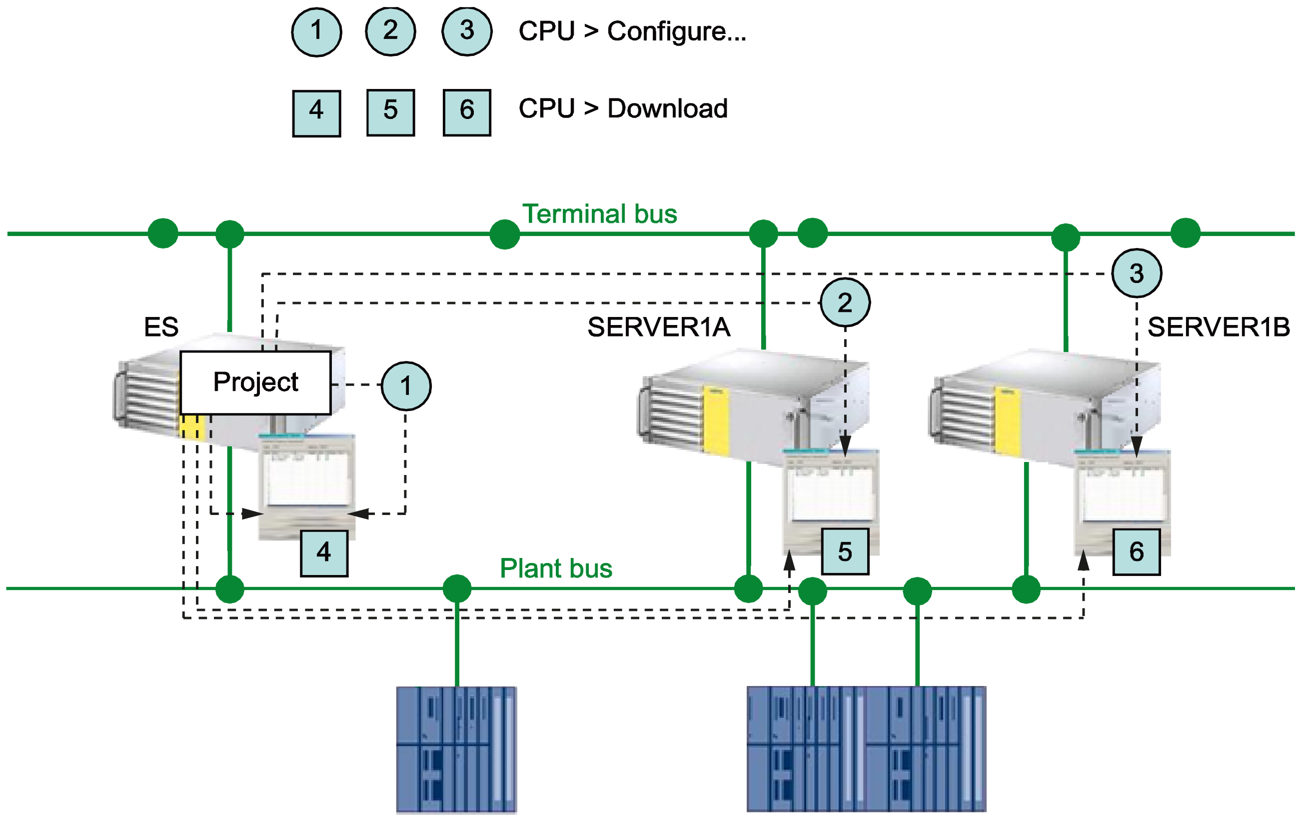
You can instead create two standard S7 connections and then realize the fault-tolerance as an application-specific block solution.

You can find more information in the "SIMATIC Fault-tolerant Systems S7-400H" (http://support.automation.siemens.com/WW/view/de/60458386) manual in the "Communication" section.

6.3 Downloading connections

Introduction

Once you have configured the stations and created the network connections, you have to download the configuration data to the stations (AS/PC stations).



A prerequisite at this point is that Station Configuration editors of the OS server must be made operational with the "Configure Target System" function (Creating and managing a PCS 7 project (Page 45)).

Compile and save your configuration in NetPro for this purpose. All stations have a "white" status color when the configuration is without errors.

For an initial configuration, perform the "PLC > Download to Current Project > Selected Stations" function for all automation and PC stations (only possible with the AS in STOP mode).

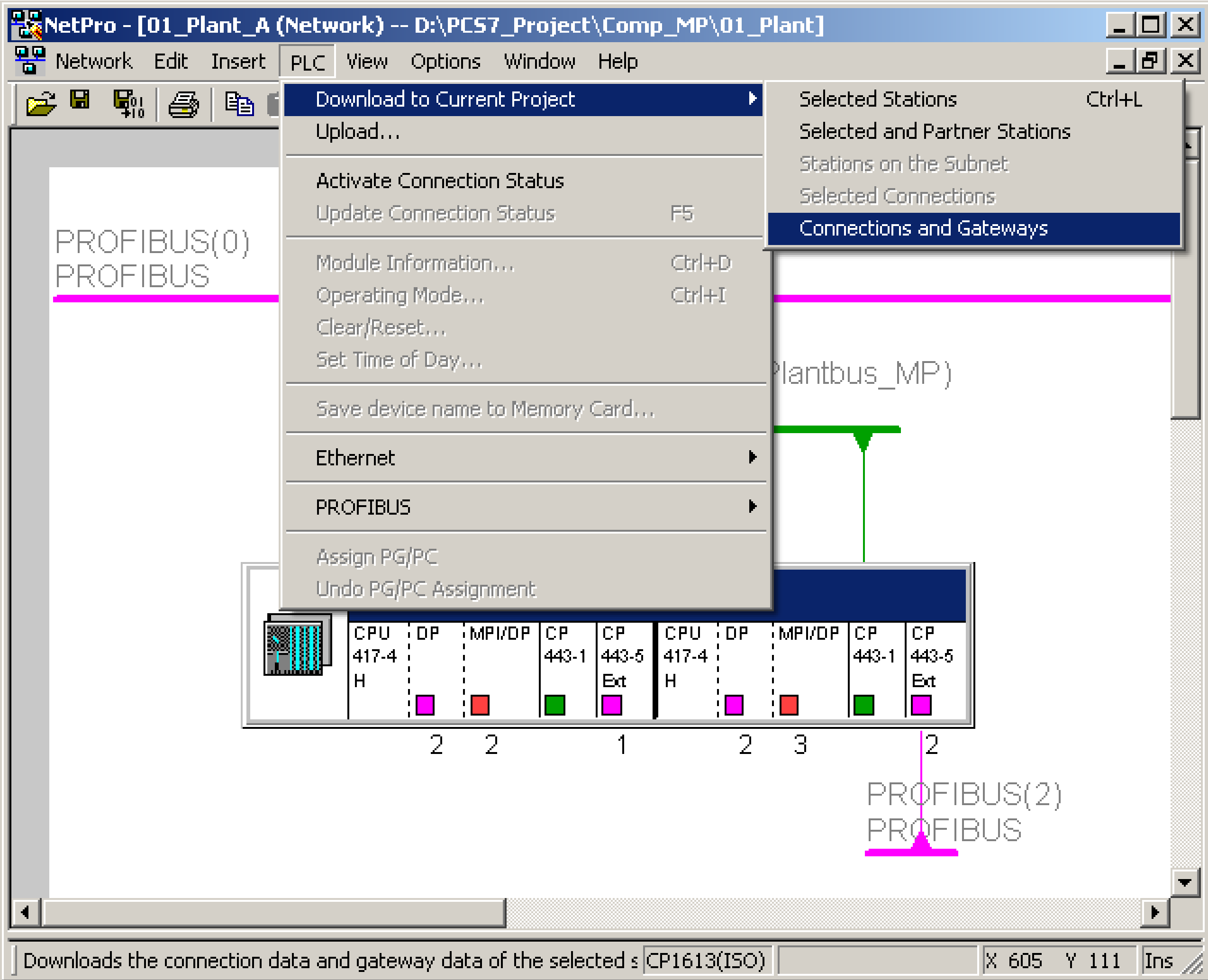
For new or modified S7 connections, select the corresponding connection and use the "PLC > Download to Current Project > Selected Connections" function (possible with the AS in RUN mode).

Note

The active AS-AS connections are briefly interrupted when the "PLC > Download to Current Project > Connections and Gateways" function is used for an AS. This interruption will not affect the output parameters for the standard blocks of the CFC library (REC_R, REC_BO).

Only the "PLC > Download to Current Project > Selected Stations" function is possible for a PC station.

The OS will then need to be compiled and downloaded if AS-OS connections are changed.



Downloading to the ES

Always start with the Engineering Station when downloading stations.

1. Select the ES and then
2. select the menu command "PLC > Download to Current Project > Selected Stations".

Downloading to OS servers

Download the configuration to SERVER1A and SERVER1B too.

Downloading to AS stations

The "PLC > Download to Current Project > Selected Stations" function loads the complete configuration including HW Config to the AS. This function can only be performed in the STOP operating state.

7 Configuring AS functions

7.1 Principles

Introduction

Plant engineering gives rise to plant parts, functions or program sections which only differ from one another in a few respects. In the interests of working efficiently, create basic elements which can be reused repeatedly and which only have to be supplied with the current parameters. Once created these are managed in the master data library and used as an instance or replica in the AS assigned.

Note

All the information on configuring the AS functions can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual, from the "Basic Engineering Concepts" section.

Further information can also be found in the "Technical Functions for the Chemical Industry" (http://support.automation.siemens.com/WW/view/en/53843373) application.

7.1.1 Master data library

Adoption of existing base elements in the master data library

The following are available in PCS 7 as base elements for the purposes of reuse as an instance:

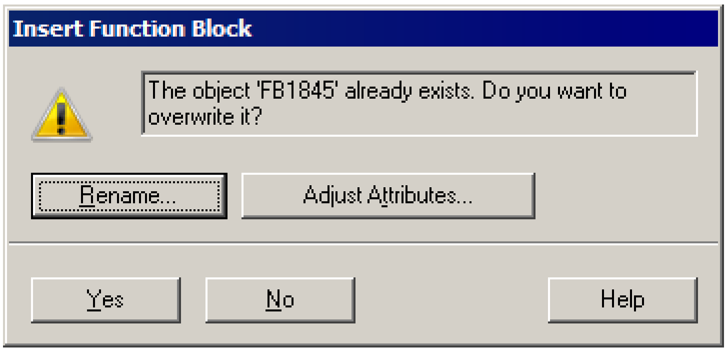
- Block type
  Also referred below as a block.
- SFC type
- Process tag type
  As an interface for PCS 7 Advanced Engineering and the Import-Export Assistant
- Model
  Models from completed hierarchy folder consisting of process tag types and of one or more process images
- Control module type
  In PCS 7 V8.0 and above this is used as the interface for PCS 7 Advanced Engineering. The control module type is referred to as CMT below.

Note

The complete description of the base elements and their use can be found in the "Typing, reuse and central changeability of engineering data" section in the "SIMATIC Process Control System PCS 7 Engineering System" manual (http://support.automation.siemens.com/WW/view/en/68157345).

Copy all required base elements from all libraries used for the configuration (e.g. PCS 7 AP Library) to the master data library of the multiproject ("Comp_LIB" in this case).

In the event that individual blocks should have changed attributes or names through the copying process then the following message is received. Calling up the "Synchronize attributes" function is recommended in this event so that no project-specific changes are lost in the master data library.

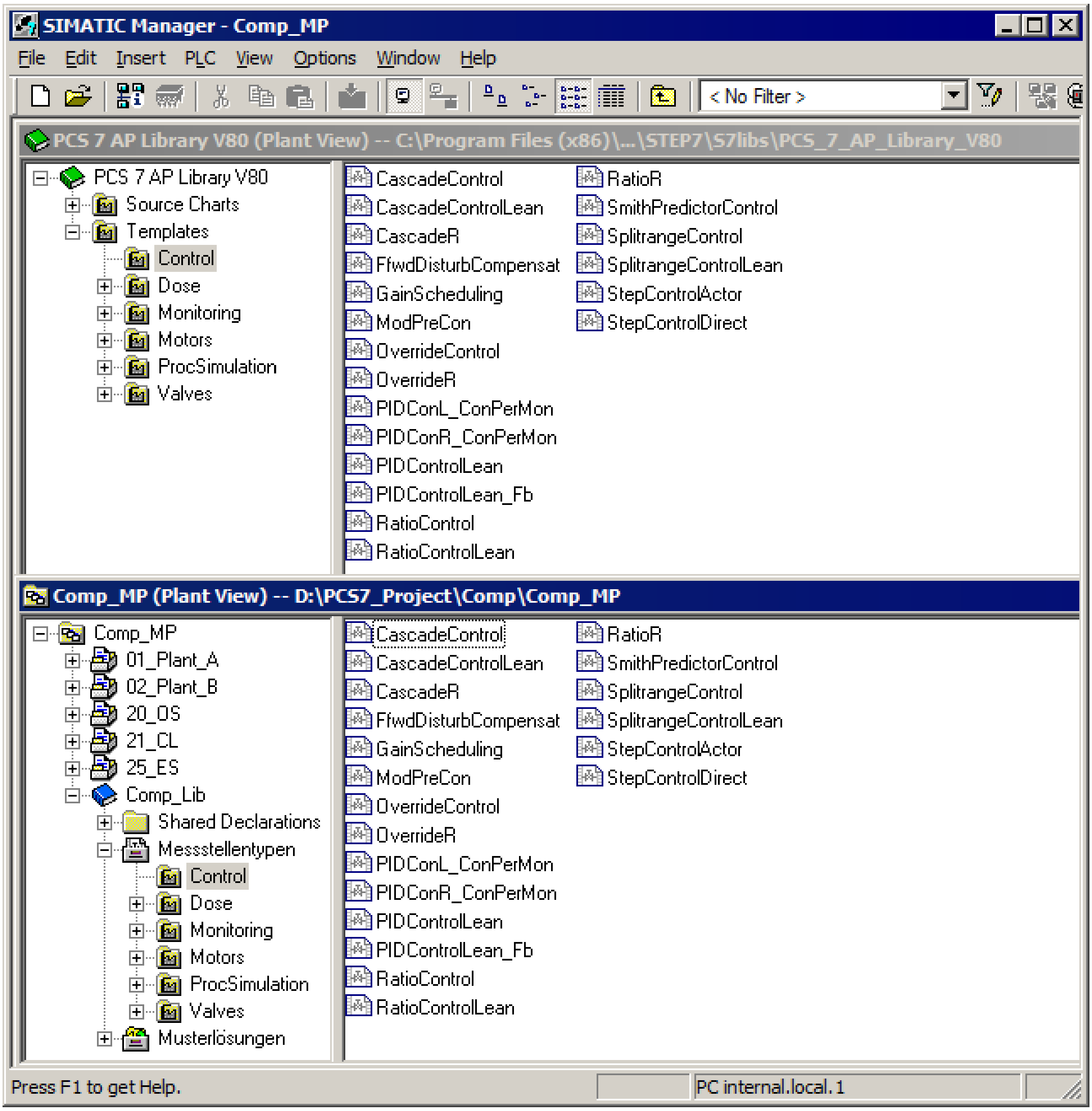


Note

When copying blocks observe the rules and notes in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345)manual.

Ensure that blocks are also copied that are called up as multi-instances by other blocks as the CPU may switch to STOP mode where FCs are missing.

The following image shows an example of how existing process tags (templates) from the PCS 7 Advanced Process Library are copied to the master library using the plant view in each case.



Note

Only base elements from the master data library should be used for configuring the charts. This ensures for example that all S7 programs will contain the same versions of the block types used. This avoids errors and warnings during later OS compilation.

7.1.2 Creating user-defined technological blocks

Block library

In PCS 7, user-specific blocks can be created quite easily, meaning that particular customer requirements can be met in a very flexible way. A user-defined block has a faceplate and its block icon for operating and monitoring the OS.

Please note that you should always take the expertise required and the time and expense involved in creating, maintaining, and servicing user-defined blocks into account. Working with existing PCS 7 block libraries is recommended with this. A major advantage with the existing library blocks is the fact that they are serviced and maintained systematically, including with regard to different PCS 7 versions. Project teams can save time and cost as a result, particularly for future upgrades where the original project team may no longer be available.

Criteria to consider when making decisions about creating user-defined blocks

The following points must be reviewed before creating user-defined blocks:

- What functions do any existing PCS 7 block libraries offer (e.g. PCS 7 add-on catalog) in terms of meeting your requirements?
- Does a sector-specific library already exist which meets your requirements?
- Can an existing PCS 7 block library be adapted to meet your requirements, e.g. related to the display?
- Is just one block to be created, or several blocks?
- Is there a description or specification of the functions required of the blocks to be created?
- Can user-defined blocks be maintained and serviced in the future?

Guidelines on the range of numbers

The block range of numbers for AS blocks is already allocated for the range from 0 to 2499 by the standard, add-on and sector-specific libraries. The FB range of numbers is therefore divided up as follows:

- Up to FB1000: Allocated with existing PCS 7 block libraries
- FB 1800-1999: Reserved for the PCS 7 system
- FB 1025 and above: Provided for SFC types
- FB 2000- 2014: Allocation for the SIMOCODE Pro library

The numbers in the range from 2500 to 2599 should be used for creating user-defined blocks.

Note

Please note that the following CPU types do not support a block range of numbers greater than 2048:

- CPUs 412-416 with V4.x version
- H-CPU 412 and 414 with V4.x version

Numbers in the range from 1200 to 1249 are recommended when using user-defined blocks on these CPU types.

Guidelines on naming

The system has a limit of 16 characters for symbolic names for function blocks. However, a maximum of 8 characters is recommended on account of the display in the CFC Editor. Symbolic names with more than 8 characters are not displayed in full in the CFC Editor for summary reasons.

When determining symbolic names the first characters should be allocated with the block names in order to allow the function blocks to be uniquely assigned during the configuration phase. If you want to expand a symbolic name with additional information (e.g. company abbreviation) then place this at the end of the symbolic name.

The following example illustrates the naming guidelines:

- Block name: "CountOh"
- Symbolic name: "CountOh_Siemens"
- Display in the CFC Editor: "CountOh_"

Guidelines on creation

The "Compile chart as FB" function should not be used when using APL blocks to create user-defined blocks as the "S7_x" attributes are not supported for structures. S7 SCL is provided for creating the blocks in this case.

Note

Detailed information on creating technological blocks using the PCS 7 guidelines can be found in the "PCS 7 - Programming Instructions for Blocks" (http://support.automation.siemens.com/WW/view/en/24449702) manual.

7.1.3 Creating user-defined driver blocks

Using driver blocks

You can use PCS 7 to create driver blocks in the same way as technological blocks for modules/devices that are not integrated. A driver block evaluates the status or the diagnostics for the modules/devices. A user-defined channel block for actual signal processing is generally required to go with this.

The main objective of creating such blocks is to achieve integration into the PCS 7 hierarchical driver concept. The hierarchical driver concept has been implemented in the PCS 7 basis library and forms a basis for asset management.

Note

If necessary, you can also consult with an appropriate SIEMENS technical department when creating driver blocks.

7.1.4 Changing the message class, priority and message text

Introduction

You can change the message class, priority, and message text for all function blocks.

Note

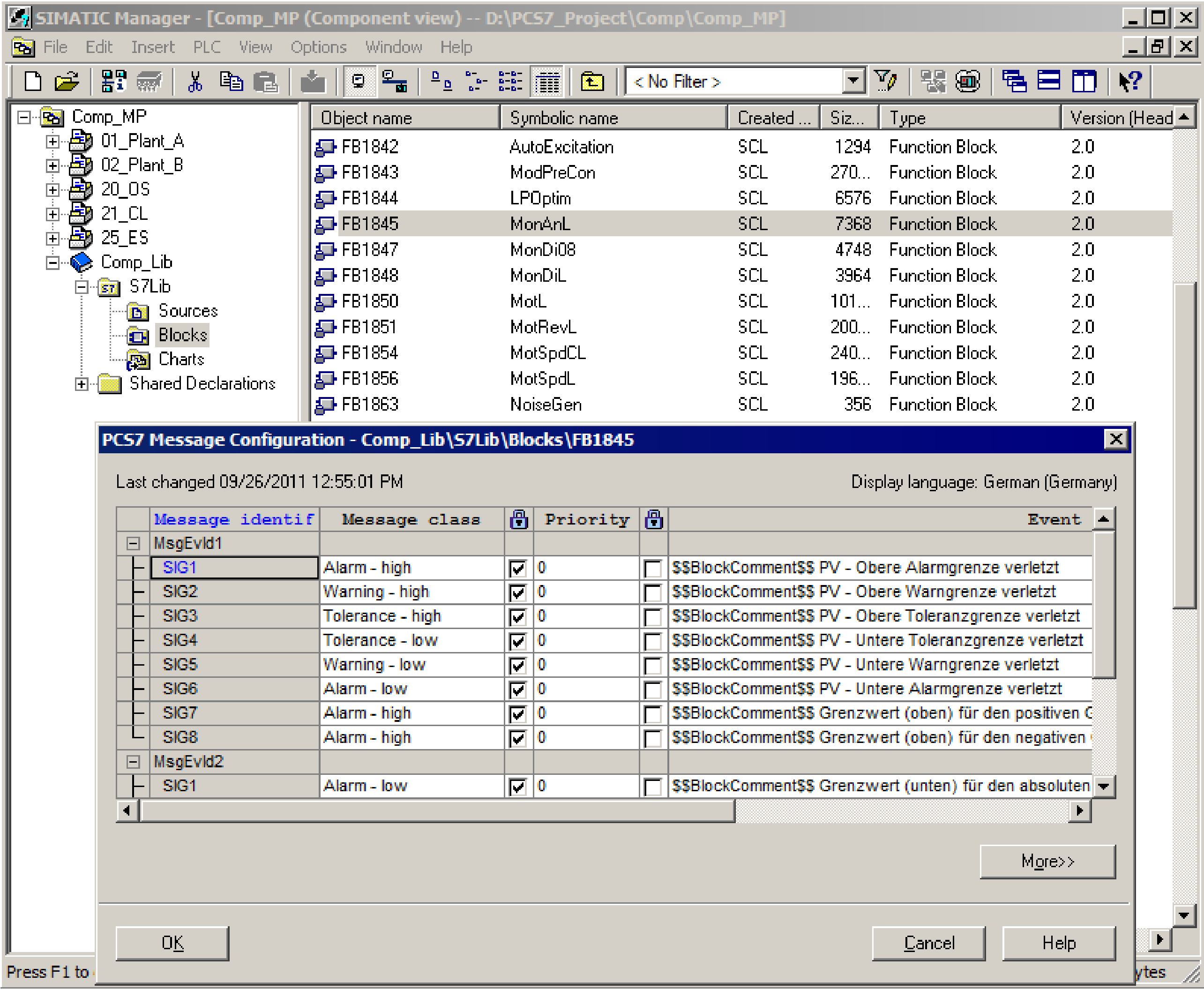
Please take note of the "Aspects of Message Configuration" table in this regard in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

As of PCS 7 V8.0 SP1, it is possible to influence the appearance of limit violations at the block in process control in group displays and in message lists. The "User-configurable message classes" function is available for this purpose.

You can find additional information on the topic of "User-configurable message classes" in the manual "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345).

Procedure

To do this, click on an FB in the master data library and select "Special Object Properties > Message".



Note

First take care of the changes in the master data library and then update the FBs in the S7 programs of the AS subprojects (see also section: Updating block types (Page 166)).

Once these changes have been made, a delta download of the automation systems is still possible. You will need to compile and download the OS servers if you make changes in the PCS 7 message configuration.

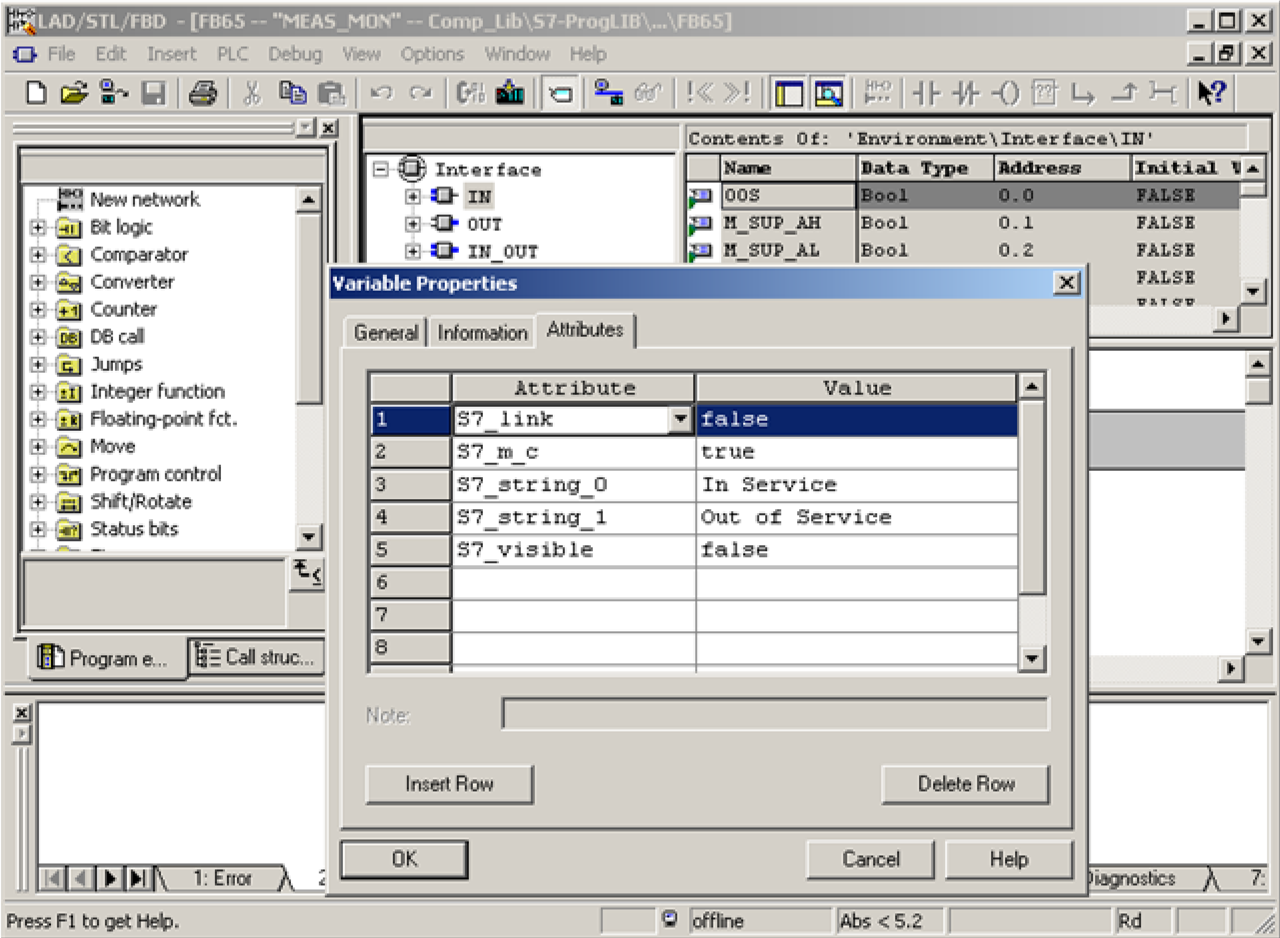
7.1.5 Changing attributes

Introduction

You can change the attributes of any function block. The attribute "S7_m_c = true" for example means that the block/block I/O should be created as a structure/tag in the OS project through the OP compilation.

Procedure

Set the attributes in the properties dialog of a block I/O on the appropriate tab.



Note

First take care of the changes in the master data library and then update the blocks in the S7 programs of the AS subprojects (see also section: Updating block types (Page 166)).

A delta download of the automation systems is still possible following changes to parameter attributes.

You may need to compile and download the OS servers if you make changes to the block attributes. You can find information on S7 attributes in the "PCS 7 Programming Guide for Blocks" (http://support.automation.siemens.com/WW/view/en/24449702) manual.

7.1.6 Updating block types

Introduction

You can update changed block types automatically in the individual S7 programs from the master data library.

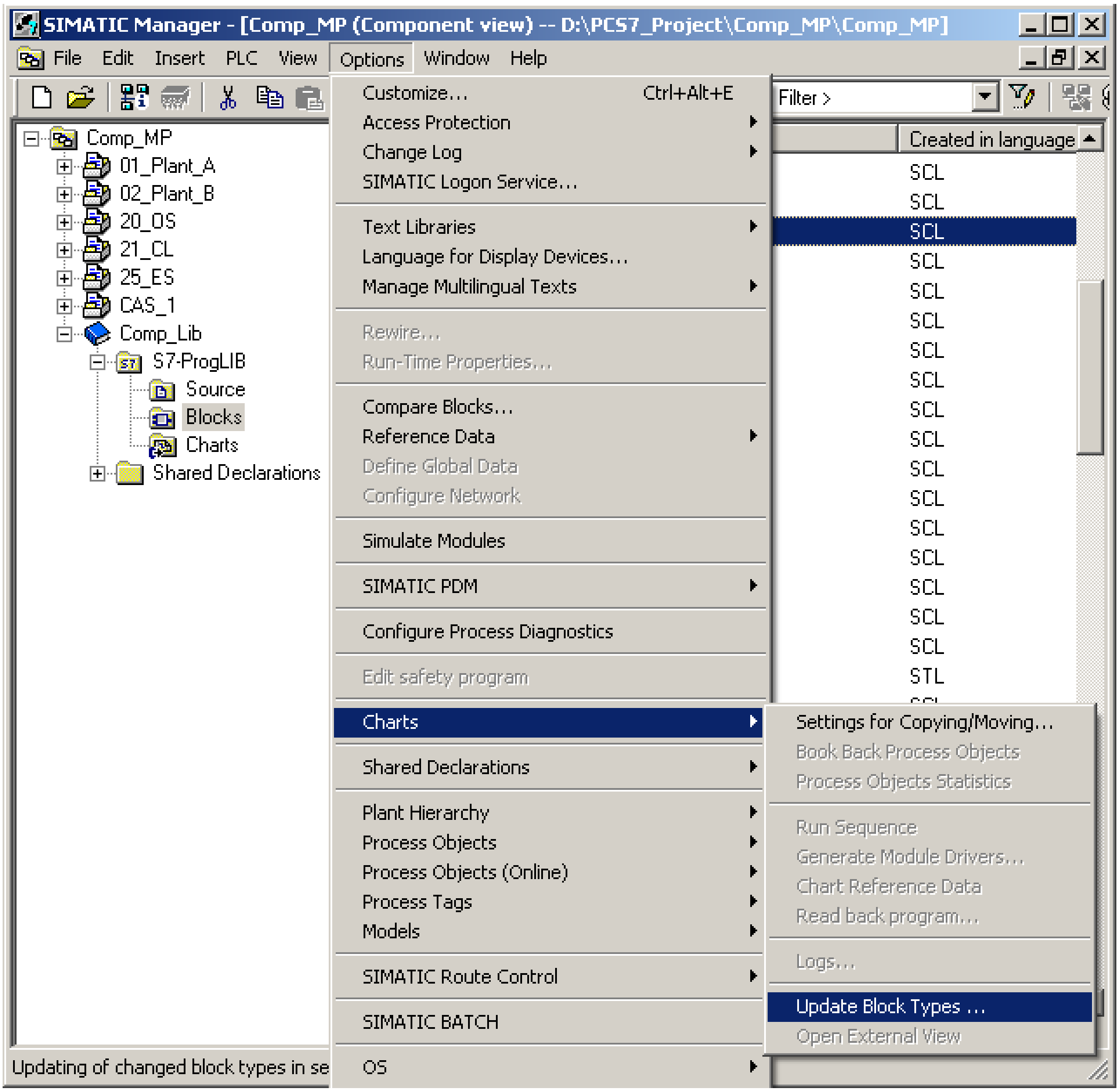
The charts of the master data library (blocks from process tag types/models) are automatically updated in addition to the S7 programs in the AS subprojects with the "Update block types" system function.

SFC types from the master data library in the S7 programs can also be centrally updated.

Once the engineering phase is complete all the block types used should be present in their current version in the master data library and should match the configured types within the multiproject.

Procedure

To do this, select the block folder or a block in the master data library followed by "Options > Charts > Update Block Types…".



Note

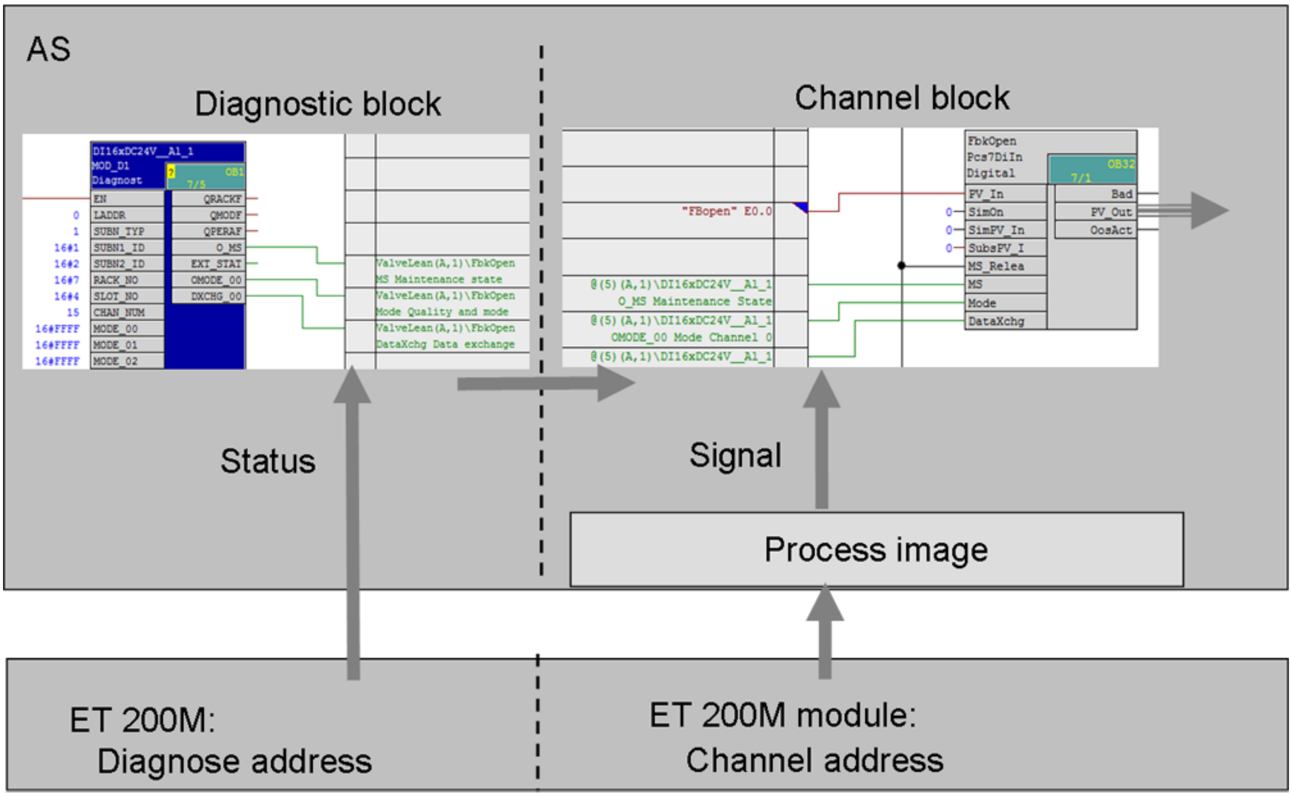
If you select one or more blocks in the block folder, only these are updated. The advantage is that this accelerates the update process.

Additional information on this process is available in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

7.1.7 Driver concept

General principle

Driver blocks act as an interface between the I/O modules, PI devices and the S7 program. Input/output signals and status information (e.g. wire break), which can then be used in the CFC editor, are made available via the driver blocks. "Signal value invalid" (QBAD) and "Value status of the signal" (Quality) are available on the channel driver.



PCS 7 features channel blocks for the actual signal and diagnostic blocks for diagnosing the subnet, racks, and modules. The channel blocks must be configured in CFC.

Define symbolic names for each channel in the hardware configuration (e.g. H4711GO). Linking a driver block to this symbolic name assigns this I/O signal to the signal driver.

The diagnostic blocks are automatically created by the system in the charts (@Charts) when the CFC charts are compiled.

Parameters are already assigned automatically to the diagnostic blocks in accordance with the settings made in the hardware configuration.

If an entire ET 200M fails, for example, a process control message is provided pointing to the faulty ET 200M. The individual process control messages of the modules and their channels are automatically suppressed. This prevents a message burst from occurring, thus making troubleshooting easier. The relevant technological messages continue to be evaluated.

Note

The diagnostic blocks from the charts (@Charts) are described in the "PCS 7 Basis Library" (http://support.automation.siemens.com/WW/view/en/68113421) manual in the "Family: @System" section.

The channel blocks of the PCS 7 Advanced Process Library are described in the "PCS 7 Advanced Process Library" (http://support.automation.siemens.com/WW/view/de/68154793) manual in the "Channel Blocks" section.

The channel blocks of the PCS 7 Library V7.1 are described in the "PCS 7 Standard Library" (http://support.automation.siemens.com/WW/view/en/36201733) function manual in the "Family: DRIVER" section.

Diagnostic block "CPU_RT"

In PCS 7 V7.0 and above the "CPU_RT" diagnostic block is inserted with "Generate module drivers" in the @CPU_RT chart. Channel/diagnostic blocks in PCS 7 Library V7.0 and above must be used for this.

The "CPU_RT" diagnostic block implements a new controller and cycle behavior in the overload range. All automation systems have the new behavior in the overload range.

A performance analysis of the AS load is also possible. The performance analysis depends on the CPU firmware (CPU FW V4.5 and above). If the CPU FW supports SFC 78, the performance data can be read via "CPU_RT". The performance data is shown in the diagnostic area of PCS 7 asset management (see also the "Integrated asset management (Page 313)" section).

Note

Further information on "CPU_RT" can be found in the "Family: @System" section of the "PCS 7 Basis Library" (http://support.automation.siemens.com/WW/view/en/68113421) manual.

7.1.8 AS resource utilization

Cycle load

It is advisable to always determine the cycle load of the AS during the engineering phase. Corresponding adjustments are required in the relevant AS where the actual load exceeds the results from the planning tool, such as PCS 7 Protime.

You can do this in the following ways:

- Using the "CPU_RT" block in PCS 7 V7.0 and above and the corresponding AS (FW > V4.5). Information on FW can be found in the "Driver concept (Page 168)" section.
- For an older AS (FW < V4.5) you can configure determination of the cycle load and download it to the AS in RUN mode at any time using CFC blocks.

Note

Further information can be found in FAQ "How can you calculate the cycle load of the automation system (AS) online?" (http://support.automation.siemens.com/WW/view/en/22000962).

Typical limits for the cycle load after commissioning the AS:

Observe the TOTALAV I/O of the "CPU_RT" block (total average value of all OB 1, OB 3x, OB 8x (in %). This value should never be above 75%, regardless of whether it involves a standard AS or an H system. This corresponds with the default limit on the MAXLIM I/O with which the "Net time consumption of all OBs exceeds Max Limit" is produced.

Peaks may occur through additional process loads, e.g. triggered by asynchronous OB errors, which may also cause time errors with a basic load of more than 75%. This leads to OB 80 being called up with a process control message included and results in the following entry in the CPU diagnostic buffer:

"Event ID 16# 3502 OB demand error / OB demanded: OB time error (OB 80)".

Increased availability as part of Lifecycle agreements:

The net time consumption of all OBs may not be above an average of 75%.

Once the engineering phase has completed check the CPU diagnostic buffer for OB 80 entries. Where there are entries present reduce the cycle load of the relevant cyclic interrupt OBs.

Memory load

Current memory utilization for the work memory and the load memory can be ascertained in the online module status of the CPU. The warning threshold for the work memory and the load memory is set at 90% as standard. This threshold can be changed in the CFC Editor.

Note

Setting the work memory code to no more than 80% is recommended where changes are frequently downloaded.

Increased availability as part of Lifecycle agreements:

The work memory code may not be set to more than 80%.

Communication utilization

The following recommendations for communication between two PCS 7-AS can be deduced from the rules on configuring AS-wide interconnections in the CFC online help:

- AS-wide interconnections can be used for configuration in PCS 7 V7.1 and above. The advantage with this is that the quantity structures are checked automatically upon compilation and are captured in the CFC reference data.
- Configurations with the communication blocks based on BSEND/BRCV (e.g. SEND_R from PCS 7 Library) are preferred in earlier versions:
  - Maximum of 50 or 100 frames/second
  - Maximum number of nodes: 30 (CPU412/414) or 62 (CPU416/417)
- The fastest cycle possible for the blocks is 200 ms for sending and receiving.
- The maximum transmission volume between automation systems in an OB is 4800 bytes.
- The volume to be transferred is calculated by adding all AS-wide interconnections of a CPU in bytes per second. The maximum possible volume that can be transferred varies depending on the CPU and its performance. This figure should not be exceeded.

The following table shows the recommended maximum values for the transmission volume of a CPU:

	CPU 412H V4.5 H system V4	H system V4.5	CPU 414, 416, 417, V5 and CPU 414H, 417H V4.5
Recommendation for the overall transmission volume	21 KB/s	30 KB/s	60 KB/s
Portion for the AS-wide communication (default setting 30%)	7 KB/s	10 KB/s	20 KB/s
Recommendation for the number of communication block instances per second	30	60	120

Increased availability as part of Lifecycle agreements:

The recommended maximum values for the transmission volume may not be exceeded.

7.2 Creating process tags

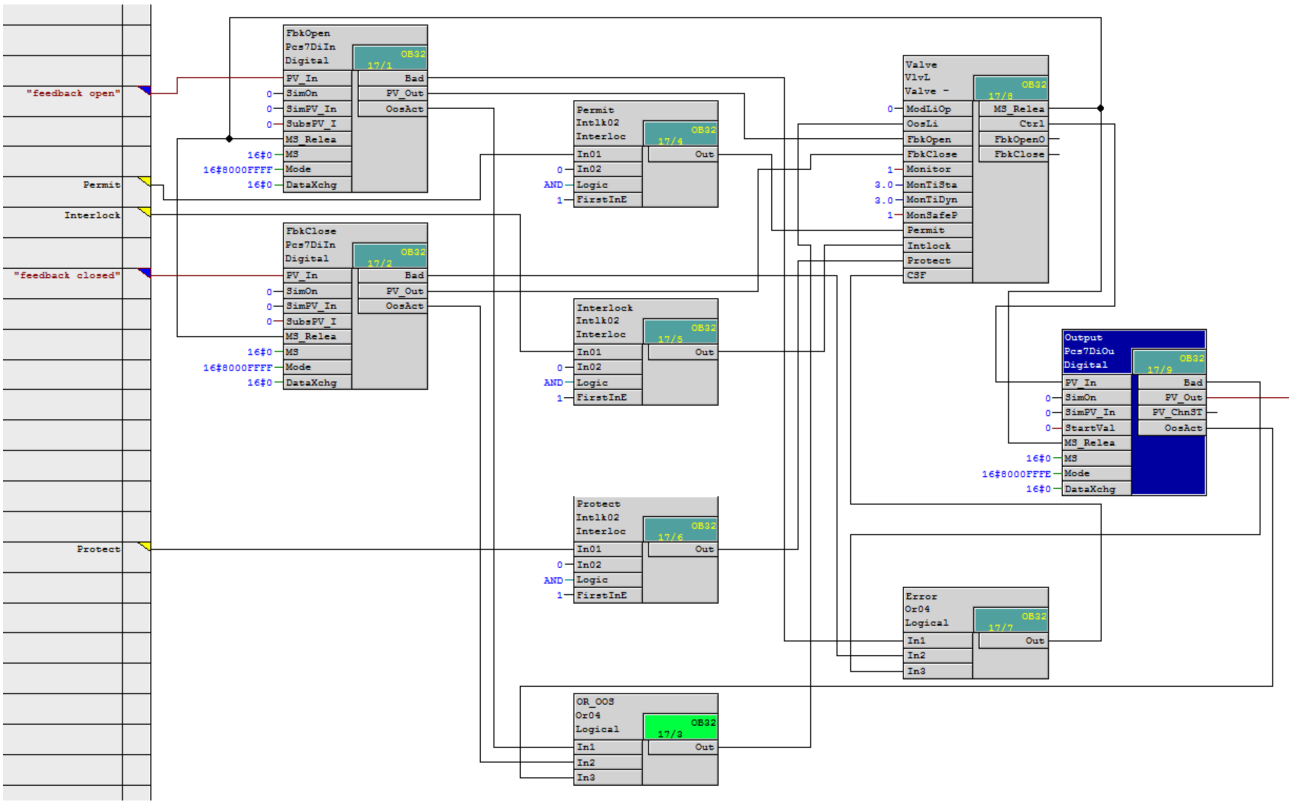
7.2.1 Process tag types (templates)

A process tag type (template) is a project-specific interconnection of blocks. It serves as a model for a specific automation function.

Example

A valve-control process tag type from the PCS 7 AP library is shown below.

The valve-control process is completed here with the channel blocks for inputs and outputs, the technological blocks "Intlk02" and "VlvL". The "Bad" output of the driver blocks is interconnected to the "CSF" error input of the valve block (valve).



Numerous process tag types are available in the PCS 7 AP library. They serve as a basis and can be adapted to the automation function for a specific project in your master data library.

User-specific process tag types should be created in the same way as the process tag types of the PCS 7 AP library.

Recommendation for creating custom process tag types

Note the following recommendations:

- Use the comment fields (for describing the logic, for example).
- Use channel blocks between the I/O data provided in the process picture and the technological blocks.
- Arrange the blocks on the CFC sheets of the process tag type in a clear manner, for example, always arrange them from left top to right bottom.
- Create variants of process tag types. If a valve needs two interlock blocks, for example, create a new process tag type for it.
- Test each process tag type before using it in the project.

Note

Information on creating CFCs and process tag types can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

All process tag types are then to be saved in the master data library and can be maintained and edited there as needed.

The process tags (replicas) in the project result from the process tag types of the master data library - either by manual copying or using the Import/Export Assistant (see also section: Import/Export Assistant (IEA) (Page 186)).

7.2.2 Control module type (CMT)

Introduction

Compared with a process tag type a control module type (CMT) has the following advantages for bulk engineering with PCS 7 Advanced Engineering:

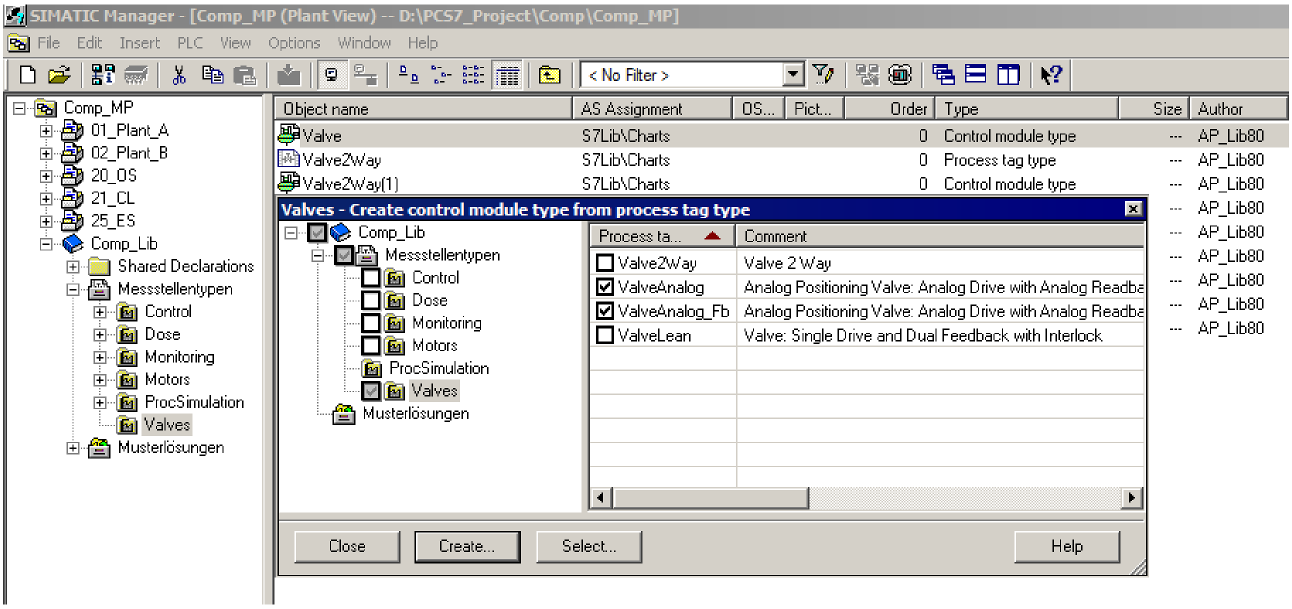
- Instance-specific changes to the instance of the control module are not lost during synchronization of type and instance.
- It is possible to create different instances from a control module type. Optional blocks are configured for this in the CMT. Before creating the instances a user can determine whether the optional blocks are activated in the relevant instance in the Advanced Engineering System. The additional "Plant Connections" view is introduced for this in the CFC Editor for PCS 7 V8.0 and above.

The advantages for bulk engineering in PCS 7 cannot be exploited without PCS 7 Advanced Engineering as there is no option for creating CMTs in bulk in PCS 7.

Creation

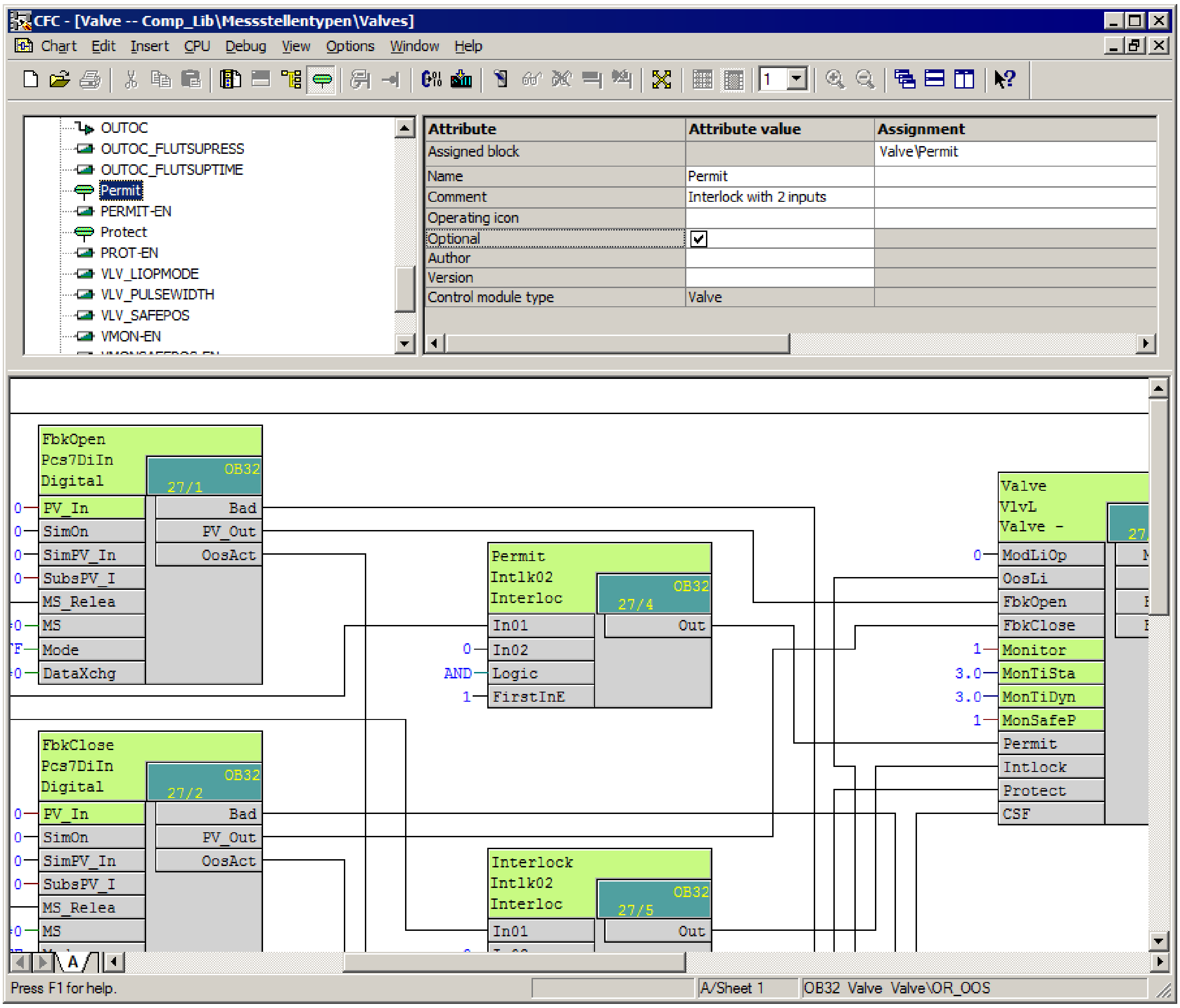
A control module type can be created directly from a CFC prototype in the plant view in the same way as a process tag type or can be generated from an existing process tag type.

For this select a folder from the process tag types of the master data library (plant view) and call "Insert new object > Control module type" or the "Control modules > Create control module type from process tag type" function.



Defining variants

A control module type is defined via its settings in the "plant connections" view of the CFC Editor. Using a valve as an example you can set up certain variants in a control module type of the master data library as shown in the following image:



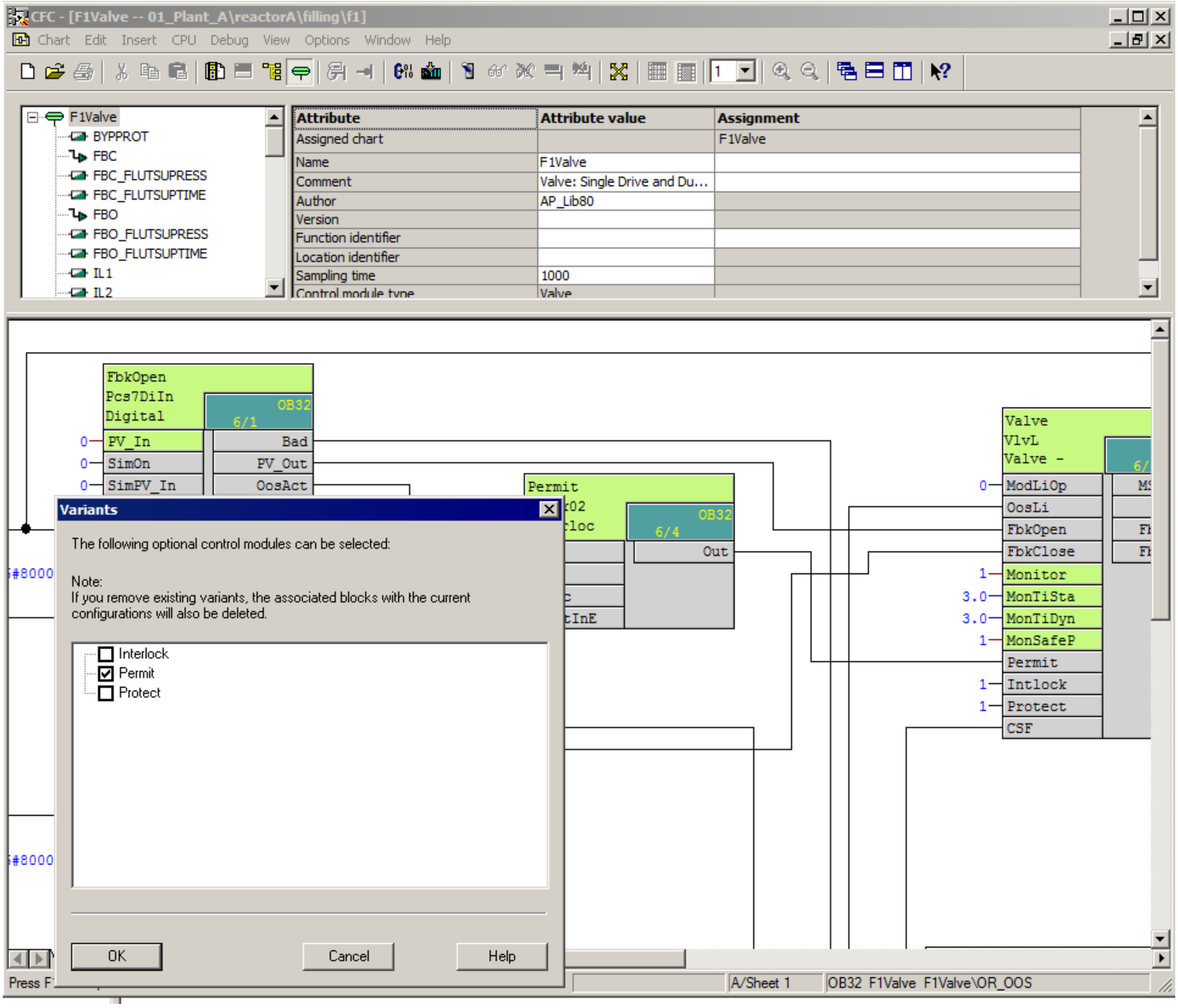
Proceed as follows to set up the variants in the example:

1. Drag the configured "Permit" block using Drag&Drop to the "Plant I/Os" view.
   A new control module is created.
2. Rename the new control module, e.g. as "Permit".
3. Select the "Optional" attribute.

Selecting variants

A control module (CMT instance) is created from a control module type by copying a control module type into the chart folder of an AS. The defined variants for a control module type are available under the "Variants" context menu function in the "Plant I/Os" view.

Here you can select whether the optional "Permit" block is required including its interconnections in the case of the valve.



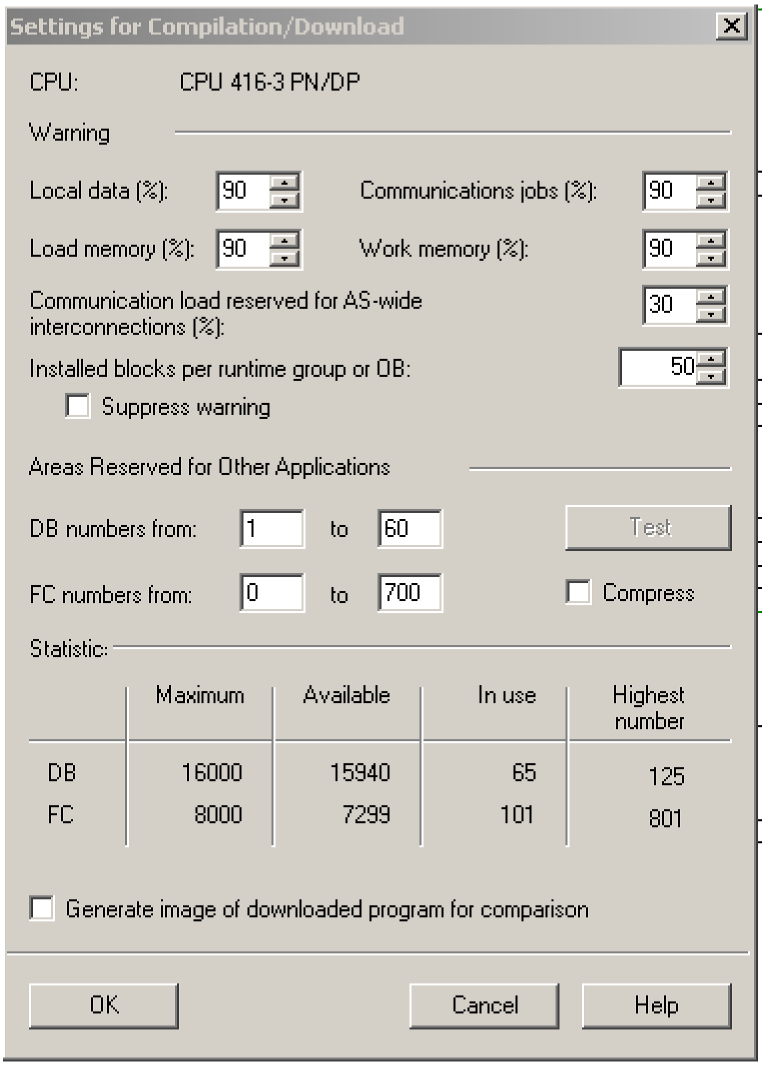
Note

Further information on managing control modules can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual as well as in the CFC-Editor online help.

7.2.3 Requirements for configuration in CFC Editor

Areas reserved for other applications

Open the "Settings for compile/download" dialog box in the CFC editor via "Options > Settings > Compile/Download" and specify the DB and FC number ranges which should be skipped when compiling the charts.



The settings for the number ranges should be the same for all S7 programs in the multiproject. It may be necessary to change the preset range depending on the additional project-specific user libraries.

The default settings are:

- DB: 1 to 60
- FC: 0 to 700

Installed blocks for each sequence group or OB

The default limit of 50 blocks is sufficient for typical configuration cases.

The monitoring is performed for:

- Blocks per sequence group (GROUP FC) or
- Blocks per TASK FC + sequence groups per TASK FC + SFCs per TASK FC

With the default setting of 50 blocks per sequence group or OB, a warning is triggered if more than 50 sequence groups (CFCs) are configured.

Too many blocks per OB without using sequence groups can cause the SCL Compiler to abort, as the compiler can only create a maximum of one 64 KB FC per OB.

The warning limit exists so that the 64 KB limit is not exceeded. You can set the warning limit individually (1 – 32767), for example, after empirical determination. To determine the warning limit empirically, the program must be compiled at regular intervals during the configuration. Then you can check in the block folder of the program whether a block (Task FC) is approaching the maximum allowable size of 64 KB. If the block size is close to this limit, the warning limit is set too high. If the block size is well below the limit of 64 KB, the warning limit can be increased.

If a block is close to the limit of 64 KB, you can reduce the block size by inserting new sequence groups or by moving blocks/sequence groups to a different cyclic interrupt.

You can find additional information on this topic in the FAQ "Why does the error message "Maximum length of code area reached (max. 64 KB)" or "Insufficient main memory" appear when the CFC charts are compiled?" (http://support.automation.siemens.com/WW/view/en/771569).

Generate image of downloaded program for comparison

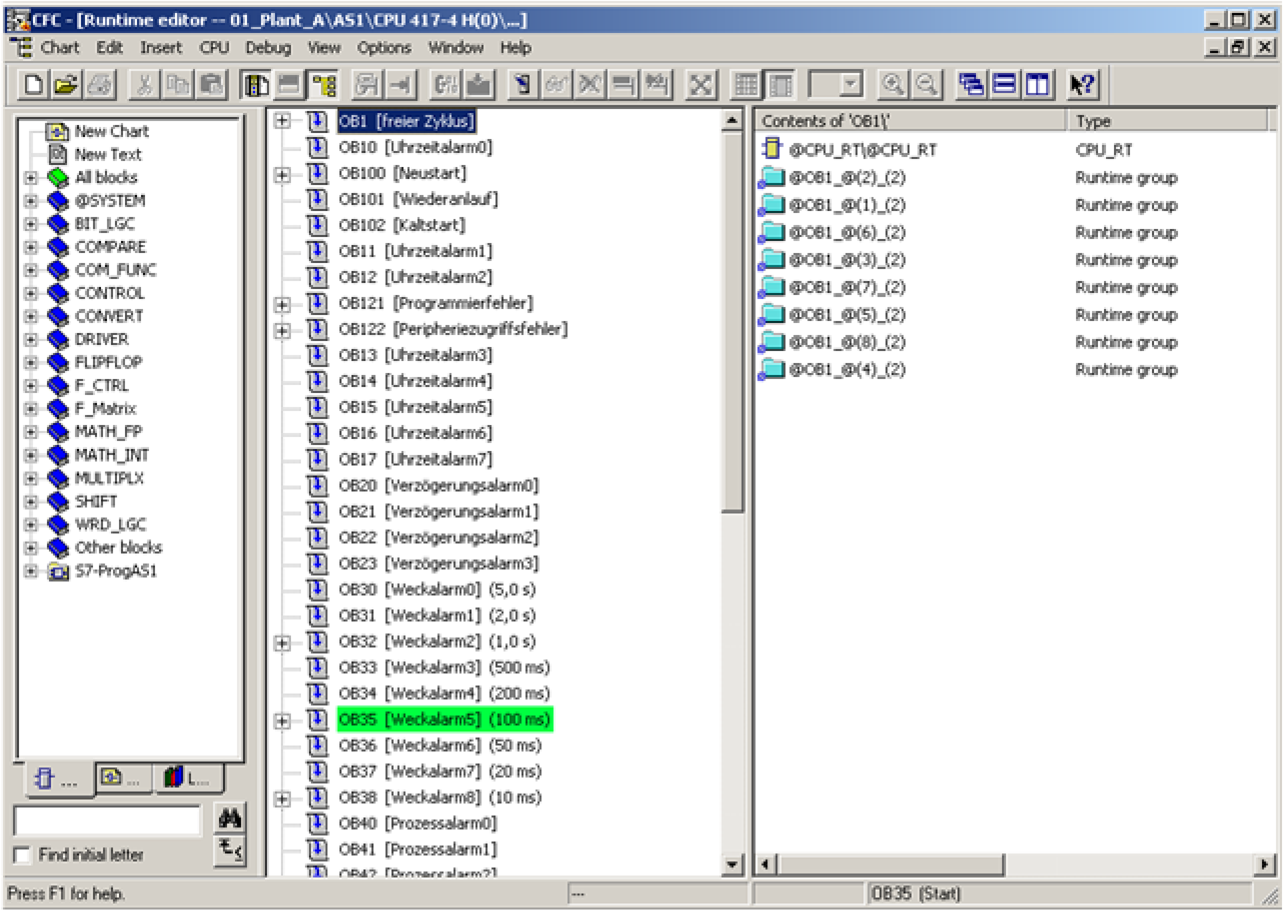
As of the PCS 7 V7.0, the "Generate image of downloaded program for comparison" option is available. This can prove useful or necessary as of a certain configuration phase (commissioning, production).

If the option is activated, this allows you to subsequently view details of the changes to be downloaded; The "Show Changes" button is available for this purpose in the "Download" dialog window. The VXM tool (Version Cross Manager, including license) must be available.

7.2.4 Run sequence

Principle of the run sequence

A runtime group is created for every CFC chart (process tag) automatically upon creation. The "Predecessor for runtime sequence" function in the runtime editor provides the option of determining the installation position of the next CFC chart within a cyclic interrupt OB. All blocks of a CFC chart are therefore assigned to the same cyclic interrupt OB. This ensures that the channel drivers and technological blocks are processed in the same cycle in a runtime sequence.



Note

If blocks with startup characteristics are included, these are also integrated in OB 100.

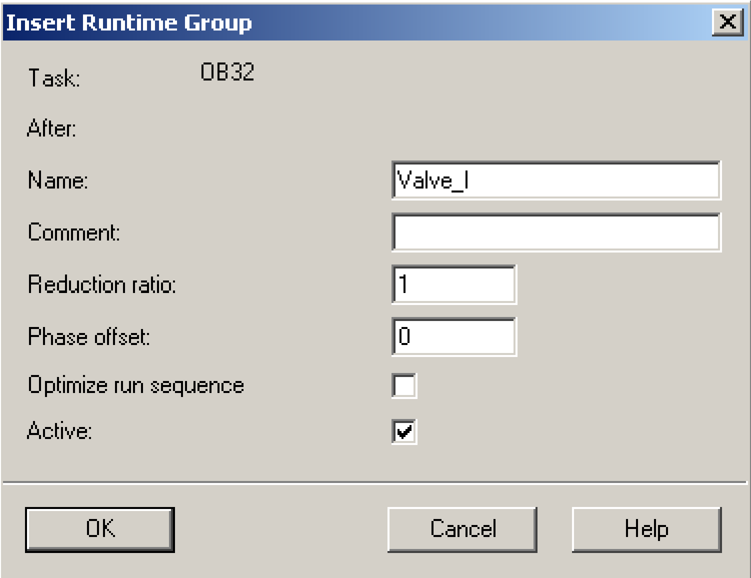
Execution time of the runtime groups

You can set the execution time of the process tags by inserting the corresponding runtime group in one of the following cyclic interrupt OBs.

Cyclic interrupt OB	Default value for time frame	Default value for priority class
OB 30	5 s	7
OB 31	2 s	8
OB 32	1 s	9
OB 33	500 ms	10
OB 34	200 ms	11
OB 35	100 ms	12
OB 36	50 ms	13
OB 37	20 ms	14
OB 38	10 ms	15

Optimize the run sequence

The timing of each individual block, or of the entire program, can be optimized using the "Options > Optimize run sequence" system function. This optimization is recommended is for PCS 7. If certain runtime groups (e.g. CFCs with cascade connections) are not to be optimized then the optimization may be deactivated in the runtime group properties.



One advantage of optimization is that all process tags of the entire S7 program are executed in the same order. This sequence is based on optimization under the IPO principle: Input driver block – Processed blocks - Output driver block.

Note

If the runtime group contains fail-safe blocks, the option is not activated.

You can find more detailed information on the run sequence and how it is optimized in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

7.3 Creating step sequences

General information about SFCs

The sequential function chart (SFC) is a sequential control system executed in stages which, depending on certain conditions, advances from one state to the next. A sequential control system controls functions, such as CFC charts, via mode and state changes, and processes them selectively.

It is created in the SFC editor. Block icons for SFCs and SFC types are generated automatically during OS compilation.

Note

Additional information on this is available in the "Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

SFC types

In the SFC, there are the "SFC chart" and "SFC type" object types.

The SFC type allows the definition of sequential controls and of an expandable interface. You can read about the advantages and disadvantages of SFC types/instances in the manual mentioned above.

Note

The creation of SFC types is described in detail in "Compendium Part C - Technical Functions with SFC Types".

An SFC type is generally preferred if a step sequencer (SFC) is used several times in the project. The instances are placed in the CFC chart similar to a function block. The SFC type is contained in the associated chart folder.

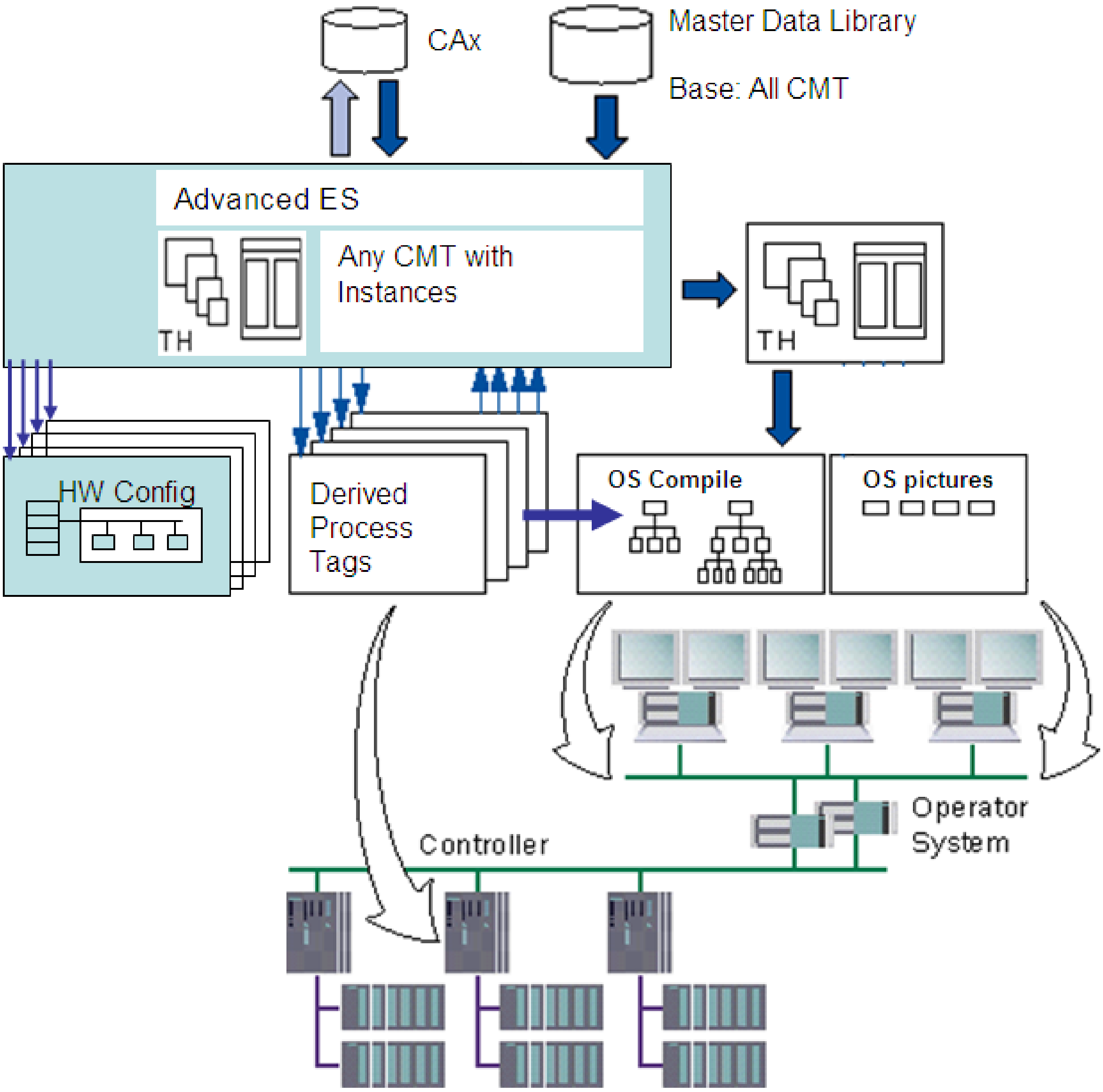
As of PCS 7 V7.0, the SFC type can be centrally edited in the master data library and all instances in the project can be automatically updated. In addition, ways of accessing the SFC instances are listed in the chart reference data of the CFC.

7.4 Bulk Engineering

7.4.1 PCS 7 Advanced Engineering

Introduction

Advanced Engineering combines the tools from the basic and detailed planning, e.g. EPlan, ELCAD and SmartPlant, with those in PCS 7 Engineering (CFC, HW Config, Plant Hierarchy).

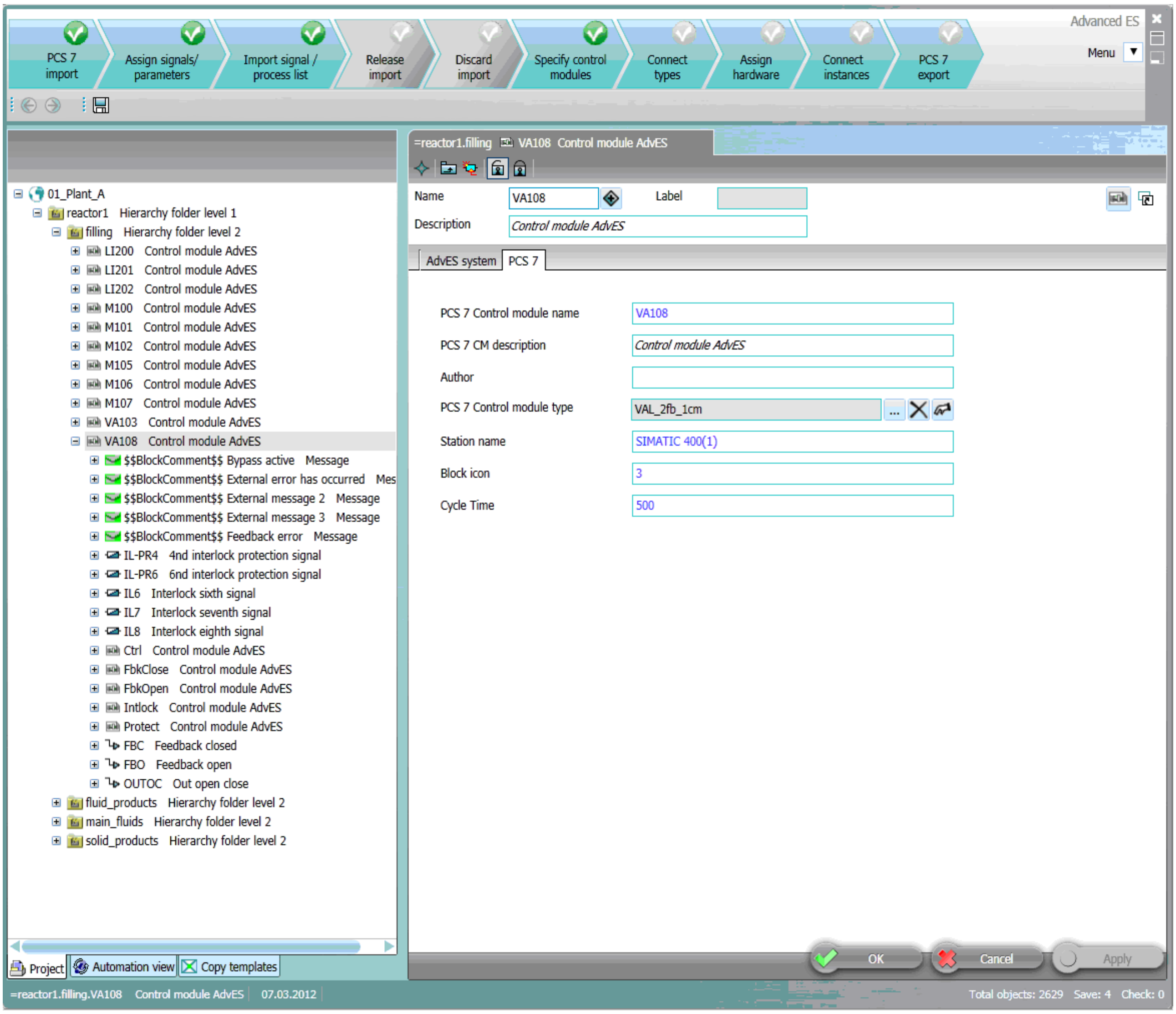


Scope of functions

Advanced Engineering is an optional package for PCS 7 Engineering which can be used from PCS 7 V7.1 SP2 and above.

- Advanced Engineering processes data for use in the PCS 7 ES.
- It is an application for importing data.
- Data can be imported into Advanced Engineering from process tag lists and signal lists and transferred to PCS 7 ES.
- Plant hierarchy, signal and parameter settings can be incorporated automatically from the process tag lists and signal lists.
- Hardware (distributed I/O including channel allocation) can be generated from the signal lists. Object-dependent bulk processing and queries are possible.
- Variants can be formed from one type when using control module types (CMT).
  Example: There is only one valve type. The variants are formed from this with or without feedback.

The following image shows an example of the Advanced Engineering working environment:



Note

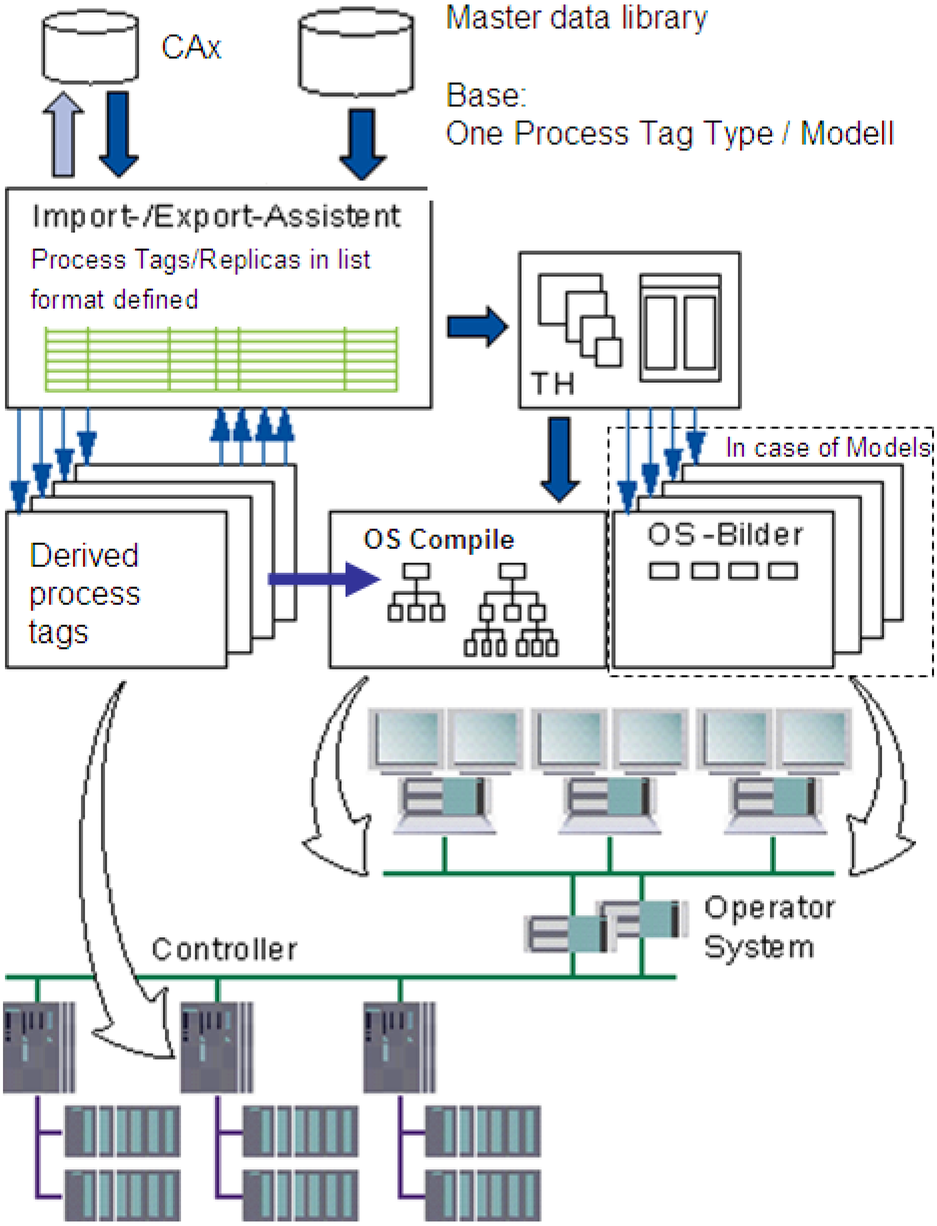
Further information on PCS 7 Advanced Engineering can be found in the following manuals:

- "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/61189618), "Exchanging data with plant engineering" section
- "SIMATIC Process Control System PCS 7 Advanced Engineering System" (http://support.automation.siemens.com/WW/view/en/57414032)

7.4.2 Import/Export Assistant (IEA)

Introduction

During the planning of a plant, a wide variety of data is created, often at a time where no definite control system is planned. By using the import function, this data can be made available to the control system engineering. You use the import/export assistant if you want to frequently use multiple models or process tag types in a project (bulk data processing) and change block parameter descriptions easily.



Scope of functions

The functions that can be used with the IEA include:

- Standardized plant libraries with tested process tag types and models
- Import of plant data (e.g. process tag lists or I/O lists) from the higher-level CAD/CAE environment
- Automatic generation of the AS configuration based on imported process tag lists and process tag types (CMTs cannot be used).
  - Creation of the plant hierarchy
  - Editing stored process tags
- Automatic derivation of the OS picture hierarchy, automatic connection of blocks, and positioning within pictures
- Automatic creation of an OS archive
- Creation of individual process objects using appropriate graphical tools such as CFC and SFC
- Export of optimized parameters back to the CAD/CAE environment

Working with the import / export assistant (IEA)

The Import Export Assistant offers the convenient option of creating function charts using process tag types and models. You also are given the option of exporting the files created in PCS 7 (for plant documentation, for example), editing them in Excel, and then importing them back into PCS 7.

The following procedure should be followed when creating process tag types and models:

- Create the process tag types and test them to ensure that they function correctly. Changes made at a later cost time.
- All workers in a multiproject should use the same process tag types. Each worker should be assigned a name band for IEA files he creates.
  This allows the files to be easily entered into the multiproject. The workers should be able to use the process tag type for import, but should not be allowed to change the template. Changes should always be made from a central location, and then made available to the workers.
- The IEA should be only be used during the configuration phase. Changes to parameters and interconnections in the charts should be made during the FAT (Factory Acceptance Test) or during commissioning.
  Since users make changes in the charts and not in the IEA files, any new IEA import may overwrite the changes.
- During the FAT and subsequently while the plant is in process mode, the process object view offers the possibility of editing charts created via the IEA in tabular form. You also have the option here of exporting and importing (see also section: "Managing process tag types with the process object view (Page 188)").

Note

Information on working with the IEA can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

7.5 Managing process tag types with the process object view

Introduction

In the process object view, all the data of the basic control can be displayed in a process control oriented view throughout the project. This means that a multiproject encompasses the data of all the projects within it.

The process object view is mainly used during the FAT and commissioning. These tasks involve working efficiently with great amount of data at a centralized location. The process object view has the advantage that all changeable tags/values of an object (white background) can be centrally edited.

When editing process tags and CFCs, all aspects (automation, I/O connection, messages, operation, and monitoring) can be consistently displayed and documented. Jumps to CFCs, SFCs, HW Config, and to the OS enable you to edit tags/values which cannot be edited in the table (e.g. parameter definition of the models, picture contents).

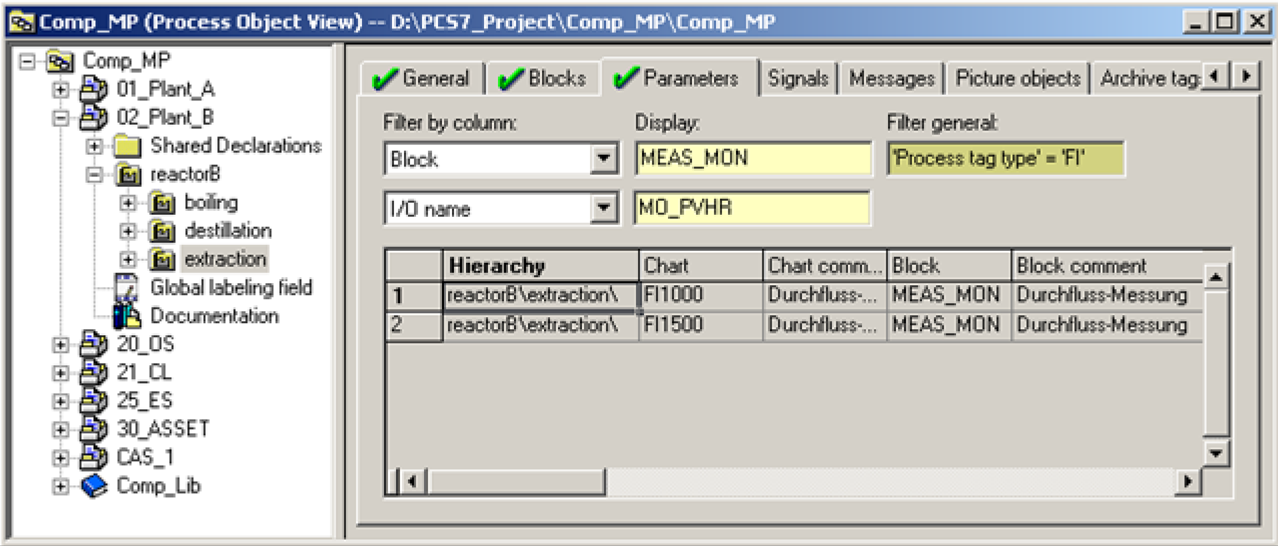
Note

Information on the structure and on working with the process object view can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

Filter function of the process object view

Filtering in the process object view is a comprehensive tool. A filter with a variety of criteria is shown here as an example:

- Process tag type "FI" (flow measurements)
- Blocks of type "MEAS_MON"
- "MO_PVHR" I/Os (measuring range high limit)



Values can be easily selected, checked, and modified using the different filter functions "General", "Block", and "I/O".

Exporting and importing inputs/outputs and messages

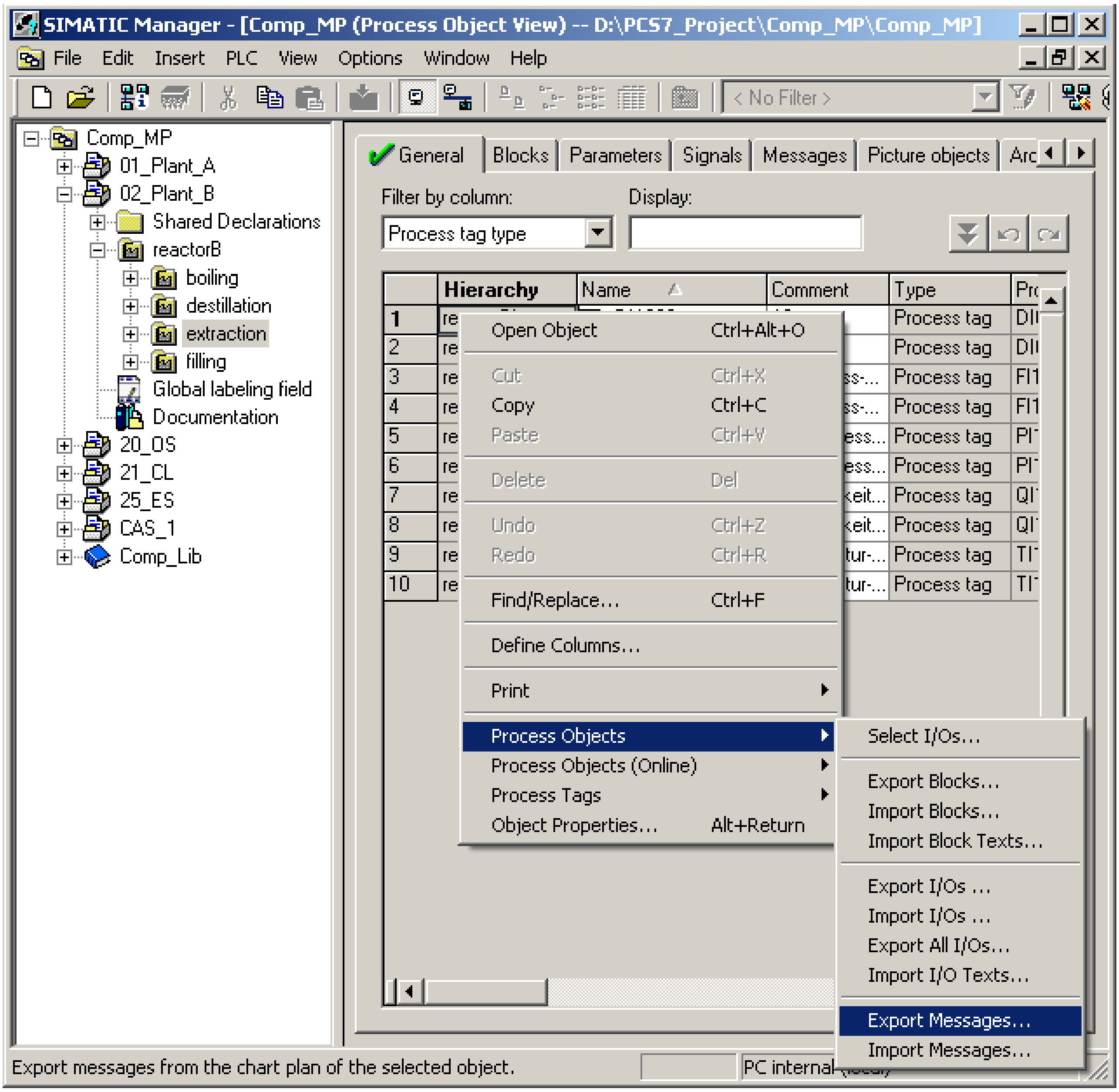
Through the exporting and importing of attributes you have the option of exporting information on parameters, signals and messages to a file, processing it with standard applications and inputting it (importing it) again.

Note

Filters are ignored during import/export. All data are always exported when they are displayed in the current view without filter.

These functions are particularly beneficial if you want to edit large amounts of data. You do not need to open the individual charts with the CFC editor in order to edit the I/Os, as the I/Os of all charts in the hierarchy folders are imported automatically.

Charts located in the selected hierarchy folder and all lower-level hierarchy folders are edited (in accordance with the selection made in the process object view).



Further functions of the process object view

Other important functions in the process object view include:

- Find/Replace
- Test mode
- Display data for fail-safe applications
- Split view with display in two windows (see above)
- View from WinCC Tag Logging for tabular configurtion of archive tags
- Defining user columns
- Undo

Always work in the process object view where possible. The overview provides considerable advantage in comparison to working in a CFC. The process object view also offers all the options of the plant hierarchy.

7.6 Comparing projects with the Version Cross Manager (VXM)

The Version Cross Manager detects differences between the various revision levels (versions) of an engineering project. It can compare entire projects, hardware configurations, CFC/SFC charts, block types and instances, signals, run sequences, etc., with one another and thus detect any objects which are missing, which have been added, or which are different.

The import and export of project and planning data plus generation of process tags from CAx function charts are available as additional functions.

Note

Usage scenarios and information on working with the Version Cross Manager can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

7.7 Archiving/Versioning with Version Trail

The overall multiproject should be archived on a regular basis, with all projects and the master data library. If a number of changes are made during commissioning and FAT in the engineering stages, an archive/backup should be created every day. Archiving the relevant projects following each AS change download is recommended in production.

In addition to simple archiving / retrieval via SIMATIC Manager there is also the option of versioning, creating and managing archives with the optional "Version Trail" package. although the archived data cannot be changed once this has been done. This means that defined archive versions can be compared with one another using the Version Cross Manager. In PCS 7 V8.0 and above it is possible to set up time-triggered archiving.

Note

A description of the process for archiving, including with the optional "Version Trail" package can be found in the "SIMATIC Process Control System PCS 7 Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345) manual.

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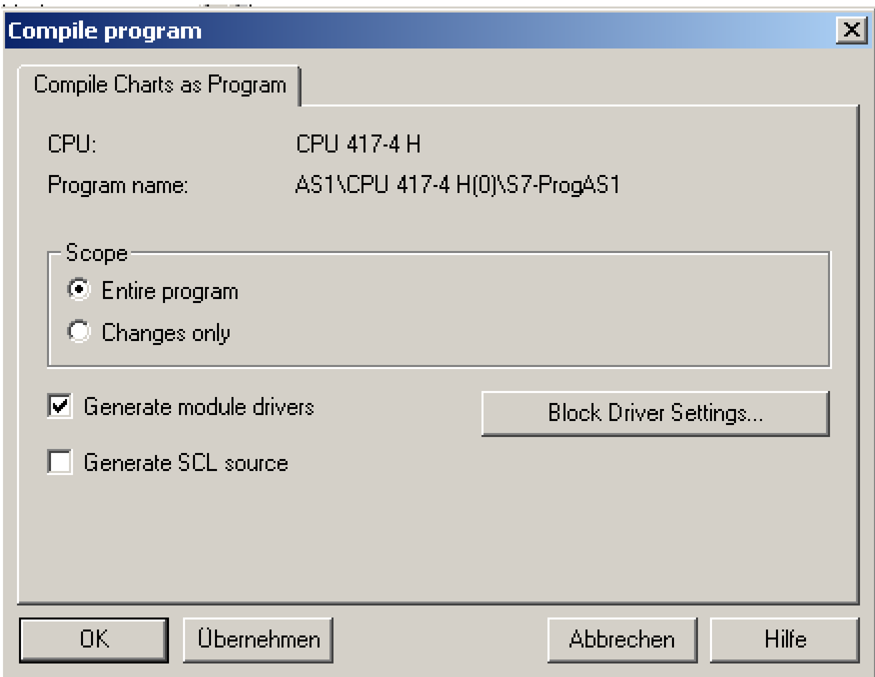
8 Compiling and downloading

8.1 Compiling the user program

The charts are reproduced in functions (FC) and data blocks (DB) when compiling the user program. The program is also checked for consistency, errors and warnings.

A one-off compilation of the overall program is required at the start. Following this a compilation of the changes will suffice.



When compiling in PCS 7 it is important that the "Generate module drivers" option is always selected where HW Config of the AS has been changed beforehand.

Note

As of PCS 7 V7.0, the two options "Make textual interconnections" and "Delete Empty Runtime Groups" are no longer available in the compilation dialog; they appear in the CFC editor instead. The sampling times are updated during every compilation.

8.2 Downloading the user program

Loading the hardware and the network configuration into the AS are conditions for downloading the user program. You can find information about this in the following sections:

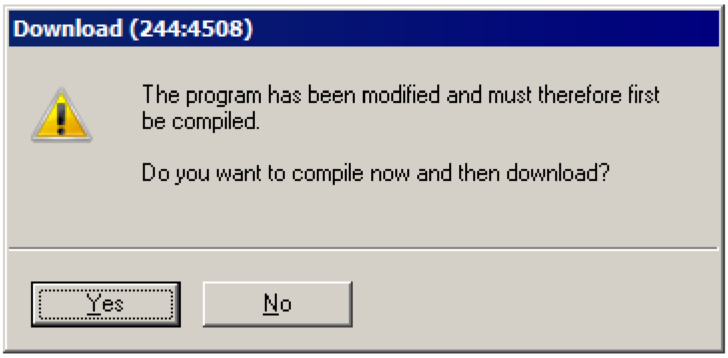
- Creating and managing a PCS 7 project (Page 45)
- Configuration of the hardware (AS and I/O) (Page 87)
- Configuration of the network connections (Page 139)

Note

The user program must be loaded before the OS project

Do not load any blocks directly from the block folder of the SIMATIC Manager with PCS 7; download the charts solely via the selected chart folder in the SIMATIC Manager or via the function in the CFC/SFC Editor.

You can also download changes directly to the chart folder without starting compilation beforehand. The system recognizes the changes in the program and completes a compilation first of all.



A full download is required when the user program is downloaded for the first time. For this the CPU switches from RUN to STOP mode following corresponding notification.

Interface changes to a function or a function block also require a full download of the program.

Downloading the changes is then normally sufficient for any program expansions.

What situations will prevent online downloads of changes?

It is no longer possible to download changes if the following conditions are present:

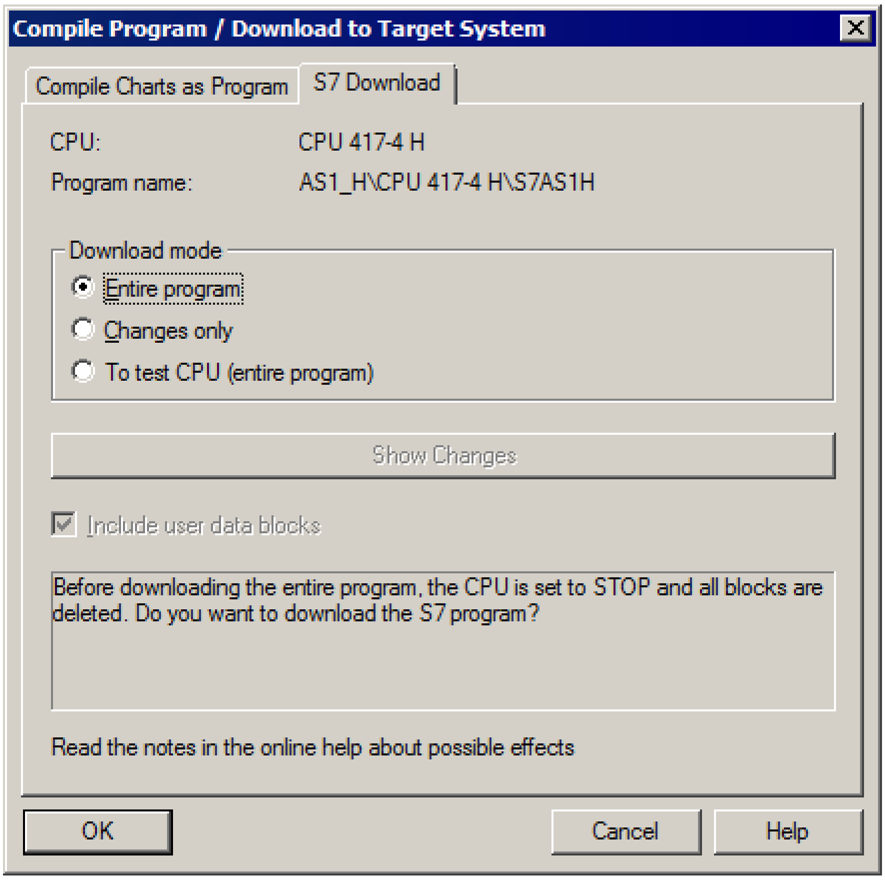
- A used block type has been replaced by a new version that contains structural changes, for example, due to the addition of I/Os and/or messages.
- DB and FC number areas have been compressed during compilation using the menu command Options > Settings > Compile/Download… > Option: "Compress". DBs and FCs will be assigned a new numbering sequence in this case.
- When a modified program was downloaded to a different CPU prior to the download of changes, for example, for debugging purposes. In this case, the time stamp no longer matches the time stamp of the original CPU. An exception to this is provided where the "Download to Test CPU" option is used in the "Download S7" dialog box. In this case the download ID and the comparison time stamp are retained. You can still therefore transfer the program to the original CPU by downloading changes.
- If you resort to an archived program that is not the original from the most recent download (time stamp comparison).

Note

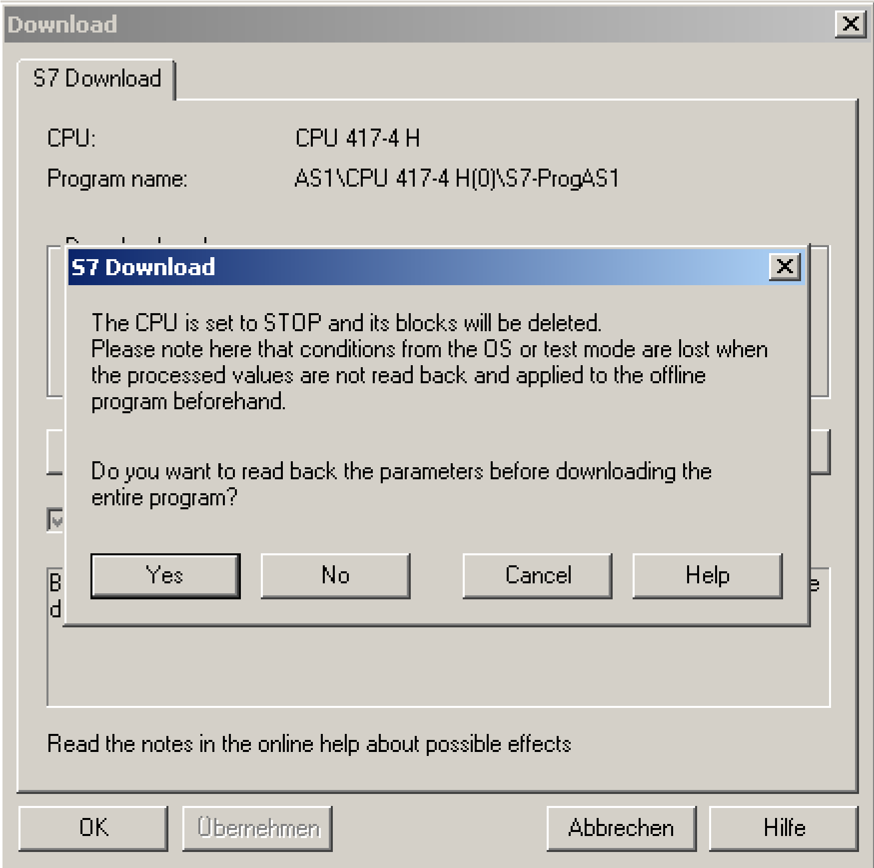
Refer to the online help for the CFC Editor and to the "Downloading changes online (Page 307)" section for additional information.

Downloading to the target system

The following image shows the dialog box for downloading the target system:



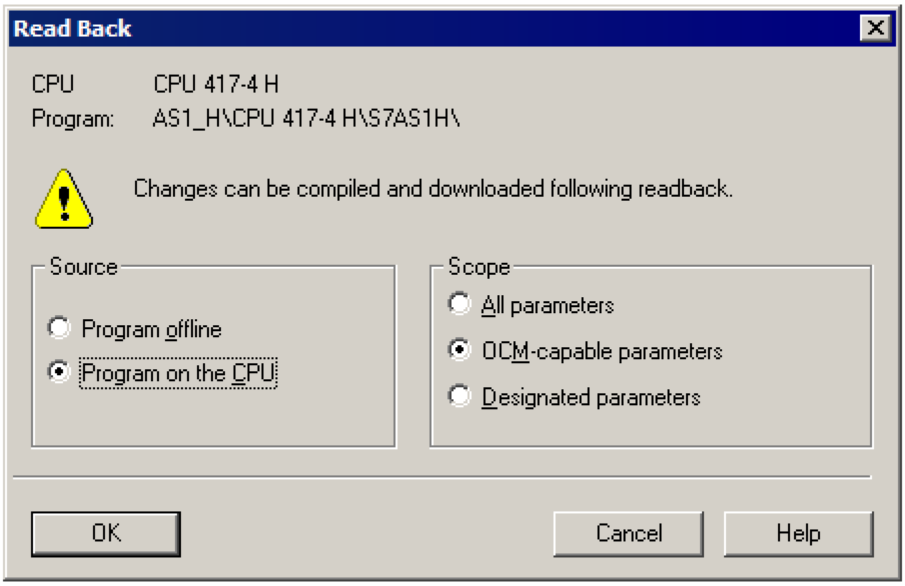
By confirming with "OK" the following notice is displayed with a query on whether the parameters need to be read back.



Read-back prior to complete download

If the parameters for a controller are changed in OS runtime, for example, they are written directly to the AS. If a complete download is made from the ES, the parameters changed on the OS will be overwritten by the ES. A prompt appears therefore before a complete download asking if you want to read back the parameters from the AS to the ES.

It is recommended that only parameters changed by the OS (or other communication partners if applicable) should be read back. This can be selected via the "Operational and observable parameters" option. If the "All parameters" option is activated, the entire current program state of the AS is read back, including the status of the logic. This may lead to undesired program states and, as a result, plant states during subsequent complete downloads.

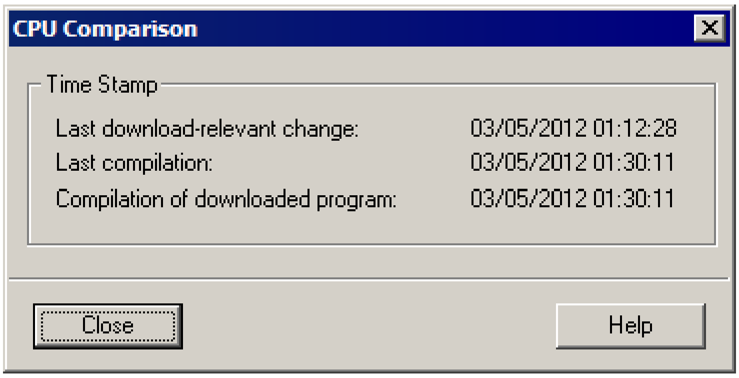


If read back of the parameters is confirmed with "OK" then the latest S7 program is downloaded in full to the AS following the read back.

Work can continue with compiling and downloading changes as soon as the AS is in RUN mode again.

Comparing Time Stamps

To check whether the AS has downloaded with the current configuration status you can run the "Compare time stamp" function in the CFC Editor via "PLC > Compare".



The program currently configured has been downloaded if the time stamp of the last compilation is the same as the time stamp of the program downloaded and the time stamp of the last download-related change is dated before the two other time stamps.

An easier check can be made directly via the symbol for the chart folder of the component view. If a small arrow is shown there in the symbol then the current configuration has not been downloaded.

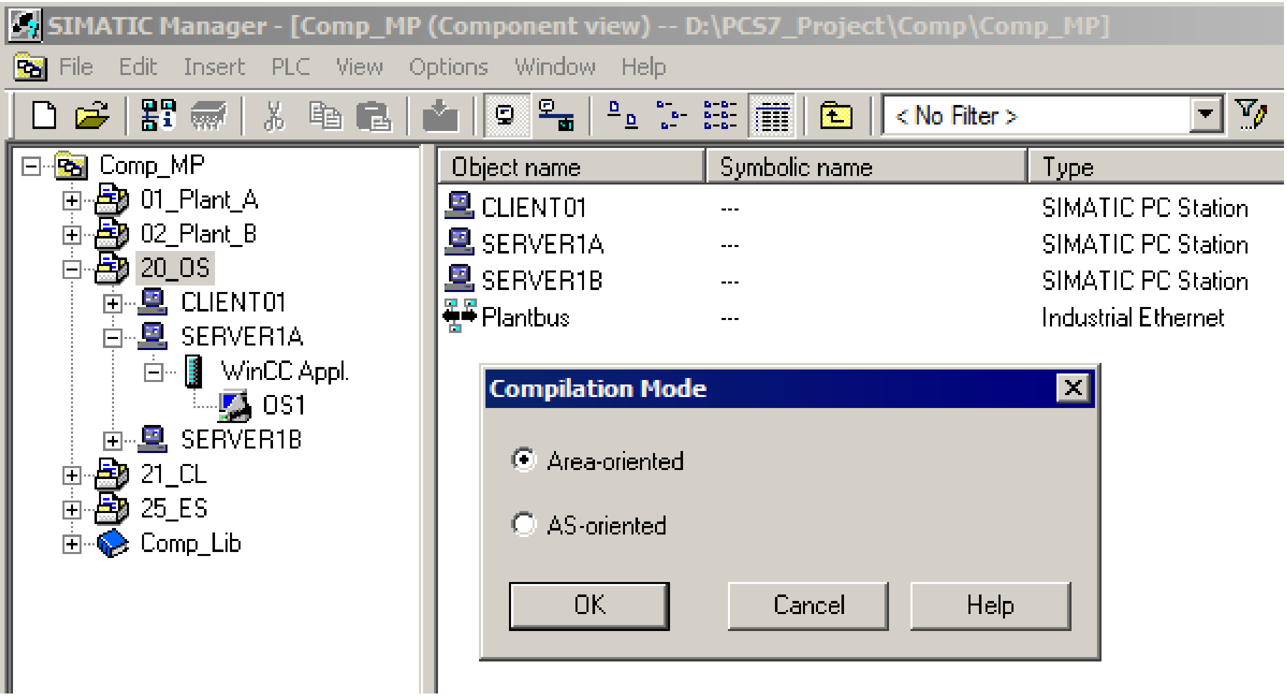
8.3 Compile OS

Introduction

With the OS compilation all the relevant AS engineering data is transferred to the OS project and any corresponding OSD objects are created automatically (e.g. picture hierarchy, SFC display, process tag symbols and picture blocks, tags, messages, archive tags, OS server package). The actual OS configuration is thereby reduced to creating the static picture objects and positioning the process tag symbols created.

OS compilation mode

The OS compilation mode can compile multiple OS within a project with an OS single/OS server station via the "Options > Compile multiple OS assistant" menu in the SIMATIC Manager ("20_OS" in the example).



With the "Area-oriented" mode the OS allocation of the area determined in the plant hierarchy (PH) is decisive rather than the S7 program allocated when creating the OS objects during the OS compilation. You can only select this mode when there is a configured PH. This mode is the default for new projects as of V6.1.

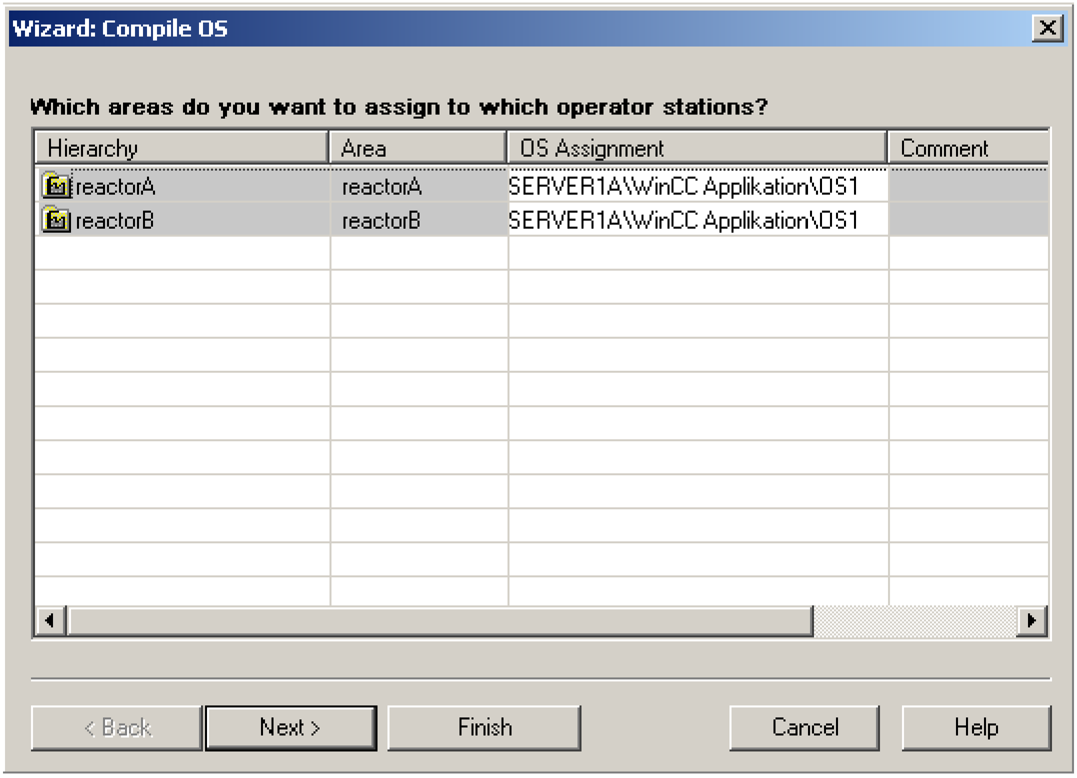
Note

We recommend using the "Area-oriented" compilation mode. This setting must be used for the PCS 7 Web option and PCS 7 asset management functions.

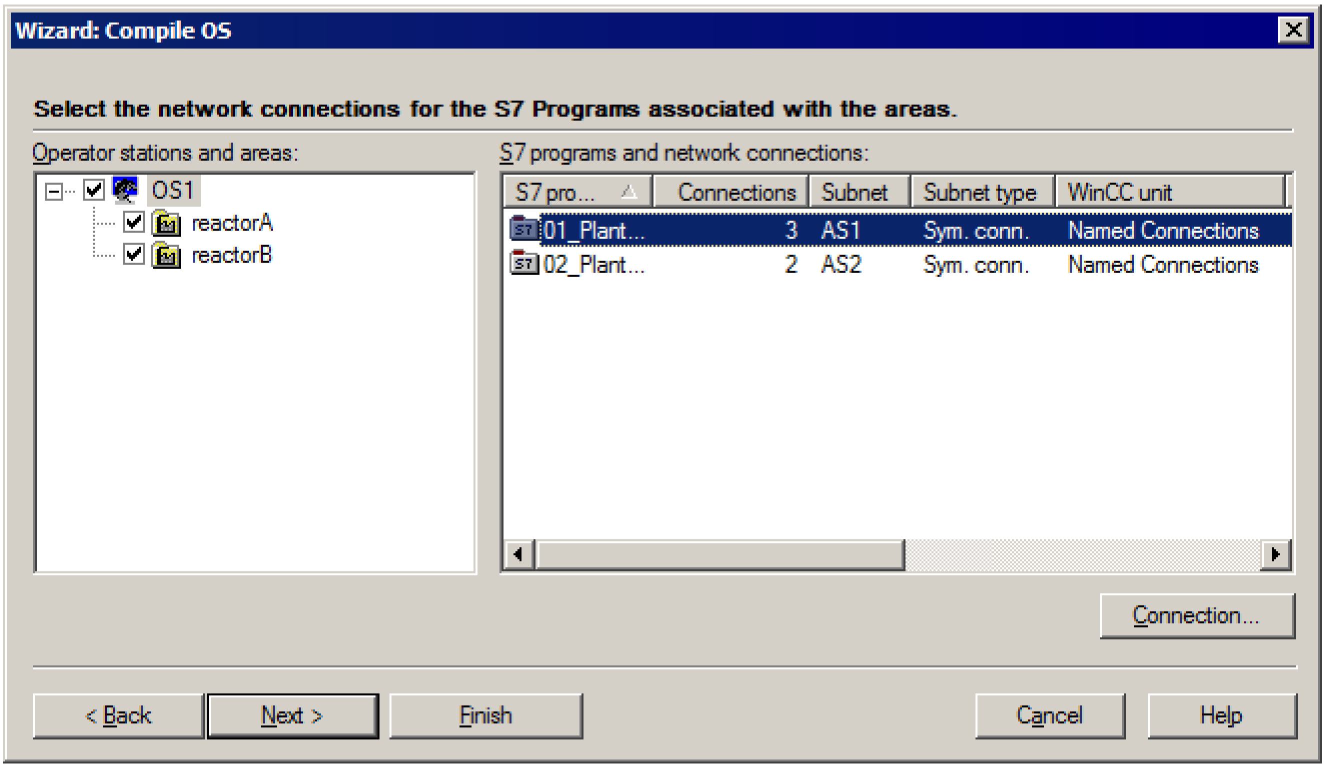
Procedure

The following steps demonstrate how to compile the OS:

1. Select the "Compile" command in the context menu of the OS project.
2. Click "Next".



3. Check that the configured network connections AS1 and AS2 are selected. In this case "Symb. Verb." is selected as the subnet type and "Named Connections" as the WinCC unit.

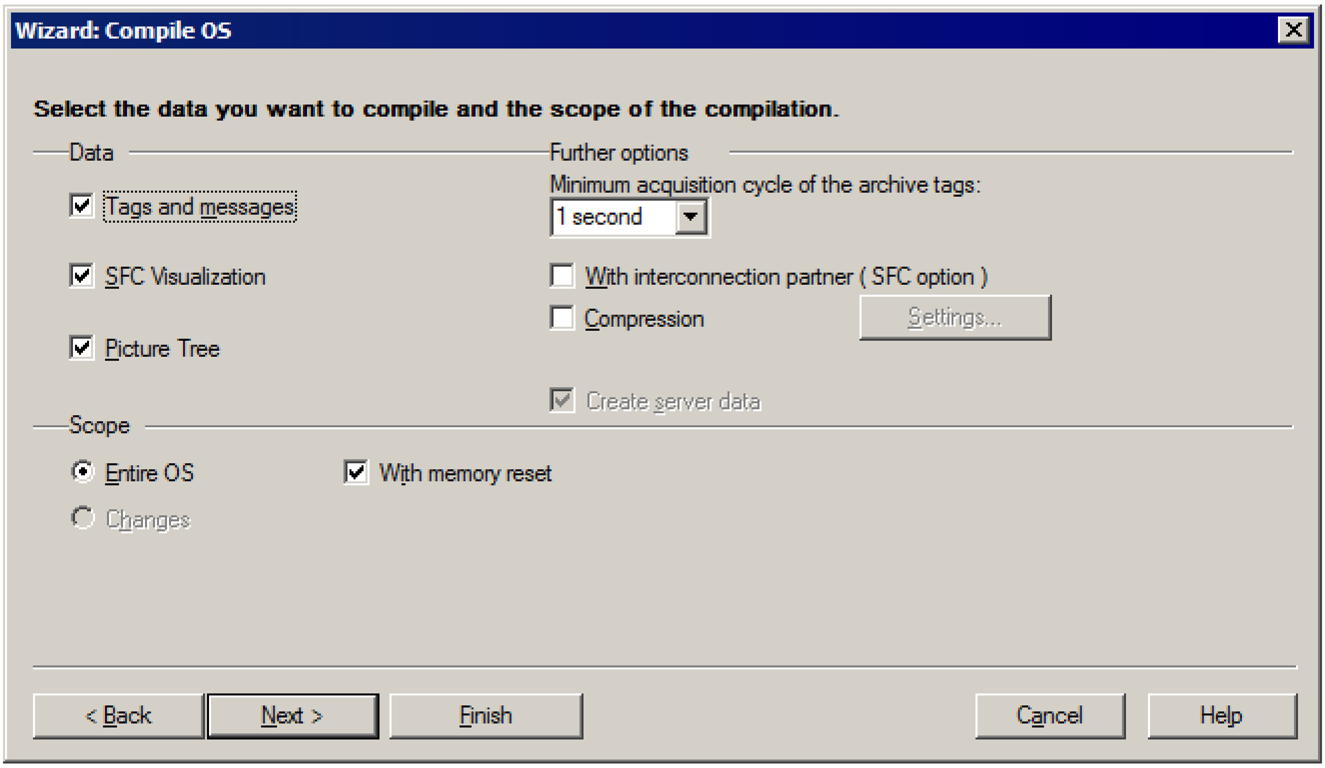


4. If the connections stated in step 3 are not selected click on the "Connection" button and select them in the open dialog box.

   Further information on symbolic connections (named connections) can be found

   in the "SIMATIC Process Control System PCS 7 Operator Station" (http://support.automation.siemens.com/WW/view/en/68157026) manual.

5. As an option you can adapt the default compilation data and the scope of the compilation. Instructions on the individual options are available via the "Help" button.



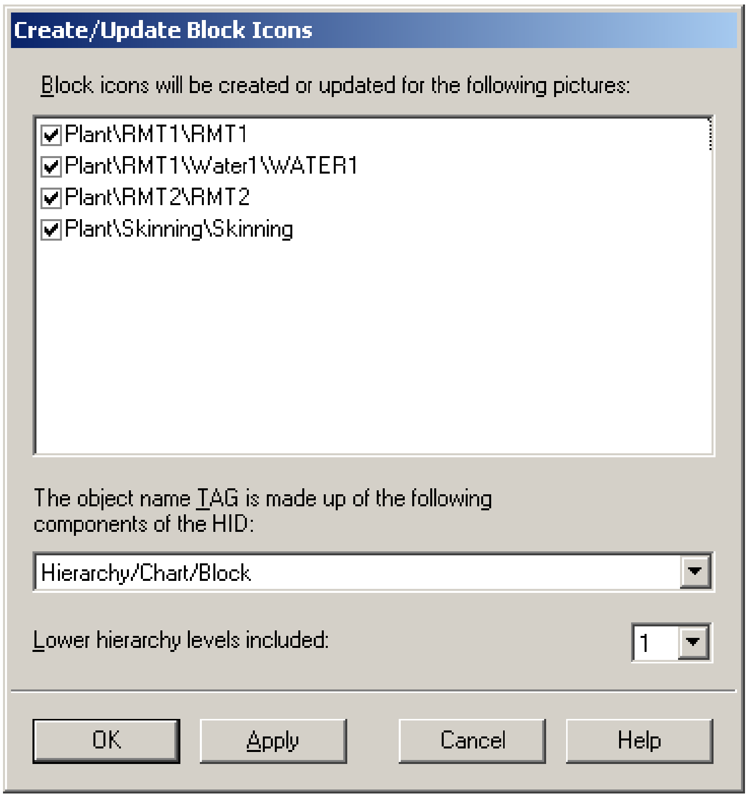
6. By clicking "Next" you will receive the summary along with a notice that work may not take place on the project during the compilation.
7. Click "Finish" to start the compilation.

Create/update block icons

As of PCS 7 V7.0, the "Create/update block icons" function is no longer listed as an option for OS compilation. If the "Derive block icons from the plant hierarchy" check box is set in the properties of a picture, the function is called automatically when the OS is compiled.

In addition to automatic execution of the "Create/update block icons" function it can also be initiated separately via the plant hierarchy. For this open the "Create/update block icons" dialog box via the "Plant hierarchy" context menu in the plant hierarchy. This dialog box has an option for adapting the structure of the process tag name (TAG) and for determining the number of lower levels that are taken into account in creating or updating the block icons.

The following image shows the "Create/update block icons" dialog box.



The PCS 7 picture blocks are implemented as a change function when the OS is compiled or with the "Create/update block icons" function.

The associated picture is updated when a change is made in the CFC chart. All block icons of a picture are updated for all other changes.

E.g. if one of the "@PCS7Typicals*.pdl" or "@PCS7TypicalsXYZ.pdl" template pictures changes, all plant pictures are updated.

9 Configuring OS functions

9.1 Project settings

The most important settings for an OS client server system are outlined in this section.

Note

Detailed information on configuring the OS functions can be found in the Process Control System PCS 7 Operator Station (http://support.automation.siemens.com/WW/view/en/68157026) manual.

9.1.1 Defining the server assignment

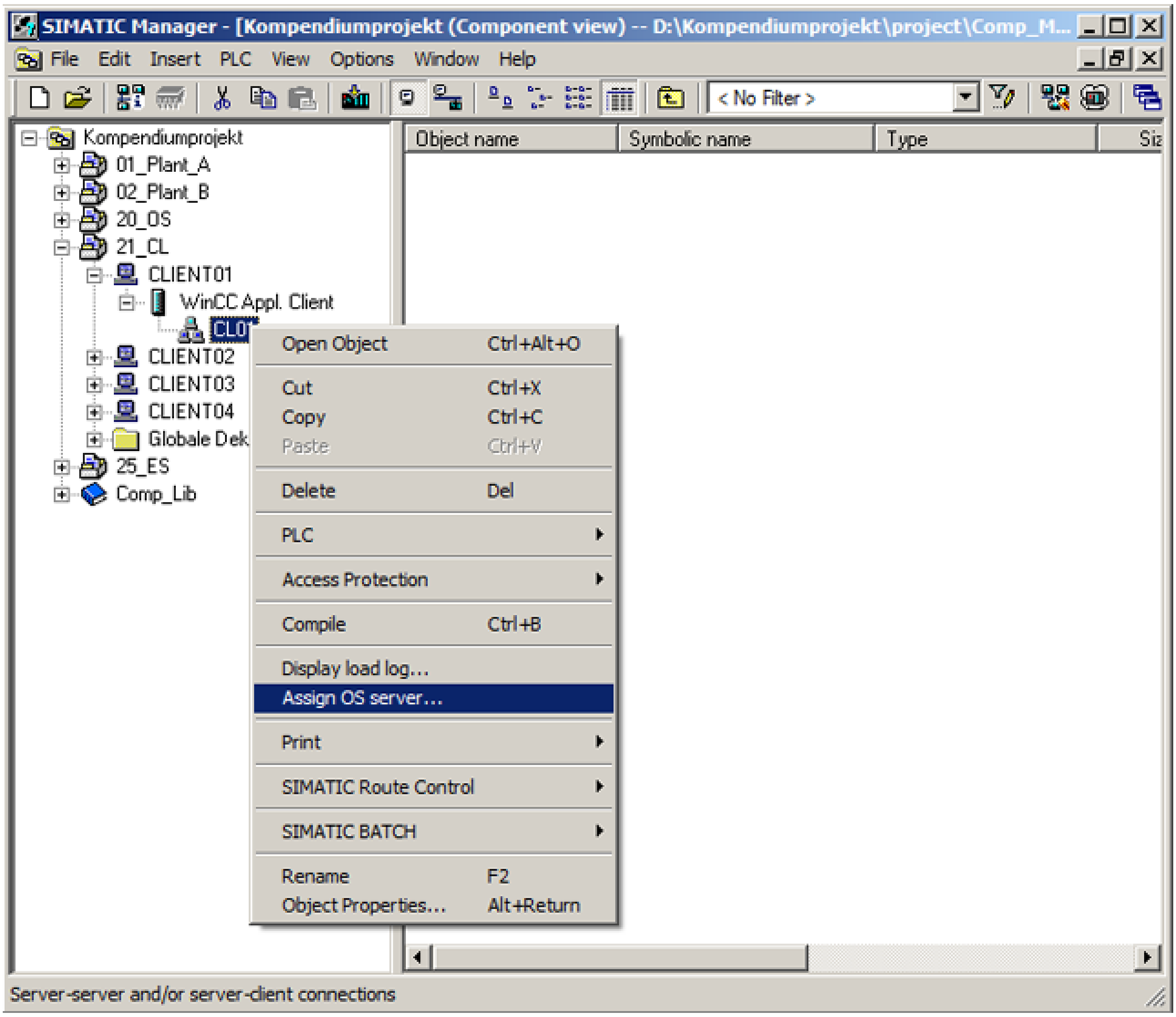
Introduction

In order for a client to be able to display the process data from different servers in a distributed system, it needs information about the associated data. Server data (packages) are generated for this, to be provided to the clients. The client requires the server data from all servers, whose process information it should visualize.

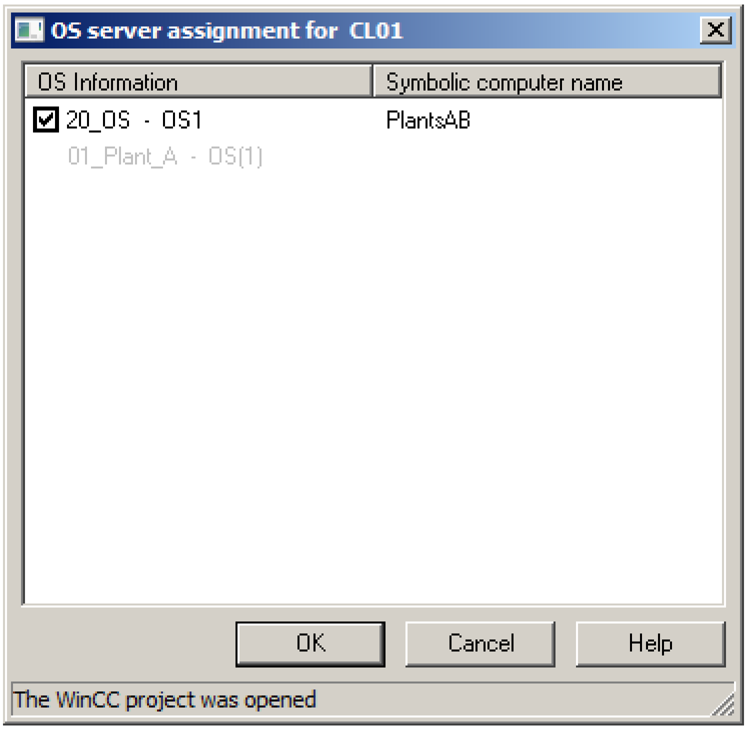
The system creates/updates the server data automatically during OS compilation and download. Alternatively, the server data can be generated manually in the SIMATIC Manager using "Generate server data" in the context menu.

Procedure

1. Assign the required server data (in our example, the package of redundant OS1) for every OS client project. To do this, use the shortcut menu command "Assign OS Server…".



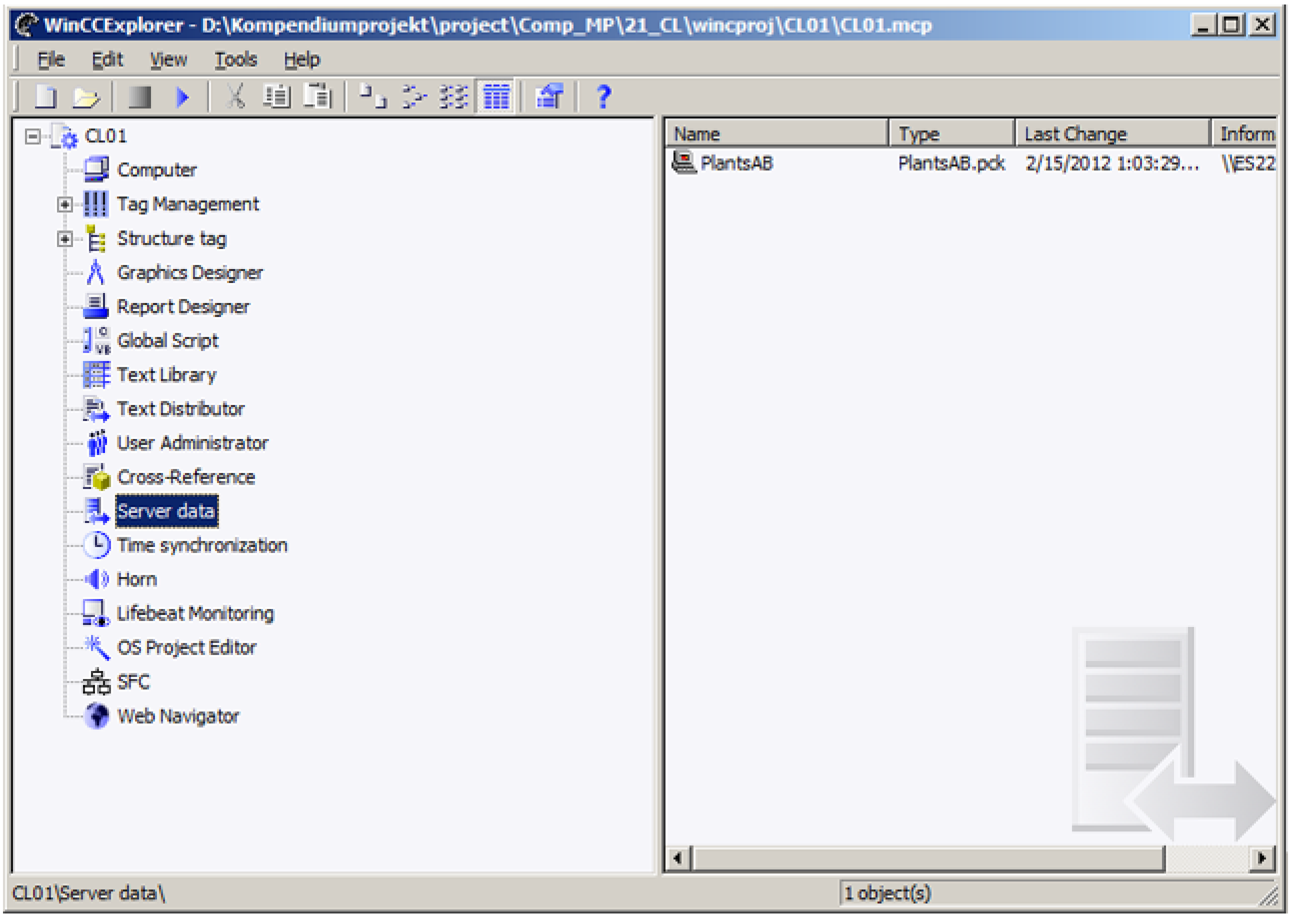
2. Make the assignment in the dialog window that opens. Entries in different colors indicate different states. You can find details in the help ("Help" button).



Note

OS server data only has to be assigned once to the OS client project. The client is automatically provided with the new OS server data when an OS server is downloaded (complete or changes only). An update is also performed when the OS client starts process mode.

When the assignment has been successfully performed, the result can also be seen in the OS client project in the WinCC Explorer under "Server data".



Note

The server data includes the computer name of the ES from which the server data is to be downloaded automatically. If the ES cannot be reached, the OS client attempts to download the server data directly from the server when runtime is restarted.

If the project is moved to another path or to another ES (another computer name), the server data must be regenerated (manually or by compiling the OS) and reassigned to the OS client projects.

9.1.2 Selecting a preferred server

Introduction

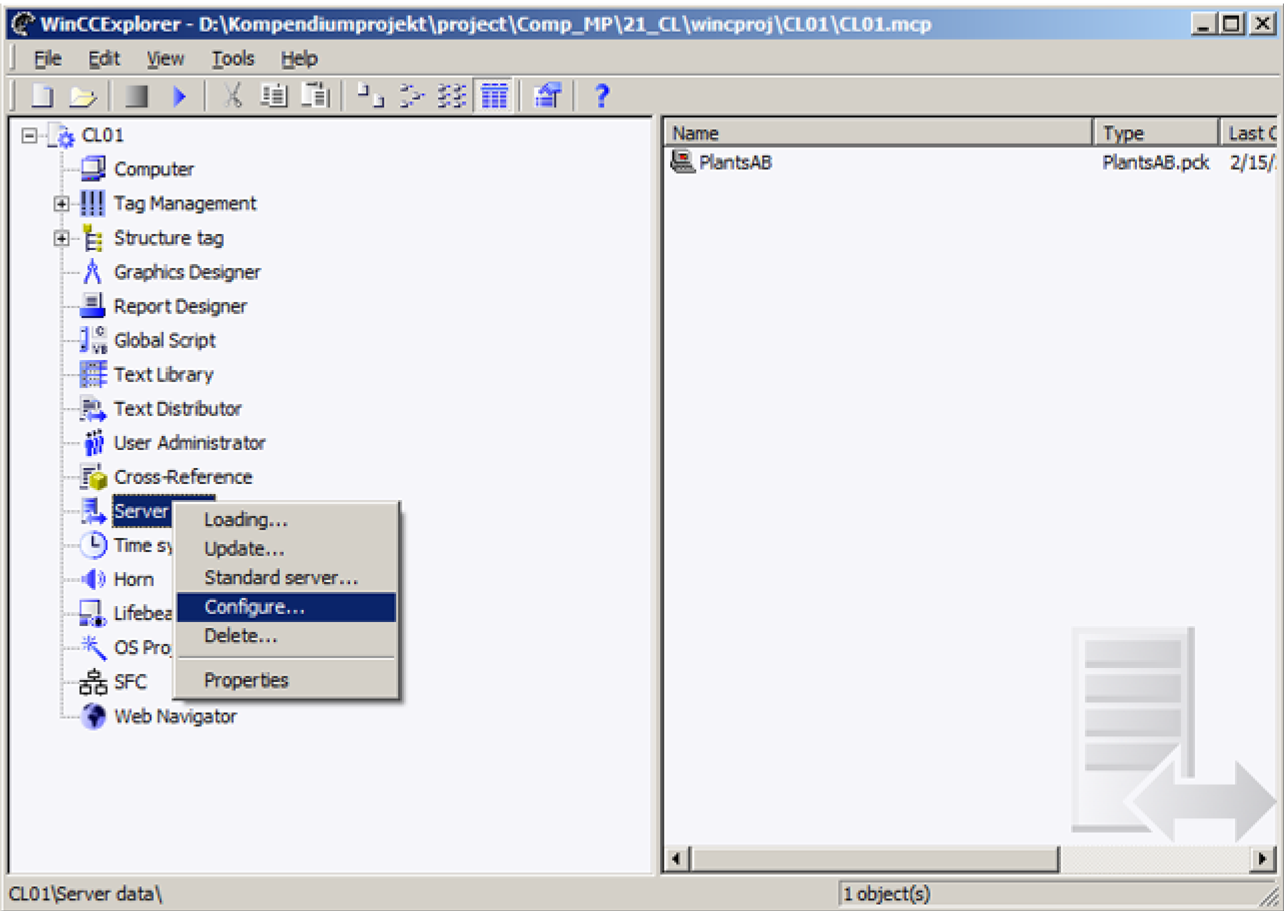
In order to achieve even utilization of a redundant server pair and constant operability, even during a switchover to the redundancy partner, you should assign one section of the OS clients to the master server and another to the standby server.

A "preferred server" is an OS server in the redundant OS server pair that the OS client connects to preferentially. The OS client receives the data from there as long as this OS server is available.

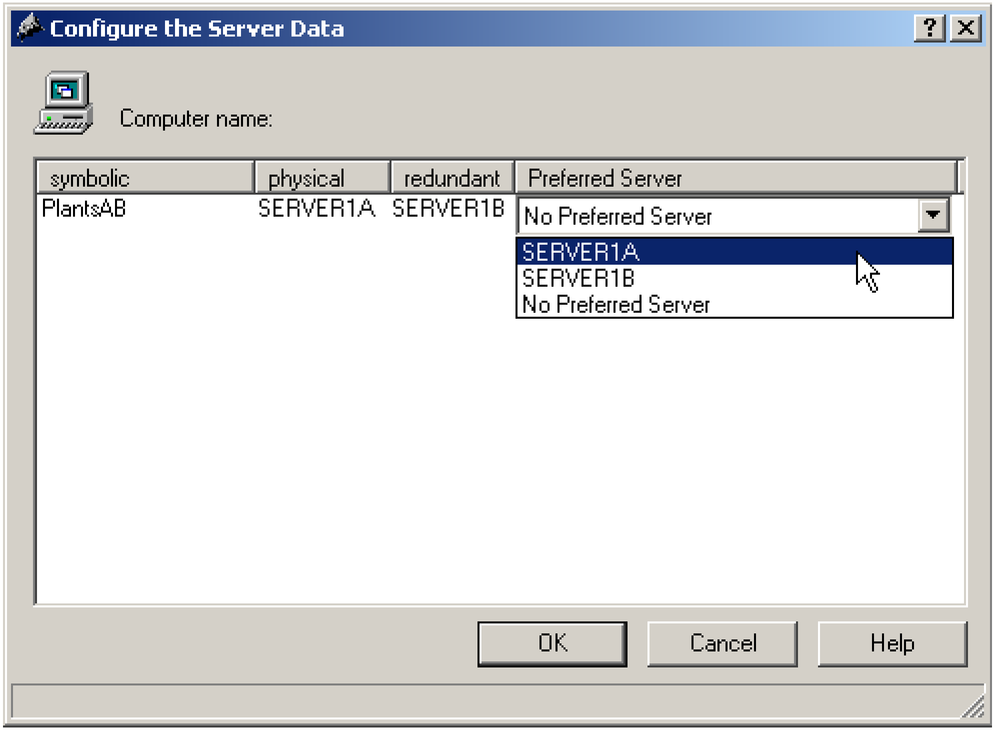
This requires a consistent connection configuration on both OS servers and no errors (redundancy) at the PCS 7 end. If the connection configuration is inconsistent or if there are errors in the redundancy connections, the OS client switches to the OS server with the most active/error-free connections.

Note

If no preferred server is entered in the "Configure the Server Data" dialog, the OS clients interconnect to the OS server that is designated as the master.



The information contained in the "Configure the Server Data" dialog originates from server data, which was assigned to the corresponding OS client.



Example

CLIENT01, CLIENT02 > assigned to SERVER1A

CLIENT03, CLIENT04 > assigned to SERVER1B

Allocation of OS clients

Referenced OS clients are automatically assigned to the same preferred server by the assigned basis OS client. A different assignment is not possible.

Note

You can find more information on this topic in the "SIMATIC Process Control System PCS 7 Fault-tolerant Process Control Systems" (http://support.automation.siemens.com/WW/view/en/68157364) manual.

9.1.3 Selecting and configuring a standard server

Introduction

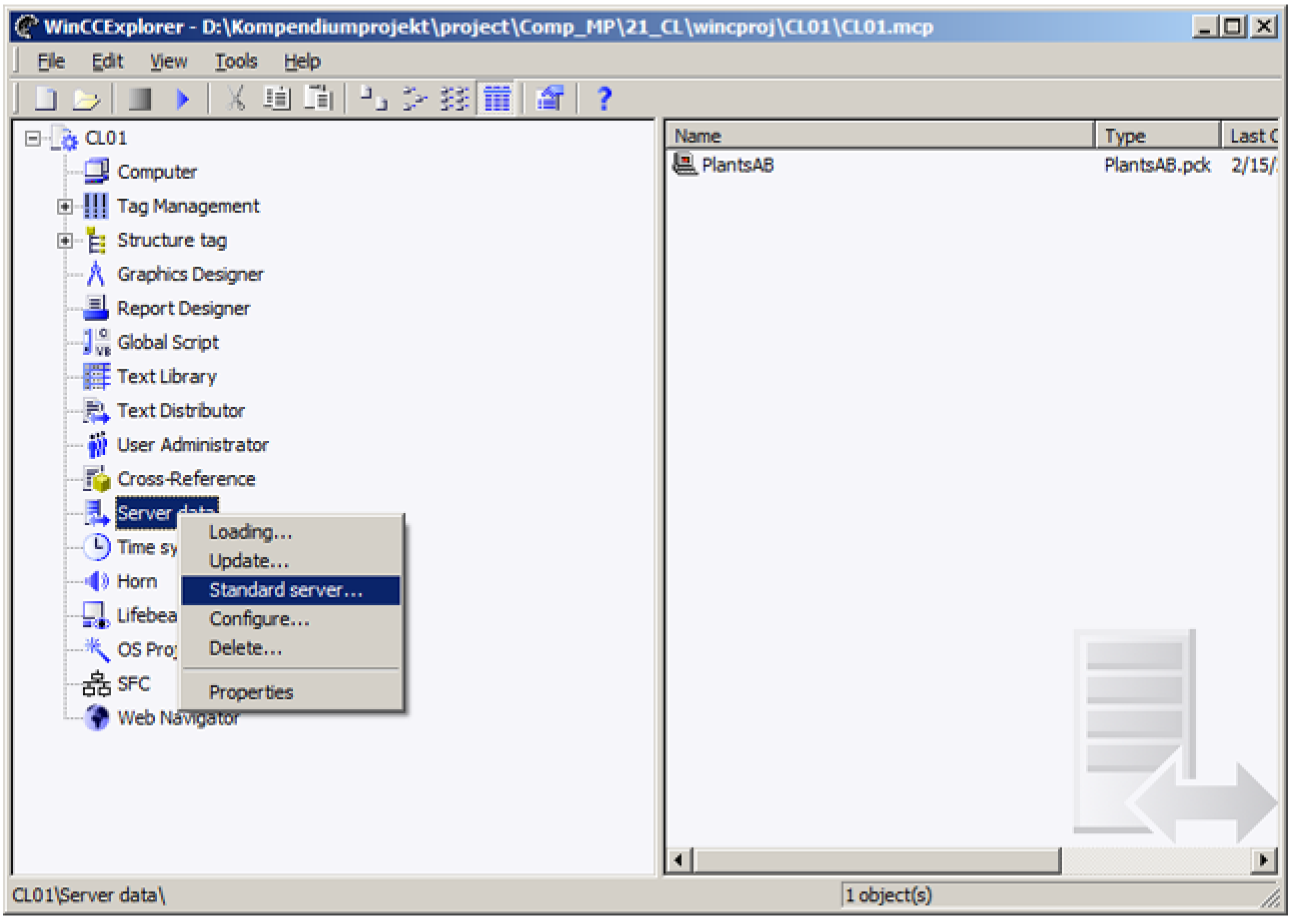
You configure a standard server for a client in a distributed system to:

- Receive messages and alarms
- Make the user-configured message classes available on a client
- Create operator messages on the client
- Make trend groups assembled on a client available to other clients
- Have access to user archives

A standard server setting is required on each client.

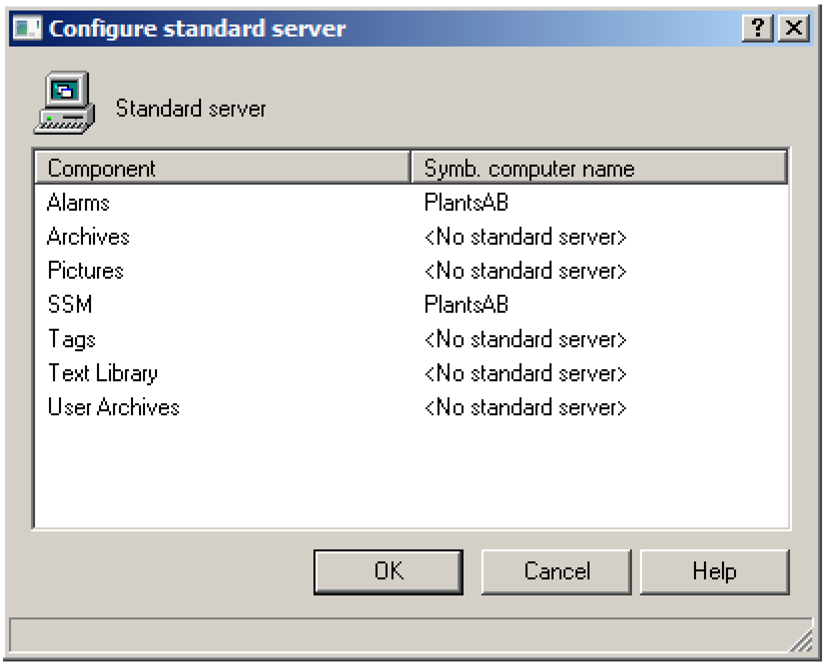
Note

Selected standard servers (e.g. for operator messages, alarms, user-configured message classes, etc.) set on a client should be configured redundantly.



Procedure

In the "Standard Servers" dialog, the standard servers are specified for the components individually listed in the dialog.



Select the standard server for the "Alarms" and "SSM" (Split Screen Manager) components only.

Note

Alarms

A standard server must always be specified for alarms. No alarm logging can be configured on the client itself. Operator messages, which are generated on a client following a successful operation, are saved on the standard server.

The user-configured message classes are transferred from the standard server.

Tags
No standard server may be specified for tags.

SSM (Split Screen Manager)
A standard server must always be specified for the SSM component. If trend groups are assembled on a client, they are saved on the standard server and synchronized with the redundant partner server on a cyclical basis.

User archives

Select the user archives component only if you have configured a user archive.

9.1.4 Working with the OS project editor

Introduction

In the OS project editor, you make settings for the user interface which a plant operator can use to control and monitor the plant in process mode.

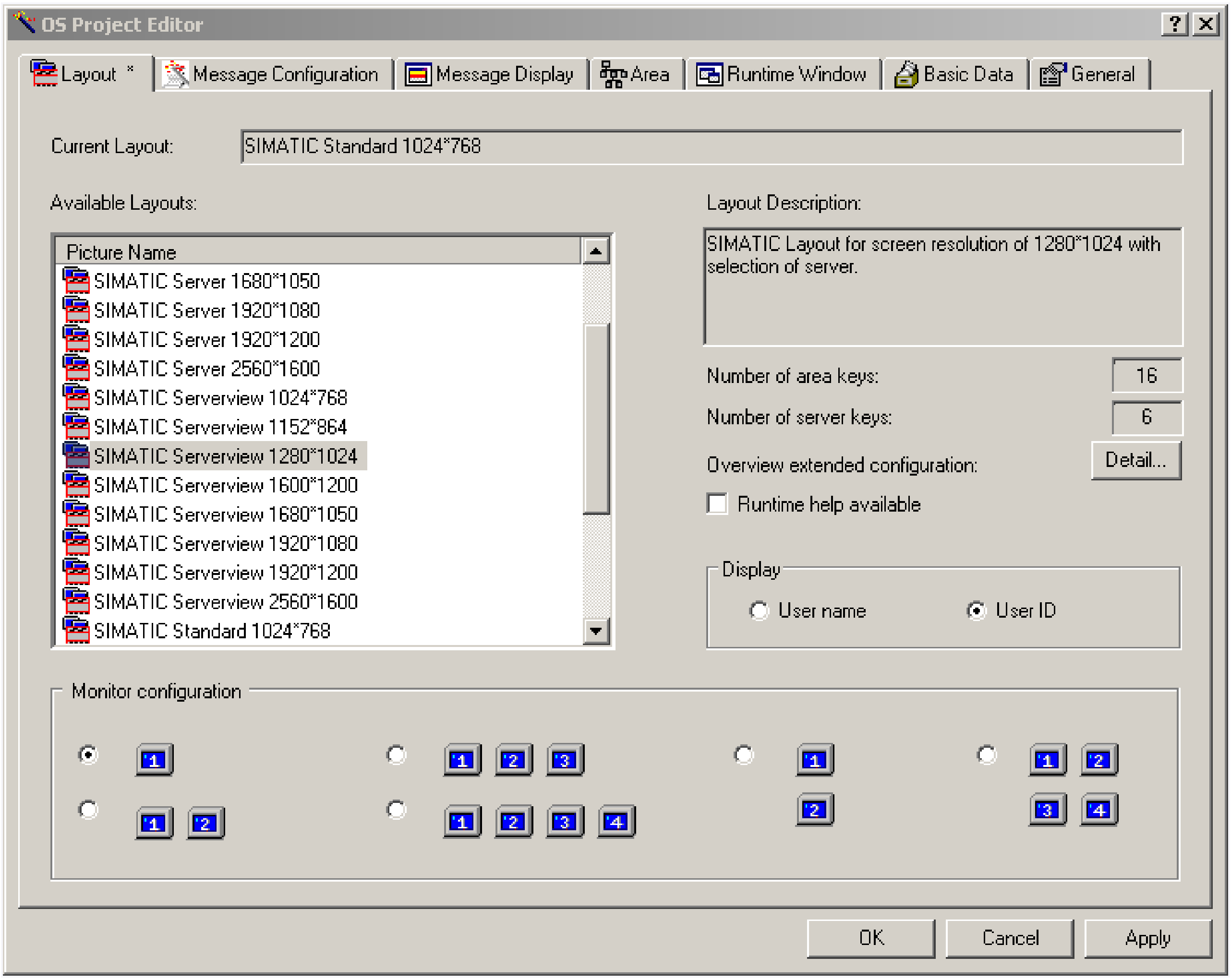
The OS project editor contains the following tabs:

Tab	Function
Layout	Settings relating to the screen resolution on the target computer and the definition of buttons in order to allow plant operators to change between individual OS areas and individual OS servers
Message Configuration	Settings for message lists and area assignments
Message Display	Configuration of the message system's runtime behavior and display of messages on message pages or in group displays
Areas	Definition of areas which the plant operator can access in the overview area
Runtime Windows	Definition of the maximum number of windows which may be open when faceplates and trends are called
Basic Data	Selection of objects which must be replaced after a change. The following objects can be selected: • Pictures • Faceplates • Scripts
General	• Settings used by the OS project editor for downloading changes • A full download must be performed for the "Entire configuration" setting. • Settings for logs which are replaced when the project editor is run

When an OS project is created in the ES, the OS project editor is opened in the background and initialized with default settings.

If you need another configuration, start the OS project editor from the WinCC Explorer and configure the required project settings.

Example OS client layout



The settings can also be modified at a later time, if necessary.

Note

Not all configuration options are available in the OS project editor in the the "Configurations that support online delta loading only" mode. In this mode, the only settings that can be changed are those that do not require a complete download of the PCS 7 OS. To be able to make other changes, you to need to switch to "Complete configuration (loss of support for online delta loading)" in the OS project editor in the "General" tab.

You will find more information on this topic in the WinCC Online Help.

9.1.5 Language settings

Language settings in WinCC

There are several menus in WinCC, which you can use to set the language. The following explains the importance of the language setting.

Menu commands in the WinCC Explorer

- "Options > Languages" menu:

  This is where you set the language for the user interfaces.
- "Computer > Properties > Parameters" menu:

  This is where you set the language for runtime. You can also set the language for printing out the project documentation in WinCC in this field.

Menu command in the Graphics Designer

- "View > Language" menu:

  You first have to select the language for displaying pictures in runtime before configuring the pictures.

Menu command in alarm logging

- "View > Language" menu:
  - Display of message texts in the selected language
  - The message texts need to be compiled in the text library

Language settings for Runtime

- Button for language selection:

  You can set the current display language for runtime here. To do this, you need to configure all switchable parts to the respective language.

Note

WinCC is always opened from the Simatic Manager in the language which is set there. Only if WinCC is **not** opened from the Simatic Manager will the language correspond to the one set before the program was last exited.

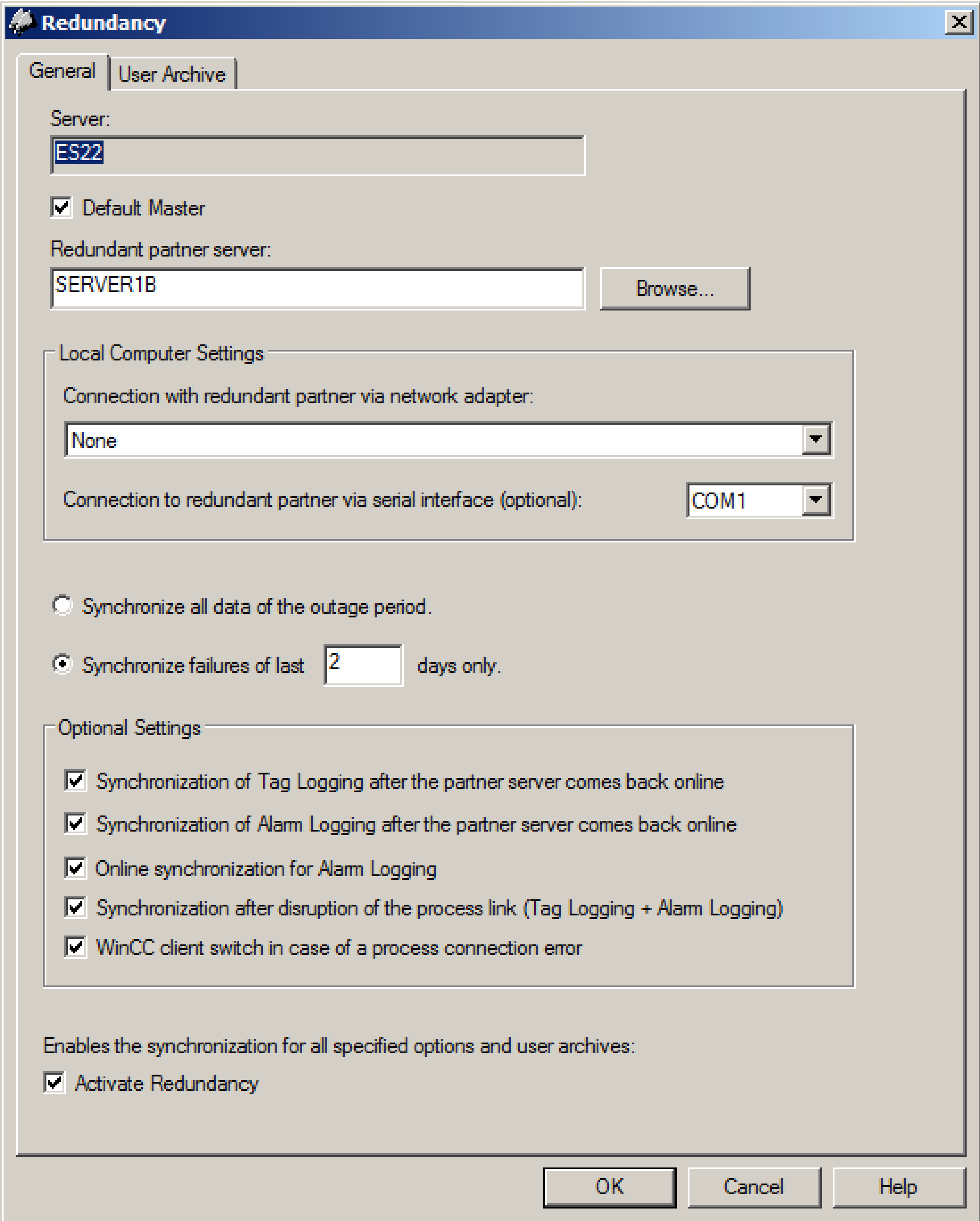
Additional information

Further instructions and information on language settings can be found in the document "Configuring texts and languages in SIMATIC PCS 7" (http://support.automation.siemens.com/WW/news/en/56248153).

9.1.6 Redundancy settings in the server project

Procedure

1. Open the "Redundancy" editor in the OS server project.
2. Check that the redundancy partner settings are correct and activate the options you require.

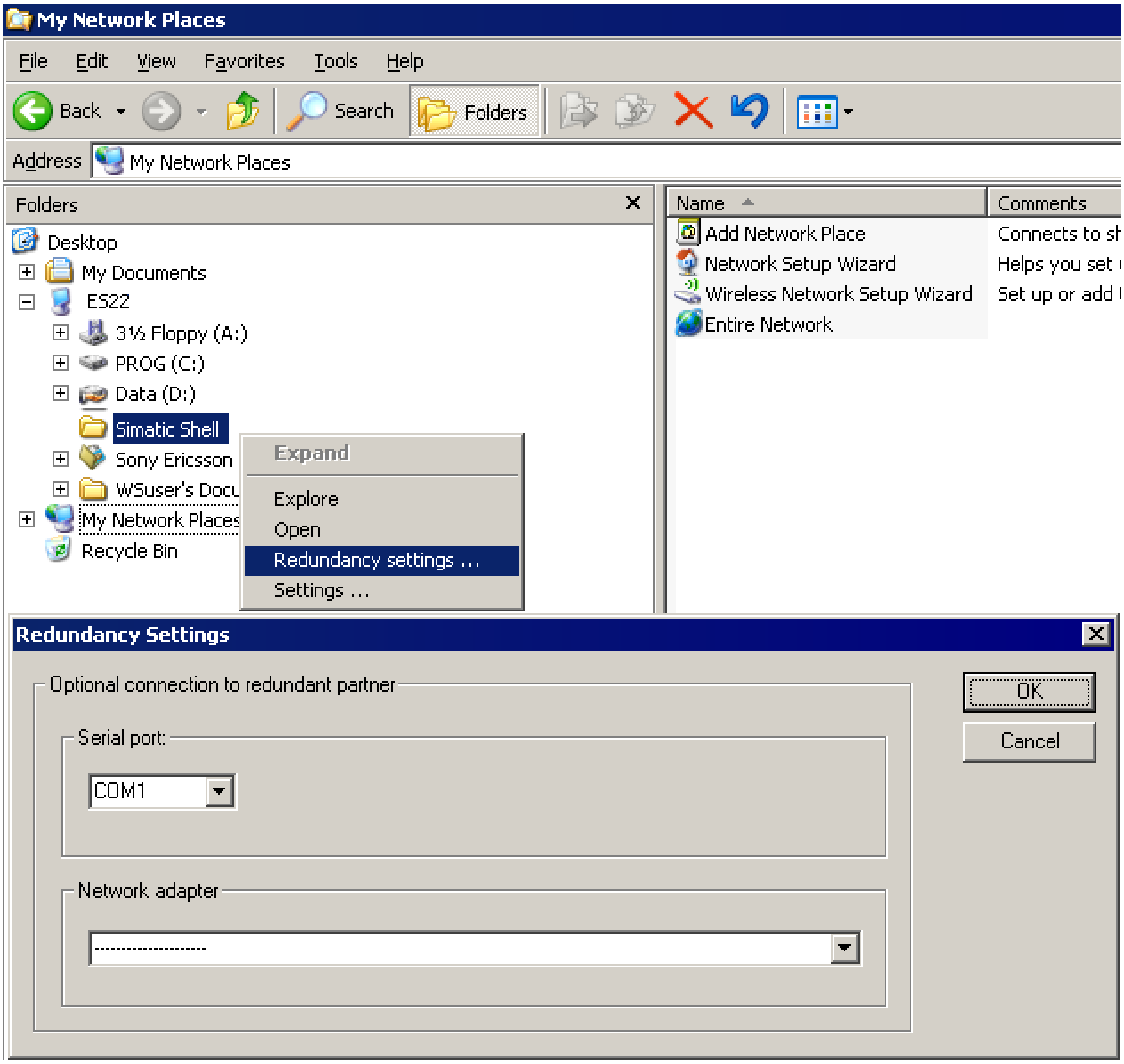


Note

The redundancy partner can be connected either via a serial interface (null modem cable) or, as of PCS 7 V7.0, via an additional network I/O (connected by means of a crossed network cable between the redundancy partners).

Following the initial download to the target computer, the redundancy settings must be checked/adapted once with regard to redundancy monitoring (e.g. connecting cable via COM port or Ethernet connection) on the target computers and confirmed with "OK".

As of PCS 7 V7.0 SP1, you adapt the settings using SIMATIC Shell in the Windows Explorer.



9.1.7 Time synchronization

Introduction

The following example shows in abbreviated form the activation of time synchronization on the OS computers in a Windows domain with a central plant clock.

As of Windows 2000 Server, all domain controllers (DC) have the same authorizations. Time synchronization must be executed by the DC which performs the role of the "PDC emulator" operating master.

The time signal comes from a SICLOCK central plant clock, which can be synchronized both via GPS and DCF77.

Note

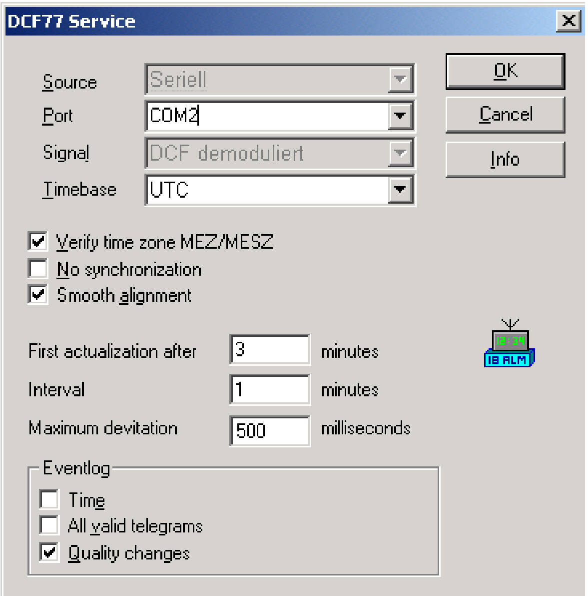
You can find the configuration options available with PCS 7 (e.g. Windows workgroup/Windows domain with/without a central plant clock) and the corresponding detailed configuration instructions in the manual "PCS 7 Time synchronization" (http://support.automation.siemens.com/WW/view/en/75734232).

Information on further configuration options can also be found at http://support.automation.siemens.com/WW/view/en/61931975.

Requirements

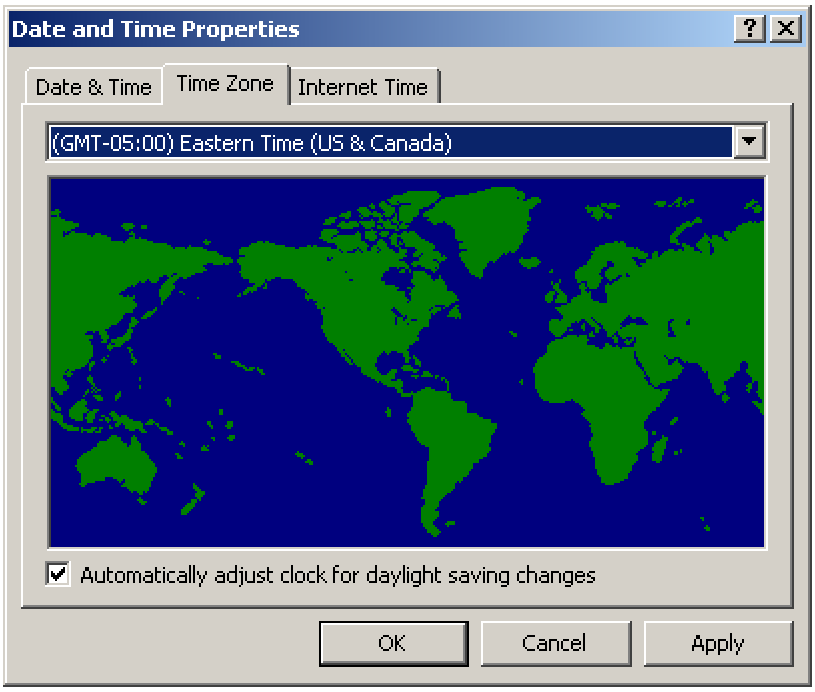
The domain controller (PDC Emulator) is connected to an external GPS/DCF77 clock which supplies the exact time. The "DCF77 Service" software executes DC synchronization.

"DCF77 Service" sample configuration for the DC (PDC Emulator):

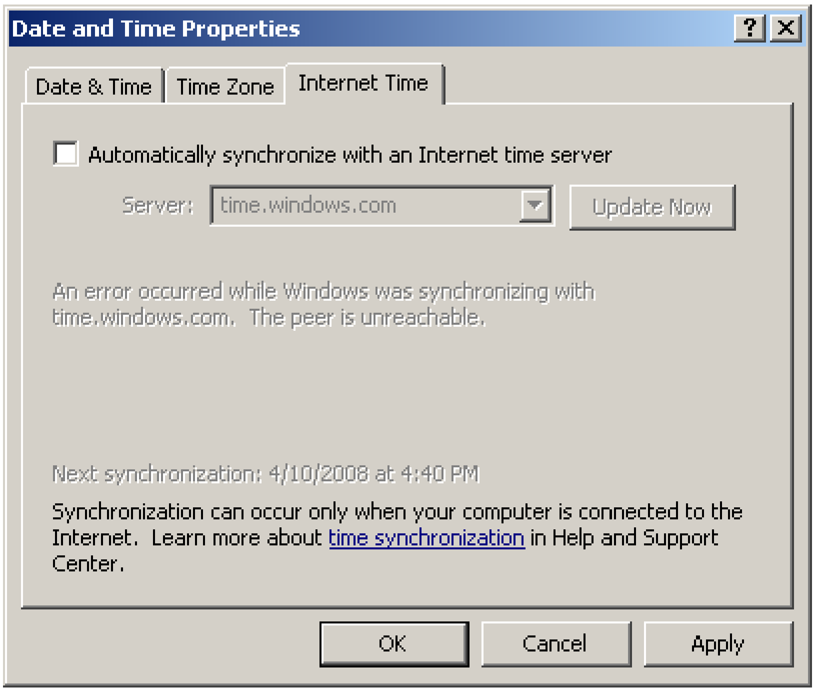


Time settings on all OS computers

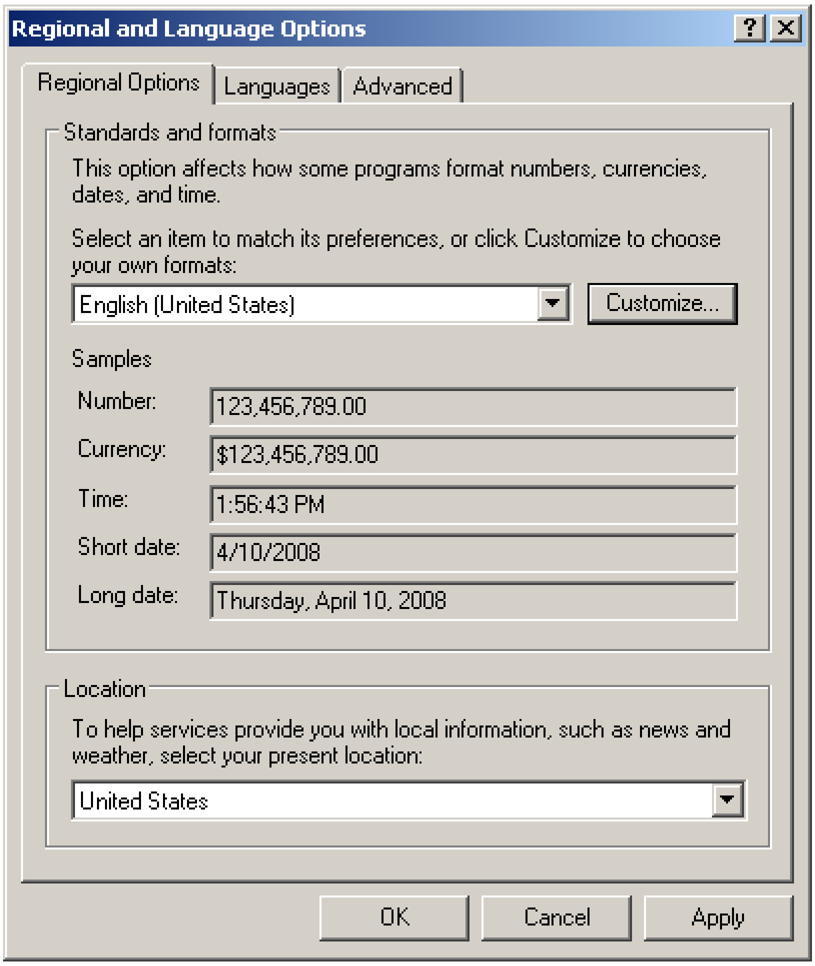
1. The time settings below must be checked/modified on every OS PC. You reach these settings via "Start > Settings > Control Panel > Date and Time".
2. Activate the automatic adjustment setting for daylight saving changes on the "Time Zone" tab on all computers and set the correct time zone (GMT -05:00 for US Eastern Time).



3. The option "Automatically synchronize with an Internet time server" found on the "Internet Time" tab must not be activated.



4. Open the "Regional and Language Options" editor via "Start > Settings > Control Panel > Regional and Language Options" and configure the correct options for your location.



Settings in the "Time Synchronization" editor in the OS server project

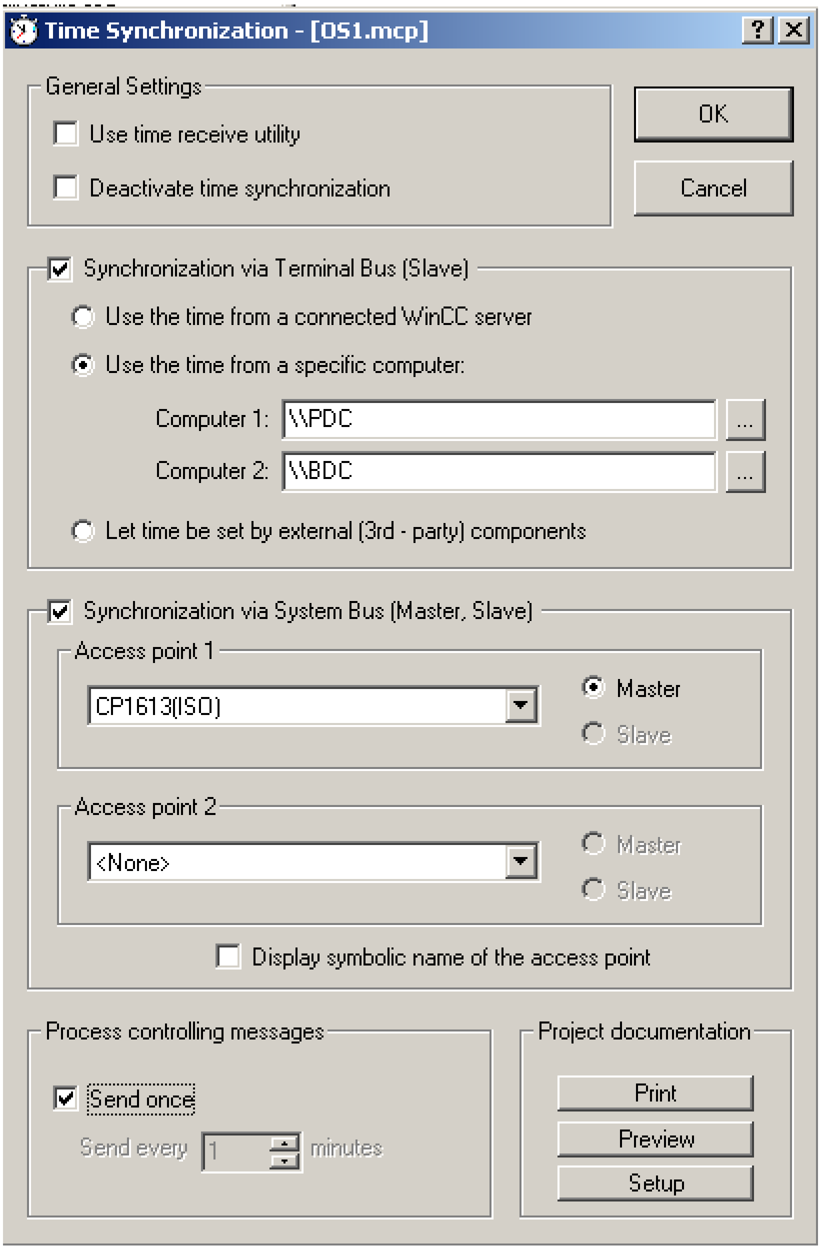
Time synchronization of the system bus is performed via the OS server and the redundant OS partner server with the aid of the CP1613/CP1623/CP1628.

Note

If the ES does not have a CP1613 or CP1623 communication processor (as of PCS 7 V7.0 SP2), select the "Display symbolic name of the access points" option in the area "Synchronization via System Bus (Master, Slave)". Select the communication processor (CP1613 or CP1623) from the "Access point 1" drop-down list and select the "Master" check box.

The OS servers act as cooperative time masters, in other words, the first OS server active on the system bus to not receive a time frame on the system bus switches automatically to time "master" mode. All other OS servers on the system bus detect the time message frame from the time master and automatically switch to time "slave" mode. A cooperative master does not have to belong to a redundant server.

Select the following parameters in the OS server project:



"Display symbolic name of the access point" option:

To configure the time synchronization from an ES, you can also display symbolic names of the access points that are represented by "<>". Activate the corresponding check box. When the target computer boots up in runtime, these names are assigned to the access points.

If e.g. you use two access points with CP1613, the following modules are assigned to the symbolic names using SIMATIC NET:

Symbolic name	Dialog field "Set PG/PC interface"	Dialog field "Set PC station"
<CP 1613 (1)>	CP 1613(ISO)	CP 1613
<CP 1613 (2)>	CP 1613(ISO)<Board2	CP 1613(2)

The two internal tags "@TimeSyncDevice1State" and "@TimeSynDevice2State" are used for the two access points. The tags are used in Runtime for diagnostics and displaying the status of the access points. The settings are "Slave", "Standby master", "Active master" and "Deactivated".

"Process controlling messages" option:

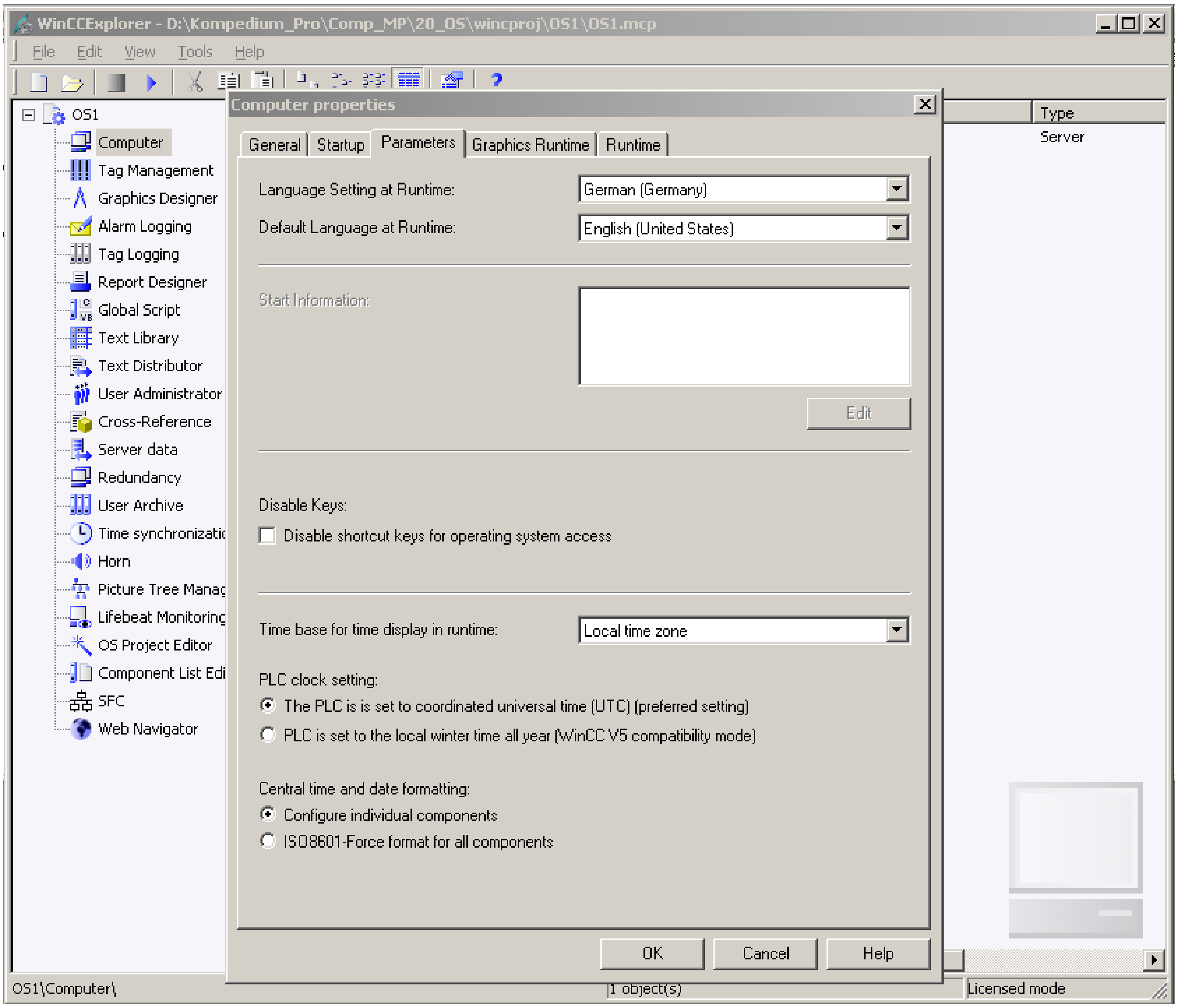
Process control messages are displayed in Runtime if synchronization problems occur. For the process control messages 1012002-1012005, 1012018 and 1012021 you can set how often the process control messages are to be displayed in Runtime in the "Process control messages" field.

Activate the "Send once" check box to have the process control messages shown only once.

If you want to send the process control message several times in Runtime, deactivate the "Send once" check box. Enter the desired value in the "Send every ... minutes" input field or use the dial control.

Computer properties in the OS client project

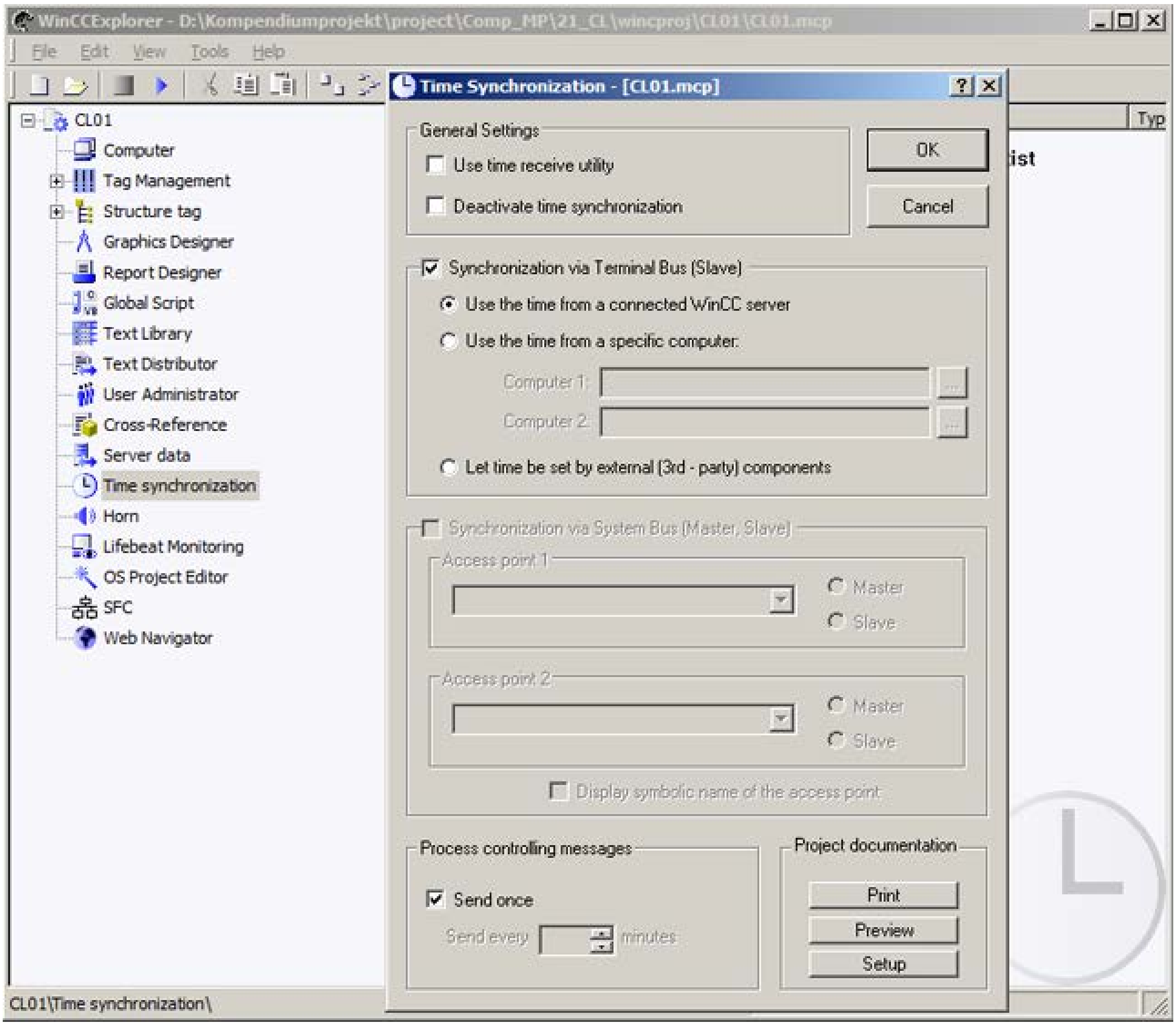
You must also make the following settings in the properties dialog of the computer:



Settings in the "Time Synchronization" editor in the OS server projects

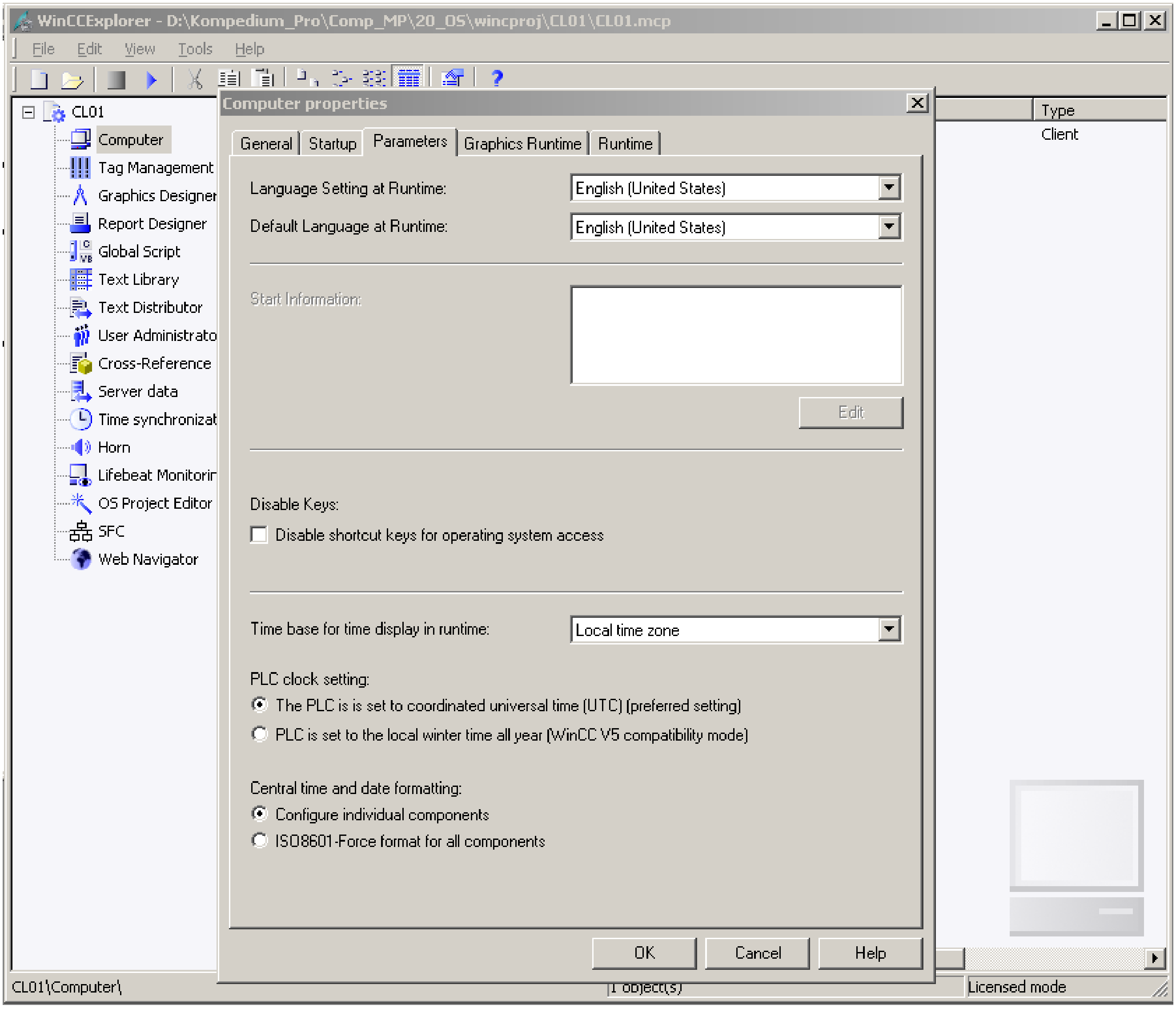
The OS clients receive their time from an OS server on the terminal bus.

You need to make the following settings in the OS projects of the clients, in the "Time Synchronization" editor:



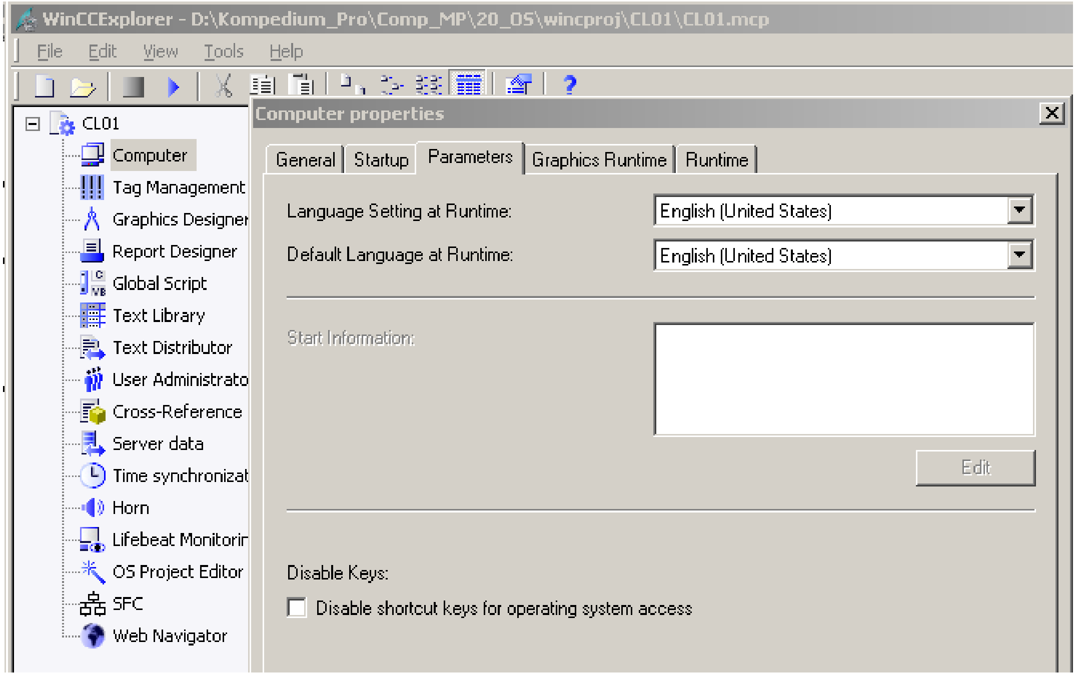
Computer properties in the OS client projects

Make the following settings here:



9.1.8 Graphics Runtime on the OS clients

Block the key combinations in the computer properties of the OC client projects. This prevents access to the operating system during runtime.



To ensure the Windows taskbar remains hidden during process mode even when standalone applications are called (e.g. "Picture selection by name", "Picture selection by process tag", "User permission", or "SFC visualization"), the "Keep the taskbar on top of other windows" check box must be deactivated in the Windows operating system under "Taskbar and Start Menu Properties".

9.1.9 Graphics Runtime on the OS servers

The following alternative measures are recommended for the purpose of reducing the load for OS servers which are not used as operating stations at the same time:

- Selecting the "SIMATIC Server" server layout in the OS project editor in the "Layout" tab. Generally applies to all OS servers, in particular OS servers with more than 4 OS clients. Granting of rights in accordance with the User Administrator and locking to prevent unauthorized key combinations is possible with this.
- Deactivation of the graphics runtime and the associated applications, e.g. SFCRT (visualization of SFC blocks) in the startup list in "Computer properties".
  Additional applications that have been added through the individual WinCC editors of the startup list cannot be removed.

Note

The measures can be used for OS servers which are subject to high loads and for the CAS, in order to ensure access here to StoragePlus, which is used to "connect" and "disconnect" archive segments that are swapped out as backups (a Windows logon is all that is required for this purpose in the GMP environment).

Graphics runtime is deactivated by default for the CAS.

9.1.10 OS resource utilization

The limiting values recommended in this section for OS servers or OS single stations are based on empirical values. They are listed as OS quantity structures in the event of Alarm Logging and Tag Logging in the PCS 7 catalog.

Work station

Once the OS engineering has completed with OS runtime running check that there is sufficient hard disk memory for operating the Microsoft SQL servers.

System partition (C): The free memory space must be greater than 20%.

Task Manager

Once the OS engineering has completed with OS runtime running check that the following values are being adhered to within the Task Manager:

- System performance: Processor utilization less than 30% on average
- System performance: Available physical memory greater than 200 MB

Alarm Logging

Once the OS engineering has completed with OS runtime running check that the permanent load of messages for an OS server is less than 10 messages per second.

The check can be made by additional configuration of an Alarm Control as a hitlist in a process picture.

Tag Logging

Once the OS engineering has completed with OS runtime running check that the tag archiving for an OS server is less than 1000 values per second.

For this monitor the internal tags @TLGRT_TAGS_PER_SECOND and @TLGRT_AVERAGE_TAGS_PER_SECOND in the TagLoggingRT group.

Note

Check the configuration as well as the associated infrastructure if these limiting values are being reached or even exceeded.

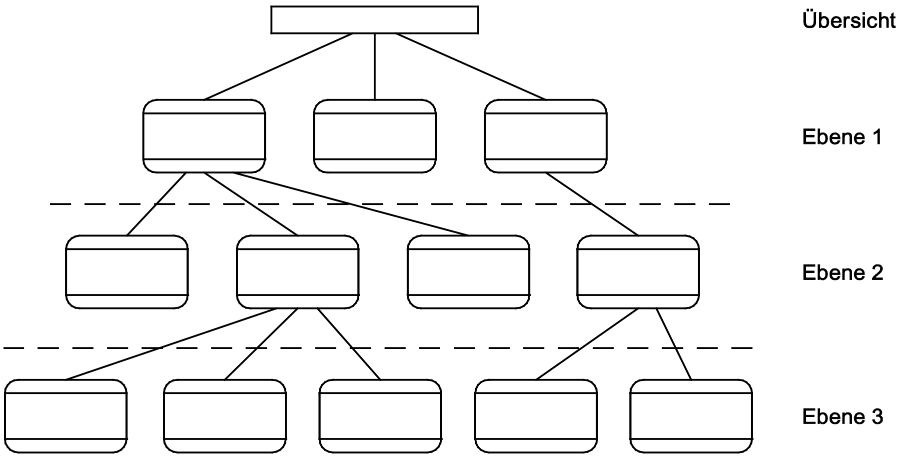
Increased availability as part of Lifecycle agreements

Where the limiting values are being exceeded corresponding measures must be taken to reduce the load of the OS server and to guarantee the performance of the OS runtime.

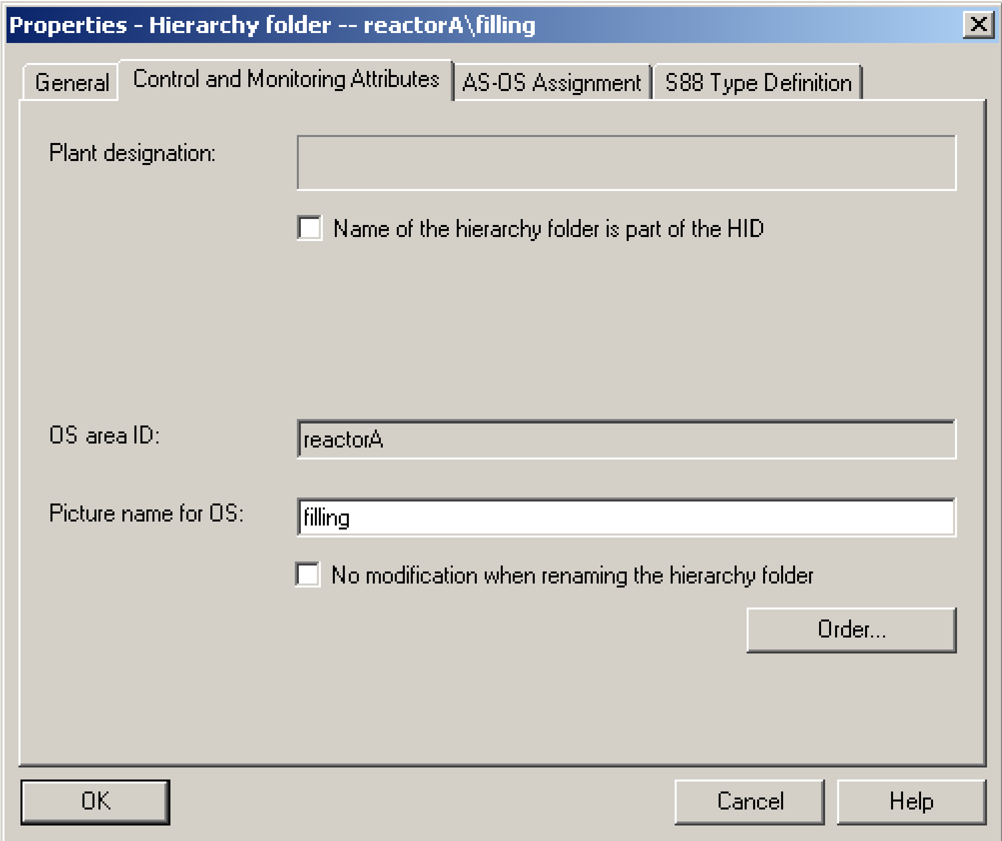
9.2 Visualization interface

9.2.1 Structure of the picture hierarchy

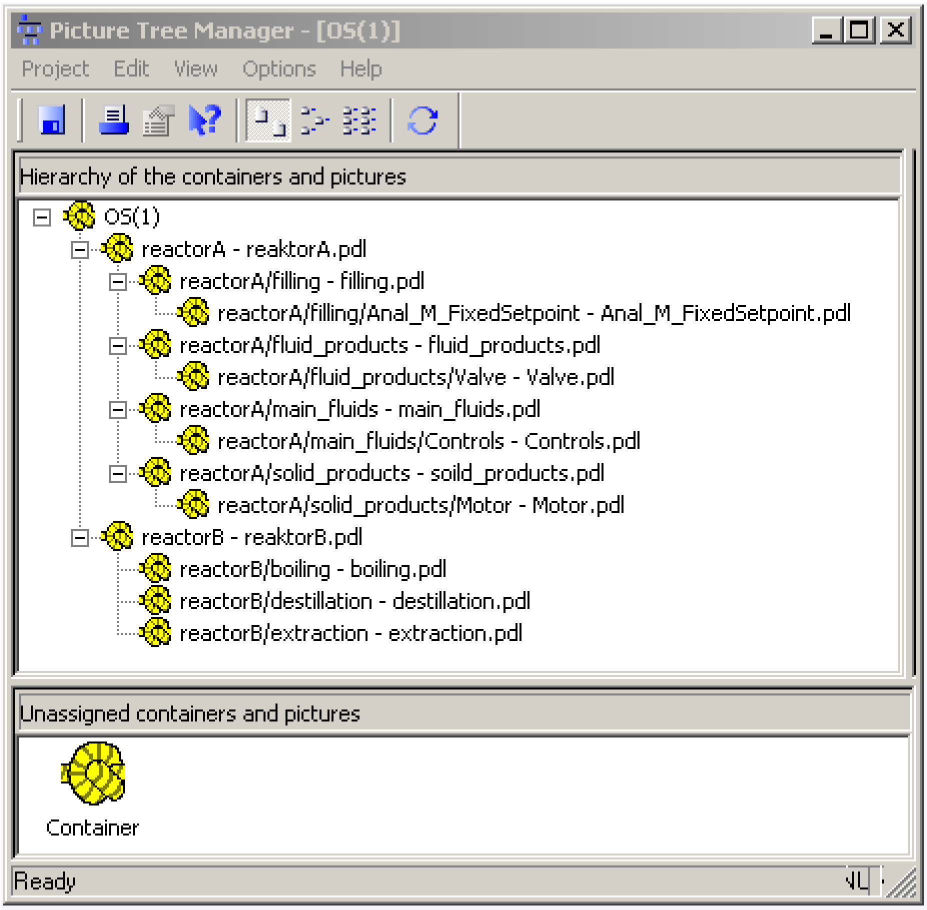
You can create a hierarchical structure for the plant with up to 8 levels. Buttons are used to navigate between the process pictures.

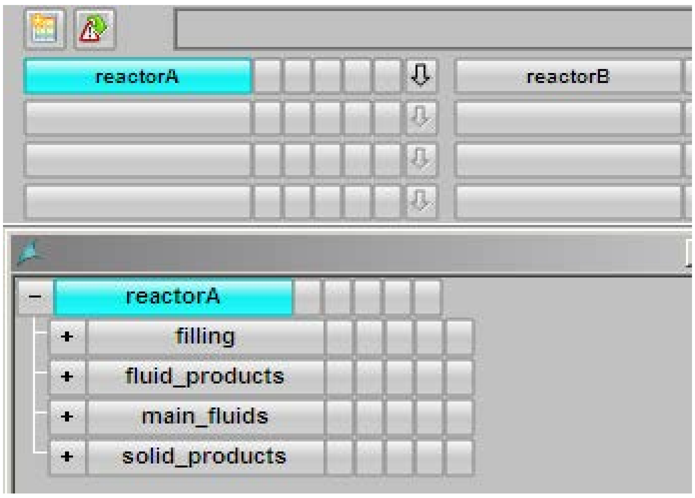


The process pictures are assigned during AS engineering of the navigation in the SIMATIC Manager. The name displayed for the OS area can also be changed in the SIMATIC Manager. As a rule, however, the same name as that shown in the plant view is used.



The picture hierarchy (Picture Tree) is automatically generated during OS compilation in accordance with the plant hierarchy settings in the SIMATIC Manager.





9.2.2 Design of process pictures

Introduction

In general, process pictures are created in accordance with a set of specifications which are drawn up in close collaboration with the customer. Sector- and company-specific standards and guidelines must be taken into account.

In the sample project, the following definitions have been laid down:

Function design

This function is provided for user objects. Use faceplates from the OS library.

Cable design

Color	Black:	Product
	Yellow:	Gas, N2
	Dark red:	Steam, heating system
	Green:	Water
	Blue:	Air
Width	Wide:	Main product cables (line width 4)
	Narrow:	Other cables (line width 2)

Boiler design

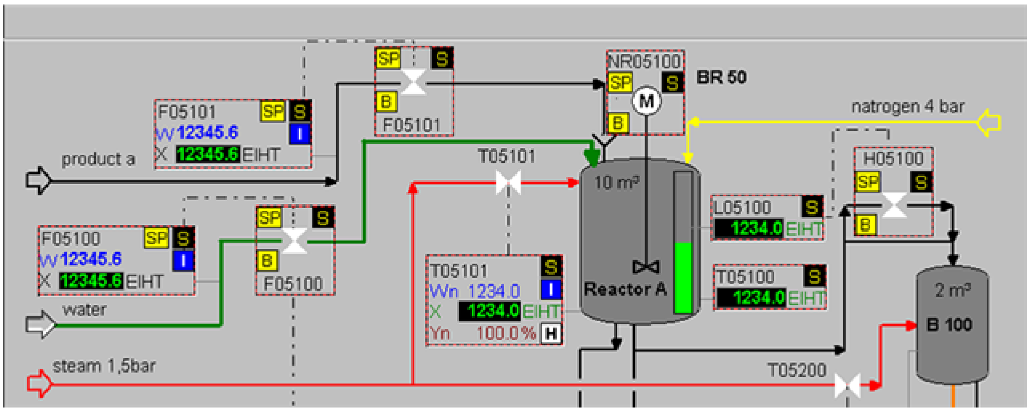
Represent boilers in graphics by means of black lines on a gray background. The boiler shape is defined by the RI flowchart.

Use static text to indicate the volume of the boilers. The fill quantity is shown by means of a bar on the boiler.

Picture navigation – Start and end of a cable

Interrupted cables are identified by an arrow at the end of the cable.

Example of a process picture for a chemical plant:



Note

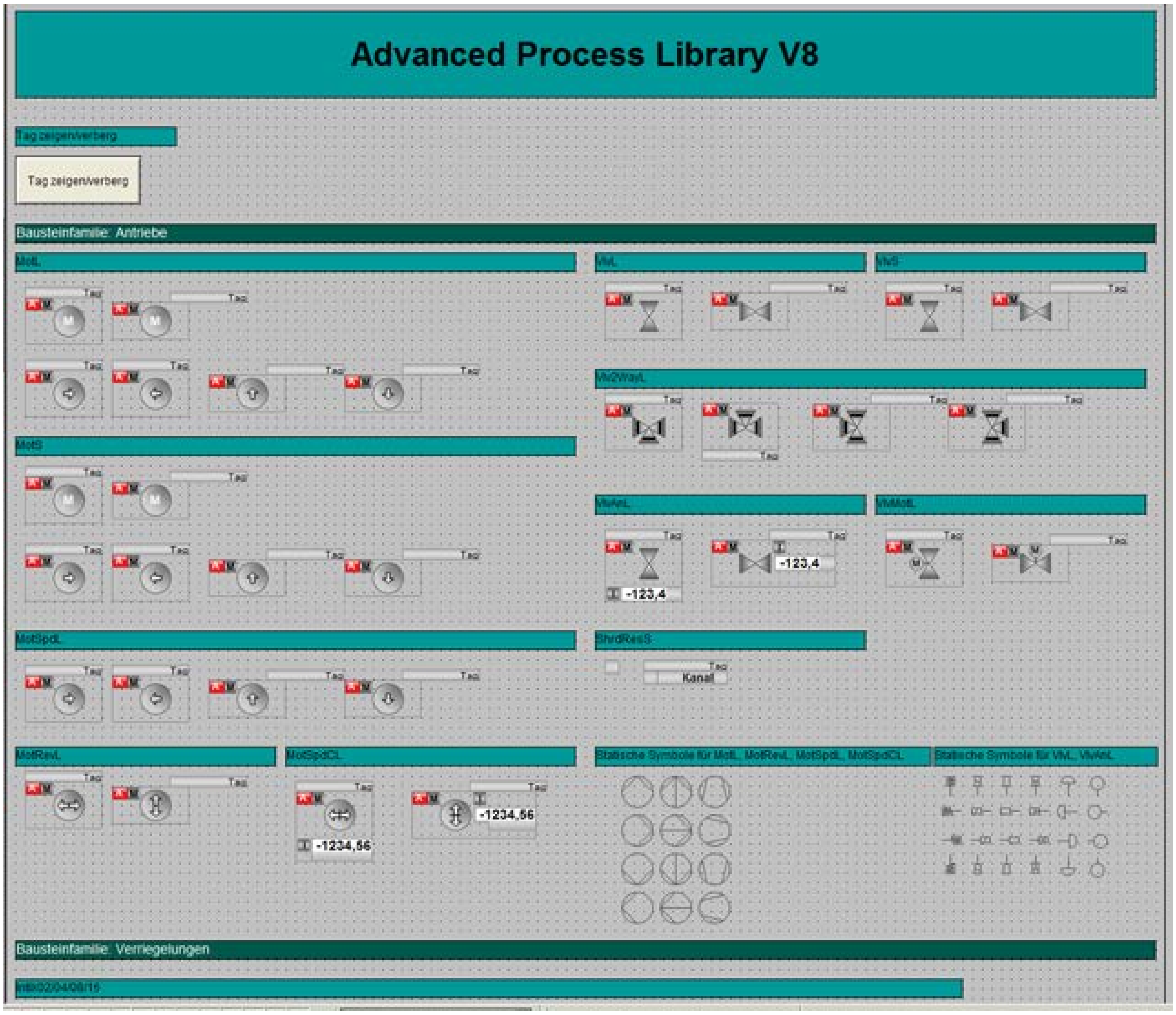
Take note of the following recommendations when creating process pictures:

- The use of numerous or extensive C actions and/or VBS actions increases the system load which can have a negative influence on picture-call times in runtime. Move cyclic computing operations to the automation system and avoid executing them on the OS.
- To achieve picture opening times of less than 2 seconds do not configure more than 50 process objects in one process picture.
- Picture size should not be more than 5 MB.

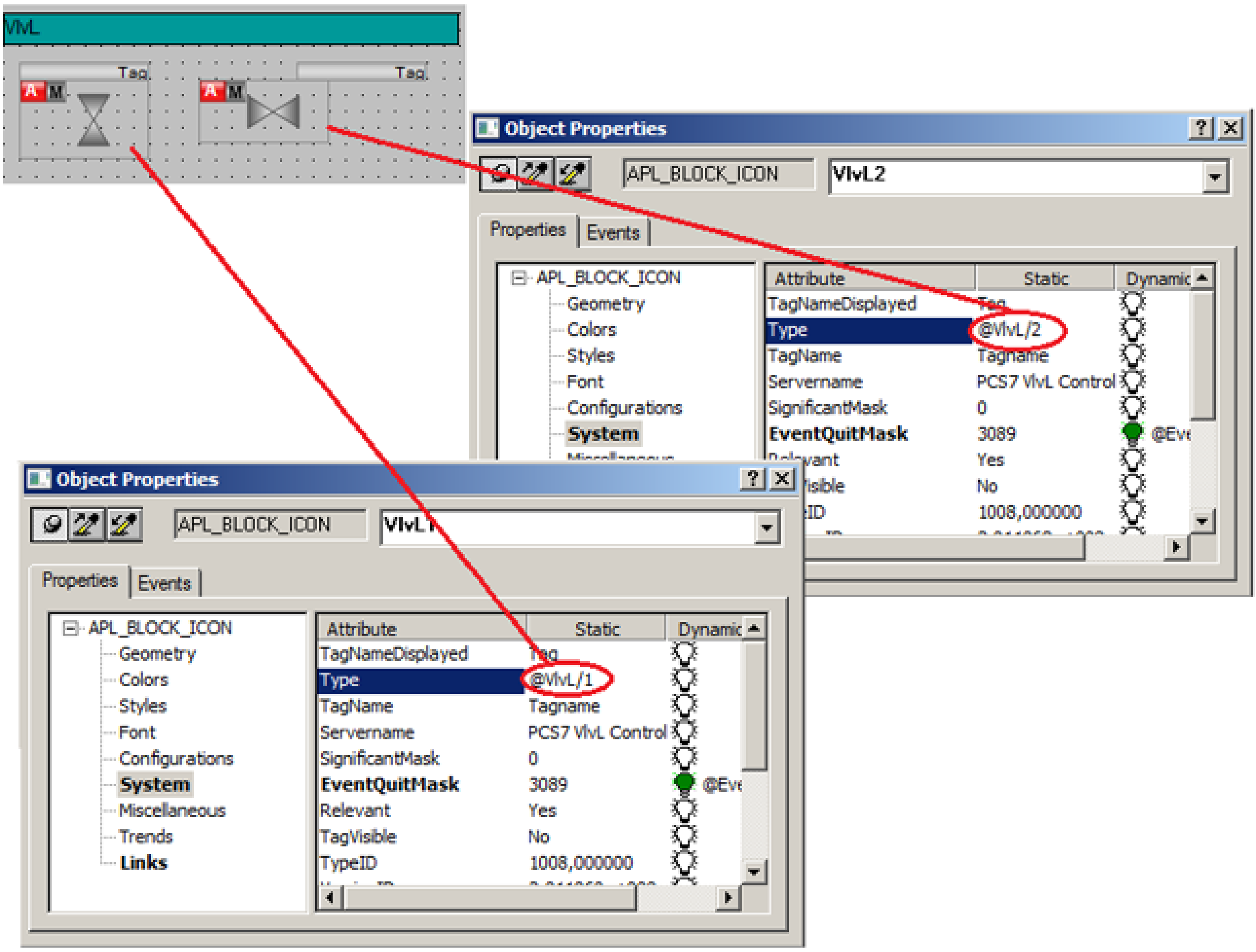
9.2.3 Block icons/User objects

Block icons are graphic objects of the "user object" (UDO, User-Defined Object)) type, which represent a corresponding block type in the OS. Block icon templates for all block types/process tag types used in PCS 7 can be found in the @PCS7TypicalsAPLV8.pdl typical picture.

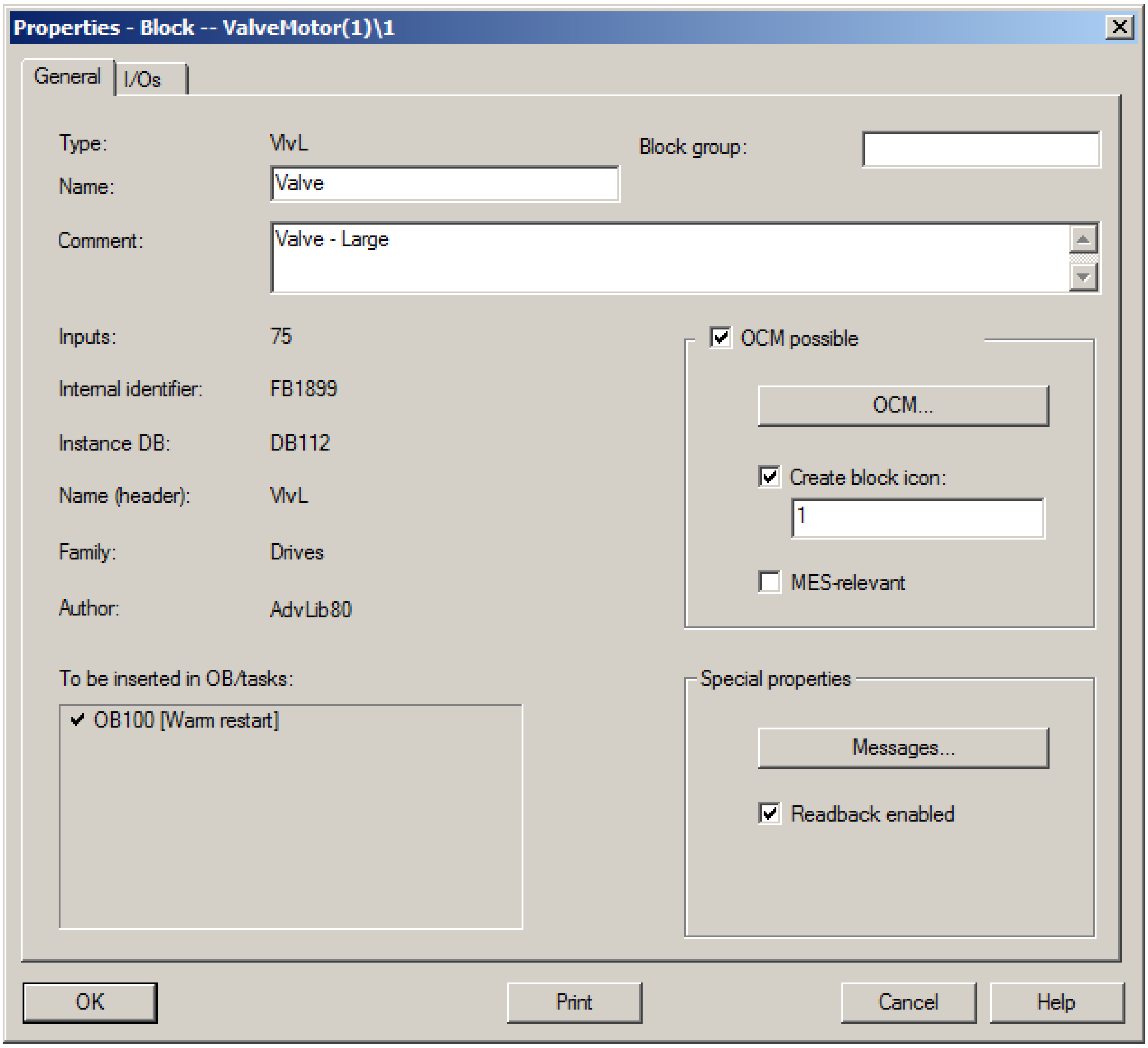
The graphic objects from this typical picture are used during OS compilation and inserted into the process pictures and linked to the appropriate process tag automatically in accordance with the plant hierarchy.



Several block icons are available for some AS blocks. This is the case, for example, for the direction of flow of the medium for a valve with a defined vertical or horizontal direction. Which of these block icons will be selected is determined by an index number in the "type" property of the corresponding block icon.



You make your selection and specification via the AS block's properties dialog in CFC. The screenshot below shows the selection box that appears for the VALVE block by way of example.



9.2.4 Custom block icons / user objects

The "Create/Update Block Icons" function uses the following template pictures:

- Template pictures created by the project engineer
  - Name starts with "@PCS7Typicals"
  - Number restricted to 10
- Default template pictures from the picture "@PCS7TypicalsAPLV8.pdl"

  The picture "@PCS7TypicalsAPLV8.pdl" is contained in every PCS 7 OS project as standard. It contains the current block icons for PCS 7 V8.0.

Note

The original "@PCS7TypicalsAPLV8.pdl" file must not be changed! Changes to the original file are overwritten in the event of an update or upgrade.

User-defined template pictures must be created for customer-specific block icons. These must start in all cases with the fixed name component "@PCS7Typicals". The file name following this can be determined freely.

The "Create/update block icons" function open all pictures with the fixed name component "@PCS7Typicals" and ascertains the picture priority alphabetically using the names:

- Prio 1: "@PCS7Typicals_MyAPL.pdl" (starting with the last picture alphabetically)
- Prio 2: "@PCS7TypicalsAPLV8.pdl"
- Prio 3: "@PCS7TypicalsAPLV7.pdl"

The pictures with the highest priority are added.

The "Create/Update Diagnostic Screens" function uses the template pictures from "@@MaintenanceTypicals".

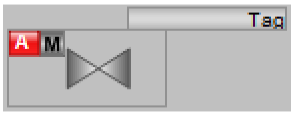
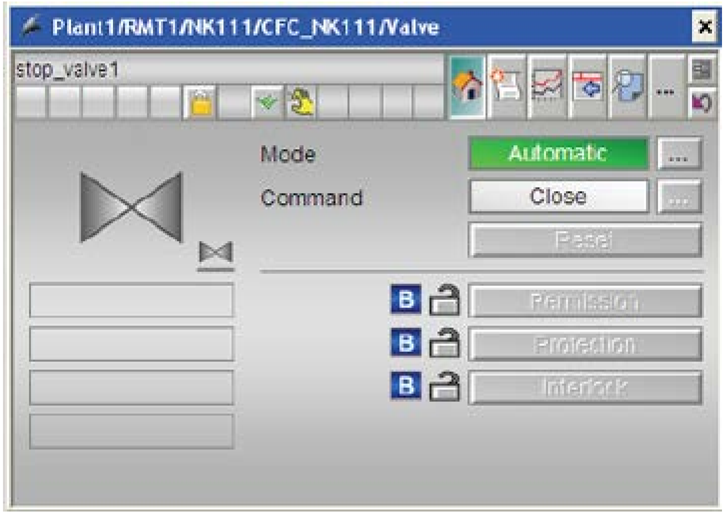
9.2.5 Faceplates

Introduction

A faceplate is the graphic representation of all elements in a technological block from the AS intended for operator control and monitoring. Faceplates are displayed in a separate window in the OS and can be opened using block icons.

The block icons and associated faceplates for valve control are shown below by way of example.

VALVE: Valve control

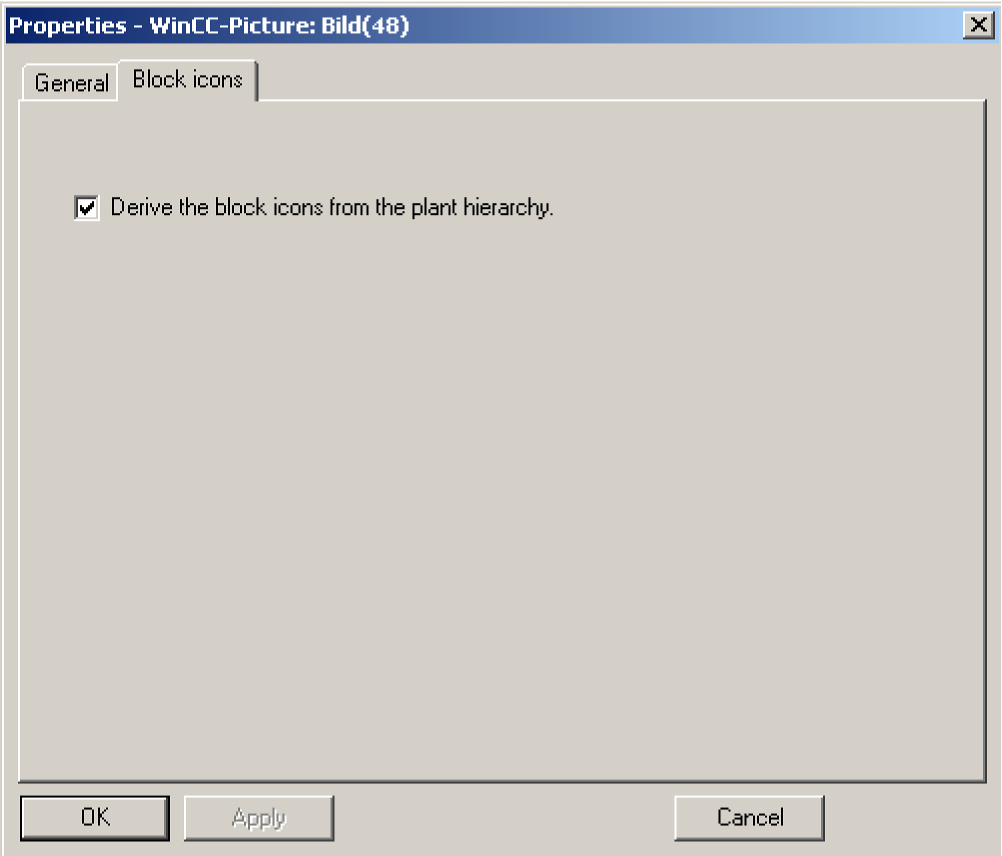
Block icon	Faceplate
	

Left-click the block icon to open the valve's faceplate within the process display.

9.2.6 Creating block icons in the SIMATIC Manager

In PCS 7 the block icons/pictures are derived from the plant hierarchy (PH) by default. This is set in the SIMATIC Manager by selecting the picture property "Derive the block icons from the plant hierarchy".

As of PCS 7 V7.0, this setting is pre-selected.



When the OS project is compiled, the block icons are derived/updated from the plant hierarchy.

Note

The derivation of the block icons is controlled with configuration files. A user normally does not have to adapt the configuration files supplied by the system.

The following attributes of the block icons are taken into consideration in the configuration file without adaptation:

- Higher ProcessControlling
- ProcessControlling
- View Tag
- Return Path
- StandardTrend
- Format_InputValue
- Format_OutputValue
- Format_xx
- defaultPos
- leftPos
- topPos

If other attribute values are to be taken into account when updating the block icons, the configuration must be adapted accordingly.

You can find a detailed description of this under "Structure of the Configuration File" in the WinCC Information System.

9.2.7 Wizards

If block icons are not derived from the plant hierarchy (PH) in the SIMATIC Manager by default, various wizards are available for working with user object templates.

Wizard name	Tab in the Dynamic Wizard
Connecting faceplate to process tag	Standard Dynamics
Updating picture objects	Picture Functions
Exporting picture objects	Picture Functions
Importing picture objects	Picture Functions

Note

Detailed information on working with the wizards can be found in the "SIMATIC Process Control System PCS 7 Operator Station" (http://support.automation.siemens.com/WW/view/en/68157026) manual.

9.3 Message system

9.3.1 Message classes and message types

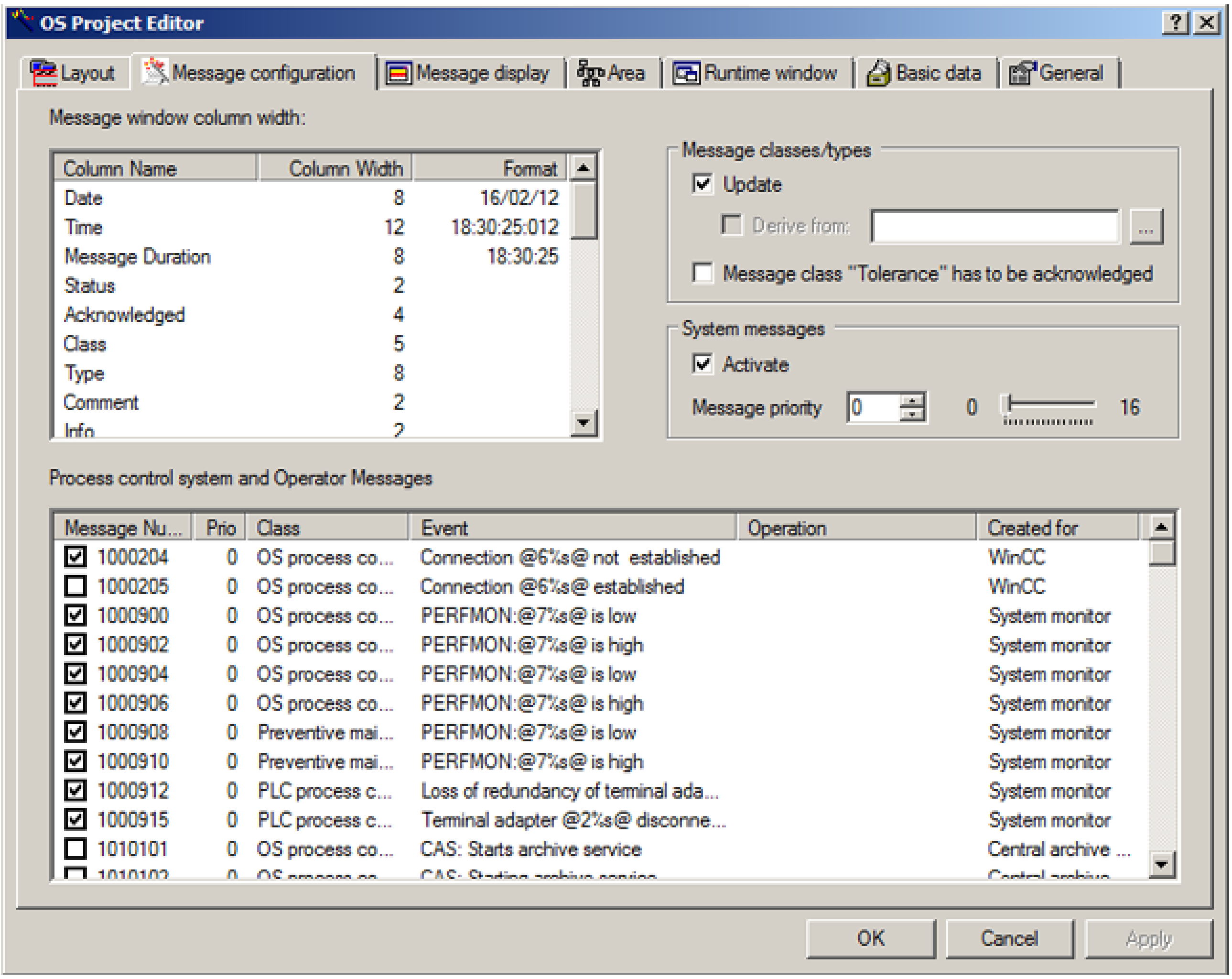
Introduction

Interrupts and messages are divided into message classes and message types. There are default settings for message classes and message types provided by the system when a project is created. These predefined message classes and message types can be selected in the AS configuration.

Note

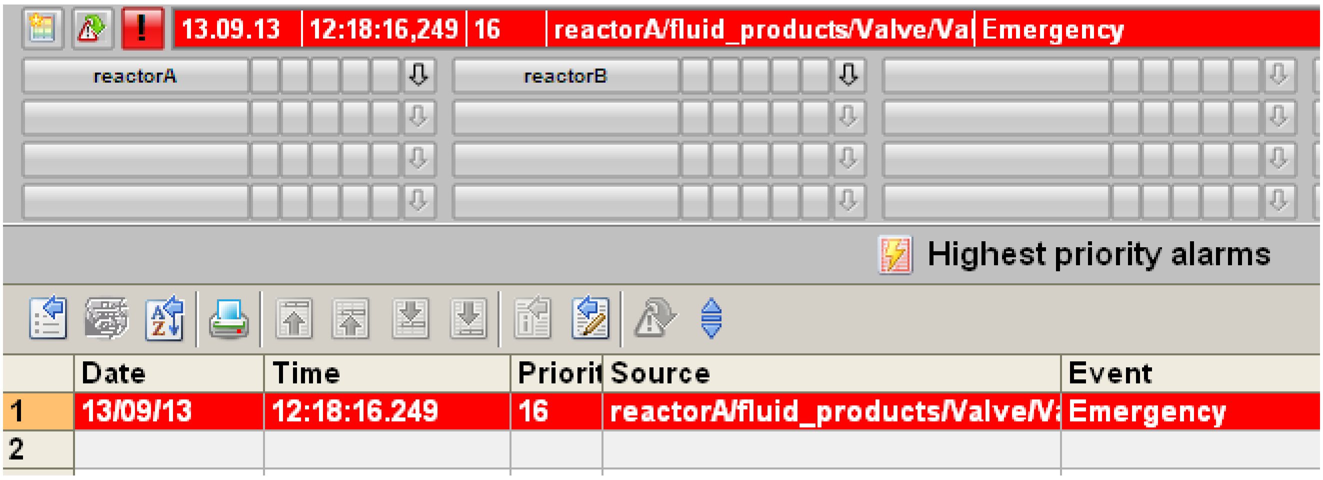
When using the "User-configurable message classes" function, observe the information in the section "Configuring the PCS 7 message system" in the manual "SIMATIC Process Control System PCS 7 – Engineering System" (http://support.automation.siemens.com/WW/view/en/68157345).

Process control and system messages are also automatically generated by the project editor for a new project. The user does have the option of suppressing individual process control messages and assigning a message priority on the "Message configuration" tab, but only if the option for delta loading is disabled on the "General" tab, thus necessitating a complete download subsequently.



Note

the highest priority of 16 is used to display "emergency messages" in a separate list named "High priority messages". A button which can be selected in order to display these messages has been added to the plant overview, next to the message line. This button flashes for as long as messages with this priority are still pending, irrespective of whether they have been acknowledged or not.



Note

To prevent too many messages being generated, the SIMATIC PCS 7 message concept employs cumulative message suppression.

Example: An I/O module with eight channels can signal a wire break for every channel. If the I/O module is not connected to a power supply, just this one message is output and other messages relating to wire breaks are suppressed.

Alarm, warning, and tolerance messages

Alarm, warning and tolerance messages indicate that a limit value has been exceeded. These limit values have been defined in the user-configured CFC. The Interrupt message class is usually used for emergency stop and other high-priority binary messages too.

The messages/signals are aimed at the operator.

AS process control messages

AS process control messages provide information about errors in I/O peripherals and in the system, e.g. wire break, short circuit, channel error, module failure, access error, redundancy failure, or failure of the auxiliary current. If a system-generated message or signal is displayed, the operator must inform the service team without delay.

OS process control messages

OS process control messages provide information about errors in the OS system, e.g. errors relating to database access, failure of OS server redundancy, errors relating to time synchronization. If a system-generated message or a signal for field instruments is displayed, the operator must inform the service team without delay.

Preventive maintenance

Preventive maintenance indicates that maintenance personnel will soon have to take a look at devices/components (due to a dirty sensor, for example).

Process messages

Process messages are specified to a user.

Operational messages

Operational messages provide information about the plant status during conventional operation (e.g. "Temperature setpoint reached").

Operator prompts

Operator prompts are messages generated by the sequential control or stacking systems which prompt the operator to perform certain tasks.

Operator messages

Operator messages indicate which tasks the operator has performed manually (e.g. "User xy: control T4711: W was: 20 DEGC, W is now: 35 DEGC"). These can also be system-generated messages which refer to events occurring in the system (e.g. "Incorrect password").

Status messages

Status messages provide information about system states during normal operation and also document these states (e.g. "Logon via Smart card").

Adapting the default settings

The information below only concerns users who are forced to modify the system default settings regarding colors and the acknowledgment theory in accordance with their requirements or who have to configure their own messages in the alarm logging system, since the S7 channel (Protocol Suite) is not used (e.g. TELEPERM M connection).

Assign a message class to each message during the configuration of the message system. When doing this, you do not have to make the numerous settings for each message; you can make the settings for the entire message class.

Up to 13 message classes can be defined in PCS 7. An acknowledgment mode is also specified for each message class. In turn, message types can be defined within the individual message classes. The text and background colors of a message are specified by its message class and message type.

Up to 16 message types can be defined within one message class. Messages are broadly divided into system-generated messages and messages containing information on the plant status. The table below provides an overview of the recommended message classes and message types. The solution here has been adapted to meet the requirements of the chemical industry.

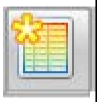
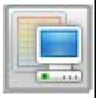
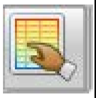
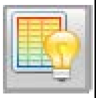
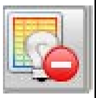
Message class	Message type	Acknowledgment	Target group	Color
Interrupt (1)	Top interrupt (1) Bottom interrupt (2)	Signal for new value with single acknowledgment	Operators	White/red
Warning (2)	Top warning (19) Bottom warning (20)	Signal for new value with single acknowledgment	Operators	Black/yellow
Tolerance (3)	Top tolerance (37) Bottom tolerance (38)	Signal without acknowledgment	Operators	White/turquoise
AS process control messages (4)	AS system (55) I/O failure (56)	Signal for new value with single acknowledgment	Operators (inform service personnel)	Yellow/black
OS process control messages (5)	OS system (71)	Signal for new value with single acknowledgment	Operators (inform service personnel)	Yellow/black
Preventive maintenance (6)	Maintenance (89)	Signal for new value with single acknowledgment	Service personnel	Yellow/black
Process message (7)	Process signal (106)	Signal for new value with single acknowledgment	Operators	White/magenta
Operational message (8)	Process signal (122)	Signal without acknowledgment	Operators	White/magenta
Operator prompt (9)	Operator request (139)	Signal without acknowledgment	Operators	White/blue
Operator message (10)	Operator message (156)	Signal without acknowledgment	Operators	White/magenta
Status message (16)	Status AS (253) Status OS (254)	Signal without acknowledgment	Operators	White/petrol

The digits in brackets are code numbers which are used to define the message class and message type in system files.

9.3.2 Message lists

Introduction

SIMATIC PCS 7 categorizes and displays messages in different message lists, based on their status and type. The message lists below are implemented in the message line:

	Message line	Displays the latest unacknowledged message above the process overview
	**Incoming alarm list**	Displays all unacknowledged messages
	**Acknowledged alarm list**	Displays all acknowledged process messages which are still active
	**Outgoing alarm list**	Displays all messages marked as "Outgoing", which have not been acknowledged
	**Process alarm list**	Displays all process control messages
	**Operation list**	Displays all operator messages (e.g. "A controller setpoint is set to xxx.")
	**History list**	Displays all messages (came in, acknowledged, and outgoing messages)
	**Hidden list**	Displays all active, manually hidden, and automatically hidden messages
	**List of messages to hide**	Displays all messages which are hidden when they are pending

---

Note

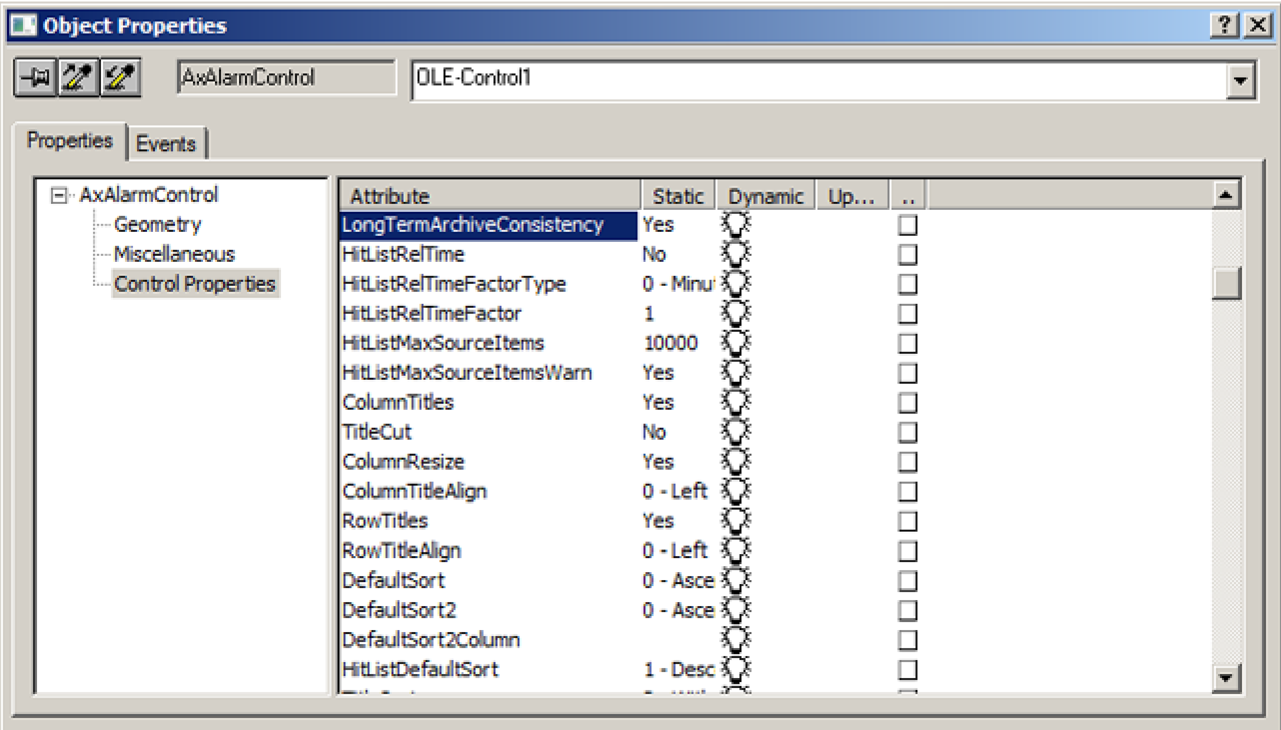
The list of hidden messages and the list of messages to hide are available as of PCS 7 V7.0.

Interrupt controls

The message lists are displayed via interrupt controls, which can be modified in the Graphics Designer.

Double-click on an interrupt control in the Graphics Designer to open the configuration dialog for message blocks/columns.

Right-click to access the properties dialog, where the "LongTimeArchiveConsistency" attribute can be used to configure characteristics in terms of the number of messages displayed per OS server.



No:	A maximum of 1,000 messages are scanned and displayed per OS server. The scan is performed according to date/time by default. The messages are sorted and displayed accordingly after all servers have been scanned. In this case, time gaps may occur in the display (for individual servers).
Yes:	A maximum of 1,000 messages are scanned and displayed throughout all OS servers. This setting always ensures that the same time sequence is used for the messages throughout all servers. The amount of data displayed is considerably less than in the first case.

9.3.3 Acknowledgment concept

A distinction is made between the status of the message source (process value 0/1) and the acknowledgment status (not acknowledged/acknowledged) for a message. The two are combined to give the message status.

Message status

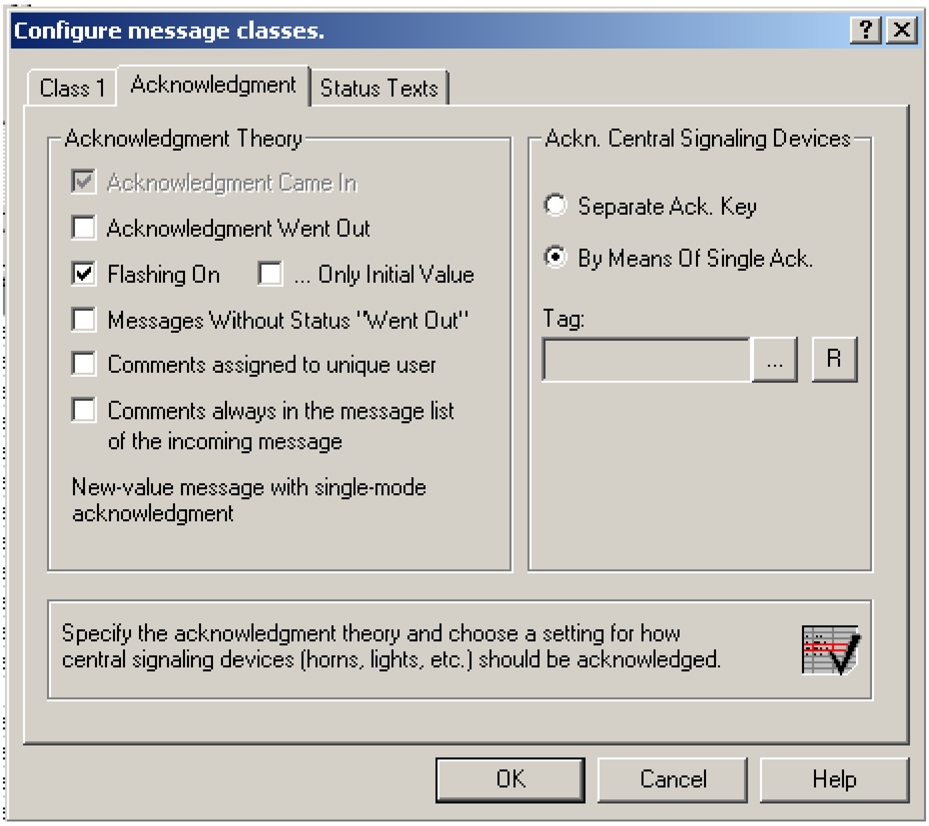
A message recognizes up to four statuses, depending on the acknowledgment concept:

- Came in
- Came in, acknowledged
- Came in, went out, unacknowledged
- Came in, went out, acknowledged

The current message status is indicated by the following attributes:

- Color and flashing display of the elements
- Plain text in text elements
- Time entries in the message line

Configure the acknowledgment theory for a message of the message class and the acknowledgment of a message via a central signaling device in the "Acknowledgment" dialog window of the alarm logging area.



Acknowledgment theory options

You can select from eight different states for the acknowledgment of a message:

- Single message without acknowledgment
- Single message with came in acknowledgment
- Single message with dual-mode acknowledgment
- First value message with single-mode acknowledgment
- New value message with single-mode acknowledgment
- New value message with dual-mode acknowledgment
- Message without "went out" status with acknowledgment
- Message without "went out" status without acknowledgment

Option	Description
Came in acknowledgment	Activate the check box for single-mode message with came in acknowledgment. Came in messages of this message class must be acknowledged. The message remains queued until it is acknowledged.
Acknowledgment went out	Activate the check box for a single message with dual-mode acknowledgment. Went out messages of this message class must be acknowledgment.
Flashing on	Activate the check box for a new value message with single or dual-mode acknowledgment. The messages of this message class flash when displayed in the message window. For a message block to flash in Runtime, flashing must be activated in the properties of the respective message block.
First value only	Activate the check box for a first value message with single acknowledgment. Only the first message of this message class flashes when displayed in the message window. The "Flashing On" check box must be activated.
Message without "Went Out" status	Activate the check box for a message without "Went Out" status with or without acknowledgment. When this option is activated, the messages do not have "Outgoing" status. If the message only recognizes the "Came In" status, the message is not entered in the message window and it is only archived.
Comments assigned to unique user	If the check box is activated, the comments in the message window are assigned to the logged on user. The user must be registered in the "User name" system block. If no comment is entered, any user can enter the first comment. When the first comment is set, all other users have read-only access to this comment.
Comment of the came in message always in the message list	If the check box is activated, the comment of the incoming message is always displayed in the user text blocks with the dynamic sections "@100%@", "@101%@", "@102%@", and"@103%@". The display then depends on the status of the message in the message list.

9.3.4 Interrupt management

Message handling options

The following methods are available for displaying message traffic in a clearer way or reducing its volume in process mode:

- Filtering alarms via their properties
- Disabling messages

  Disabling an individual process tag or a subarea of the hierarchy by means of an OS operation. In PCS 7 this is carried out as the origin of the message, in exactly the same way as an acknowledgment on the block in the AS. Using this type of message suppression, however, does mean that no more events will be output and no associated signal changes will be saved to the message archive.
- Smart Alarm Hiding

  This function enables interrupts to be hidden automatically in accordance with definable plant states in order to reduce the volume of message traffic in process mode. The advantage of this method is that hidden messages are still archived. The procedure is based on grouping together messages, which, in accordance with the "STATEREP" CFC blocks (PCS 7 Library) and "STRep" (PCS 7 APL), are then assigned to the plant states to be defined. Messages can also be hidden manually.

  You can display hidden messages via the "List of hidden messages" and "List of messages to hide" message pages.

Note

Information on configuring and on operating and monitoring the Smart Alarm Hiding can be found in the document "PCS 7 in Practice - Smart Alarm Hiding" (http://support.automation.siemens.com/WW/view/en/55699984).

9.3.5 Group display

A particular message from a process picture can be traced across all levels using the group display. The overview area forms the highest level. In this overview, the operator can view messages for every area in a group display.

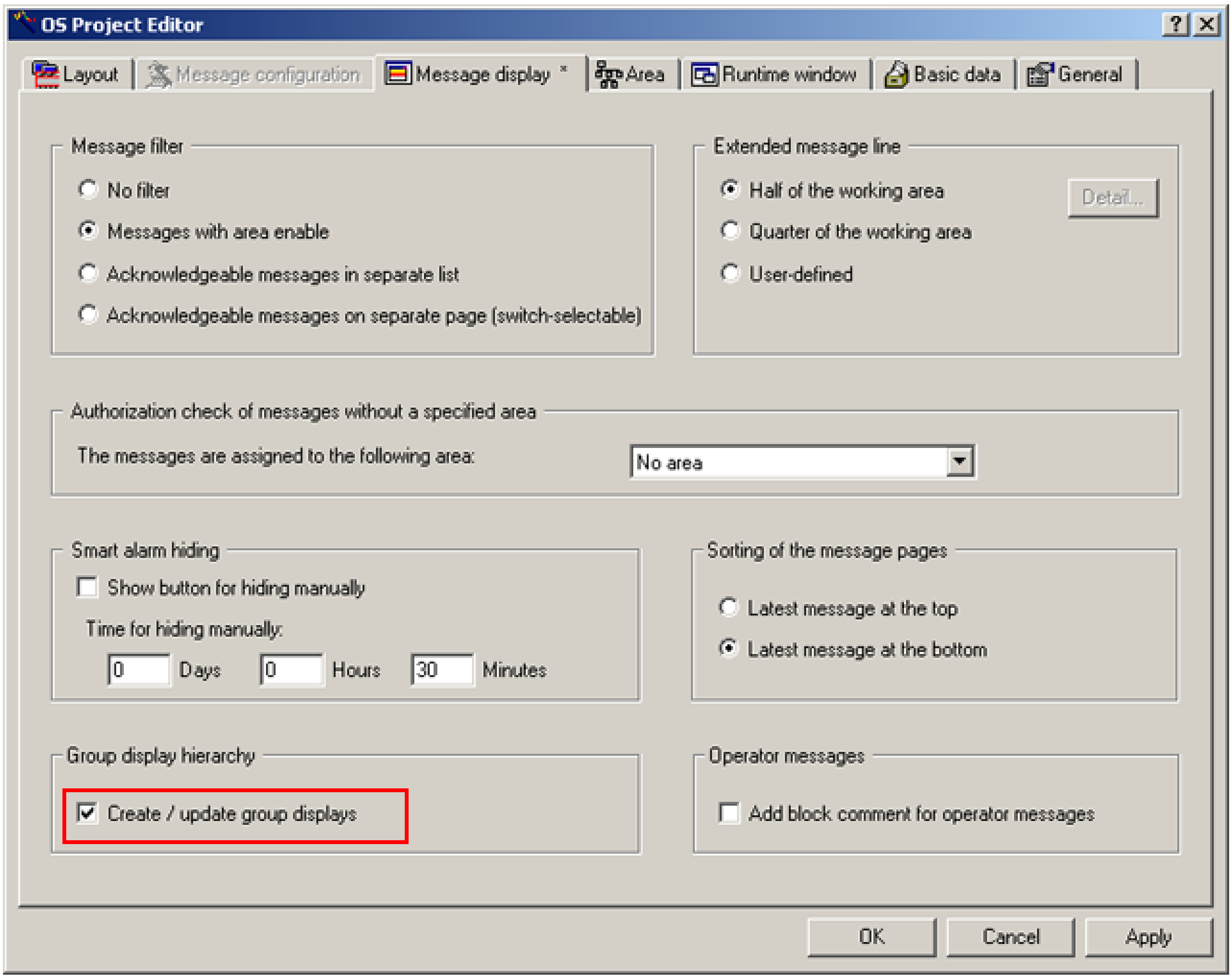
The messages are only valid in the relevant area. The group displays for an area are linked on a local level by means of a logical OR function and encompass all lower hierarchy levels.

You can branch from the group display (when a newly received, flashing message is present) to the picture tree at just the click of a mouse. The function branches down to the process picture, in which the message can be uniquely assigned. If messages occur in two process pictures at the same time and these pictures are "ORed", the function branches to the first process picture in which the the group displays come together.

The group display can contain the following information:

A	Flashing interrupt signal	(white on red)
W	Flashing warning	(black on yellow)
T	Tolerance	(white on blue, not flashing)
S	Flashing error message	(yellow on black)
O	Operator request	(white on blue, not flashing)
X	Message lock active in the area	(white on gray)

This function is activated for an OS in the "Group display hierarchy" field of the "Message display" tab in the OS project editor.



9.3.6 Audible interrupt signaling

Process failures and errors can be indicated by audible signals, as well as output in the message list. The signal is issued by means of a signal module or active loudspeaker by outputting a multimedia (Wave) file via the computer's sound card.

The Horn editor in the WinCC Explorer offers numerous options for different audible signals to be triggered for individual message classes, areas, and priorities, once a corresponding internal tag (horn group) has been created.

Note

Information on the function and installation of signal modules can be found in the "Process Control System PCS 7 WinCC Basic Process Control" (http://support.automation.siemens.com/WW/view/en/1400148) manual.

As of PCS 7 V7.0, the "Multiple acknowledgment in the following group" function has been added to the horn multiple acknowledgment options in the Horn editor. Using the new function for multiple acknowledgment is recommended in PCS 7 V7.0.

9.3.7 Time stamp

Messages are generated in different areas and at various positions within PCS 7. The origin of the message will, therefore, affect its time stamp.

All messages are archived and are displayed in the same way, regardless of their origin. AS and I/O messages are forwarded to the OS servers separately via the plant bus. They already contain the appropriate time stamp. The OS server arranges all messages in the correct order.

To ensure that the correct time stamp is always available, you must configure time synchronization between all the components of the PCS 7 project.

Origin	Configuration of the message text	Time stamp place of origin	Meaning in PCS 7
Operator station (OS)	In OS "alarm logging"	In the OS	OS system messages
Automation system (AS)	In the instances of the function block (e.g. CTRL_PID or MEAS_MON)	In the AS	Process messages and AS system messages from the SIMATIC station
Distributed I/O (ET 200M, ET 200iSP, SimcodePro)	In the instances of function block IM_DRV	In the ET 200M via IM 153-2	Selected initial-value-acquisition events in the event of a plant failure (10 ms accuracy)

Note

Information on the time stamping in the distributed I/O can be found in the "SIMATIC Process Control System PCS 7 High-Precision Time Stamp" (http://support.automation.siemens.com/WW/view/en/68154111) manual.

9.4 Archiving

9.4.1 Introduction

Backing up process values and messages

In a PCS 7 plant, you can archive various types of data which are produced in process mode. This data includes process values (analog and binary) and messages.

PCS 7 provides the option of automatically creating archive tags for process values that are marked accordingly. In order for this to happen, the process values must be labeled as relevant for archiving in the SIMATIC Manager using the "Archive" attribute. This attribute can only be set for block I/Os intended for operator control and monitoring. The available labels "Archiving" and "Long-term archiving", specify whether the process value should also be saved for the long term if a Process Historian or Central Archive Server (CAS) is used. If you have selected the "Create archives" option, PCS 7 then creates the labeled archive tags automatically when the "Compile OS" function is executed.

The recording and archiving times can be adapted to the physical type of the process tag immediately after this step in a clear display (in the SIMATIC Manager process object view, for example).

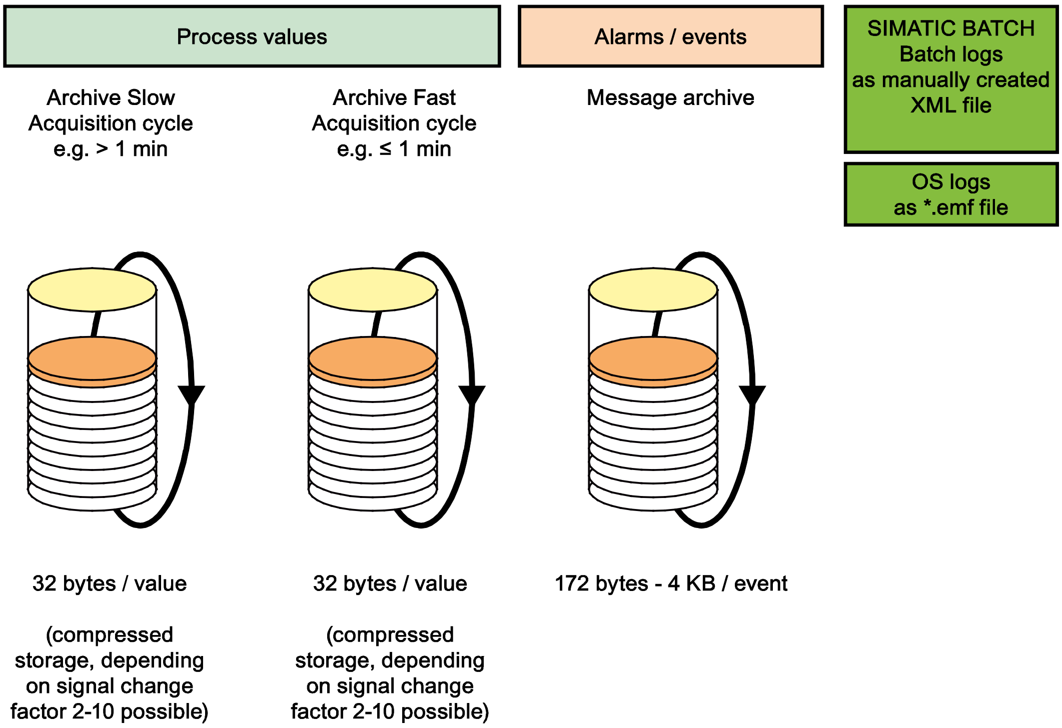
The individual process tags can be roughly divided into four classes for display purposes:

- Temperature measurement (CT) 10 s to 20 s
- Level measurement (CL) 5 s to 10 s
- Pressure measurement (CP) 3 s to 5 s
- Flow measurement (CF) 0.5 s to 3 s

Depending on how the components have been dimensioned, their values may differ from the example values given here.

By default, archiving is performed locally on the OS servers. The PCS 7 system distinguishes between archive tags which must be archived in intervals of under one minute (TagLogging Fast) and those which must be archived in intervals of over one minute (TagLogging Slow), where one minute is the default setting. The system assigns the tags to two separate archive databases accordingly in online mode. If these archive values are mixed together in the configurable "process value archives" or the system archive, this will not have any effect on the process of assigning them to different databases.

The figure below shows the structure of the archives, which are designed as circular logs and use single segments. If a segment is full, a backup of it can be created straightaway. To this end, a copy of the segment is transferred to a swap-out location, which you must define. This procedure is extremely important if the central archive server (CAS) or StoragePlus is used.



Organizes circular archives with individual segments

The archive values associated with TagLogging Fast and also with TagLogging Slow (as of PCS 7 V7.0) are saved in the database in a compressed state, although this does not impair the quality of the values.
The compression factor which can be achieved depends on a number of factors, particularly on whether or not the archive values can be combined during the acquisition of measured values by means of a sufficiently large hysteresis setting.
Compression ensures that the size of the values will be reduced by a factor of 0.5. This results in a value that is usually around 6 bytes per measured value, but which can sometimes reach up to 16 bytes per measured value.
A message with the maximum number of associated values and comments requires 4 KB. The minimum value for a message is 172 bytes.

Archive settings

The system always offers two criteria for specifying the archive size of a single segment and the overall size of the circular log:

- Definition of a time period
- Physical size in bytes

If one of these two criteria is exceeded, this will lead to a switch to the next segment in the case of a single segment, or to the overwriting of the first segment of the entire circular log.

As the total hard disk capacity available for archiving is predefined, the specification in bytes is the only criterion which is relevant for the entire circular log.

This specification must be standardized for all three archive databases (TagLogging Fast, TagLogging Slow, and AlarmLogging) in line with the available hard disk capacity.

In practice, you define a time period which you would like to use for TagLogging and make a rough calculation of the associated memory requirements. If a central archive server (CAS) is used, experience has shown that it is sufficient to only create time ranges on the OS servers which cover the period of time a standard operator would need to access the system for the purpose of process control (several days/weeks/months).

9.4.2 Archive configuration for TagLogging Fast and TagLogging Slow

Calculation

Calculation of the memory requirements of all segments for a specified period of y months for TagLogging Fast:

To perform this calculation, you will need to know how many archive values are saved per second on average. You can view this information in a clear format in the SIMATIC Manager's process object view, which is also where the process value archives, created by means of the OS, are read in.

The memory requirements for x bytes are generally calculated as follows:
number of archive values/s * x bytes * 60 s/min * 60 min/h * 24 h/day * 31 days/month * y months

A specification comprising days or weeks is usually used for a single segment. A segment change faster than one day may not be used, as this would make the number of segments to be connected to the MS SQL database when the OS server starts up too large, thus impairing performance.

Note

As a rule, no more than 200 single segments (for the TagLogging Fast/Slow and AlarmLogging archive databases) may be generated in total.

The maximum size of a single segment should not exceed 700 MB (PCS 7 prior to V8.0) or 2 GB (PCS 7 after V8.0).

The size of a single segment in bytes can also be calculated using the definition provided above. It is not the decisive criterion, but it does need to be checked. In the event of a swap-out to the CAS, a single segment must be no larger than a single segment on the CAS, which is in turn defined by the backup medium selected there (e.g. CD/DVD).

For additional information, refer to the section "Central archive server (CAS) (Page 273)".

Example

You are planning on using a period of around 2 months: You have calculated a mean value of 750 archive values/s for TagLogging Fast.

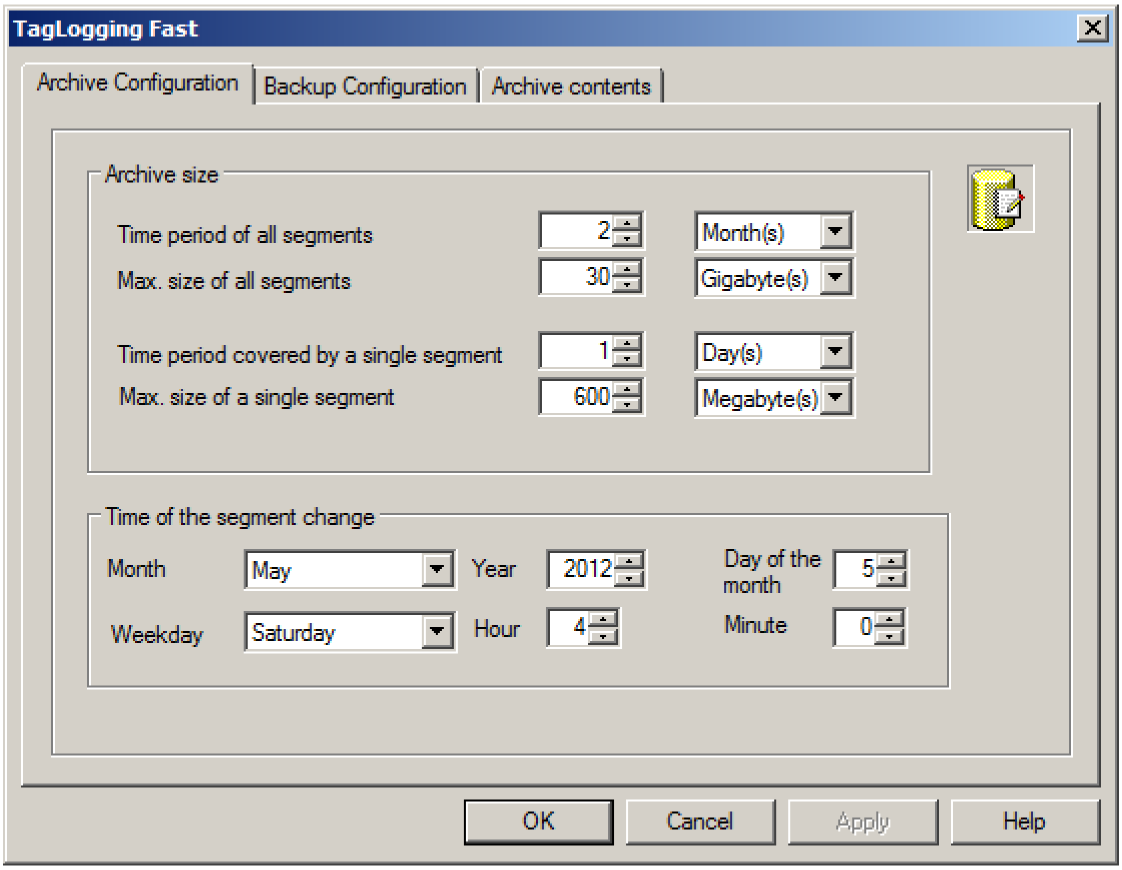
- The maximum size for all segments is calculated as follows:
  - Where a memory requirement of 16 bytes per measured value is assumed:
    approx. 60 GB
    (750 archive values/s * 16 bytes/value * 60 s/min * 60 min/h * 24 h/day * 31 days/month * 2 months)
  - Where a memory requirement of 6 bytes per measured value is assumed:
    approx. 22 GB
    (750 archive values/s * 6 bytes/value * 60 s/min * 60 min/h * 24 h/day * 31 days/month * 2 months)

  In our example, we have selected 30 GB.
- The following is calculated for a single segment per day:
  - Where a memory requirement of 16 bytes per measured value is assumed:
    approx. 1 GB
    (750 archive values/s * 16 bytes/value * 60 s/min * 60 min/h * 24 h/day * 1 day)
  - Where a memory requirement of 6 bytes per measured value is assumed:
    approx. 370 MB
    (750 archive values/s * 6 bytes/value * 60 s/min * 60 min/h * 24 h/day * 1 day)
    In our example, we have selected 600 MB.

Note

If a CAS is used, for reasons of performance we recommend that you set the size of a single segment to a maximum of 700 MB.

You must then make the following corresponding settings in the "TagLogging Fast" configuration of the "TagLogging" editor:



You proceed in exactly the same way for "TagLogging Slow". You have calculated a mean value of 100 archive values/s for TagLogging Slow.

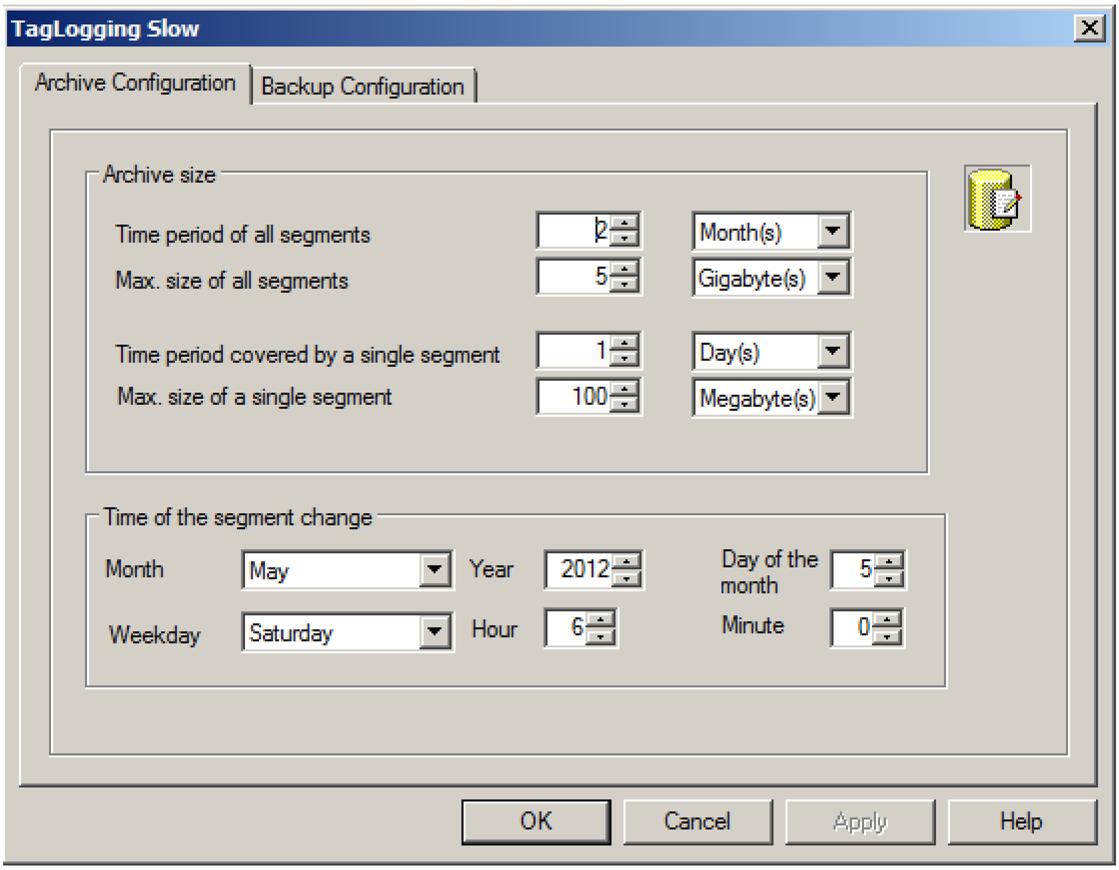
- The maximum size for all segments is calculated as follows:
  - Where a memory requirement of 16 bytes per measured value is assumed:
    approx. 8 GB
    (100 archive values/s * 16 bytes/value * 60 s/min * 60 min/h * 24 h/day * 31 days/month * 2 months)
  - Where a memory requirement of 6 bytes per measured value is assumed:
    approx. 3 GB
    (100 archive values/s * 6 bytes/value * 60 s/min * 60 min/h * 24 h/day * 31 days/month * 2 months)

  In our example, we have selected 5 GB.
- The following is calculated for a single segment per day:
  - Where a memory requirement of 16 bytes per measured value is assumed:
    approx. 130 MB
    (100 archive values/s * 16 bytes/value * 60 s/min * 60 min/h * 24 h/day * 1 day)
  - Where a memory requirement of 6 bytes per measured value is assumed:
    approx. 50 MB
    (100 archive values/s * 6 bytes/value * 60 s/min * 60 min/h * 24 h/day * 1 day)
    In our example, we have selected 100 MB.

    Note

    If a CAS is used, for reasons of performance we recommend that you set the size of a single segment to a maximum of 700 MB.

You must then make the following corresponding settings in the "TagLogging Slow" configuration of the "TagLogging" editor:



9.4.3 Archive configuration for AlarmLogging

Calculation

Unlike with TagLogging, messages occur as events and you must make assumptions, for example, as regards an average message load which is continuously present. These assumptions can differ from one another considerably, depending on the technology/sector in question.

In practice, however, you can also proceed in another way, by calculating the TagLogging requirement and adding the available, unused hard disk memory space to the AlarmLogging database. This would then become the specification for the maximum size of all segments.

The memory requirements are generally calculated as follows:

Number of messages/s * 4 KB/message * 60 s/min * 60 min/h * 24 h/day * 31 days/month * y months

Example

You assume that the number of events in your plant is 1 message/s.

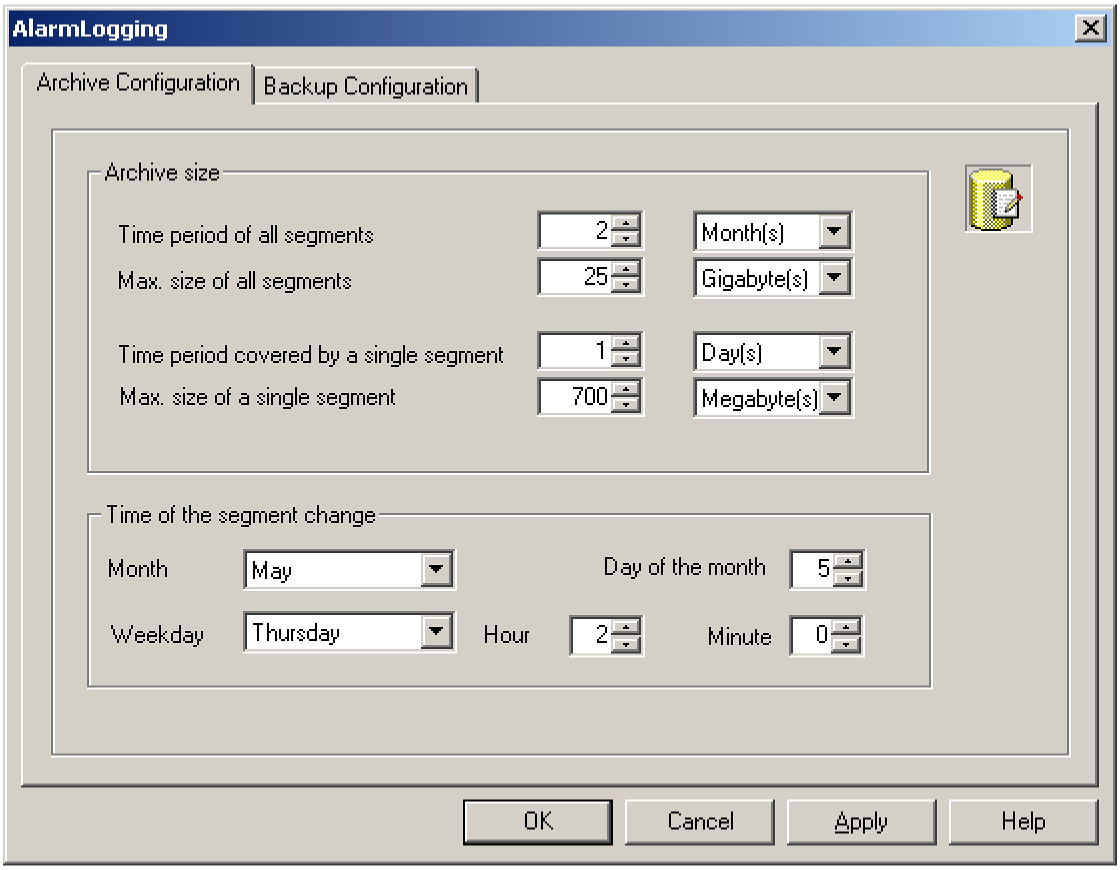
- The maximum size for all segments is calculated as follows:
  approx. 20 GB
  (1 message/s * 4,000 bytes/message * 60 s/min * 60 min/h * 24 h/day * 31 days/month * 2 months)
- The following is calculated for a single segment per day:
  approx. 330 MB
  (1 message/s * 4,000 bytes/message * 60 s/min * 60 min/h * 24 h/day * 1 day)
  Deliberately set this limit higher so that you can still achieve a daily swap-out even if a message burst occurs. In our example, we have selected 700 MB.

Note

As a rule, no more than 200 single segments (for the TagLogging Fast/Slow and AlarmLogging archive databases) may be generated in total.

If a CAS is used, for reasons of performance we recommend that the maximum size of a single segment you select should be 700 MB.

You must then make the following settings in the "AlarmLogging" editor:



In our example, therefore, the hard disk not only has to provide the TagLogging memory requirements, but also an additional 60 GB on the OS server for archiving purposes (total of "Max. size of all segments").

9.4.4 Long-term archiving using SIMATIC PCS 7 Process Historian

9.4.4.1 Introduction

Introduction

The new Process Historian (PH) with reporting system is being introduced in parallel with the Central Archive Server (CAS) archiving system as part of the introduction of SIMATIC PCS 7 V8.0.

Note

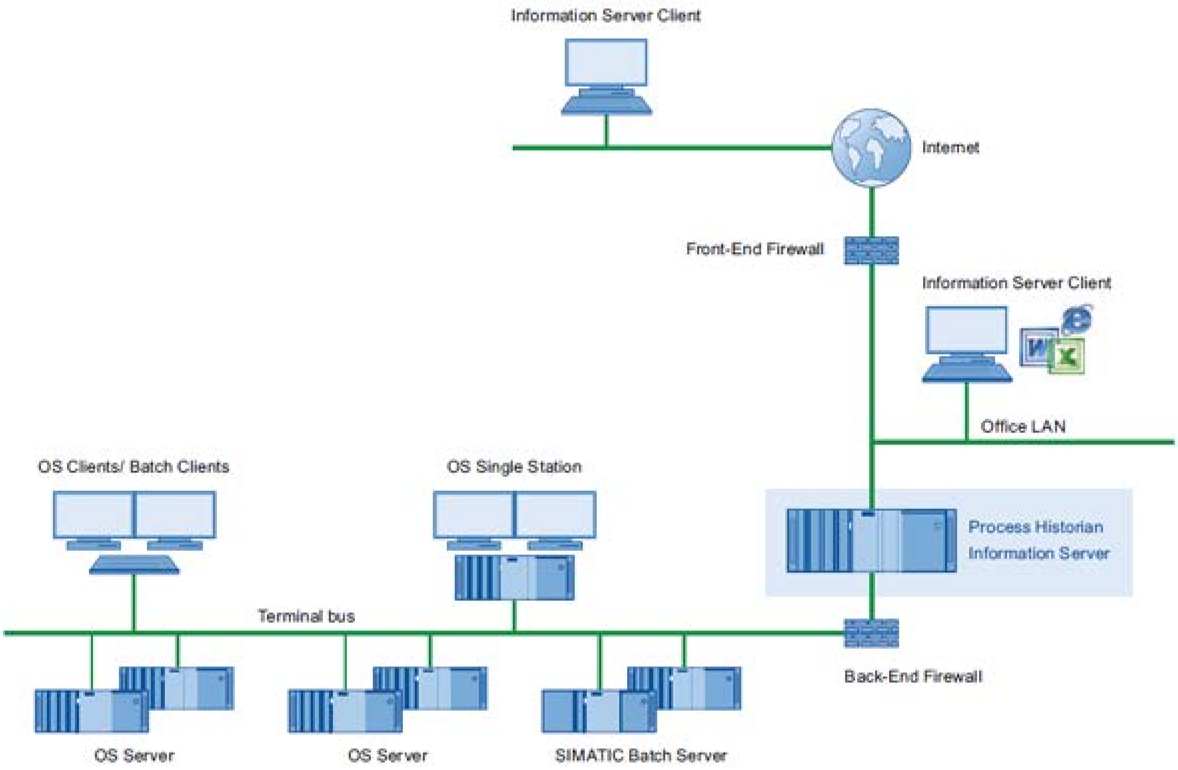
Migration of CAS data to PH data is not possible in the PH version as of PCS 7 V8.0 SP1.

As of PCS 7 V8.0 SP1, redundant operation of the PH is possible.

Process Historian and Information Server

PCS 7 Process Historian (PH) is a long-term archiving server for process data. Tags, alarms and SIMATIC BATCH data can be archived on the PH. The Information Server (IS) can be used to create reports based on the data saved in the PH. Reports can be created with this using a web application or via a corresponding add-in in an Office application (Word or Excel).

The following image shows a schematic configuration in the SIMATIC PCS 7 environment which is suited to smaller installations with the corresponding quantity structure:



Note

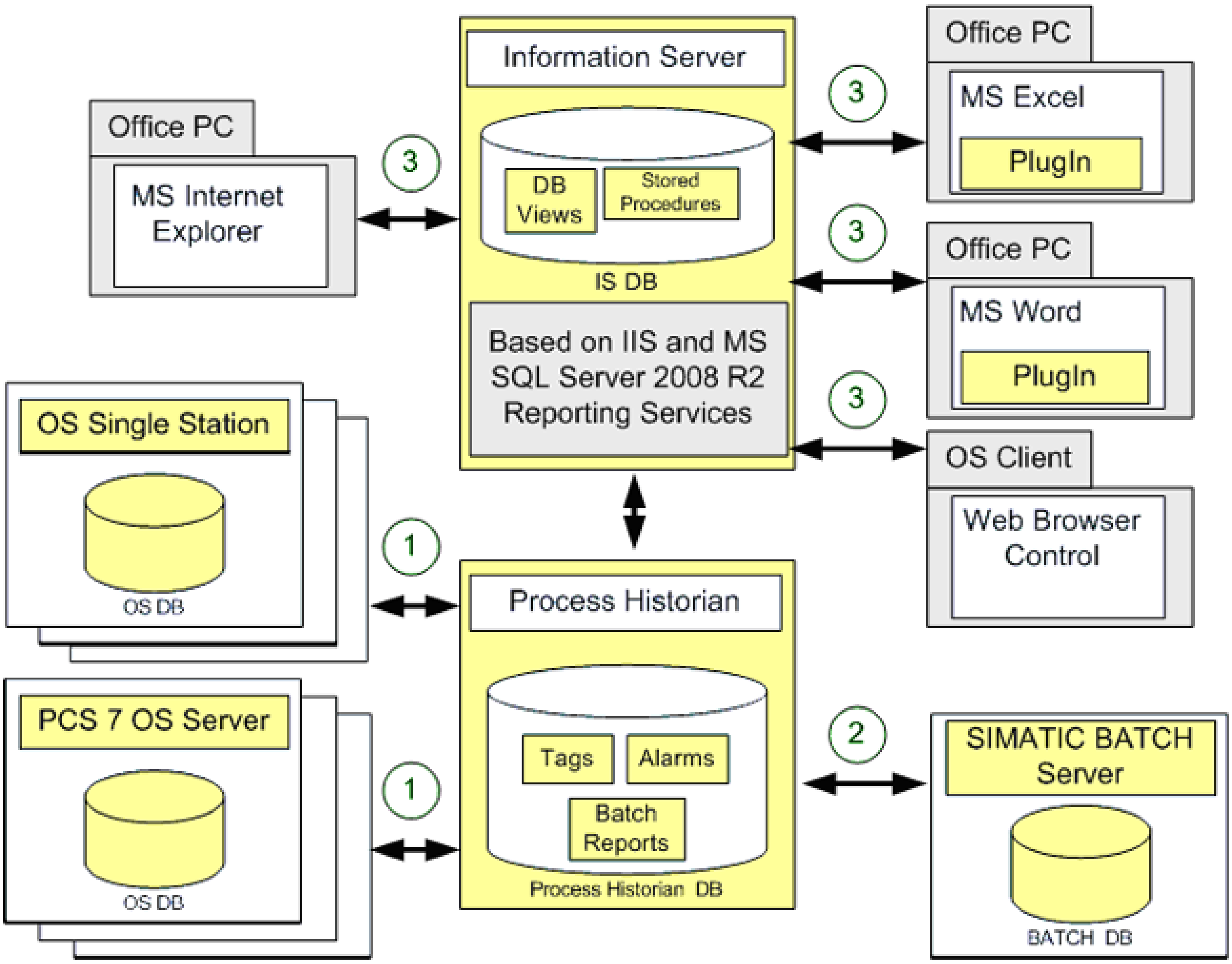
The "Process Historian" and "Information Server" components can be installed on a computer.

How the Process Historian and Information Server work

All OS servers and OS single stations for which there is a Process Historian (PH) configured in the PCS 7 project swap out your alarms to the PH in runtime. In addition all OS archive tags identified as "Long-term archiving" are archived on the PH for runtime in real time. The PH is an open system. This means that the data archived on the PH can be processed via SQL queries. The standard database interfaces of the MS SQL server are supported.

The Information Server (IS) is a web-based reporting system. The IS provides the user with the data from the PH database using the Internet Information Service (IIS).

The following image provides an overview of the Process Historian and Information Server mode of operation:



1. Prompt data archiving of the OS single stations and the OS server on the PH.
2. SIMATIC BATCH swaps out its batch data to the PH in the manner in which this is also available in the BATCH database (native archiving).
3. IS client access to the IS for report creation

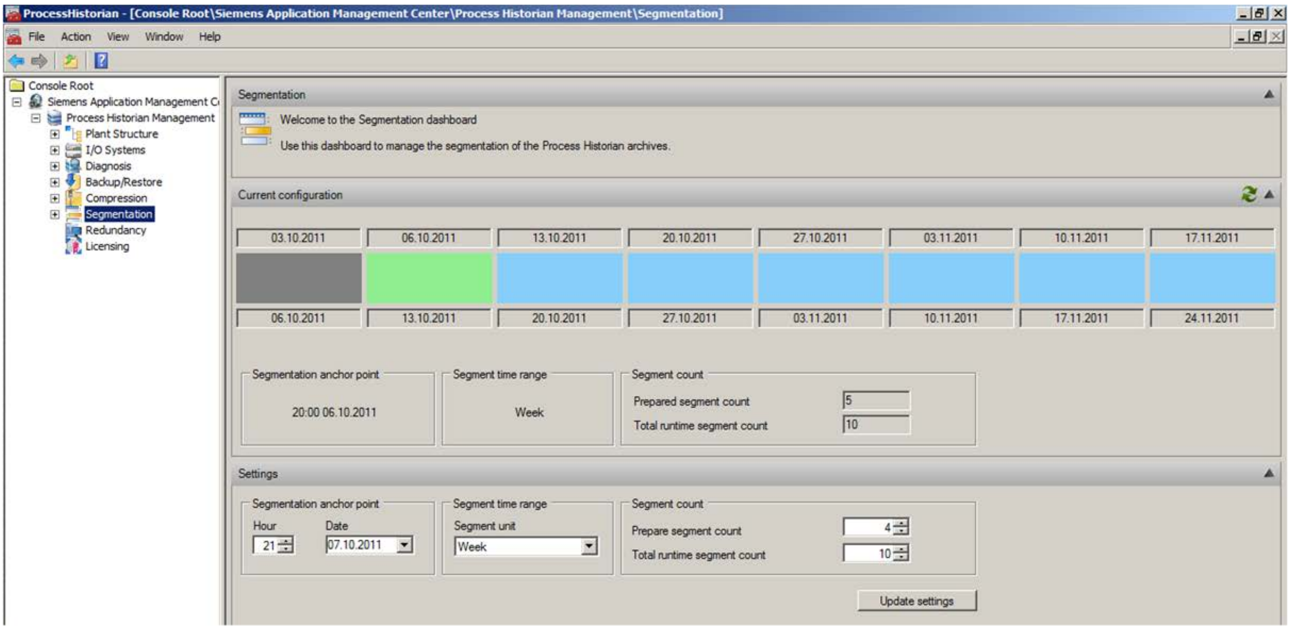
9.4.4.2 Process Historian (PH)

Introduction

The Process Historian (PH) is used to archive process values, messages and batch data from the process control system SIMATIC PCS 7 V8.0.

The process values and messages managed in the PH database can be displayed on OS clients and OS single stations clearly and graphically (with WinCC Alarm or WinCC Trend Control). Data selection is supported by integrated filter functions. Messages and process values can be displayed both in tabular form as well as graphically. The saved data is divided into segments for processing and managing very large amounts of data.

The following figure shows an example of segmenting in the PH:



There is also the option of exporting process values in CSV format for further processing in other Windows applications, e.g. Microsoft Excel.

The SQL server is used for the data archiving. The managed data can be swapped out to common storage media (backup/restore).

The PH does not need a connection to the system bus. It can be connected to the OS and Batch Servers of the SIMATIC PCS 7 plant via terminal bus, for example, using the integrated network connection (on-board Ethernet RJ45 port) of the server.

The PH is suitable as long-term data storage for PCS 7 projects. You can swap out the data from multiple projects/multiprojects to a PH.

Functions of the Process Historian

The PH includes the following functions:

- All OS process data is available promptly in the PH.
- Batch archives from SIMATIC BATCH are saved with native archiving in the PH.
- The PH also supports single stations.
- The PH supports multiple PCS 7 projects in parallel.
- Easy access to historical process data via web and Office applications.
- Widely-distributed standard reporting system which is adapted to PCS 7 reporting, including standard report templates.
- The PH can be integrated easily into existing IT infrastructures and web portals.
- Large amounts of process data can be processed across multiple projects and presented in reports.
- Report templates can be created and adapted flexibly.
- Data from the PH can be presented at the OS runtime level with the WinCC Trend Control und WinCC Alarm Control.
- PH data can be accessed via OPC HDA in association with the OpenPCS 7 station.
- Backup/restore function on external data storage media

Licensing

A "Process Historian Server" basic license is required to operate the PH. The "Process Historian Server Redundancy" license is required for a redundantly configured system. This includes a redundancy license in addition to the basic license. The "Process Historian and Information Server" license is offered for a combined PH and Information Server.

Note

As of PCS 7 V8.0 SP1, no countable PH archive license is required for a PCS 7 OS as a PH data source.

There are the following license types for the PH:

- Process Historian server
- Process Historian Server Redundancy
- Process Historian Archive-BATCH
- Process Historian and Information Server

Hardware requirements

Using an "IPC 847C" type server is recommended for PCS 7 plants with up to three OS servers (max. archiving load of 1000 values/sec. per OS server).

With intensive use a PH system is not a typical application area for an IPC. Using a SIMATIC Premium server is therefore recommended for large plants.

The work memory and number of processors and hard disks can be expanded with the configuration.

Software requirements

The following software requirements apply to the PH:

- Windows Server 2008 R2 SP1 Standard Edition (64 bit)
- Microsoft SQL-Server 2008 R2 SP1 Standard Edition (64 bit)
- MS Message Queuing

Note

The PH is approved exclusively for 64-bit operating systems.

Additional information

You can find additional information on the system requirements in the following documentation:

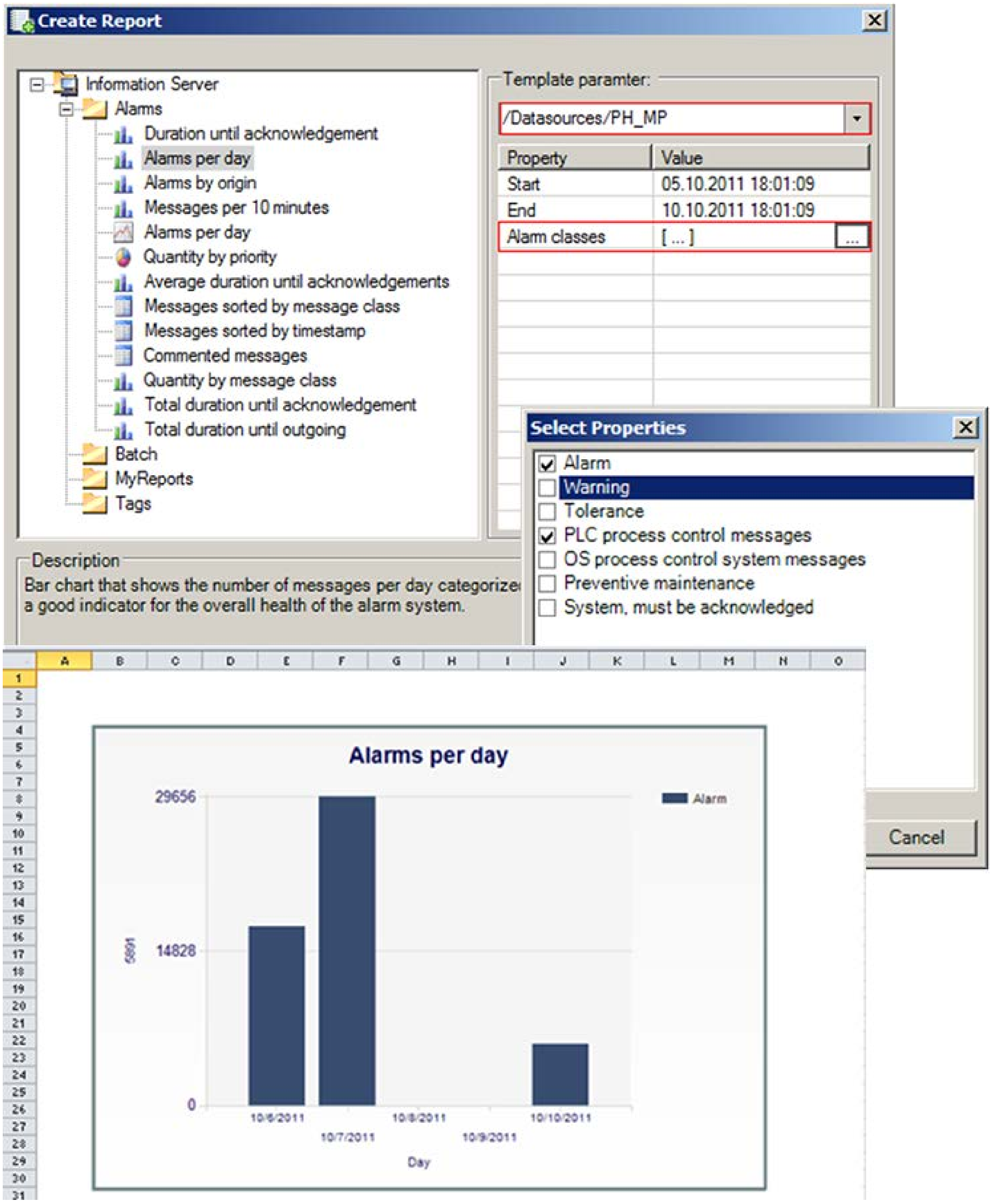
- "SIMATIC Process Historian Administration" (http://support.automation.siemens.com/WW/view/en/68713474) manual
- Process Historian Installation Notes
- Application note "Installation and Commissioning of Process Historian/Information Server in the PCS 7 Environment" (http://support.automation.siemens.com/WW/view/en/66579062).

9.4.4.3 Information Server (IS)

Introduction

The Information Server is the Process Historian reporting system for compiling and evaluating data or presenting it in graphic form. Based on Microsoft Reporting Services it provides web-based Thin Client access to historical data.

The following image shows an example creation and view of a graphic (report) using MS Office Plug-in at MS Excel level:

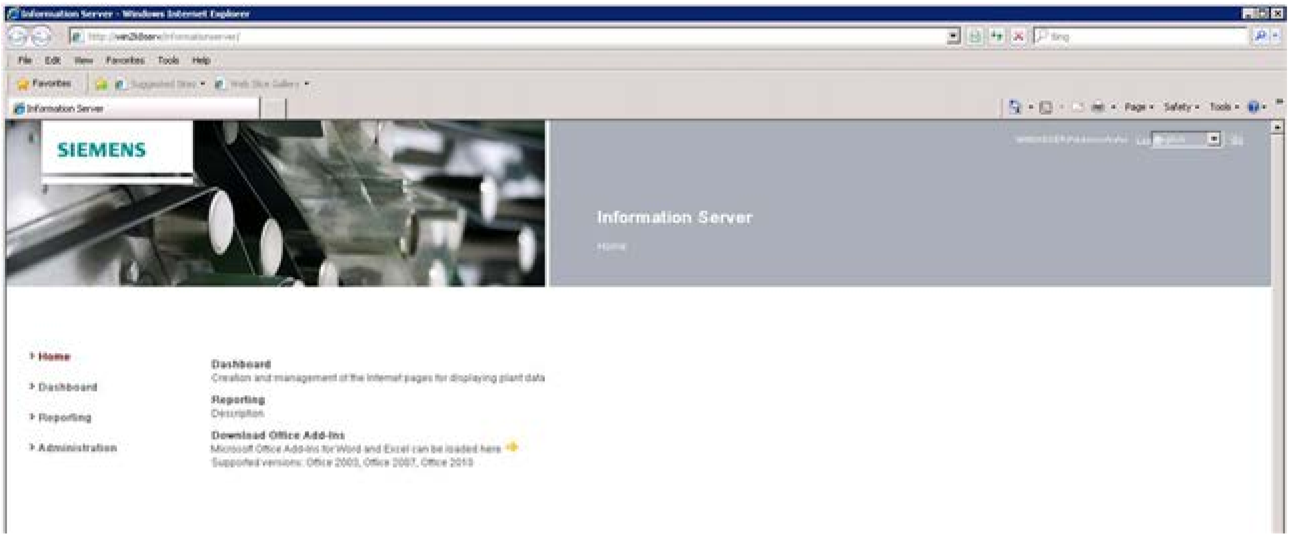


You can access the Information Server web application via Internet Explorer with the corresponding access rights. In addition to displaying reports, the web application is also used for administering the Information Server.

The Information Server uses the Internet Information Service (IIS) to provide data to an IS client.

An add-in for Microsoft Word and Excel provides additional access to the Process Historian database.

The following image shows an example of the Information Server web application:



Functions

The Information Server's functions include:

- Web Front End of the Process Historian
- IIS application
- Access protection
- User administration
- Report creation
- Report management
- Automated sending of reports via e-mail
- Report template uploads and downloads
- Report page creation
- Provision of the Microsoft Office add-in

Licensing

The License Manager counts all active report client connections. The Information Server client (MS Internet Explorer, Excel or Word application) accesses the Information Server via an installed add-in. This captures all active report clients for each computer and verifies a license on the IS.

The following table shows the IS licenses:

Version	Identifier
V8.0	Information server
n.v.	Information Server - Client Access (1 Client)
n.v.	Information Server - Client Access (3 Client)
n.v.	Information Server - Client Access (5 Client)
n.v.	Information Server - Client Access (10 Client)
n.v.	Information Server - Data Source Access (1 Client)
n.v.	Information Server - Data Source Access (3 Client)
n.v. = not versioned	

Note

Only one "Information Server - Data Source Access" license is required for a PCS 7 OS system, even if the system is configured redundantly

Hardware requirements

Using an IPC 547D or IPC 847C is recommended.

Software requirements

The following software requirements apply to the Information Server:

- Windows 7 SP1 Ultimate
- Windows Server 2003 R2 SP2, Windows Server 2008 SP2 Standard Edition
- Windows Server 2008 R2 SP1 Standard Edition (64 bit)
- Internet Information Service

The following are also required for reporting with MS Office:

- Visual Studio Tools for Office VSTO 4.0
- .NET Framework V4.0
- IS Office PlugIn

Additional information

You can find more information in the following manuals:

- Information Server 2013 - Operating Manual (http://support.automation.siemens.com/WW/view/en/68714282)
- Information Server 2013 - Administration (http://support.automation.siemens.com/WW/view/en/68713492)
- Information Server Installation Notes
- Application note "Installation and Commissioning of Process Historian/Information Server in the PCS 7 Environment" (http://support.automation.siemens.com/WW/view/en/66579062)
- Application note "Creating Report Templates for the Information Server on the Process Historian Database in the PCS 7 Environment" (http://support.automation.siemens.com/WW/view/en/64906050)

9.4.5 Long-term Archiving using CAS

9.4.5.1 Central archive server (CAS)

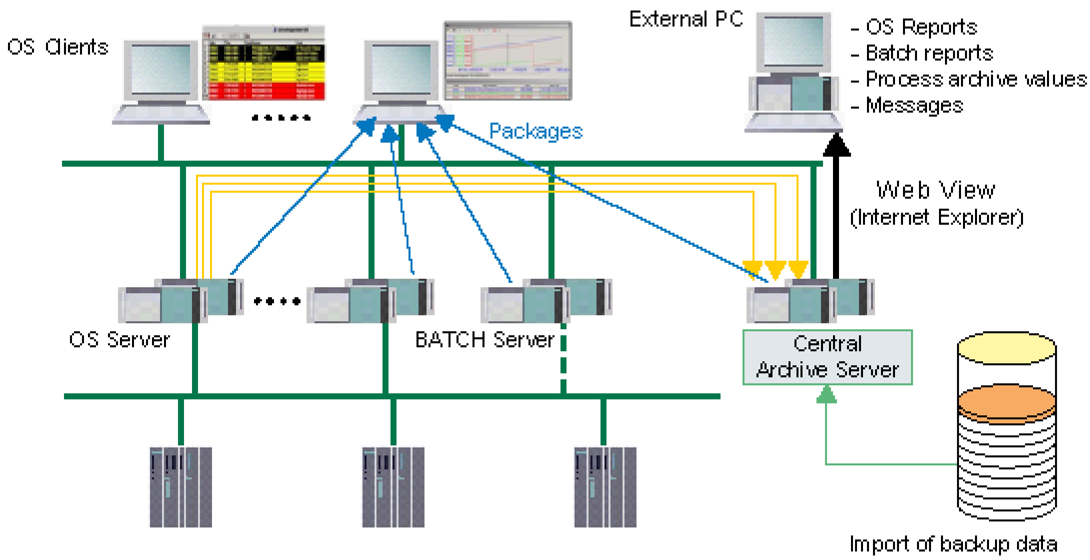
Introduction

The central archive server (CAS) is used for long-term archiving:

- OS archive data (process values and messages)
- OS logs
- SIMATIC BATCH batch data

The data swapped out from the OS archives is managed by CAS in a central database.

Plant configuration with CAS



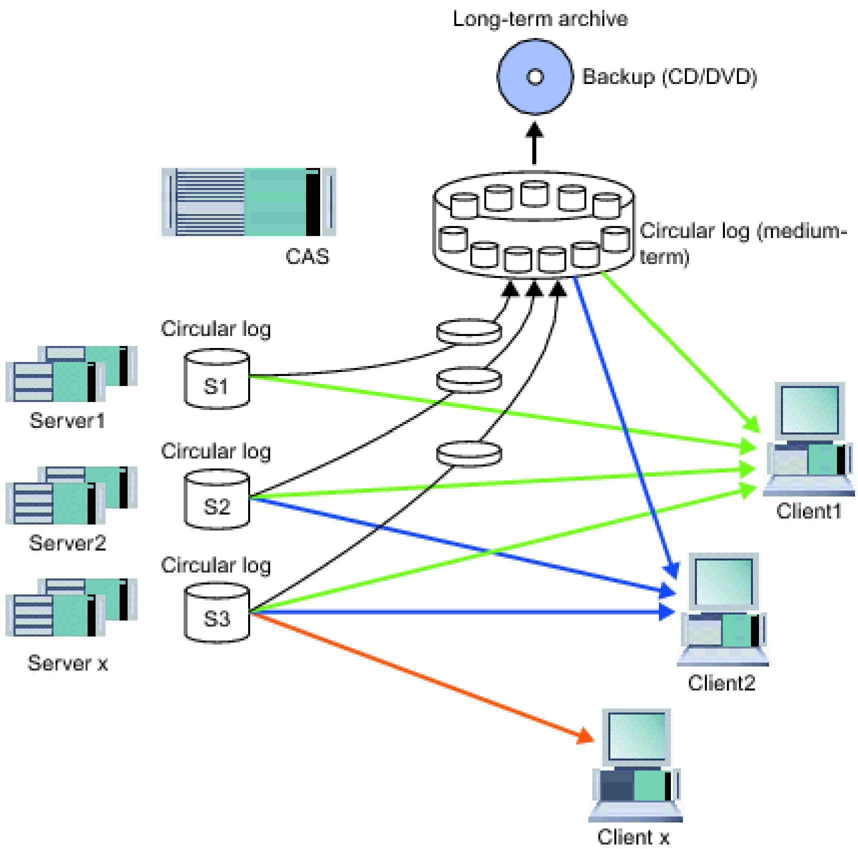
Note

The CAS can be operated with Windows Server 2003 or 2003 R2. Further information can be found in the "Process Control System PCS 7 PC Configuration and Authorization" (http://support.automation.siemens.com/WW/view/en/68157327) manual.

Operating principle

The relevant OS server transfers copies of completed archive segments to the enabled input path (share) of the CAS. The transfer of batch logs from SIMATIC BATCH is controlled by the Batch Control Center.

The received data segments are saved in a database in the CAS. CAS circular logs have the same structure as OS server circular logs. The segment size of these circular logs should be configured such that they can be swapped out to the long-term memory medium.

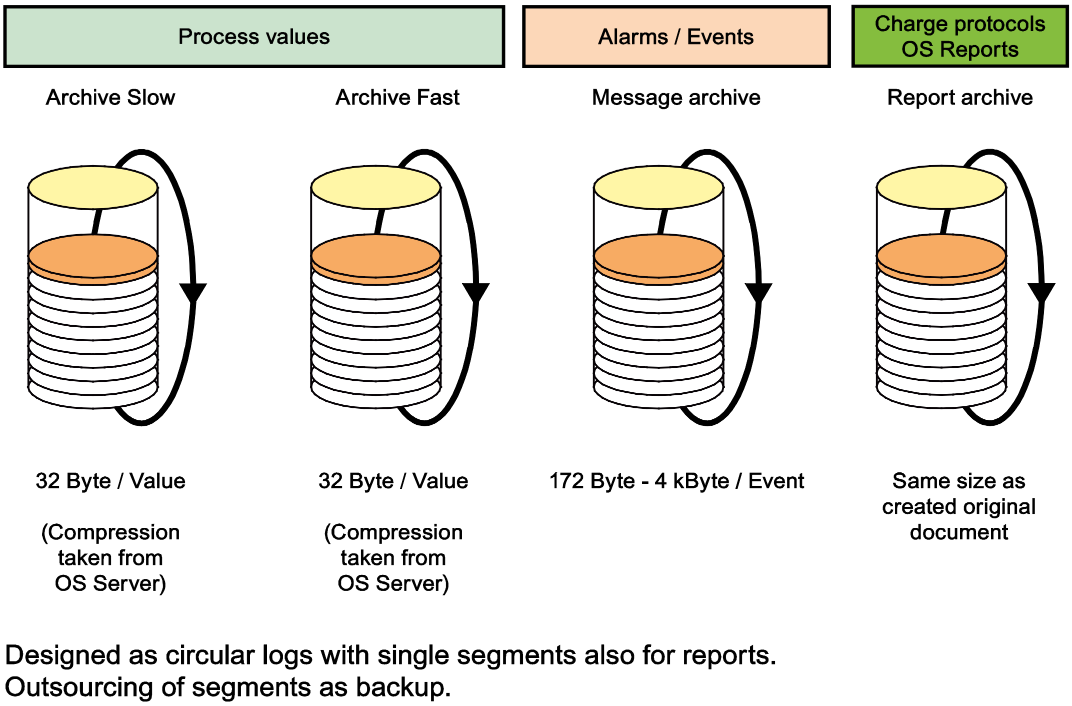


The OS clients can access the process values and messages saved in the CAS. To achieve this, the CAS server data must be assigned to the OS clients.

If the data requested for a selected time range is no longer available in the CAS circular logs either, the corresponding long-term memory medium must be inserted and its data linked to the CAS database again. This is executed on the CAS using the StoragePlus Administration Console. (see Section StoragePlus (Page 284)).

The saved CAS archive data can be displayed using the StoragePlus Web Viewer, as well as on every networked PC via Internet Explorer.

The figure below illustrates how the CAS archive databases are organized, as compared to the OS servers listed in the previous section.



Batch logs are transferred to the enabled input path of the CAS, "ArchiveDir", directly via the Batch Control Center (BCC). This is also possible in the form of a PDF file in addition to the existing XML file type.

The user must activate a prepared script in order to transfer the OS logs generated electronically in the PRT_OUT folder of an OS client project.

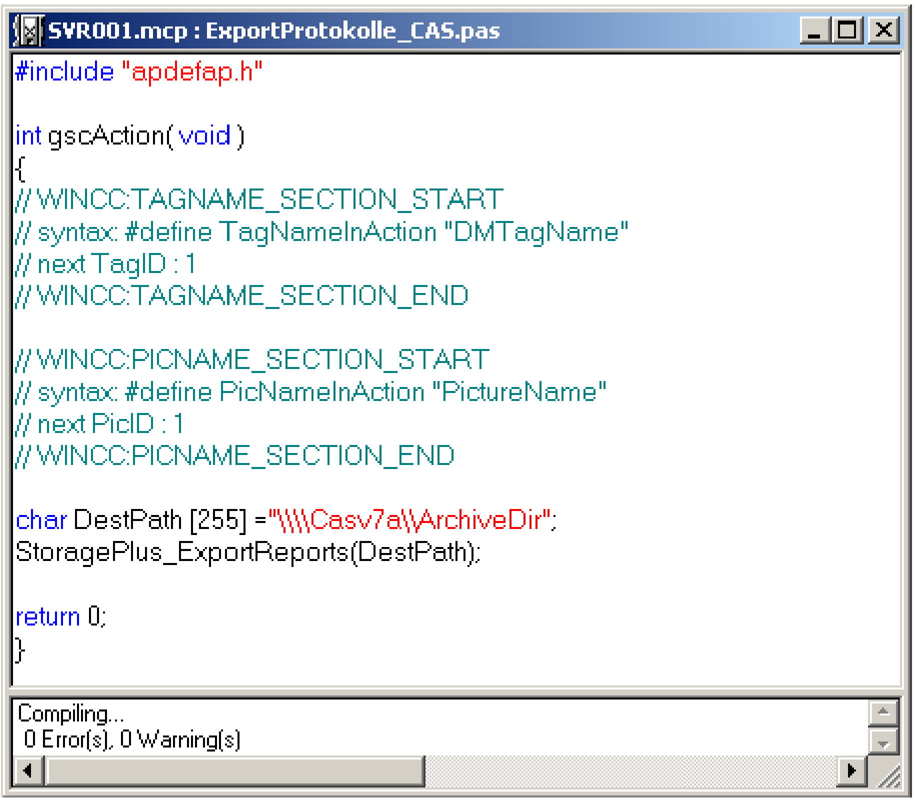
This is executed by means of a global action with a cyclical trigger (e.g. every 10 minutes) and calls the "StoragePlus_Exports" standard script on an OS client.

Note

In PCS 7, only one OS client usually creates the logs, which are to be swapped out to the CAS electronically.

The destination path for the CAS or StoragePlus (DestPath) is "\\\\<TargetcomputerName>\\ArchiveDir".

User script for exporting the OS logs



A check is performed at regular intervals to see whether a log has been output in the "PRT_OUT" folder of the OS client project. The *.emf files found are transferred and then deleted from the OS project.

For a redundant CAS, the redundancy takes care of synchronization for the SIMATIC BATCH batch log.

For OS logs, use the "StoragePlus_ExportsEx" standard script instead and transfer both paths to the redundant CAS computer.

Licensing

If a CAS is used in the project, the TagLogging archive tags are now licensed at this central location, not on the OS servers themselves.

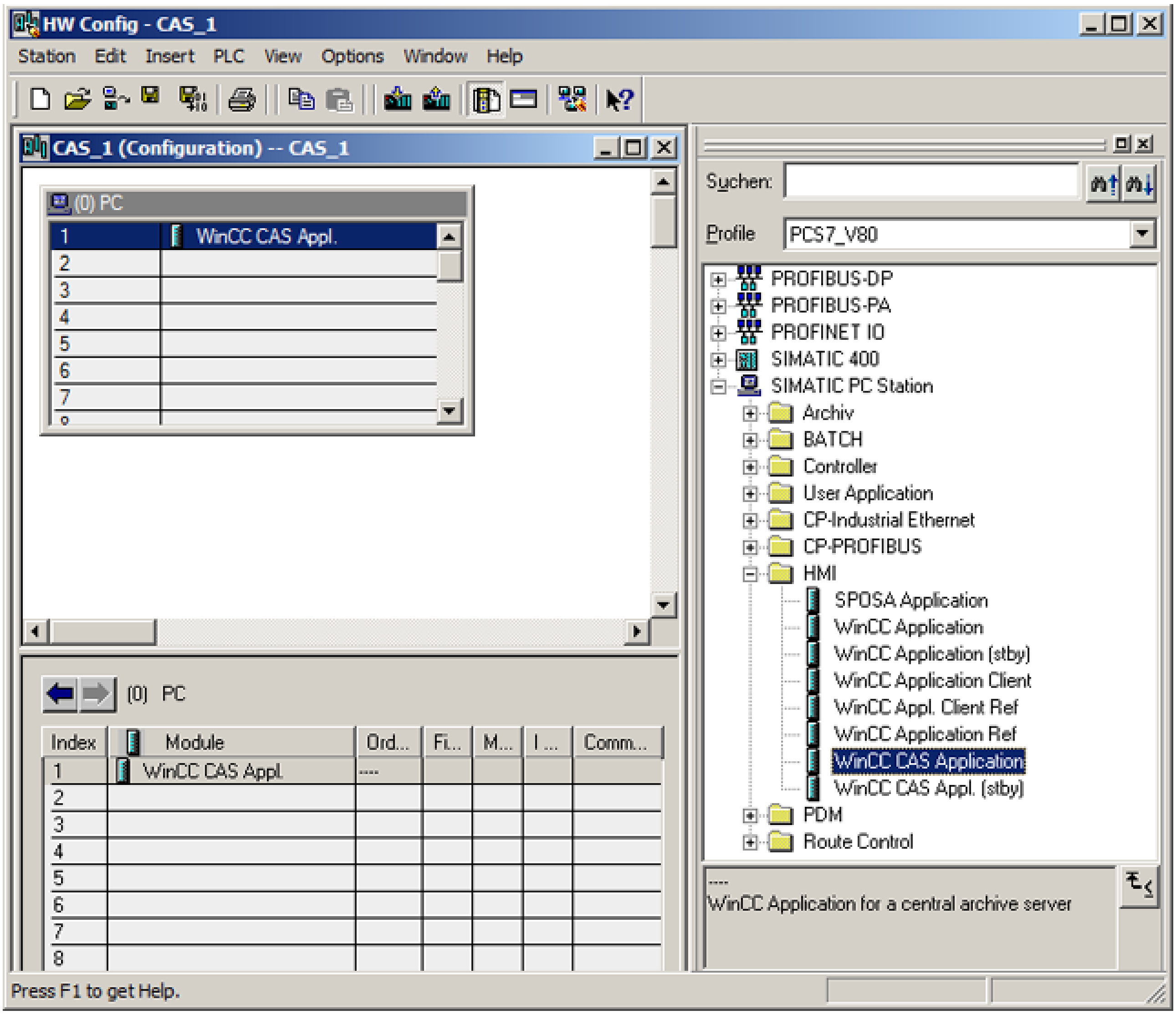
The individual OS servers then obtain the appropriate number of archive licenses required from the CAS remotely.

Archive tags are only counted where their ID, "Archiving" or "Long-term archiving", indicates that they are to be used. This means that archive tags intended for swapping out to the CAS with the ID "Long-term archiving" are not counted on the OS servers.

9.4.5.2 CAS configuration

Procedure

1. In the subproject "CAS_1" in the SIMATIC Manager, select "Insert > Station > SIMATIC PC station" from the shortcut menu and open it in HW Config.
2. Insert a "WinCC CAS Application" from catalog "PCS 7 V8.0".



3. Save and exit HW Config.

Note

CAS can be configured redundantly as of PCS 7 V7.0 SP1 (WinCC CAS Appl. (stby)).

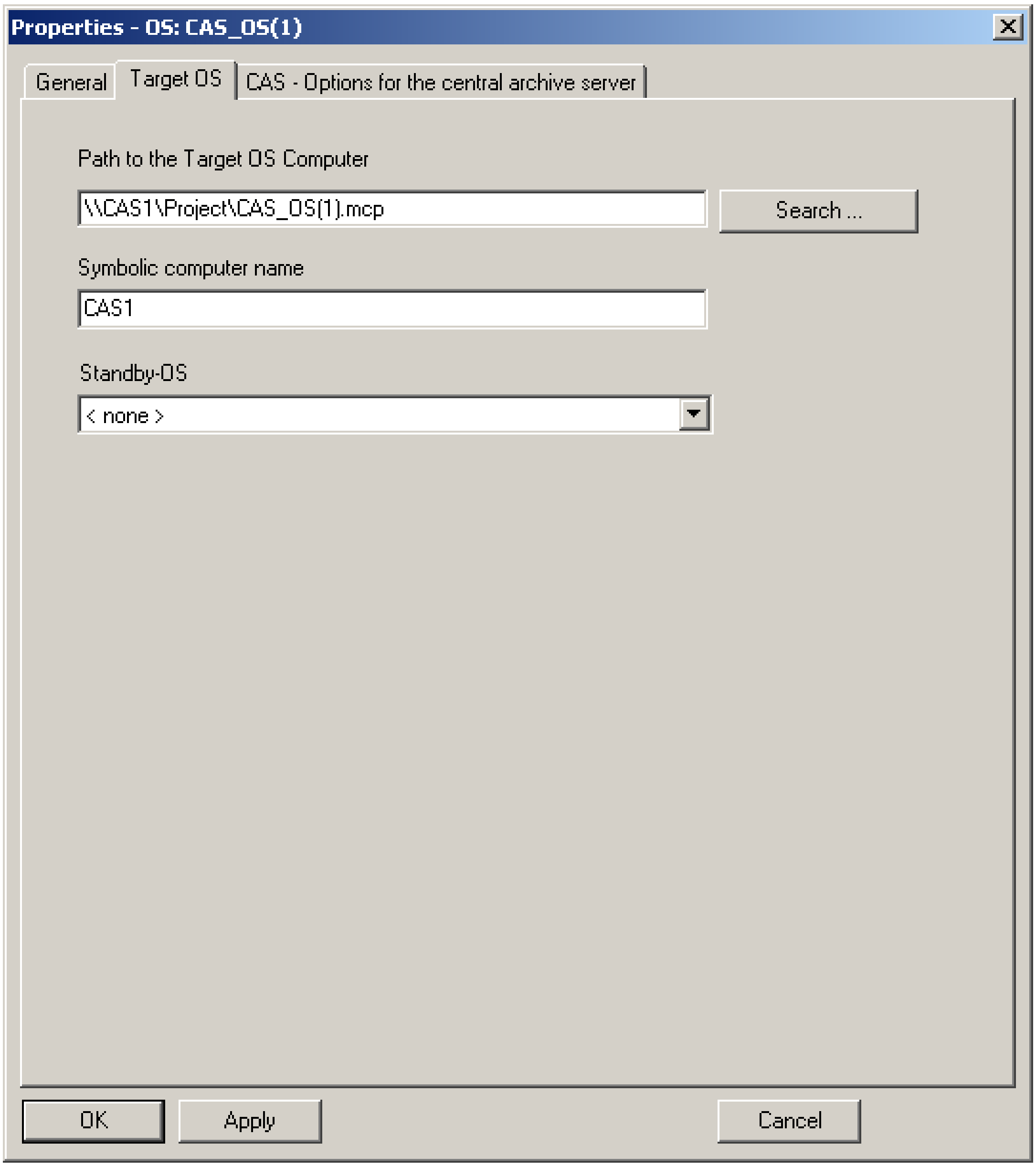
---

4. Enter the symbolic computer name of the archive server and its destination path in the properties dialog of the newly created OS project.

Note

The symbolic computer name is used for the package designation. Always assign unique and meaningful names at this location. This also applies to OS server projects.

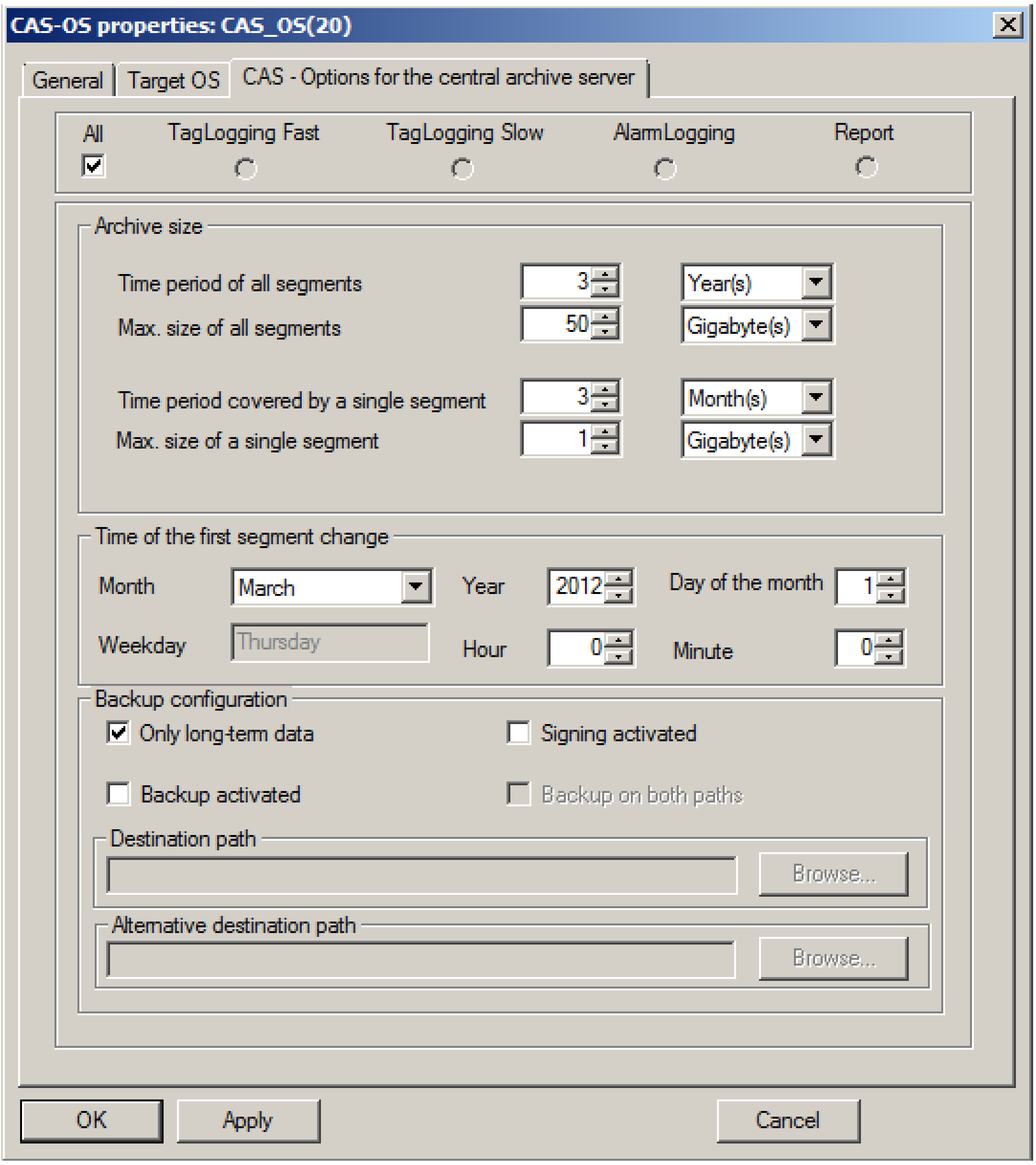
The CAS uses the name of the package in order to internally identify the OS server from which the archive data originates. If package names are subsequently changed, it is no longer possible to access archive data which has already been saved.



Note

One CAS (simple or redundant) can be used in a multiproject.

5. Configure the CAS layout on the "CAS – Options for the central archive server" tab.



Division of memory capacity

The memory capacity of the central archive server which is physically available is divided up between the space required for TagLogging Fast, TagLogging Slow, and AlarmLogging on all OS servers and the total logs generated.

As the CAS accepts this data largely unchanged, the corresponding archive size can be calculated as a relevant entry, along with the approximate associated period that can be used for all segments:

- TagLogging Fast and TagLogging Slow (calculation as in Section Archive configuration for TagLogging Fast and TagLogging Slow (Page 258)).
  Please note, however, that only the number of archive tags displaying the "Long-term archiving" ID description will be used. The default setting in PCS 7 sees the CAS filter only those archive tags intended for long-term storage.
- AlarmLogging (calculation as in section "Archive configuration for AlarmLogging (Page 262)".
- Report, size of the original files generated

Rules governing single segments

The specification of the size of a single segment as a relevant entry is determined by the size of the backup medium to be used. The period covered by a single segment must, therefore, be set to a value that is high enough to ensure it cannot be exceeded.

Taking a CD as an example of a backup medium, a size of 650 MB is selected.
However, for other media a value of 1 GB may suffice, if a great deal of importance is placed on performance when selecting a period and if the operator will need continuous access to CAS archive data for the purpose of process control.

If there is a preference for the CAS to only be accessed in order to evaluate historical data, the entire memory capacity of a DVD can be specified, for example. The latter setting would also be better if a very large hard disk memory capacity were available, as otherwise a disproportionately large number of single segments would have to be connected to the SQL database.

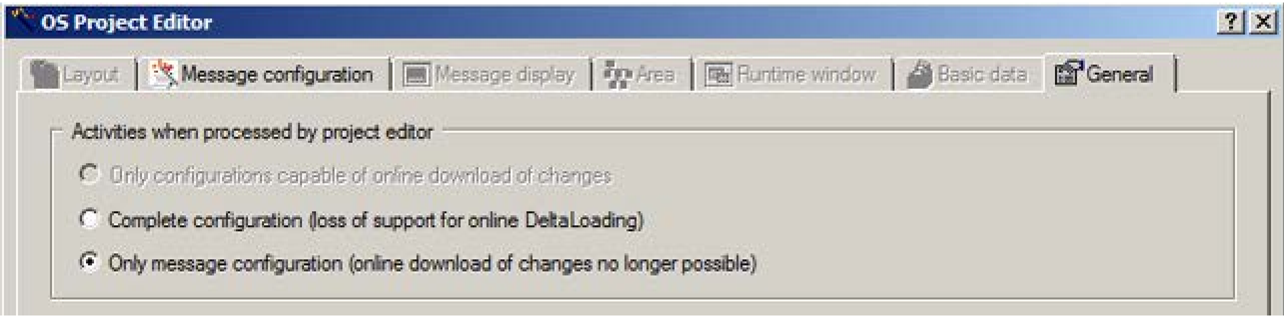
Rules to be observed:

- The specification that there must be no more than 200 single segments in total for the archive databases (TagLogging Fast/Slow, AlarmLogging, and Report) applies to the CAS too.
- In addition, a single segment transferred out by the OS servers must not be larger than the associated single segment in the CAS.

Settings in WinCC Explorer

1. Open the CAS project in WinCC Explorer.
2. Run through the OS project editor once in order to generate the CAS process control messages on the "Message configuration" tab.

   These messages are saved in the CAS database and are then available on the OS clients (default setting "All servers" in the OS client interrupt control area).



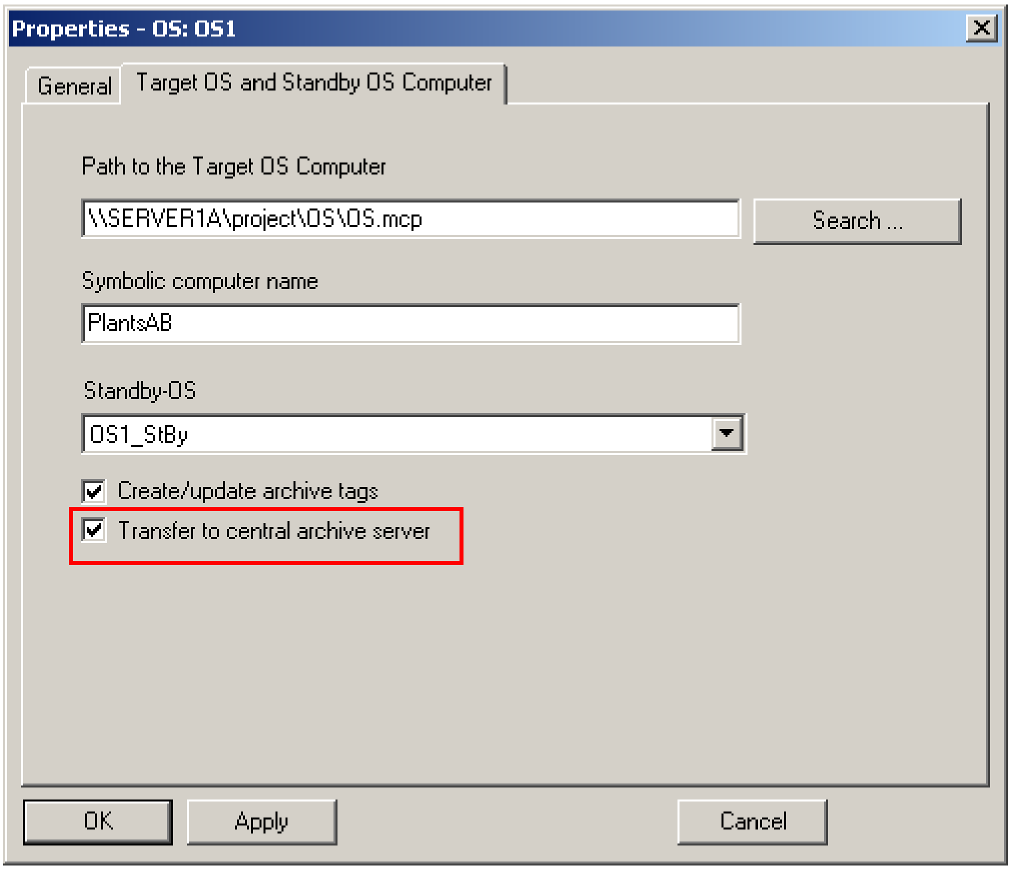
3. Open the "Time Synchronization" editor and integrate the CAS into the plant's existing time synchronization concept.
4. If the CAS is operated in a redundant configuration, you need to activate "Redundancy".

   The same algorithm as that used for the OS servers is used for online updates. However, the selections for updates will be deactivated following a failure of the process link and a client switchover, since the CAS does not have a process connection. Following the initial download, the redundancy settings must be checked with regard to redundancy monitoring (e.g. connecting cable via COM port and/or Ethernet connection) on both target computers directly and saved there.
5. Close WinCC Explorer, without having made any changes to the startup list (leave graphics runtime deactivated) or any other individual configuration settings.

Final settings in the SIMATIC Manager

1. Now, use the SIMATIC Manager to generate the server data for the CAS and assign it to all OS clients which will need to access CAS data.
2. If it has not been done already, activate the "Transfer to central archive server" option in the properties dialog of the OS server project.

   This ensures that, when the next download to the target computers is performed, the swap-out locations are entered in the CAS and, if applicable for a redundant CAS, in the TagLogging Fast/Slow and AlarmLogging configurations automatically. If StoragePlus is used, this step must be performed manually.



9.4.6 StoragePlus

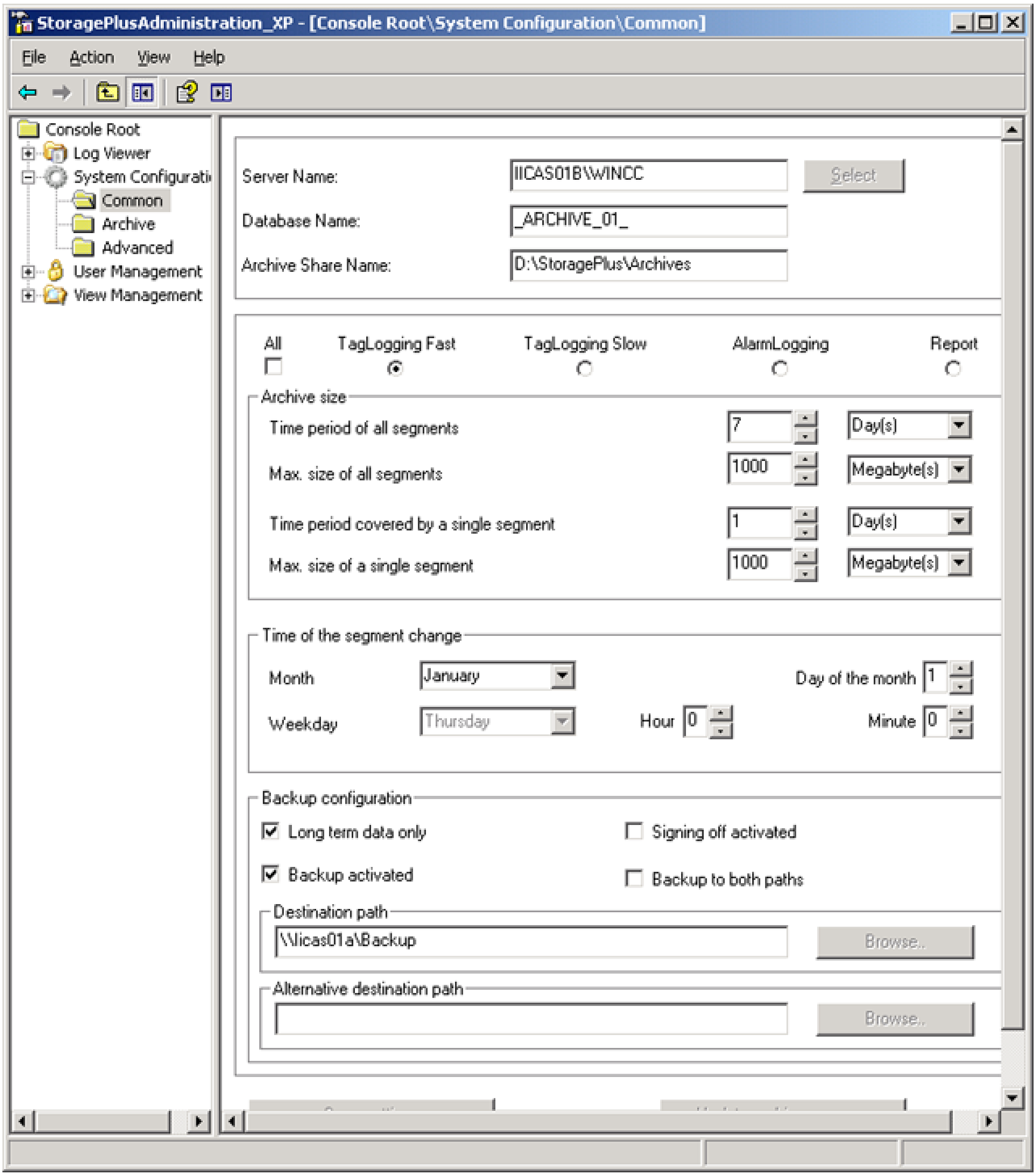
Use of StoragePlus/Comparison with CAS

StoragePlus is used on a separate computer and cannot be operated redundantly. It can only be operated and views can only be retrieved on a local level, on the StoragePlus computer.

It is not possible to use Internet Explorer to access StoragePlus from other computers, nor to retrieve data via the OS system.

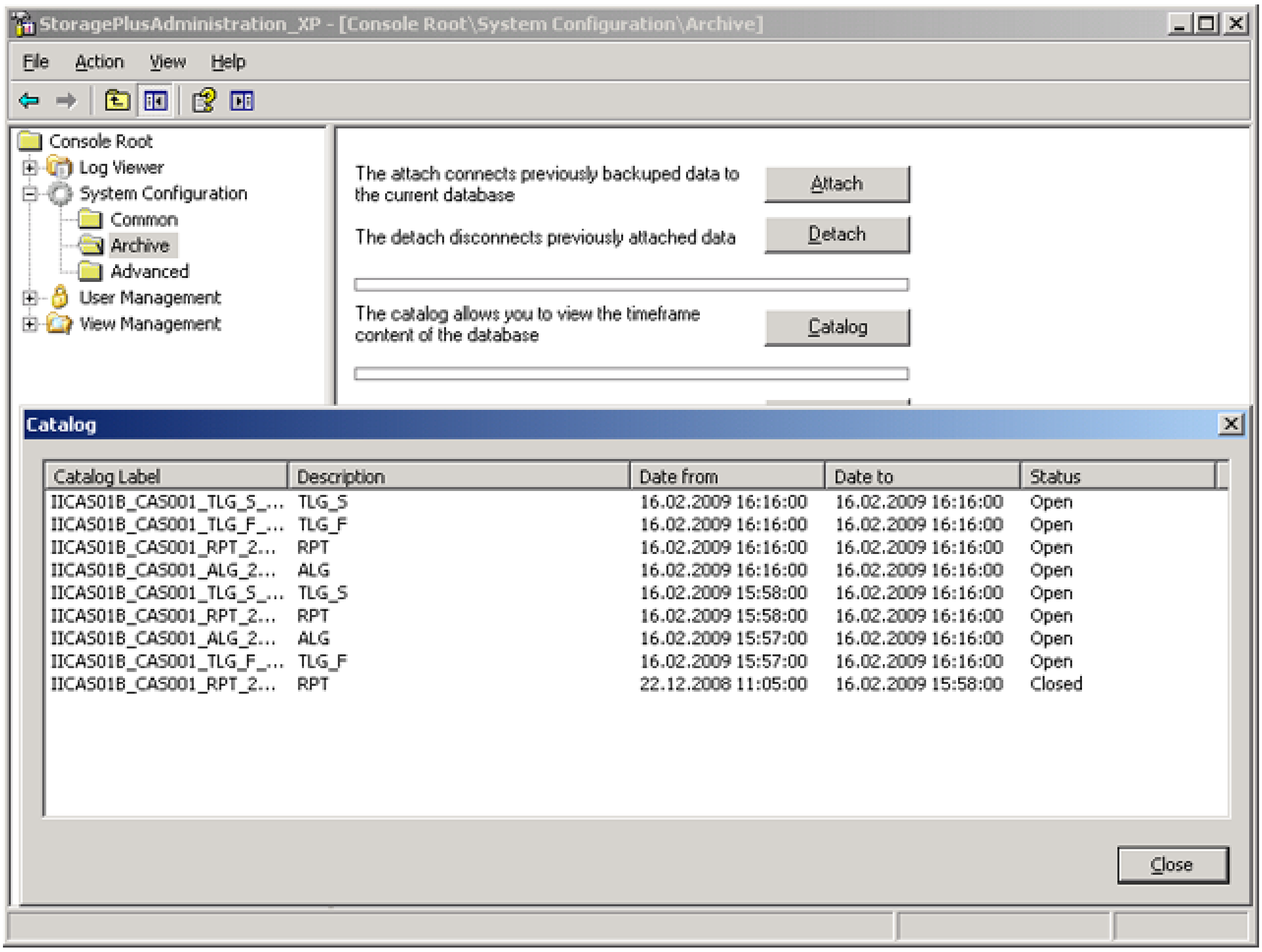
The database structure described in the section relating to "CAS" also forms part of StoragePlus.

The database design is configured in the "Common" area of the StoragePlus Administration Console. In terms of its configuration, it corresponds to the SIMATIC Manager menu, "CAS Options" tab described in the section relating to CAS.



Overview of database segments in StoragePlus

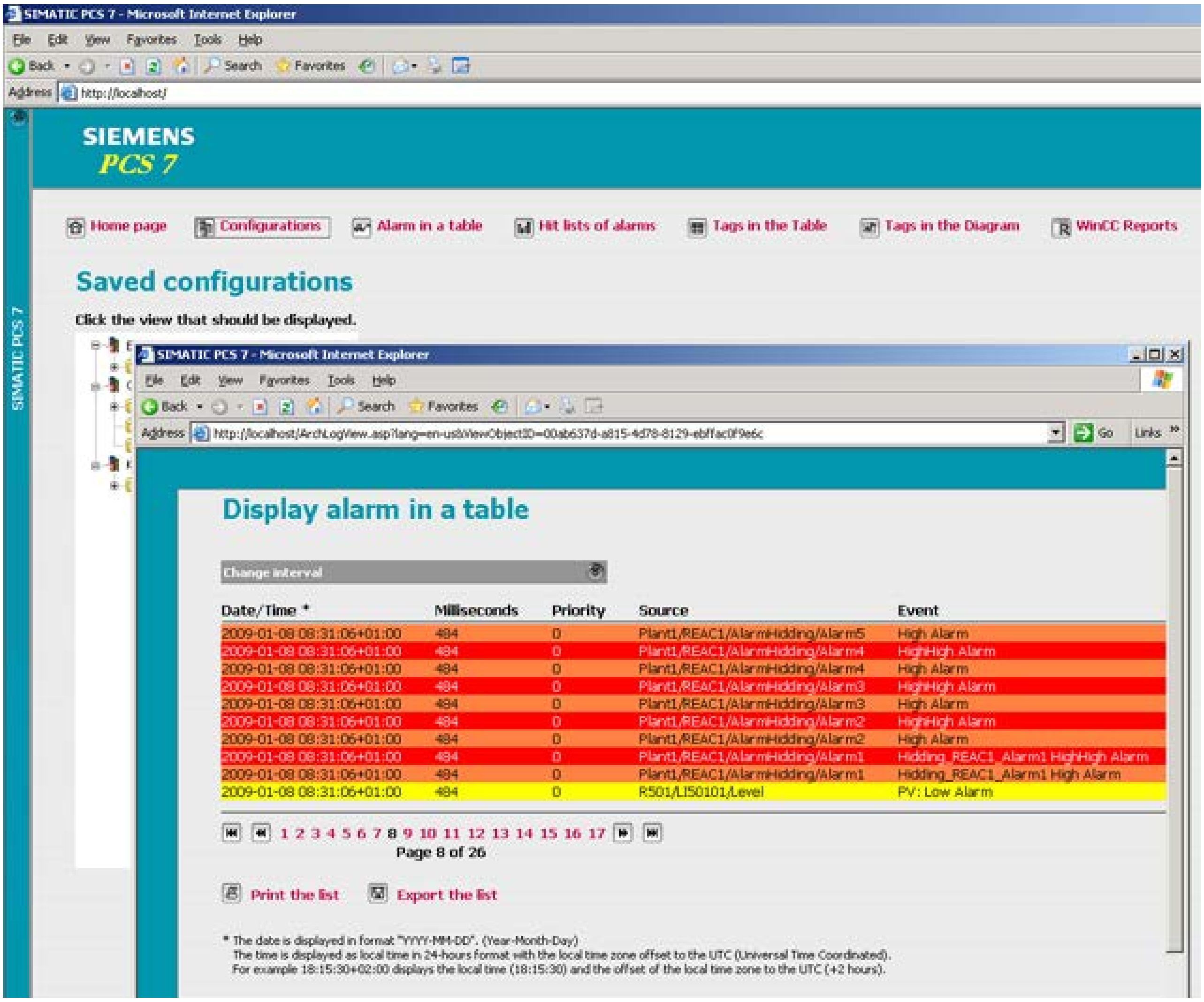
The "Catalog" button in the "Archive" area of the Administration Console provides an overview of the archive type segments currently connected to the StoragePlus database.



The "Attach" and "Detach" buttons are used to automatically attach swapped-out backups to or detach them from the StoragePlus database, as required.

Web Viewer

The StoragePlus Web Viewer allows saved CAS data to be accessed by means of views.



The views can be permanently configured beforehand using the StoragePlus View Editor or can be freely compiled while the CAS data is being accessed.

9.5 PCS 7 Web option

Requirements

The following requirements apply to using the Web solution:

- The Web solution can be implemented both in plants with a server/client structure as well as on OS single stations.
- The Web solution gives users the opportunity to use a Web client to access Web servers whose plants or plant areas still use a previous version of PCS 7 V8.0. The latest version, however, must have been installed and already been operated on the Web client. This way a Web client from PCS 7 V8.0 can access Web servers of versions PCS 7 V7.1 SP3 and above with the relevant functional scope of these versions.
- In order to execute a process operation via faceplates, the OS hierarchy (Picture Tree) must be derived from the SIMATIC Manager plant hierarchy. At the very minimum, however, the area names used in the OS and AS must match.

OS server load

In the case of a plant where the configuration is planned as a mixture of OS clients and Web clients, the permissible number of clients in terms of the load on the OS servers can be roughly calculated using this formula:

Number of OS clients * 2 + number of Web clients * 1 <= 60

Notes on configuration

The following points must be taken into account when configuring the Web solution:

- Where there is an existing server/client structure, the number of times run through to publish images, scripts and status displays for the Web server is based on the number of server packages downloaded (publishing operations: number of server packages + Web server).
- The "WebNavigator" option must be enabled and selected as the startup screen "@Screen.pd_" for the respective user in the User Administrator of the Web server.
- Different languages, which have been configured in the OS system, can be assigned in the User Administrator for different logon profiles.
- It is also possible to emit an audible signal on a Web client when new messages occur. You can find more information on this in the configuration example "Audible interrupt signals for PCS 7 Web clients" (http://support.automation.siemens.com/WW/view/en/29088810).

Additional information

You will find a detailed description of how to use the Web solution in the "SIMATIC Process Control System PCS 7 OS Web Option" (http://support.automation.siemens.com/WW/view/en/68154057) manual.

Additional relevant information can be found in the "Security Concept PCS 7 Recommendations and Information" (http://support.automation.siemens.com/WW/view/en/22229786) and "Security Concept PCS 7 and WinCC – Basic Document" (http://support.automation.siemens.com/WW/view/en/60119725).

9.6 OpenPCS 7

Introduction

Data from PCS 7 is also available to higher-level systems with Open PCS 7 (e.g. plant management level). The following standard interfaces can be used to exchange data from OpenPCS 7 stations:

- OPC DA (Data Access)
- OPC A&E (Alarm & Events)
- OPC HDA (Historical Data Access)
- OPC "H" A&E (Historical Alarm & Events)
- OLE/DB for OLE-enabled applications (e.g. MS Office products) and for accessing historical values, alarms and messages via standardized database access.

Note

System description

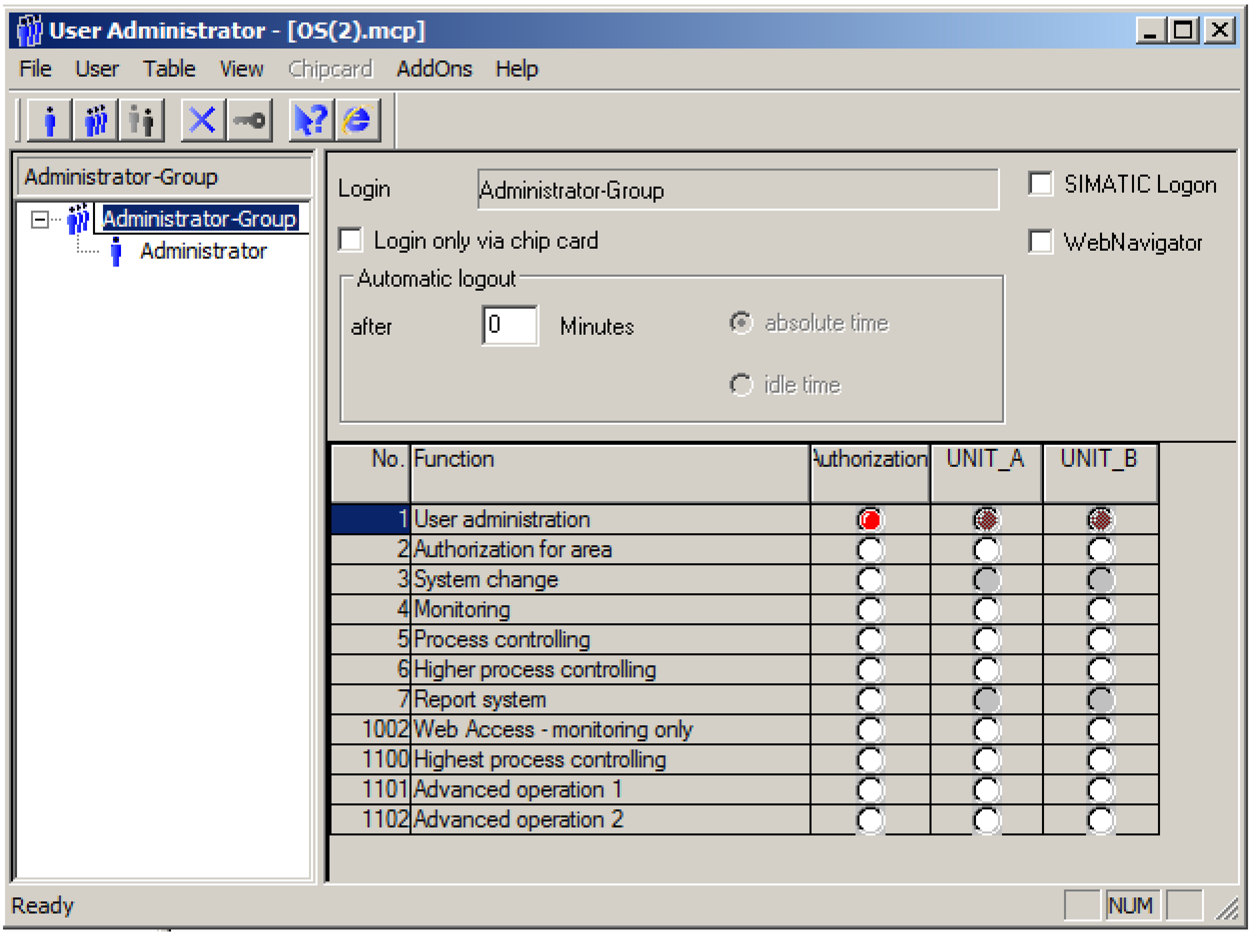
You will find a detailed description of how to use the Web solution in the "SIMATIC Process Control System PCS 7 OpenPCS 7" (http://support.automation.siemens.com/WW/view/en/68154075) manual.

9.7 User administration

9.7.1 User Administrator

Scope of functions

The "User Administrator" editor is used to establish user administration.



The editor is used to assign access rights to users for individual editors in the configuration system and to functions in process mode, as well as to monitor these rights. To this end, access rights, also known as authorizations, are assigned for OS functions in the User Administrator. These authorizations can be assigned to individual users or to user groups; they can also be assigned during process mode.

Other characteristics of the User Administrator:

- Configuration functions for "variable logon", which a user can employ to log on to the OS client. This can be achieved by means of a variable value, for example, which is set via a key-operated switch.
- Automatic user logoff after a certain period of time
- User logon via a smart card

You can choose between two user administration options:

- WinCC Logon
- SIMATIC Logon

Selection guide for WinCC Logon and SIMATIC Logon

Criterion	SIMATIC Logon	WinCC Logon
In process mode, the operator must log on to several applications on a PC (OS, SIMATIC BATCH, Route Control, Automation License Manager, SIMATIC Manager).	Suitable	Not suitable
A client/server project with multiple OS clients is used.	Suitable	Not suitable
A single station is used, or a client/server project with just a few OS clients. The OS clients are referenced OS clients.	Suitable	Suitable
One central administration for users/user groups is required.	Suitable	Not suitable
No central administration for users/user groups is required.	Suitable	Suitable
Logon and logoff procedures are to be logged.	Suitable	Not suitable

SIMATIC Logon is supplied with "Contract License" in SIMATIC PCS 7 V7.1 and above.

which means there are no further licensing costs for SIMATIC Logon within PCS 7. As a result, we generally recommend that SIMATIC Logon is used, as it provides more benefits than WinCC Logon and is not associated with any additional costs.

Note

SIMATIC Logon and the User Administrator write different user information to a smart card: SIMATIC Logon also requires the information as to which logon computer or domain controller should be used for user authentication.

This is why the Smart card must be specified again with any change from SIMATIC Logon to WinCC Logon or vice-versa.

9.7.2 WinCC Logon

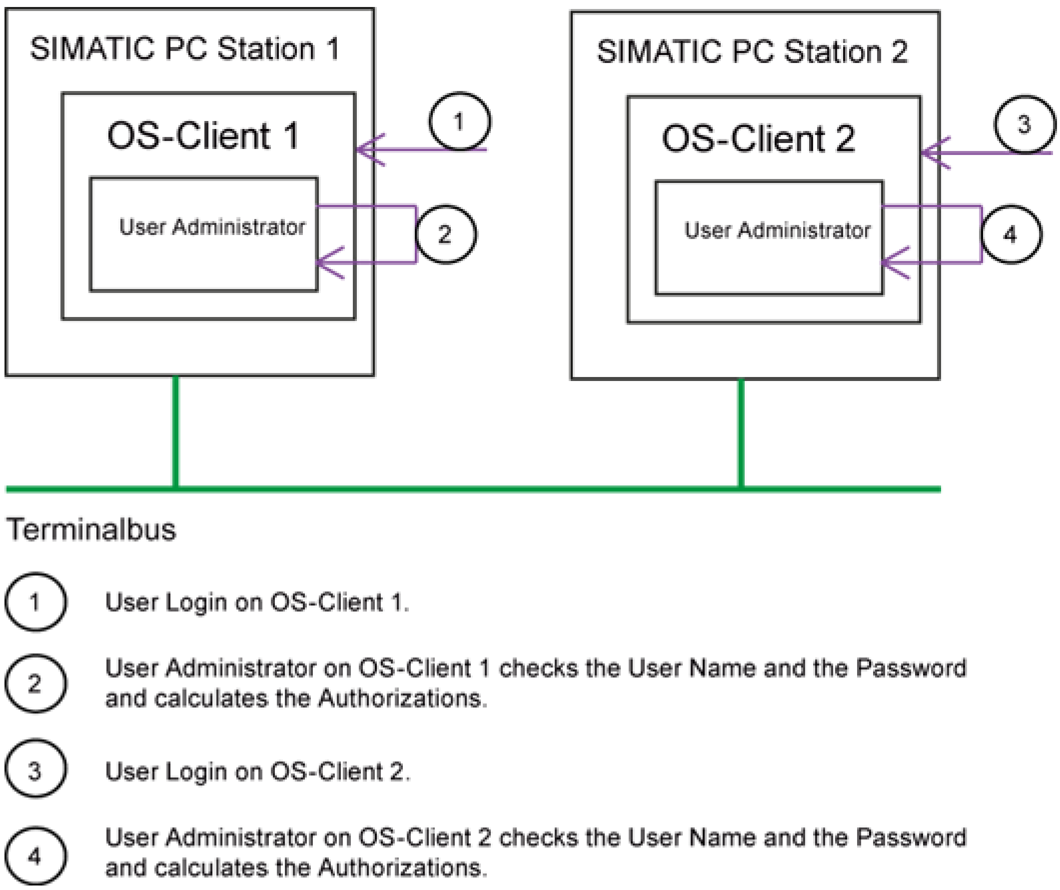
Method of operation

When a user logs on to the system with a user name and password, the User Administrator checks whether that user has been created in the OS. If the user has not been created, he/she will not be assigned any authorizations in the OS; the same applies if an incorrect password is entered.

This means that the user will not be able to monitor or control the process in process mode.

If a properly logged-on user calls an OS functionality which is protected by an authorization, the User Administrator checks whether the relevant authorizations permit this function to be accessed. If the appropriate authorizations are not in place, the User Administrator denies the user access to the requested functionality.

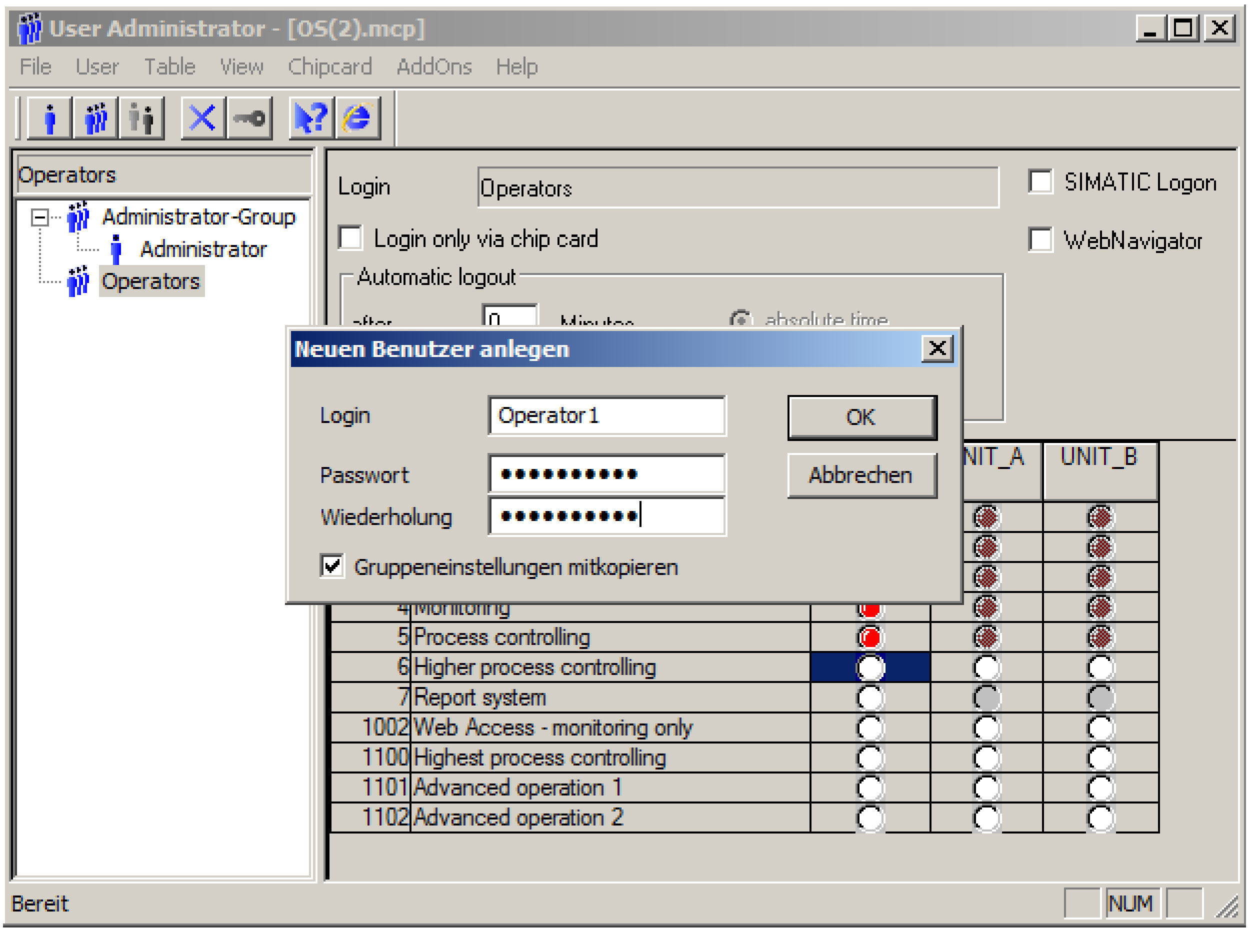
User groups, users, and their passwords are managed in the "User Administrator" editor. The user groups, users, and passwords must be created separately in every OS client. In order to avoid having to duplicate creation work in the OS clients, you can work with referenced OS clients. For referenced OS clients, however, the user administration configurations must be exactly the same for every client.



Configuring user administration

The example below shows how to configure the user administration system using WinCC Logon:

1. Use the SIMATIC Manager to open the OS client project, then open the "User Administrator" editor from there.
2. Select the "User > Create Group" menu command to create a new "Operators" user group and assign the relevant authorizations.
3. Create a new user named "Operator1" within the "Operators" group and assign a password to the user.



Note

A distinction is made between uppercase and lowercase letters as of PCS 7 V8.0 SP1.

9.7.3 SIMATIC Logon

Introduction

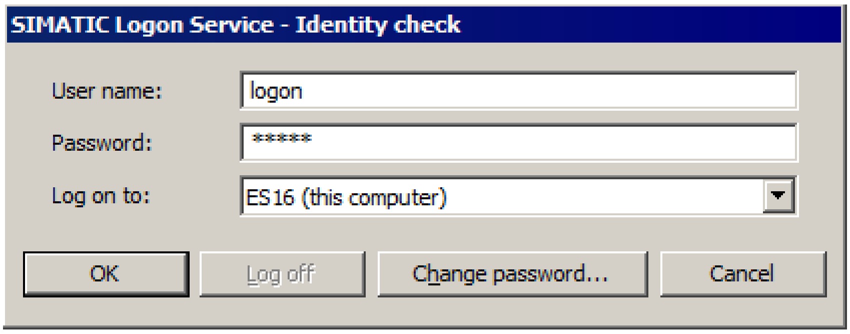
SIMATIC Logon is a Windows-based central user management system with access protection for the SIMATIC PCS 7 system components.

SIMATIC Logon consists of the following components:

Software component	Area of application	PCS 7 system component which uses the software component
SIMATIC Logon Service	Central access protection for SIMATIC applications	All components which use SIMATIC Logon
SIMATIC Logon Role Management	Role management for applications and their assignment to Windows groups, including assignment of authorizations	SIMATIC BATCH SIMATIC Manager
SIMATIC Logon Event Log Viewer	The SIMATIC Logon Event Log Viewer is a component which handles the logging and visualization of events for an application.	All components which use SIMATIC Logon
SIMATIC Electronic Signature	Creation of electronic signatures for status changes in the process and for accessing the process	SIMATIC BATCH
SIMATIC Logon Development Kit	The Development Kit is for programmers who want to integrate SIMATIC Logon in customer applications.	None

SIMATIC Logon Service

The SIMATIC Logon Service is the central access protection for SIMATIC applications. In the SIMATIC Logon Service you logon with your user name and password before the SIMATIC applications are opened.



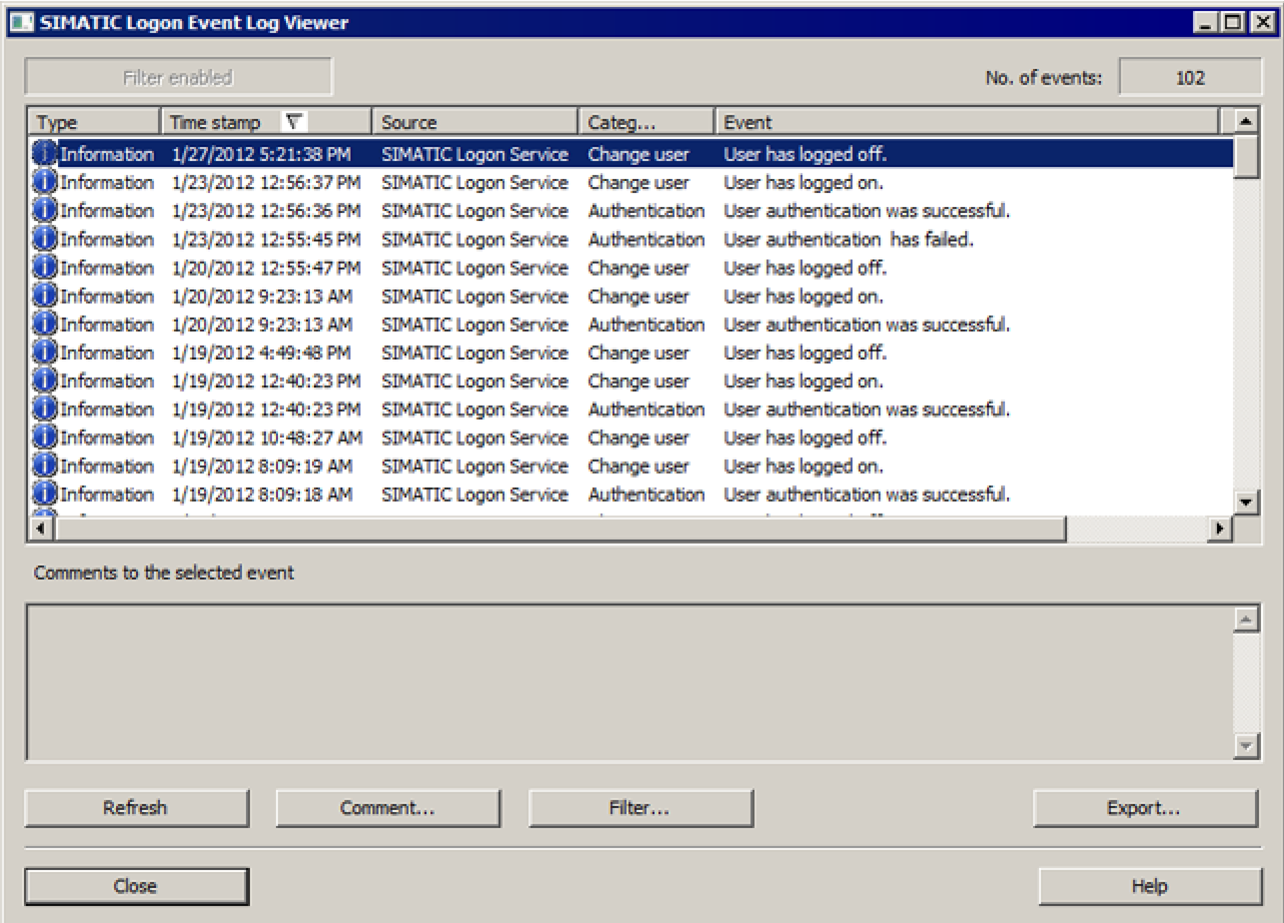
SIMATIC Logon Role Management

SIMATIC Logon Role Management is used to assign roles to Windows groups and to give authorizations.

SIMATIC Logon Role Management is started from the individual applications (e.g. SIMATIC BATCH, ALM).

SIMATIC Logon Event Log Viewer

SIMATIC Logon Eventlog Viewer is a SIMATIC Logon component for recording and displaying events.



SIMATIC Electronic Signature

Electronic signatures can be used for status changes in the process or with events in the process. This function is only available in SIMATIC BATCH.

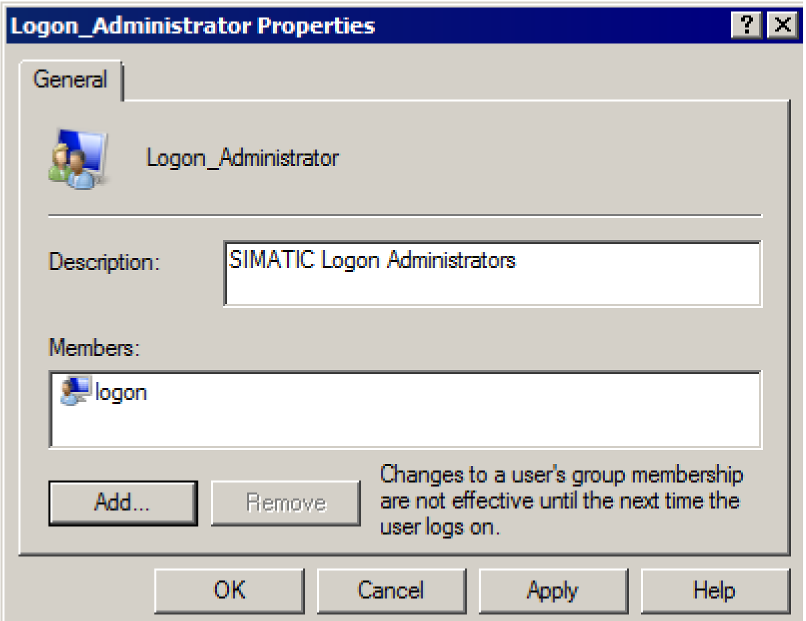
SIMATIC Logon Development Kit

The Development Kit is a function for programmers who want to integrate SIMATIC Logon into a customer application.

"Logon_Administrator" Windows group

To configure SIMATIC Logon, a Windows group called "Logon_Administrator" is required. In version V1.5 and above this group is set up automatically when installing SIMATIC Logon on the local computer. All users who are stipulated as members of the Windows "Logon_Administrator" group are authorized to access the logon dialog box "Configure SIMATIC Logon".

The following image shows an example of the "Logon_Administrator" group where the user "logon" has been added:



Note

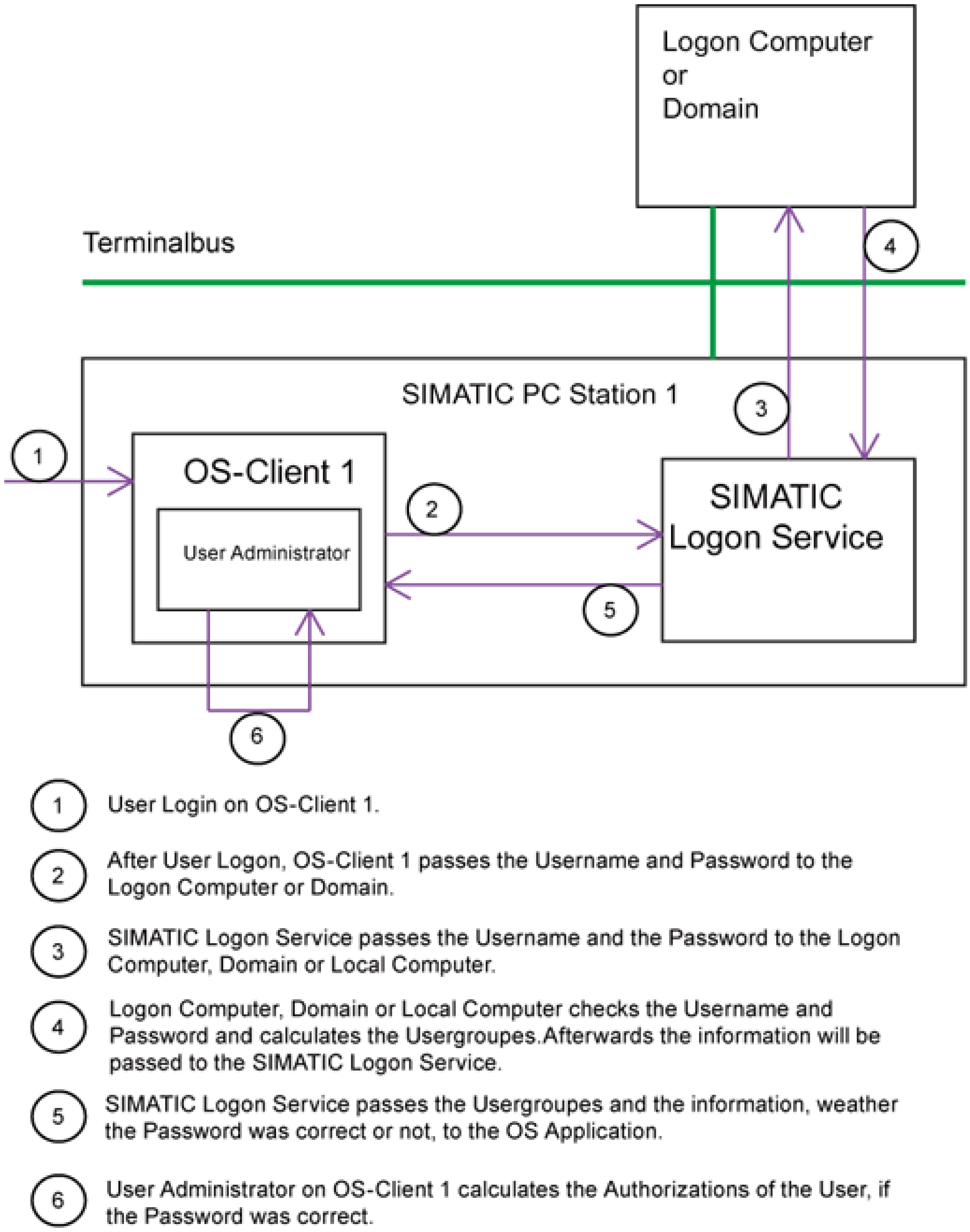
SIMATIC Logon users must be direct members of a Windows group. These users may not be members of a subgroup of a Windows group.

You can find information on Windows users and groups, for example, at the following link: http://technet.microsoft.com/en-us/library/dd861336.aspx.

Method of operation

Information on the logon process and functional mechanism of SIMATIC Logon can be found in the "SIMATIC Logon" (http://support.automation.siemens.com/WW/view/en/34519648) manual.

The following image shows an authentication scenario with SIMATIC Logon:



Note

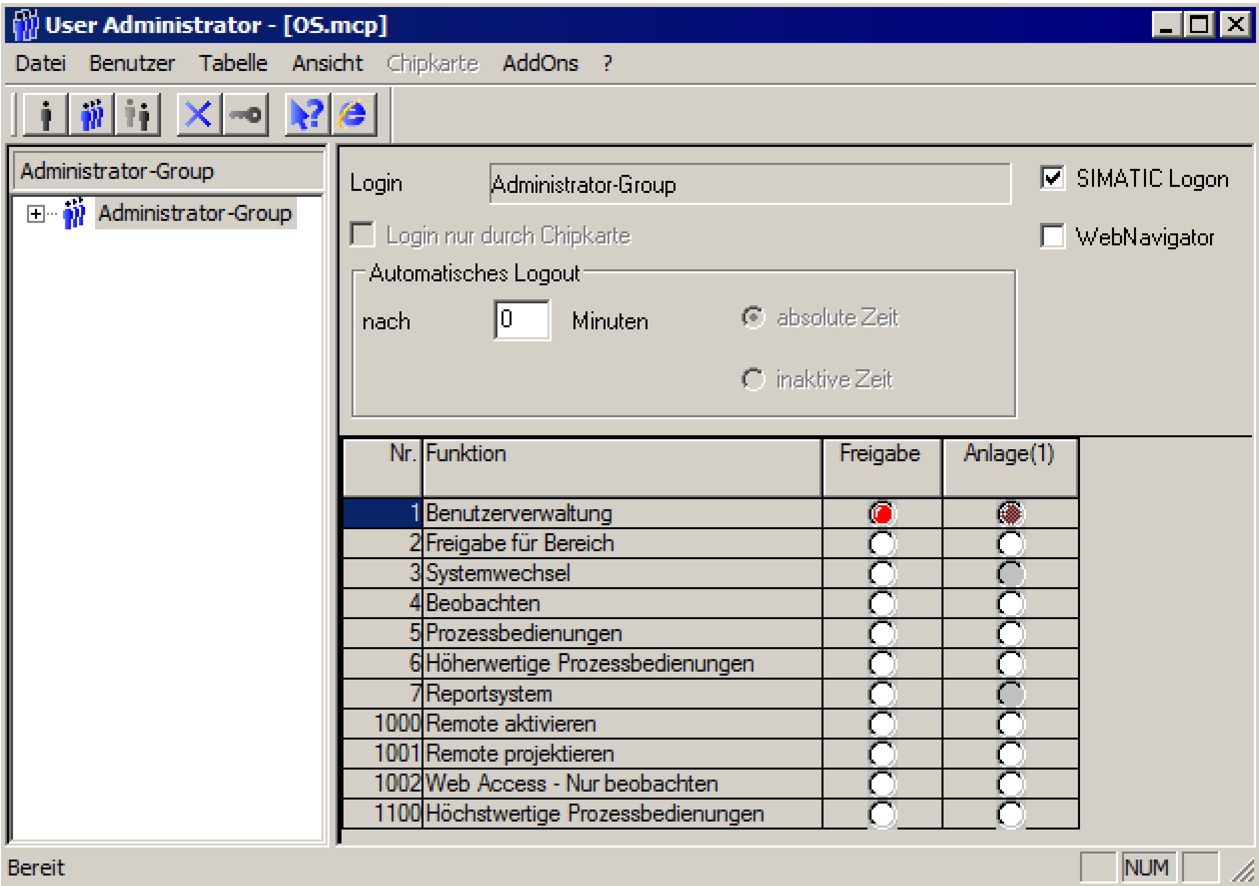
If you run SIMATIC Logon with a logon computer, this computer must be available at all times and must not demonstrate any excessive peak loads; Using the ES as the logon computer is not recommended for this reason.

With SIMATIC Logon you can log on via the local computer, irrespective of whether you are working with a logon computer or a domain. We recommend that you create all the necessary users and groups on the local computer also, so that you can still log on to applications when the logon computer or domain are unavailable.

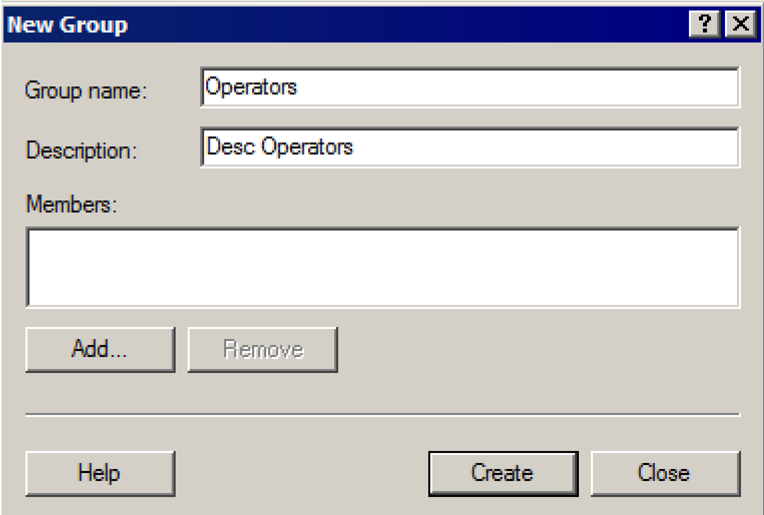
Configuring user administration

The following steps provide examples of how user management can be configured in association with SIMATIC Logon. The "Operators" group has been created as an example. You will need a valid SIMATIC Logon installation in order to execute the steps.

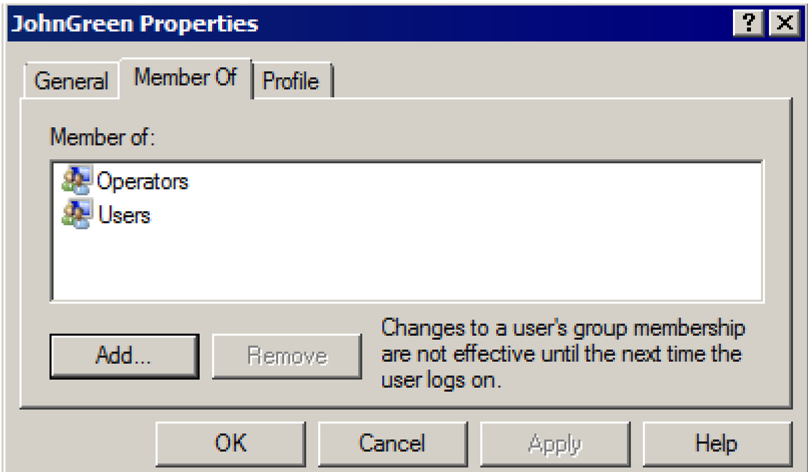
1. Open the OS client project on the ES.
2. Open the "User Administrator" editor.
3. Activate the "SIMATIC Logon" option.



4. Create a user group called "Operators" in the "User Administrator" editor.
5. Assign the relevant authorizations for the "Operators" user group.
6. Open the Windows operating system's Computer Management area.
7. Create a user group called "Operators" in the Windows group management.



8. Create a new user named "JohnGreen", for example, in Computer Management and assign this user to the "Operators" user group.



Note

Only the groups in the "User Administration" Editor should be created for SIMATIC PCS 7 OS.

The names of the newly created user groups must be written in exactly the same way in the Windows operating system and the OS User Administrator. These names are case-sensitive.

Users are only created in the operating system of the logon computer. Once a user has successfully logged on via the logon computer, authorizations are then assigned to that user in the OS.

The following SIMATIC PCS 7 system components can also use SIMATIC Logon in addition to the SIMATIC PCS 7 OS:

- SIMATIC PCS 7 OS
- SIMATIC BATCH
- SIMATIC Route Control
- SIMATIC Manager
- Automation License Manager

License

The license for SIMATIC Logon is integrated in PCS 7 in version V7.1 and above. A master license is automatically created on the system through the installation via the SIMATIC PCS 7 framework setup.

9.8 Downloading the OS projects

Requirement

The following requirements must be fulfilled in order to load OS projects:

- Required NTFS permissions of the destination path must be set with the "SIMATIC Rights" tool.
- The logged-on user must have be at least a Power User (Windows XP/Windows Server 2003) or User (Windows 7/Windows Server 2008 R2).
- The logged-on user must be a member of the Windows user group "SIMATIC HMI". For PCS 7 V7.0 to V7.1 SP2, the logged-on user must also be a member of the Windows user group of the SQL server "SQLServer2005MSSQLUser$<COMPUTER_NAME>$WINCC".
- As of PCS 7 V7.1 SP2 with WinCC V7.0.2 Update 1, the members of the Windows user group "SIMATIC HMI" should not be members of the Windows user group "SQLServer2005MSSQLUser$<COMPUTER_NAME>$WINCC" at the same time.

Note

You can find details about the "SIMATIC Rights" tool and Windows user permissions in the PCS 7 Readme” (http://support.automation.siemens.com/WW/view/en/66807356).

Procedure

By and large, individual OS projects, OS servers, and OS clients are downloaded in the same way. This is illustrated below, using SERVER1A as an example.

1. In the component view, select the OS object you want to download, then select the "PLC > Download" menu command.

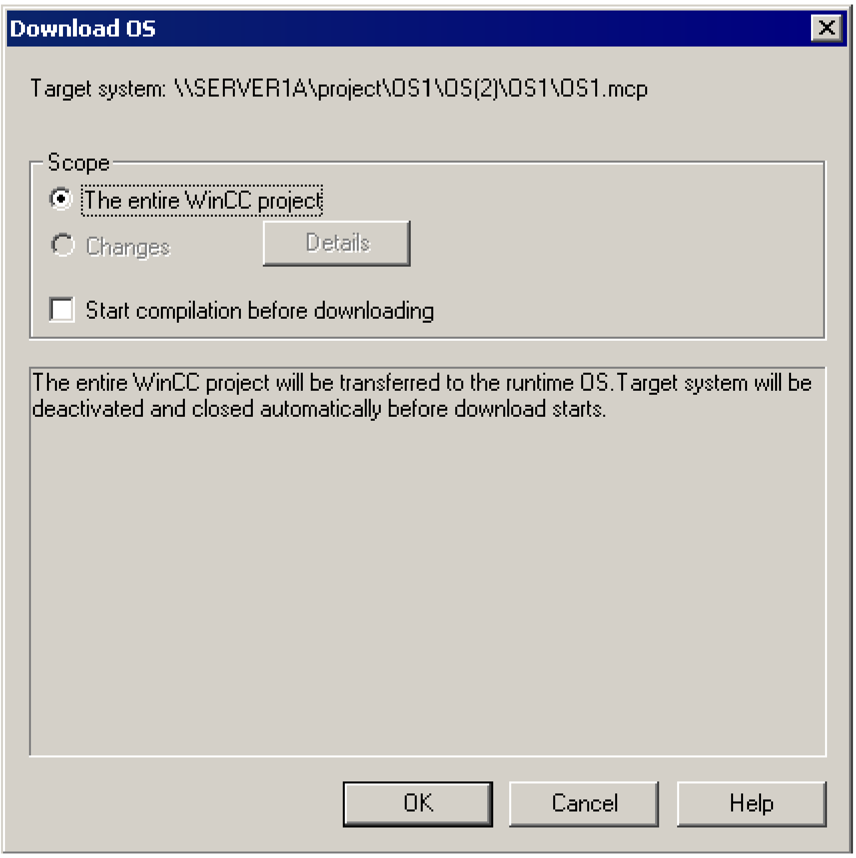
 Note

 In PCS 7 this is the only permissible method of downloading OS projects to the target computer. Using the WinCC Project Duplicator is expressly forbidden.

 You can find more details on configuring the Windows user authorizations in the "SIMATIC Process Control System PCS 7 PC Configuration and Authorization" (http://support.automation.siemens.com/WW/view/en/68157327) manual.

2. In the next dialog you define the scope of the data which you wish to download.

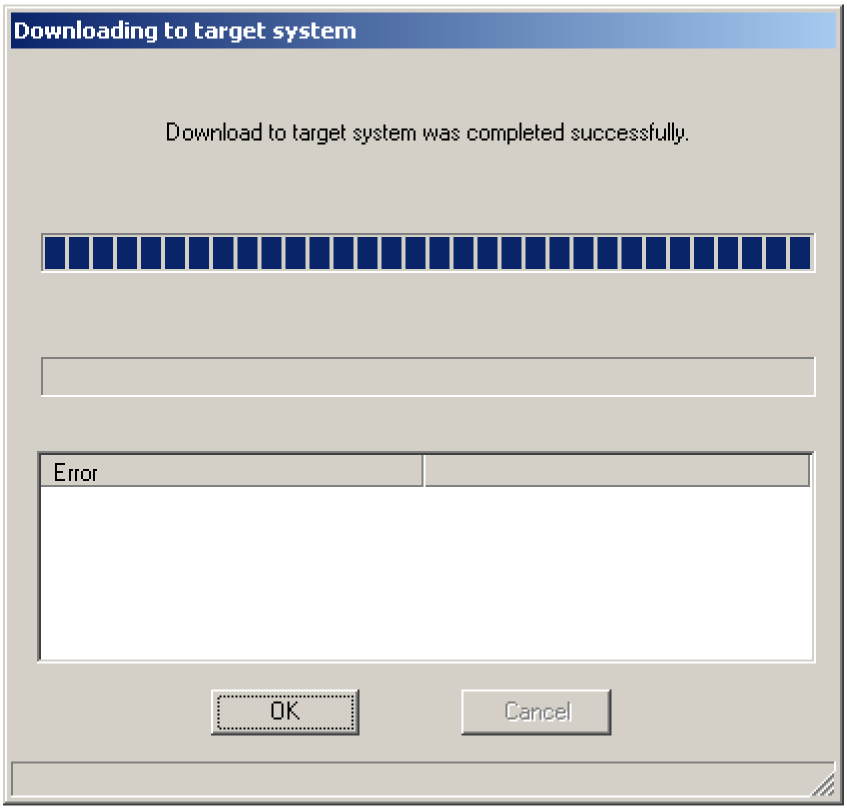
 The first time an OS server (in this case, SERVER1A) is downloaded, a complete download is required. The procedure to follow for downloading changes for OS servers is described in this document, in section Downloading changes online (Page 307). OS clients always have to be downloaded in full.



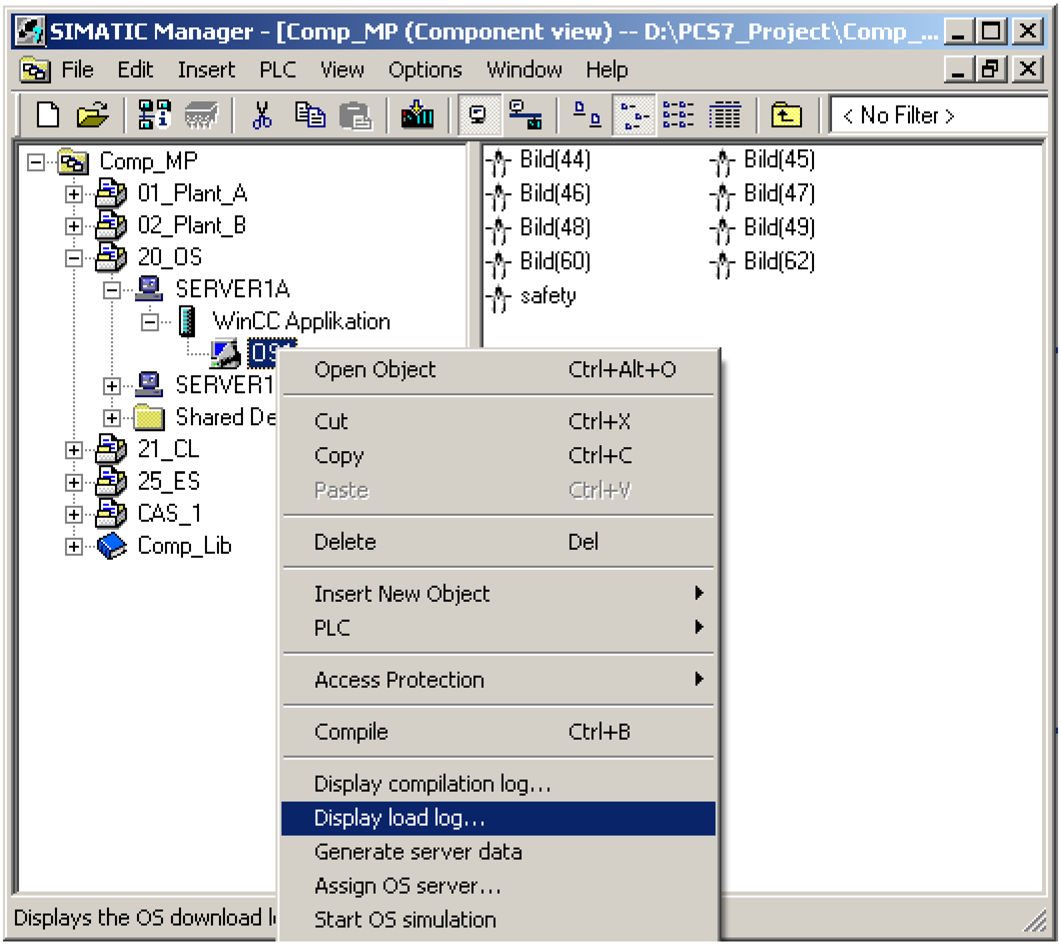
 Note

 You can initiate compilation of the OS prior to the download procedure.

3. The dialog below shows how the download procedure is progressing; this procedure must be completed successfully.



4. You can call the load log for the server as well as for the client once the download procedure is complete. All the actions performed during the download procedure are recorded in this log, together with the time and date when they were executed.
   In the component view, select the OS, followed by the "Display load log..." menu command.



Note

The computer name in the WinCC project during configuration corresponds to the name of the engineering station for all OS projects. When the OS projects are downloaded to the individual PCs, the name is automatically replaced by that of the corresponding target OS computer (see load log).

10 Changing projects in process mode

10.1 Downloading changes online

Introduction

Once you have inserted new plant objects/pictures and tested their function on the ES, you must update the relevant AS and OS servers to make the changes available to the operator.

If no changes have been made to the structure and it is possible to only compile OS changes, the OS servers can remain in runtime mode during the download procedure. Runtime mode must be stopped for a complete download of the OS.

The OS clients are updated automatically. The OS client must be explicitly downloaded only where changes have been made to the OS client project (permissions in the User Administrator, for example). An OS client can only be downloaded in full.

Note

Never make changes to the OS projects on the individual OS servers and OS client stations directly, as you will not be able to use the "Download changes" function. In this event you must execute a complete download.

All changes are made on the ES and are then downloaded to the various OS stations. The redundancy settings for OS servers and the settings for the Web server are exceptions.

The background to this and further information on downloading changes can be found in the section "Downloading Changes to a Project" in the "SIMATIC Process Control System PCS 7 Operator Station" (http://support.automation.siemens.com/WW/view/en/68157026) manual.

There is an option for displaying the number of changes made via the "Details" button in the dialog box for starting the OS download. Based on the number of changes the system suggests whether downloading the changes is sufficient or whether a complete download needs to be executed.

Requirement

You can only download changes online to a PCS 7 OS when runtime mode is activated on the corresponding PC. Both stations must be in runtime mode for redundant servers.

In order to use the function for downloading changes online, the entire project must have been compiled and downloaded without errors at least once. Exactly the same project data must have been downloaded in full to redundant OS servers.

Procedure

The update procedure can be performed in stages or automatically, with the help of the "Compile and Download Objects" dialog box.

10.1.1 Compiling and downloading in stages

Procedure

1. Compile the S7 program in the CFC or SFC editor or in the plan directory of the component view. It makes no difference whether the "Changes only" or "Entire program" option is selected in terms of the AS's capacity to download changes.
2. Download the S7 program into the AS, which is in the RUN-P state, using the "Changes" option.
3. Compile the OS project of the master OS, using the "Changes only" option. This setting also ensures that the server data corresponding to the OS is updated automatically.
4. Download the OS project from the ES to the servers.

   Once the OS runtime is activated on the target station the "OS-Download" dialog box offers the option of downloading the changes.

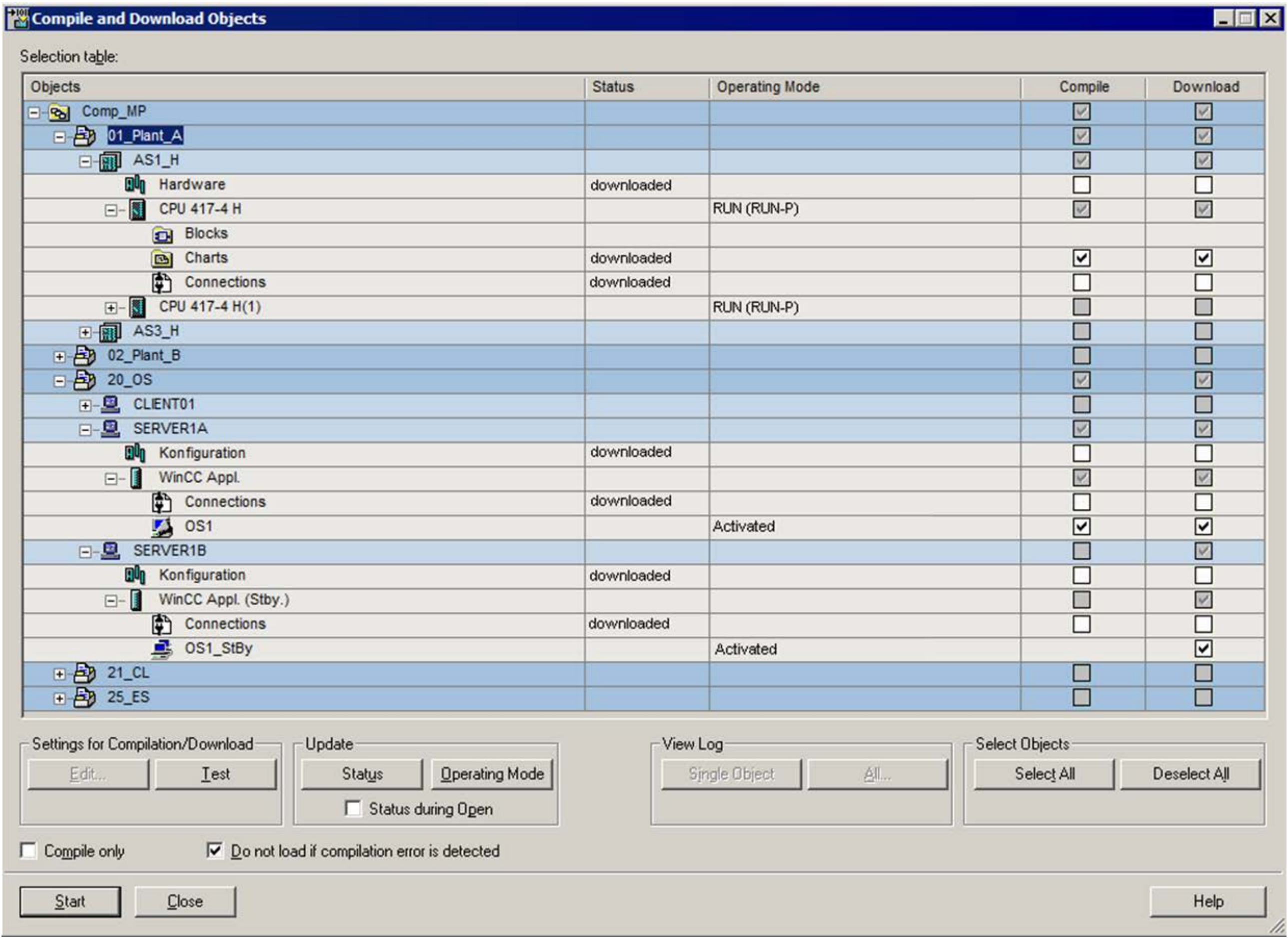
   When downloading changes to a redundant OS server pair, the function first downloads the changes to the configured standby OS. Once this procedure has been executed in full and confirmed with "OK", the process of downloading changes to the configured master OS is started. This order is observed regardless of which of the two OS servers is currently configured as the master.

Note

The steps described should be performed promptly to ensure that no inconsistencies arise for operators between the time when the AS is changed and the time when the OS is changed. Operating staff should also be informed of any pending changes.

10.1.2 Central dialog "Compile and Download Objects"

The "Compile and Download Objects” dialog box can be used to update all SIMATIC stations automatically, one after the other.



The settings for compiling changes and for downloading changes are made separately for the relevant objects via the "Edit" button. This calls up the dialogs described in Section "Compiling and downloading in stages (Page 308)".

The "Test" button can be used to check the consistency of the settings prior to starting the automatic process.

When changes are downloaded to the OS servers, the OS clients are also updated, as they receive the new server data.

10.1.3 Recommendations

Recommendations for the quantity structure

Only configuring and downloading manageable changes (between 10 and 30 process objects) is recommended for downloading changes online.

Downloading changes online is not suitable for transferring mass data but is instead designed for inserting new measuring points or measuring point changes into a project.

Permitted actions for downloading changes to the OS

An overview of the points where changes can be made can be found in the section "Downloading Changes to a Project" in the "SIMATIC Process Control System PCS 7 Operator Station" (http://support.automation.siemens.com/WW/view/en/68157026) manual.

10.2 Complete online download to a redundant OS server pair

Introduction

You always need to perform a complete download for the initial loading or after performing substantial changes.

Procedure

The following steps must be taken to download the entire program during operation while retaining data archiving:

1. Compile the OS project (in full or changes only).
2. Download the OS project in full from the ES to the OS servers. The OS runtime on the target station is deactivated automatically with this and the project is closed.

   The OS runtime is reactivated automatically once the download has completed.
3. After activation, the redundancy manager starts to synchronize the data of the two redundant OS servers. Wait until the process control message "REDRT:Archive update complete" appears.

4. Next download the standby OS. The server already loaded becomes the "Master" again. The OS clients switch over again.
5. If a message appears confirming that the download procedure has been completed successfully, the project has been downloaded in full. After activation, the redundancy manager starts to synchronize the data again. Wait until the process control message "REDRT:Archive update complete" appears.

Note

Both partners should always be downloaded promptly in order to restore the consistency of the configuration data in the redundant system.

11 Integrated asset management

PCS 7 diagnostics and maintenance functions enable you to monitor the various components of a PCS 7 plant and to display its status in process mode. This status is represented by defined icons.

A maintenance station (MS) must be configured in order to make use of these diagnostics and maintenance functions. The basis of an MS is always an OS that provides additional maintenance functions. The maintenance station can be operated as a single station system or as a server in a server-client architecture.

The MS server performs the following basic tasks:

- Provides the diagnostic area with pictures
- Monitoring of all AS components (CPU, distributed I/O, field devices)
- Monitoring of the network components and PC stations
- Monitoring of user-specific devices (with AssetM blocks)

11.1 Configurations

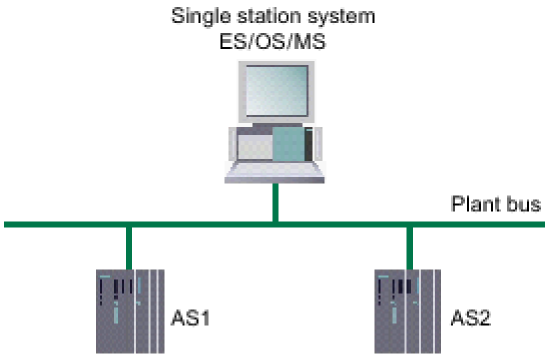
11.1.1 Characteristics for the MS server

The following characteristics apply for the MS server:

- Maintenance Station Standard (integrated in PCS7)
  - Licenses required
  - Full functionality
- Maintenance Station Basis (integrated in PCS7)
  - No licenses required
  - Overview screens only for CPU objects
  - PC objects and network components
  - Detailed information cannot be called up (e.g. image blocks)
- Maintenance Station PDM (Stand-alone)
  - With special software and hardware bundle only
  - Parameter assignment and monitoring of field devices
  - Monitoring of PC objects and network objects (optional)

11.1.2 Single station system with maintenance station (MS)

The ES, OS, and MS are located on the same computer.



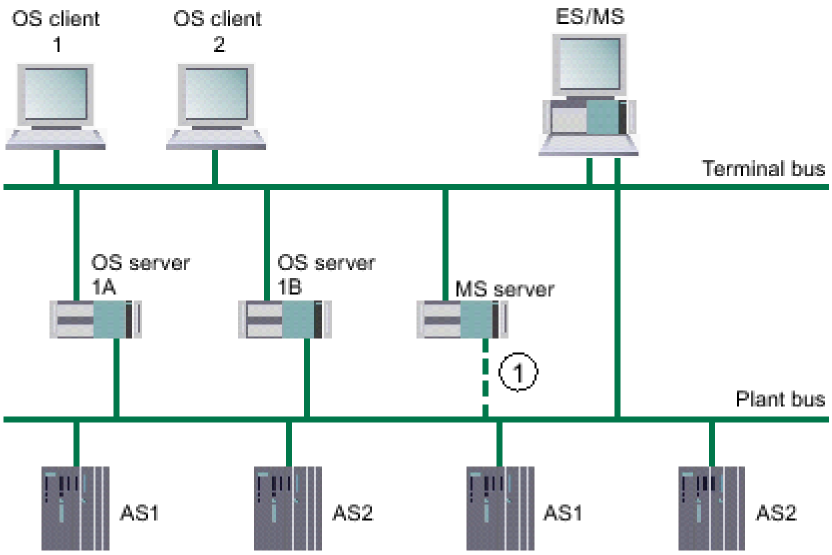
Note

In this plant configuration, the OS must be configured as a single station system. You make this setting when creating the project in the SIMATIC Manager, using the "New Project" PCS 7 wizard.

11.1.3 Multiple station system with MS client on the ES

Introduction

The MS client runs directly on the master ES. The current multiproject is stored here. The MS server can be installed on an existing OS server or on a separate computer depending on the size of the plant. The MS server can be configured redundantly. You can provide one MS server for each multiproject. All components in the multiproject is monitored by this server.



① Network adapter with TCP/IP connection to the plant bus for monitoring via SNMP

Decision support

1. MS server on an existing OS server:
   - Plants with 1-2 OS servers
   - The OS server must be sufficiently scaled for licenses and performance. Buffers for later expansions must also be figured in.
   - The benefit with this option: There is no additional computer required.
   - Furthermore only maintenance licenses are required and no additional OS server licenses.
2. MS server as separate computer:
   - Plant with three or more servers
   - The benefit with this option: Clear assignment for the MS servers to the "diagnostics area" and not to plant areas
   - More transparent handling: When the MS server is loaded, for example, this has no effect on the plant areas, which always have to be available to the operator.
   - High flexibility due to separation, such as for upgrading the plant

11.2 Tips on configuration

General settings in the multiproject

The following chart shows the settings which must be checked and adapted where necessary for monitoring the components with the maintenance station:

<table>
<tr><th>Setting</th><th>Location</th><th>Comment</th></tr>
<tr><td>Regional language and
Language for display devices</td><td>SIMATIC Manager</td><td>• Set a language in which the OS project is to be operated in process control.</td></tr>
<tr><td>AS station name (1)</td><td>SIMATIC Manager</td><td rowspan="2">• <=14 characters
• No spaces</td></tr>
<tr><td>Designation of components (1)</td><td>HW Config</td></tr>
<tr><td>S7 program (1)</td><td rowspan="4">SIMATIC Manager</td><td>• Message number range must be the same for all S7 programs in the multiproject/project
• The name of an S7 program may not be assigned twice</td></tr>
<tr><td>Driver blocks (1)</td><td>The driver blocks must be at least of version V6.1.
Use a corresponding library, if necessary.</td></tr>
<tr><td>OS compilation mode</td><td>Area-oriented</td></tr>
<tr><td>Plant hierarchy setting (1)</td><td>The settings of the plant hierarchy must be the same in all projects of the multiproject/project.</td></tr>
<tr><td>OS project type single station project (2)</td><td rowspan="2">WinCC Explorer</td><td>The single station project type must be selected in project properties.</td></tr>
<tr><td>Group display hierarchy (1)</td><td>When user diagnostics is used, the group display hierarchy must be automatically created.</td></tr>
</table>

(1) Only applies to MS Basic and MS Standard

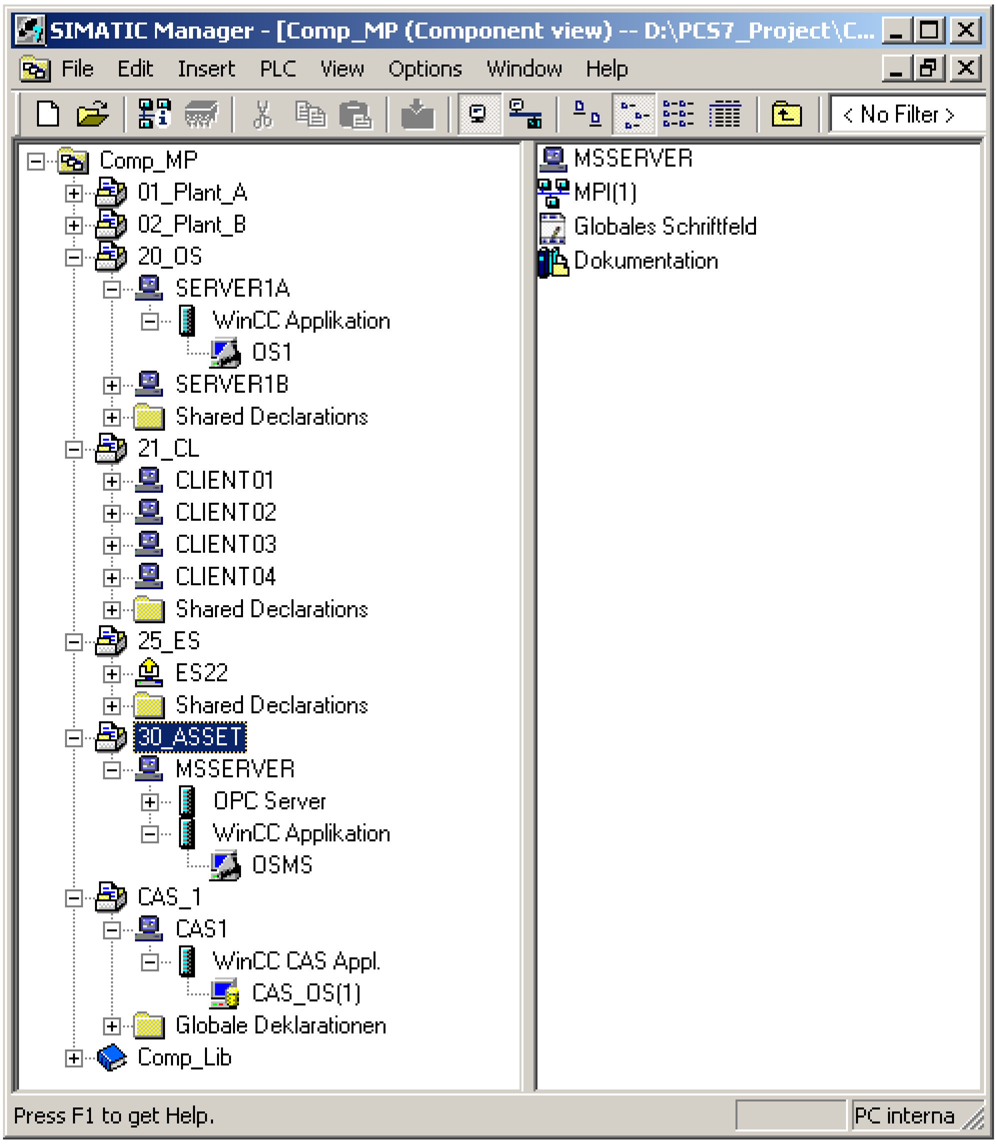
(2) Only applies to SIMATIC MS PDM

Note

The configuration and the related requirements which must be met are described in detail in the "Process Control System PCS 7 Maintenance Station" (http://support.automation.siemens.com/WW/view/en/68157295) manual.

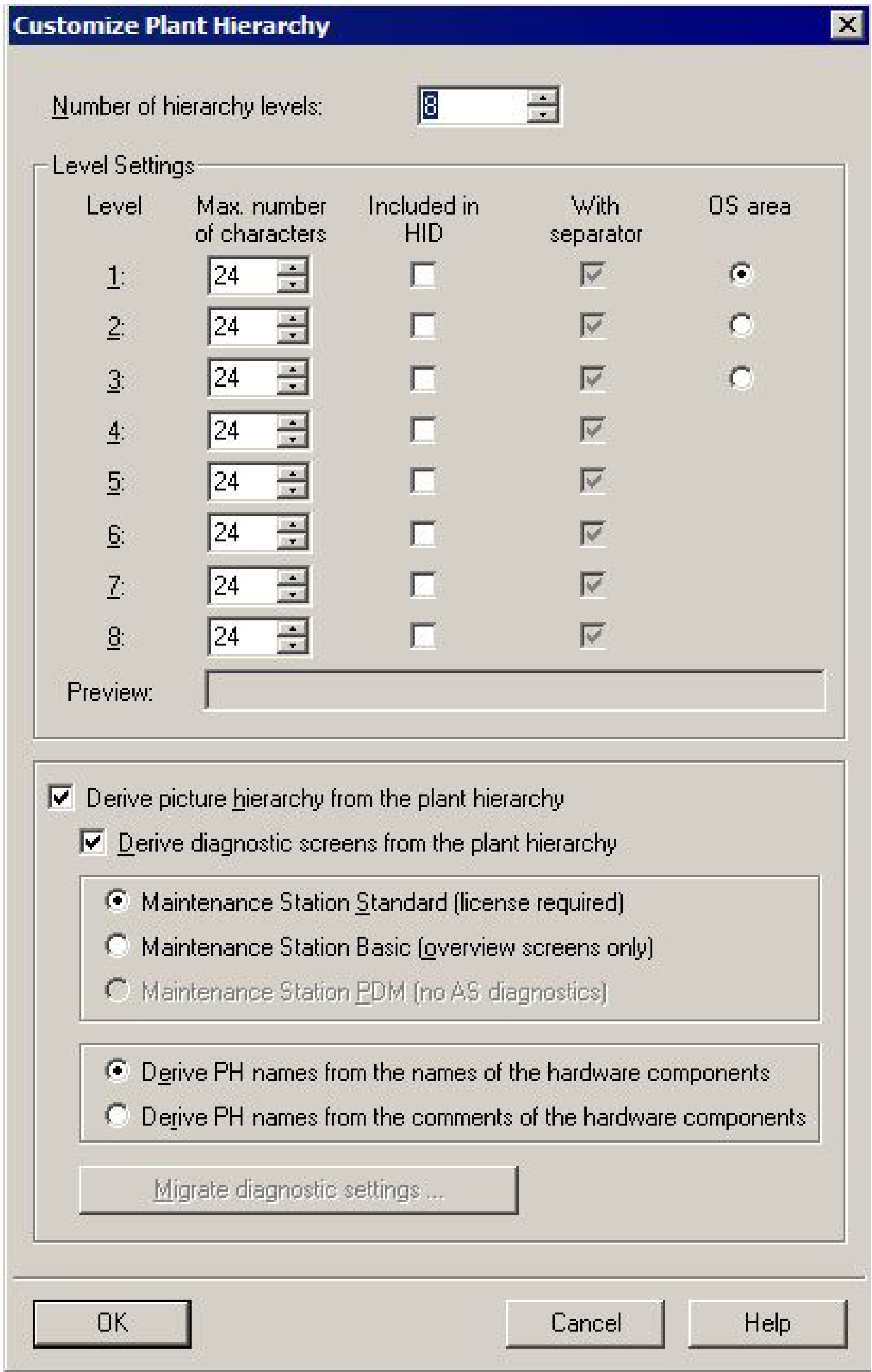
Asset management

In the "MS server as separate computer" option you create a separate project in the multiproject for the PC stations for asset management



The data present in the multiproject serves as the basis for asset management (diagnostics blocks, HW Config, system charts with diagnostic blocks and PDM).

The names of the components in the diagnostics area are derived from the names of the components in HW Config and PDM. Assign unique names that do not exceed 14 characters.



Diagnostic structure

The following general steps show how to create a diagnostic structure:

1. Check the "Derive picture hierarchy from the plant hierarchy" option.
2. Check the "Derive diagnostics screens from the plant hierarchy" box.
3. Select a characteristic for the maintenance station.
4. Select the derivation of the PH name.
5. Select the MS server from the OS servers present in the multiproject.

Diagnostic screens

The following steps show how the diagnostics screens are created and/or updated:

1. Run the "Create/Update Diagnostic Images" command.
2. Compile and load the MS server.

These steps are required following any change in HW Config or to the SNMP configuration or user diagnostics.

11.3 More information

Information on the Maintenance Station and on operating the diagnostic area can be found in the "Process Control System PCS 7 Maintenance Station" (http://support.automation.siemens.com/WW/view/en/68157295) manual.

You can find information about retrospective configuration of Asset Management in existing PCS 7 projects, for example, in projects where the picture hierarchy is not derived from the plant hierarchy, in the document "Integration of SIMATIC PCS 7 Asset Management into existing projects" (http://support.automation.siemens.com/WW/view/en/27833758).