Configuration Instruction for Process Automation

applications & TOOLS

PCS 7 V6.1+SP1
Configuration Instruction

PCS 7 Minimal Configurations

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Preface

Purpose of this document

Typical PCS 7 systems have at least one ES (Engineering Station) on the PC side, one or more possibly redundant servers, as well as several OS clients (Operator Stations). Apart from the maximum availability of process control and data acquisition, the predominant option here is loading program changes or expansions quickly into the running process with out any interference.

In comparison, small systems or stand alone units tend to work with extremely little maintenance requirements after commissioning. To reaching a high efficiency requires being able to work with as few PC stations as possible. It therefore makes sense to use the rarely used ES as an OS in process mode, as it already contains all the necessary functionality and licenses.

This document is meant as a selection aid during research for the suitable PC configuration for small plants. Various minimal configurations (up to a maximum of three PCs) are compared regarding their functionality. Since the respective PCS 7 configuration is not a focus of the system documentation, the activities necessary for the setup are given in form of detailed step-by-step instructions.

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Main contents

The main focus is on the following points:

- Configuration comparison regarding functionalitiy and costs
- Activities for engineering of the various configurations

Reference to the Automation and Drives Service & Support

This article is from the Internet application portal of the Industry Automation and Drive Technologies Service & Support. The following link will take you directly to the download page of this document:

http://support.automation.siemens.com/WW/view/en/24023824

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1 Minimal Configurations - An Overview

Based upon using the ES as OS in process mode, or realizing several OS with as few PCs as possible, various constellations are possible. The following variants were selected according to feasibility and sensibility within the context of PCS 7.

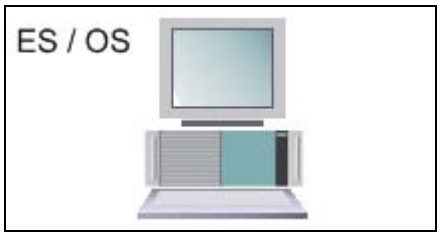
For the described configurations, similar solution approaches are given, for which the configuration does not deviate considerably, or for which certain criteria have lead to exclusion.

Generally, when using the engineering computer as OS, certain functionality losses must be taken into account as for certain activities the OS project must be closed. This will also be further discussed below.

1.1 ES as OS Single Station

The smallest of all possible configurations requires only one PC station.

Figure 1-1



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Process mode / functionality

Since version 6.1 of PCS 7 the OS project can also be compiled during activated Runtime (delta compilation). This provides the operator and archiving functions permanently.

Costs

For the cheapest of all variants, the overall costs for PC hardware and software at the example of an ES/OS license for 2000 PO/RC 64K are approx 21.000€ (list price).

Alternatives / variations

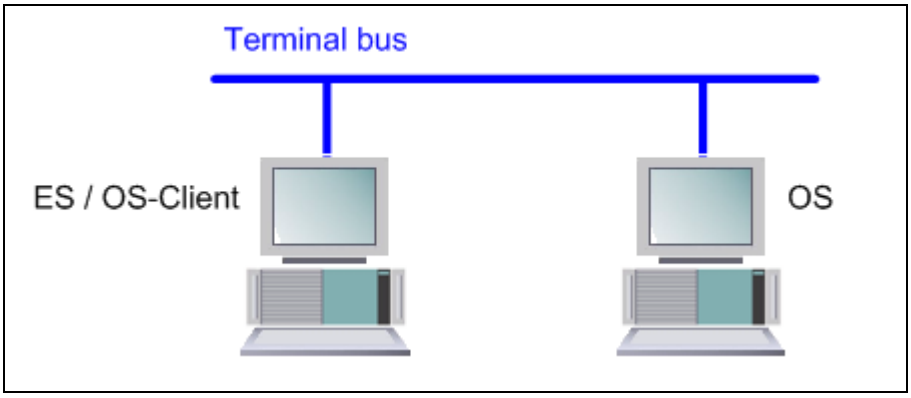
Alternatively, the complete package SIMATIC PCS 7 BOX is also an option. It combines the AS, the OS as well as the ES in a compact PC system. Also integrated is a PROFIBUS interface for connecting the decentralized process periphery.

Note The description and configuration instruction for this configuration is available in chapter 3 “ES/OS Single Station“.

1.2 ES as OS Client

With an additional PC station as OS server, there is the option of using the ES as an OS client. It accesses the data of the OS server in process mode and visualizes the data.

Figure 1-2



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Process mode / functionality

For PCS 7 the OS server can be used for operator functions if a maximum of four OS clients is connected. During server failure, the complete OS functionality fails here. Furthermore, the OS client must be terminated for later OS project changes. However, the OS server continues working during compiling,/ loading of changes.

Costs

The overall costs for PC hardware and software at the example of a respective ES/OS license for 2000 PO/RC 64K are approx 35.000€ (list price).

Alternatives / variations

An advantage of this configuration is the option of relatively simply and cost-effectively connecting further clients to the OS server.

Note The description and configuration instruction for this configuration is available in chapter 4 “ES/OS Client and OS Server”.

1.3 ES as OS Single Station (redundant)

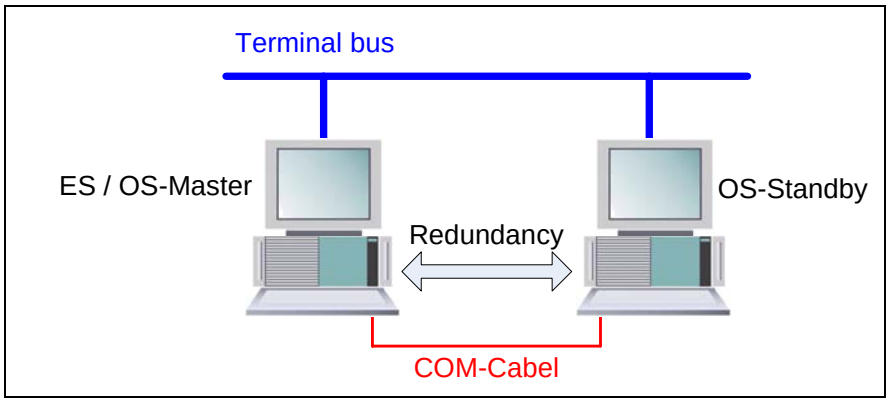
As a further constellation with two PC stations, the ES is here again used as OS single station similar to the first variant with only one PC. However, it uses the same OS project, which previously was loaded to a further OS single station. Before the OS project is activated on both stations, the mutual redundancy parameterization is performed.

Note

PCS 7 does not provide the here required system functions as a standard. Accordingly, there where no official system test nor a release for this configuration.

The setup of the redundancy with WinCC means and its functional efficiency in process mode were determined after repeated customer requests in the test laboratory of the Customer Support.

Figure 1-3



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Process mode / functionality

In this example, both PC stations work as OS single stations in process mode, which mutually synchronize each other online as well as after failure of one of the partners. This also becomes relevant during later OS project changes for which the Master OS needs to be terminated. In this case, the standby OS takes on the master role. It continues working during compiling / loading of the changes and updates the redundancy partner after its return.

For an entire download, the OS project must be deactivated and closed on both stations. During this time, no OS functionalities are available.

Costs

The overall costs for PC hardware and software at the example of a respective ES/OS license for 2000 PO/RC 64K are approx 34.000€ (list price).

Alternatives / variations

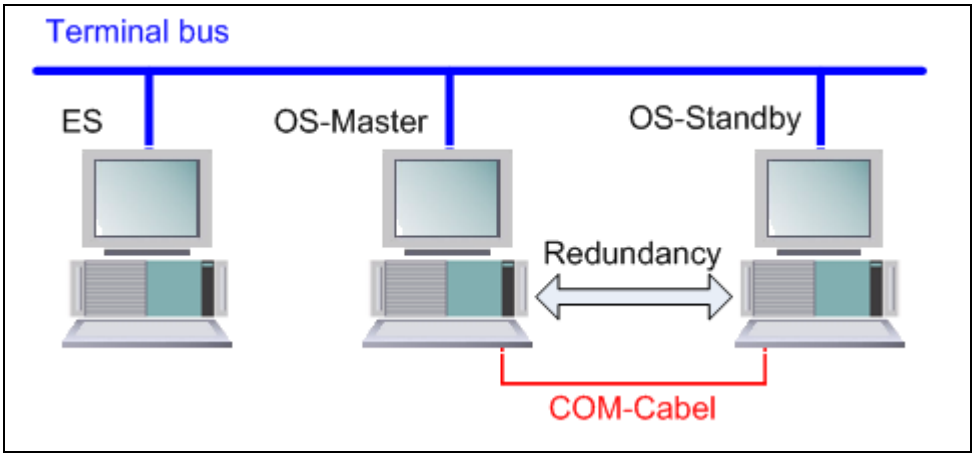
As an alternative, the redundancy could be omitted here. However, the only costs saved would be the redundancy license, approx. 3.000€. Furthermore, it must be noted, that during process mode, the parallel usage of the OS project of an other station is not PCS 7 conform.

Note The description and configuration instruction is available in chapter 5 “ES/OS Master and standby OS“. Furthermore, a list or restrictions/ particularities is available there which must be considered in the decision for this configuration.

1.4 ES without OS functionality (temporary usage)

The PCS 7 conform realization of the OS redundancy requires three PC stations. The ES then only fulfills engineering tasks and is only used for testing OS functions during that time.

Figure 1-4



Process mode / functionality

Since the ES is not involved in the process mode, the operator functions of both OS single stations are permanently available. Even during entire download of project changes, one OS always remains active. The redundancy provides for mutual synchronization, online as well as after failure of one of the partners.

Costs

The overall costs for PC hardware and software at the example of a respective ES/OS license for 2000 PO/RC 64K are approx 44.000€ (list price).

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Alternatives / variations

The low-maintenance plants focused on in this documentation often do not require a permanent ES. If for configuration, commissioning and project changes a temporary ES is rented, the above costs are reduced by approx. 20.000€.

The theoretical expansion with additional OS clients is in this example not possible without problems, as both of the OS have not been installed with a server operating system.

Note The description and configuration instruction for this configuration is available in chapter 6 “Separate ES, Master and Standby OS“.

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2 General/optional System Settings

The relevant cross-configuration system settings are suggested below.

2.1 Bus connection of the PC stations

Plant bus (system bus)

In the ES as well as in each server, a network card in “Configured Mode“ is employed for the plant bus. On this network card, only the ISO protocol is activated for Windows. If a CP 1613 exists, it is used as access to the plant bus. The configuration occurs in SIMATIC NetPro and HW Config.

Terminal bus

Apart from the configuration with only one ES/OS single station, all other PC stations are also linked with the terminal bus. The required second network card of ES and the server is here set to “PG operation“. In SIMATIC NetPro and HW Config this card is not configured. PCS 7 finds this network access via the computer names or the paths for the target computer, which must be entered at the object properties of the PC station. For this network card, only the TCP/IP protocol (no ISO) is activated for Windows.

Client-PC stations are generally only equipped with a network card that connects them to the terminal bus. For this network card, only the TCP/IP protocol (no ISO) is activated for Windows.

2.2 Autostart of WinCC

This document contains the step-by-step instructions, that the OS project is opened on the OS servers and clients for the purpose of activating Runtime.

In the plant this should be avoided as normally, no configuration licenses (RC licenses) exist on the OS. If hereby the WinCC Explorer is opened for more than an hour, WinCC goes into demo mode and must be closed entirely for further configuration steps (incl. Runtime) and be opened again.

For automatically activating Runtime during the start of the computer without opening the WinCC Explorer, an autostart can be configured for the project.

In conjunction with SIMATIC NET Edition 2005 (as from WinCC V6.0 SP3) the WinCC tool `"AutoStartRT"` should be configured in `"Set SIMATIC NET Configuration Console PC station"` in order to configure the WinCC Autostart:

http://support.automation.siemens.com/WW/view/en/23061262

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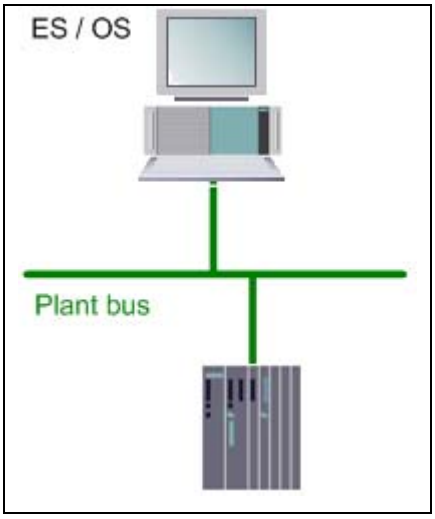
3 ES/OS Single Station

3.1 Configuration description

The stand-alone system is the smallest possible configuration. The same PC is used for ES and OS functionalities.

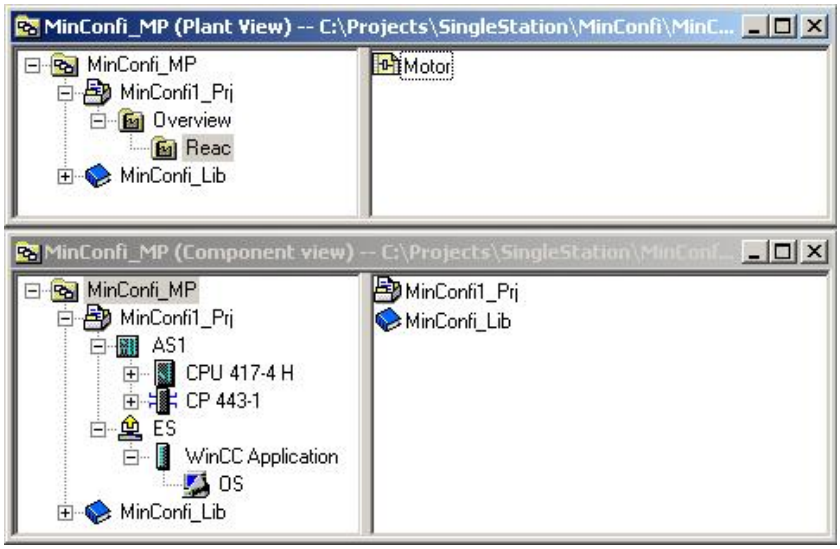
Hardware setup

Figure 3-1



PCS 7 configuration

Figure 3-2



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Particularities / Restrictions

While the ES activities can be executed using two monitors, the OS mode only enables using one monitor as the OS is configured as stand-alone system.

3.2 Required hardware, software and licenses

Hardware

The following hardware is recommended for this configuration and can be ordered via the Siemens mall. Your selected operating system and the system software SIMATIC PCS 7 is then preinstalled accordingly.

Table 3-1

Component	Product information	Operating system	Plant bus interface	MLFB	L price/piece [€]
1 x ES	SIMATIC PCS 7 ES/OS IL 43 BCE W2K	Windows 2000 SP4	RJ45 network card	6ES7 650-0LC16-0YX0	3,900.00
	SIMATIC PCS 7 ES/OS IL 43 IE W2K	Windows 2000 SP4	CP 1613 A2	6ES7 650-0LC16-0YX1	4,990.00
	SIMATIC PCS 7 ES/OS IL 43 BCE WXP	Windows XP SP2	RJ45 network card	6ES7 650-0LF16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE WXP	Windows XP SP2	CP 1613 A2	6ES7 650-0LF16-0YX1	4,990.00

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Licenses/Software

The following license must be purchased in addition to the above PC station. There are different license forms which are graded according to the number of configurable process objects (PO) or the number of the OS variables.

Table 3-2

Software	Name	MLFB	L price/piece [€]
1 x Engineering standard software	PCS 7 Engineering Software V6.1 AS and OS	e.g. 6ES7 658-5AC16-0YA5 (for 2000 PO/RC 64K)	17,000.00

Note The Rental License, which is restricted to 50 operating hours, provides an additional license for engineering of short-term projects.

3.3 Step-by-Step Configuration

Note The following instruction was generated on the basis of Windows XP SP2 and PCS 7 V6.1 SP1.

For the plant bus transition a CP1613 is used as an example.

3.3.1 ES configuration

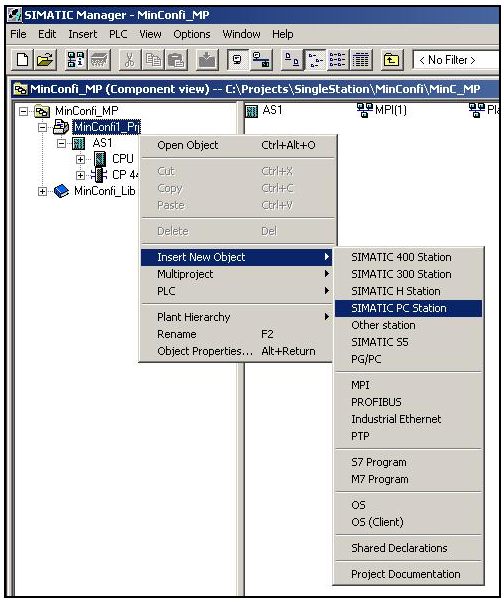
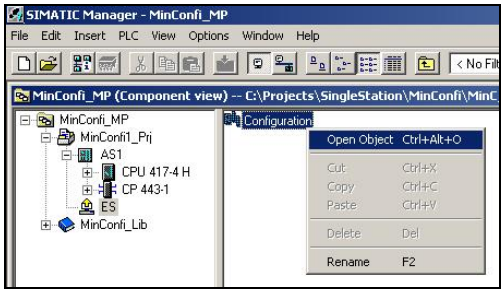
Creating the multiproject

As a basis for the following instruction, the station must be physically networked according to Figure 1-4. Furthermore, a multiproject must have been created on the ES in which the AS has already been configured regarding hardware and software.

Generating the PC station

In the PCS 7 project, the PC station is created which represents the ES as well as the OS.

Table 3-3

Step	Activity	Screenshot
1.	In the "Component view" you open the context menu of the project and insert a new PC station via "Insert New Object" -> "SIMATIC PC Station". Change the name of the PC station so that it corresponds with the name of the local computer in the network.	
2.	Open the HW config of the PC station.	

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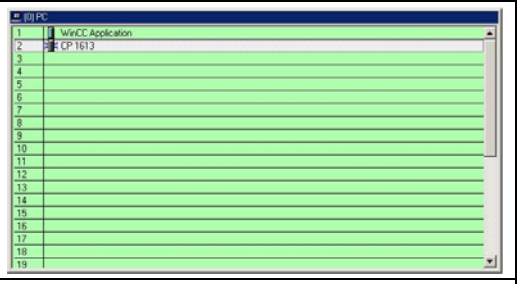
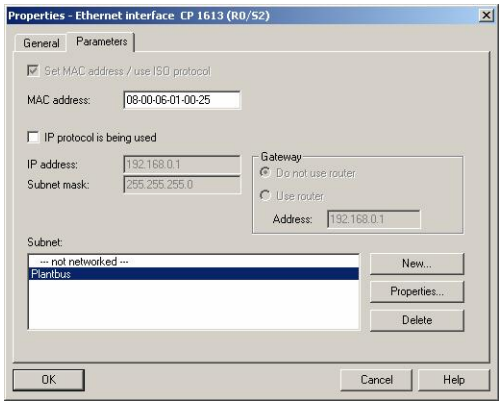
Step	Activity	Screenshot
3.	Add a "WinCC Application" and a "CP 1613".	
4.	In "Subnet" you select the already created plant bus or create it via the "New..." button when working in a separate subproject. Assign the respective MAC address to the CP 1613. Confirm the settings with "OK".	
5.	Save and compile via menu item "Station" -> "Save and Compile". Close HW Config.	

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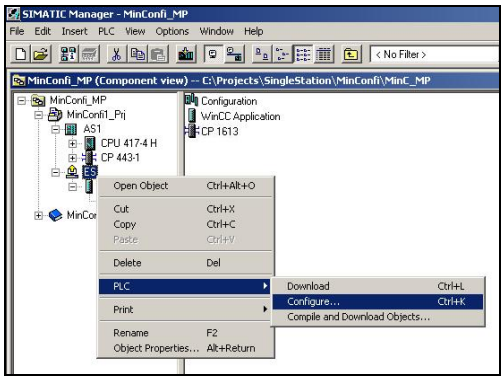
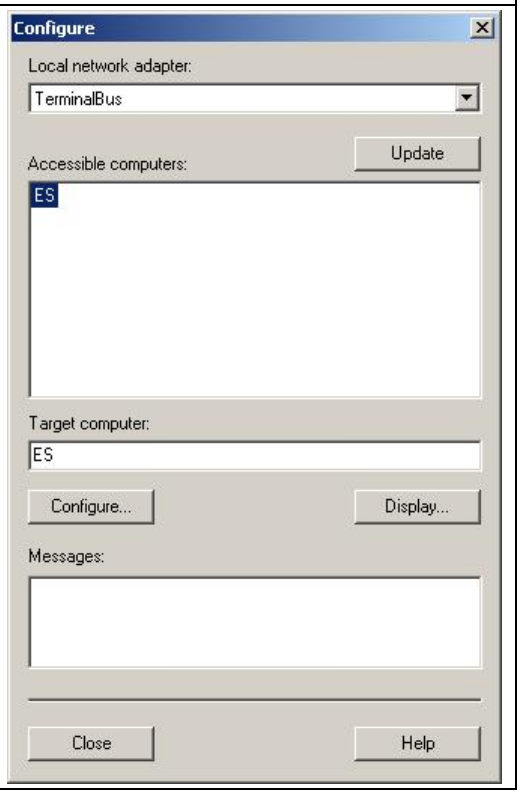
Configuring the PC station

The settings made are now transferred into the local PC station (assembling the component configurator).

Table 3-4

Step	Activity	Screenshot
1.	Select the PC station and chose "PLC" > "Configure..." from the options menu.	
2.	In "Accessible computers" you select the local PC. Press the "Configure..." button.	

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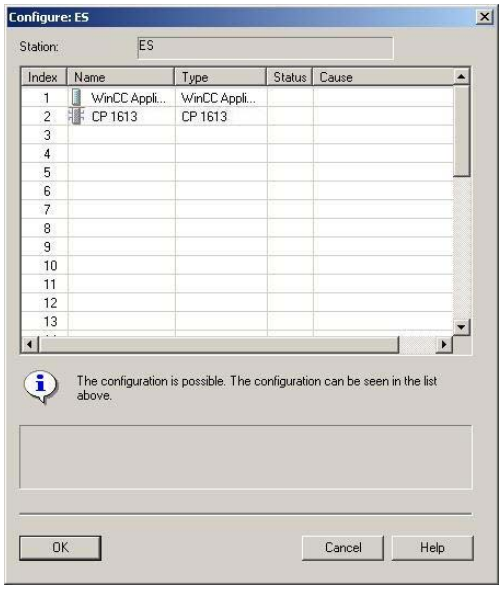
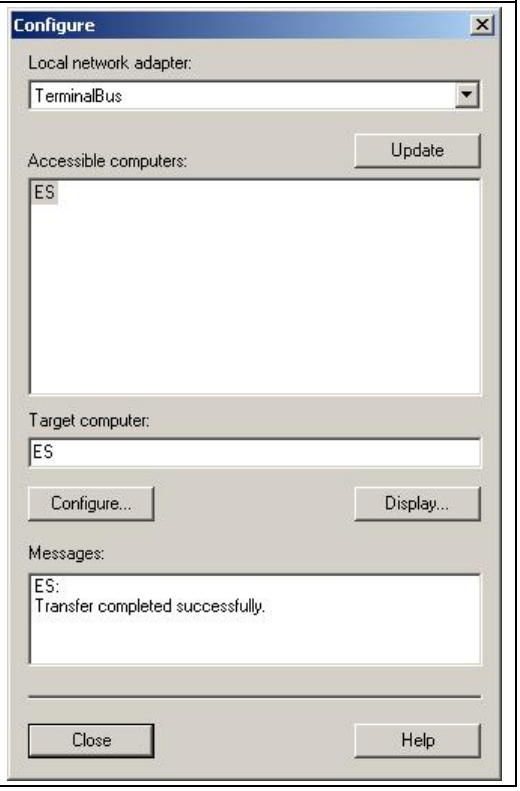
Step	Activity	Screenshot
3.	In the displayed window you see how the PC station is configured. Confirm this with "OK".	
4.	Acknowledge the information which appears with "OK".	
5.	Subsequently you receive the following message in the bottom window pane: "Transfer completed successfully.". Close the configuration dialog box.	

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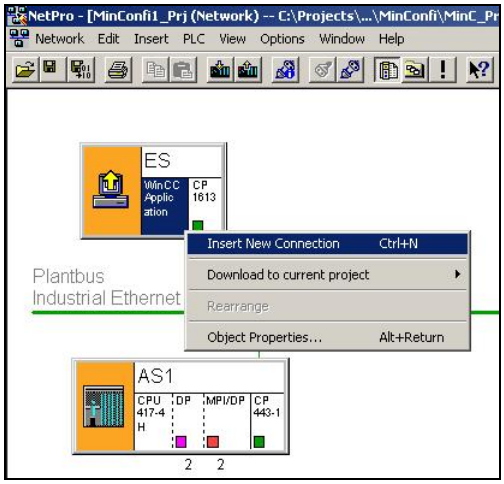
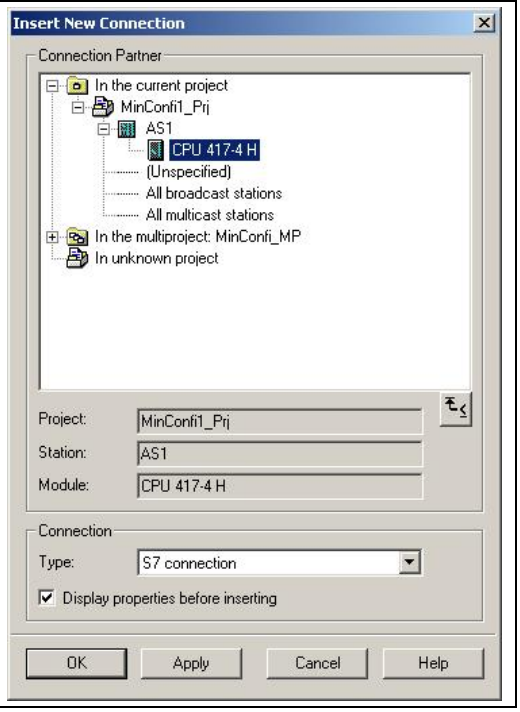
Configure and load the communication settings

The connection with NetPro is configured below and loaded into the stations.

Note For station granular configuration, the subnets of the individual subprojects must be joined beforehand.

Table 3-5

Step	Activity	Screenshot
1.	Open NetPro. Select the WinCC application of the ES and open the context menu. Here you select "Insert New Connection".	
2.	In the "Connection Partner" window you select CPU of the AS. Ensure, that in the "Connection" field "S7 connection" has been selected. Confirm the entries with "OK".	

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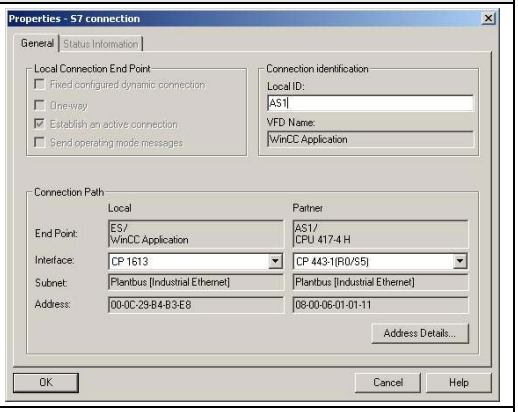
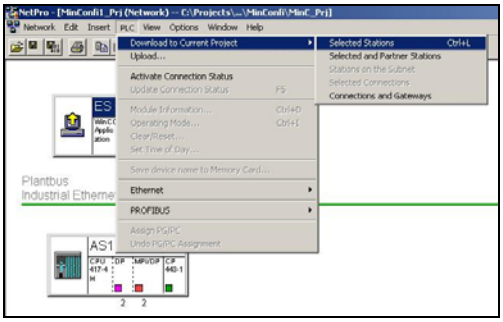
Step	Activity	Screenshot
3.	In "Connection identification" you change the "Local ID" to a meaningful name, e.g. AS1.	
4.	Save and compile via menu item "Network" -> "Save and Compile". Select "Compile and check everything".	
5.	Select the ES and load the connection via the menu item "PLC" -> "Download to Current Project" -> "Selected Stations". Download the AS in the same way. Then close NetPro.	

Compile and load the user program

Compile the S7 program and load it into the AS.

Compile the OS project

Compile the OS project in the SIMATIC Manager.

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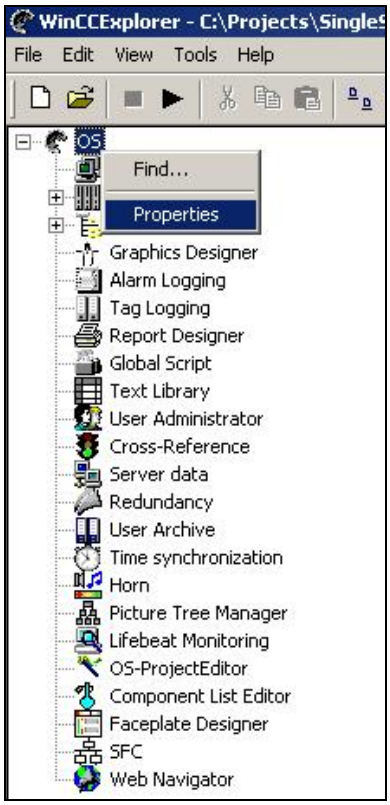
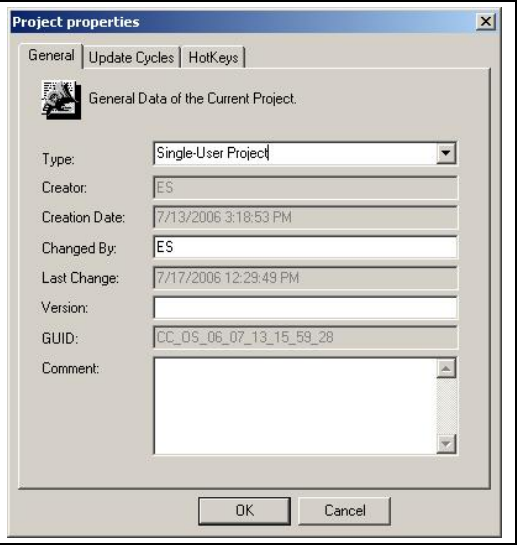
3.3.2 OS configuration

Table 3-6

Step	Activity	Screenshot
1.	Open the OS project. In the opened WinCC Explorer you open the OS project and select "Properties" in the context menu.	
2.	In the "General" tab of the "Type:" field you select "Single-User Project". Acknowledge the entry with the "OK" button and also acknowledge the message with "OK".	

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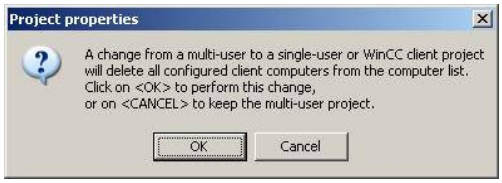
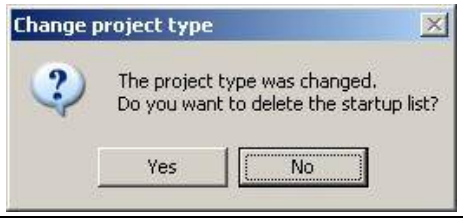
Step	Activity	Screenshot
		
3.	Prevent deleting the startup list by pressing the "No" button.	
4.	Close the Windows Explorer. NOTE This closing is absolutely necessary. Only renewed opening enables reading the changes.	

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3.3.3 Activating the Runtime

After the OS project was closed, you can open it again and activate the Runtime.

3.3.4 Loading of OS project modifications

Particularities for stand alone systems

If OS and ES are operated in a computer, no load process must be performed as all of the required data already exists. Here, executing the “Compile OS“ function is sufficient. Analog to the “Download changes“ function, the “Compile changes“ function can be executed at stand-alone systems without terminating the process mode of the OS.

Delta-compilation

Small project changes can be transferred into the active OS project by means of delta compilations.

Note Detailed information on which configuration steps enable a delta-download are available in the “PCS 7 – Configuration Manual Operator Station“, chapter 10.

Delta-compilation offers two advantages:

- The OS can remain in process mode.
- The duration of the compilation process is considerably reduced.

Entire compilation

Entire compilation must principally be performed during the first compilation process or after performing extensive modifications, such as modifications in the message configuration.

Note Detailed information on which configuration steps require entire compilation are available in the “PCS 7 – Configuration Manual Operator Station“, chapter 10.

Entire compilation requires the OS project to be deactivated.

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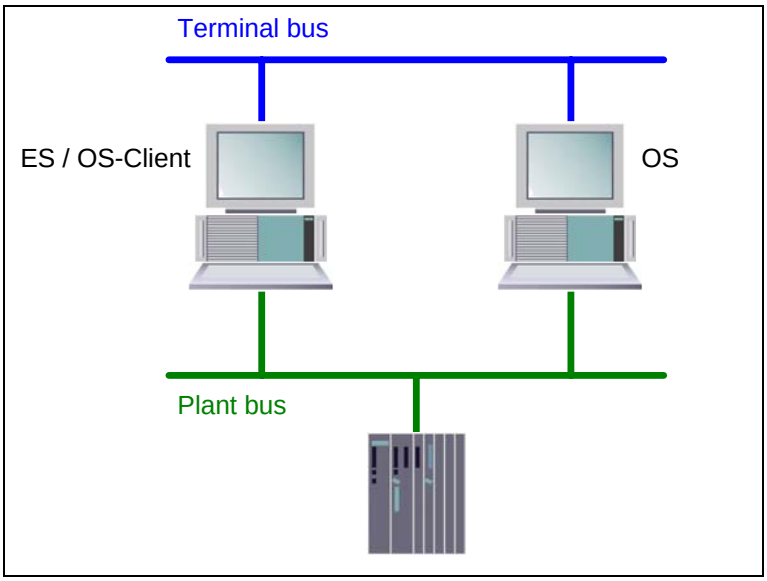
4 ES/OS Client and OS Server

4.1 Configuration description

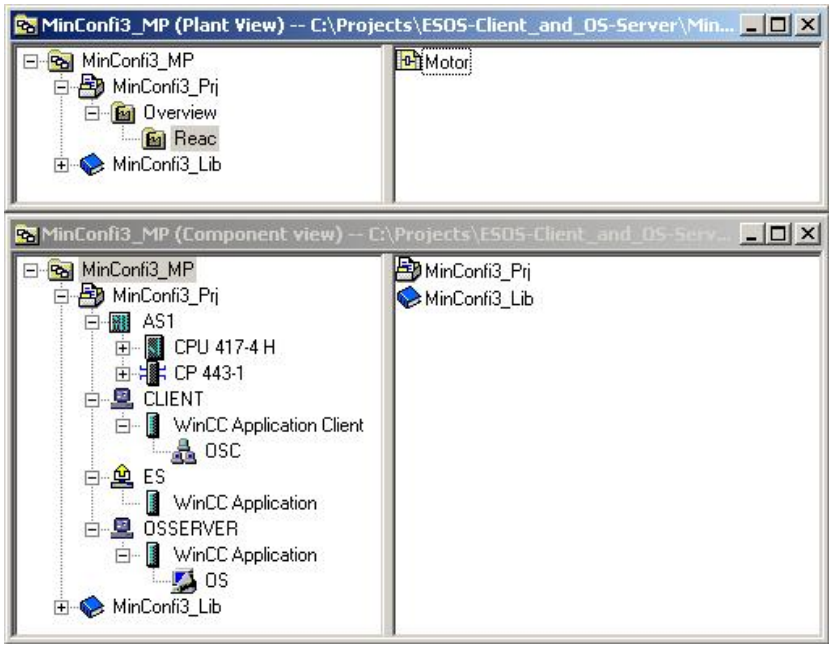
For a server-client structure with only two computers, the ES serves as OS client at the same time.

Figure 4-1



PCS 7 configuration

Figure 4-2



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4.2 Required hardware, software and licenses

Hardware

The following hardware is recommended for this configuration and can be ordered via the Siemens mall. Your selected operating system and the system software SIMATIC PCS 7 is then preinstalled accordingly.

Table 4-1

Component	Product information	Operating system	Plant bus interface	MLFB	L price/piece [€]
1 x ES	SIMATIC PCS 7 ES/OS IL 43 BCE W2K	Windows 2000 SP4	RJ45 network card	6ES7 650-0LC16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE W2K	Windows 2000 SP4	CP 1613 A2	6ES7 650-0LC16-0YX1	4,990.00
	SIMATIC PCS 7 ES/OS IL 43 BCE WXP	Windows XP SP2	RJ45 network card	6ES7 650-0LF16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE WXP	Windows XP SP2	CP 1613 A2	6ES7 650-0LF16-0YX1	4,990.00
1 x OS Server	SIMATIC PCS 7 OS Server IL 43 BCE W2K	Windows Server 2000 SP4	RJ45 network card	6ES7 650-0LE16-0YX0	4,990.00
	SIMATIC PCS 7 OS Server IL 43 IE W2K	Windows Server 2000 SP4	CP 1613 A2	6ES7 650-0LE16-0YX1	6,460.00
	SIMATIC PCS 7 OS Server IL 43 BCE SRV03	Windows Server 2003 SP1	RJ45 network card	6ES7 650-0LH16-0YX0	4,990.00
	SIMATIC PCS 7 OS Server IL 43 IE SRV03	Windows Server 2003 SP1	CP 1613 A2	6ES7 650-0LH16-0YX1	6,460.00

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Licenses/Software

The following licenses must be purchased in addition to the above PC stations. There are different license forms which are graded according to the number of configurable process objects (PO) or the number of the OS variables.

Table 4-2

Software	Name	MLFB	L price/piece [€]
1 x Engineering standard software	PCS 7 Engineering Software V6.1 AS and OS	e.g. 6ES7 658-5AC16-0YA5 (for 2000 PO/RC 64K)	17,000.00
1 x OS standard software	SIMATIC PCS 7 OS Software Server V6.1	e.g. 6ES7 658-2BC16-0YA0 for PO 2000 / RT 64K	8,900.00

Note The Rental License, which is restricted to 50 operating hours, provides an additional license for engineering of short-term projects.

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4.3 Step-by-Step Configuration

Note The following instruction was generated on the basis of Windows XP SP2 and PCS 7 V6.1 SP1.

For the plant bus transitions, CP1613 is used as an example. A clock synchronization is activated.

4.3.1 Preparatory steps

Create a project folder on the OS server and enable it so that complete access is possible from the ES.

4.3.2 ES configuration

Creating the multiproject

As a basis for the following instruction, all PC stations must be physically networked according to Figure 4-1. Furthermore, a multiproject must have been created on the ES in which the AS has already been configured regarding hardware and software.

Then you can start with the following CPU and CP settings.

AS settings

This example describes a path where the OS server defines the master time.

Note Further options of clock synchronization are described in detail in the “PCS 7 – Configuration Manual Operator Station“ in chapter 11 “Clock synchronization and life signal monitoring“.

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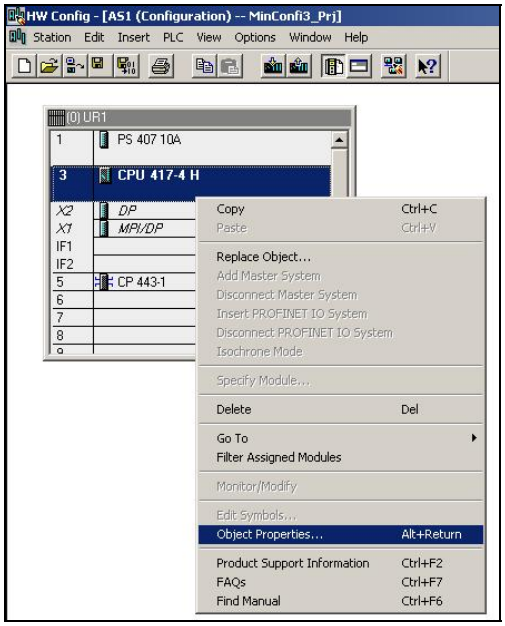
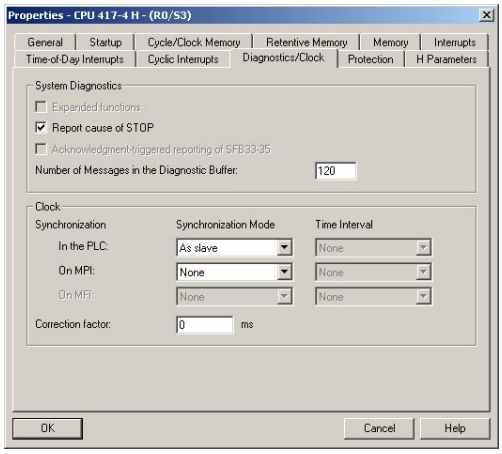
Table 4-3

Step	Activity	Screenshot
1.	Open the HW config of the AS. Select the CPU and chose “Object Properties…” from the context menu.	
2.	Switch to the “Diagnostic/Clock” tab. In the “In the PLC:” box of the “Clock” section you select “As slave” as the “Synchronization Mode”. Confirm this setting with “OK”.	

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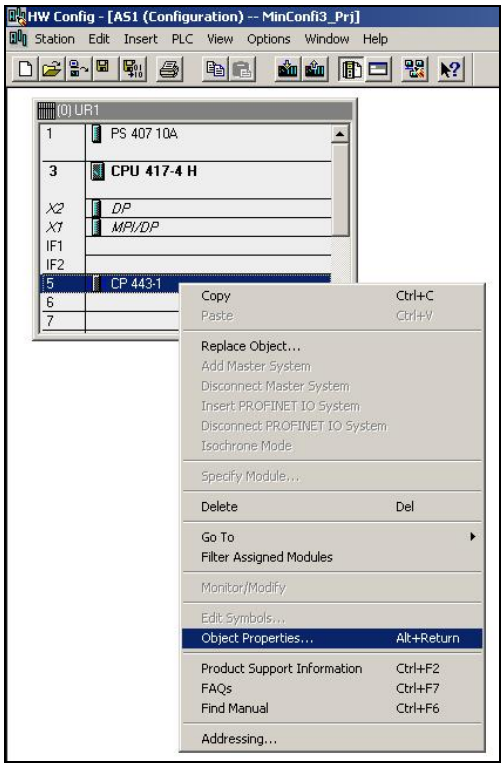
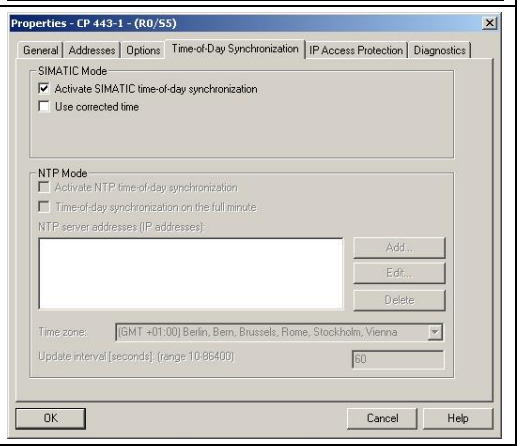
Step	Activity	Screenshot
3.	Open the context menu of the CP and select "Object Properties…".	
4.	Switch to the "Time-of-Day Synchronization" tab. Checkmark the "Activate SIMATIC time-of-day synchronization" box. Confirm the setting with "OK".	
5.	Save and compile the configuration via "Station" -> "Save and Compile". Close HW Config.	

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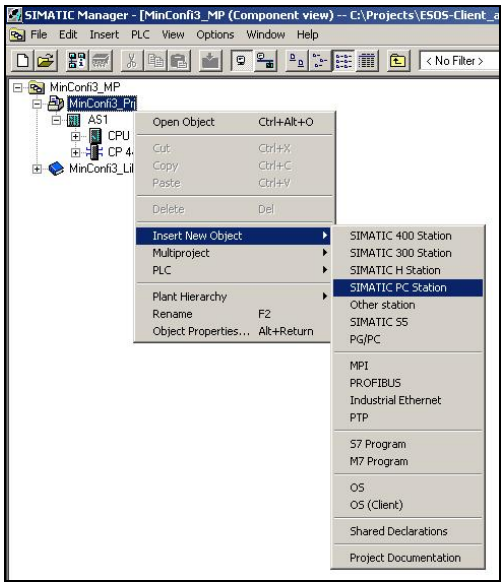
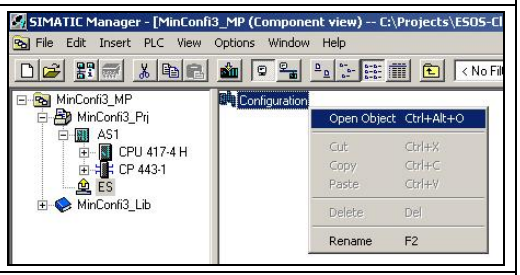
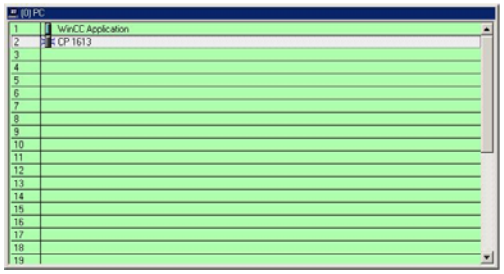
Generate the PC station for the ES

In order to be able to test the OS project of the OS server on the ES, we create for the ES a PC station with WinCC application.

Table 4-4

Step	Activity	Screenshot
1.	In the "Component view" you open the context menu of the project and insert a new PC station via "Insert New Object" -> "SIMATIC PC Station". Change the name of the PC station so that it corresponds with the name of the local computer in the network.	
2.	Open the HW config of the PC station of the ES.	
3.	Add a "WinCC Application" and a "CP 1613".	

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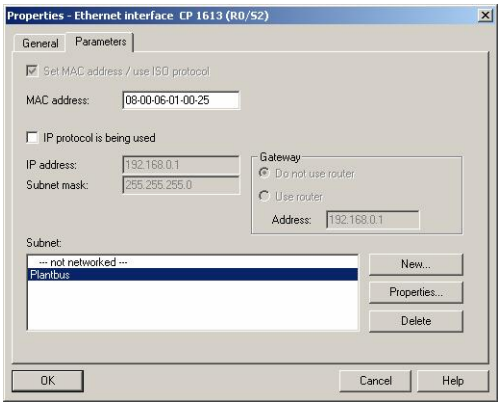
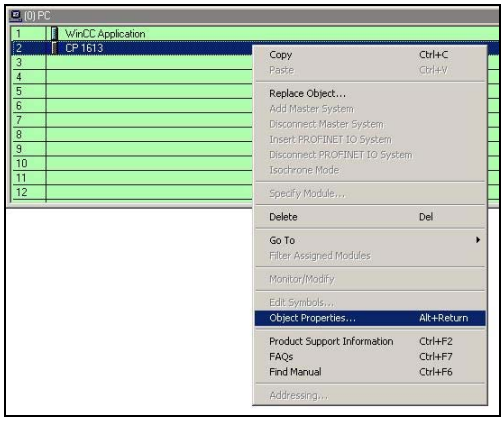
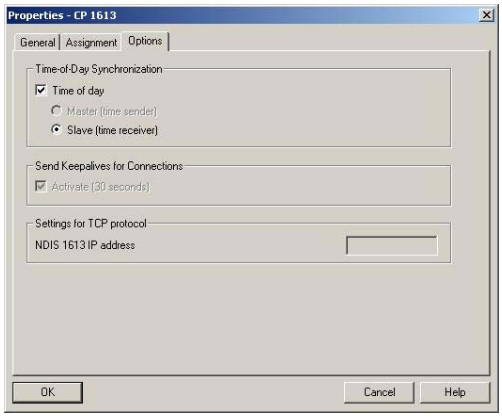
Step	Activity	Screenshot
4.	In "Subnet" you select the already created plant bus or create it via the "New..." button when working in a separate subproject. Assign the respective MAC address to the CP 1613. Confirm the settings with "OK".	
5.	Open the context menu of the CP 1613 and select "Object Properties...".	
6.	Select the "Options" tab and checkmark the "Time of day" box. Confirm the setting with "OK".	
7.	Save and compile via menu item "Station" -> "Save and Compile". Close HW Config.	

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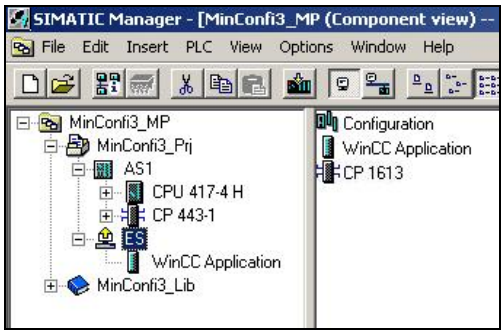
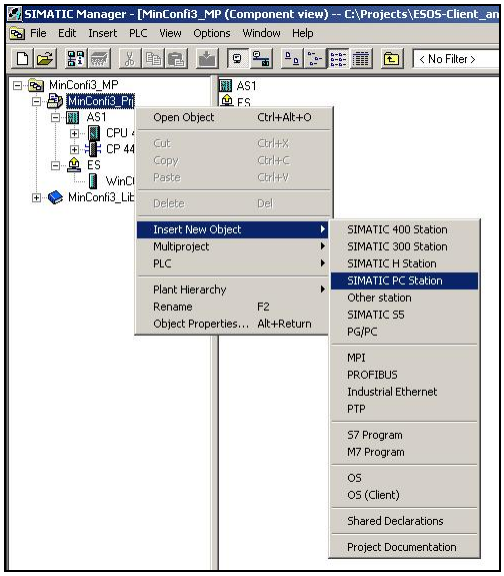
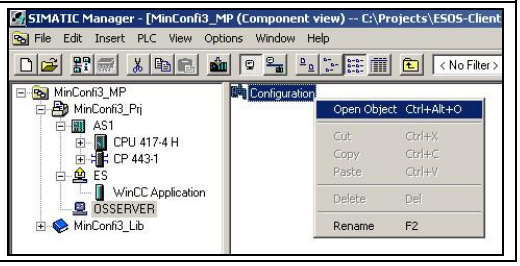
Step	Activity	Screenshot
8. optional	In the SIMATIC Manager you delete the OS project of the PC station of the ES as it is not required in our example.	

Generate the PC station for the OS server

Table 4-5

Step	Activity	Screenshot
1.	In the component view you open the context menu of the project and insert a new PC station via "Insert New Object" -> "SIMATIC PC Station" whose name you can chose as you wish.	
2.	Open the HW config of the PC station of the OS server.	

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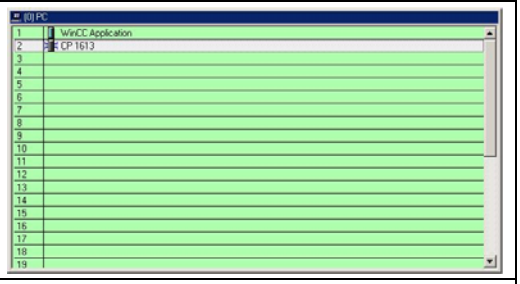
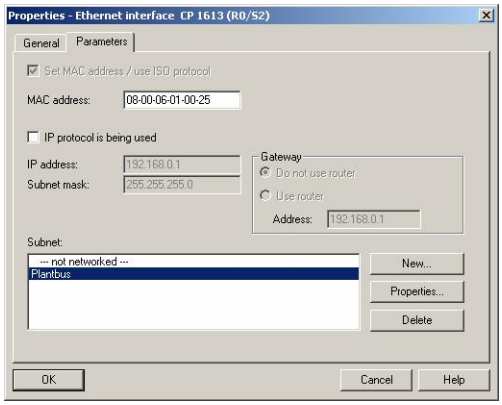
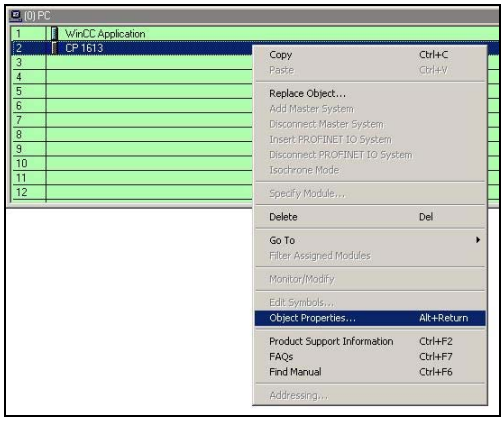
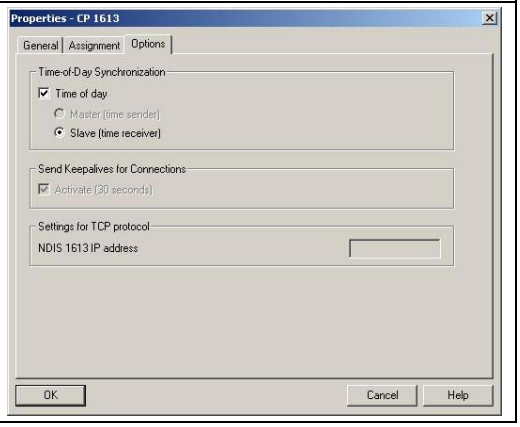
Step	Activity	Screenshot
3.	Add a "WinCC Application" and a "CP 1613".	
4.	In "Subnet" you select the already created plant bus or create it via the "New..." button when working in a separate subproject. Assign the respective MAC address to the CP 1613. Confirm the settings with "OK".	
5.	Open the context menu of the CP 1613 and select "Object Properties...".	
6.	Select the "Options" tab and checkmark the "Time of day" box. Confirm the setting with "OK".	

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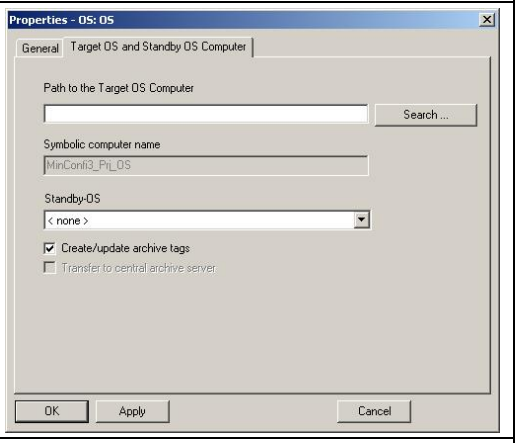
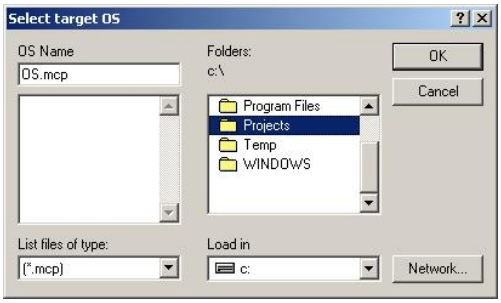
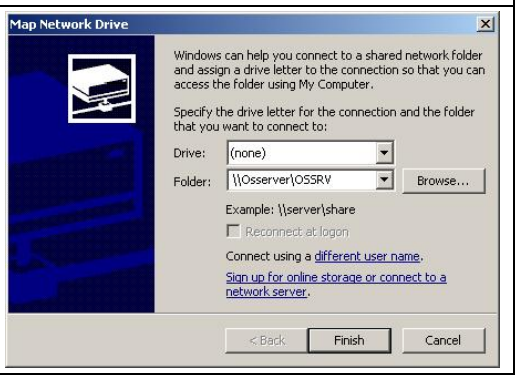
Step	Activity	Screenshot
7.	Save and compile via menu item "Station" -> "Save and Compile". Close HW Config.	
8.	In the SIMATIC Manager you open the properties dialog of the OS project of the OS server. Switch to the "Target OS and Standby OS Computer" tab. In "Standby-OS" you select "<none>". Then you press the "Search..." button.	
9.	Press the "Network..." button.	
10.	In "Drive" you select "<none>". Via the "Browse..." button you navigate to the enabled project folder of the OS server.	
11.	"Folder:" now contains the selected path. Check it and confirm with the "Finish" button.	

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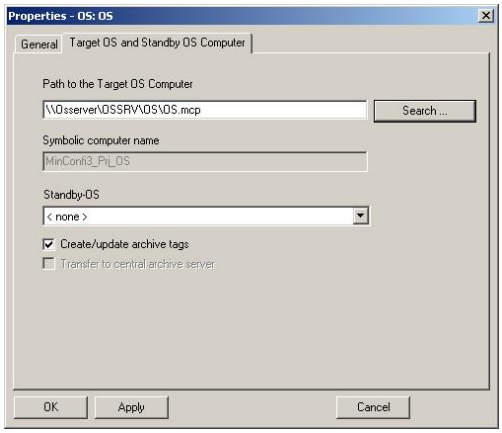
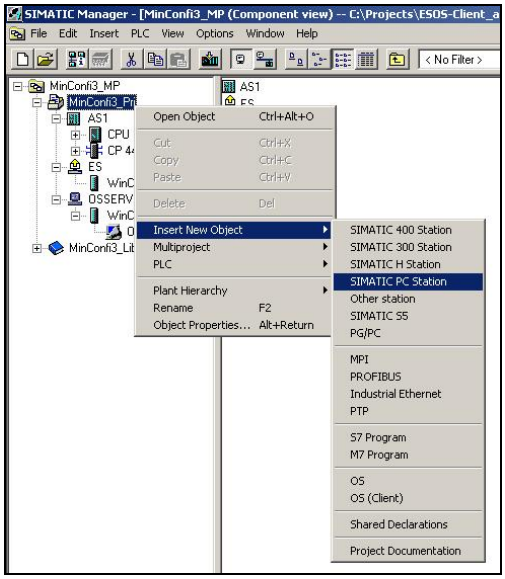
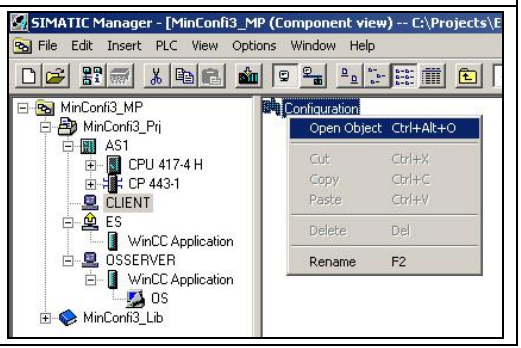
Step	Activity	Screenshot
12.	In the "Path to the Target OS Computer" input field you check the path. Confirm this with "OK".	

Generate the PC station for the client

Table 4-6

Step	Activity	Screenshot
1.	In the component view you open the context menu of the project and insert a new PC station via "Insert New Object" -> "SIMATIC PC Station" whose name you can chose as you wish.	
2.	Open the HW config of the PC station of the OS client.	

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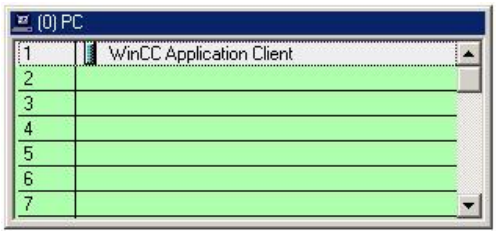
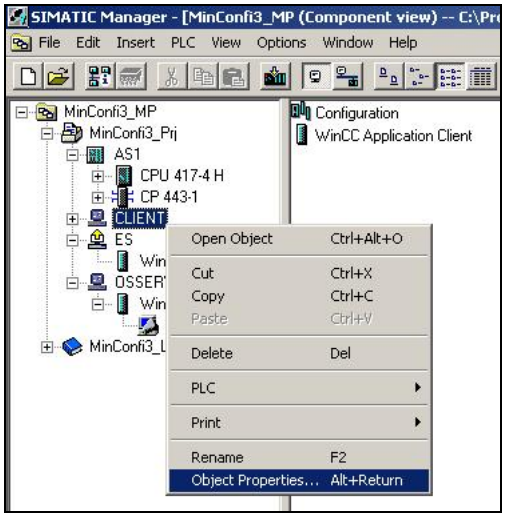
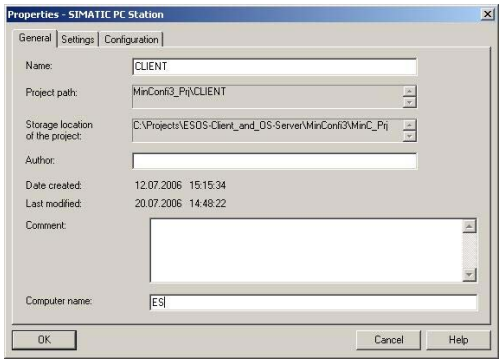
Step	Activity	Screenshot
3.	Add a "WinCC Application Client".	
4.	Save and compile via menu item "Station" -> "Save and Compile". Close HW Config.	
5.	Open the context menu of the PC station of the client in the SIMATIC Manager and select "Object Properties".	
6.	In "Computer name" you enter the name of the PC on which the client is to be operated. In the configuration on hand, this is the ES computer. Confirm the setting with "OK".	

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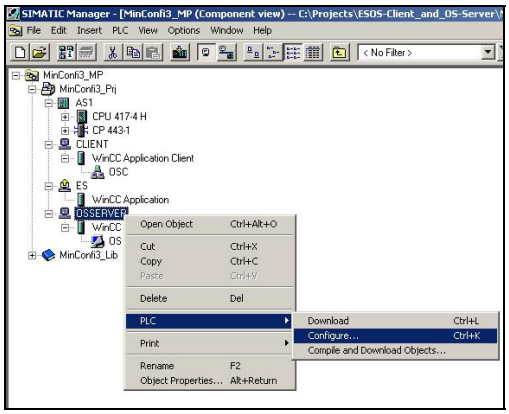
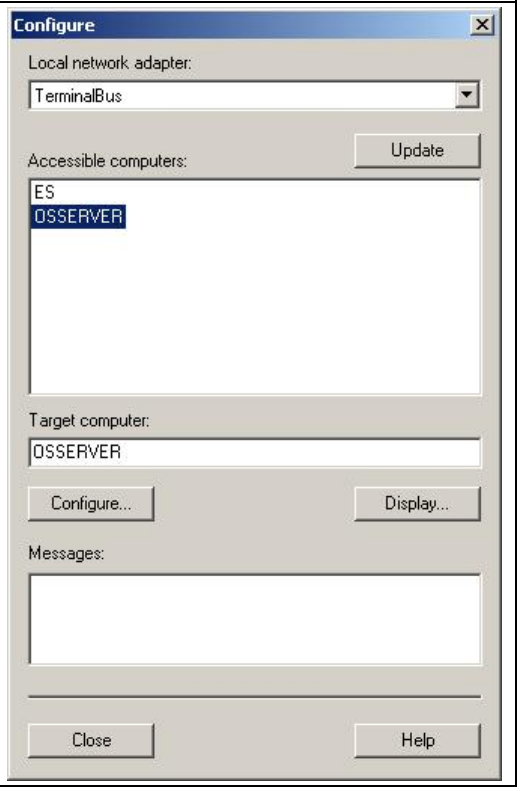
Configuring all PC stations

The settings made are now transferred to the individual PC stations (assembling the component configurator).

Table 4-7

Step	Activity	Screenshot
1.	Configure the component configuration of the OS server. To do this you open the context menu of the OS-PC station and select "PLC" > "Configure…".	
2.	In the "Accessible computers" field you select the PC which corresponds to the OS server. Press the "Configure…" button.	

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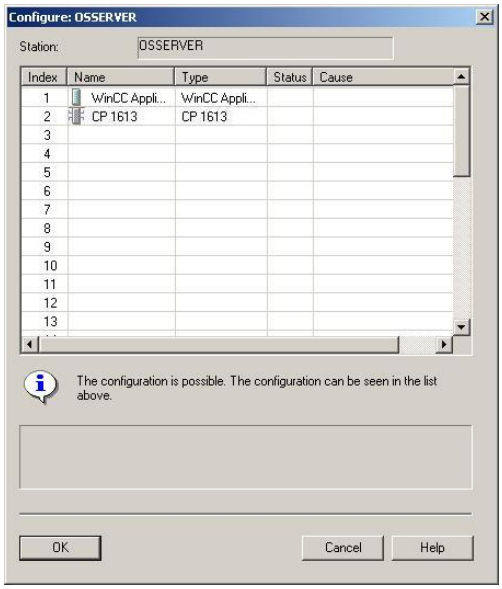
Step	Activity	Screenshot
3.	In the displayed window you see how the PC station is configured. Confirm this setting with "OK".	
4.	Confirm the information which appears with "OK".	
5.	Subsequently you receive the following message in the bottom window pane: "Transfer completed successfully.". Close the configuration dialog box.	
6.	Please configure the component configurator of the ES analog to step 1 to 5.	

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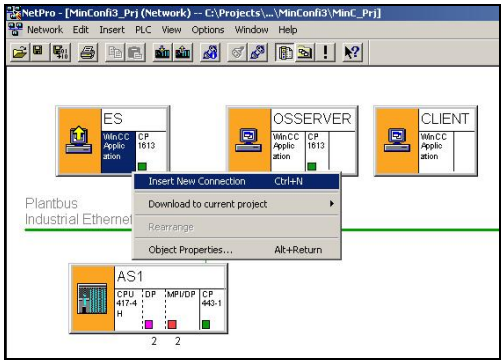
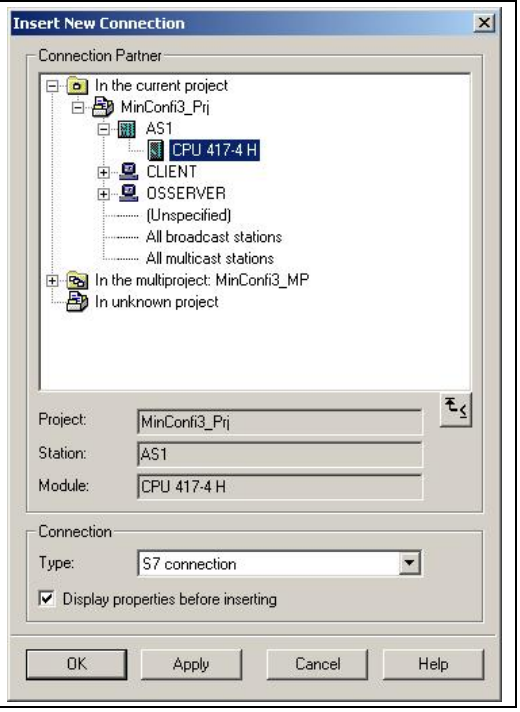
Configure and load the communication settings

The connection with NetPro is configured below and loaded into the stations.

Note For station granular configuration, the subnets of the individual subprojects must be joined beforehand.

Table 4-8

Step	Activity	Screenshot
1.	Open NetPro. Select the WinCC application of the ES and open the context menu. Here you select "Insert New Connection".	
2.	In the "Connection Partner" window you select CPU of the AS. Ensure, that in the "Connection" field "S7 connection" has been selected. Confirm the entries with "OK".	

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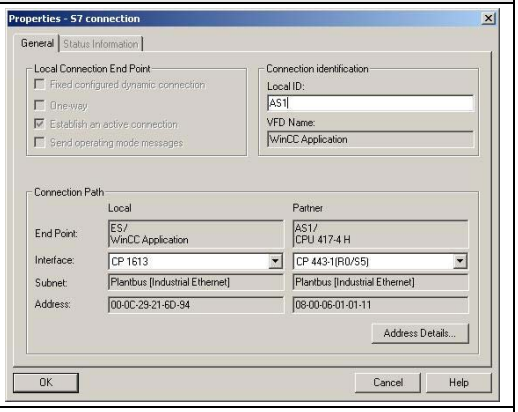
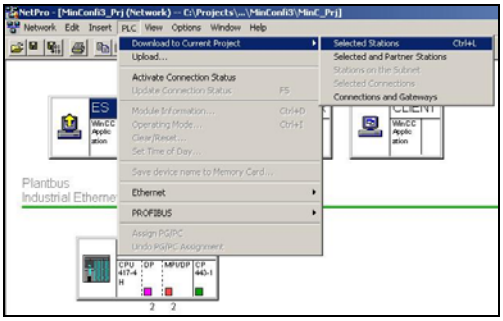
Step	Activity	Screenshot
3.	In "Connection identification" you change the "Local ID" to a meaningful name, e.g. AS1.	
4.	Repeat steps 1 to 3 for connecting the OS server to the AS. It is important here, that the connections of the ES and the OS server with the AS have identical names. Then save and compile NetPro via menu item "Network" -> "Save and Compile…". Select "Compile and check everything".	
5.	Select the ES and load the connections via the menu item "PLC" -> "Download to Current Project" -> "Selected Stations". Download OS server and the AS in the same way. Then close NetPro.	

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Compile and load the user program

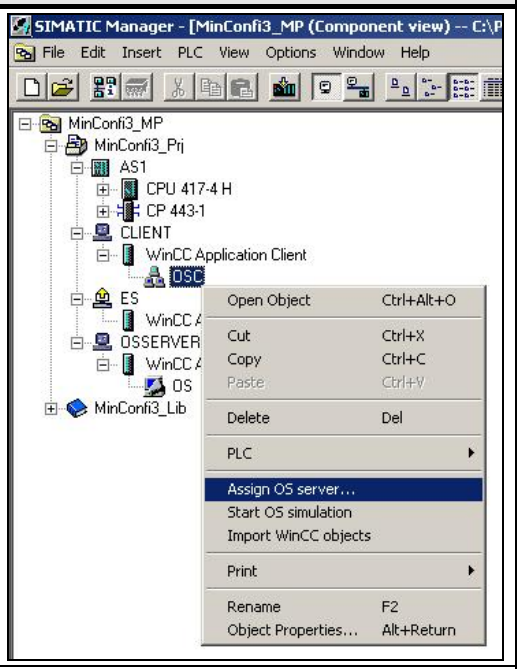
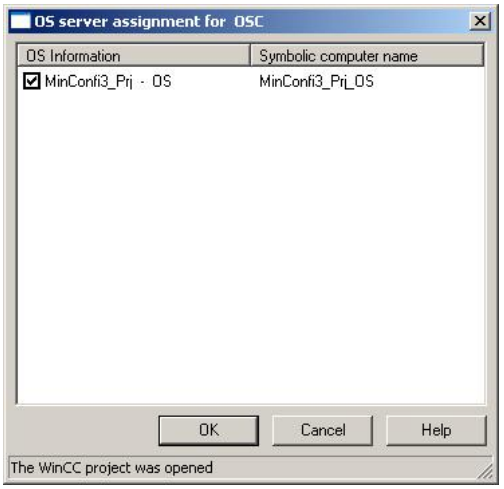
Compile the S7 program and load it into the AS.

Compile the OS project

Compile the OS project in the SIMATIC Manager.

Assigning the server packages

Table 4-9

Step	Activity	Screenshot
1.	Select the OS project of the OS client and select "Assign OS server…" in the context menu.	
2.	Then select the respective OS project and acknowledge with "0K".	

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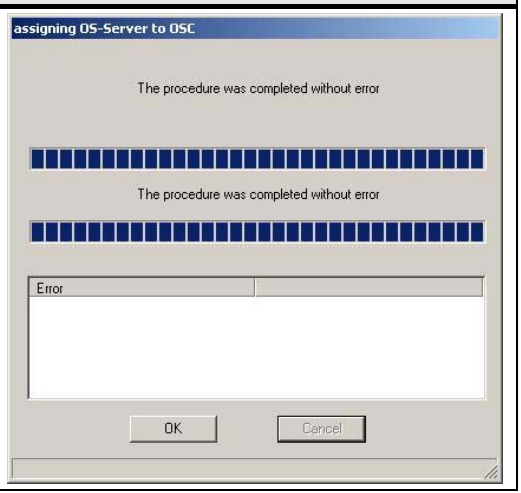
Step	Activity	Screenshot
3.	Confirm the successful download of the package with "OK".	

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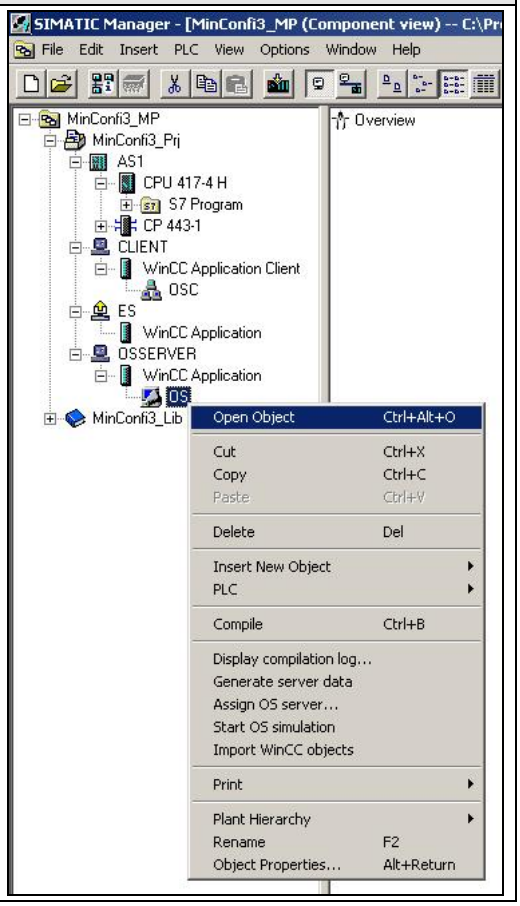
4.3.3 OS configuration

Activating the clock synchronization

On the ES, the necessary settings are activated in the OS projects by OS server and OS client.

Table 4-10

Step	Activity	Screenshot
1.	Open the OS server project.	

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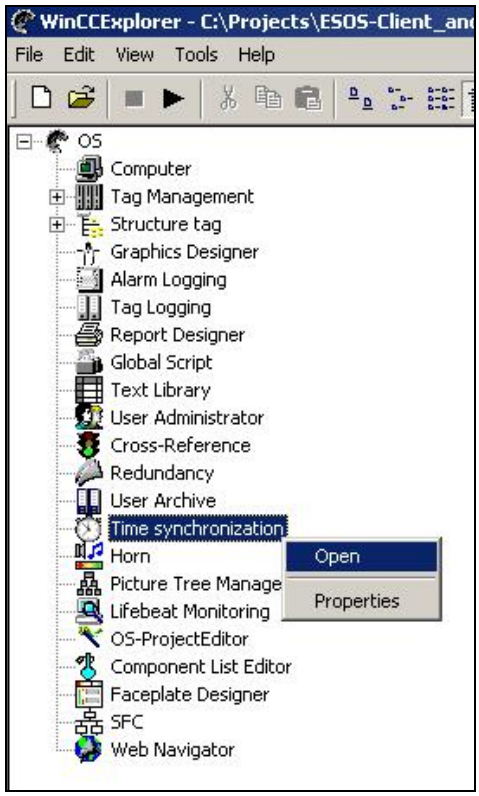
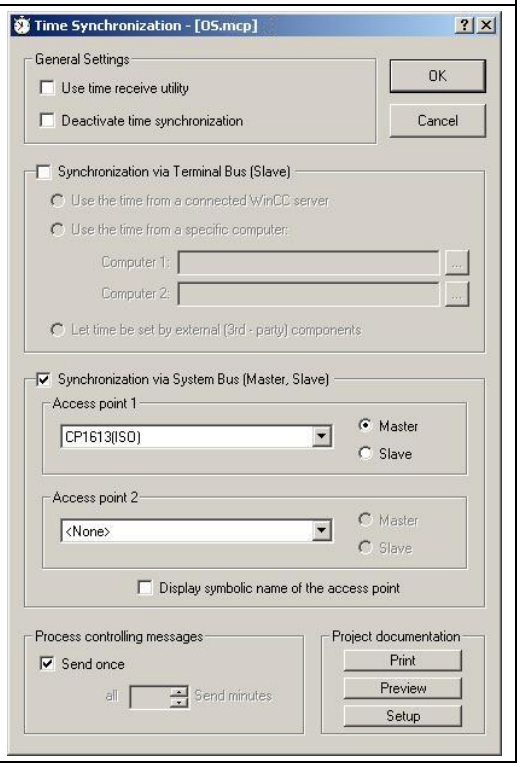
Step	Activity	Screenshot
2.	Open the "Time synchronisation" editor.	
3.	Here you activate the "Synchronization via system Bus (Master, Slave)" checkbox. In "Access point 1" you select "CP1613(ISO)" and activate the "Master" radio button. Confirm the settings with "OK". NOTE: If the ES server, as opposed to the OS server, does not have a CP 1613, the settings for the clock synchronization cannot be executed here. The clock synchronization settings must, in this case, be executed on the OS server itself after downloading the OS project.	

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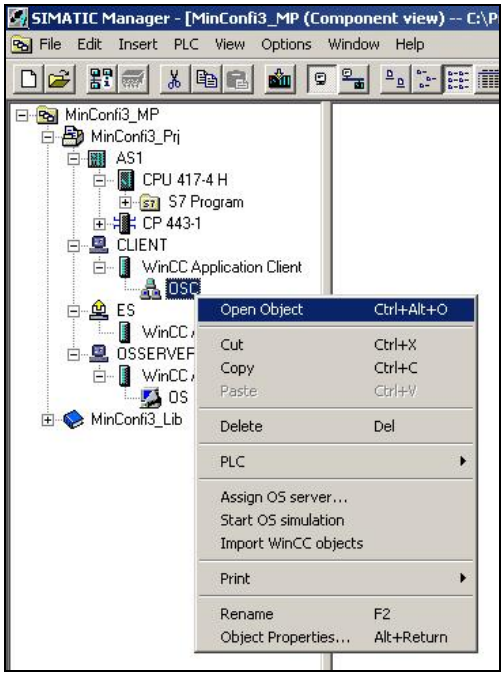
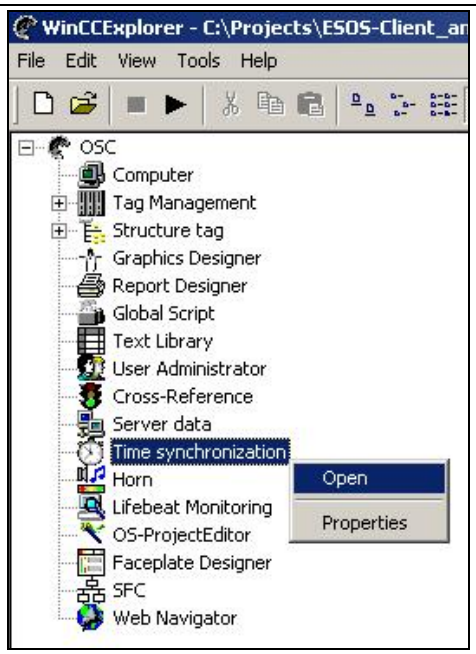
Step	Activity	Screenshot
4.	Close the server project.	
5.	Open the OS client project.	
6.	Open the "Time synchroniza-tion" via the context menu and execute "Open".	

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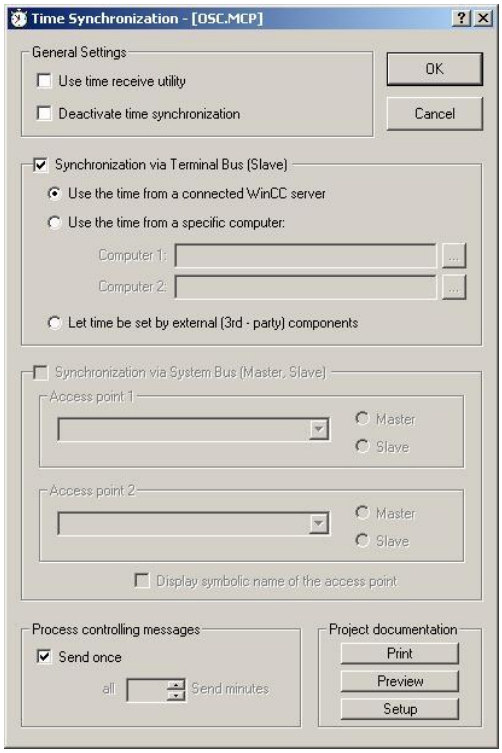
Step	Activity	Screenshot
7.	Activate the "Synchronization via Terminal Bus (Slave)" checkbox and select "Use the time from a connected WinCC server". Confirm the settings with "OK".	
8.	Close the OS project.	

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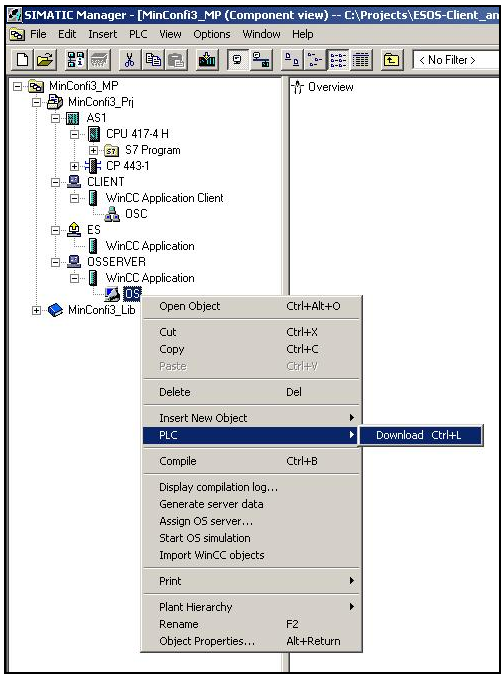
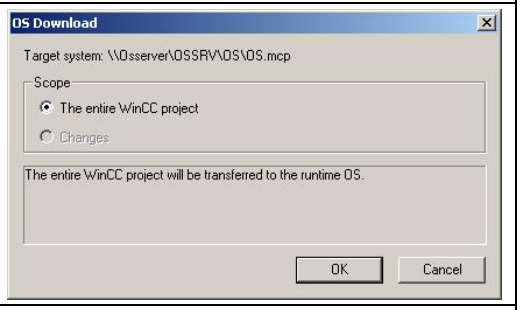
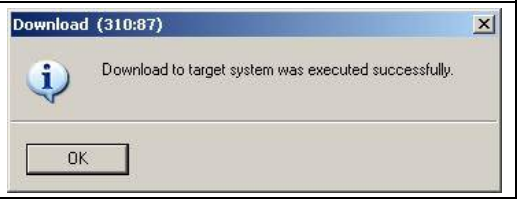
Load the OS project to the OS server

After the clock synchronization has been configured on the ES side, the OS project can be downloaded to the OS server.

Table 4-11

Step	Activity	Screenshot
1.	In the SIMATIC Manager you select the OS project of the OS server and select "PLC" > "Download" from the context menu.	
2.	Loading the OS project for the first time requires an entire download. Start the download with "OK".	
3.	After the successful download, the OS project is located on the OS server in the intended folder. Acknowledge the corresponding message by clicking "OK"	

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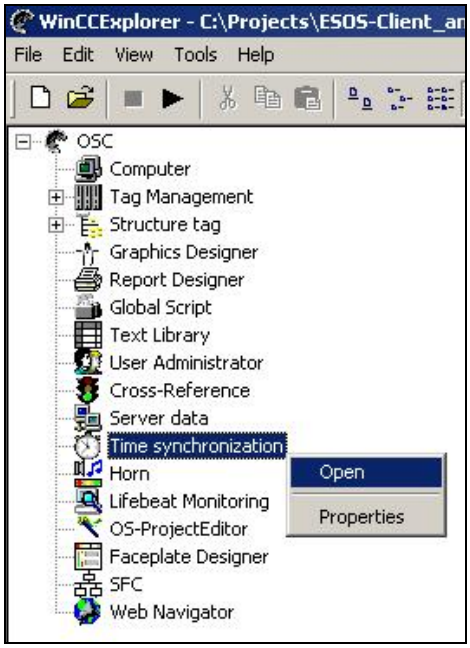
OS configuration on the OS server

If the engineering station has no CP 1613 as opposed to the OS server, it is necessary to perform the following step-by-step instructions. Otherwise, we generally advise you to check those after the project download onto the target system.

Table 4-12

Step	Activity	Screenshot
1.	Open the OS project on the OS server.	
2.	Open the "Time synchronization" Editor in the WinCC Explorer.	

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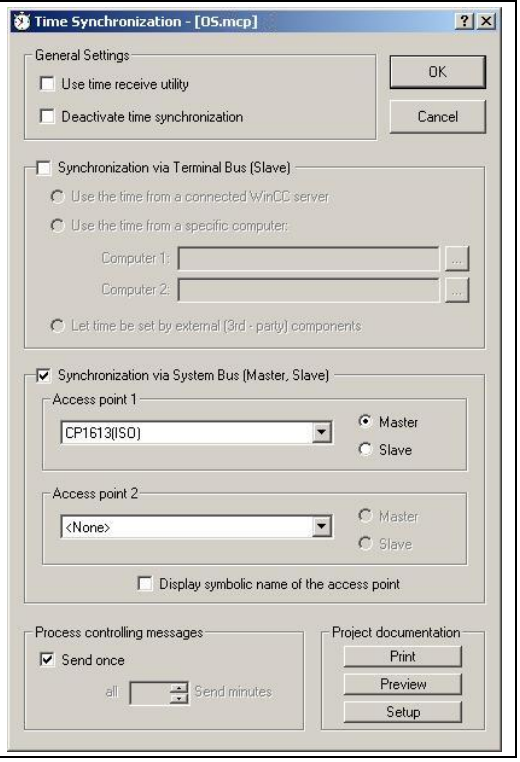
Step	Activity	Screenshot
3.	Here you check or activate the "Synchronization via system Bus (Master, Slave)" checkbox. In "Access point 1" you check or select "CP1613(ISO)" and press the "Master" radio button. Close the window with "OK".	

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4.3.4 Activating the Runtime

Open the OS project on the OS server and activate Runtime.

Then change to the ES computer and open the OS client project. Here you also activate Runtime.

4.3.5 Loading of OS project modifications

Delta-download

Small project changes can be transferred into the active server project by means of delta download.

Note Detailed information on which configuration steps enable a delta download are available in the “PCS 7 – Configuration Manual Operator Station“, chapter 10.

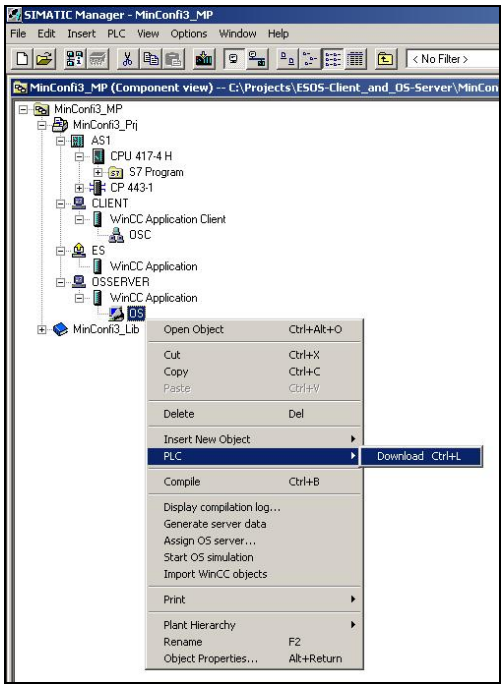
At the same time, the download process causes the OS client to update its server data.

Delta download offers two advantages:

- The OS can remain in process mode.
- The duration of the download process is considerably reduced.

Before OS compilation and download are possible on the ES, the OS client project must be deactivated and closed.

Table 4-13

Step	Activity	Screenshot
1.	Prior to that, you start the OS compilation process with the “Changes“ option.	
2.	Then you open the context menu of the OS project for the download and select `"PLC" > "Download"`. NOTE: Due to the fact, that the OS server is in Runtime, only the “Changes“ option is active in the OS Download dialog. Start the download by pressing `"OK"`.	

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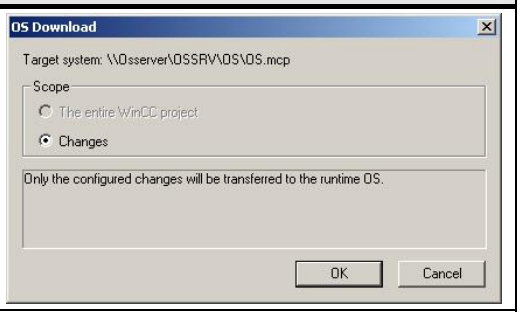
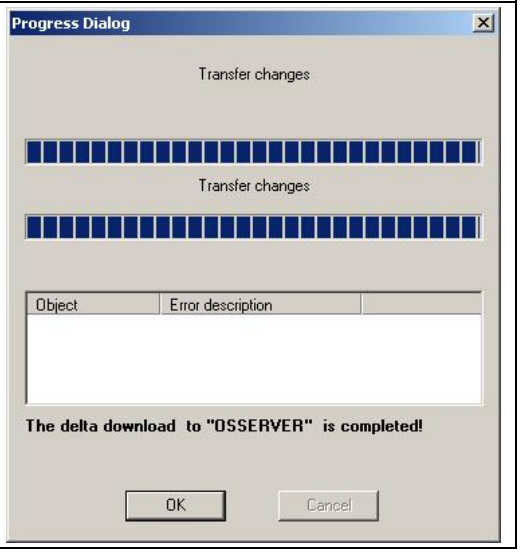
Step	Activity	Screenshot
		
3.	Confirm the successful download with "OK". After the delta-download, you can open the OS-Client project again in the ES and activate Runtime.	

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Entire download

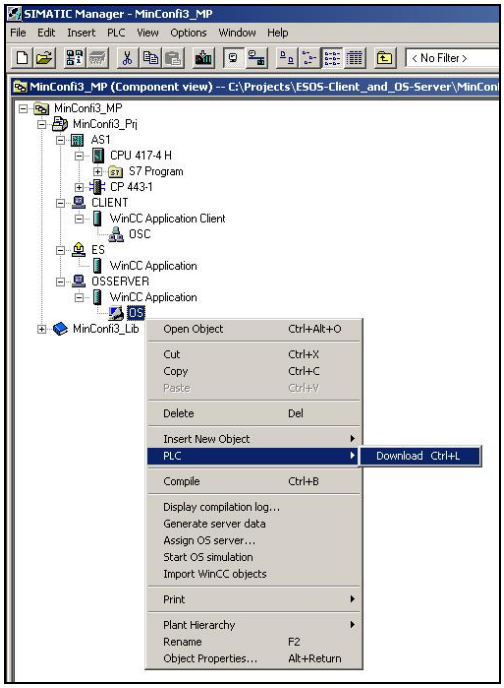
Entire download must principally be performed during the first download process or after performing extensive modifications, such as expansions of the system by an additional AS. In these cases only an entire compilation is possible beforehand.

Note Detailed information on which configuration steps require entire download are available in the “PCS 7 – Configuration Manual Operator Station“, chapter 10.

At the same time, the download process causes the OS client to update its server data.

Before OS compilation and download are possible from the ES, the OS client project as well as the OS server project must be deactivated and closed.

Table 4-14

Step	Activity	Screenshot
1.	Prior to that, you start the compilation process of the OS server project with the “The entire WinCC project“ option.	
2.	Then download the OS project via its context menu `"PLC" > "Download"` to the server PC. NOTE: As the OS server is deactivated and the entire OS project compiled, the only possible option in the download dialog is “The entire WinCC project“. Start the download by pressing `"OK"`.	

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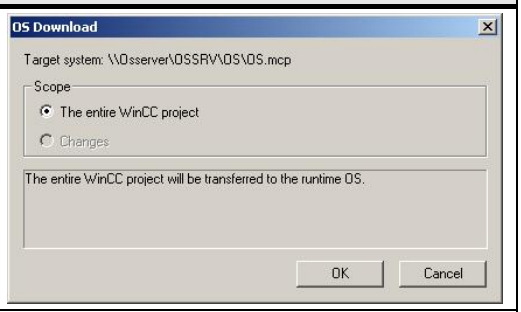
Step	Activity	Screenshot
		
3.	Confirm the successful download with "OK". After the download process has been completed successfully, open and activate the OS project on the OS server.	
4.	Then also open and activate the client project on the ES.	

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5 ES/OS Master and standby OS

5.1 Configuration description

Two redundant OS Single Stations, of which one simultaneously represents the ES, can be realized by creating a multiproject with only one OS project. After its download onto the second OS it will be opened there as well as on the ES computer and activated. The redundancy settings occur mutual after the download in the WinCC Explorer.

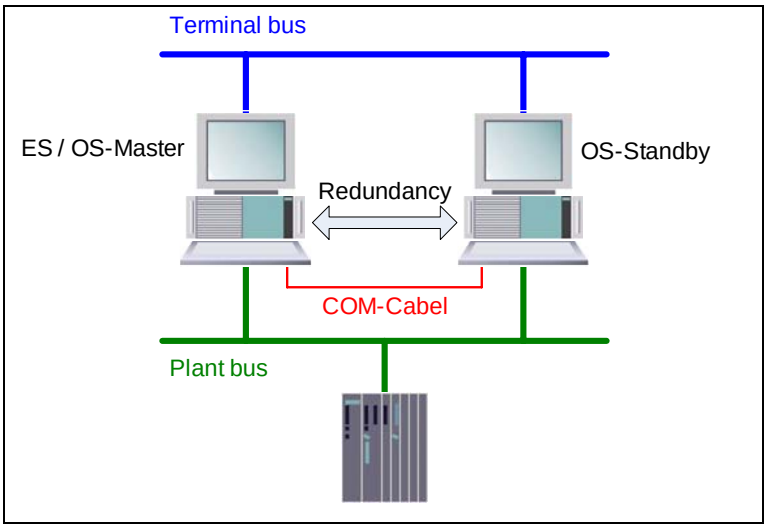
Note

In our example, the redundancy settings in WinCC are made so that the ES is defined as master OS and the second OS as standby OS.

Please note: The configuration is not PCS 7-compliant!

Hardware setup

Figure 5-1



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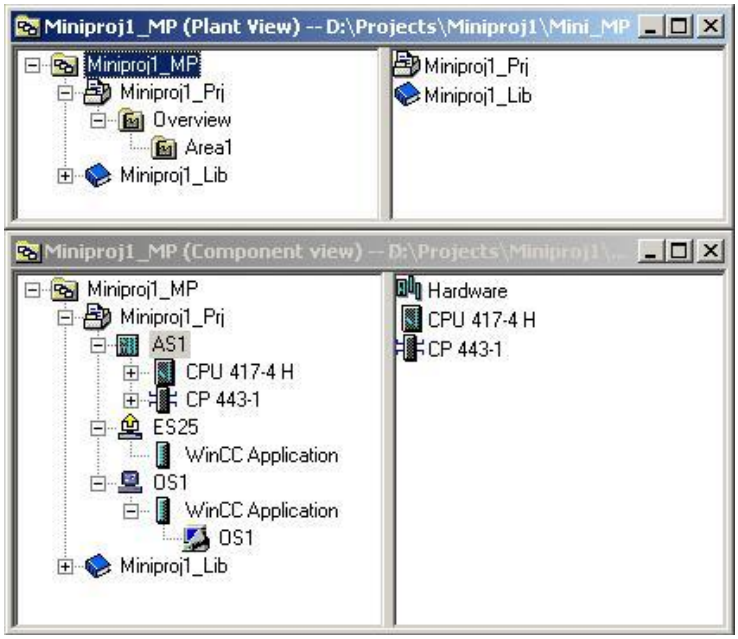
PCS 7 configuration

Figure 5-2



Particularities / Restrictions

Due to the non PCS 7 conform configuration there are differences in the system behavior which must be considered:

- The last activated OS takes on the master role.
- Entire download requires the OS projects of both computers to be deactivated and closed. During this time, neither operator actions nor archiving is possible.
- Delta-download of the OS computer requires the Runtime of the ES computer to be terminated as well as the WinCC project to be closed. Some restrictions connected with this are:
  - no operator actions can take place at the ES computer at that time.
  - Messages generated at that time contain the time stamp (crossed out) at which the Runtime was activated again.
  - If messages contain accompanying values, then they are displayed with the value 0.0.
- Runtime being active on the ES computer results in the runtime archive being stored under the multiproject path. Therefore they are also included into the ZIP file during archiving and cause increased storage space as well as archiving times.
  Workaround:
  - Deactivate runtime on the ES computer.

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- Reset archive in the OS project on the ES computer and close entire PCS 7 project.

After archiving and reactivating the Runtime, the archives are updated again.

5.2 Required hardware, software and licenses

Hardware

The following hardware is recommended for this configuration and can be ordered via the Siemens mall. Your selected operating system and the system software SIMATIC PCS 7 is then preinstalled accordingly.

Table 5-1

Component	Product information	Operating system	Plant bus interface	MLFB	L price/piece [€]
1 x ES	SIMATIC PCS 7 ES/OS IL 43 BCE W2K	Windows 2000 SP4	RJ45 Network card	6ES7 650-0LC16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE W2K	Windows 2000 SP4	CP 1613 A2	6ES7 650-0LC16-0YX1	4,990.00
	SIMATIC PCS 7 ES/OS IL 43 BCE WXP	Windows XP SP2	RJ45 Network card	6ES7 650-0LF16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE WXP	Windows XP SP2	CP 1613 A2	6ES7 650-0LF16-0YX1	4,990.00
1 x OS Single Station	SIMATIC PCS 7 ES/OS IL 43 BCE W2K	Windows 2000 SP4	RJ45 Network card	6ES7 650-0LC16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE W2K	Windows 2000 SP4	CP 1613 A2	6ES7 650-0LC16-0YX1	4,990.00
	SIMATIC PCS 7 ES/OS IL 43 BCE WXP	Windows XP SP2	RJ45 Network card	6ES7 650-0LF16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE WXP	Windows XP SP2	CP 1613 A2	6ES7 650-0LF16-0YX1	4,990.00
1 x Redundancy	RS 232 connecting cable, 10 m			6ES7 902-1AC00-0AA0	89.00

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Licenses/Software

The following licenses must be purchased in addition to the above PC stations. There are different license forms which are graded according to the number of configurable process objects (PO) or the number of the OS variables.

Table 5-2

Software	Name	MLFB	L price/piece [€]
1 x Engineering Standard-Software	PCS 7 Engineering Software V6.1 AS and OS	e.g. 6ES7 658-5AC16-0YA5 for PO 2000 / RC 64K	17,000.00
1 x OS Standard-Software	SIMATIC PCS 7 OS Software Single Station V6.1	e.g. 6ES7 658-2AC16-0YA0 for PO 2000 / RT 64K	5,900.00
1 x OS Single Station Redundancy	WinCC/ Redundancy	6AV6 371-1CF06-0DX0	3,050.00

Note The Rental License, which is restricted to 50 operating hours, provides an additional license for engineering of short-term projects.

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5.3 Step-by-Step Configuration

Note The following instruction was generated on the basis of Windows XP SP2 and PCS 7 V6.1 SP1.

For the plant bus transitions, CP1613 is used as an example. A clock synchronization is activated.

5.3.1 Preparatory steps

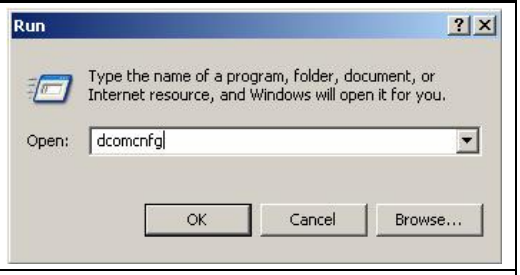
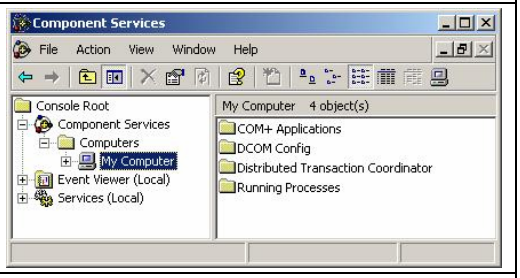
Create and enable project folder

Create a project folder on the standby OS and enable it so that complete access is possible from the ES.

DCOM settings

Should you wish to use redundant individual lot systems in Windows XP SP2, the following DCOM settings must be performed on both computers according to PCS7 readme.

Table 5-3

Step	Activity	Screenshot
1.	Select the menu item "Start" > "Run..." Enter "dcomcnfg" in the input field and press <OK>.	
2.	In the tree structure you select "Component Services" > "Computers" > "My Computer".	
3.	In the context menu (right mouse button) you select "Properties".	

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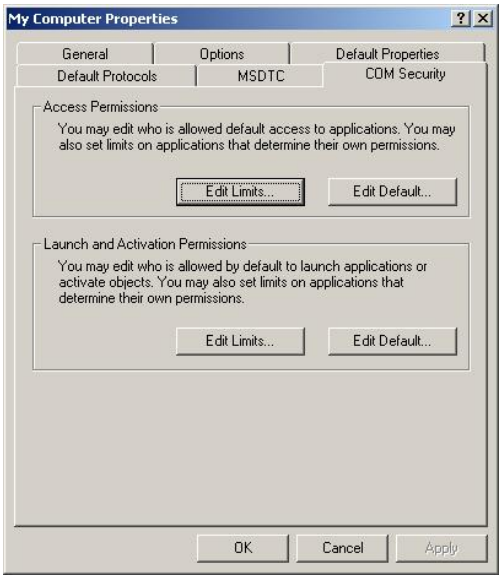
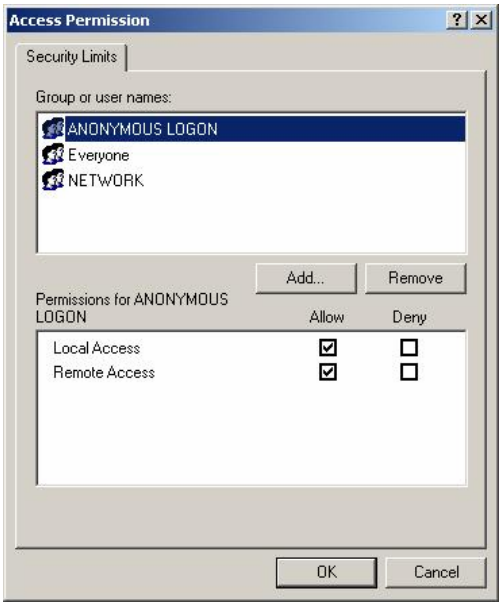
Step	Activity	Screenshot
4.	Switch to the "COM Security" tab. Click the "Edit Limits…" button in the "Access Permissions" field	
5.	For the "ANONYMOUS LOGON" user group you checkmark the "Allow" boxes for the following permissions: • "Local Access" • "Remote Access" Afterwards you click the "OK" button twice. The Access Permissions have now been configured. Restart the computer to accept these settings.	

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5.3.2 ES configuration

Creating the multiproject

As a basis for the following instruction, all PC stations must be physically networked according to Figure 5-1. Furthermore, a multiproject must have been created on the ES in which the AS has already been configured regarding hardware and software.

AS settings for the clock synchronization

This example describes a path where the first activated OS single station defines the master time.

Note Further options of clock synchronization are described in detail in the "PCS 7 – Configuration Manual Operator Station" in chapter 11 "Clock synchronization and life signal monitoring".

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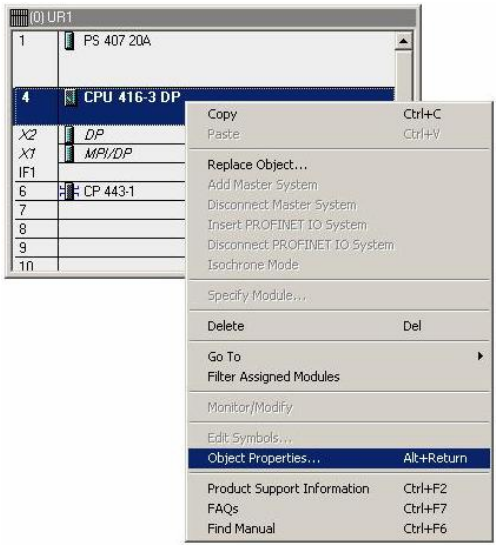
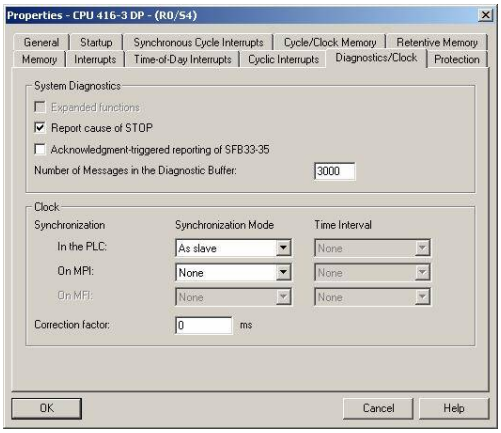
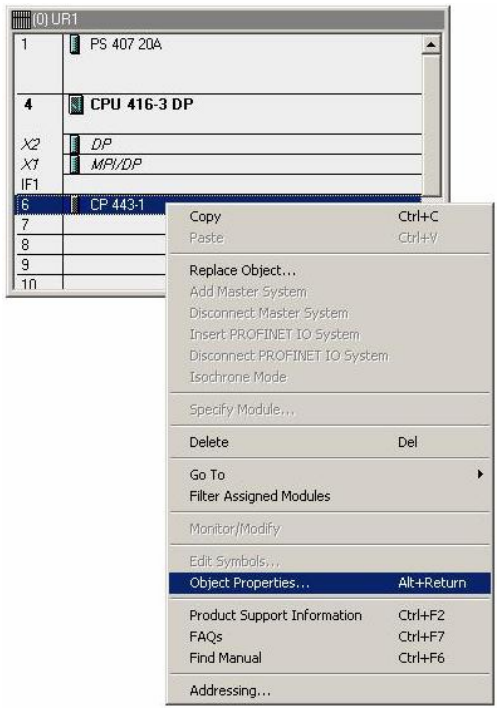
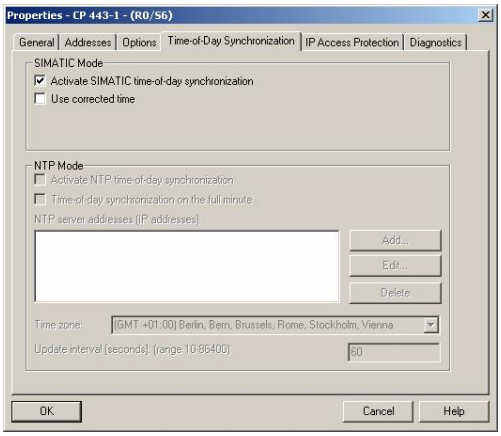
Table 5-4

Step	Activity	Screenshot
1.	Open the HW config of the AS. Select the CPU and chose "Object Properties…" from the context menu.	

Step	Activity	Screenshot
2.	Switch to the "Diagnostic/Clock" tab. In the "In the PLC:" box of the "Clock" section you select "As slave" as the "Synchronization Mode". Confirm this setting with "OK".	
3.	Open the context menu of the CP and select "Object Properties…".	
4.	Switch to the "Time-of-Day Synchronization" tab. Checkmark the "Activate SIMATIC time-of-day synchronization" box. Confirm the setting with "OK".	

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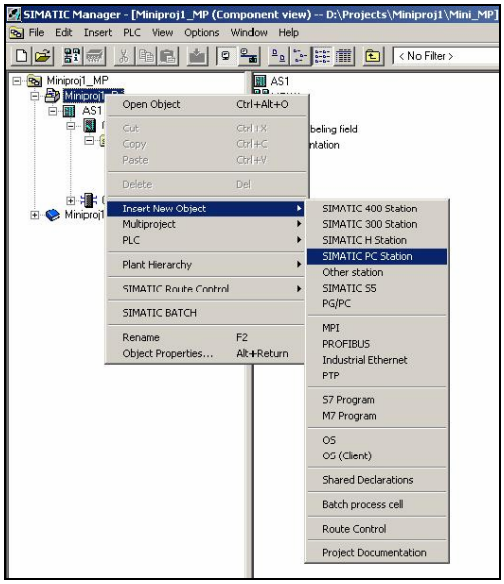
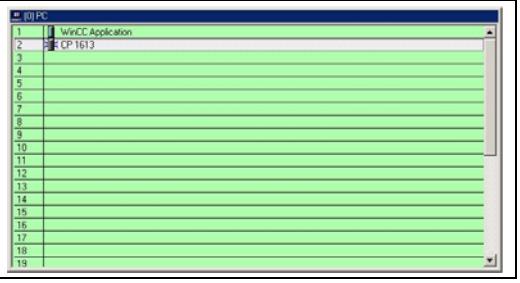
Step	Activity	Screenshot
5.	Save and compile the configuration via menu item "Station" -> "Save and Compile". Close HW Config.	

Generate the PC station for the ES

To enable commissioning the OS project on the ES as well, we create for the ES a PC station with WinCC application.

Table 5-5

Step	Activity	Screenshot
1.	In the "Component view" you open the context menu of the project and insert a new PC station via "Insert New Object" -> "SIMATIC PC Station". Change the name of the PC station so that it corresponds with the name of the local computer in the network.	
2.	Open the HW config of the PC station of the ES.	
3.	Add a "WinCC Application" and a "CP 1613".	

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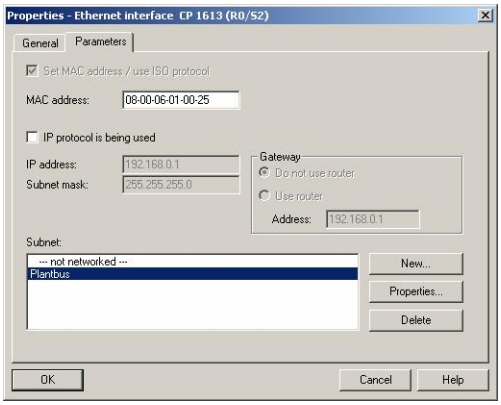
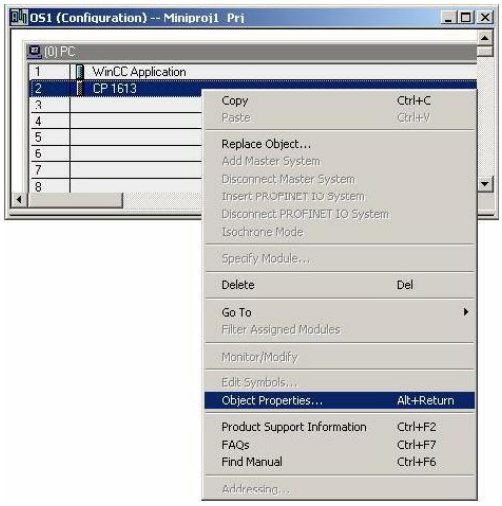
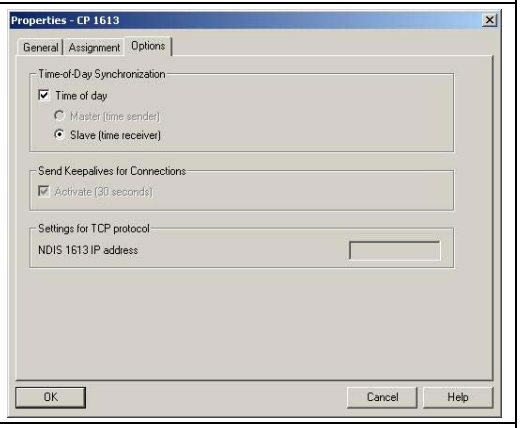
Step	Activity	Screenshot
4.	In “Subnet“ you select the process bus or create a new subnet via the “New“ button, when working station granular. Assign the respective MAC address to the CP 1613. Confirm the settings with “OK“.	
5.	Open the context menu of the CP 1613 and select “Object Properties…“.	
6.	Select the “Options“ tab and checkmark the “Time of day“ box. Confirm the setting with “OK“.	
7.	Save the configuration via menu item “Station“ -> “Save and Compile“. Close HW Config.	

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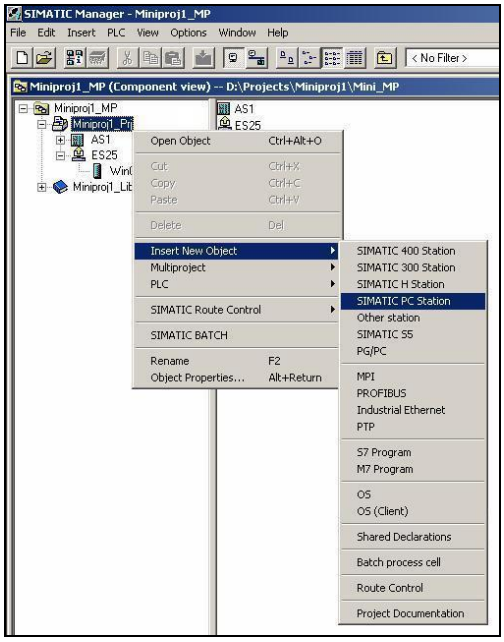
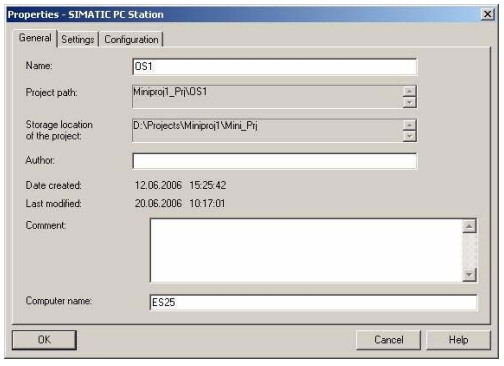
Step	Activity	Screenshot
8. optional	In the SIMATIC Manager you delete the OS project of the PC station of the ES as it is not required in our example.	

Generate the PC station for the standby OS

Table 5-6

Step	Activity	Screenshot
1.	In the component view you open the context menu of the project and insert a new PC station via "Insert New Object" -> "SIMATIC PC Station" whose name you can chose as you wish.	
2.	Open the context menu of the PC station of the standby OS and select "Object Properties…". In the "Name:" field you enter the name of the PC station of the standby OS. IMPORTANT In the "Computer name:" field you enter the name of the ES station (master OS), **not** the name of the standby OS. Confirm the configuration with "OK".	

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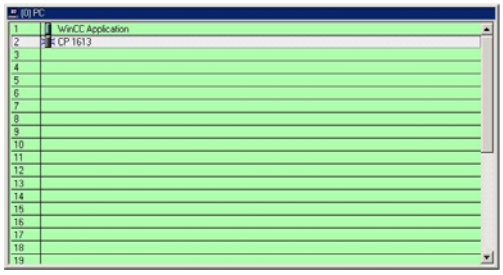
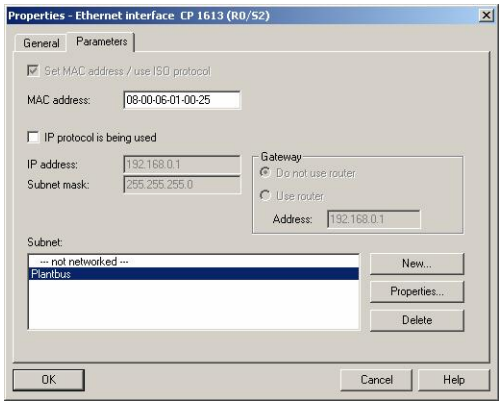
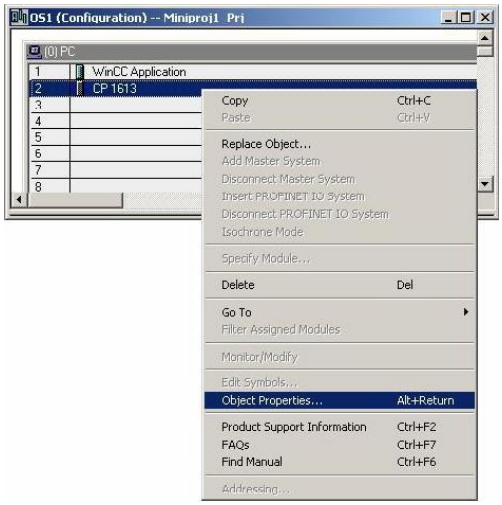
Step	Activity	Screenshot
3.	Open the HW config of the PC station of the standby OS.	
4.	Add a "WinCC Application" and a "CP 1613".	
5.	In "Subnet" you select the process bus or create a new subnet via the "New" button, when working station granular. Assign the respective MAC address to the CP 1613. Confirm the settings with "OK".	
6.	Open the context menu of the CP 1613 and select "Object Properties…".	

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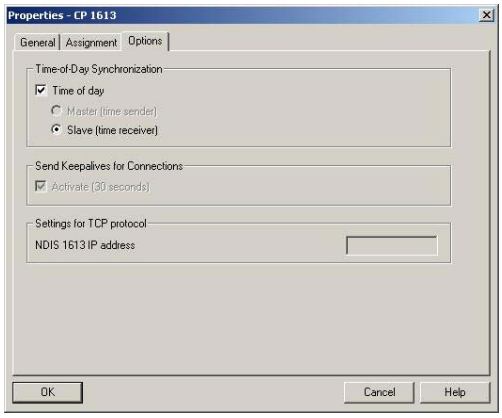
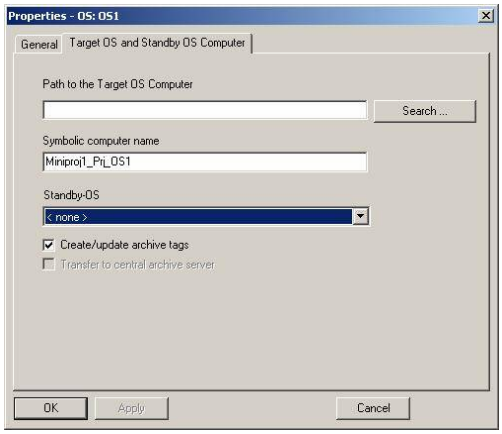
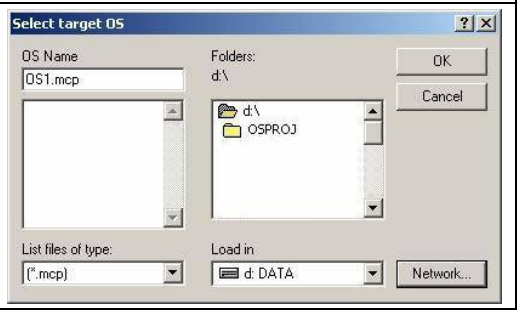
Step	Activity	Screenshot
7.	Select the "Options" tab and checkmark the "Time of day" box. Confirm the setting with "OK".	
8.	Save and compile via menu item "Station" -> "Save and Compile". Close HW Config.	
9.	In the SIMATIC Manager you open the properties dialog of the OS project. Switch to the "Target OS and Standby OS Computer" tab. Press the "Search..." button.	
10.	Press the "Network..." button.	

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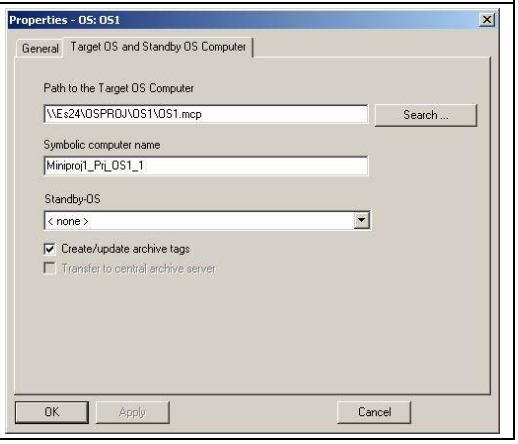
Step	Activity	Screenshot
11.	In "Drive" you select "<none>". Via the "Browse..." button you navigate to the enabled project folder of the standby OS. Check the path and confirm with the "Finish" button.	
12.	In the "Path to the Target OS Computer" input field you check the entire project path once more. Confirm this with "OK".	

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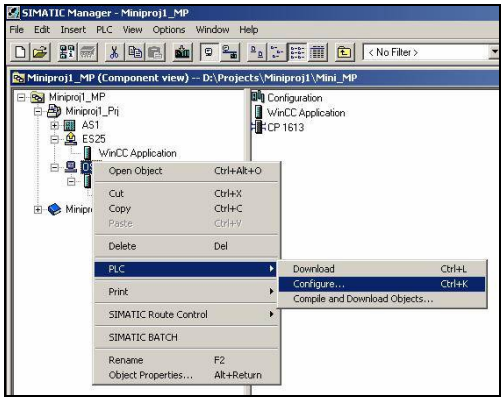
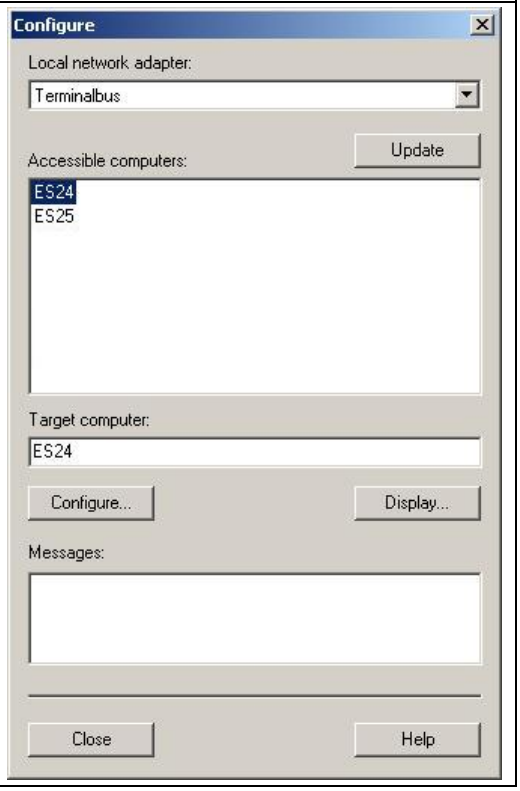
Configuring all PC stations

The settings made are now transferred to the individual PC stations (assembling the component configurations).

Table 5-7

Step	Activity	Screenshot
1.	Configuring the component configurator of the standby OS. Select the PC station and the standby OS and chose "PLC" > "Configure..." from the options menu.	
2.	In the "Accessible computers" field you select the PC which corresponds to the standby OS. Press the "Configure..." button.	

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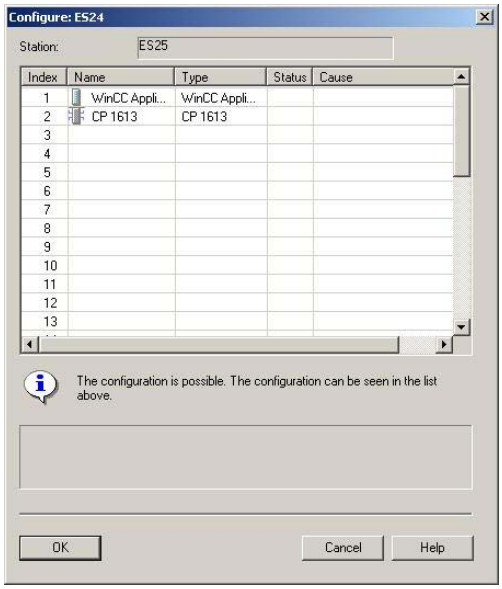
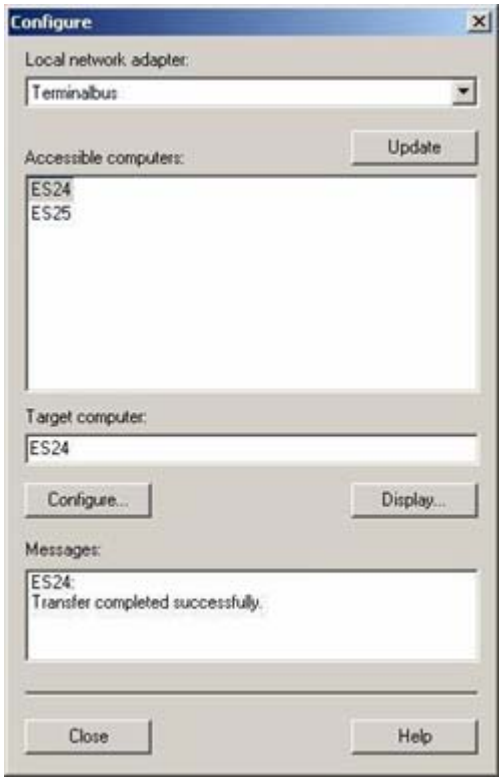
Step	Activity	Screenshot
3.	In the displayed window you see how the PC station is configured. Confirm this setting with "OK".	
4.	Acknowledge the information which appears with "OK".	
5.	Subsequently you receive the following message in the bottom window pane: "Transfer completed successfully.". Close the configuration dialog box.	
6.	Please configure the component configurator of the ES (master OS) analog to step 1 to 5.	

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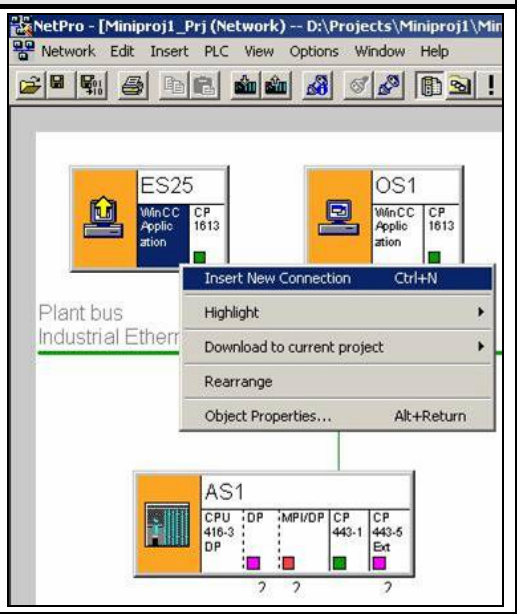
Configure and load the communication settings

The connection with NetPro is configured below and loaded into the stations.

Note For station granular configuration, the subnets of the individual subprojects must be joined beforehand.

Table 5-8

Step	Activity	Screenshot
1.	Open NetPro. Select the WinCC application of the ES and open the context menu. Here you select "`Insert New Connection`".	

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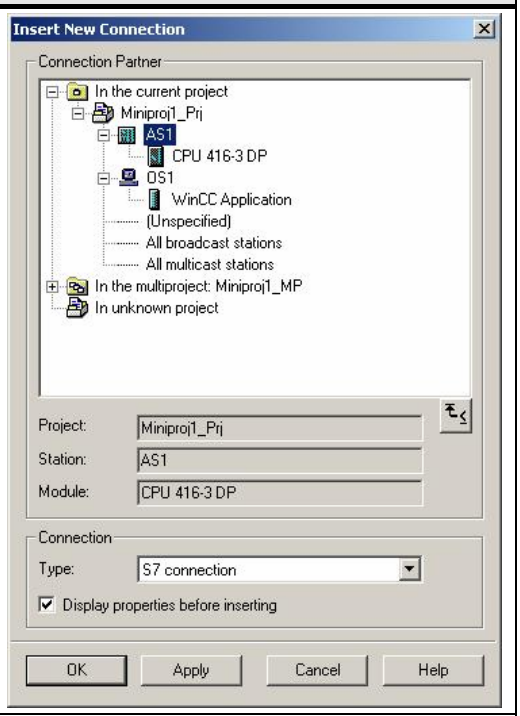
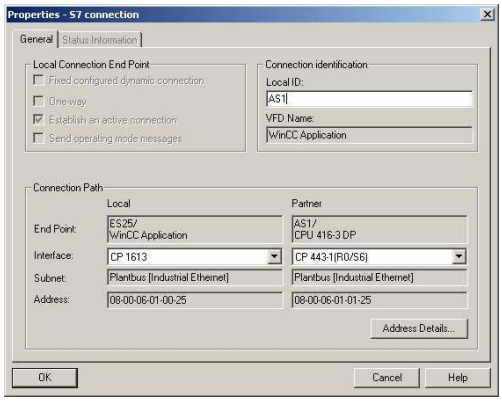
Step	Activity	Screenshot
2.	In the "Connection Partner" window you select CPU of the AS. Ensure, that in the "Connection" field "S7 connection" has been selected. Confirm the entries with "OK".	
3.	In "Connection identification" you change the "Local ID" to a meaningful name, e.g. AS1.	
4.	Repeat steps 1 to 3 for S7 connection between the standby OS and the AS. It is important here, that the connections have the same name. Then save and compile NetPro via menu item "Network" -> "Save and Compile…". Select "Compile and check everything".	

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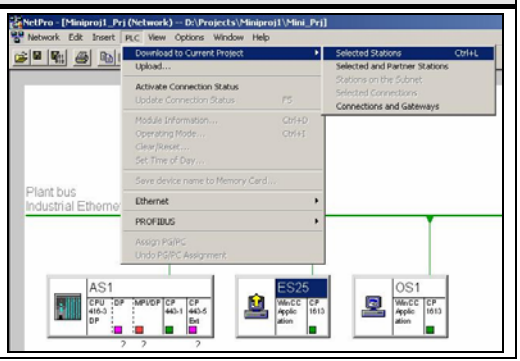
Step	Activity	Screenshot
5.	Select the ES and load the connections via the menu item "PLC" -> "Download to Current Project" -> "Selected Stations". Download standby OS server and the AS in the same way. Then close NetPro.	

Compile and load the user program

Compile the S7 program and load it into the AS.

Compile the OS project

Compile the OS project in the SIMATIC Manager.

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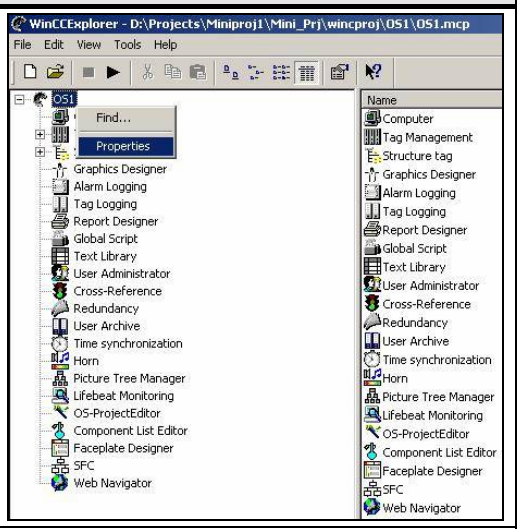
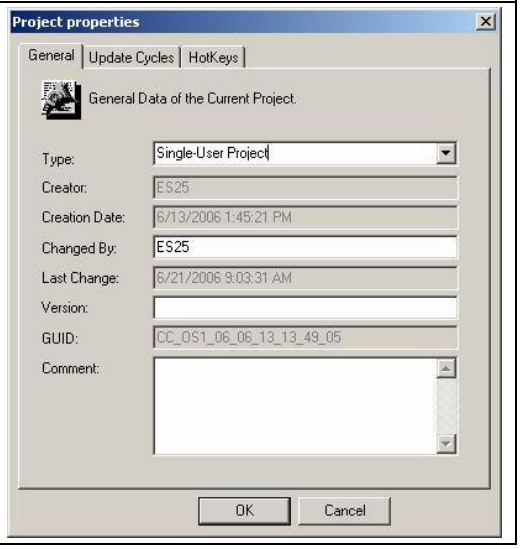
5.3.3 OS configuration

OS configuration on the ES

Conversion from multi to single place systems is made on the ES, as well as settings for redundancy and clock synchronization.

Note For this particular configuration it is necessary to complete the redundancy setting in the WinCC Explorer of the standby OS after the download

Table 5-9

Step	Activity	Screenshot
1.	Open the OS project on the ES computer. In the opened WinCC Explorer you open the OS project and select "Properties" in the context menu.	
2.	In the "Type:" field you select "Single-User Project". Acknowledge the entry with the "OK" button and also confirm the message with "OK".	

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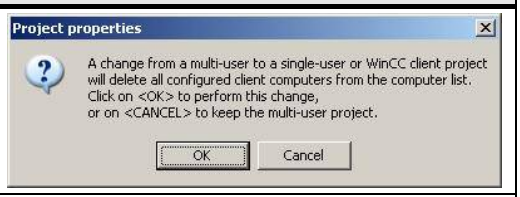
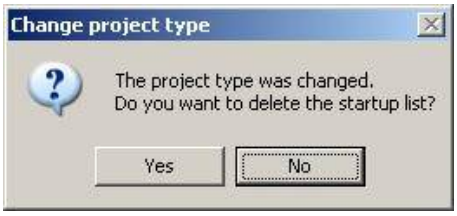
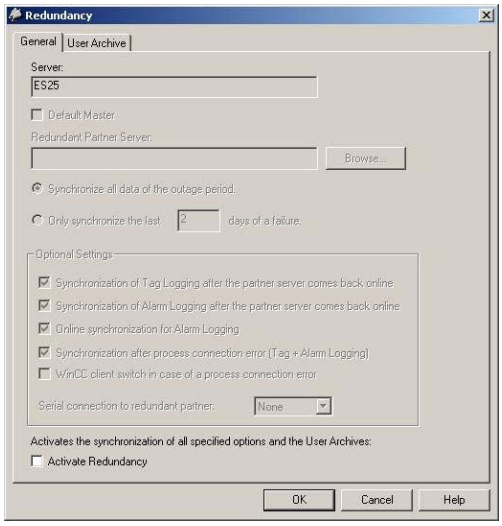
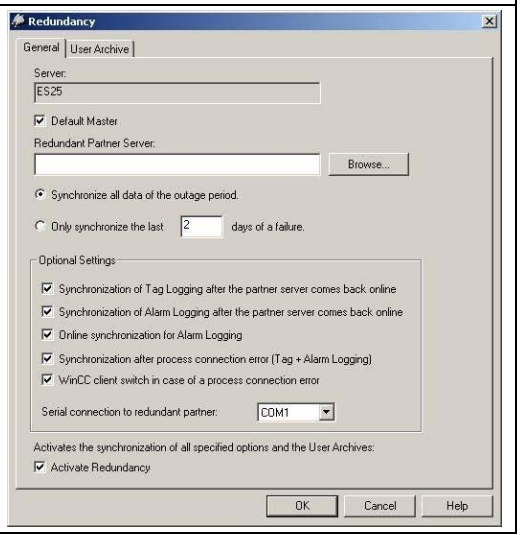
Step	Activity	Screenshot
		
3.	Prevent deleting the startup list by pressing the "No" button.	
4.	Open the "Redundancy" editor. Activate the option box "Activate Redundancy".	
5.	Activate the option box "Default Master". If necessary, adjust the redundancy properties in "Optional Settings" to your requirements. If you do not wish to operate the RS 232 redundancy cable at the COM1 interface, then these settings must later be performed on the standby OS itself (see section "OS configuration on the OS"). This setting is not possible on the ES as the interfaces of the respective stations are unknown there. Confirm the settings with "OK".	

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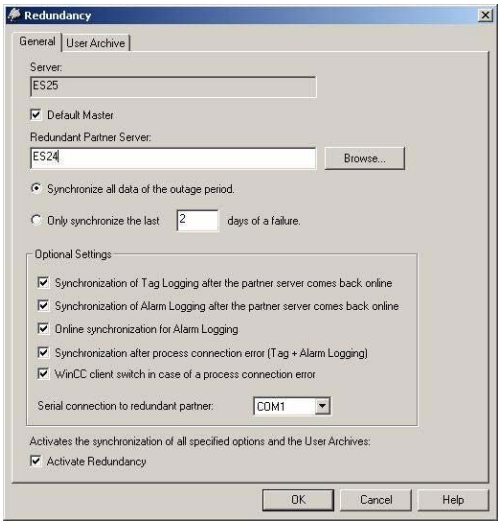
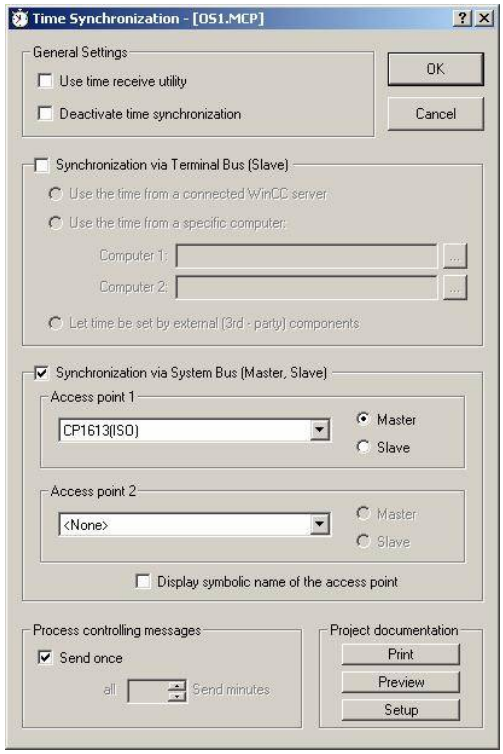
Step	Activity	Screenshot
6.	Via the "Browse..." button you select the standby OS as redundant partner. Confirm the redundancy settings with "OK".	
7.	Open the "Time synchronization" editor. Here you activate the checkbox "Synchronization via system Bus (Master, Slave)". In "Access point 1" you select "CP1613(ISO)" and activate the "Master" radio button. Confirm the settings with "OK". NOTE: If the ES server, as opposed to the standby OS, does not have a CP 1613, the settings for the clock synchronization cannot be executed here. The clock synchronization settings must, in this case, be executed on the standby OS itself after downloading the OS project.	
8.	Close the OS project.	

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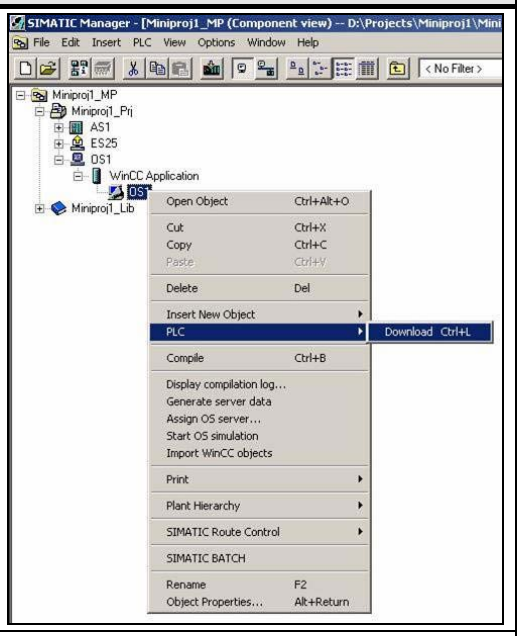
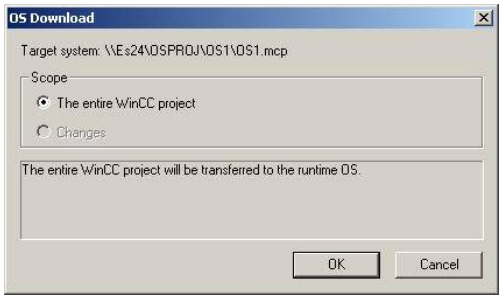
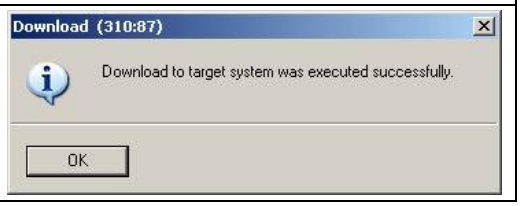
Loading OS project to the standby OS

After the redundancy and clock synchronization have been configured on the ES side, and the OS project has been closed, you can load the OS project onto the standby OS.

Table 5-10

Step	Activity	Screenshot
1.	In the SIMATIC Manager you select the OS project and select "PLC" > "Download" from the context menu.	
2.	Loading the OS project for the first time requires an entire download. Start the download with "OK".	
3.	After the successful download, the OS project is located on the standby OS in the intended folder. Acknowledge the corresponding message by clicking "OK"	

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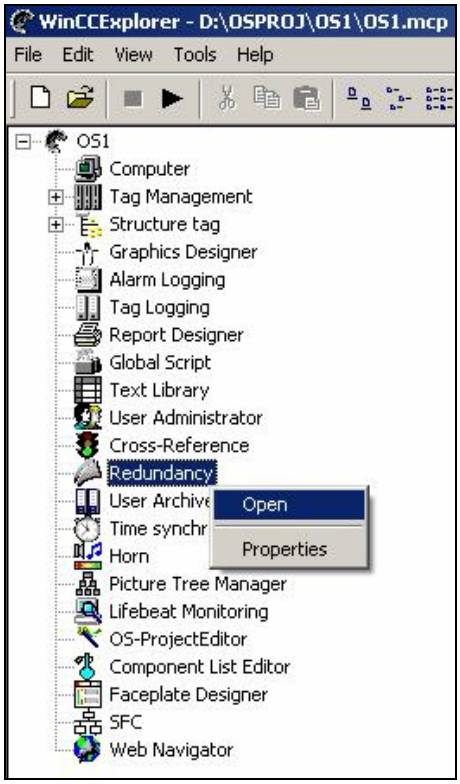
OS configuration on the OS

For this special configuration, it is necessary to make the redundancy settings before the download.

Additionally, if the ES (master OS) has no CP 1613 as opposed to the standby OS, you have to complete the time synchronization settings. Otherwise, we generally advise you to check those after the project download onto the target system.

Note Normally, all configuration works are executed on the ES for the purpose of consistent data management, so that no WinCC engineering licenses are required on the OS. Nevertheless, a license free time window of one hour is available after each opening of the WinCC Explorer for WinCC configuration works.

Table 5-11

Step	Activity	Screenshot
1.	Open the OS project on the standby OS computer.	
2.	Open the "Redundancy" editor in WinCC-Explorer.	

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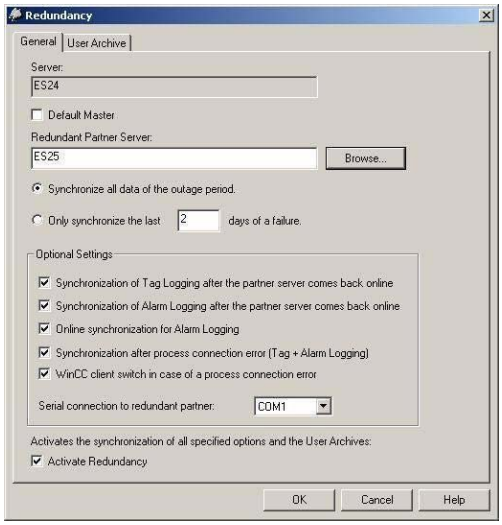
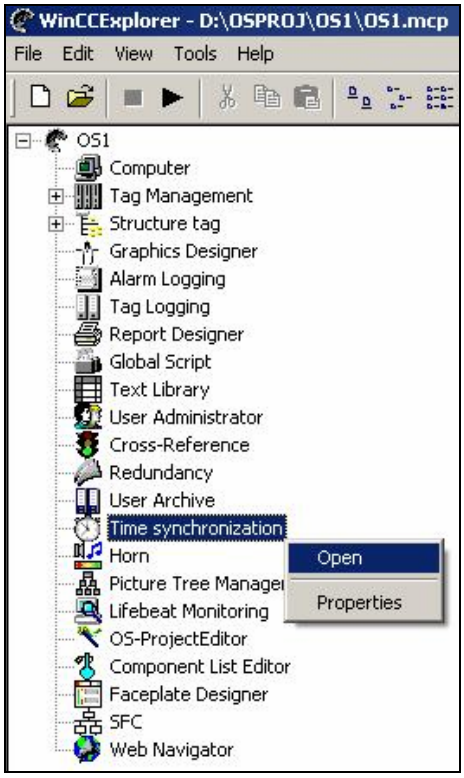
Step	Activity	Screenshot
3.	Here you uncheck the "Default Master" checkbox. Via the "Browse..." button you select the ES computer as redundant partner. Check whether your desired checkboxes are activated at "Optional Settings". Confirm the settings with "OK".	
4.	Subsequently you open the "Time synchronization" editor.	

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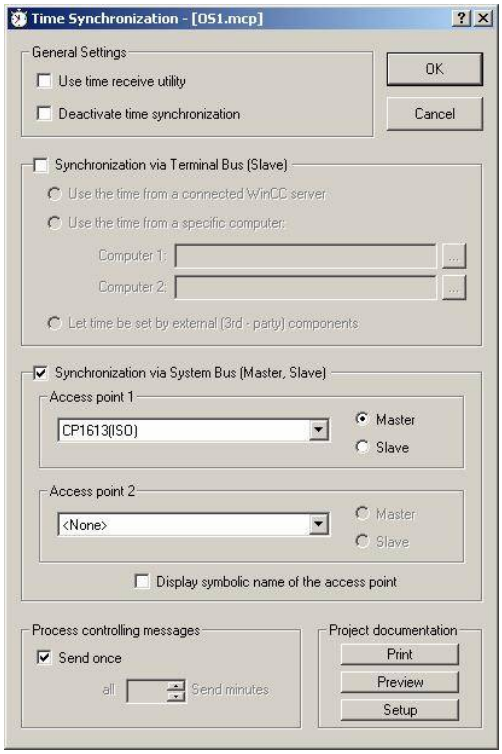
Step	Activity	Screenshot
5.	Check or activate the "Synchronization via system Bus (Master, Slave)" checkbox. In "Access point 1" you check or select "CP1613(ISO)" and press the "Master" radio button. Confirm the settings with "OK".	
6.	If not already done, close the OS project and open it again, so the redundancy settings become effective.	

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5.3.4 Activating the Runtime

Successively activate the OS project on the standby OS as well as on the ES. The order is not of importance here. It is recommended to wait with activating the second Runtime until the start process of the first one is completed entirely.

Regarding the redundancy, the online synchronization is active immediately. The mutual archive update on the other hand takes approx. 15 min..

5.3.5 Loading of OS project modifications

Delta-download

Small project changes can be transferred into the active standby OS project by means of delta downloads.

Note Detailed information on which project steps enable a delta download are available in the “PCS 7 – Configuration Manual Operator Station“, chapter 10.

Delta download offers two advantages:

- The OS can remain in process mode.
- The duration of the download process is considerably reduced.

Before OS compilation and download are possible on the ES, the OS client project must be deactivated and closed.

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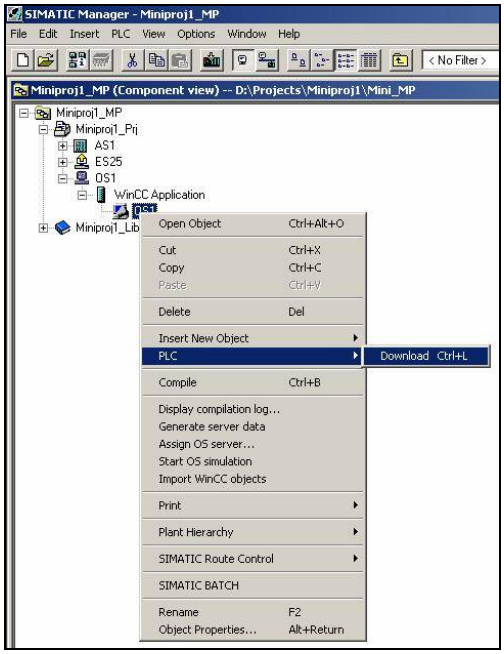
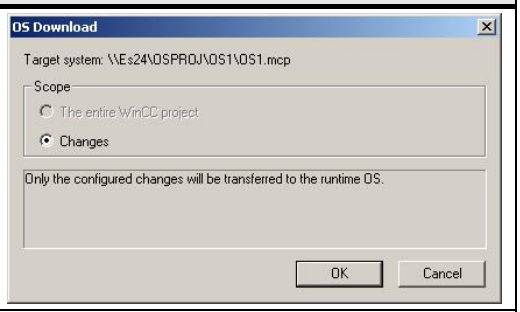
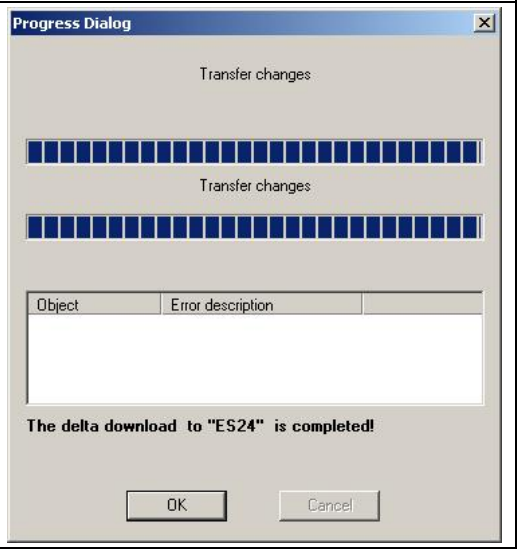
Table 5-12

Step	Activity	Screenshot
1.	Prior to that, you start the OS compilation process with the “Changes“ option.	
2.	Then you open the context menu of the OS project of the OS server for the download and select `"PLC" > "Download"`. NOTE: Due to the fact, that the standby OS is in Runtime, only the “Changes“ option is active in the OS Download dialog. Start the download by pressing `"OK"`.	

Step	Activity	Screenshot
		
3.	Confirm the successful download with "OK". As soon as the download is completed, you can open and activate the OS project on the ES computer again. NOTE: The online synchronization is immediately available after starting the Runtime. The archive update is completed after approx. 15 min.	

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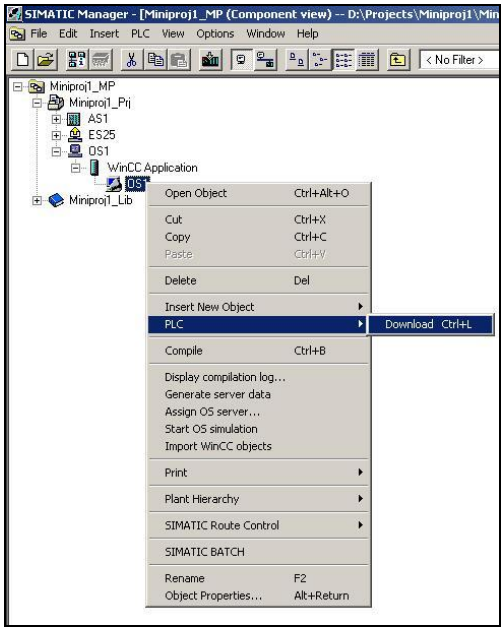
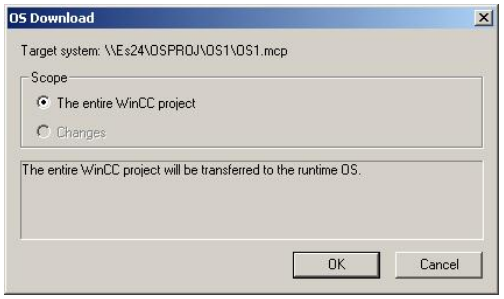
Entire download

Entire download must principally be performed during the first download process or after performing extensive modifications, such as expansions of the system by an additional AS. In these cases only an entire compilation is possible beforehand.

Note Detailed information on which configuration steps require entire download are available in the “PCS 7 – Configuration Manual Operator Station“, chapter 10.

Before OS compilation and download are possible from the ES, the OS project must be deactivated and closed on both stations.

Table 5-13

Step	Activity	Screenshot
1.	Prior to that, you start the compilation process of the OS project with the “The entire WinCC project“ option.	
2.	Then download the OS project via its context menu `"PLC" > "Download"`. Confirm the successful download with `"OK"`. As the standby OS is deactivated and the entire OS project compiled, the only possible option in the download dialog is “The entire WinCC project“. Start the download by pressing `"OK"`.	 

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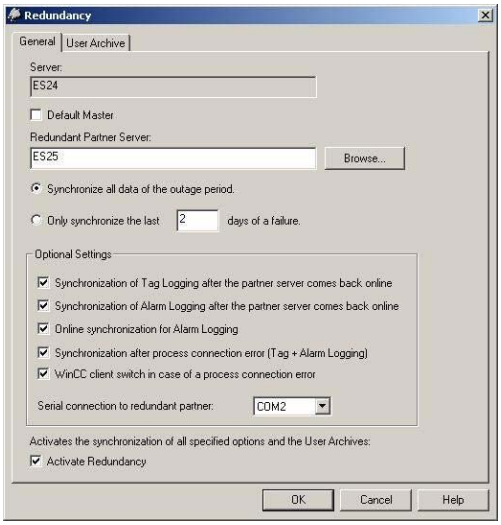
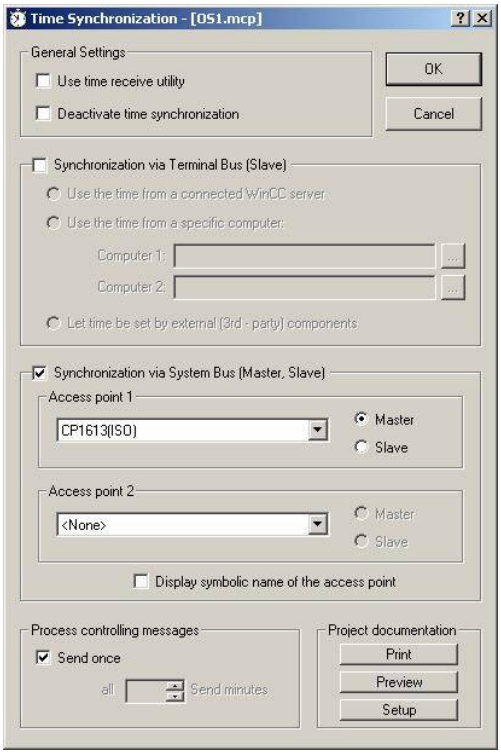
Step	Activity	Screenshot
3.	Confirm the successful download with "OK". Open the OS project on the ES and activate Runtime.	
4.	Switch to the standby OS and open the "Redundancy" editor. There you uncheck the "Default Master" checkbox. IMPORTANT: You must again specify the correct name of the partner station "Redundant Partner Server:". Confirm the settings with "OK".	
5.	Subsequently you open the "Time synchronization" editor. Control the settings and then close the window with "OK".	
6.	If not already done, close the OS project and open it again, so the redundancy settings become effective. Then you also activate the Runtime here.	

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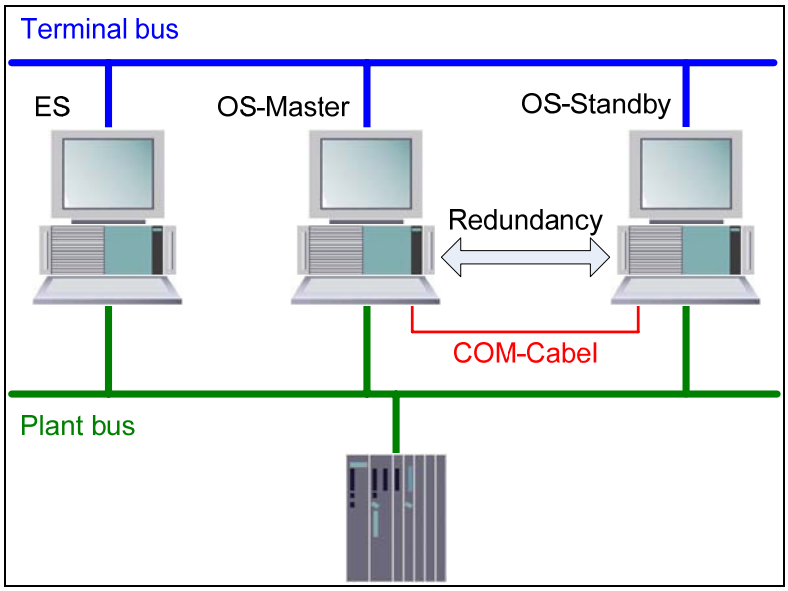
6 Separate ES, Master and Standby OS

6.1 Configuration description

With three PC stations, the OS functionality can also be secured twice without using the ES computer.

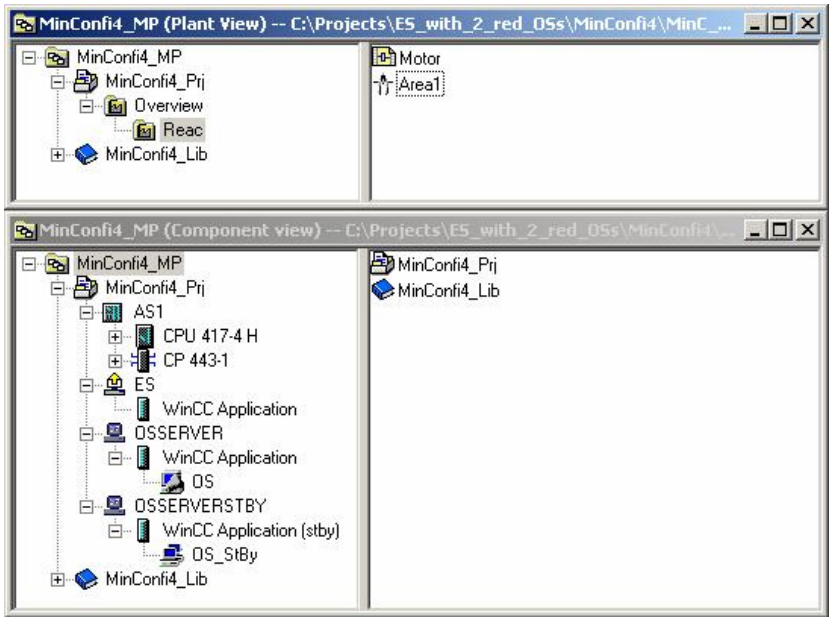
Hardware setup

Figure 6-1



PCS 7 configuration

Figure 6-2



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6.2 Required hardware, software and licenses

Hardware

The following hardware is recommended for this configuration and can be ordered via the Siemens mall. Your selected operating system and the system software SIMATIC PCS 7 is then preinstalled accordingly.

Table 6-1

Component	Product information	Operating system	Plant bus interface	MLFB	L price/piece [€]
1 x ES	SIMATIC PCS 7 ES/OS IL 43 BCE W2K	Windows 2000 SP4	RJ45 Network card	6ES7 650-0LC16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE W2K	Windows 2000 SP4	CP 1613 A2	6ES7 650-0LC16-0YX1	4,990.00
	SIMATIC PCS 7 ES/OS IL 43 BCE WXP	Windows XP SP2	RJ45 Network card	6ES7 650-0LF16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE WXP	Windows XP SP2	CP 1613 A2	6ES7 650-0LF16-0YX1	4,990.00
2 x OS Single Stations	SIMATIC PCS 7 ES/OS IL 43 BCE W2K	Windows 2000 SP4	RJ45 Network card	6ES7 650-0LC16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE W2K	Windows 2000 SP4	CP 1613 A2	6ES7 650-0LC16-0YX1	4,990.00
	SIMATIC PCS 7 ES/OS IL 43 BCE WXP	Windows XP SP2	RJ45 Network card	6ES7 650-0LF16-0YX0	3,990.00
	SIMATIC PCS 7 ES/OS IL 43 IE WXP	Windows XP SP2	CP 1613 A2	6ES7 650-0LF16-0YX1	4,990.00
1 x Redundancy	RS 232-Connecting cable, 10 m			6ES7 902-1AC00-0AA0	89.00

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Licenses/Software

The following licenses must be purchased in addition to the above PC stations. There are different license forms which are graded according to the number of configurable process objects (PO) or the number of the OS variables.

Table 6-2

Software	Name	MLFB	L price/piece [€]
1 x Engineering standard software	PCS 7 Engineering Software V6.1 AS und OS	e.g. 6ES7 658-5AC16-0YA5 für PO 2000 / RC 64K	17,000.00
2 x OS Standard Software	SIMATIC PCS 7 OS Software Single Station V6.1	e.g. 6ES7 658-2AC16-0YA0 für PO 2000 / RT 64K	5,900.00
1 x OS Single Station Redundanz	WinCC/Redundancy	6AV6 371-1CF06-0DX0	3,050.00

Note The Rental License, which is restricted to 50 operating hours, provides an additional license for engineering of short-term projects.

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6.3 Step-by-Step Configuration

Note The following instruction was generated on the basis of Windows XP SP2 and PCS 7 V6.1 SP1.

For the plant bus transitions, CP1613 is used as an example. A clock synchronization is activated.

6.3.1 Preparatory steps

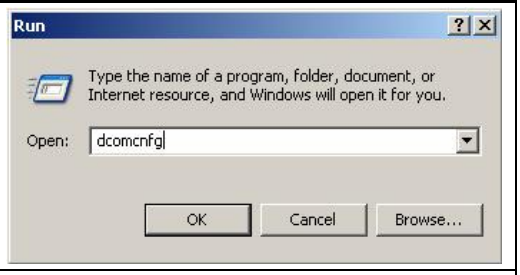
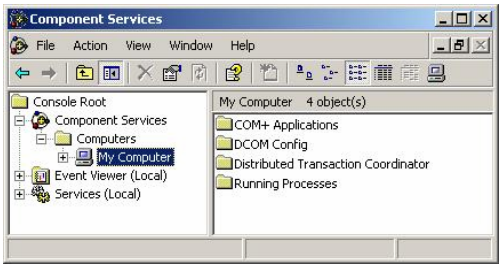
Create and enable project folder

Create one project folder each on master and standby OS and enable it so that complete access is possible from the ES.

DCOM settings

Should you wish to use redundant individual lot systems in Windows XP SP2, the following DCOM settings must be performed on both computers according to PCS7 readme.

Table 6-3

Step	Activity	Screenshot
1.	Select the menu item "Start" > "Run..." Enter "dcomcnfg" in the input field and press <OK>.	
2.	In the tree structure you select "Component Services" > "Computers" > "My Computer".	
3.	In the context menu (right mouse button) you select "Properties".	

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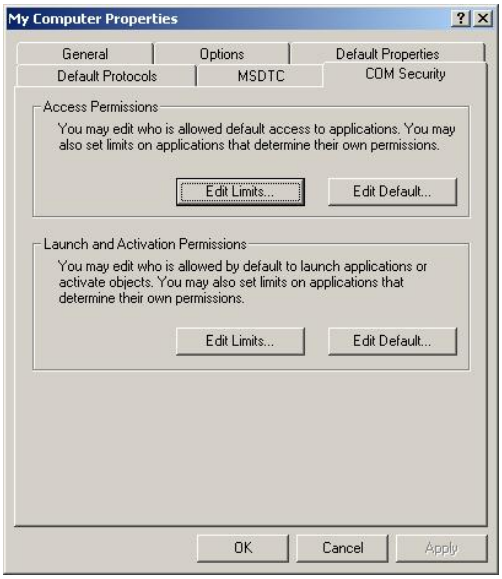
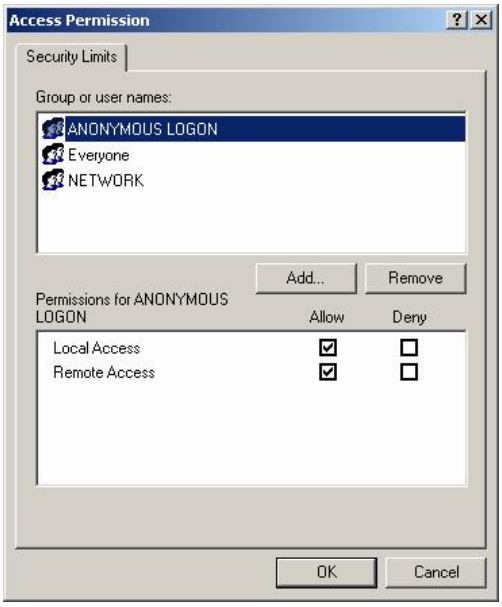
Step	Activity	Screenshot
4.	Switch to the "COM Security" tab. Click the "Edit Limits…" button in the "Access Permissions" field.	
5.	For the "ANONYMOUS LOGON" user group you checkmark the "Allow" boxes for the following permissions: • "Local Access" • "Remote Access" Afterwards you click the "OK" button twice. The Access Permissions have now been configured. Restart the computer to accept these settings.	

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6.3.2 ES configuration

Creating the multiproject

As a basis for the following instruction, all PC stations must be physically networked according to Figure 3-1. Furthermore, a multiproject must have been created on the ES in which the AS has already been configured regarding hardware and software.

Then you can start with the following CPU and CP settings.

AS settings

Evaluation of the process data requires all components of the process control system to work with an identical clock, so that messages can be allocated in correct temporal sequence.

Below, a path is described where the redundant OS single stations define the master time.

Note Further options of clock synchronization are described in detail in the "PCS 7 – Configuration Manual Operator Station" in chapter 11 "Clock synchronization and life signal monitoring".

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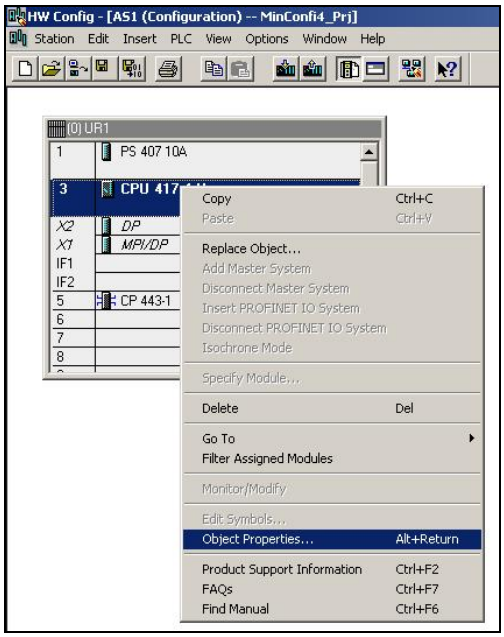
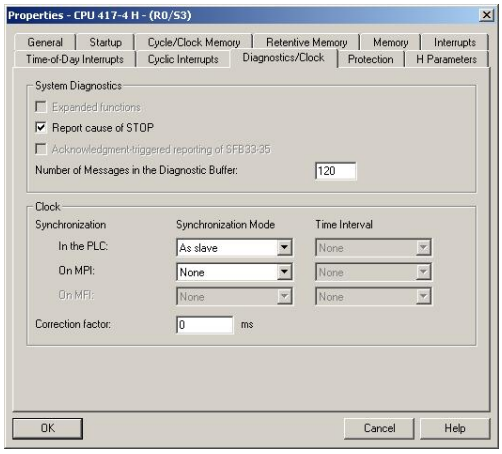
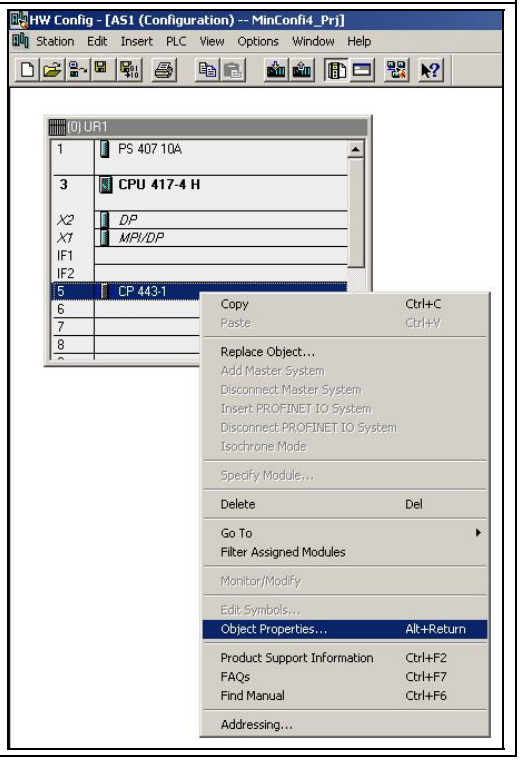
Table 6-4

Step	Activity	Screenshot
1.	Open the HW config of the AS. Select the CPU and chose "Object Properties…" from the context menu.	

Step	Activity	Screenshot
2.	Switch to the "Diagnostic/Clock" tab. In the "In the PLC:" box of the "Clock" section you select "As slave" as the "Synchronization Mode". Confirm this setting with "OK".	
3.	Open the context menu of the CP and select "Object Properties...".	

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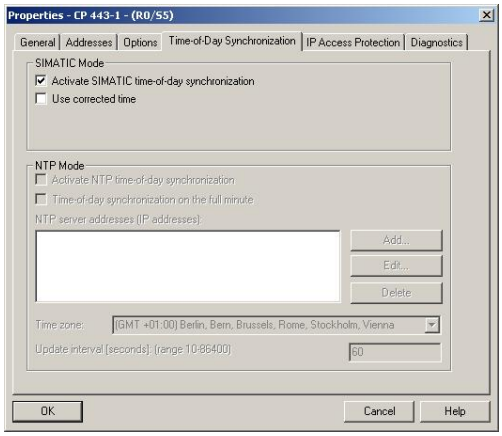
Step	Activity	Screenshot
4.	Switch to the "Time-of-Day Synchronization" tab. Checkmark the "Activate SIMATIC time-of-day synchronization" box. Confirm the setting with "OK".	
5.	Save and compile the configuration via "Station" -> "Save and Compile". Close HW Config.	

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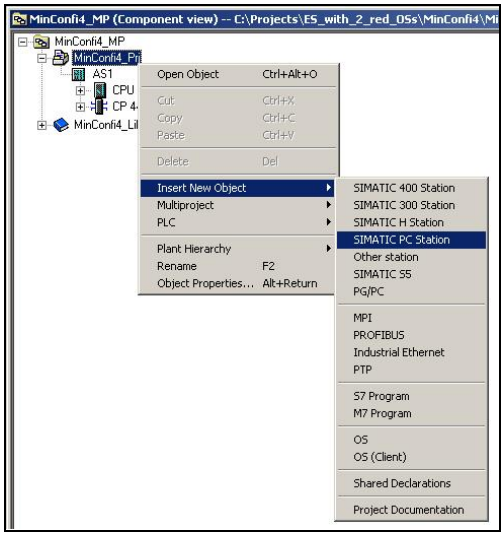
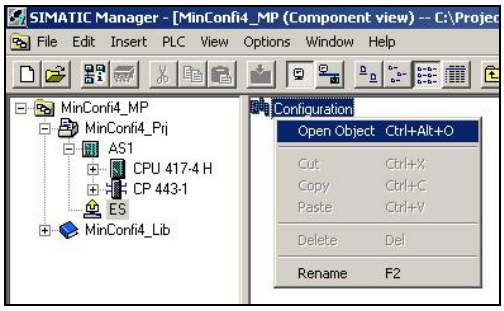
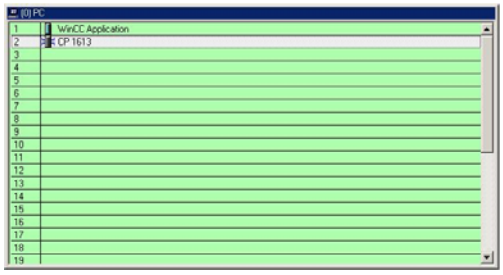
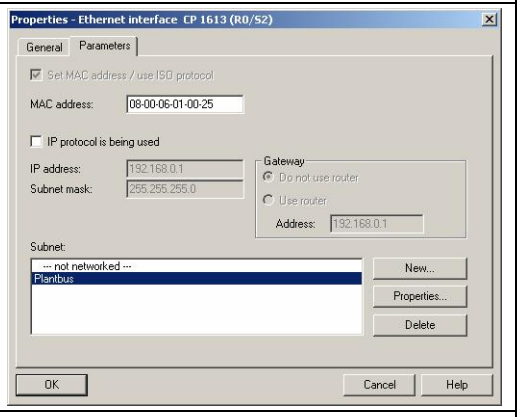
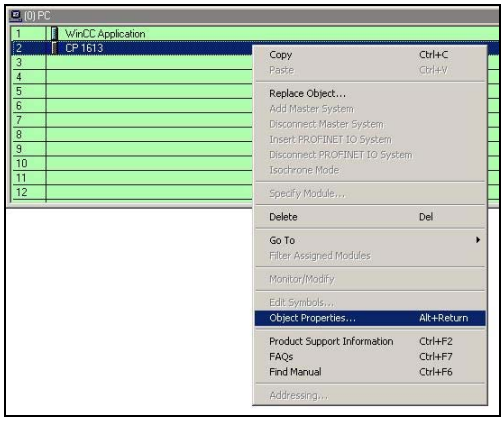
Generate the PC station for the ES

In order to be able to test the OS project on the ES, we create for the ES a PC station with WinCC application.

Table 6-5

Step	Activity	Screenshot
1.	In the "Component view" you open the context menu of the project and insert a new PC station via "Insert New Object" -> "SIMATIC PC Station". Change the name of the PC station so that it corresponds with the name of the local computer in the network.	

Step	Activity	Screenshot
2.	Open the HW config of the PC station of the ES.	
3.	Add a "WinCC Application" and a "CP 1613".	
4.	In "Subnet" you select the already created plant bus or create it via the "New..." button when working in a separate subproject. Select it and assign the respective MAC address to the CP 1613. Confirm the settings with "OK".	
5.	Open the context menu of the CP 1613 and select "Object Properties...".	

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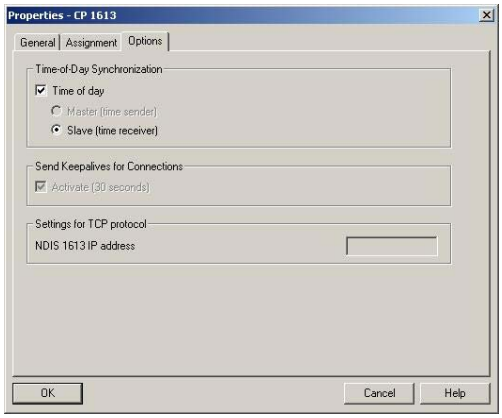
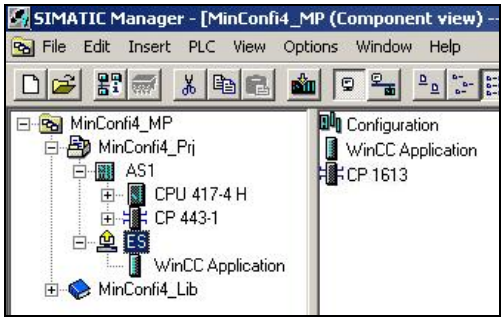
Step	Activity	Screenshot
6.	Select the "Options" tab and checkmark the "Time of day" box. Confirm the setting with "OK".	
7.	Save and compile via menu item "Station" -> "Save and Compile". Close HW Config.	
8. optional	In the SIMATIC Manager you delete the OS project of the PC station of the ES as it is not required in our example.	

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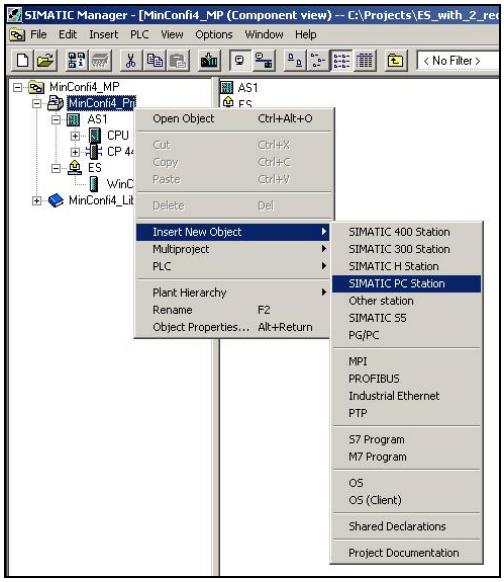
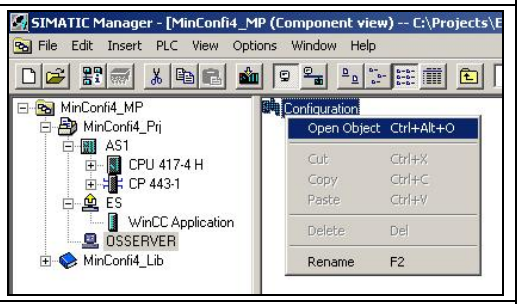
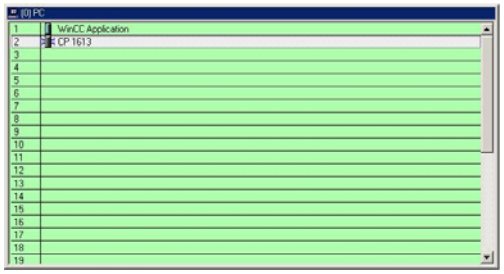
Generate the PC station for the master OS

Table 6-6

Step	Activity	Screenshot
1.	In the component view you open the context menu of the project and insert a new PC station via "Insert New Object" -> "SIMATIC PC Station" whose name you can chose as you wish.	
2.	Open the HW config of the PC station of the master OS.	
3.	Add a "WinCC Application" and a "CP 1613".	

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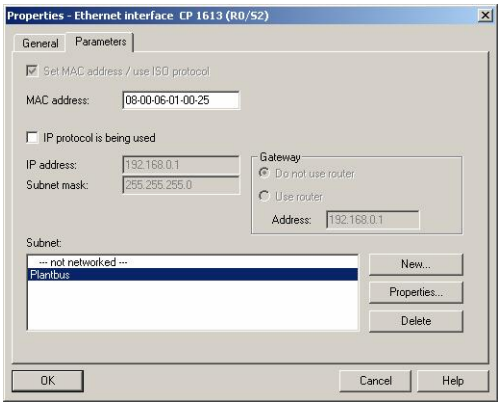
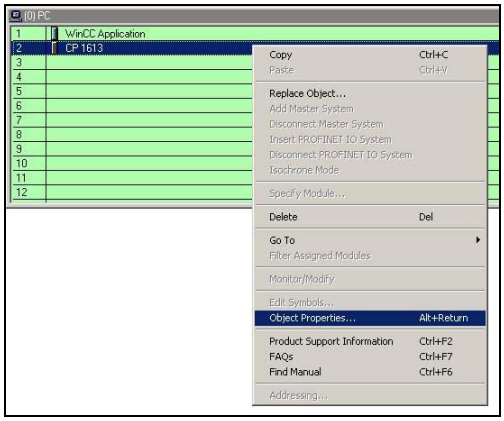
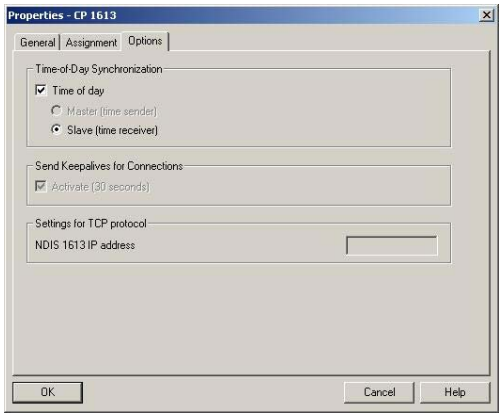
Step	Activity	Screenshot
4.	In "Subnet" you select the already created plant bus or create it via the "New..." button when working in a separate subproject. Select it and assign the respective MAC address to the CP 1613. Confirm the settings with "OK".	
5.	Open the context menu of the CP 1613 and select "Object Properties...".	
6.	Select the "Options" tab and checkmark the "Time of day" box. Confirm the setting with "OK".	
7.	Save and compile via menu item "Station" -> "Save and Compile". Close the HW Config.	

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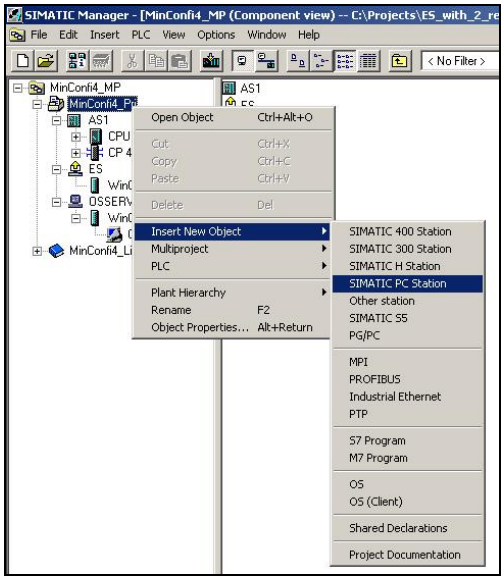
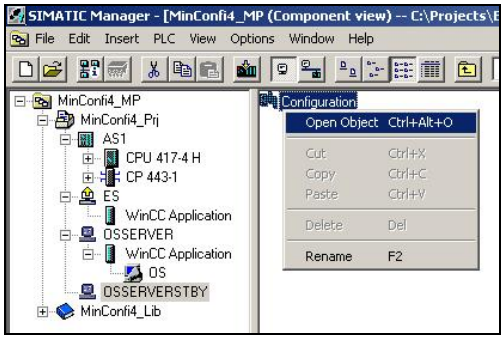
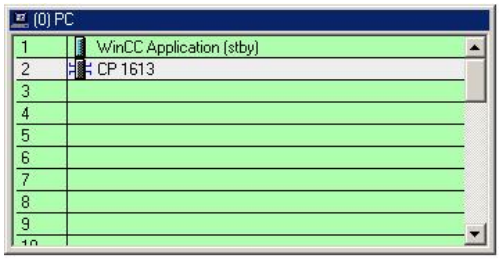
Generate the PC station for the standby OS

Table 6-7

Step	Activity	Screenshot
1.	In the component view you open the context menu of the project and insert a new PC station via "Insert New Object" -> "SIMATIC PC Station" whose name you can chose as you wish.	
2.	Open the HW config of the PC station of the standby OS.	
3.	Add a "WinCC Application (stby)" and a "CP 1613".	

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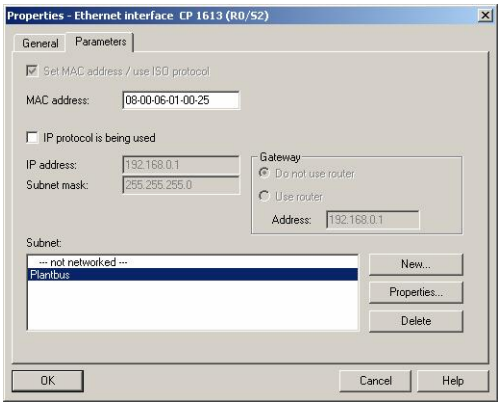
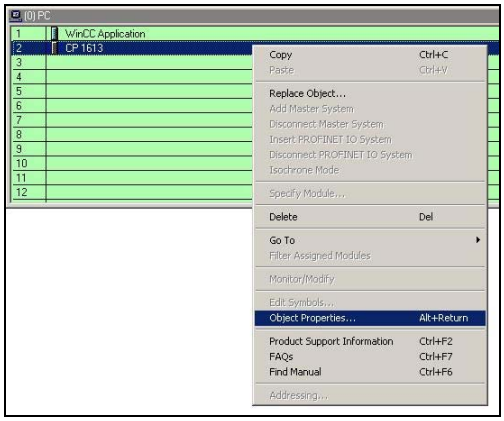
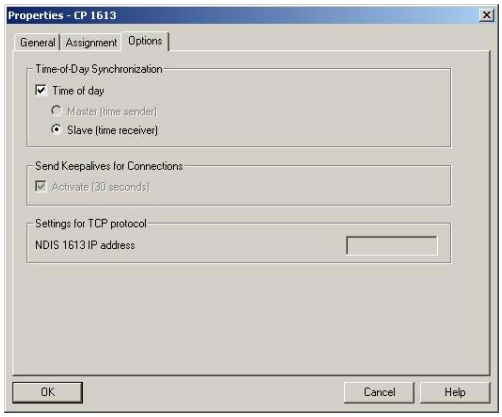
Step	Activity	Screenshot
4.	In "Subnet" you select the already created plant bus or create it via the "New..." button when working in a separate subproject. Select it and assign the respective MAC address to the CP 1613. Confirm the settings with "OK".	
5.	Open the context menu of the CP 1613 and select "Object Properties...".	
6.	Select the "Options" tab and checkmark the "Time of day" box. Confirm the setting with "OK".	
7.	Save and compile via menu item "Station" -> "Save and Compile". Close the HW Config.	

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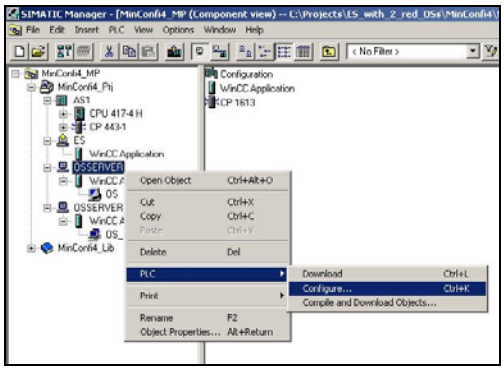
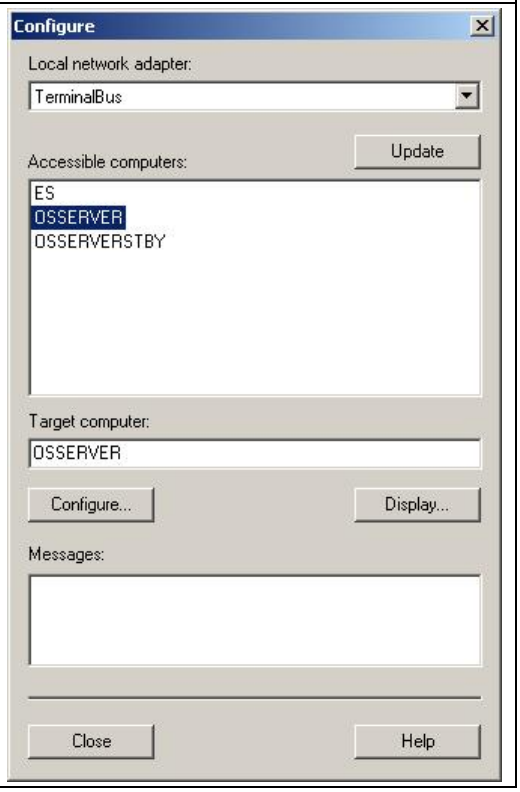
Configuring all PC stations

The settings made are now transferred to the individual PC stations (assembling the component configurator).

Table 6-8

Step	Activity	Screenshot
1.	Configuring the component configurator of the master OS. Select the PC station and the master OS and chose "PLC" > "Configure..." from the options menu.	
2.	In the "Accessible computers" field you select the PC which corresponds to the master OS. Press the "Configure..." button.	

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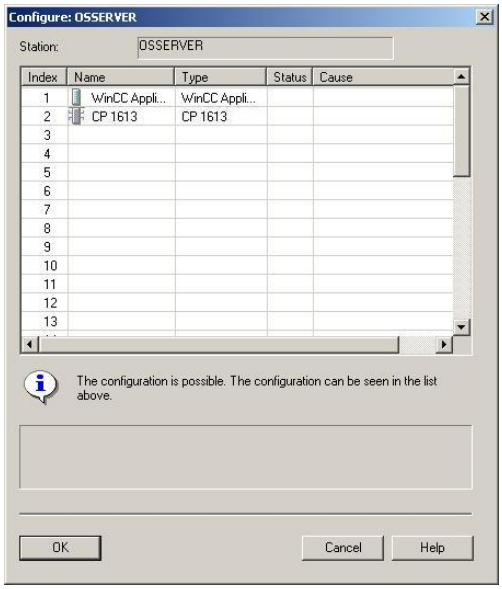
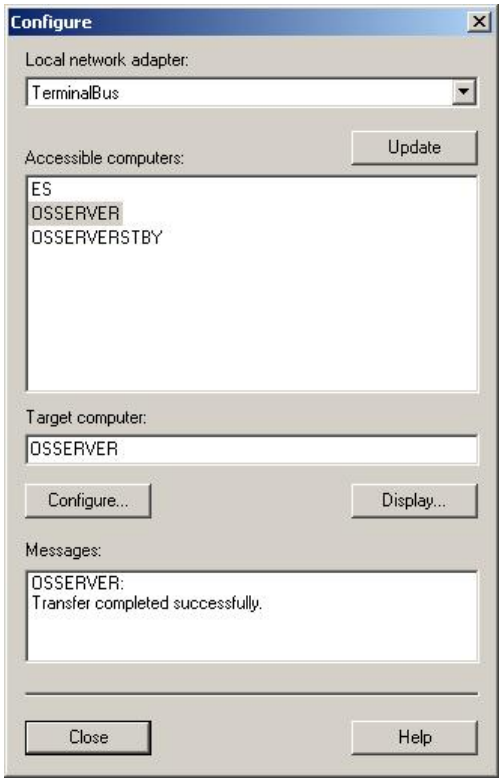
Step	Activity	Screenshot
3.	In the displayed window you see how the PC station is configured. Confirm this setting with "OK".	
4.	Acknowledge the information which appears with "OK".	
5.	Subsequently you receive the following message in the bottom window pane: "Transfer completed successfully.". Close the configuration dialog box.	
6.	Please configure the component configurators of standby OS and ES.	

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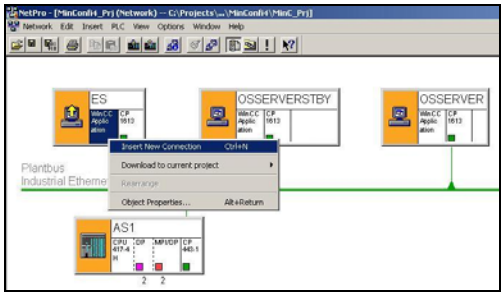
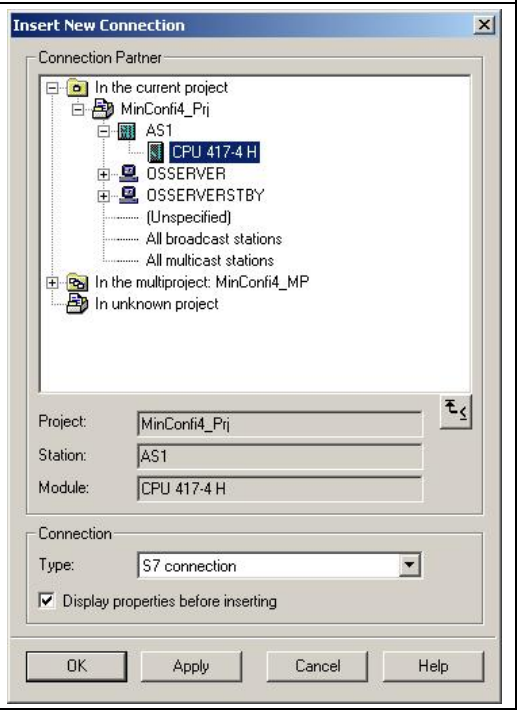
Configure and load the communication settings

The connection with NetPro is configured below and loaded into the stations.

Note For station granular configuration, the subnets of the individual subprojects must be joined beforehand.

Table 6-9

Step	Activity	Screenshot
1.	Open NetPro. Select the WinCC application of the ES and open the context menu. Here you select "Insert New Connection".	
2.	In the "Connection Partner" window you select the CPU of the AS. Ensure, that in the "Connection" field "S7 connection" has been selected. Confirm the entries with "OK".	

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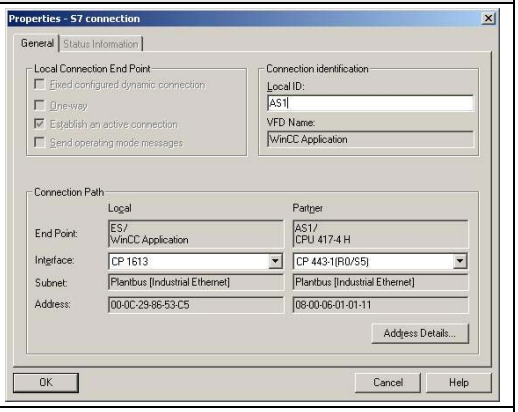
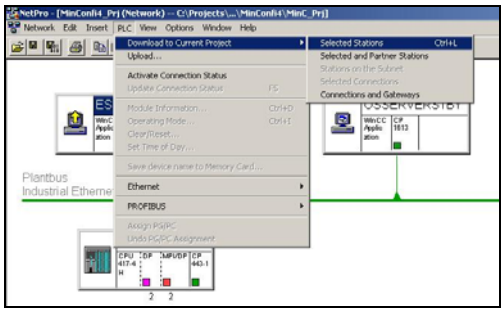
Step	Activity	Screenshot
3.	In the "Connection identification" tab you change the "Local ID" to a meaningful name, e.g. AS1.	
4.	Repeat steps 1 to 3 for connecting master and standby OS to the AS. It is important here, that the connection of master OS, standby OS and ES with the AS have identical names. Then save and compile NetPro via menu item "Network" -> "Save and Compile…". Select "Compile and check everything".	
5.	Select the ES and load the connection via the menu item "PLC" -> "Download to Current Project" -> "Selected Stations". Download the AS, master OS, and standby OS in the same way. Then close NetPro.	

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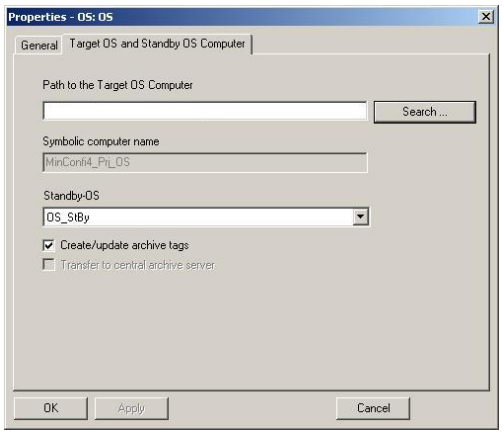
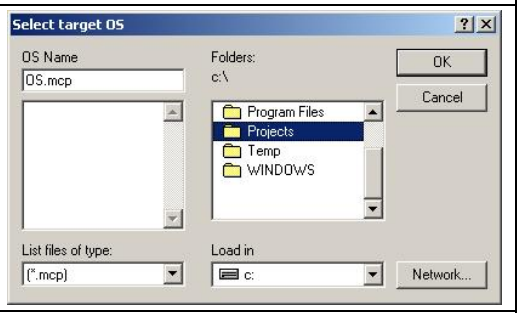
Master/Standby settings

Here you make the master / standby assignment and select the download paths.

Table 6-10

Step	Activity	Screenshot
1.	In the SIMATIC Manager you open the properties dialog of the OS project of the master OS. Switch to the "Target OS and Standby OS Computer" tab. In the "Standby-OS" drop-down menu you select "OS_StBy". Then you press the "Search..." button.	
2.	Press the "Network..." button.	
3.	In "Drive" you select "<none>". Via the "Browse..." button you navigate to the enabled project folder of the master OS.	

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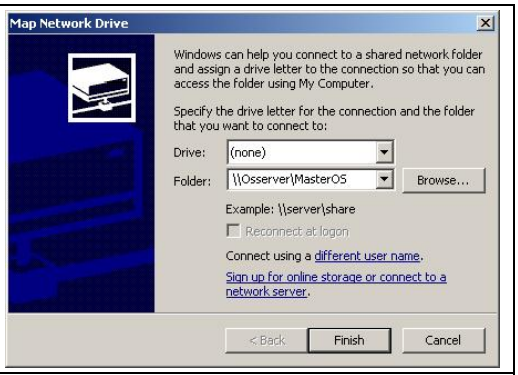
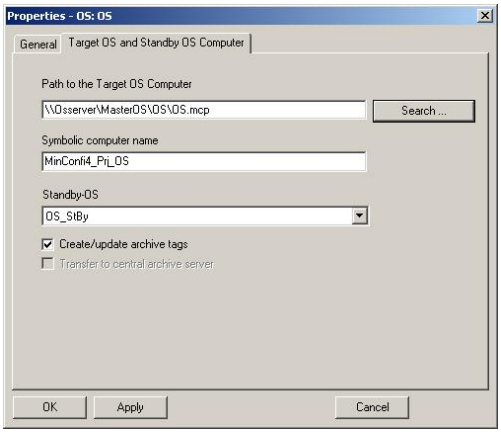
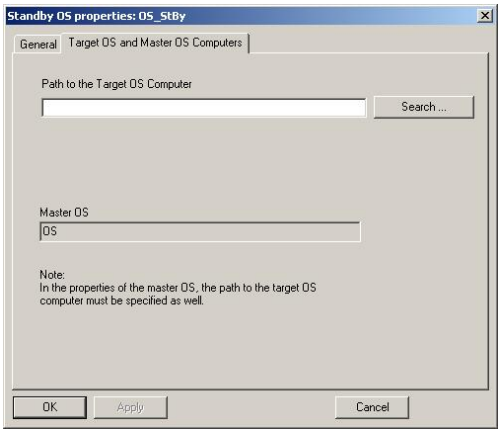
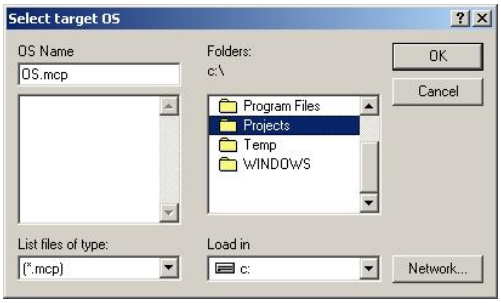
4.	The "Folder:" input box now contains the selected path. Check it and confirm with the "Finish" button.	
5.	In the "Path to the Target OS Computer" input field you check the path. Confirm this with "OK".	
6.	Open the properties dialog of the OS project of the standby OS. Switch to the "Target OS and Master OS Computers" tab. In "Master OS" you check whether the correct OS project of the master OS has been entered. Press the "Search..." button.	
7.	Press the "Network..." button.	

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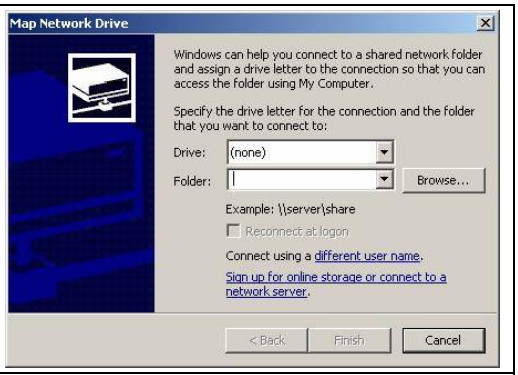
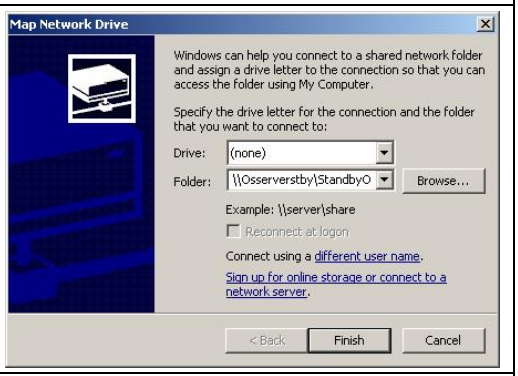
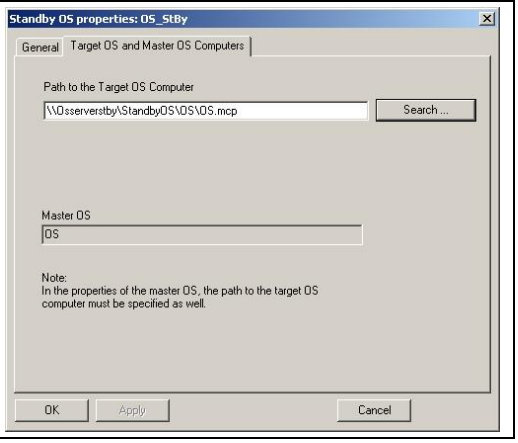
8.	In "Drive" you select "<none>". Via the "Browse..." button you navigate to the enabled project folder of the standby OS.	
9.	The "Folder:" input box now contains the selected path. Check it and confirm with the "Finish" button.	
10.	In the "Path to the Target OS Computer" input field you check the path. Confirm this with "OK".	

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Compile and load the user program

Compile the S7 program and load it into the AS.

Compile the OS project

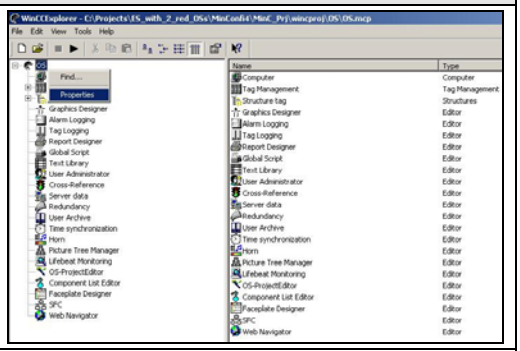
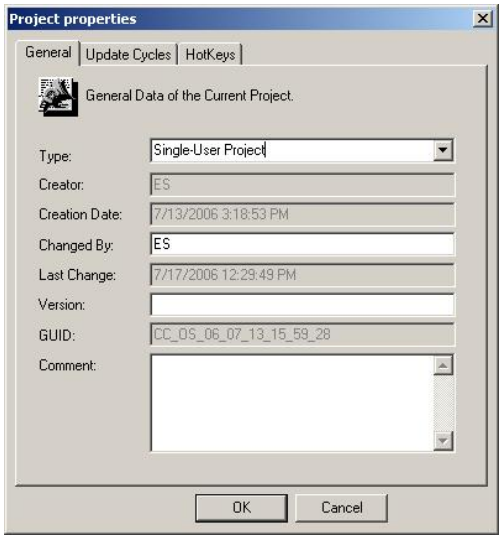
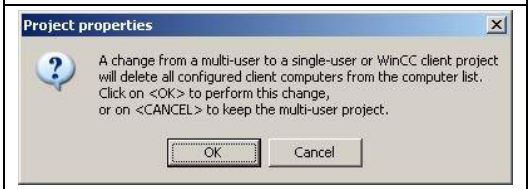
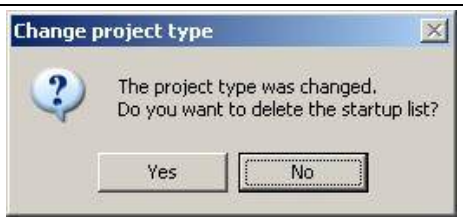
Compile the OS project of the master OS in the SIMATIC Manager.

6.3.3 OS configuration

OS configuration on the ES

Conversion from multi to single place systems is made on the ES, as well as settings for redundancy and clock synchronization.

Table 6-11

Step	Activity	Screenshot
1.	Open the OS project of the master OS on the ES computer. In the opened WinCC Explorer you open the OS project and select "Properties" in the context menu.	
2.	In the "General" tab of the "Type:" field you select "Single-User Project". Acknowledge the entry with the "OK" button and also acknowledge the message with "OK".	 
3.	Prevent deleting the startup list by pressing the "No" button.	

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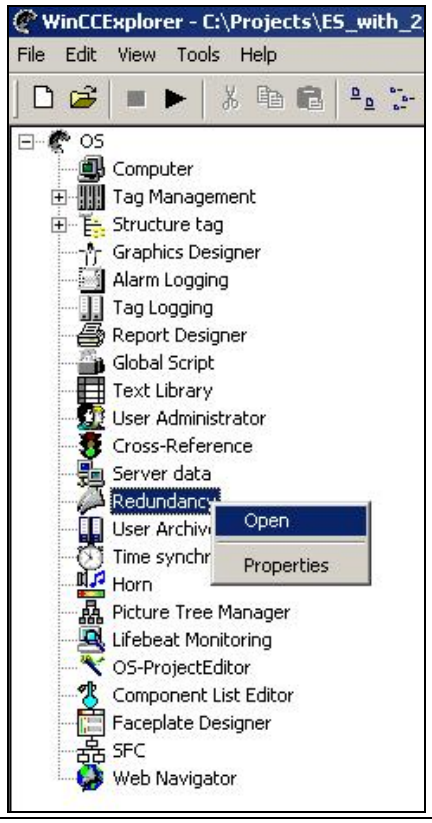
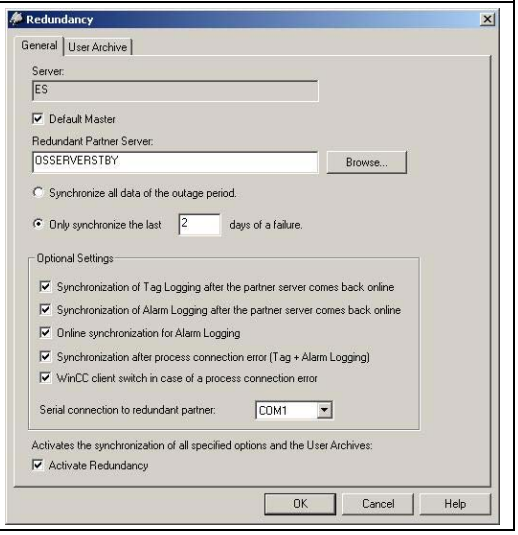
Step	Activity	Screenshot
4.	Open the "Redundancy" editor.	
5.	Check whether the standby OS has been entered in "Redundant Partner Sever:" Check whether your desired check-boxes are activated at "Optional Settings". If you do not wish to operate the RS 232 redundancy cable at the COM1 interface, then these settings must later be performed on the OS itself (see section "OS configuration on the OS"). This setting is not possible on the ES as the interfaces of the respective stations are unknown there. Confirm the settings with "OK".	

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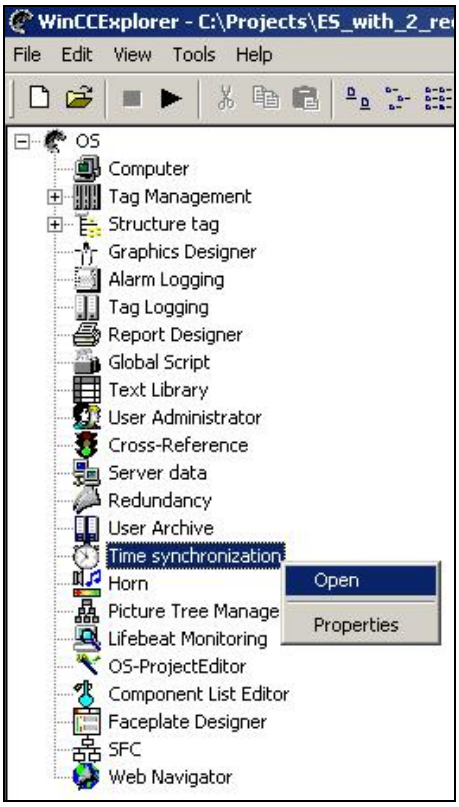
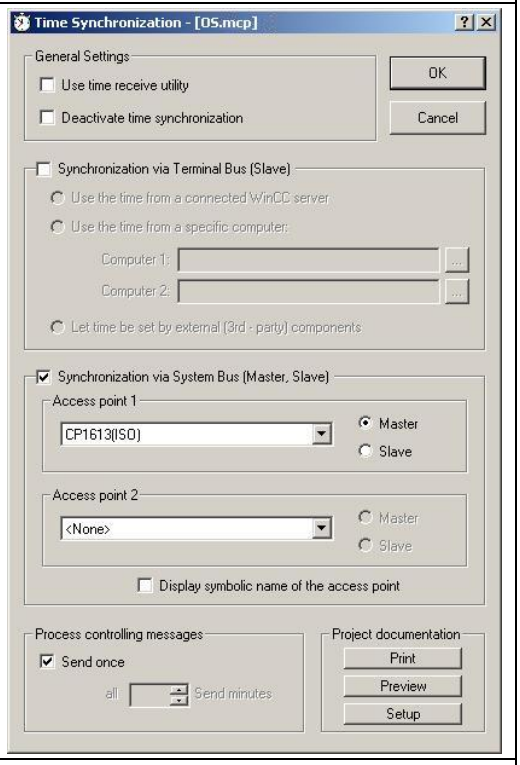
Step	Activity	Screenshot
6.	Open the "Time synchronization" editor.	
7.	Here you activate the "Synchronization via system Bus (Master, Slave)" checkbox. In "Access point 1" you select "CP1613(ISO)" and activate the "Master" radio button. Confirm the settings with "OK". NOTE: If the ES server does not have a CP 1613, the settings for the clock synchronization cannot be executed here. The clock synchronization settings must, in this case, be executed on both single stations itself after downloading the OS project.	
8.	Close the OS project.	

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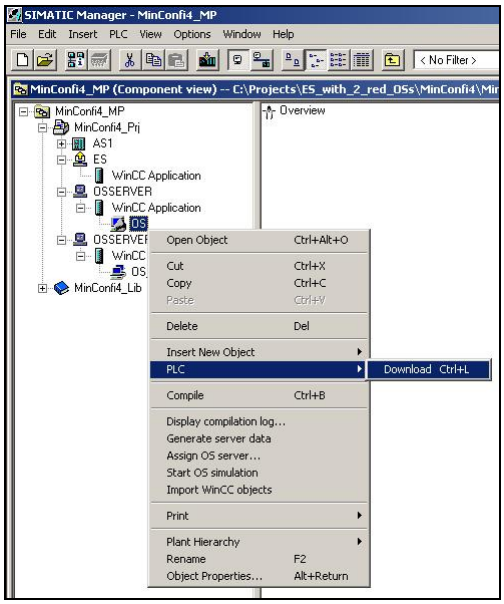
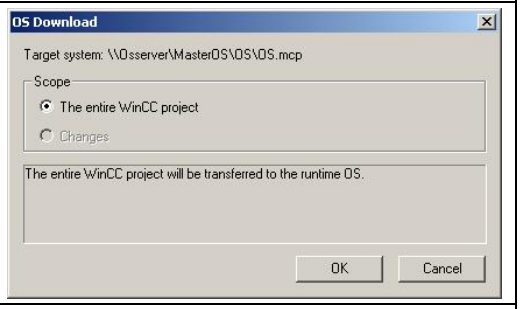
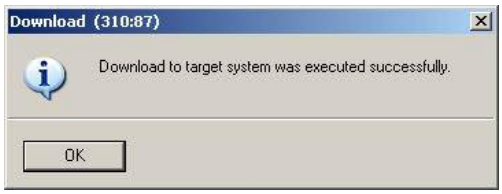
Loading OS project to the OS computers

After the redundancy and clock synchronization have been configured on the ES side, the OS project can be loaded to the master and standby OS.

Table 6-12

Step	Activity	Screenshot
1.	In the SIMATIC Manager you select the OS project of the master OS and select "PLC" > "Download" from the context menu.	
2.	Loading the OS project for the first time requires an entire download. Start the download with "OK".	
3.	After the successful download, the OS project is located on the master OS in the intended folder. Quittieren Sie die entsprechende Meldung mit „OK".	
4.	Repeat steps 1 to 3 with the OS project of the standby OS.	

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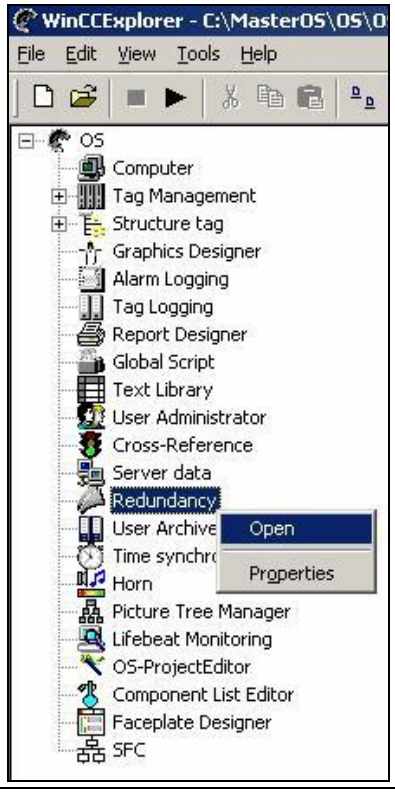
OS configuration on the OS

If the engineering station has no CP 1613 as opposed to the OS, or the RS 232 redundancy cable is not connected at COM1 there, the following step-by-step instructions must be performed. Otherwise, we generally advise you to check those after the project download onto the target systems.

Note Normally, all configuration works are executed on the ES for the purpose of consistent data management, so that no WinCC engineering licenses are required on the OS. Nevertheless, a license free time window of one hour is available after each opening of the WinCC Explorer for WinCC configuration works.

Table 6-13

Step	Activity	Screenshot
1.	Open the OS project on the master OS.	
2.	Open the "Redundancy" editor in the WinCC Explorer.	

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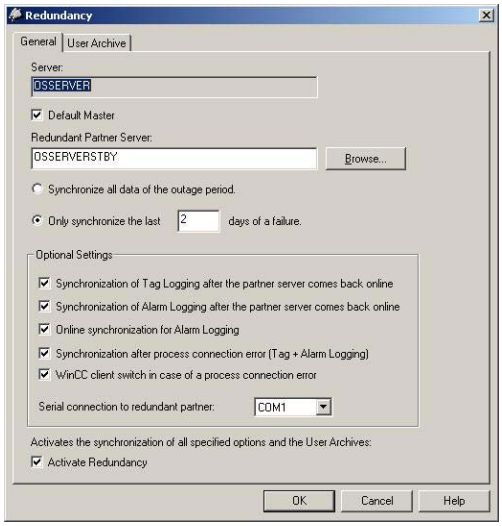
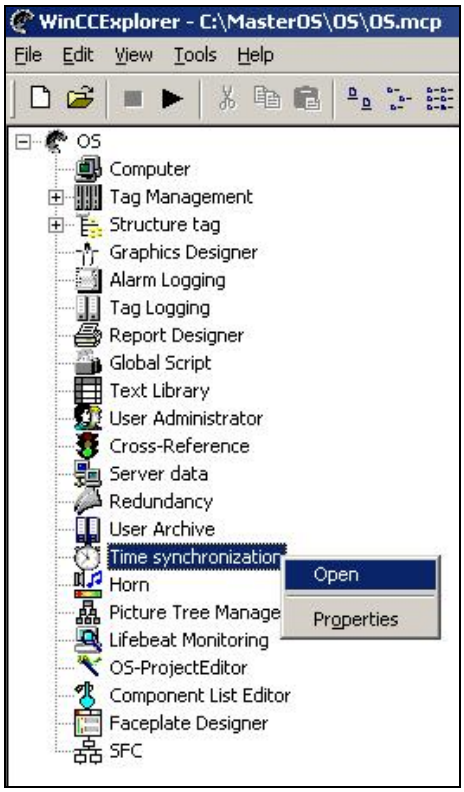
Step	Activity	Screenshot
3.	Check whether your desired check-boxes are activated at "Optional Settings". Also check whether the name of the standby OS has been entered correctly in "Redundant Partner Server:". If you are operating the RS 232 redundancy cable at a location different to the COM1 interface, you have to set the appropriate interface at "Serial connection to redundant partner:" Confirm the setting with "OK".	
4.	Subsequently you open the "Time synchronization" editor.	

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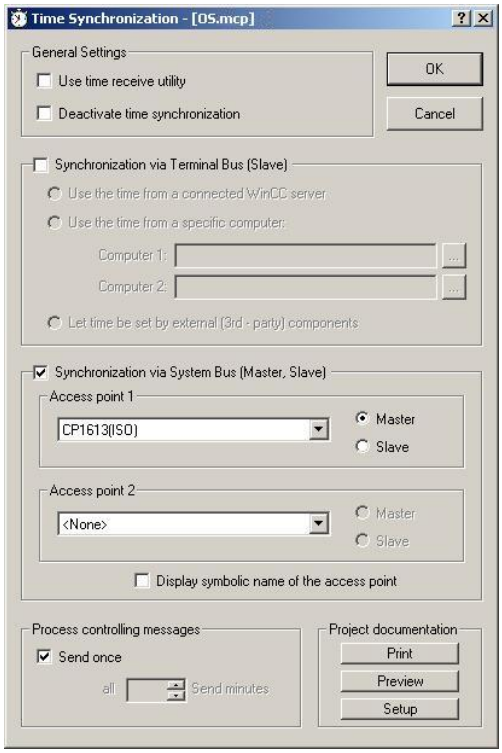
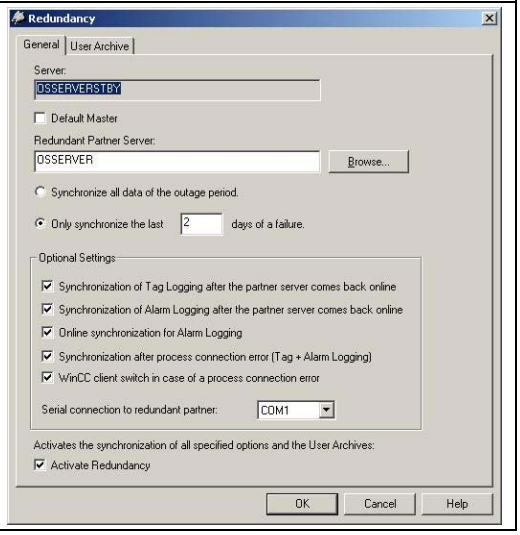
Step	Activity	Screenshot
5.	Check or activate the "Synchronization via system Bus (Master, Slave)" checkbox. In "Access point 1" you check or select "CP1613(ISO)" and press the "Master" radio button. Confirm the settings with "OK".	
6.	If changes have been made in the redundancy settings, close the OS project and open it again, so the settings become effective.	
7.	Repeat steps 1 to 6 on the standby OS with the following modifications for step 3 (redundancy): • The "Default Master" checkbox must be deactivated. • Check whether the name of the master OS has been entered correctly in "Redundant Partner Server:".	

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6.3.4 Activating the Runtime

Successively activate the OS project on the master OS as well as on the standby OS. The order is not of importance here. It is recommended to wait with activating the second Runtime until the start process of the first one is completed entirely.

Regarding the redundancy, the online synchronization is active immediately. The mutual archive update on the other hand takes approx. 15 min..

6.3.5 Loading of OS project modifications

Delta-download

Small project changes can be transferred into the active OS project by means of delta download.

Note Detailed information on which configuration steps enable a delta download are available in the “PCS 7 – Configuration Manual Operator Station“, chapter 10.

Delta download offers two advantages:

- The OS can remain in process mode.
- The duration of the download process is considerably reduced.

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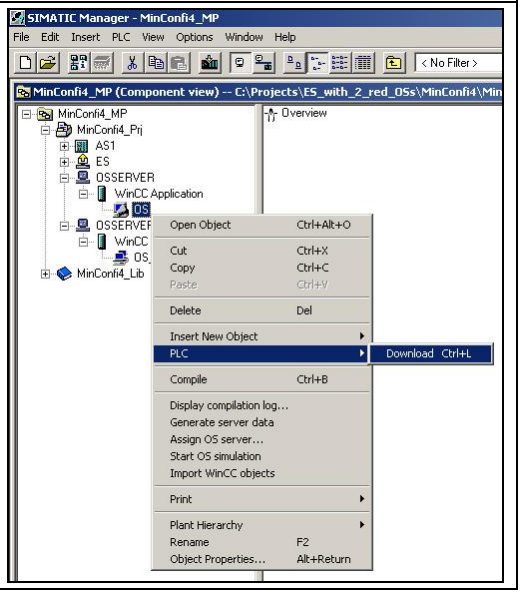
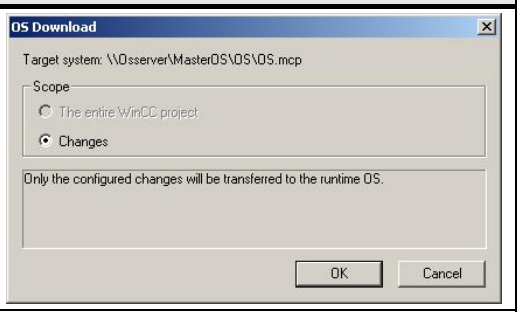
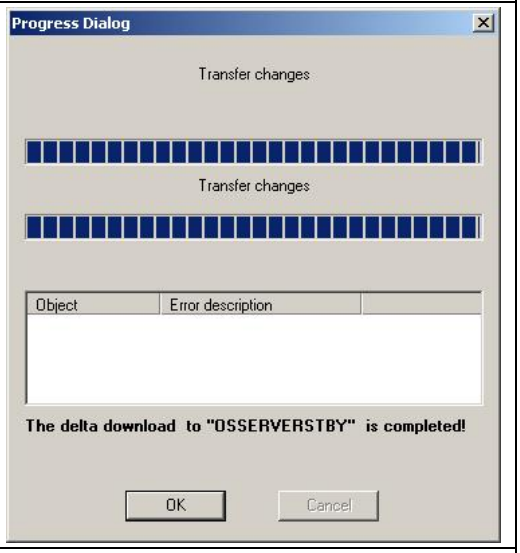
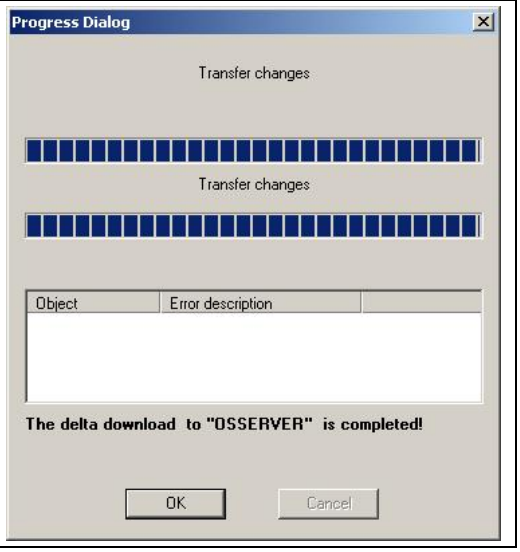
Table 6-14

Step	Activity	Screenshot
1.	Prior to that, you start the compilation process of the master OS project with the “Changes“ option on the ES.	
2.	Open the context menu of the OS project of the master OS and select `"PLC" > "Download"`. NOTE: Due to the fact, that Runtime is active in the Download dialog, only “Changes” can be selected. Start the download by pressing `"OK"`.	

Step	Activity	Screenshot
		
3.	The service which starts then first performs a delta download to the standby OS. If this download process is completed, a confirmation is requested. Confirm this with "OK".	
4.	Then the delta-download to the master OS is started. If this download process is completed, a confirmation is requested. Acknowledge it with "OK".	

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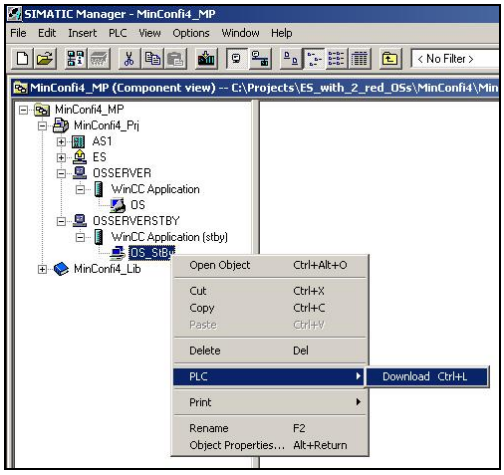
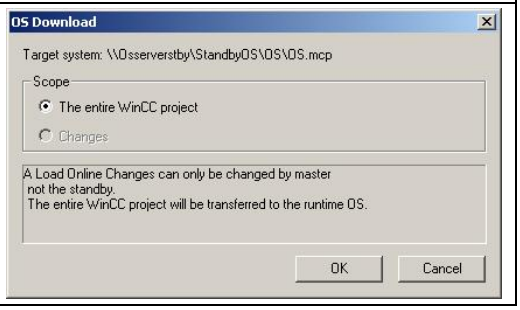
Entire download

Entire download must principally be performed during the first download process or after performing extensive modifications, such as expansions of the system by an additional AS. In these cases only an entire compilation is possible beforehand.

Note Detailed information on which configuration steps require an entire download are available in the “PCS 7 – Configuration Manual Operator Station“, chapter 10.

An entire download during runtime, while keeping the data archiving and successive synchronization of single stations, requires following the step-by-step instruction below:

Table 6-15

Step	Activity	Screenshot
1.	Prior to that, you start the compilation process of the master OS project with the “The entire WinCC project“ option on the ES.	
2.	Switch to the standby OS. There you deactivate the runtime and close the OS project.	
3.	Then download the OS project of the standby OS in the SIMATIC Manager of the ES via its context menu `"PLC" > "Download"`. NOTE: As the standby OS is deactivated and the entire OS project compiled, the only possible option in the download dialog is “The entire WinCC project“. Start the download by pressing `"OK"`.	 

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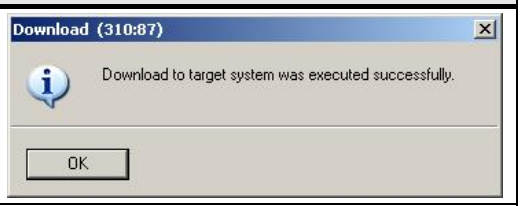
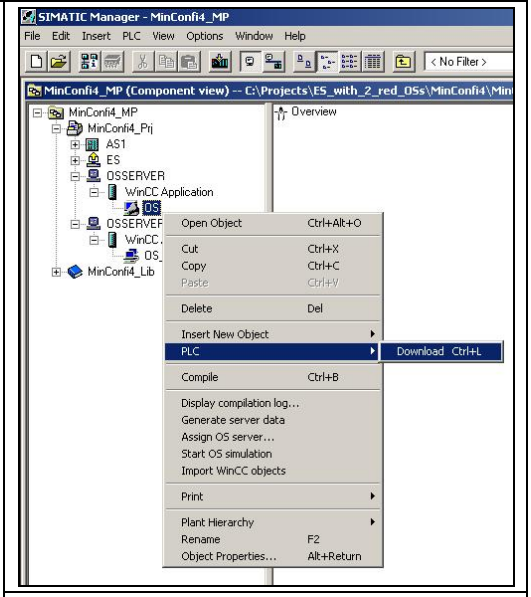
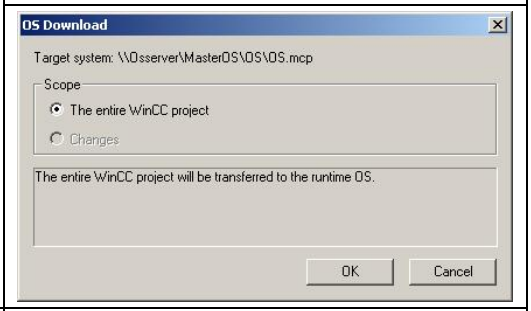
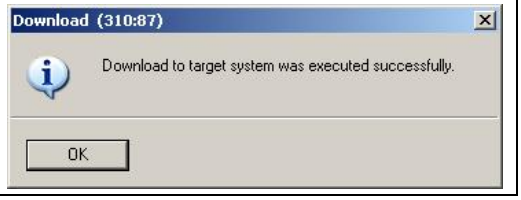
Step	Activity	Screenshot
4.	Confirm the successful download with "OK". Switch to the standby OS. Open the OS project and start the Runtime.	
5.	As soon as the Runtime of the standby OS is activated, change to the master OS. There you deactivate the runtime and close the OS project.	
6.	Download the OS project of the master OS in the SIMATIC Manager of the ES via its context menu "PLC" > "Download". NOTE: As the master OS is deactivated and the entire OS project compiled, the only possible option in the download dialog is "The entire WinCC project". Start the download by pressing "OK".	 
7.	Confirm the successful download with "OK". Switch to the master OS. Open the OS project and start the Runtime.	

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