Configuration for Communication

applications & TOOLS

INAT Echochange Gateway between Allen-Bradley EtherNet/IP Networks and SIMATIC Industrial Ethernet Networks

Configuration

SIEMENS

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Foreword

Objective of the application

Worldwide, the demand for the connection of networks of different providers increases. Interoperability is of utmost importance because of economic and technological reasons.

In this context, the products by Allen Bradley/Rockwell are of special interest. Together with a large number of partner companies, Allen-Bradley offers a large portfolio of controllers, peripheral devices and network components especially occupying a remarkable share of the US market.

The present application exemplary presents how to connect Allen-Bradley "EtherNet/IP" networks to SIMATIC-supported Ethernet networks. Here, an "Echochange" module by the INAT company is used.

Main contents of this application

Due to the wide variety of the product ranges by both Allen-Bradley and Siemens, it is not possible to explain all possible combinations within the framework of only one application. Therefore, the main focus of the present document is the application of INAT "Echochange" modules.

Delimitation

This application contains no further description concerning

- programming principles of Allen-Bradley controllers
- Allen-Bradley networks.

Additional information

The present selection aid is intended to be a supplement to the application "*Communication with Allen-Bradley ControlLogix Controllers via PROFIBUS Scanners*" (entry ID 23809864, see \3\). Using an "Echochange" module is an alternative to the network connection presented there.

The entry no. 23809864 contains essential background information on Allen-Bradley controllers and network technology. It is recommended to read the entry mentioned above.

Structure of the document

The documentation of this application is divided into the following main parts:

Part	Description
Application Description	Provides a general overview of the contents. You will learn about the standard hardware and software components used.
Function Principles and Program Structures	This part describes the detailed function processes of the involved hardware and software components, the solution structures and – where useful – the specific implementation of this application. This part is necessary if you want to learn about the interaction of the solution components, for example in order to use them as the basis for own development.
Structure, Configuration and Operation of the Application	This part leads you step by step through the structure, important configuration steps, commissioning and operation of the application.
Appendix	This section of the documentation includes further information, e.g. literature, glossary etc.

Reference to Automation and Drives Service & Support

This entry originates from the Internet application portal of the Automation & Drives Service and Support. Clicking the link below directly displays the download page of this document.

http://support.automation.siemens.com/WW/view/en/23901499

Table of Contents

Application Description

Content

Here, you will get an overview of Allen-Bradley components and technologies as well as of possible connections to SIMATIC networks. The main focus is the connection of SIMATIC-supported Ethernet to EtherNet/IP (Allen-Bradley).

1 Automation Task

Here you will find information on …

... which classes of controllers and networks are offered by Allen-Bradley and which problems might occur during their connection to SIMATIC networks.

1.1 Overview

Note

In legal terms, "Allen-Bradley" is a subsidiary company of "Rockwell Automation" dealing with the development and application of programmable logic controllers.

In order to avoid confusion, in this application the term "Allen-Bradley" stands for all products offered by Rockwell and Allen-Bradley.

Introduction

Especially in the United States, Allen-Bradley currently occupies a remarkable market share. To serve for the combination of different networks and for the increasingly required interoperability, this application exemplarily presents a possibility of operating an "ISO on TCP" network with SIMATIC network nodes together with an Allen-Bradley EtherNet/IP network.

Allen-Bradley controllers and networks

In the course of time, Allen-Bradley developed a series of different controller classes (PLC 5, SLC 500, ControlLogix etc.) and network types (DH+, DH 485, ControlNet, EtherNet/IP etc.) which are very different with regard to their area of application. For this reason, it is impossible to present a universally applicable solution for connecting SIMATIC products to Allen-Bradley products. Each case has to be considered separately.

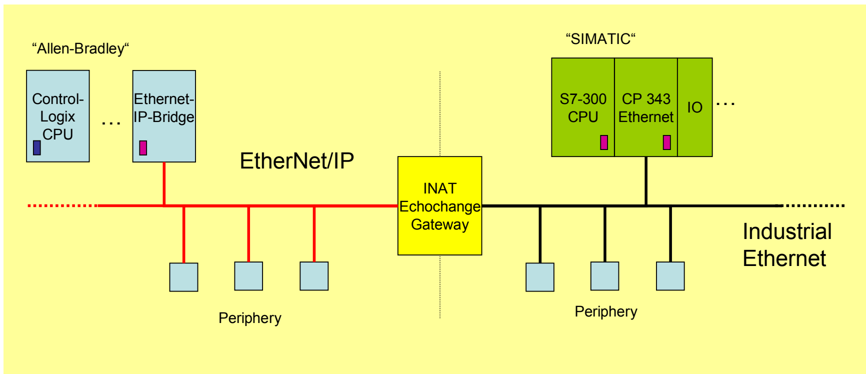
You will find a detailed description of Allen-Bradley's product range under \3\.

Our example presents the use of a **ControlLogix** controller combined with an **EtherNet/IP network** on the Allen-Bradley side.

Overview of the automation task

The figure below provides an overview of the automation task.

Figure 1-1



The task is to establish communication between an Allen-Bradley ControlLogix controller in an EtherNet/IP network on one side and a S7-300 CPU in an Industrial Ethernet network on the other side.

Description of the automation task

Industrial Ethernet and *EtherNet/IP* are two Ethernet variants which are supported by both Siemens and Allen-Bradley for sophisticated communication tasks in industry environment.

Both protocols are similar to each other, but not completely compatible. In order to establish a connection between two subnetworks, a gateway is required.

Such a gateway is offered by the INAT company (\5\) and is called "*Echochange*" gateway (\6\).

2 Automation Solution

Here you will find information on …

the solution selected for the automation task.

2.1 Overview of the overall solution

Diagram

The following Figure 2-1 schematically shows the major components of the solution.

An "Echochange" gateway is positioned at the interface between an EtherNet/IP network in which a ControlLogix CPU by Allen-Bradley is communicating and an Industrial Ethernet network. There, it ensures communication between the two networks.

Note Please observe that the "Echochange" gateway can take over numerous communication tasks. The solution presented here only gives an example for a possible use. You will find detailed information on the different options of the "Echochange" under \6\ and in the device manuals.

In the presented case of application, an Industrial Ethernet branch is operated with a S7-300 CPU which accesses the network via a CP 343 communication module.

Note The application example described in "TCP/IP Coupling between an Allen-Bradley ControlLogix CPU and a S7-400 CPU" ("\download\infos\echochange\examples\clx_s7400.pdf" on the INAT Echochange installation CD) and serving as our basis provides the use of a S7-400 CPU on the SIMATIC side. Nevertheless, it is possible without any major modifications to use a S7-300 CPU instead for the example. The present instructions are limited to the use of a S7-300 CPU.

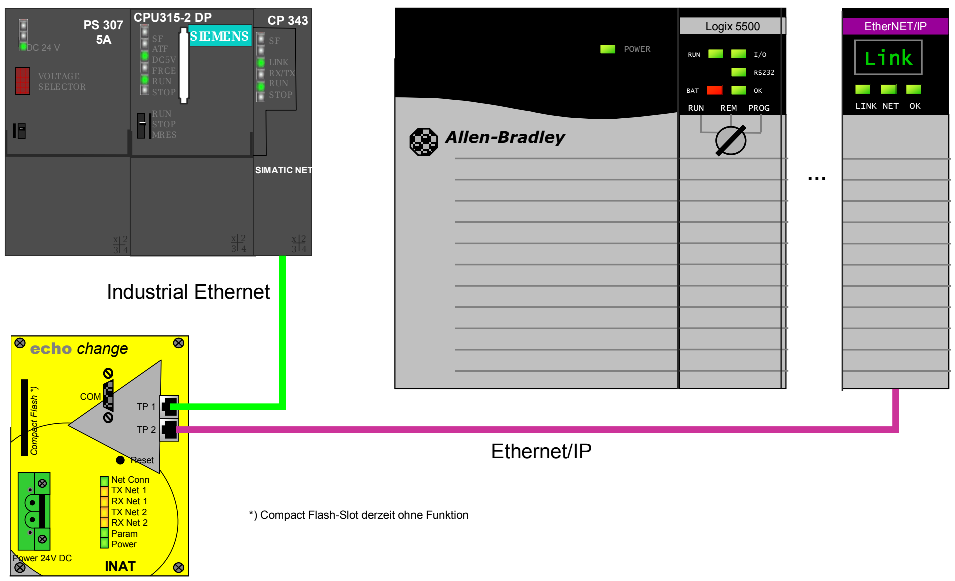
A second network branch consists of a ControlLogix CPU accessing an EtherNet/IP network by means of an EtherNet/IP communications bridge.

Both CPUs are able to communicate on their respective branches with further nodes (CPUs or I/O devices).

The connection between the two subnetworks is established by means of an "Echochange" gateway compiling the two protocols in use by adapting the datagram headers.

In the present application example, this connection is used to exchange **data blocks or variable arrays** between the two controllers. Thus, it is possible to write directly into memory areas of the partner CPU.

Figure 2-1: Exemplary hardware setup for using an "Echochange" gateway



Setup

An "Echochange" gateway is inserted between the two subnetworks. The gateway is equipped with two Ethernet interfaces which are freely configurable.

The configuration of the "Echochange" gateway itself can be made via one of the Ethernet interfaces or via a third serial RS 232 interface at the device.

The connection parameters (protocol, addresses etc.) of the "Echochange" gateway can be set by means of the configuration software.

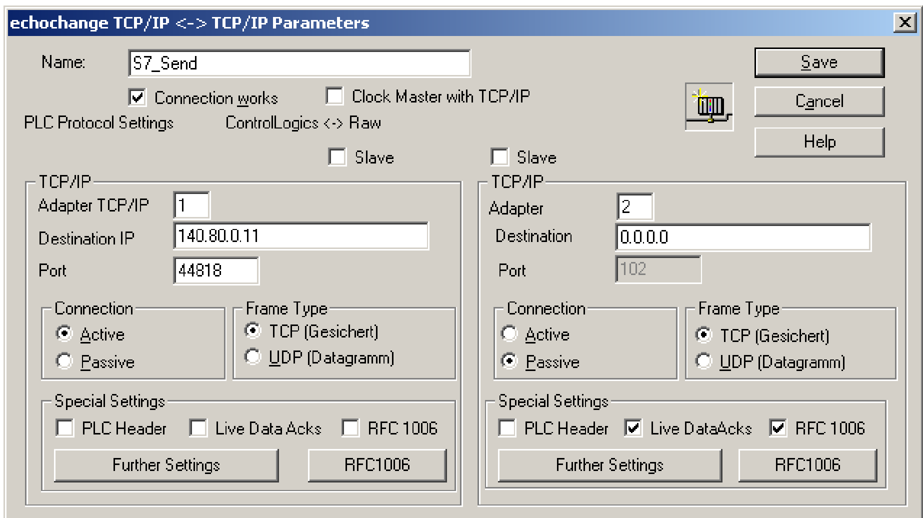
2.2 Description of the Core Functionality

If the example configuration is used as described here, a cyclic data exchange between the two CPUs takes place.

Overview and description of the user interface

For configuring the "Echochange" gateway, a proprietary configuration software is enclosed in the delivery.

Figure 2-2: Dialog of the configuration software for the "Echochange" gateway



The CPUs (SIMATIC or ControlLogix) are configured by means of the usual software packages (SIMATIC Manager or RSLogix).

Process sequence of the core functionality

The "Echochange" gateway can be used for various cross-network services.

If the example configuration "TCP/IP Coupling between an Allen-Bradley ControlLogix CPU and a S7-400 CPU" ("\download\infos\echochange\examples\clx_s7400.pdf" on the INAT Echochange installation CD) enclosed in the scope of delivery of the installation CD is used, the data exchange takes place between a variable or a variable field of the Allen-Bradley controller and a data block of the S7 controller. With their data areas, both controllers write into the area of the respective communication partner.

Table 2-1: Overview of the data areas exchanged in the example configuration

Transmitter	Start address / Range	Receiver	Target address
ControlLogix	Data word 0 10 words (INT) "INT_ARRAY“	S7-300	DB5, DW2
S7-300	DB6, byte 12 16 bytes	ControlLogix	"INT_ARRAY“

Advantages of this solution

Using the "Echochange" gateway as gateway between the two network sections offers the following major advantages:

- low hardware and wiring effort,
- manageable configuration effort,
- high-performance, robust and flexible connection.

2.3 Required Hardware and Software Components

Note In the following tables, components which are not offered by Siemens are grayed. For procurement of these components, the indicated distribution sources are responsible (also see page 13).

Hardware components

Table 2-2: Required hardware components

Component	No.	MLFB / Order number	Note
SIMATIC Field PG M Standard	1	6ES7712-0AA0.-0XXX	or comparable PC with MPI interface
PS 307 power supply	1	6ES7307-1BA00-0AA0	or comparable power source
SIMATIC S7-300 CPU 315-2DP	1	6ES7315-2AG10-0AB0	or S7-400
Ethernet communications processor CP343-1 Lean	1	6GK7343-1EX20-0XE0	or comparable module
Power supply	1	1756-PA72/B	Procurement via 1
ControlLogix 5500 CPU	1	1756-L1M2	Procurement via 1
1756-ENET EtherNet/IP interface	1	1756-IB16D	Procurement via 1
"Echochange" Ethernet gateway	1	200-6000-01	Procurement via 2

Standard software components

Table 2-3: Required software components

Component	No.	MLFB / Order number	Note
Simatic S7, Step 7 V5.4 (or higher)	1	6ES7810-4CC08-0YA5	
RSLogix 5000 Standard Edition, V13.03 (or higher)	1	9324-RLD300DEE	German version, procurement via 1
Installation and example software for the "Echochange" gateway	1		enclosed in the scope of delivery of the gateway, otherwise procurement via 2

Sources of supply for Germany:

1. **Rockwell Automation** Zweigniederlassung der Rockwell Int'l GmbH
   Düsselbergerstrasse 15
   42781 Gruiten
   Germany
   Phone: +49 2104 9600
   Fax: +49 2104 960 121
   (also see \7\, \8\)
2. **INAT GmbH**
   Ostendstraße 50A
   90482 Nürnberg
   Germany
   Phone: +49 911 544 27-0
   Fax: +49 911 544 27-27
   (also see \5\)

Example files and projects

No prepared projects is enclosed in the delivery of this selection aid.

Please fall back on the configurations on the "Echochange" installation CD.

2.4 Alternative Solutions

The "Echochange" installation CD offers further configuration examples.

Further possibilities of connecting Allen-Bradley controllers to SIMATIC CPUs:

- Using a PROFIBUS scanner made by SST which integrates the CPU as master device into a SIMATIC PROFIBUS installation. See \3\.
- Using an Anybus gateway by means of which a SIMATIC CPU can communicate as master device of a DeviceNet with DeviceNet I/O devices.
  (http://support.automation.siemens.com/WW/view/en/23902276 (starting in fall 2006), starting in fall 2006).

Function Principles and Program Structures

Content

This part discusses the detailed function processes of the involved hardware and software components, the solution structures, and where sensible the concrete implementation of this application.

You only need this part, if you want to learn about the interaction of the solution components.

3 Functional Mechanisms of the "Echochange" Gateway

Here you will find information on …

... how the "Echochange" gateway converts the different protocols.

3.1 Basics of the Gateway Function

The "Echochange" gateway supports the following protocols:

Table 3-1

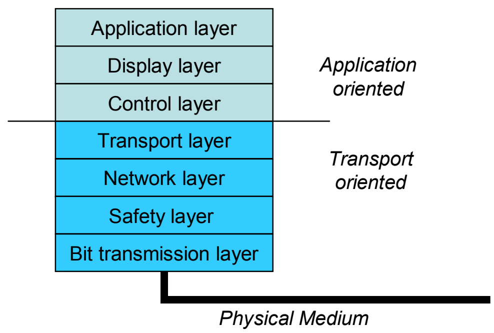
Protocol
TCP
UDP
IP
ISO (H1)
ISO on TCP (RFC 1006)
SPS Header
EtherNet/IP (optional)

The gateway can establish the connection between networks operating several of these protocols.

The OSI reference model ("7 layers")

The OSI reference model provides a structure which serves as standard for the setup of data transmission protocols. During this setup, different protocol functions (transmission of individual bits, integrity check of entire messages, consistency check of a data session etc.) are allocated to several protocol layers.

Figure 3-1

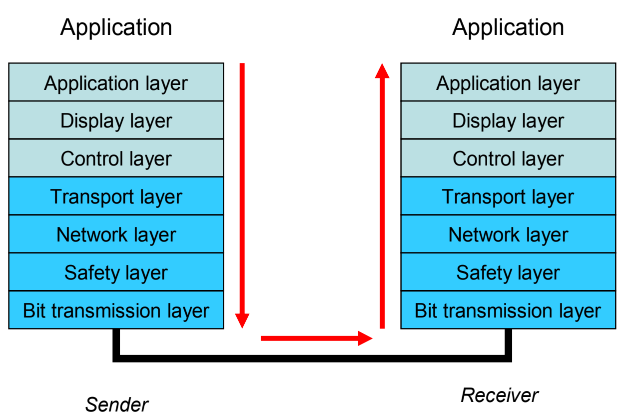


The "bottom" layers of the OSI model take over the most primitive tasks (voltage level, timing of the bit-by-bit data transmission). The higher the layer, the more complex are the tasks.

Data transmission by means of the layer model

By the "top" application, the data are handed over to the physical level step by step, are transmitted and are reassembled at the receiver.

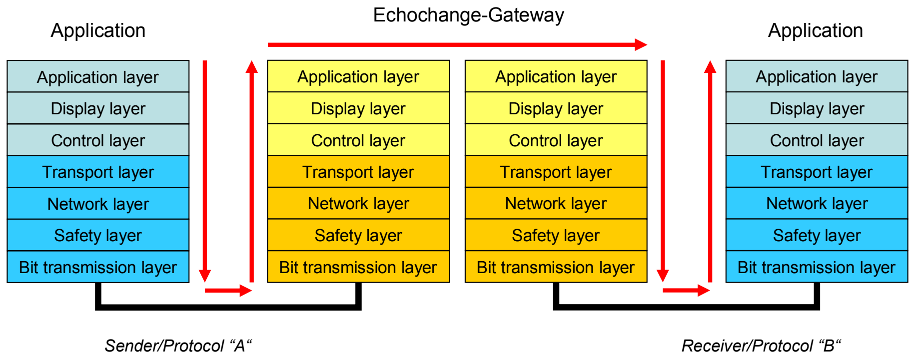
Figure 3-2



"Echochange" as gateway between different protocols

If there are different protocols between transmitter and receiver, the "Echochange" gateway acts as a mediator by receiving the message of the transmitter, by splitting it according to the rules of the transmitter protocol and by then forwarding it:

Figure 3-3



For this purpose, the "Echochange" gateway is provided not only with a serial configuration interface, but also with two Ethernet interfaces "TP1" and "TP2" which are connected to the respective networks under the transmitter or receiver protocol.

3.2 Protocol Variants "RFC 1006" (SIMATIC) and "EtherNet/IP" (Allen-Bradley)

Industrial Ethernet

"Industrial Ethernet" is used as a general term combining several technologies of the SIMATIC environment which allow the use of Ethernet in the industrial environment.

This not only comprises specific connections and devices (switches, hubs etc.), but also protocol adaptations which meet the following requirements of industrial applications:

- high system stability,
- reliable operation even in environments with strong electronic interference,
- guarantee of short communication times,
- high reliability of data transmission

ISO–on–TCP

ISO-on-TCP is a communication protocol which is used within the framework of Industrial Ethernet. Technically, it is a communications connection of the transport layer (level 4 of the communication according to ISO, also see Figure 3-1) which is mapped on TCP.

By means of an ISO-on-TCP connection, messages can be exchanged bidirectionally. TCP provides a data flow communication without blocking the data in messages. In contrast, ISO is message-oriented. With ISO-on-TCP, this mechanism is mapped on TCP. This process is described in

RFC1006 (see below). ISO–on–TCP connections allow program-controlled/ event-controlled communication via Ethernet from SIMATIC S7 to:

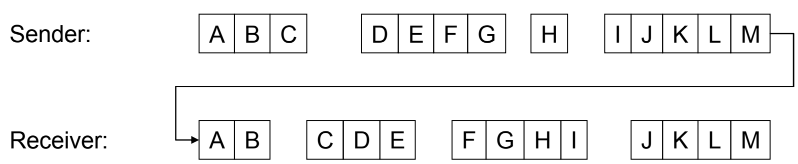
- SIMATIC S7 with Ethernet CP
- SIMATIC S5 with Ethernet CP
- PC/PG with Ethernet CP
- any other system

"RFC 1006"

In principle, TCP is a data flow-oriented protocol. This means that though it is guaranteed that the data are transmitted completely and arrive at the receiver in the same sequence as they were send by the transmitter, it is not guaranteed that the data blocks keep their structure.

In other words: During transport, restructuring of the data, combination or splitting might occur:

Figure 3-4



Expanding the TXP protocol by "RFC 1006" is a possibility of making sure that not only the integrity and sequence, but also the block structure of data transmission is maintained.

This is important for the so-called message-oriented "H1" services by means of which the Siemens PLC communication takes place.

EtherNet/IP

EtherNet/IP is an open industrial network standard using CIP ("Control and Information Protocol") as application protocol. Within the Allen-Bradley environment, CIP is also used for the ControlNet and DeviceNet protocols.

With EtherNet/IP, data are exchanged either via I/O connections ("implicit messages") or via Message Connections ("explicit messages").

3.3 Limitation of Possible Data Types

Currently, the "Echochange" gateway only can exchange data of the type "integer" (two bytes).

4 Function Mechanisms of this Application

Here you will find information on …

... which measures have to be taken for configuring the "Echochange" gateway in order to establish connection between the network parts.

Asymmetric procedure

Due to the protocols in use, the steps to be carried out to use the gateway are not completely symmetric. In particular, no parameterization of the ControlLogix CPU has to be performed if this CPU is used as receiver (see chapter 4.2). In this case, the gateway directly writes into the address of the respective variables of the Allen-Bradley CPU.

Note

Refer to chapter 6 for details on the configuration.
You will find detailed background information on the settings to be done in the "Echochange" User Manual, manual version 0304-001 (German, "\download\handbuch\echan_d.pdf" on the INAT Echochange installation CD) and under "TCP/IP Coupling between an Allen-Bradley ControlLogix CPU and a S7-400 CPU" ("\download\infos\echochange\examples\clx_s7400.pdf" on the INAT Echochange installation CD).

4.1 Functionality "ControlLogix transmits, SIMATIC receives"

See also chapter 6.1.

The following steps have to be performed to allow a communication from the ControlLogix to the S7 device:

- The ControlLogix device has to transmit the respective data via a "CIP MSG" command.
- The "Echochange" gateway receives the data, converts them and forwards them to the S7 CPU.
- By means of an "AG_RECV“ block, the S7-300 CPU receives the data which are transmitted via the connection established by means of the gateway.

4.2 Functionality "SIMATIC transmits, ControlLogix receives"

See also chapter 6.2.

The communication from the S7 to the ControlLogix CPU is established as follows:

- By means of an "AG_SEND“ block, the S7-300 transmits the relevant data to the "Echochange" gateway.

- The gateway directly forwards the data to the ControlLogix CPU.

In this case, no specific configuration of the ControlLogix CPU is required. Instead, the "Echochange" gateway is informed directly on the question into which controller tags the data of the S7 CPU have to be written.

Structure, Configuration and Operation of the Application

Content

This part leads you step by step through the structure, important configuration steps, commissioning and operation of the application.

5 Installation and Commissioning

Here you will find information on …

the hardware and software to be installed, and the steps necessary for commissioning the example.

5.1 Installation of Hardware and Software

This chapter describes the hardware and software components to be installed. The description and manuals as well as delivery information contained in the delivery scope of the respective products, should be followed in any case.

Installation of the hardware

The hardware components are listed in chapter 2.3. For the hardware setup, proceed according to the table below:

Table 5-1

No.	Instructions
1.	Install the components of the SIMATIC rack next to each other onto the top hat rail, connect the modules by means of bus connectors on the rear and ensure the power supply of the stations.
2.	Insert the Allen-Bradley components into the rack. Please observe correct allocation of the slots!
3.	Ensure power supply of the "Echochange" module and connect the two Ethernet interfaces "TP 1" and "TP 2" to the respective interfaces at the CP 343 or 1756-ENET by means of crossed Ethernet cables.
4.	Connect your programming device to the configuration interface "COM" of the "Echochange" gateway by means of a serial null modem cable.

Note The setup guidelines of the components must be generally adhered to.

Installation of the standard software

After having installed the hardware, prepare the configuration software for use:

Table 5-2

No.	Instructions
1.	Install the *SIMATIC Step 7 Manager*.
2.	Install the *RSLogix 5000* configuration software for ControlLogix controllers.
3.	Install the communications software *RSLinx* required for the *RSLogix* function.
4.	Install the INAT programming software for the "Echochange" module.

Note Always observe the installation manuals of the respective software packages and follow the instructions contained.

6 Configuration

Here you will find information on …

... how to ensure a runnable configuration with the "Echochange" gateway.

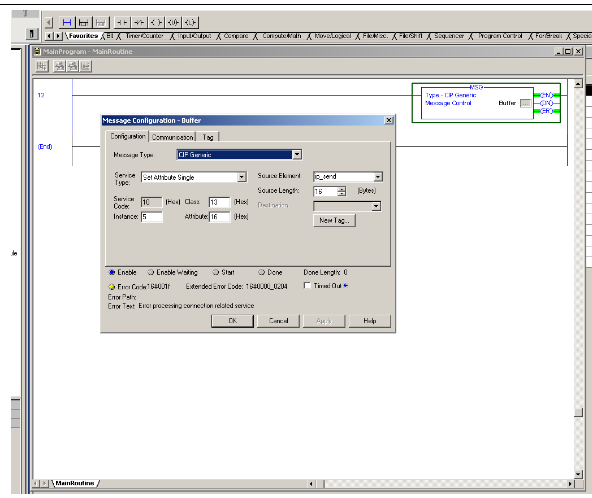
Note Unlike indicated under "TCP/IP Coupling between an Allen-Bradley ControlLogix CPU and a S7-400 CPU" ("\download\infos\echochange\examples\clx_s7400.pdf" on the INAT Echochange installation CD), a S7-300 CPU is used in our application (compared to the use of a S7-400 CPU in the original case). Nevertheless, this does not cause any major differences, as the configuration of all components is run identically.

Note The following tables only show the basic steps which are necessary to establish communication between the two CPUs. Always follow the step-by-step instructions of the INAT installation CD ("TCP/IP Coupling between an Allen-Bradley ControlLogix CPU and a S7-400 CPU" ("\download\infos\echochange\examples\clx_s7400.pdf" on the INAT Echochange installation CD)) which gives you detailed and precise information and which may also consider future modifications of the "Echochange" gateway.

6.1 Communication from the ControlLogix CPU to the S7-300 CPU

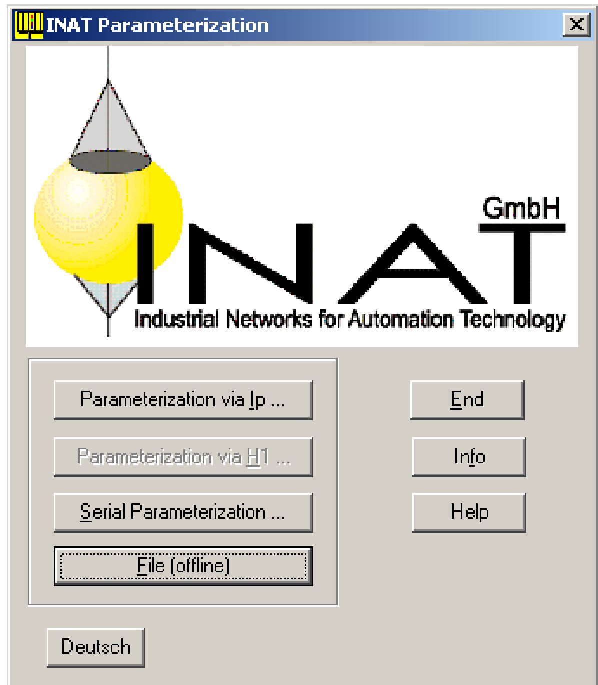
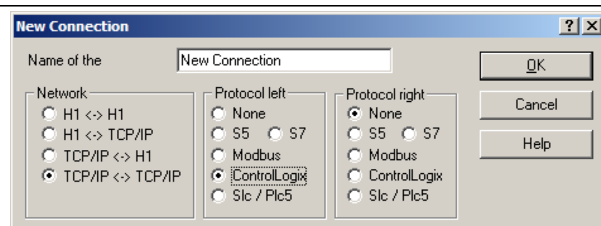
Configuring the ControlLogix CPU

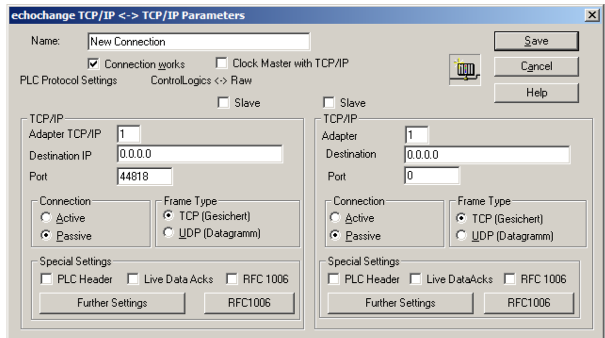
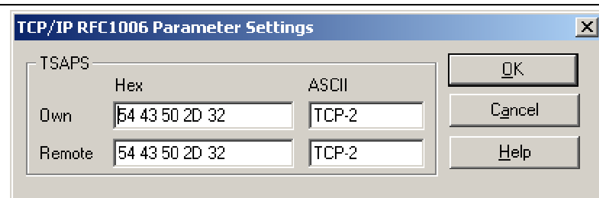
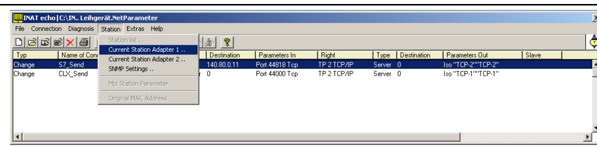
Table 6-1

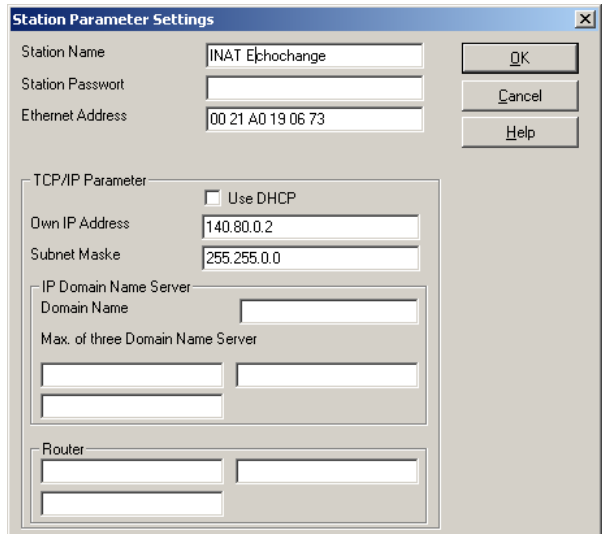
No.	Instructions	Note
1.	Start the RSLogix configuration software. Create the variables as controller tag the values of which shall be transmitted to the S7-300 CPU. *The variables can be individual tags or fields. Currently, only the "INT" type is supported.*	
2.	When configuring the CPU, make sure by means of a "`CIP MSG`“ command which is executed regularly that communication with the gateway is maintained. In this dialog "`Source Element`“ designates the controller tag the values of which thus shall be transmitted.	
3.	When configuring the ControlLogix CPU, observe that there are *two* different IP addresses for its communication partners, namely: • "Echochange" port • S7-300 These partners are configured separately.	
4.	Please configure the Ethernet access for the 1756 ENET module and assign an IP address to it.	
5.	Save the configuration and transmit it to your device.	

Configuring the "Echochange" gateway

Table 6-2

No.	Instructions	Note
1.	Start the INAT configuration software and create a new connection (either via "Parameterization..." or in a file without direct connection to the gateway).	
2.	During configuration, generally observe that the configuration software might use different designations for the interfaces "`TP 1`" and "`TP 2`", such as "`left`" and "`right`" (see figure on the right) or "`Adapter` 1" and "`Adapter` 2" (see figure below).	

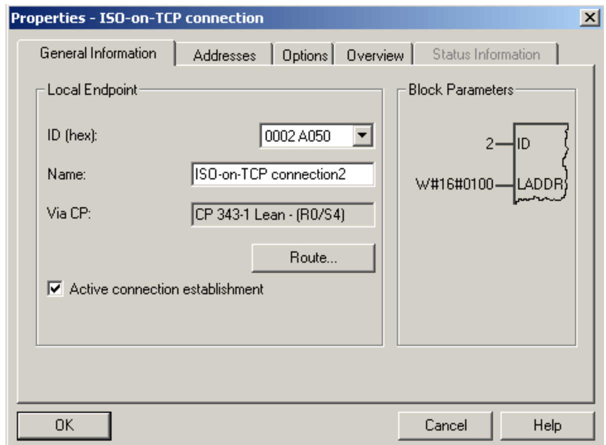
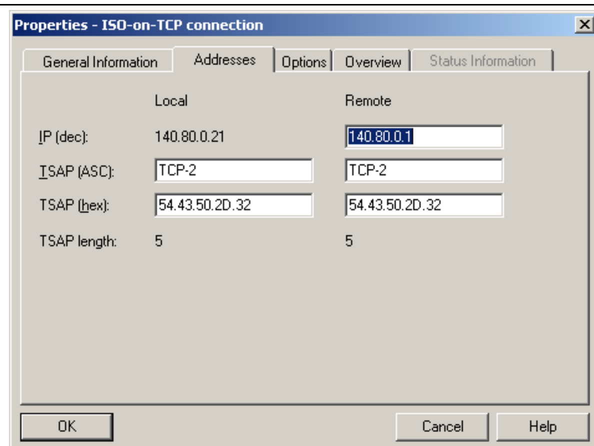
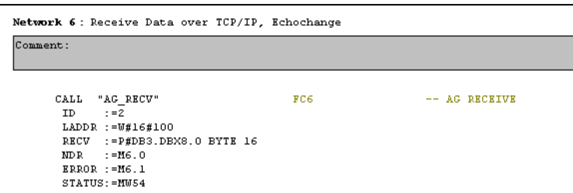
<table>
<tr><th>No.</th><th>Instructions</th><th>Note</th></tr>
<tr><td>3.</td><td>When following the parameterizing instructions of the INAT manual, observe that a total of 4 IP addresses has to be parameterized, namely the two addresses of the IP interfaces of the "Echochange" gateway as well as the addresses of the ControlLogix and S7-300 CPUs (or of the respective CP). The two addresses mentioned last are defined in the dialog on the right. For passive connection setup, the address "<code>0.0.0.0</code>" can be used.
For the connection to the S7-300 CPU, select "<code>RFC 1006</code>" as specific setting.</td><td>
</td></tr>
<tr><td>4.</td><td>In the specific RFC 1006 parameters, choose a connection name which you will use as well for the SIMATIC configuration.</td><td>
</td></tr>
<tr><td>5.</td><td>By means of the main menu command "<code>Station → Current Station Adapter 1/2</code>", you can define the IP addresses of the two Ethernet interfaces of the gateway.</td><td></td></tr>
</table>

No.	Instructions	Note
6.	The dialog which opens allows setting further parameters of the interface.	
7.	Follow the other configuration steps according to the INAT manual and to the application example and save your configuration on the "Echochange" gateway.	

Configuring the S7-300 CPU

Table 6-3

No.	Instructions	Note
1.	Start the SIMATIC Manager with the corresponding configuration. Create a new connection in the network configuration (NetPro).	
2.	The connection is "unspecified". As connection type, select "`ISO-on-TCP`". (In principle, you can also select other alternatives.)	

<table>
<tr><th>No.</th><th>Instructions</th><th>Note</th></tr>
<tr><td>3.</td><td>Write down the "<code>Block Parameters</code>". In step 5, the values for "<code>ID</code>" and "<code>LADDR</code>" have to be entered when calling the "<code>AG_RECV</code>" block!</td><td>
</td></tr>
<tr><td>4.</td><td>The "<code>Remote</code>" IP address is the address of the "Echochange" gateway, not that of the CLX CPU!
Please use the same connection name ("<code>TSAP</code>", "Transport Service Access Point") as for the INAT configuration.</td><td>
</td></tr>
<tr><td>5.</td><td>When configuring the CPU, insert a network in which a "<code>AG_RECV</code>" block is called. The connection data which you have created in the network configuration have to be transmitted to this block. Moreover, a data area has to be specified which can take the data transmitted by the ControlLogix CPU.</td><td>
</td></tr>
<tr><td>6.</td><td>To conclude, save and transfer your project to the SIMATIC CPU.</td><td></td></tr>
</table>

6.2 Communication from the S7-300 CPU to the ControlLogix CPU

Note Please observe that for this functionality no connection has to be configured in the Allen-Bradley ControlLogix controller. The "Echochange" gateway can write onto the tags directly. Also see chapter 4.2.

Configuring the S7-300 CPU

Table 6-4

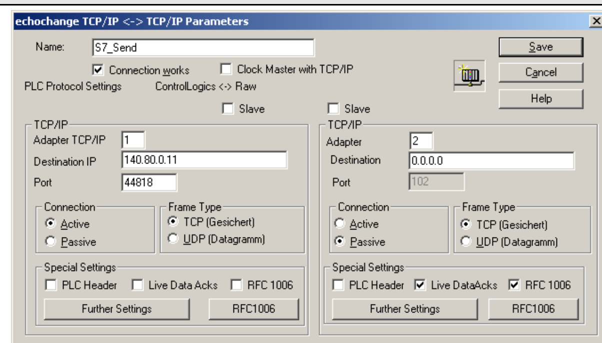
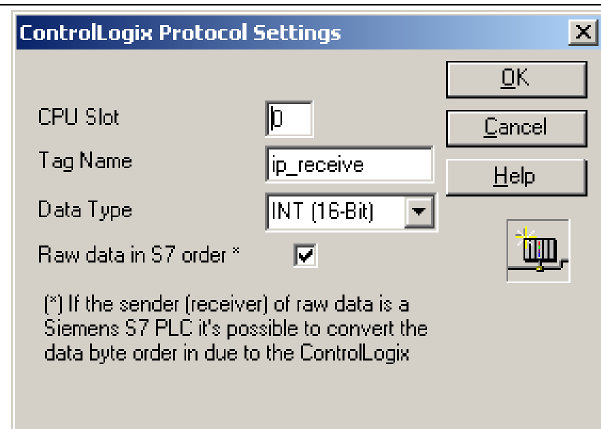
No.	Instructions	Note
1.	Start the SIMATIC Manager and define an Ethernet connection following the same steps as performed under Table 6-3. The parameterization must correspond to the configuration of the "Echochange" gateway (see Table 6-5).	

2.	Insert a network into the configuration of the SIMATIC CPU which regularly calls the "`AG_SEND`" block and thus initiates the data transmission.
	The block has to be filled with the data of the newly created network configuration as well as with the data area to be transmitted.
		Network 5 : Send Data over TCP/IP and Echochange
		Comment:
		`CALL "AG_SEND"` `FC5` `-- AG SEND`
		`ACT :=M100.0`
		`ID :=1`
		`LADDR :=W#16#100`
		`SEND :=DB3.DB_VAR` `P#DB3.DBX0.0` `-- Block of data which will be written to the CLX CPU`
		`LEN :=16`
		`DONE :=M50.0`
		`ERROR :=M50.1`
		`STATUS:=MW52`

3.	Save and transfer your project to the SIMATIC CPU.	

Configuring the "Echochange" gateway

Table 6-5

No.	Instructions	Note
1.	In the INAT parameterizing software, basically repeat the configuration described under Table 6-2. Unlike the other configuration, here the interface communicating with the ControlLogix CPU has to be "active" and its IP address has to be entered.	
2.	Select in the protocol definition a controller tag "`Tag Name`" which has been created in the ControlLogix CPU. Without any further configuration of the ControlLogix CPU, the transmitted data are written into this variable. Please make sure that the tag ("`ip_receive`" in the example on the right) is configured in time and that enough memory space is reserved to take the transmitted data. Please observe that currently only "`INT`" variables can be transmitted.	
3.	After having saved the configuration, transfer it to the "Echochange" gateway.	

Appendix and Bibliography

7 Bibliography

7.1 Bibliographic References

This list is by no means exhaustive and only gives a selection of appropriate sources.

Table 7-1: Bibliography

	Topic	Title
/1/	STEP7	Automatisieren mit STEP7 in AWL und SCL *[Automation with STEP7 in STL and SCL]* Hans Berger published by: Publicis MCD Verlag ISBN 3-89578-113-4
/2/	"Echochange" basics	"Echochange" User Manual, manual version 0304-001 (German, "\download\handbuch\echan_d.pdf" on the INAT Echochange installation CD)
/3/	"Echochange" application example S7-400	"TCP/IP Coupling between an Allen-Bradley ControlLogix CPU and a S7-400 CPU" ("\download\infos\echochange\examples\clx_s7400.pdf" on the INAT Echochange installation CD)

7.2 Internet Links

This list is by no means exhaustive and only gives a selection of appropriate websites.

Table 7-2: Web addresses

	Topic	Title
\1\	Reference to this documentation	http://support.automation.siemens.com/WW/view/en/23901499
\2\	Siemens A&D Customer Support	http://www.ad.siemens.de/support
\3\	Entry in the automation portal "Allen-Bradley Communication with PROFIBUS Scanners"	http://support.automation.siemens.com/WW/view/en/23809864
\4\	Entry in the automation portal "Allen-Bradley Communication with Anybus Gateway"	http://support.automation.siemens.com/WW/view/en/23902276 (starting in fall 2006)

	Topic	Title
\5\	Website of INAT GmbH (manufacturer of the "Echochange" gateway)	http://www.inat.de/
\6\	"Echochange" product description	http://www.inat.de/index.php?255&backPID=255&tt_products=268
\7\	"Allen-Bradley" website	http://www.ab.com
\8\	"Rockwell Automation" website	http://www.rockwellautomation.com