

# Automation Studio Online Communication

## TM211



Perfection in Automation  
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### Prerequisites

Training modules: TM210 – Automation Studio Basis

Software: Automation Studio 3.0

Hardware: None

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### 1. INTRODUCTION

All the programming and diagnostics services of Automation Studio run on a single PC. It is therefore necessary to create a connection from the PC to the controller.

The use of a wide range of transfer media allows us to use existing connections and wiring, which results in more flexible diagnostics. Remote maintenance is an important concept these days.



Fig. 1 Communication

This training module covers the various online connections that are possible. It goes on to describe the configuration of a connection using various media. Possibilities for remote maintenance are also discussed.

## 1.1 Objectives

The course participant will learn how to construct various online connections using a range of media.

The course participant will understand the importance of the routing mechanism.

The course participant will learn about the benefits of remote maintenance.

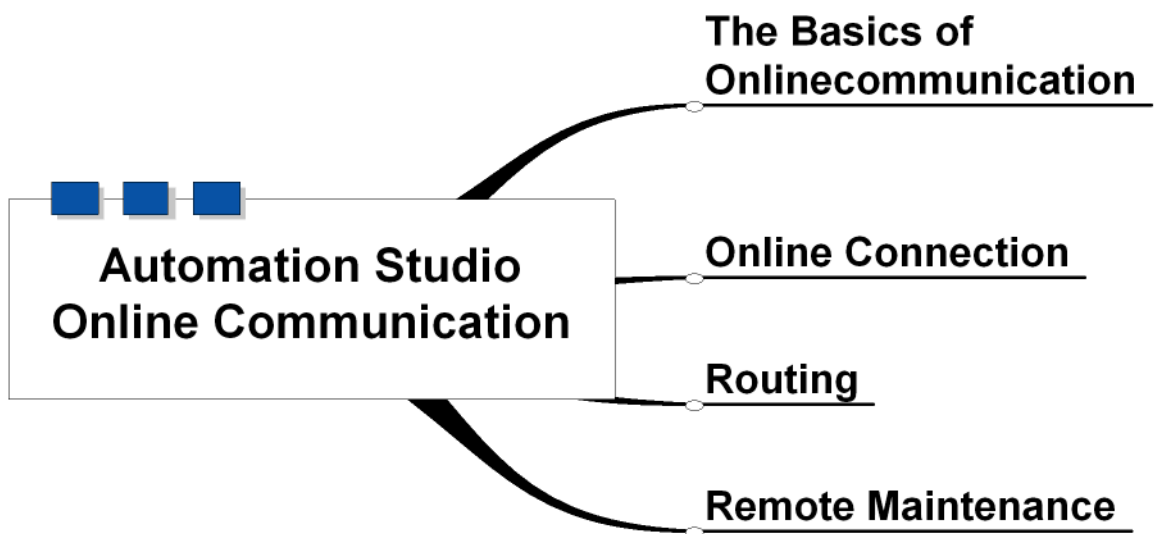


Fig. 2 Overview

### 2. THE BASICS OF ONLINE COMMUNICATION

The Process Visualization Interface (PVI) is the foundation of communication between PC and controller.

All applications that receive data from the controller, including Automation Studio, are connected to it through the PVI.

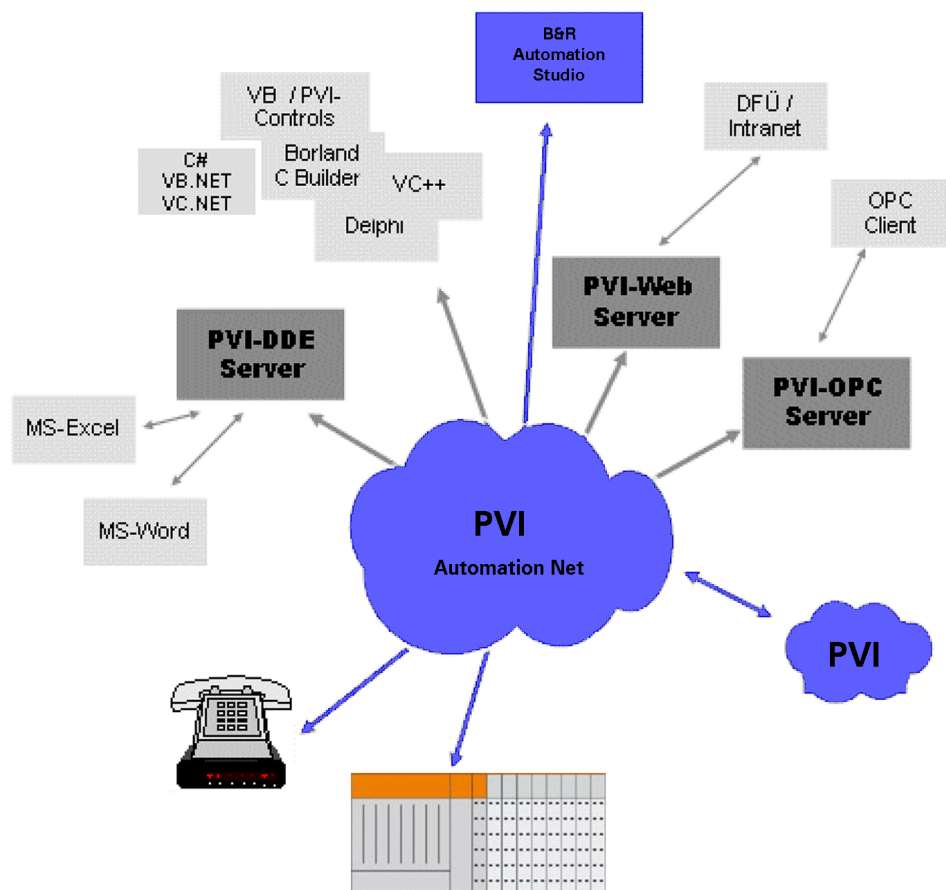


Fig. 3 Basics of online communication

The following chapters deal mainly with the connection between Automation Studio and the controller. Other connections will be described in later modules.

### 3. ONLINE CONNECTION

In order to build an online connection from the Automation Studio to the controller, there are settings on both ends that must be configured. Not all of the controller's interfaces are pre-configured as online interfaces. They can also be used for third-party connections with devices from other manufacturers. In addition, different hardware will require different settings when building the connection.

If an interface on the controller is to be used for a direct online connection with a particular PC, that PC must have an interface of the same physical type (and it must be correctly configured).

Regardless of the transfer media used, the connection between PC and controller is based on a uniform communication protocol. This is B&R's own INA (Industrial Network Architecture) protocol.

#### 3.1 System configuration

It is necessary to activate the online function for the interface in the Automation Studio project.

Since the configuration varies depending on the type of interface, each one is handled individually in the following section.

**Note:**

In order for the changes you make to be transferred to the target system, the configuration must be sent to the target system. You will automatically be prompted by Automation Studio™ to **restart** the target system. This is absolutely necessary. Keep in mind the consequences of restarting your target system.

The first interface of a system, labeled IF1, can be used as an online interface with no special configuration.

### 3.1.1 Ethernet

The following settings will activate the Ethernet interface for INA communication.

Select **Open IFx Ethernet Configuration** from the **shortcut menu**.

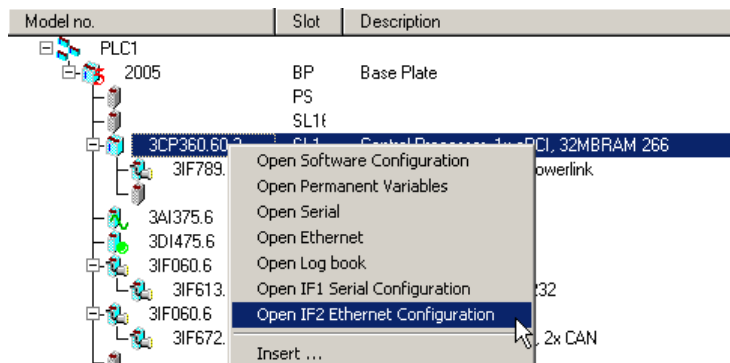


Fig. 4 Opening the Ethernet configuration

The following appears:

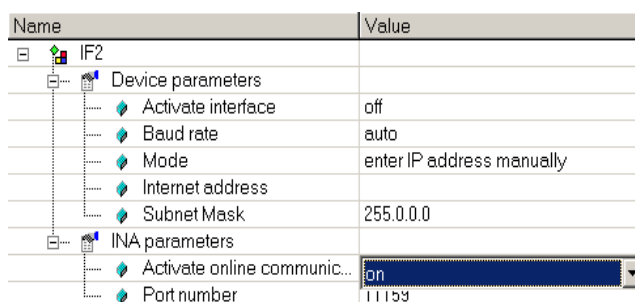


Fig. 5 Ethernet configuration

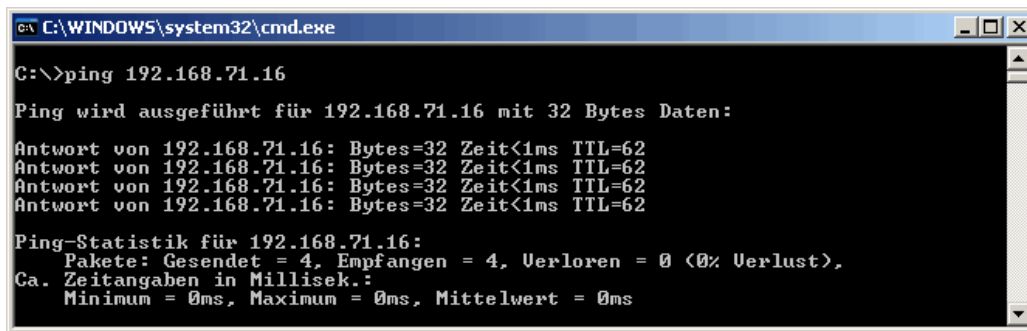
**Activate the INA communication** to use Ethernet as online interface.

At the very least, an IP address and a subnet mask must then be set.

#### Note:

You can obtain the necessary values for your IP address, subnet mask, default gateway and broadcast address from your network or system administrator.

The default port number for an INA connection is 11159. To test the Ethernet connection to the controller, run the command **ping** xx.xx.xx.xx (IP address of the controller) in the Windows command line. The command line can be found in the start menu under **Programs - Accessories - Command prompt**.



```
C:\WINDOWS\system32\cmd.exe

C:\>ping 192.168.71.16

Ping wird ausgeführt für 192.168.71.16 mit 32 Bytes Daten:

Antwort von 192.168.71.16: Bytes=32 Zeit<1ms TTL=62
Antwort von 192.168.71.16: Bytes=32 Zeit<1ms TTL=62
Antwort von 192.168.71.16: Bytes=32 Zeit<1ms TTL=62
Antwort von 192.168.71.16: Bytes=32 Zeit<1ms TTL=62

Ping-Statistik für 192.168.71.16:
    Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0 (0% Verlust),
    Ca. Zeitangaben in Millisek.:
        Minimum = 0ms, Maximum = 0ms, Mittelwert = 0ms
```

Fig. 6 Testing the Ethernet connection

### 3.1.2 Serial

Every Automation Target has a serial onboard interface that is always configured as an online interface.

The rest of the serial interfaces can be configured as follows.

Select **Open IFx Serial Configuration** from the **shortcut menu**.

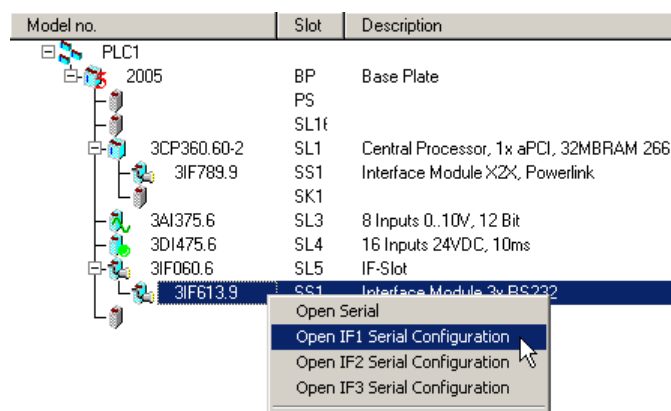


Fig. 7 Opening the interface properties

The right section of the window should now look like the figure below. The settings for the interface can be changed here.

Name	Value
SL5.SS1.IF1	
Device parameters	
Type	RS232
Baud rate	57,600
Receive idle time	5
Parity	even
Bits per character	8
Stop bits	1
INA parameters	
Activate INA communication (online)	on
INA modem parameters	
Activate modem configuration	off

Fig. 8 Parameters for the serial interface

In addition to **activating the INA communication (Online)** for the online connection, the transfer rate (baudrate) can also be changed.

#### Note:

The information regarding changed interface settings (baud rate, parity) must be stored for other users.

It is best to leave the default settings.

The default parameters are:

baud rate = 57600, data bits = 8, parity = even, stop bits = 1.

### 3.2 Connection settings

The previous sections explained the preparations that must be made on the controller in order to set up a connection through the desired interface. There are also settings to be made on the PC end in order to create a connection.

All online connections can be configured in Automation Studio in the same dialog box.

This dialog box is opened by selecting **Settings** from the **Online** menu.

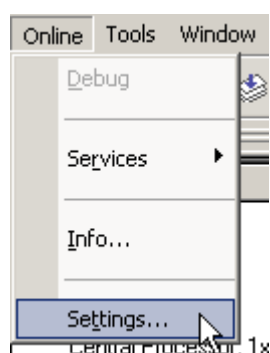


Fig. 9 Opening online settings

The connection settings can be made in the following dialog box:

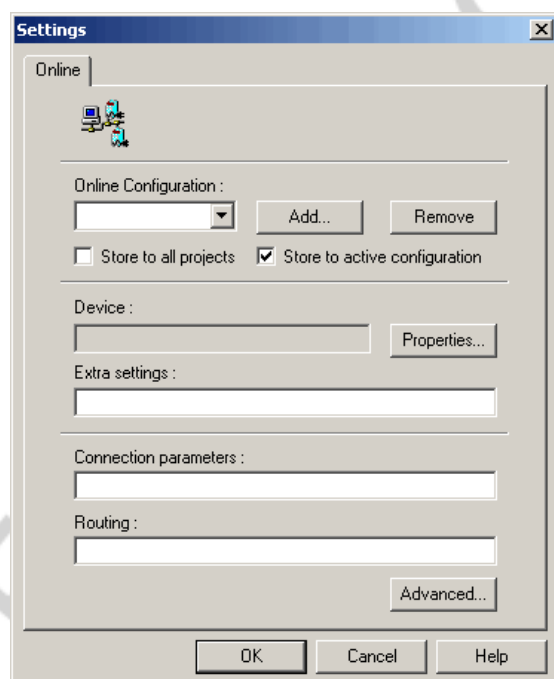


Fig. 10 Online settings

Any number of connection configurations can be saved. Add a new connection by clicking on the **Add...** button.



Fig. 11 Adding a connection

This opens the following window.

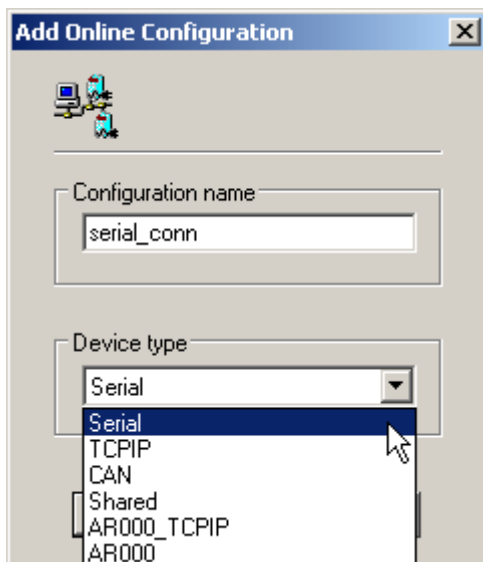


Fig. 12 Naming a new connection

The **device type** can be selected in the following dialog box: Select the device type for which you have already configured an online connection on the controller.

Determine the name under which the configuration will be saved (**configuration name**) and select **OK**.

Activate the selected configuration by clicking again on the OK button in the main dialog box. At the same time, Automation Studio attempts to establish a connection to the target system.

**Note:**

For a description of the device type, press the **F1** key while in the dialog box.

**Note:**

As a default, the system configuration (sysconf) is automatically sent to the USER – ROM. When the USER – ROM is deleted, so is the online configuration. To retain the online connection in this case, the system configuration (sysconf) must be saved in the SYSTEM – ROM. If the PLC is in DIAGNOSTIC mode it is the same.

### 3.2.1 Ethernet

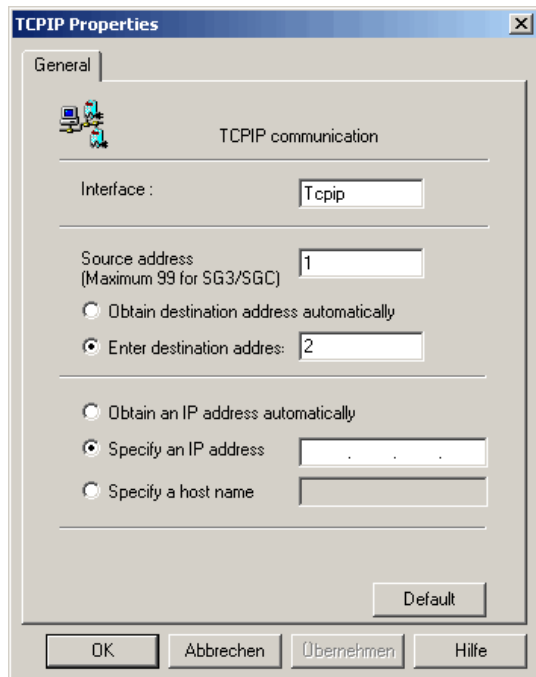


Fig. 13 Ethernet configuration

Settings for the Ethernet connection from the PC to the controller can be made here.

The **Destination address** is the node number of the Ethernet interface on the controller. This is set on the controller using node selection switches, and usually in hexadecimal. In the configuration dialog box, the value must be entered in decimal form. Some of the node selection switches on the target system must be set in hexadecimal. (e.g. \$2C becomes 44).

An Ethernet connection is configured as follows:

- Be sure that the IP address set on your PC that is in the same address range as the IP address of the controller. Your administrator is responsible for determining this value.
- Add an Ethernet configuration as described above, and open its properties.

The options **Obtain an IP address automatically** and **Specify an IP address** can be selected if needed.

When the first option is selected, Automation Studio attempts to establish a connection to a controller with the listed destination address. To do this, a broadcast telegram is sent to the Ethernet, and each destination station replies with its destination address.

When the second option is selected, the IP Address for the destination station is entered as an additional test to be sure that only the controller with the set IP Address and destination address is contacted.

**Note:**

The **Source address** can be selected as desired. This is true as long as no other software or Automation Studio™ session has the same source address, and as long as it is different than the **Destination address**. The Destination address should be unique as well.

### 3.2.2 Serial

A serial connection can be configured after it has been added. Select **Properties** to open the properties dialog box for the chosen configuration.



Fig. 14 Opening the configuration settings

Edit the settings for the active configuration in the following dialog box.

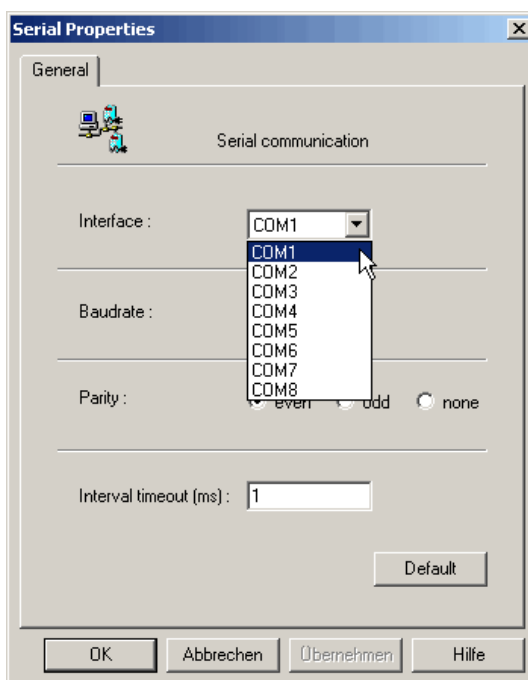


Fig. 15 Configuration settings

The correct interface must be selected in the line **Interface** in order to determine through which of your PC's serial interfaces Automation Studio will establish a connection.

The other settings are standards that apply to all newly delivered target systems.

If something else has been configured on the target system, these settings must also be adjusted.

Save your settings by clicking on **OK**.

The setting **Interval timeout (ms)** is the maximum time between characters in the receive frame.

## 4. ROUTING

Routing is an extension of online connections. In addition to the simple direct connection, it is also possible to communicate through already existing networks.

### 4.1 Principle



Fig. 16 Routing

This figure presents the concept of routing. It is possible to expand an already existing connection, in this example a serial one.

The connection via the selected path remains the same. One can use an additional interface from the target system to leave the current network and establish a connection to a controller in the automation system.

Networks and wiring can be used to establish an online connection to all controllers in this network via, for example, a central connection point.

In order for such a system to work properly, all interfaces on the controllers must be configured as online interfaces.

The following networks can be used for a routing connection:

- Ethernet network
- CAN Network
- Serial point-to-point connections

**Note:**

An RS422 or RS485, just as an RS232 interface, can only be used as a point to point connection for INA communication.

## 5. REMOTE MAINTENANCE

Remote maintenance of control systems is becoming more and more important. With ever-increasing globalization, more and more machines and equipment is being exported.

Infrastructure problems make some places hard to reach, and traveling there costs a lot of money and time.

All programming and diagnostic functions of Automation Studio are completely available for remote maintenance. Program updates, backing up data, and recording can all be done at any time.

Even the routing is possible in conjunction with remote maintenance.

### 5.1 Modem

One way to build an online connection is with a modem connection. A modem is needed for both the controller and the PC. The structure looks like this:



Fig. 17 Modem connection

On the PC end, it suffices if the correct modem driver is installed.

### 5.1.1 System configuration

On the controller end, the following settings must be made.

Name	Value	Description
SL6.SS1.IF1		3IF672.9
Device parameters		
Type	RS232	
Baud rate	57,600	
Receive idle time	5	characters
Parity	even	
Bits per character	8	
Stop bits	1	
INA parameters		
Activate INA communication (online)	off	
INA modem parameters		
Activate modem configuration	on	
Baud rate	57,600	
Receive idle time	255	characters
Parity	None	
Bits per character	8	
Stop bits	1	
Parameter string	ATS0=1	

Fig. 18 Modem configuration

The option **Activate modem configuration** must be activated in the properties dialog box for the interface settings of the desired serial interface. The settings can now be made for the connection from the PLC to the modem. The main settings to be made are the transfer rate and the initialization of the modem. Don't forget to save and transfer!

## 5.1.2 Connection settings

After adding a modem connection, the following parameters can be defined in the properties dialog box under **Online:Settings**.

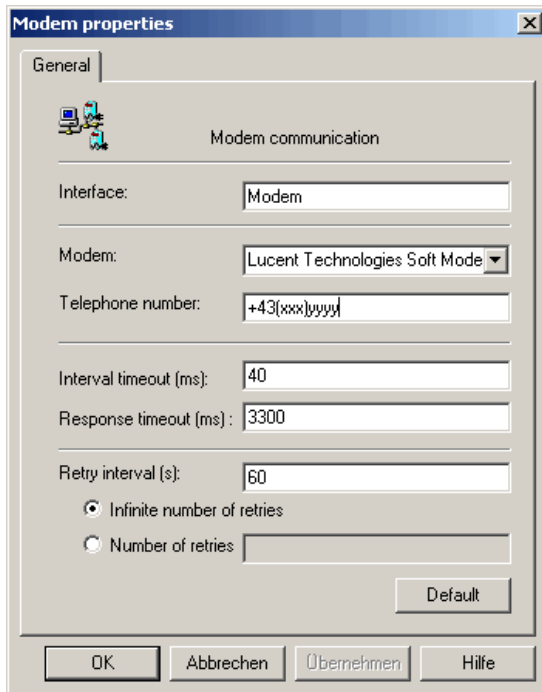


Fig. 19 Online connection via modem

The modems installed on the PC are shown in the **Modem** combination field. You can choose one of them.

The **Telephone number** is also listed.

Depending on the type of modem, a timeout is listed under **Response timeout**. (Since modems send data in blocks, the time between sending of data can fluctuate. The response timeout compensates for this.)

After saving the connection with **OK**, the modem connection is established. This also happens when opening the project (after a query).

### Note:

The data transfer rates and settings that need to be made on the interface will vary depending on the type of modem being used. This information can be found in the operating instructions for the modem.

## 5.2 Internet & dial-up

Internet and dial-up connections can also be used to perform remote maintenance.

The internet connection is available to the user after dialing-up an IP address in another network. This can be used to establish a standard Ethernet connection with Automation Studio.

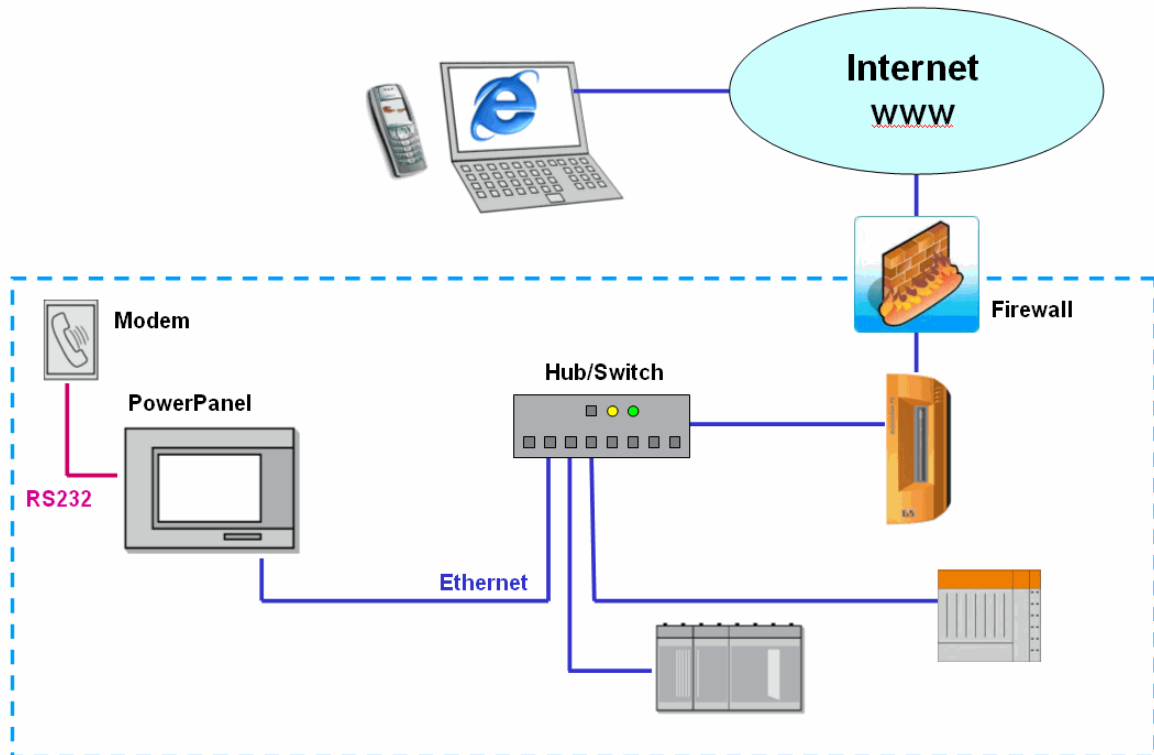


Fig. 20: Internet and dial-up connection

### Note:

Network administrators are responsible for setting up such network connections via internet and dial-up.

An IP address must be entered for the controller. The other network must also be configured so that the remote maintenance computer has access to this one. (router, gateway, firewall, port number, etc.)

### 5.3 Remote PVI

PVI makes it possible to use interfaces from other PCs as online interfaces. An Ethernet connection is established on the PC running Automation Studio to a PC whose interface (e.g. serial interface) is connected to the controller. First, you must enter a port number for the remote PC, which you can get from the network administrator. An online connection can be established to this controller just as if it were connected to the local PC.

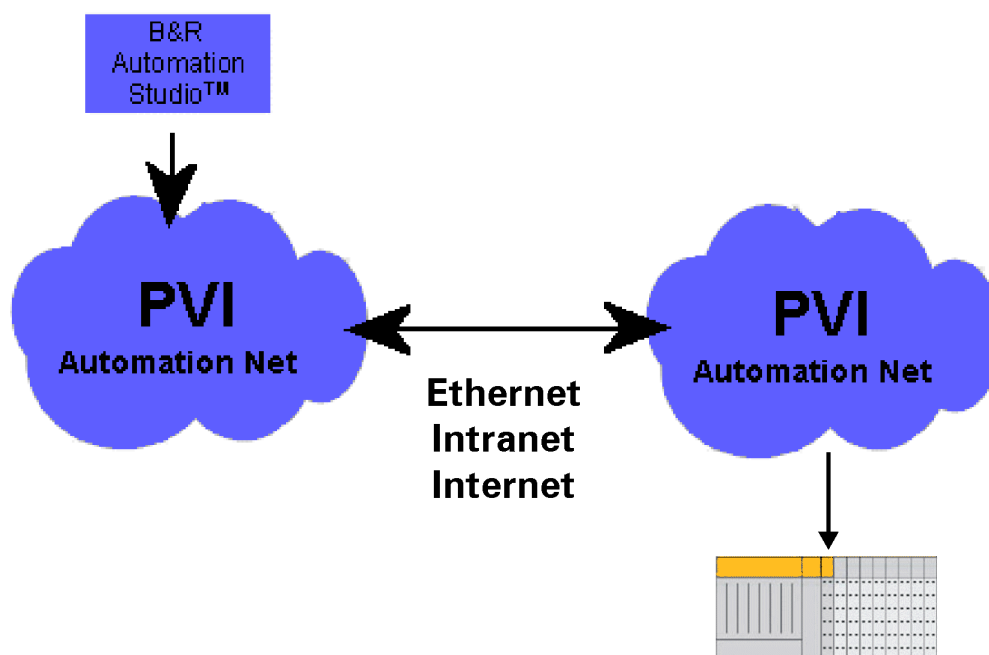


Fig. 21 Schematic of a remote PVI connection

The remote connection must be activated in the PVI manager on the server PC.

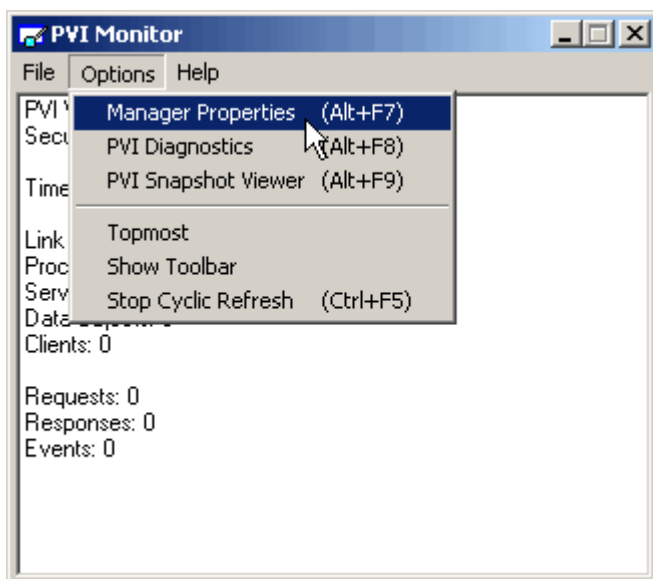


Fig. 22 Opening the settings in the PVI monitor

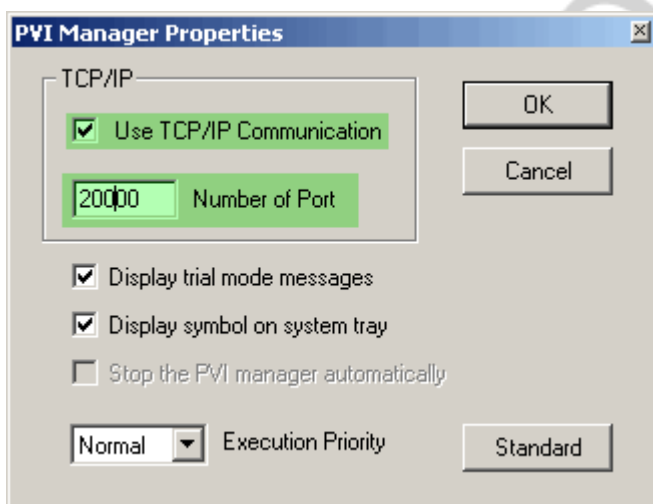


Fig. 23 Activating the TCP/IP connection, assigning the port number

Activate the remote connection by clicking on the checkbox **Use TCP/IP Communication**. Enter the remote port number in the text field **Number of port**.

The PVI manager on the server must be restarted.

A new connection can be added to the remote maintenance computer on which the remote connection is activated.

Add a new connection of the same type that exists between the controller and the server PC. (e.g. serial).

Click on the Advanced button.

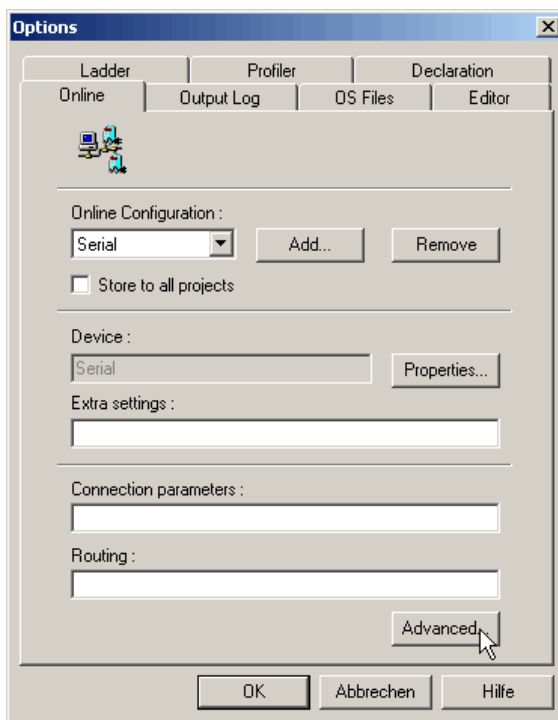


Fig. 24 Opening the advanced settings

This opens the following window.

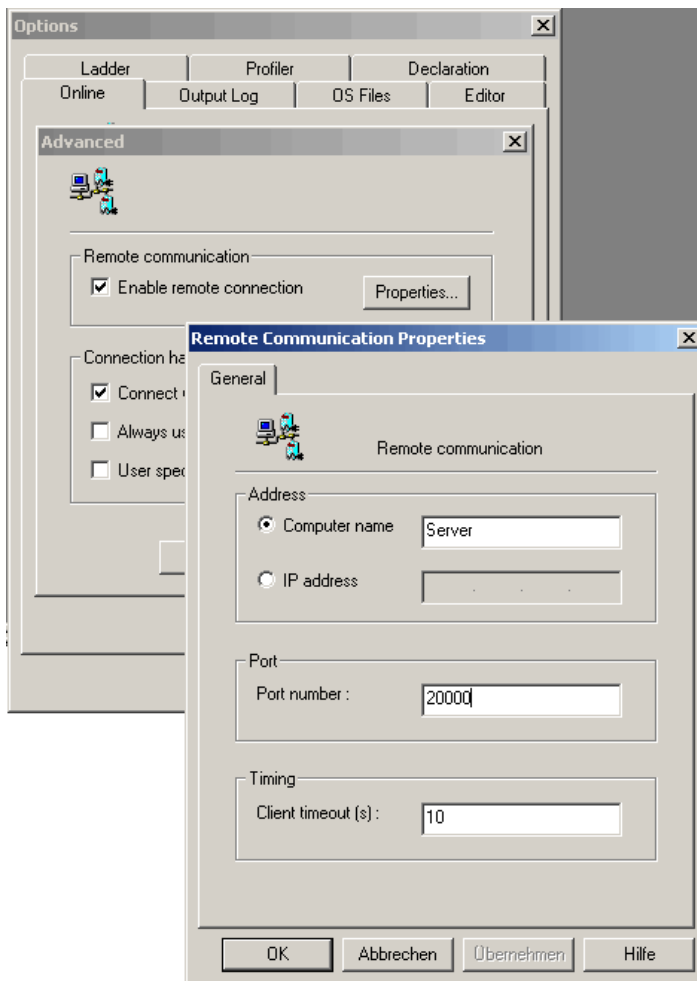


Fig. 25 Configuration of the remote connection

Check the **Enable remote connection** checkbox. Click on the **Properties** button to configure the remote connection.

Enter the **Computer name** of the server PC or use its IP address.

In the text field, enter the **Port number** that you assigned on the server PC for the PVI manager.

Complete the entries by clicking on OK and follow the instructions given by Automation Studio.

Next time it is started, Automation Studio will ask you if you want to activate the remote connection.

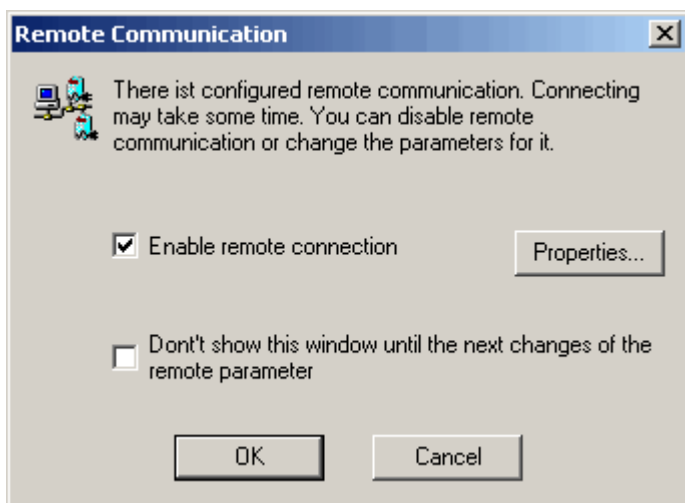


Fig. 26 Starting Automation Studio: Activate remote connection?

## 6. SUMMARY

Flexible connection paths from programming system to controller make online communication and diagnostics flexible.

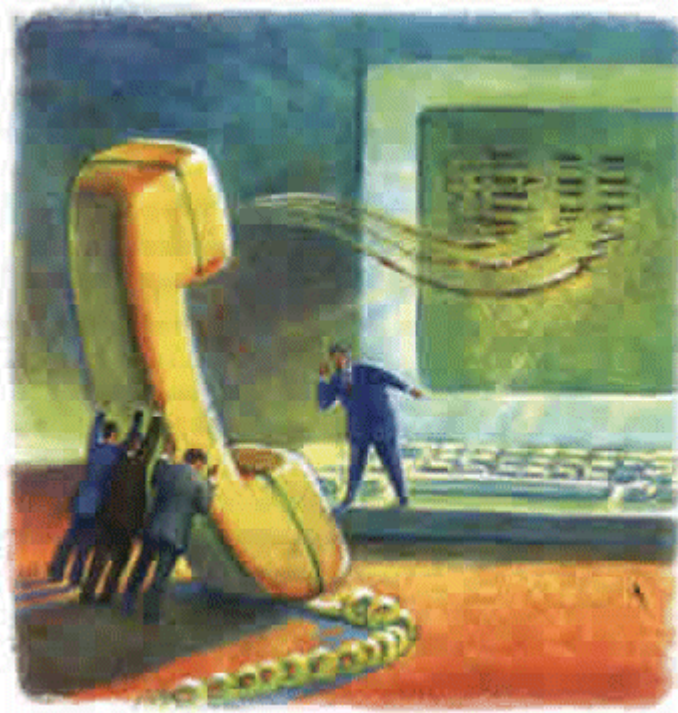


Fig. 27 Communication

Using the routing mechanism, already existing networks can be used in an automation system.

Continuous communication also makes it possible to combine remote maintenance and routing. Be sure to use the correct node numbers and activate each of the interfaces with the online protocol (INA). This can be looked up in the training module.

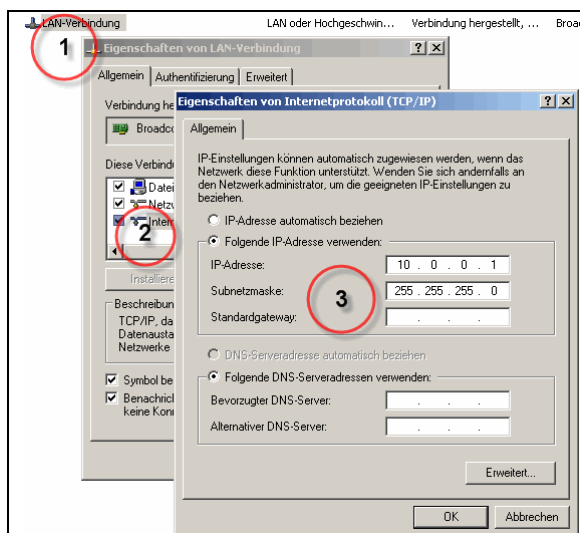
As with all communication, it either works perfectly from the start, or there are some obstacles that must be removed first.

The online help will help you with this. Additional basic knowledge regarding the individual transfer media would also be a great benefit.

## 7. APPENDIX

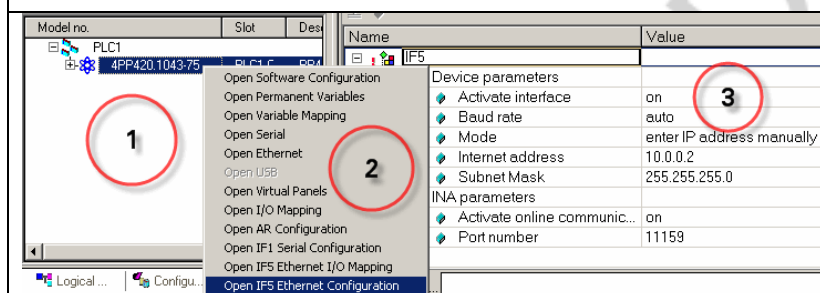
### 7.1 Configuration example for an Ethernet connection

A network connection should be established to the controller. The following settings must be made on the PC and the controller:



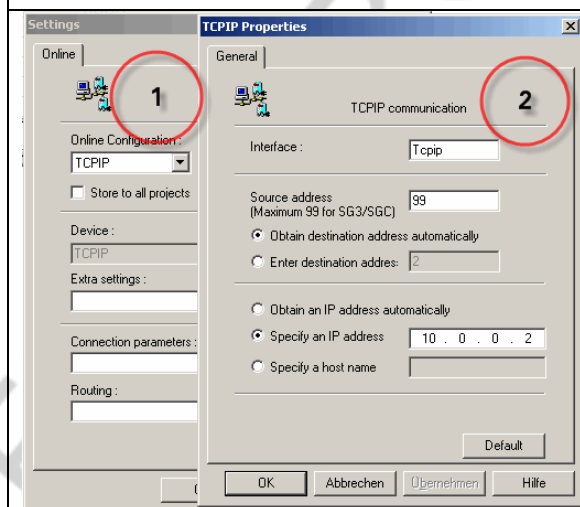
The TCP/IP setting must be made in the Windows Control Panel:

1. Open the Control Panel, select the LAN connection and open the Properties dialog box
2. Open the TCP/IP settings
3. Configure the TCP/IP settings according to the image



Configure the interface settings for the CPU:

1. Select the CPU in the **Physical View**
2. Make a right click on the CPU and select **Open IFx Ethernet Configuration**
3. In the INA tab, select the **Activate INA communication (online)** option

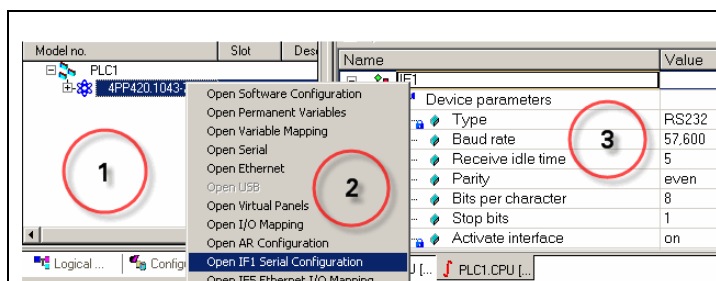


An Ethernet connection can be established in AS after setting up the CompactFlash or transferring the parameters via a serial connection:

1. Open the **Online – Settings** dialog box, and select the existing **TCPIP** connection
2. Configure the properties according to the image

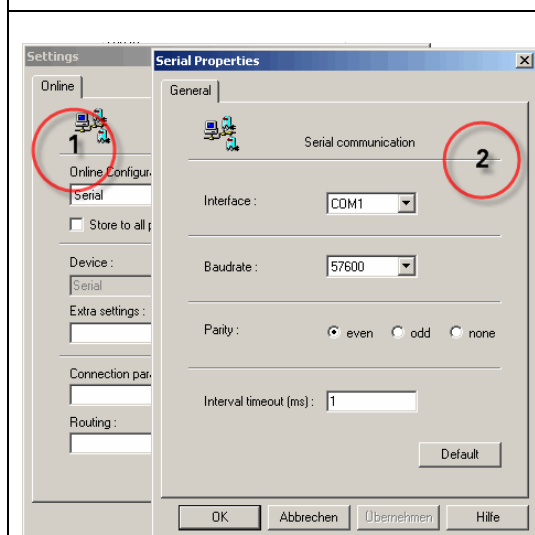
## 7.2 Configuration example for a COM1 connection

An online connection should be established via COM1.  
The serial interface on a CPU is principally configured as the online interface; the following settings are to be made in Automation Studio for all other serial interfaces:



The following serial interface settings must be made:

1. Select the CPU in the **Physical View**
2. Make a right click and select the entry **Open IFx Serial Configuration**
3. Configure the properties according to the image



The online connection can be selected in AS as follows:

1. Open the **Online – Settings** dialog box, and select the existing **Serial** connection
2. Configure the properties according to the image

## Notes

ELECTRONIC DOCUMENT

## Overview of training modules

TM200 – B&R Company Presentation **	TM600 – The Basics of Visualization
TM201 – B&R Product Spectrum **	TM610 – The Basics of ASiV
TM210 – The Basics of Automation Studio	TM630 – Visualization Programming Guide
TM211 – Automation Studio Online Communication	TM640 – ASiV Alarm System
TM212 – Automation Target **	TM650 – ASiV Internationalization
TM213 – Automation Runtime	TM660 – ASiV Remote
TM220 – The Service Technician on the Job	TM670 – ASiV Advanced
TM223 – Automation Studio Diagnostics	
TM230 – Structured Software Generation	TM700 – Automation Net PVI
TM240 – Ladder Diagram (LAD)	TM710 – PVI Communication
TM241 – Function Block Diagram (FBD)	TM711 – PVI DLL Programming
TM246 – Structured Text (ST)	TM712 – PVI Services
TM247 – Automation Basic (AB)	TM730 – PVI OPC
TM248 – ANSI C	
TM250 – Memory Management and Data Storage	TM800 – APROL System Concept
TM260 – Automation Studio Libraries I	TM810 – APROL Setup, Configuration and Recovery
TM261 – Closed Loop Control with LOOPCONR	TM811 – APROL Runtime System
	TM812 – APROL Operator Management
TM400 – The Basics of Motion Control	TM813 – APROL XML Queries and Audit Trail
TM410 – The Basics of ASiM	TM830 – APROL Project Engineering
TM440 – ASiM Basic Functions	TM840 – APROL Parameter Management and Recipes
TM441 – ASiM Multi-Axis Functions	TM850 – APROL Controller Configuration and INA
TM445 – ACOPOS ACP10 Software	TM860 – APROL Library Engineering
TM450 – ACOPOS Control Concept and Adjustment	TM865 – APROL Library Guide Book
TM460 – Starting up Motors	TM870 – APROL Python Programming
	TM890 – The Basics of LINUX
TM500 – The Basics of Integrated Safety Technology	
TM510 – ASiST SafeDESIGNER	

\*\*) see Product Catalog

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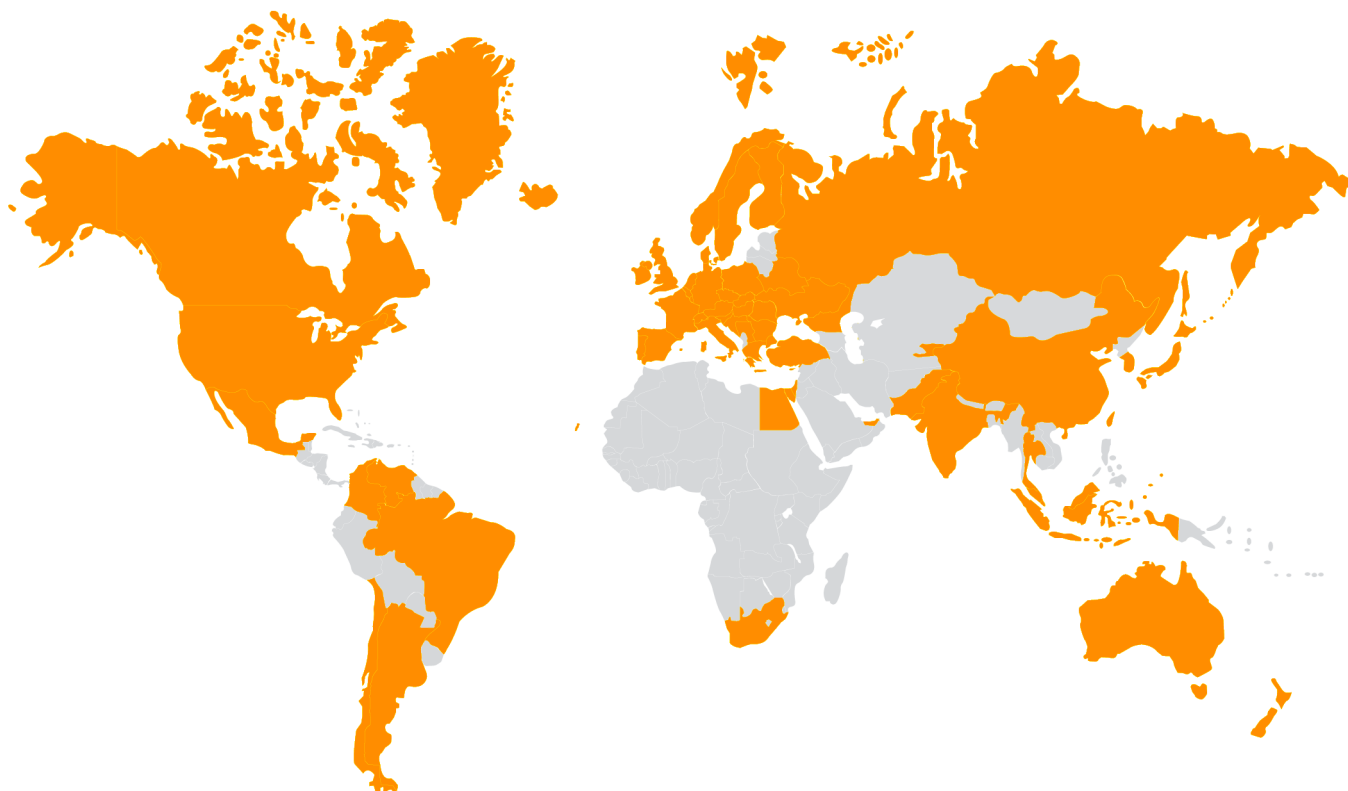
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