

# SINAUT ST7 Telecontrol Configuration in a safe Internet/ GPRS Connection via MSC Protocol

SINAUT ST7 Telecontrol– Configuration 8– Volume 3

[Application Description • October 2010](#)

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## SIMATIC SIMATIC NET Configuration 8 - Volume 3

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# 1 Automation Task

## 1.1 Overview

Two waste water process stations can be controlled and monitored from a central station. The following figure gives an overview of the automation task.

Figure 1-1



## 1.2 Requirements

There are the following requirements in addition to the requirements in Volume 1:

- The process data are transmitted via an encoded internet connection.
- The configuration for the encoded connection is easy and it does not require any additional software.
- Internet connection via wired network/DSL is not possible to one of the remote stations.
- An additional device is not required in the Control Center for the encoded connection.

## 1.3 Prerequisites

It is assumed in this document that the user has read Volume 1 & Volume 2. The following topics have already been described in Volume 1 & Volume 2 of this configuration.

Volume 1:

- Basics on SINAUT Telecontrol and TIM Modules
- Description: SINAUT Object, ST7cc and WinCC Variables
- Configuration of the TIMs with TD7onTIM
- Configuration and operation of the ST7cc project

Volume 2:

- Basics on GSM and GPRS mobile radio
- Basics on DSL/internet connection

## 2 Automation Solution

### 2.1 Overview of the overall solution

This solution uses the TIM modules from Firmware Version 2.0 and the MD720-3 GSM/GPRS modem as the main SIMATIC components.

These components establish an encoded connection between

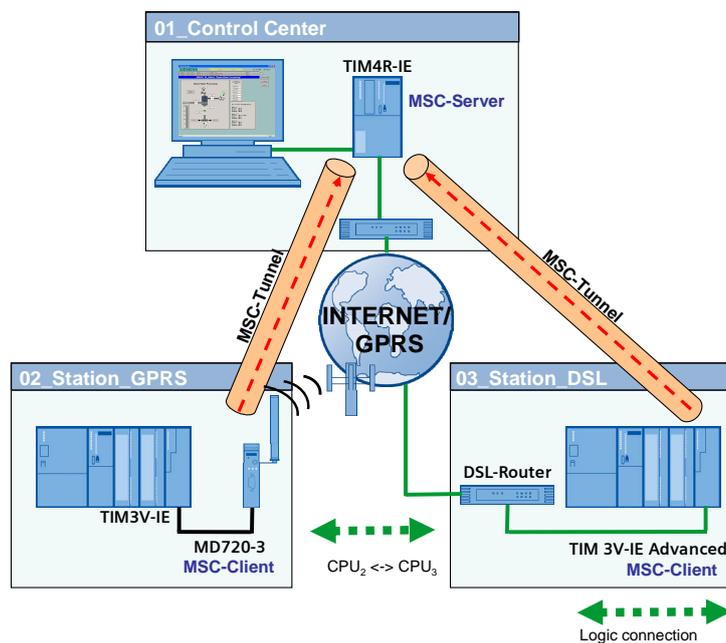
- the Control Center WinCC/ST7cc which is connected to the internet via DSL and
- several SINAUT stations which are connected with the internet via GPRS or DSL.

This makes it possible to exchange process data between a station and the control center or between the stations (bi-directionality is possible). The MSC protocol is used as VPN procedure here (the MSC protocol is explained in Chapter 3.5).

#### Layout

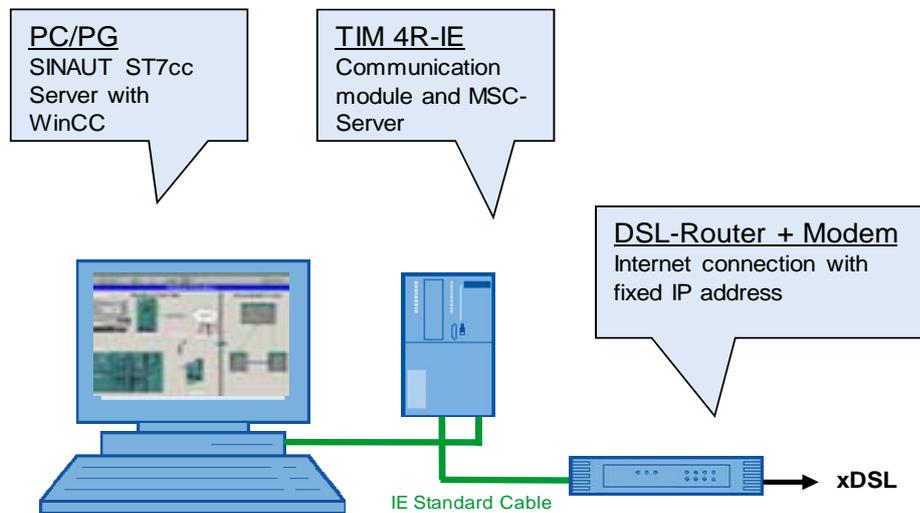
The following figure shows the implemented solution of this configuration in an overview:

Figure 2-1



### Layout of the Control Center (01\_Control\_Center)

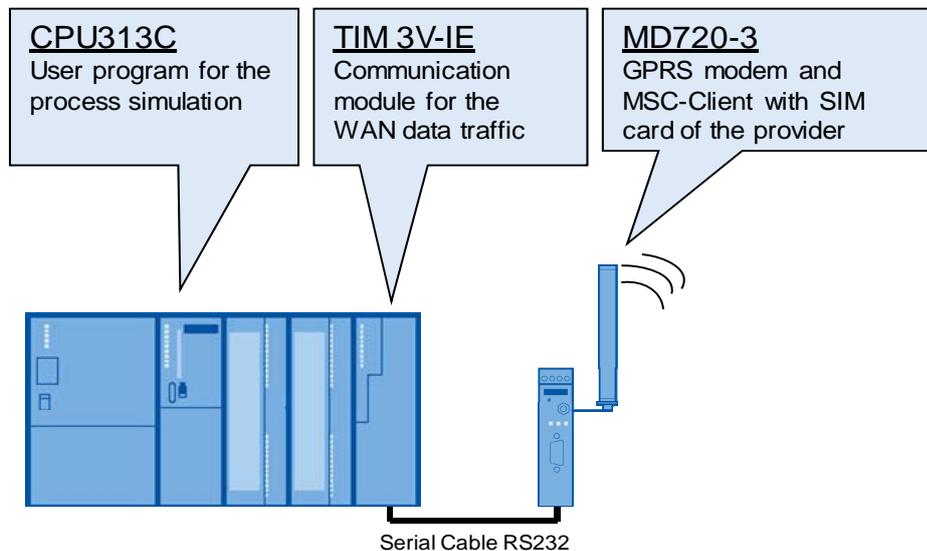
Figure 2-2



The Control Center consists of a standard Windows PC/PG. The PC is connected through its integrated Ethernet interface with the second port of TIM4R-IE. The TIM4R-IE is connected with the DSL router via its first Ethernet port.

### Layout of the GPRS station (02\_Station\_GPRS)

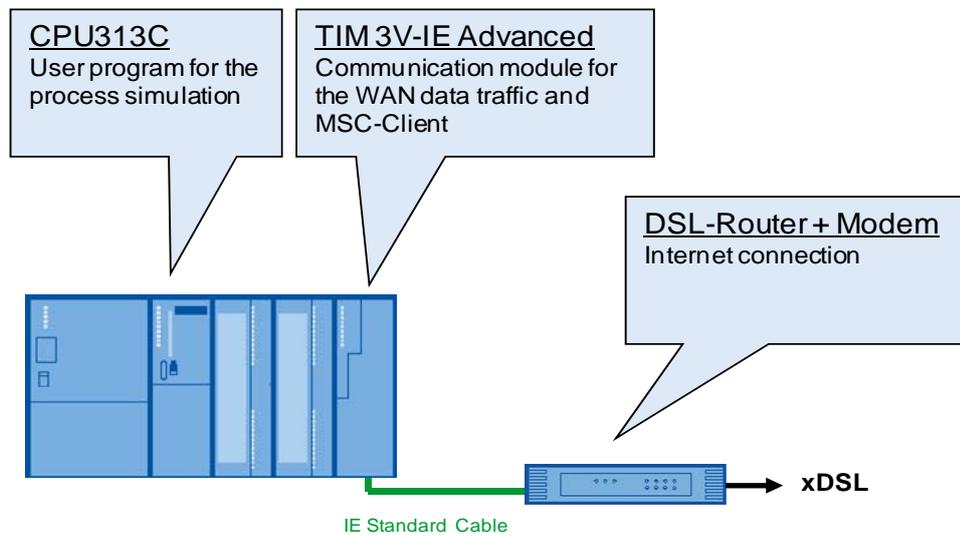
Figure 2-3



The GPRS station consists of a compact CPU and a TIM3V-IE module. The TIM3V-IE is connected with the GPRS modem MD720-3 via the RS232 interface.

**Layout of the DSL station (03\_Station\_DSL)**

Figure 2-4



The DSL station consists of a compact CPU and a TIM3V-IE Advanced module. The TIM3V-IE is connected with the DSL router via the integrated Ethernet interface.

**2.2 Description of the core functionality****Communication buildup**

- The GPRS modem MD720-3 (02\_Station\_GPRS) and the TIM3V-IE Advanced (03\_Station\_DSL) build up a VPN tunnel as an MSC client via the internet to the TIM 4R-IE in the Control Center (01\_Control\_Center).
- The stations communicate with the Control Center via these VPN tunnels.
- The stations communicate with each other via the Master TIM (MSC Master) ("cross-communication" via the TIM 4R-IE as router).

**Advantages of this solution**

This solution has the following advantages:

- Cost-effective station setup by using MD720-3 and S7-CPU 313C
- Low connection costs by using the GPRS network
- Cost-effective setup of the Control Center by direct connection to a DSL router as a stand-alone device; facilitated by the integrated MSC-VPN protocol
- Saving of time and costs through fast and comfortable configuration of the encoded connections with the SINAUT configuration software
- No supplemental mobile radio service required for fixed IP addresses or contracts for private GPRS networks with bi-directional data traffic, since VPN is integrated in the system ST7.
- Low-cost data transmission thanks to billing based on the data volume

## 2.3 Hardware and software components used

The application was created with the following components:

### Hardware components

Table 2-1

Component	Qty.	MLFB/Order number	Note
TIM 4R-IE	1	6NH7800-4BA00	as of Firmware V2.0
TIM 3V-IE	1	6NH7800-3BA00	as of Firmware V2.0
TIM 3V-IE Advanced	1	6NH7800-3CA00	as of Firmware V2.0
GPRS modem MD720-3	1	6NH9720-3AA00	
Connecting cable TIM3V-IE - MD720	1	6NH7 701-5AN	
ANT 794-4MR	1	6NH9860-1AA00	Quad-band antenna omnidirectional with 5m cable
PG	1	6ES7712-	<a href="#">Configurator</a>
Power supply PS307 5A	3	6ES7 307-1EA00-0AA0	
S7-CPU 313C	2	6ES7313-5BF03-0AB0	
Micro Memory Card	2	6ES7953-8LF11-0AA0	Min. 64 kB
Front connector for signal modules	2	6ES7392-1BM01-0AA0	
IE FC TP STANDARD CABLE	1	6XV1840-2AH10	Connection cable IE minimum order quantity 20m
IE TP XP CORD CABLE	1	6XV1870-3RH20	Crossed connection cable IE minimum order quantity 2m
RJ45 plug-in connector	16	6GK1901-1BB10-2AA0	Can be integrally moulded

### Standard software components

Table 2-2

Component	Qty.	MLFB/Order number	Note
SINAUT ST7 Engineering Software Edition 09/2009	1	6NH7 997-0CA50-0AA0	
SINAUT ST7cc V2.7	1	6NH7997-7CA15-0AA1	License for max. 6 SINAUT stations
STEP 7 V5.4 SP5	1	6ES7 810-4CC08-0YA5	or higher
SIMATIC NET PC software Edition 2006	1	6GK1704-1LW64-3AA0	The use of SIMATIC NET PC Software Edition 2008 has been released as of SINAUT ST7cc V.2.7 HF1.
SIMATIC WinCC V6.2 SP2	1	6AV6381-1BM06-2AX0	For information about the current releases refer to "Service&Support Aktuell" (see <a href="#">11</a> ) in the annex).

**Infrastructure**

Table 2-3

Component	Qty.	MLFB/Order number	Note
DSL Router + Modem	2		Optionally, router with an integrated modem or individually, e.g. Netgear RP614GR, Gigaset SE 515
Internet provider	2		
Fixed IP address	1		Contract with your internet provider
SIM card	1		Mobile radio contract with a GSM network provider; activated for GPRS. Tariff with data option or pure data tariff.

**Example files and projects**

The list below includes all files and projects used in this example.

Table 2-4

Component	Note
23810112_SINAUT_INTERNET_MSC_CODE.zip	This zip-file contains:
<ul style="list-style-type: none"> <li>STEP7_INTERNET_MSC.zip</li> </ul>	STEP 7& SINAUT ST7 project
<ul style="list-style-type: none"> <li>WinCC_INTERNET_MSC.zip</li> </ul>	WinCC & ST7cc project

**Note**

The TIM Firmware Version 2.0 is available on the Service & Support website. This site also provides information for updating the firmware. See [11](#) , [12](#) , [13](#)

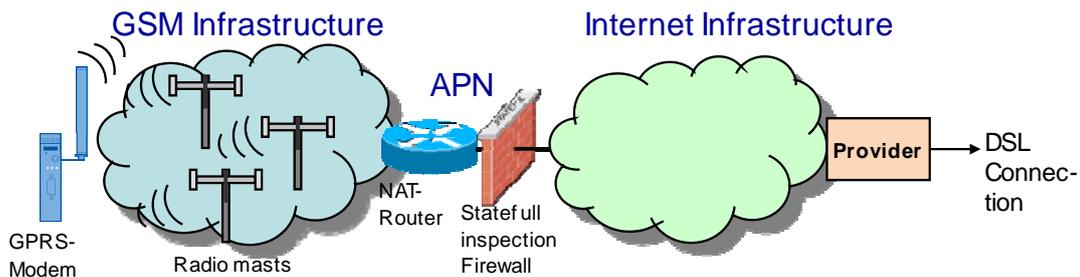
## 3 Function Mechanisms of this Application

### 3.1 Components/infrastructure of the EGPRS/GSM transmission chain

#### EGPRS/GSM transmission chain

The following picture shows the transmission path of the GPRS route.

Figure 3-1



The graphic shows all important components necessary for a GPRS connection via the internet.

Table 3-1

Component	Function	Note
GPRS modem	GPRS client; can send data via the GPRS radio network;	Has an IP address assigned to it by the APN
APN	<b>Access Point Name</b> ; address of the mobile radio provider which defines the node from the EGPRS/GPRS network to the internet. Assigns an IP address to the client (private or public IP address depending on the APN)	APN for Vodafone: <b>web.vodafone.de</b> APN for Telekom: <b>internet.t-mobile</b> APN for E-Plus: <b>internet.eplus.de</b>
NAT router:	Mediates between internal, private networks and the public internet using NAT	<b>Network Address Translation</b> maps private IP addresses to public addresses.
Statefull inspection firewall	Protection wall; only allows answer packages to inquiries;	Packages from outside, which do not belong to an inquiry triggered by the client, are rejected.
Provider	Local internet provider	

#### Transmission requirements

Transmission of data packages in this example is subject to certain requirements:

- **Security:** The transmission path must be secure and protected against unauthorized access. This is facilitated by a VPN tunnel with MSC protocol in this example.
- **Stability:** The transmission path must be stable. Regular monitoring by keep-alive protocols (TCP-IP Keep Alive, for the monitoring of the MSC tunnel, peer monitoring for the TIM-TIM communication) is necessary.
- **Bi-directionality:** Data transmission must occur point-to-point in both directions.
- **Accessibility:** The DSL router in the Control Center must have a fixed public IP address. (Dynamic IP address is also possible if a DynDNS server is used.)

#### Connection setup procedure

Due to the additional route via the internet service provider, the connection setup between MD720-3 and TIM4R-IE runs through various steps which are described in greater detail in the following table.

Table 3-2

Step	Description
1	The MD720-3 (MSC client) establishes a GPRS data connection via the mobile radio network provider (APN). The mobile radio network provider forwards the GRPS data traffic to the internet.
2	The MD720-3 sends data packages with a target address (IP address of the router) into the internet.
3	Provided, that the DSL connection of the Control Center with the internet has been established, the data packages are forwarded by the DSL router to the TIM 4R-IE (MSC Server).
4	The MSC tunnel between MD720-3 and TIM4R-IE is established.
5	The package-oriented data traffic can take place now.

## 3.2 GPRS modem MD720-3

The MD720-3 modem establishes by GPRS a secure IP data connection between remote GPRS stations and the service center.

#### Basic requirements for operation

Operating the MD720-3 modem requires a SIM card with GPRS service which is plugged to the modem.

The GSM/GPRS modem MD720-3 covers all four bands of the GSM networks with the quad-band antenna ANT 794-4MR and, thus, it can be used almost worldwide.

- 850 MHz
- 900 MHz
- 1800 MHz
- 1900 MHz

**Note** Note the country approvals for the MD720-3.

Link [\4](#).

### Properties of MD720-3

The following core functions are provided by the MD720-3 for a secure radio data connection:

- MSC client: Secure connection via public networks through encoded data transmission
- GPRS modem for a package-switched data communication via GSM
- Bi-directional data connection
- Simple configuration of wirelessly connected devices which does not require any special radio technology knowledge

## 3.3 DSL router

### Requirements for the router

When a secure GPRS connection via the internet is used it is advantageous that the router has a **fixed IP address** in the Control Center. This refers to an IP address, which is permanently assigned to the router and so is permanently available under this address. This IP address is permanently entered in the configuration of the MSC tunnel. (Dynamic IP address is also possible if a DynDNS server is used.)

The DSL router must be able to handle the **Port Forwarding** property. With Port Forwarding the router waits for data packages at a configured port and forwards them to a certain port in the internal network. For the MSC protocol any port (starting from port 1025) can be used which will be forwarded to the MSC Server via Port Forwarding.

## 3.4 Properties of the Firmware Version 2.0 for the IE-TIMs

The central component of the SINAUT ST7 Telecontrol System is the communication module TIM. The following new functions are available from Firmware Version 2.0 for the Industrial Ethernet-TIMs (TIMs with RJ45 Ethernet Port).

Table 3-3

Component	Properties
<b>TIM3V-IE</b>	Wireless communication via the modem MD720-3 in the GPRS mode. In the GPRS mode the GSM modem MD720-3 can establish a direct connection with a TIM4R-IE which is connected to the internet.
<b>TIM3V-IE Advanced</b>	<ul style="list-style-type: none"> <li>• Wireless communication via the modem MD720-3 in the GPRS mode. In the GPRS mode the GSM modem MD720-3 can establish a direct connection with a TIM4R-IE which is connected to the internet.</li> <li>• The MSC-VPN tunnel protocol which is integrated in TIM3V-IE Advanced can be used for the direct connection to a DSL router (MSC client) for communication via the internet.</li> </ul>

Component	Properties
<b>TIM4R-IE</b>	<p>This TIM can communicate directly via a simple router with internet connection with up to 128 S7-300 stations. The communication takes place in a secure mode via ST7 and integrated MSC tunnel technology then.</p> <p>The TIM4R-IE is connected with the internet (MSC server) via the integrated MSC tunnel protocol with an IE interface (only Port 1) via a router (fast internet connection, e.g. DSL).</p>

**Note**

For more information on SINAUT Telecontrol refer to Volume 1 or the official documentation [/1/](#) and [/2/](#).

### 3.5 Security

#### Security requirements

- Data confidentiality: The user data have to be encoded and protected against unauthorized access.
- Station authentication: Only defined stations must participate in the data communication. An authentication is required.
- Package identification: It must be ensured, that data packages arrive at their target address unchanged.
- Secrecy: Networks behind the VPN Gateways should be hidden from third parties.

#### VPN tunnel

A VPN tunnel is a “virtual private network” (comparable with a LAN) via an unsecured network (internet). This is made possible with encoded data packages, authentication and authentication of the stations. Authentication (proof of one’s own identity) and authentication (checking the identity of the peer) occurs via a key (Pre-Shared Key) or certificates (X.509v3 certificates). There are different protocols which can be the basis of the VPN tunnel, e.g. IPSec, SSL, L2TP, MSC.

#### MSC protocol

MSC (Micro Switching Centre) is a TCP/IP based proprietary protocol which has been developed for cost-effective VPN networks in Telecontrol Systems.

The authentication (checking the identity of the peer) of the MSC client at the MSC server takes place with the username and password and the net data are encoded via a pre-shared key.

The connection is initiated by the MSC client. The following table shows the TIMs with the MSC function which is supported by them.

Figure 3-2

	TIM 3V-IE	TIM 3V-IEAdvanced	TIM 4R-IE
MSC-Client (Station) TIM with connected MD720-3			
MSC-Client (Station) TIM			
MSC-Server (Control Center) TIM			

### Benefit from the MSC protocol

- The tunnel connection (MSC) can be configured directly via STEP7 and SINAUT ST7 Engineering Software from V 5.0 (SINAUT ST7 Engineering Software Package from Version 09/2009) which provides time and cost advantages.
- This allows to operate cost-effective stations with standard safety requirements (e.g. water or waste water applications) which communicate via the internet.
- Due to the tunnel technology bi-directional communication can be executed with the Control Center with GPRS mobile radio standard connections to the internet. The connection remains "online" at low data volumes.

### Note

If the security requirements are very high, you can use either the GPRS router MD741-1 or SCALANCE S (both products support VPN IPsec tunnels) at the IE interface. For information about this solution refer to Volume 2.

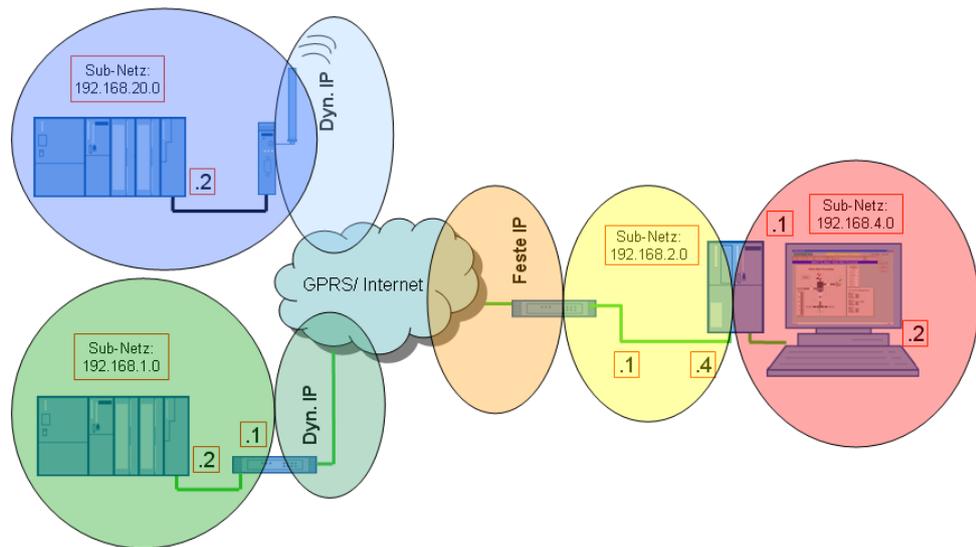
## 4 Configuration and Settings

This chapter describes the settings which are required for the configuration of an MSC tunnel. These settings have already been integrated in the STEP7 project for Volume 3; therefore, the user need not select these settings for the example project.

The step-by-step creation of a SINAUT project with an MSC tunnel and the required settings in the SINAUT Engineering Tool for starting the application project are demonstrated in the flash video in addition.

The following picture shows the different subnets which were used in this example.

Figure 4-1



The following table gives you an overview of the IP addresses used. Cells with the same color belong to one subnet respectively. Modules with two addresses (internal/external) work as routers for the respective other subnet.

Table 4-1

Module		IP address	
		Internal	External
<b>STATION 2</b>	TIM 3V-IE	192.168.20.2	
	MD720-3	-	Dynamic from APN
<b>STATION 3</b>	TIM 3V-IE Adv.	192.168.1.2	
	DSL router	192.168.1.1	Dyn. or fixed
<b>Control center</b>	DSL router	192.168.2.1	Fixed IP address from provider
	TIM 4R-IE	192.168.4.3	192.168.2.4
	PG / PC	192.168.4.2	

The subnet mask is 255.255.255.0 in all network components

**Note** The configuration of the SINAUT objects (TD7onTIM) and of the ST7cc server has been described in Volume 1 Chapter 4.

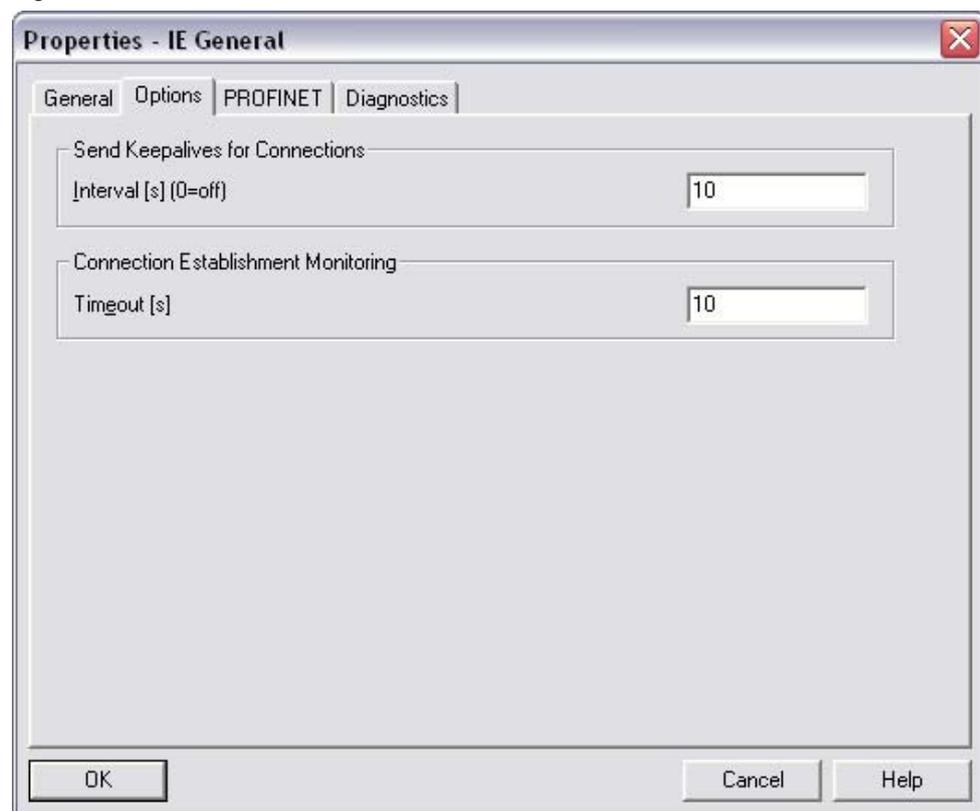
**Note** You can adapt the supplied example project to your needs (e.g. other CPU type). For information refer to Volume 1 Chapter 5.

## 4.1 Ethernet/GPRS settings in NETPRO

### 4.1.1 Control Center ST7cc

The IP address of the Control Center is set as in Table 4-1. The value for the parameter **Send Keepalives for Connections** of the Ethernet interface in the Control Center must coincide with the value of this parameter in the Master TIM. It is set to 10 seconds for this reason.

Figure 4-2



**4.1.2 TIM 4R-IE in the Control Center**

The first Ethernet interface of TIM4R-IE will be used for the MSC network. The second Ethernet interface will be used for the local connection to the Control Center ST7cc.

**Note** The only interface which can be configured for an MSC network is the Ethernet 1 interface of TIM4R-IE.

The TIM4R-IE in the Control Center uses the DSL router as router in the MSC network. Therefore, the MSC port (Ethernet 1 port) of the TIM was configured as follows:

IP address: **192.168.2.4**

Subnet mask: **255.255.255.0**

Router: **192.168.2.1** (internal IP address of the DSL router)

The following screenshot shows the additional settings to be made for the Master TIM so that TIM will be used as MSC Master.

Figure 4-3

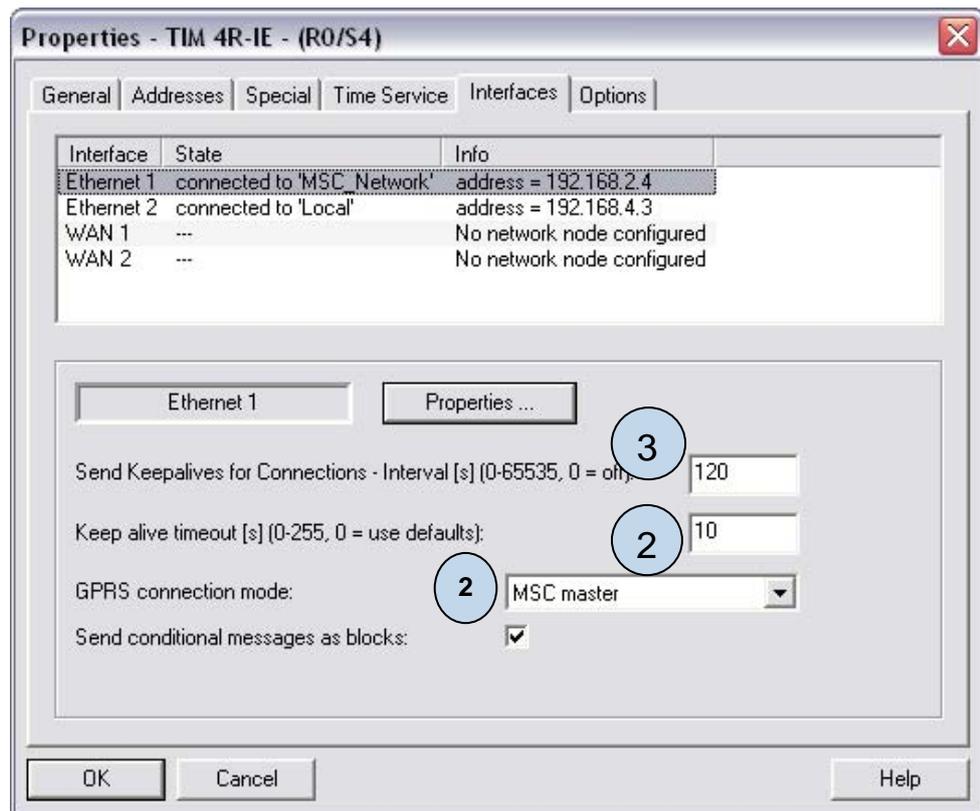


Table 4-2

No.	Property	Description
1	Send Keepalives for Connections- Interval [s]	With this parameter, the <b>TCP/ IP Keep Alive Interval</b> of the TIM is set for the MSC network. The recommended setting for GPRS connections is 120 sec. Since there is a connection to a GPRS station in this example, this value has to be set to 120 sec. at the Master TIM (MSC Master).
2	Ethernet timeout for sending of messages [s]	Usually, a send frame in the EGPRS/GPRS network is acknowledged within 1-2 sec. At high network loads this may take longer. In practice, a value of 10 seconds has proven successful.
3	GPRS connection mode	For the connection via MSC protocol the interface is configured in the Control Center as <b>MSC Master</b> .

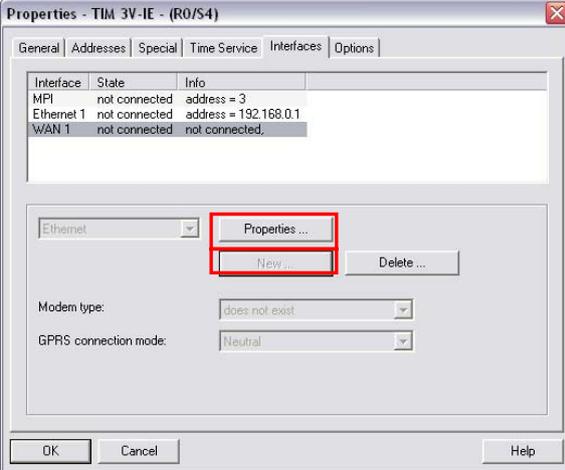
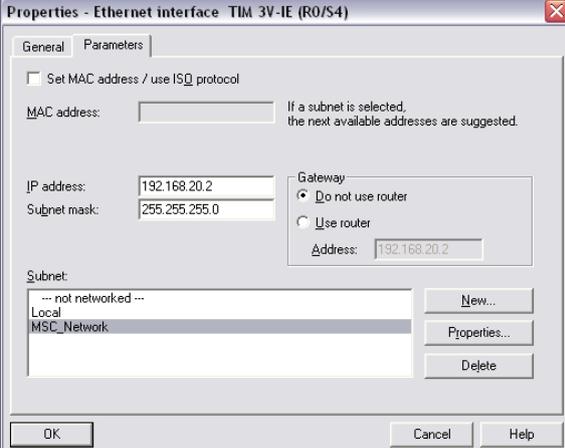
### 4.1.3 GPRS station

Table 4-3

No.	Action	Screenshot
1.	Open the properties of the TIM 3V-IE by double-clicking the TIM and go to the tab <b>Interfaces</b> .	
2.	Select the <b>WAN 1</b> interface and set <b>Ethernet</b> as the WAN network.	

## 4 3BConfiguration and Settings

### 4.1 22BEthernet/GPRS settings in NETPRO

No.	Action	Screenshot
3.	Click the button <b>New</b> and then <b>Properties</b> .	
4.	Enter an IP address for the TIM. This IP address does not exist in reality.  Select the subnet MSC network and close the window with <b>OK</b> .	

#### Note

You can select the IP address for the TIM freely. It must not exist already in the project though and it should be located in a different IP subnet.

#### 4.1.4 DSL station

The TIM3V-IE Advanced uses the DSL router as router in the MSC network. For that reason the Ethernet interface of the TIM was configured as follows:

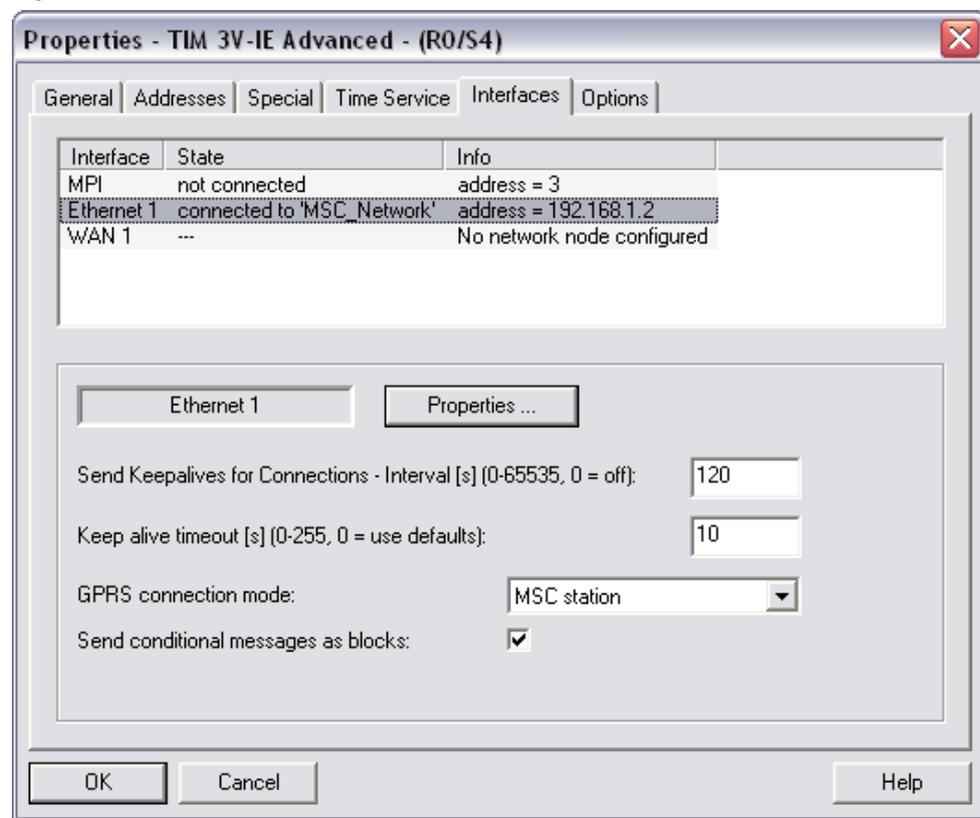
IP address: **192.168.1.2**

Subnet mask: **255.255.255.0**

Router: **192.168.1.1** (internal IP address of the DSL router in the station)

The mode **MSC Station** must be selected for the TIM in the station. The value for the parameter **Send Keepalives for Connections** must coincide with the value of this parameter in the Master TIM. It is set to 120 seconds for this reason.

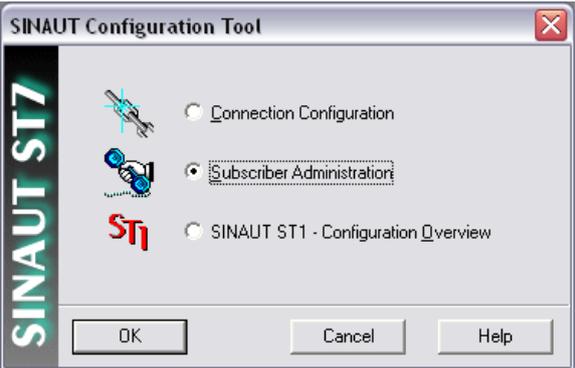
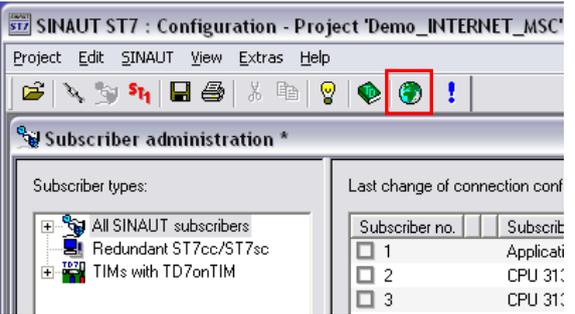
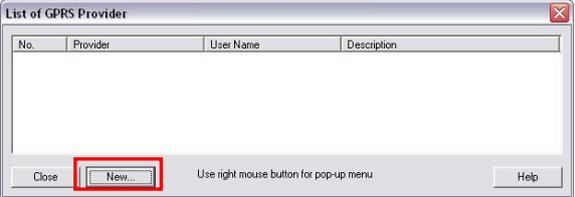
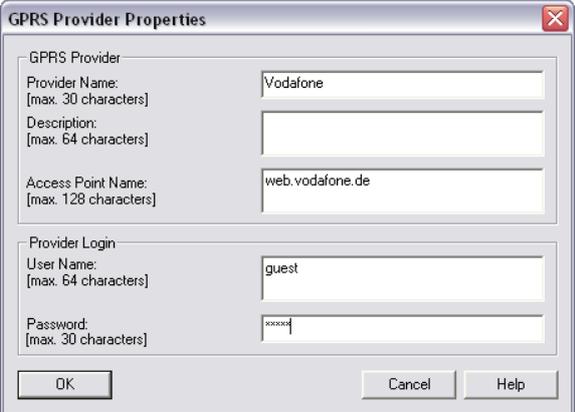
Figure 4-4

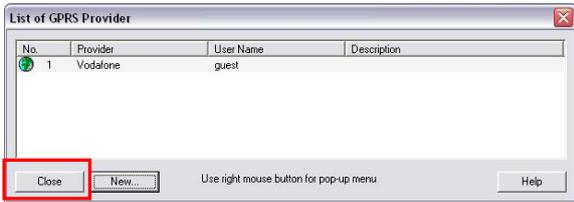


## 4.2 Settings in SINAUT ST7 Configuration Tool

### 4.2.1 Provider settings

Table 4-4

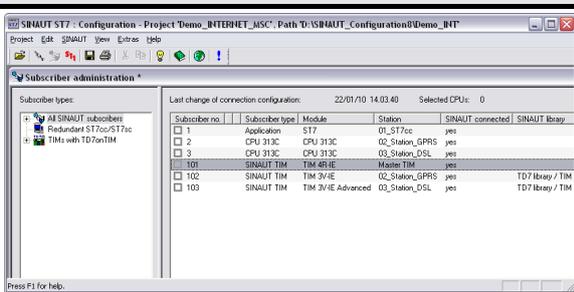
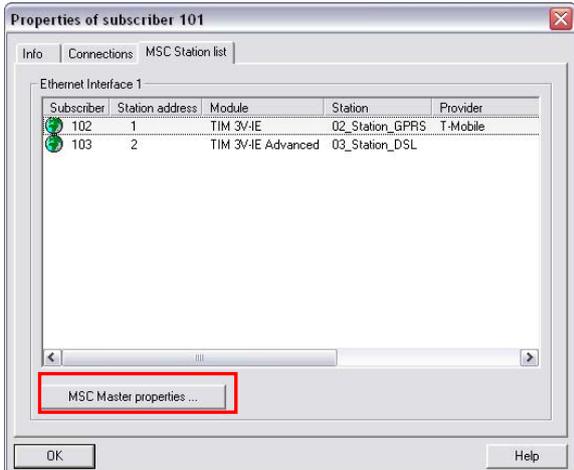
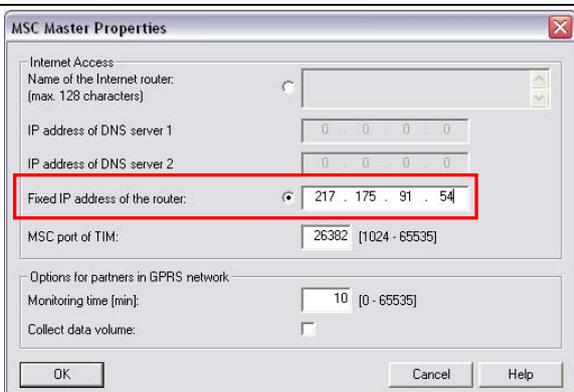
No.	Action	Screenshot
1.	Start the SINAUT ST7 configuration tool and open your project.	Start -> SIMATIC -> SINAUT ST7 -> Configuration
2.	Select <b>Subscriber Administration</b> and start with <b>OK</b> .	
3.	Open the list of GPRS providers via the globe icon.	
4.	Click the button <b>New</b> .	
5.	Enter the properties of your provider. The information for Access Point Name, Username and Password will be provided by your GPRS provider. Close the window with <b>OK</b> .	

No.	Action	Screenshot
6.	Your provider has been entered in the list of GPRS providers. Close the window with <b>Close</b> .	

### 4.2.2 MSC settings

#### Inputting the IP address of the DSL router in the Control Center

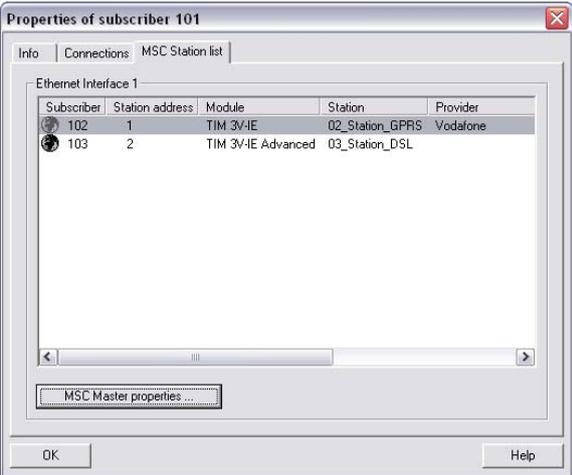
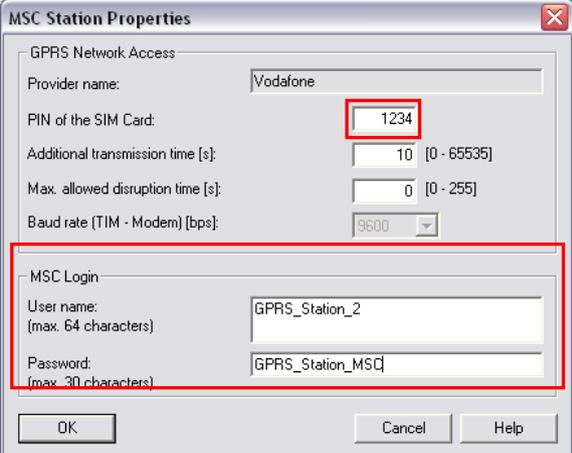
Table 4-5

No.	Action	Screenshot
1.	Open the properties dialog of the Master TIM by double-clicking MasterTIM.	
2.	Click the button <b>MSC Master properties</b> .	
3.	Enter the fixed IP address of the DSL router allocated by the provider. Close all windows with <b>OK</b> .	

**Note** If you do not have a fixed IP address, use in step 2 the fields **Name of the Internet Router** and **IP address of DNS Server**.

**Setting of the GPRS station**

Table 4-6

No.	Action	Screenshot
1.	Double-click the GPRS station.	
2.	The window with the MSC station properties will be opened. Enter the PIN number of your SIM card. Enter a user name and password for the MSC login then and close the window with <b>OK</b> .	

**Note** The MSC user name must be unique in the project.

**Setting of the DSL station**

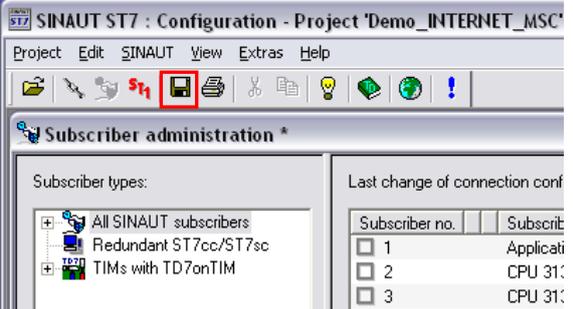
Table 4-7

No.	Action	Screenshot
1.	Double-click the DSL station.	
2.	Enter a user name and password for the MSC login and close the window with <b>OK</b> .	
3.	The globes of the MSC stations are displayed in color. That means that all required settings have been made. Close the window with <b>OK</b> .	

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## 4 3BConfiguration and Settings

### 4.2 23BSettings in SINAUT ST7 Configuration Tool

No.	Action	Screenshot
4.	Save and compile your project.	

## 5 Installation

For startup we offer you a finished STEP 7 / SINAUT example project as a download. This software example supports you in the first steps and tests with this configuration. It enables a quick function test of hardware and software interfaces between the here described products.

The software example is always assigned to the components used in this configuration and shows their principal interaction. However, it is not a real application in the sense of technological problem solving with definable properties.

### 5.1 Installation of the hardware

For the hardware components, please refer to Chapter 2.3. To set up the hardware, please follow the instructions in the below table:

Table 5-1

No.	Action	Remark
1.	Standard PG or customized PC with MS WINDOWS XP SP2 and Ethernet interface	Please follow the respective operating instructions and installation instructions
2.	Mount the voltage supply	
3.	Install TIM4R-IE	Connect voltage supply
4.	Install CPU313C	<ul style="list-style-type: none"> <li>Adjust backplane bus adapter for TIM</li> <li>Connect voltage supply</li> <li>Plug the MMC</li> <li>Provide power to potentially required I/O module here: DI16/DO16 L+ : 1, 21, 31 M : 20, 30, 40</li> </ul> For manual CPU313C refer to <a href="#">/3/</a> in the annex.
5.	Install TIM3V-IE	<ul style="list-style-type: none"> <li>Connect voltage supply</li> </ul>
6.	Install MD720-3	<ul style="list-style-type: none"> <li>Insert SIM card into the device</li> <li>Connect voltage supply</li> <li>Connect modem to the TIM 3V-IE via the serial cable</li> </ul> For manual MD720-3 refer to <a href="#">/4/</a> in the annex.
7.	Repeat steps 4 and 5 for 03_Station_DSL	The TIM for this station is a TIM3V-IE Advanced
8.	Switch on the system.	

## 5.2 Installation of the standard software

The following software packages are required for this configuration:

- STEP 7
- SIMATIC NET
- SINAUT ST7
- WinCC
- SINAUT ST7cc

**Note** The order of software installation is available in Volume 1.

## 5.3 Installation of the example project

Table 5-2

No.	Action	Screenshot
1.	Unzip the file 23810112_SINAUT_INTERNET_MSC.zip	In the following the directory <b>D:\SINAUT_Configuration8</b> is used as project folder.
2.	Unzip the file WinCC_INTERNET_MSC.zip	The WinCC project is now filed at <b>D:\SINAUT_Configuration8\WinCC_Internet_MSC\DemoTIM3V-IE\DemoTIM3V-IE.MCP</b>
3.	Start STEP 7 and unzip STEP7_INTERNET_MSC.zip to <b>D:\SINAUT_Configuration8</b>	The STEP 7 project is filed at <b>D:\SINAUT_Configuration8\Demo_INTERNET_MSC</b> now.

## 6 Startup of the Application

In the following chapters, the steps will be explained for the startup of the application example. When you created a new project as demonstrated in the flash video, go to Chapter 6.2

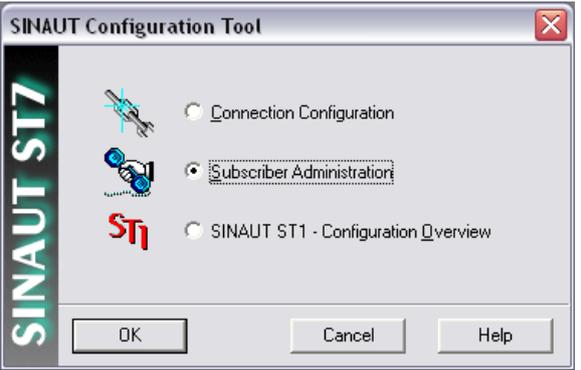
Table 6-1

Number	Configuration step	Chapter
1	Adapting the DSL and GPRS settings	6.1
2	Configuring the DSL router	6.2
3	Configuring the Control Center	6.3
4	Downloading the Master TIM, Station 2 and 3	6.4

### 6.1 Adapting the DSL and GPRS settings

In order to be able to operate the example project, you have to input the IP address of the DSL router in the Control Center and the PIN of the SIM card for the GPRS station. Open the example project as follows:

Table 6-2

No.	Action	Screenshot
1.	Start the SINAUT ST7 configuration tool.	Start -> SIMATIC -> SINAUT ST7 -> Configuration
2.	Open the project <b>Demo_INTERNET_MSC</b> under <b>D:\SINAUT_Configuration8</b>	
3.	Select <b>Subscriber Administration</b> and start with <b>OK</b> .	

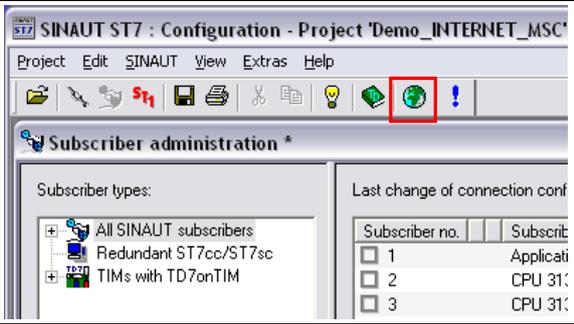
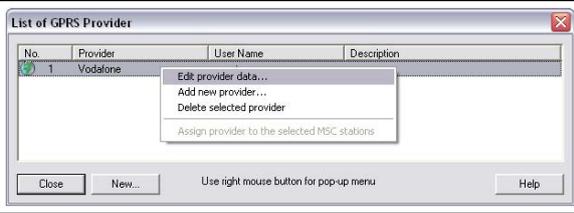
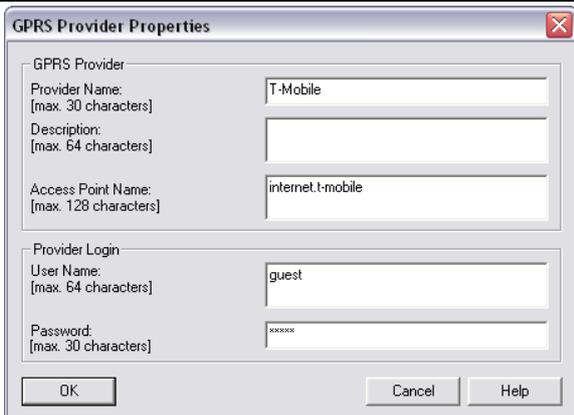
#### Adapting the GPRS provider

This example has been created with a Vodafone SIM card. If you use a SIM card of another provider, proceed as follows:

## 6 5BStartup of the Application

### 6.1 27BAdapting the DSL and GPRS settings

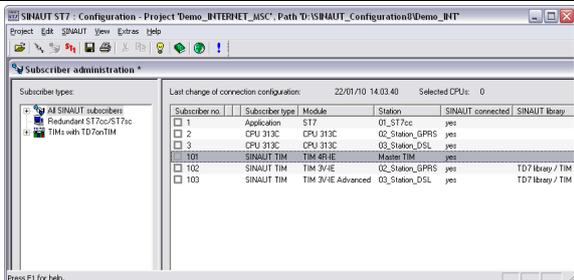
Table 6-3

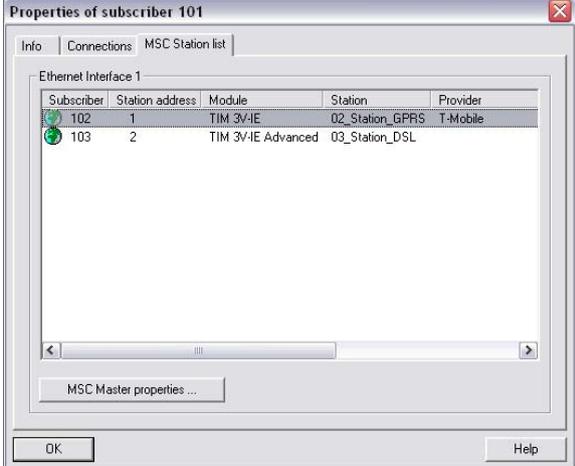
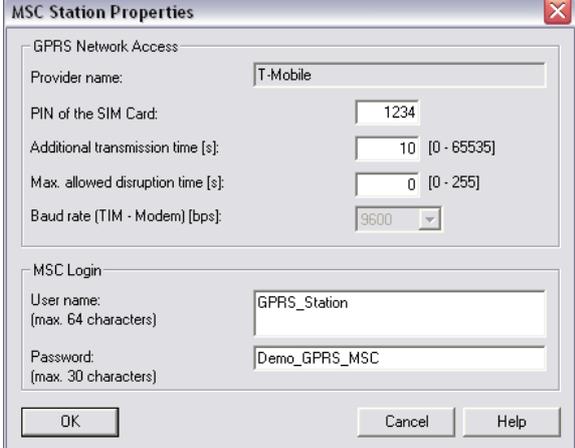
No.	Action	Screenshot
1.	Open the list of GPRS providers via the globe icon.	
2.	Select the provider with your right mouse key and select the context menu <b>Edit provider data</b> .	
3.	The window with the GPRS provider properties opens. Enter the properties of your provider. Close all windows with <b>OK</b> or <b>close</b> .	

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### Inputting the PIN of the SIM card

Table 6-4

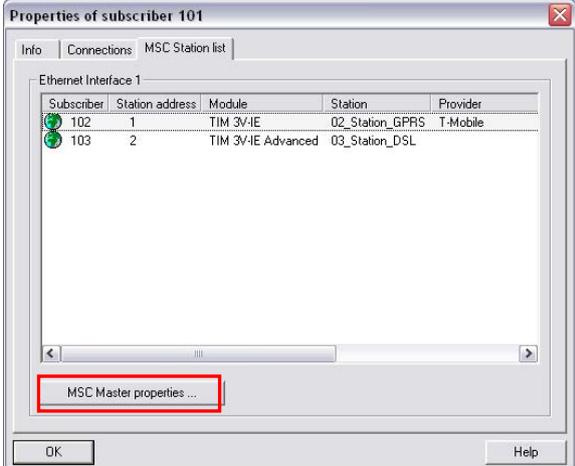
No.	Action	Screenshot
1.	Open the properties dialog of the Master TIM by double-clicking MasterTIM.	

No.	Action	Screenshot
2.	Go to the tab <b>MSC Station List</b> and double-click the GPRS station.	
3.	The window with the MSC station properties opens. Enter the PIN number of your SIM card. Close the window with <b>OK</b> .	

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### Inputting the IP address of the DSL router in the Control Center

Table 6-5

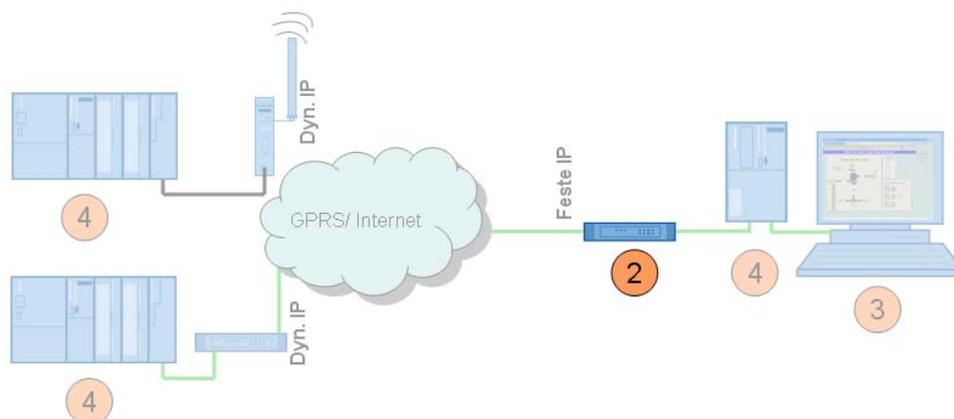
No.	Action	Screenshot
1.	In the properties window of the Master TIM click the button <b>MSC Master properties</b> .	

No.	Action	Screenshot
2.	Enter the fixed IP address of the DSL router allocated by the provider. Close all windows with <b>OK</b> .	
3.	Save and compile your project.	

**Note** If you do not have a fixed IP address, use in step 2 the fields **Name of the Internet Router** and **IP address of DNS Server**.

## 6.2 Configuring the DSL Router

Figure 6-1



No specific router is discussed for the configuration as the operating screens differ from router to router.

Most routers have a web page for the configuration.

**Required PC/PG IP address**

For the configuration of the router you must assign an IP address to your PG/PC which is located in the internal network of the router.

**Configuration**

Table 6-6

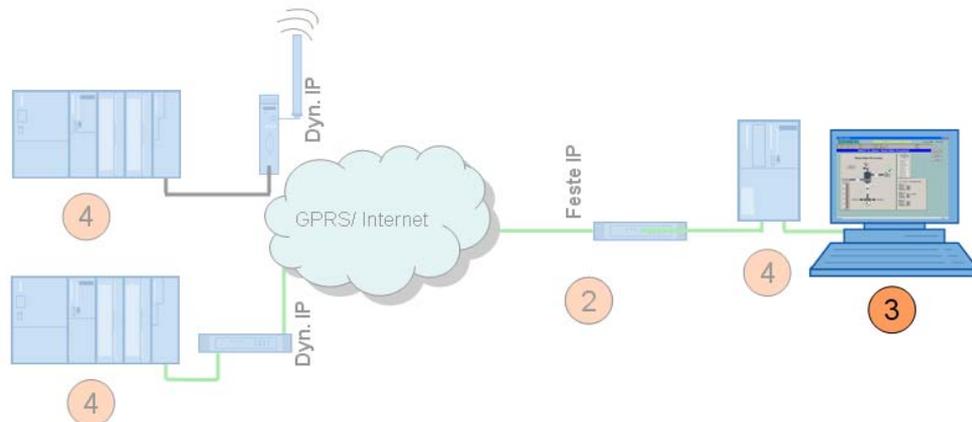
No.	Action	Remark
1.	Open the configuration user interface of the router.	This may be an additional software, "Telnet" or a web page.
2.	Enter the connection data for your internet connection.	Login, password etc, which you received from your provider.
3.	Switch off the DynDNS server.	Your internet access has a fixed IP address.
4.	Enter your DNS server.	The address is made available together with the access data.
5.	Specify a LAN IP address for the router.	In this example: 192.168.2.1
6.	Switch off the DHCP server.	The TIM is assigned a fixed address.
7.	Forward the port which you defined in the SINAUT configuration as MSC port of the MSC Master to the same port of the TIM4R-IE.	TCP port 26382 to port 26382 of 192.168.2.4 (by default: port 26382)

**Note** If you do not have a fixed IP address, enter your DynDNS domain, user name and password in the DSL router.

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**6.3 Configuring the Control Center**

Figure 6-2



The following settings must be made:

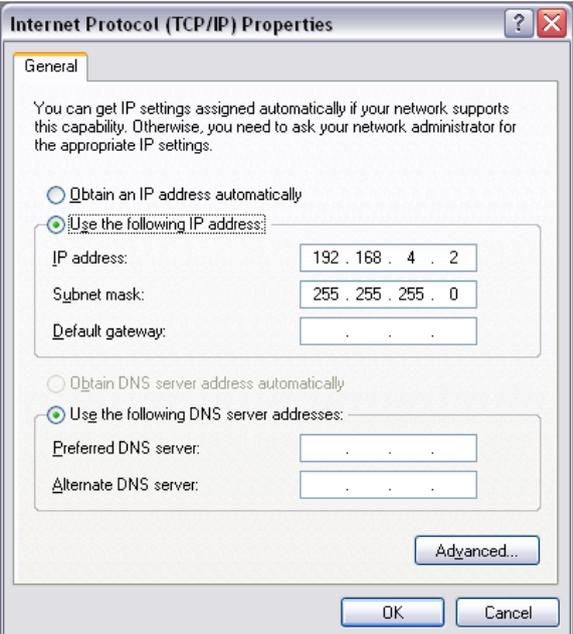
- Assign IP address
- Change computer name to CONTROLROOM
- Initial startup of PC station:

- set the component configurator
- set the access point

### Changing the IP address

Due to the download of the various modules the IP address of the PC/PG must be changed frequently. This section shows the steps required for this. Figure 4-1 shows the network setting to which you have to change the PG/PC at the end of the configuration steps (after Chapter 6.4)!

Table 6-7

No.	Action	Screenshot
1.	<p>Open the <b>Internet Protocol (TCP/IP) Properties</b> by selecting <b>Start -&gt; Settings -&gt; Network Connection -&gt; Local Connections</b></p> <p>Select the option field <b>Use following IP-address</b></p> <p>and fill in the field as shown in the screenshot. Select the option field <b>Use the following DNS Server</b> and enter the DNS server according to the screenshot. Close the dialogs with "OK".</p>	
2.	<p>If your PG has an IWLAN interface, switch it off.</p>	

### Changing the computer name and starting the PC station

How the computer name is changed and how the PC station is configured for initial operation, has already been explained sufficiently step-by-step in Volume 1. Please take the information on the procedure from this volume. (See Chapters 6.3.1 and 6.3.4 in Volume 1)

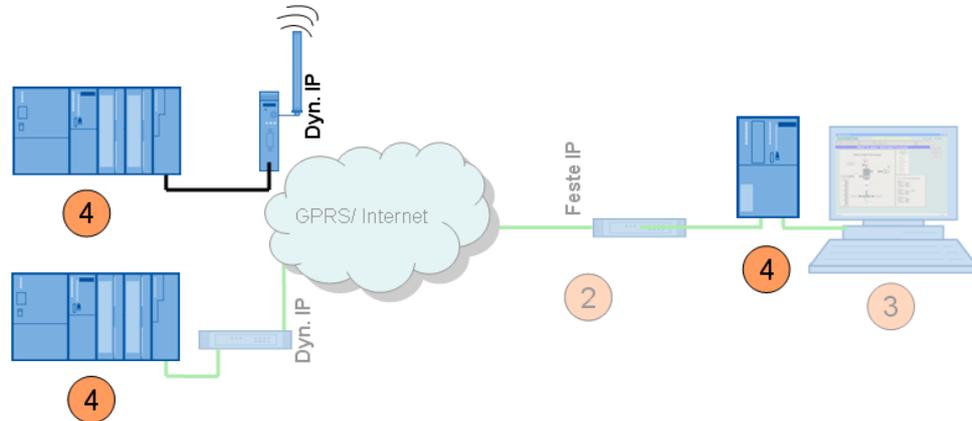
#### Note

The included STEP 7 project for Volume 2 serves as basis for the configuration of the PC station.

Please make sure that you use the IP address and xdb file which were defined for Volume 2. (See Table 4-1)

## 6.4 Downloading the Master TIM, Station 2 and 3

Figure 6-3



The included STEP 7 project serves as basis for the configuration of the stations and the Master TIM. This project has already been configured with the correct IP addresses for the second volume.

Table 6-8

No.	Action	Remark
1.	For the download of the <b>03_Station_DSL</b> change the IP address of your PG/PC into IP address: <b>192.168.1.20</b> Subnet Mask: 255.255.255.0	
2.	Before the STEP 7 project can be downloaded to the CPU, the IP address of the TIM module has to be changed as specified in Table 4-1.	The configuration of the IP address in the TIM is explained in Volume 1, Chapter 6.3.2.
3.	For loading the SIMATIC station, please connect the PC/PG with the TIM via the crossed connection cable.	Make sure that you assign the IP address <b>192.168.1.2</b> / subnet mask 255.255.255.0 to the TIM 3V-IE.
4.	For loading the <b>02_Station_GPRS</b> change the IP address of the computer into 192.168.0.20.	The TIM is loaded via the RJ45-Port which is not used in the project. For that reason, it keeps its default address 192.168.0.1.
5.	For loading the SIMATIC station, please connect the PC/PG with the TIM via the crossed connection cable.	
6.	For loading the <b>MasterTIM</b> repeat the steps 1-3.	<ul style="list-style-type: none"> <li>PG/PC IP address: <b>192.168.4.2</b> Subnet Mask: 255.255.255.0</li> <li>Use an <b>uncrossed</b> patch cable.</li> <li>TIM4R-IE IP address <b>192.168.4.3</b>/ subnet mask 255.255.255.0</li> </ul>

## 7 Operating the Application

### 7.1 Final configuration

When all modules have been loaded, change the IP address of the PC/PG according to Table 4-1

Connect all stations according to Figure 4-1.

### 7.2 Commissioning of the ST7cc control center and function test

#### Note

The commissioning of the ST7cc control center is only discussed briefly in this chapter. A precise step-by-step instruction is available in Volume 1.

#### Commissioning

The commissioning of the ST7cc control center requires the following steps:

- Start WinCC and open the project **D:\SINAUT\_Configuration8\WinCC\_INTERNET\_MSC\DemoTIM3V-IE\DemoTIM3V-IE.MCP**.
- Start ST7cc config (via START -> SIMATIC -> ST7cc -> ST7cc config) and open the project **D:\SINAUT\_Configuration8\DemoTIM3V-IE\ST7cc\ST7\_Project.XML**.
- Activate the project for runtime in ST7cc config and load the server settings into the system.
- Start ST7cc Runtime (START -> SIMATIC -> ST7cc -> ST7cc Runtime).
- Wait until the ST7cc server is running.
- Start WinCC Runtime.

You can see in WinCC Runtime whether a connection has been established to the stations. The image typicals of the stations are displayed green.

### 7.3 Operation scenarios

The operation scenarios are identical with those in Volume 1 and they are given in the documentation Volume 1 Chapter 7.

## 8 Further Notes, Tips and Tricks, etc.

### 8.1 What to do if

... no GPRS connection is established?

Table 8-1

No.	Action	Remark
1.	Is the SIM card still valid?	
2.	Check the data of your APN and SIM card which you entered in the SINAUT project.	Is the APN address and the respective access code that of your provider? Have you entered the PIN correctly in both lines?
3.	Did you insert the SIM card correctly?	

#### Note

A disabled or incorrectly inserted SIM card is signaled as a "SIM card error" at the MD720-3.

... no VPN tunnel is set up via MSC protocol?

Table 8-2

No.	Action	Remark
1.	Has the fixed IP address of the DSL router been input correctly in the SINAUT project?	
2.	If you use a DynDNS server, check the respective settings in the DSL router and in the SINAUT project.	<ul style="list-style-type: none"> <li>• Has the domain been activated at your DynDNS provider?</li> <li>• Has the domain name, user name and password been entered correctly in the DSL router?</li> <li>• Has the domain name been entered correctly in the SINAUT project?</li> </ul>
3.	Has the MSC port been forwarded in the settings of the DSL router?	<p>Check in the SINAUT project which port has been defined as MSC port.</p> <p>Has this port in the settings of the DSL router been forwarded to the IP address of the Master TIM (Ethernet 1)?</p>

### 8.2 Diagnosis

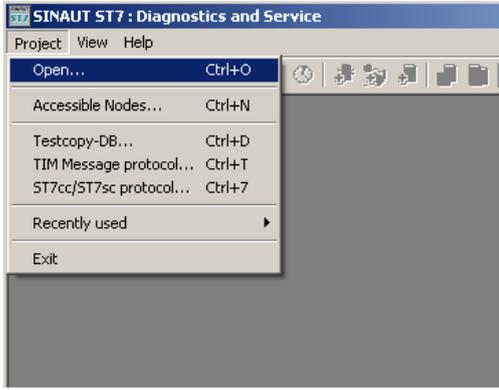
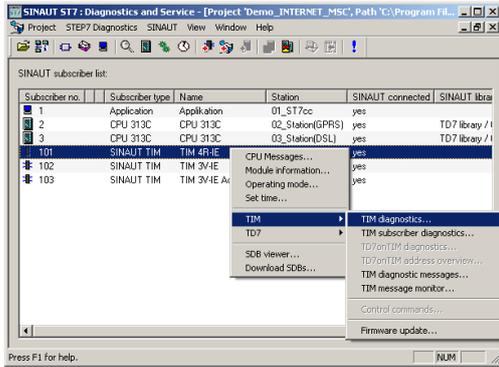
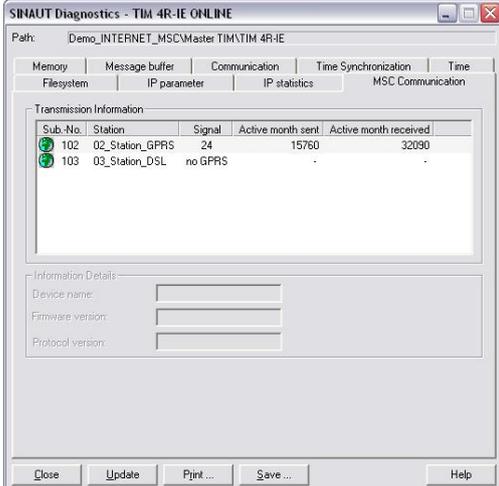
#### Sniffer

A network sniffer, e.g. Wireshark (former Ethereal), records the data traffic between stations. At the end of the recording, the data are depicted in form of packages and can be easily analyzed.

#### SINAUT ST7 Diagnostics and Service

The SINAUT ST7 Diagnostics and Service Tool provides functions for checking the connections, interfaces and communication. The firmware and software components of the network nodes can be read off.

Table 8-3

No.	Action	Screenshot															
1.	Open the SINAUT Diagnostics & Service Tool via <b>Start-&gt; SIMATIC-&gt; SINAUT ST7-Diagnostics and Services</b>																
2.	Open your project via <b>Project-&gt; Open</b>																
3.	Select the Master TIM with the right mouse key and go to <b>TIM -&gt; TIM diagnostics</b>																
4.	Go to the tab <b>MSC Communication</b> . Here you get information about the connectivity to the MSC clients. If the provider is accessible, the globe will be displayed in green.	 <table border="1" data-bbox="895 1384 1334 1518"> <thead> <tr> <th>Sub. No.</th> <th>Station</th> <th>Signal</th> <th>Active month cent</th> <th>Active month received</th> </tr> </thead> <tbody> <tr> <td>102</td> <td>02_Station_GPRS</td> <td>24</td> <td>15760</td> <td>32090</td> </tr> <tr> <td>103</td> <td>03_Station_DSL</td> <td>no GPRS</td> <td></td> <td></td> </tr> </tbody> </table>	Sub. No.	Station	Signal	Active month cent	Active month received	102	02_Station_GPRS	24	15760	32090	103	03_Station_DSL	no GPRS		
Sub. No.	Station	Signal	Active month cent	Active month received													
102	02_Station_GPRS	24	15760	32090													
103	03_Station_DSL	no GPRS															

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**Note**

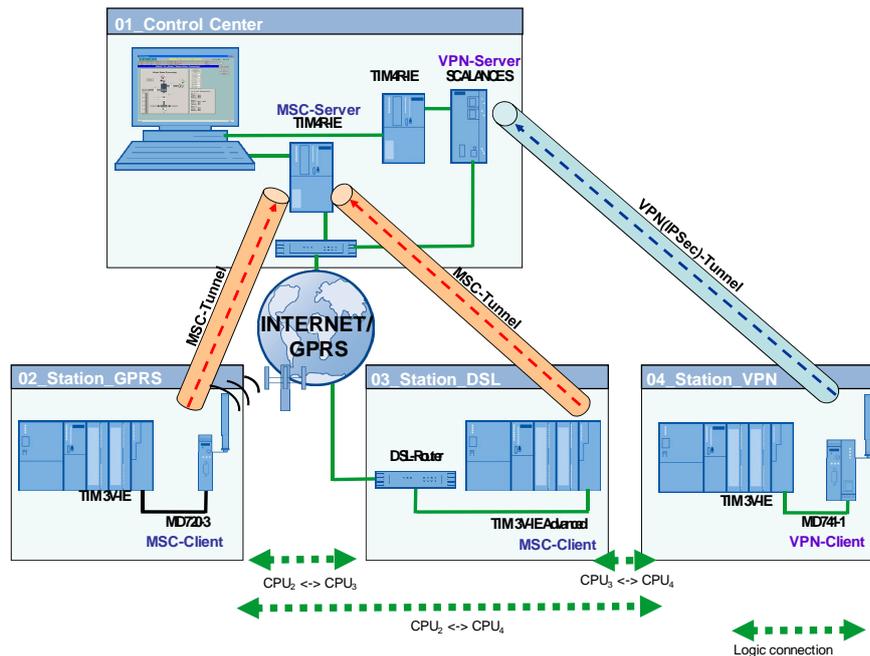
For more information about the SINAUT ST7 Diagnostics refer to the SINAUT ST7 System Manual, Volume 2 Software (see [/2/](#) in the annex).

## 8.3 Data communication between MSC and VPN- IPsec Clients

### Overview

As a combination of the solution described in this volume and the solution in Volume 2, there is the option of creating a connection between MSC and VPN- IPsec Clients. A new station is added in this example. This station is connected with the Control Center via VPN- IPsec- tunnels.

An additional TIM 4R-IE and a SCALANCE S are installed in the Control Center. A GPRS router MD741-1 is used in the new remote station (04\_Station\_VPN). This station can exchange data with the Control Center or with the MSC stations.



### Configuration & operation scenarios

Refer to Volume 2 for the configuration of the SCALANCE S, MD 741-1 and the Ethernet settings for the Master TIM and for the TIM in Station 4.

The operation scenarios are identical with Volume 1.

## 9 Glossary

### DSL

Digital Subscriber Line; households and companies can send and receive data with a high transmission rate via this line. DSL uses the already installed two to four copper wires of the telephone network, the "subscriber line".

### GPRS

General Packet Radio Service. It is an expansion of the GSM mobile radio standard by *package-oriented* data transmission.

### GSM

Global System for Mobile Communications is a fully digital mobile radio network standard.

### LAN

Local Area Network

Such a network has only a limited geographical range.

As opposed to public networks, it is under the legal control of the user and restricted to an office building or company premises.

### Pre-Shared Key

The pre-shared key is a symmetrical crypto-system. Each station has only one secret key for the decoding and encoding of data packages. The authentication is made with a common password.

### WAN

Wide Area Network

Wide area networks are designed for the language or data transmission via long distances. The concept of such networks is mainly shaped by the service provider's offers.

## 10 Links & Literature

### 10.1 Literature

The following list is by no means complete and only provides a selection of relevant sources.

Table 10-1

	Topic	Title
/1/	SINAUT ST7 Hardware	SINAUT ST7 Systemhandbuch Band 1: System und Hardware 07/2009 <a href="http://support.automation.siemens.com/WW/view/en/39026870">http://support.automation.siemens.com/WW/view/en/39026870</a>
/2/	SINAUT ST7 Software	SINAUT ST7 Systemhandbuch Band 2: Software 07/2009 <a href="http://support.automation.siemens.com/WW/view/en/39027081">http://support.automation.siemens.com/WW/view/en/39027081</a>
/3/	GPRS/GSM- Modem SINAUT MD720-3	Systemhandbuch GPRS/GSM-Modem SINAUT MD720-3 <a href="http://support.automation.siemens.com/WW/view/en/23117745">http://support.automation.siemens.com/WW/view/en/23117745</a>
/4/	CPU 31xC	CPU 31xC und CPU 31x, Technische Daten Gerätehandbuch (6ES7398-8FA10-8AA0) <a href="http://support.automation.siemens.com/WW/view/en/12996906">http://support.automation.siemens.com/WW/view/en/12996906</a>

### 10.2 Internet Links

The following list is by no means complete and only provides a selection of relevant sources.

Table 10-2

	Topic	Title
\1\	Download of Firmware V2.0 for the TIM 3V-IE / TIM 3V-IE Advanced	<a href="http://support.automation.siemens.com/WW/view/en/38698649">http://support.automation.siemens.com/WW/view/en/38698649</a>
\2\	Download of Firmware V2.0 for the TIM4R-IE	<a href="http://support.automation.siemens.com/WW/view/en/38698648">http://support.automation.siemens.com/WW/view/en/38698648</a>
\3\	How do you download the basis package of the SINAUT TIM Firmware via the NCM Firmware Loader?	<a href="http://support.automation.siemens.com/WW/view/en/26515335">http://support.automation.siemens.com/WW/view/en/26515335</a>
\4\	Country approval of MD720-3	<a href="http://support.automation.siemens.com/WW/view/en/24796562">http://support.automation.siemens.com/WW/view/en/24796562</a>

# 11 History

Table 11-1

Version	Date	Changes
V1.0	18.10.2010	First issue