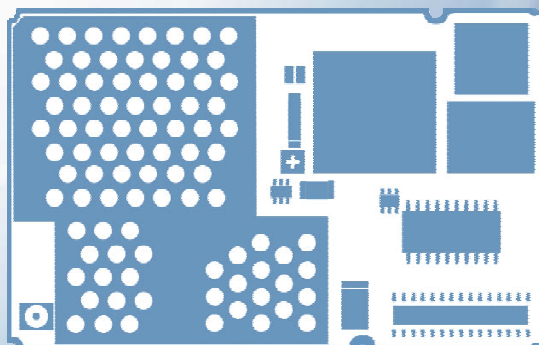# SIEMENS

GPRS
Startup User Guide
(Windows 2000)

Siemens Cellular Engines

Version: 04.00
DocId: GPRS_startup_v04.00
Supported products: AC 43, AC 45, MC 45, MC 388

Wireless Modules

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2 Introduction

This document describes how to establish a PPP connection with Microsoft Windows 2000 using any Siemens GPRS engine. Configurations and settings for other operating systems (Windows 95/98) may slightly differ, but the general proceeding is similar.

The current releases of GPRS engines are able to connect to all networks, which offer GPRS services (in Germany for example T-D1, D2, E-plus, Viag).

The figures presented in this guide, show the settings required for the German network provider T-D1. Users of other networks must adapt their settings accordingly. Chapter 9.2 summarizes the settings for all German network providers.

2.1 References

[1]   AT Command specification
[2]   Release Notes
[3]   Request for Comments: RFC 1661 - The Point-to-Point Protocol (PPP)
[4]   Request for Comments: RFC 1994 - PPP Challenge Handshake Authentication Protocol (CHAP)

2.2 Abbreviations

APN	Access Point Name
CHAP	Challenge Handshake Authentication Protocol
CID	Context Identity
CSD	Circuit switched Data
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
DSB	Developer Support Box
GPRS	General Packet Radio Service
GSM	Global System of Mobile Communication
IP	Internet Protocol
MS	Mobile Station
NOM	Network Operation Mode
OS	Operating System
PDP	Packet Data Protocol
PIN	Personal Identification Number
PPP	Point to Point Protocol
PSD	Packet switched Data
PTM	Packet Transfer Mode
QoS	Quality of Service
RAS	Remote Access Service
ROM	Read Only Memory
SIM	Subscriber Identity Module
TCP	Traffic Control Protocol

3 What you need

1. GPRS settings from your network provider
   Before you can set up your device to access the GPRS network, contact your network provider to obtain the following information:

   - APN (name of an access point that connects the mobile network to the Internet)
   - Primary and secondary DNS
   - Default QoS settings
   - IP header compression
   - IP address (DHCP or static)
   - User name and password (may be optional)

2. Modem installation and configuration
   You will need to set up the modem driver used for the Dial-Up connection. Follow the steps in chapter 4.

   Note:
   Administration rights for your Operating System may be needed in order to install the modem driver. Contact your local system administrator for advice.

3. Dial-Up Network installation and configuration
   Furthermore, you will need to configure the Dial-Up Network itself. Follow the steps in chapter 5.

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4 Setting up a Windows modem driver

4.1 Adding a new modem

If no Standard 19200 bps Modem has been installed yet, add a new standard modem to the modem section of the control panel:
Tap **Start** -> **Properties** -> **Control panel**

Double click on **Phone and Modem Options**

Click on **Add...** in order to install a new modem
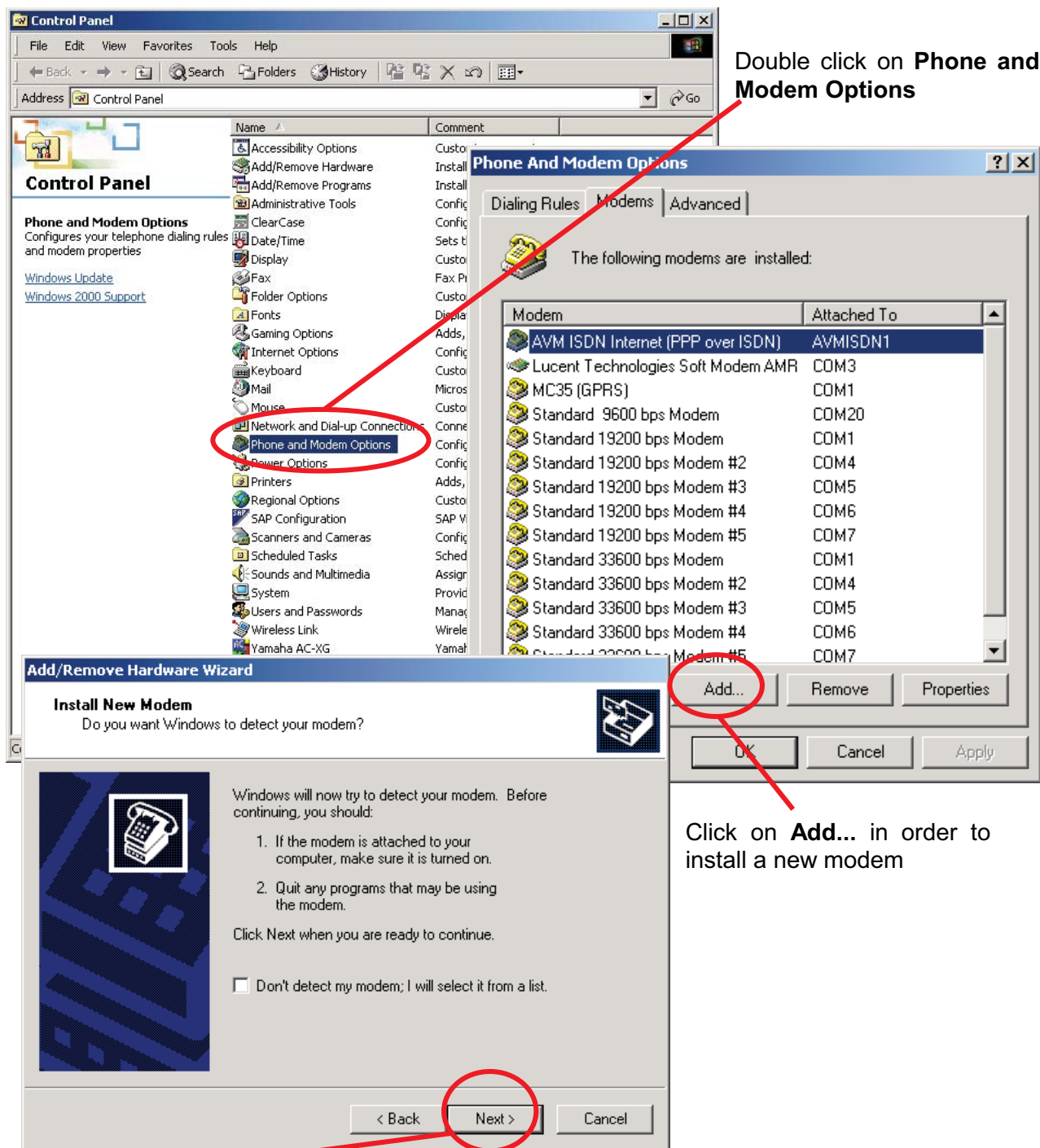
Click **Next** to continue the modem installation.

Select **Standard Modem Types** and choose the **Standard 19200 bps Modem**.
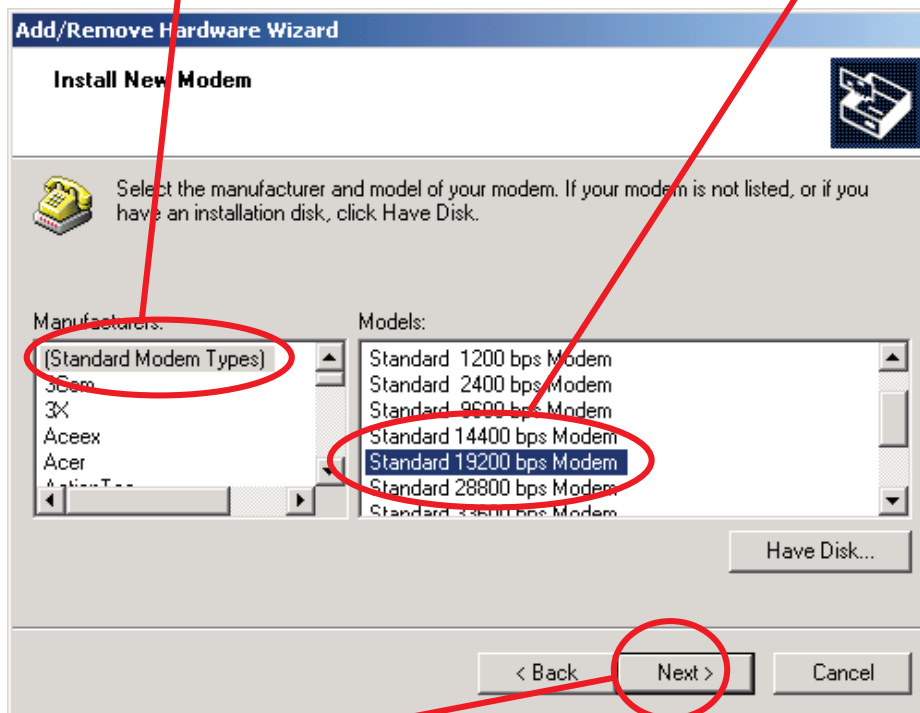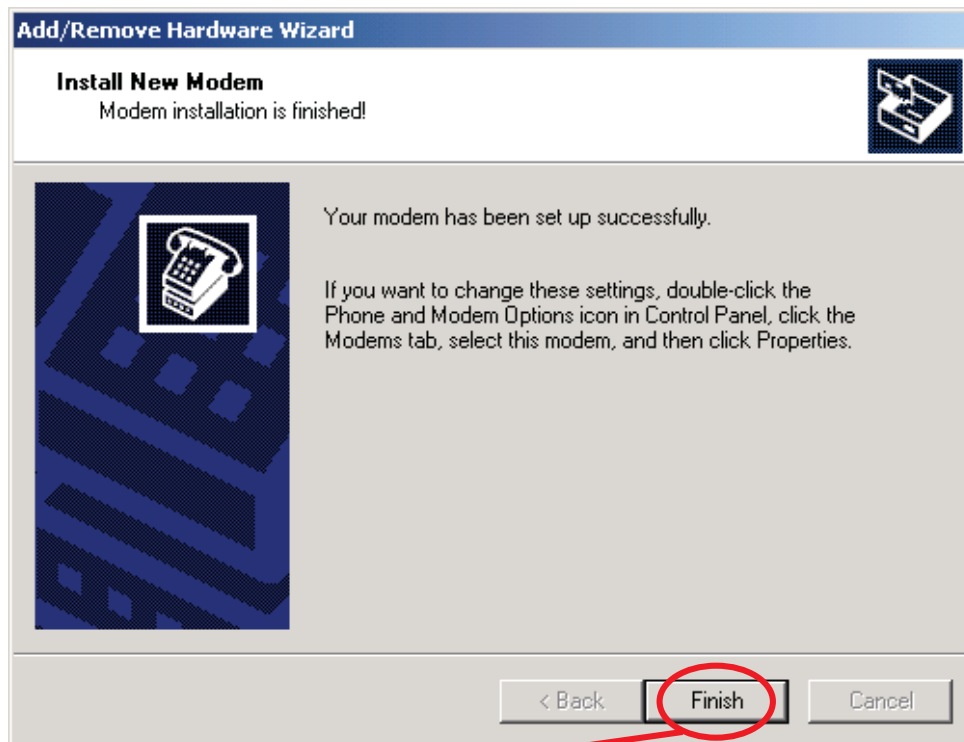

Click **Next** to continue the modem installation.
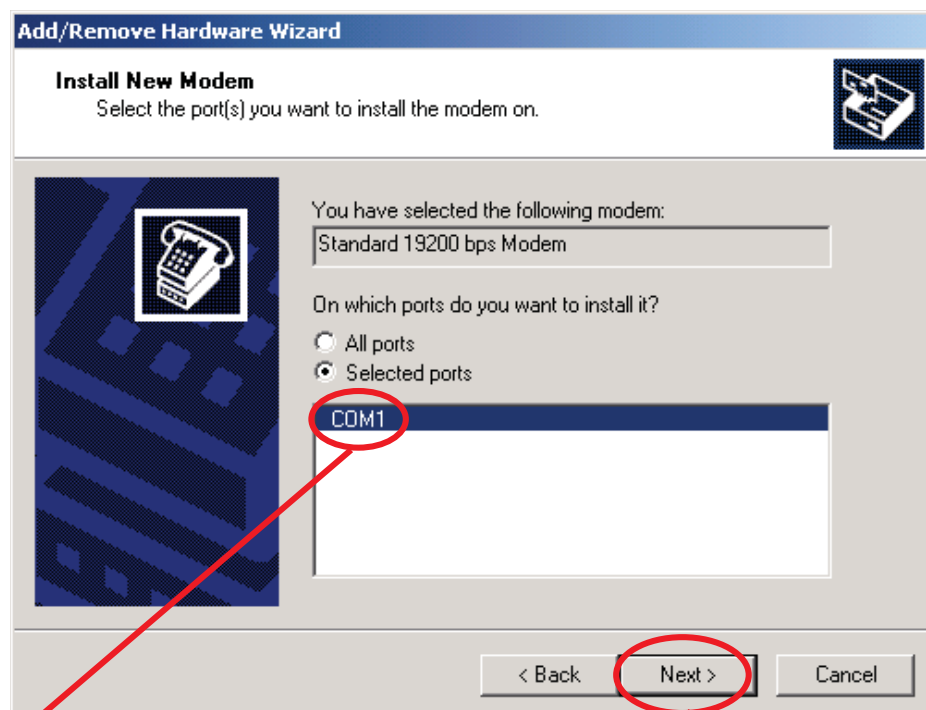
Select the **COM Port**, which shall be used for the connection. Click on **Next** to continue the modem installation.

Note: If potentially all ports shall be used for connection, select **All ports** before proceeding.

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Click on **Finish** to terminate the modem installation.

4.2 Configuring the modem driver

To configure the modem driver, tap **Start** -> **Properties** -> **Control panel** -> **Phone and Modem Options** as described in chapter 4.1. Choose the modem and COM Port to be configured and click on **Properties**.
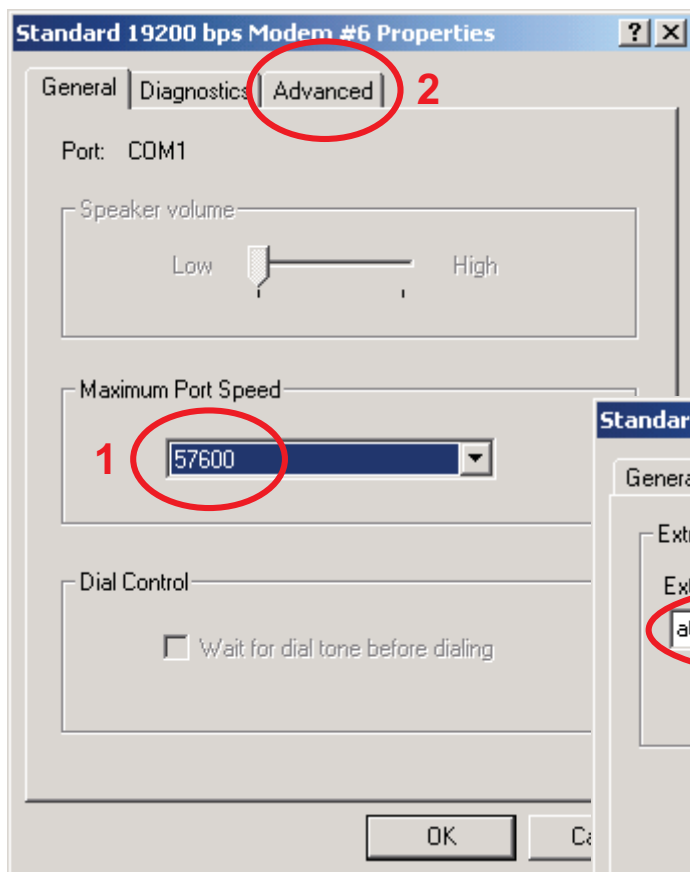
Choose the desired baud rate (1). 57600 or 115200 is recommended for most cases.

Tap **Advanced** (2) in order to enter the advanced settings.
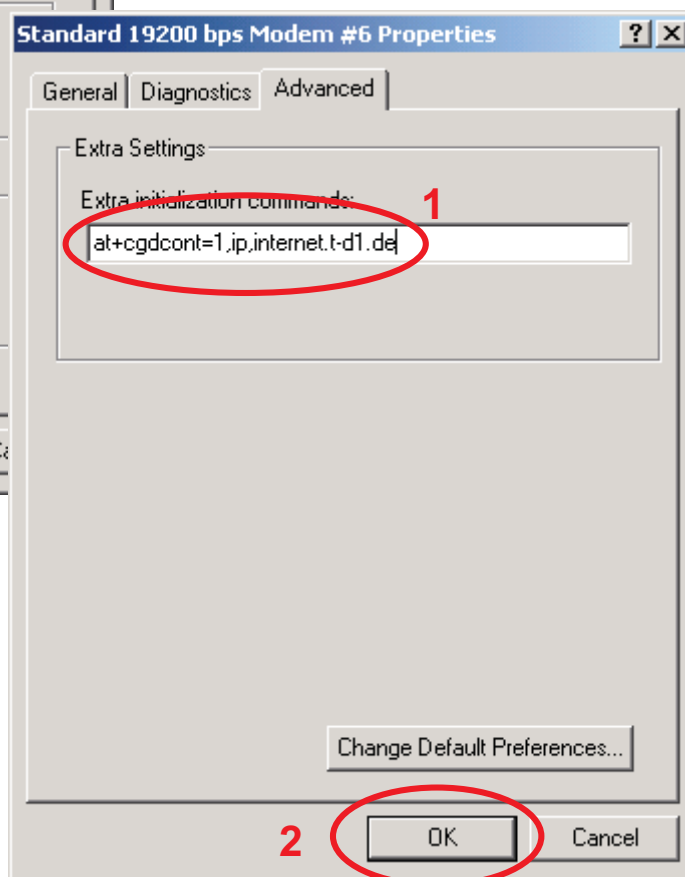
As **Extra initialization command** (1) enter the **at+cgdcont** command with the corresponding parameters.

Note: The APN depends on the network operator. The example given refers to the german operator D1.

Click on **OK** (2) to finish the configuration of the modem driver

5 Setting up the Dial-up network

5.1 Adding a new Dial-up connection

In order to use the GPRS service a new dial-up connection must be added. Tap **Start** -> **Properties** -> **Control panel**

Double click on **Network and Dial-up Connections.**
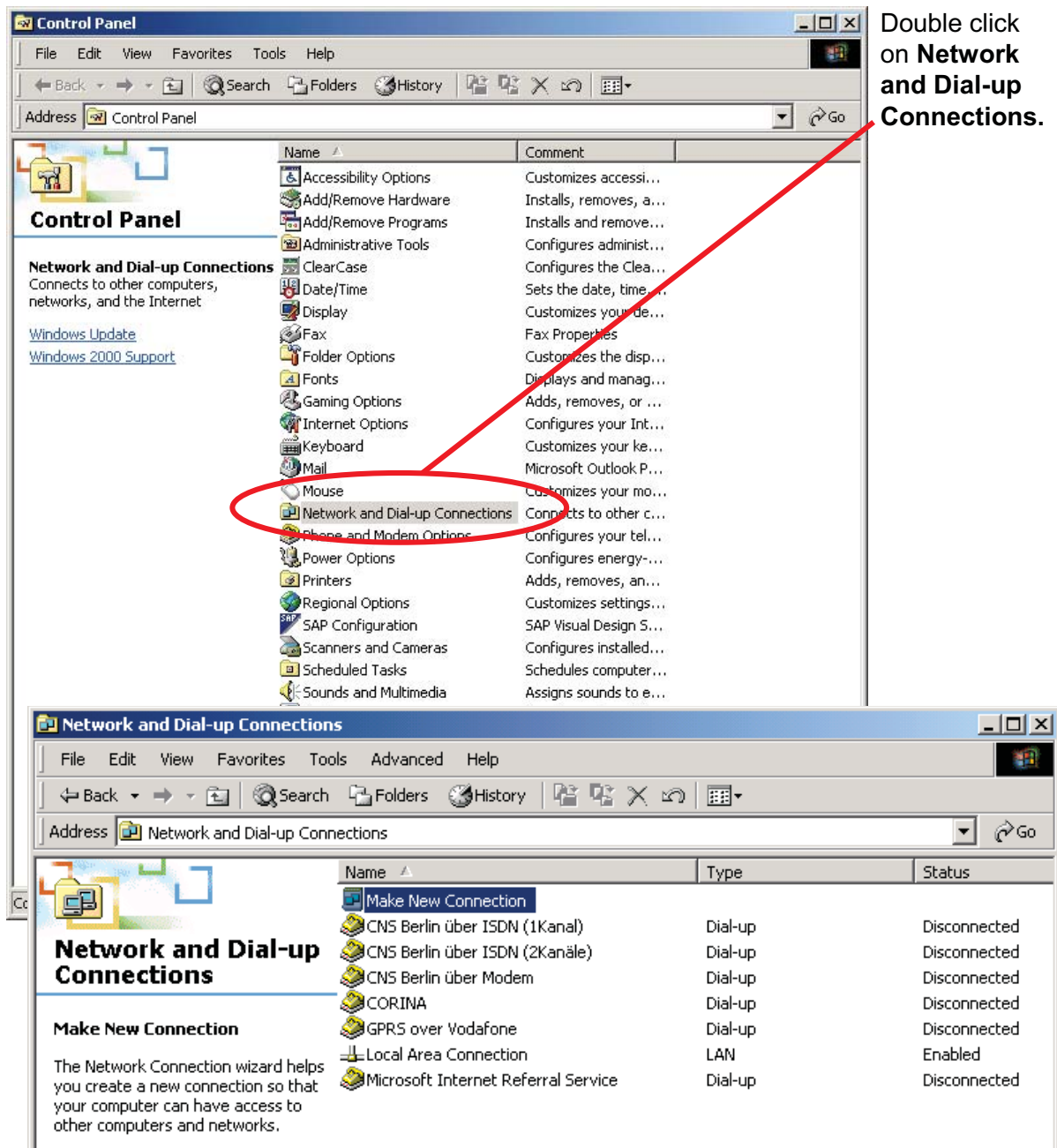
Select **Make New Connection** in order to set up a new dial-up connection.

The Network Connection Wizard opens in a new panel.

Click **Next** to continue the installation of a new dial-up connection.
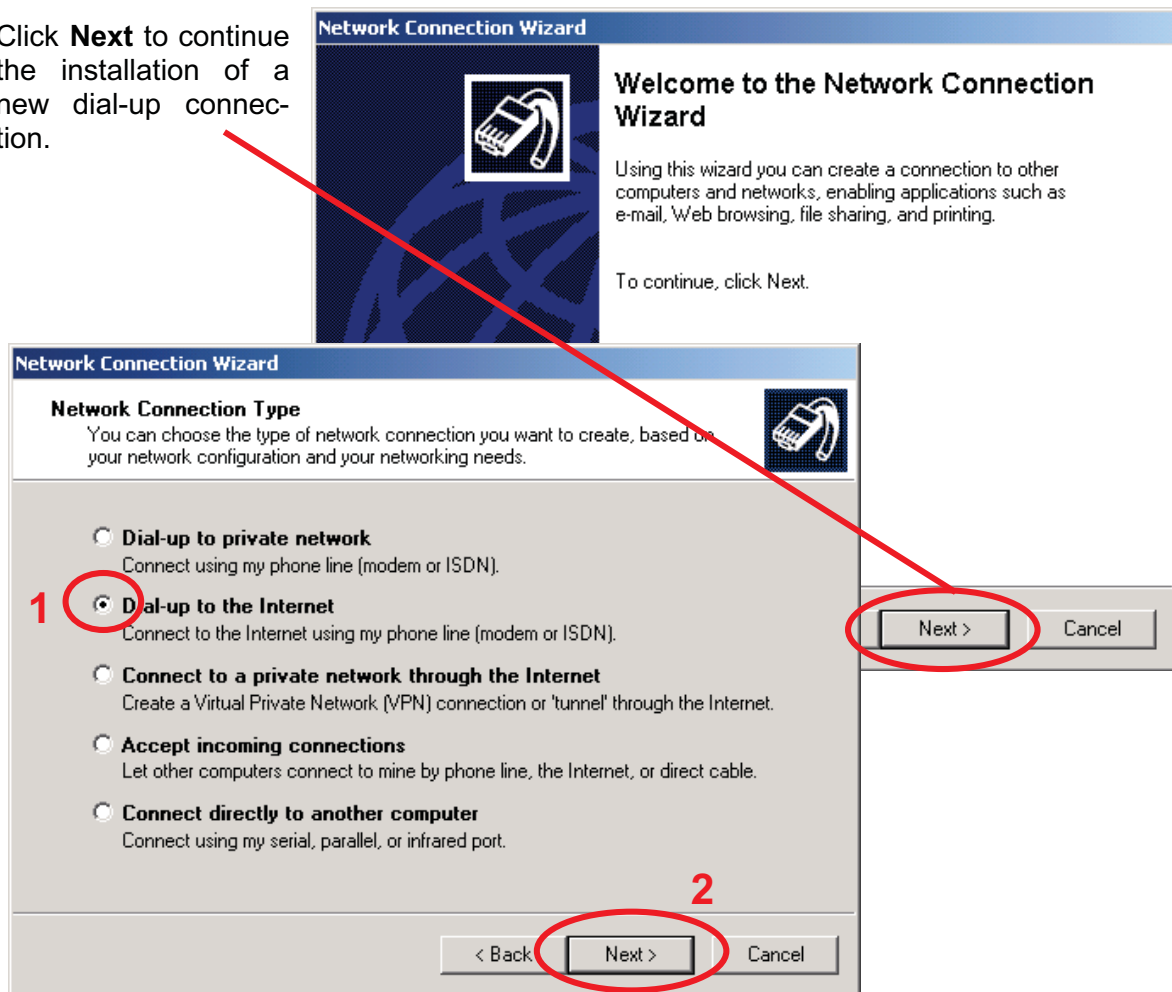
Tap **Dial-up to the Internet** (1) and click **Next** (2) to proceed with the installation of a new dial-up connection.

Select **I want to set up an Internet connection manually...** (1) and Click **Next** (2) to continue the installation of a new dial-up connection.
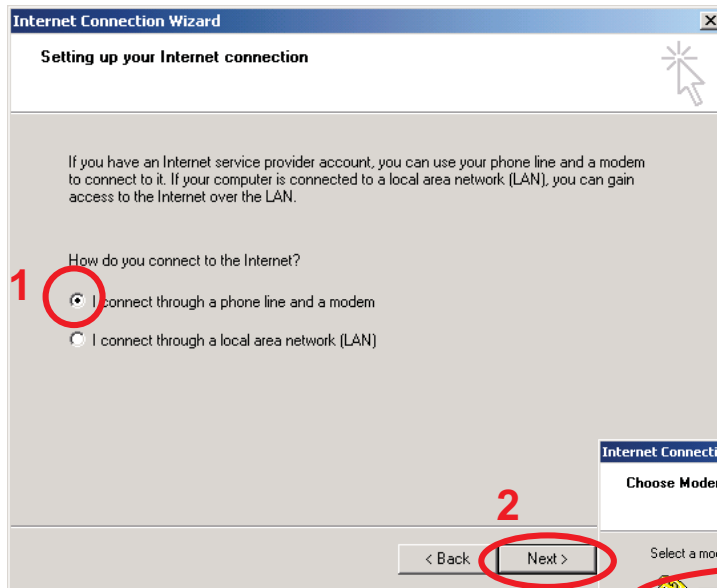
Select **I connect through a phone line and a modem** (1) and Click **Next** (2) to continue the installation.

Select the **Standard 19200 bps Modem** (1) and Click **Next** (2) to continue the installation.
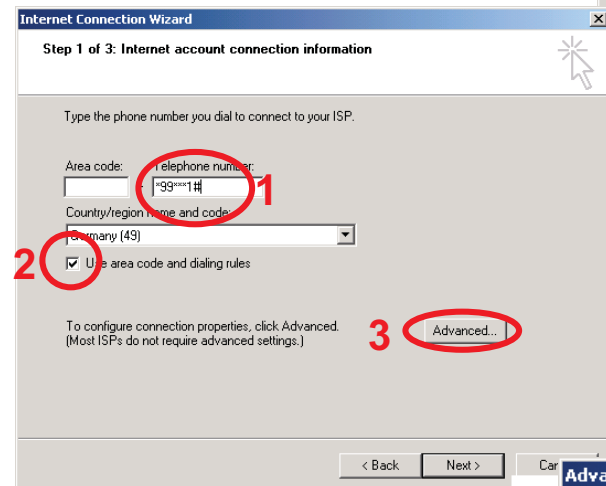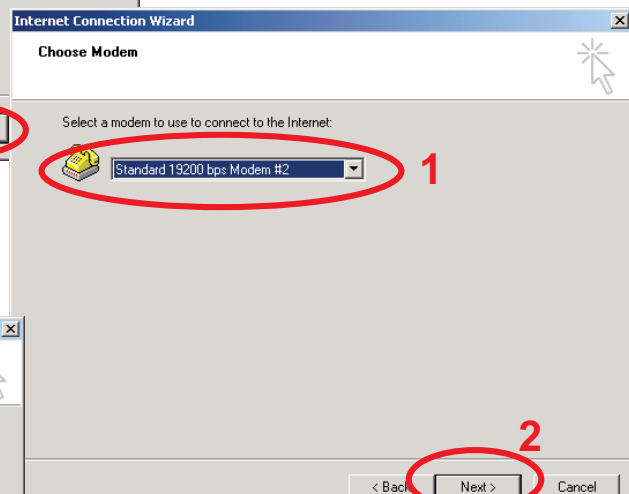
Insert the telephone number ***99***1#** (1) for a GPRS connection. Select the appropriate **country/region name** (example is Germany for T-D1) and use the **area code and dialing rules** (2). Click on **Advanced** (3).

Choose **PPP** as **connection type** (1) and **None** for **Logon procedure** (2). Tap **Addresses** (3) in order to enter more settings.
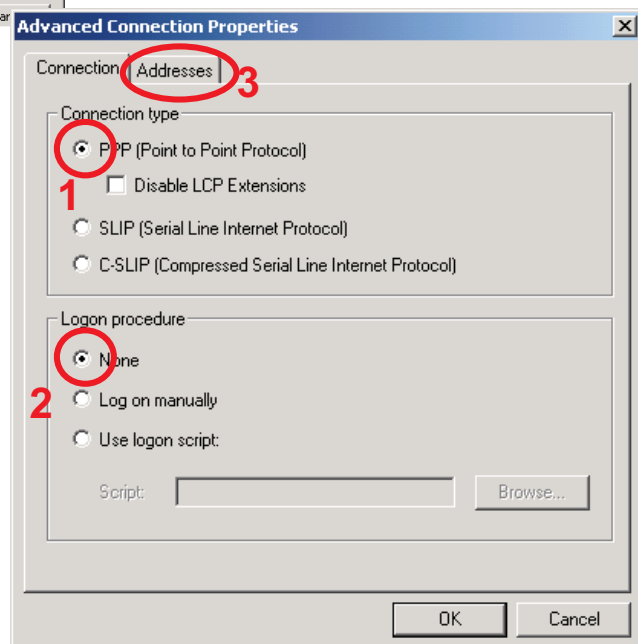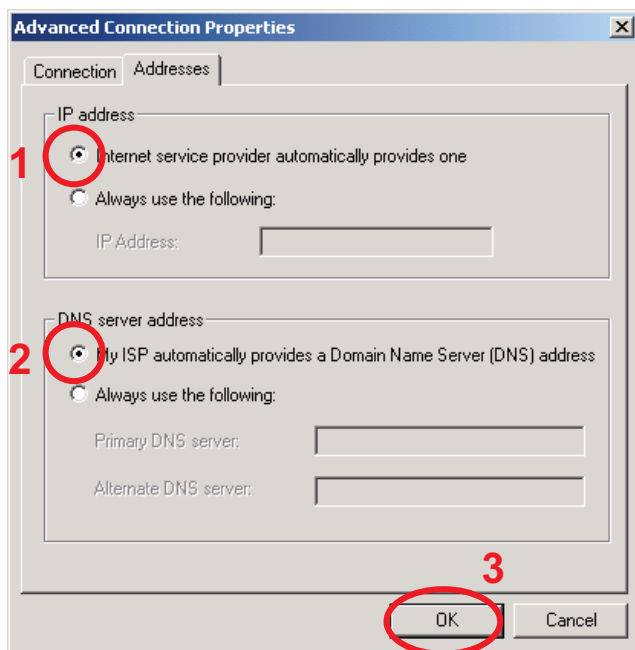
Tap **Internet service provider...** (1) and **My ISP...** (2). Click **OK** (3) to return to the Internet Connection Wizard.
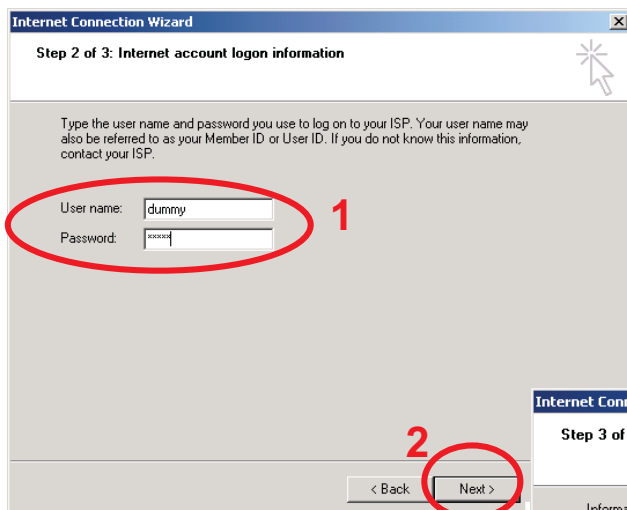
Enter **User name and Password** (1).

Note: These values must be provided by the network operator. Some operators do not require any value. This is also the case for D1. Therefore dummy values have been entered.

Click **Next** (2) to continue the installation.

Enter a Connection name (1).

Note: Given the fact that more than one connection may be defined, it is recommended to enter a meaningful name.

Click **Next** (2) to continue the installation.
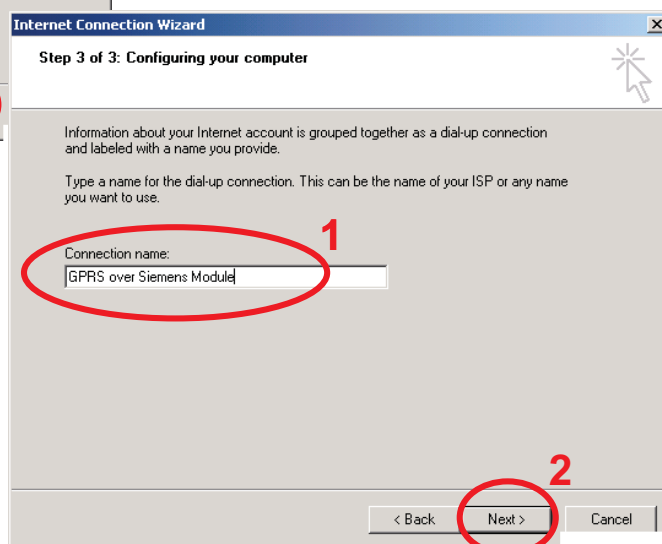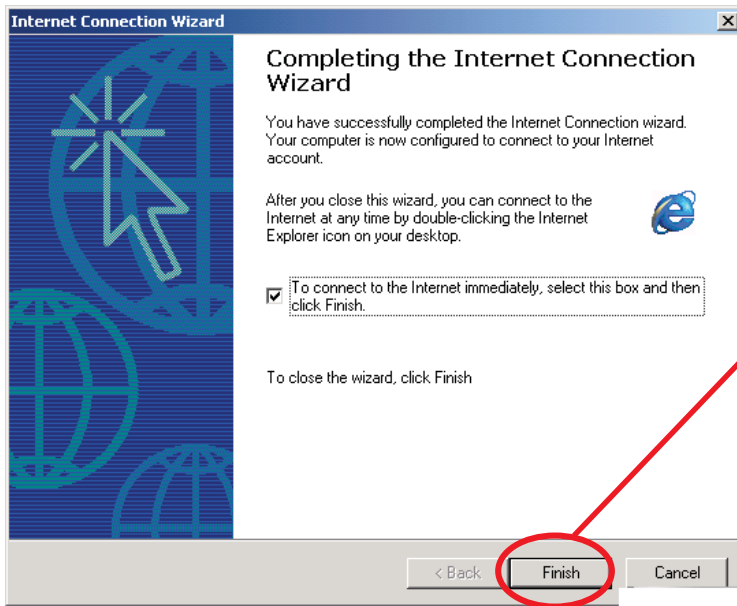
The installation process is now finished. Click **Finish** to exit the procedure.

5.2 Configuring the dial-up connection

In order to use the GPRS service a new dial-up connection must be added. Tap **Start** -> **Properties** -> **Control panel -> Network and Dial-up Connections**
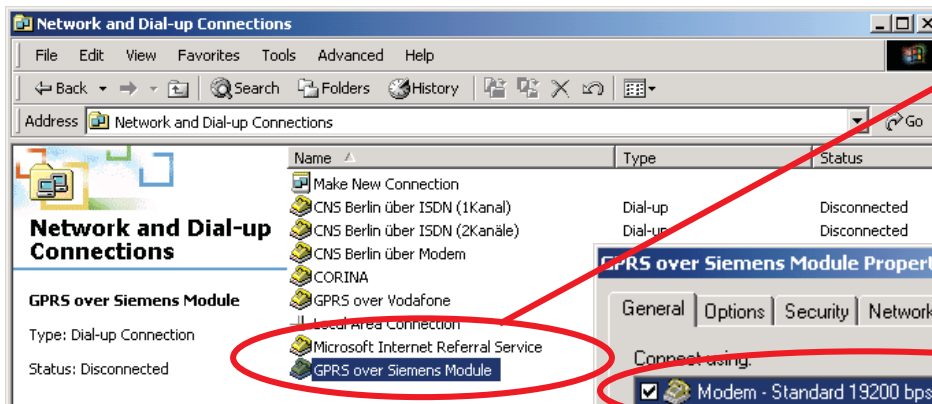
Double click on **GPRS over Siemens Module.**

In the **General** slide select the Modem, which has been installed (1). The correct **phone number** and **Country Code** should already appear, because they have been entered earlier. If not, enter them now.
All other settings on this page can be made according to own taste.
Click on **Configure** (2) to make further settings for the modem.
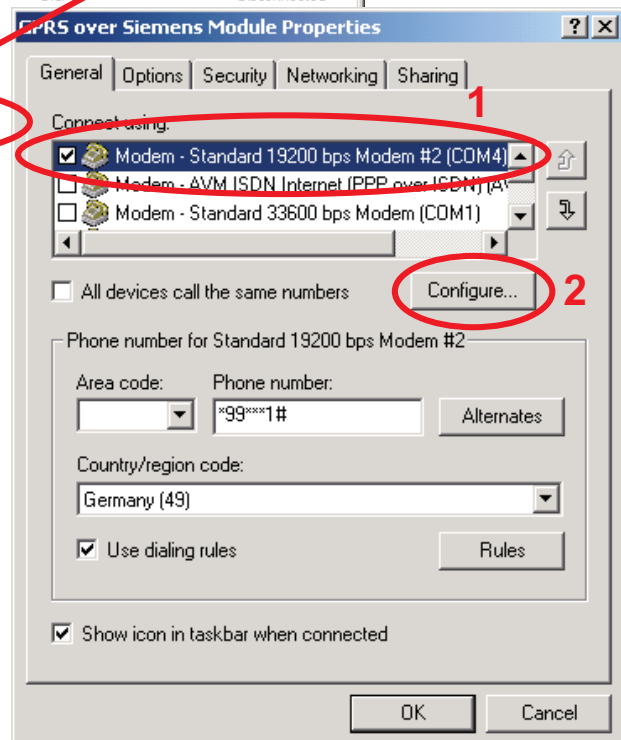
A new panel opens for the Modem Configuration.

Enter the following values:
* **Maximum speed (bps)** (1)**:**
  Values 57600 bps or 115200 bps are recommended for most applications. However, any individual value may be chosen.
* **Hardware features** (2)**:**
  Enable hardware flow control
* **Initialization** (3)**:**
  Settings may vary according to own taste.

The **modem speaker** (4) can be enabled if desired.

Click **OK** (5) to proceed with the configuration. Tip the **Networking** tab.
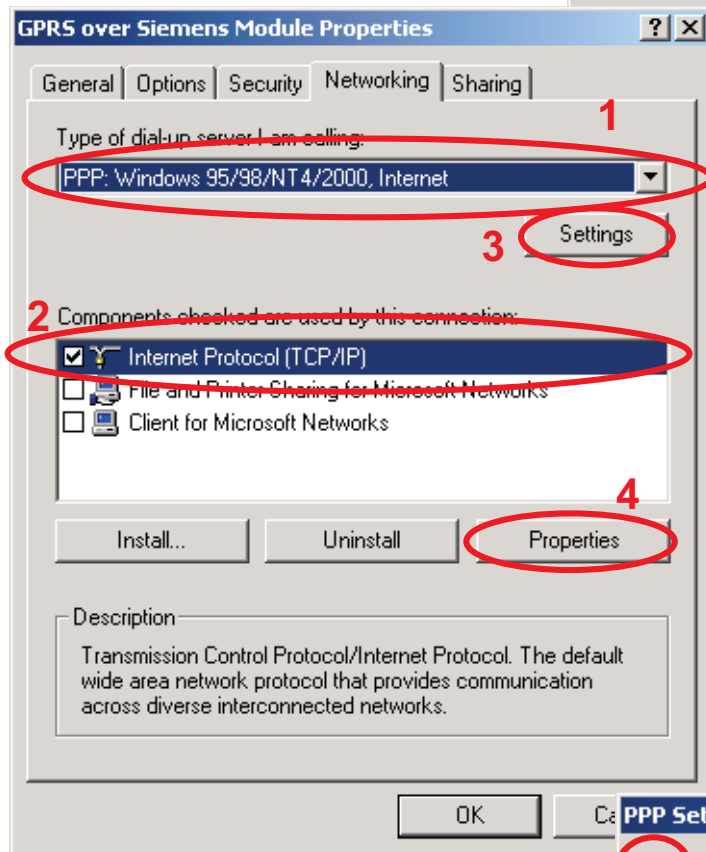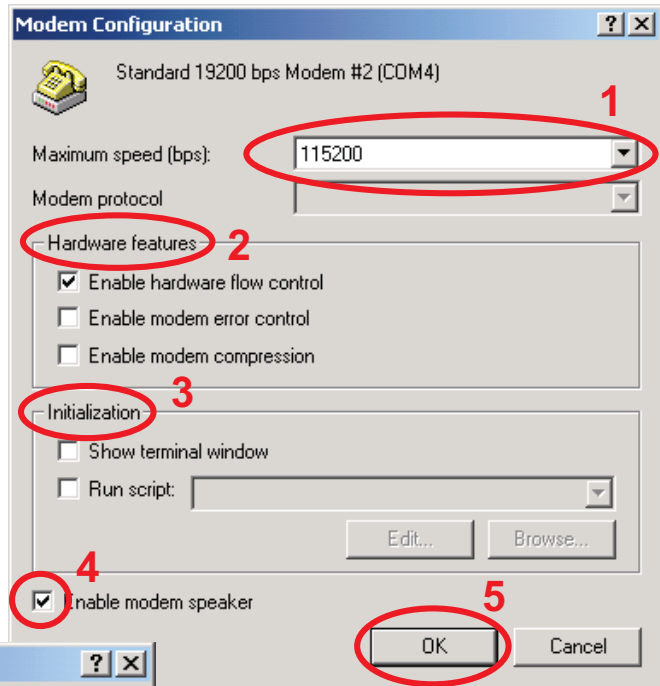
Choose **PPP:...** (1) for the type of dialup server and tap **Internet Protocol (TCP/IP)** (2). Click on **Settings** (3) in order to configure the PPP connection.

The **PPP Settings** window will open. Select **Enable LCP extensions** (3a) and **Negotiate multi-link for single link connections** (3b).
Click on OK (3c).

Click on **Properties** (4) in order to configure the **TCP/IP properties**.
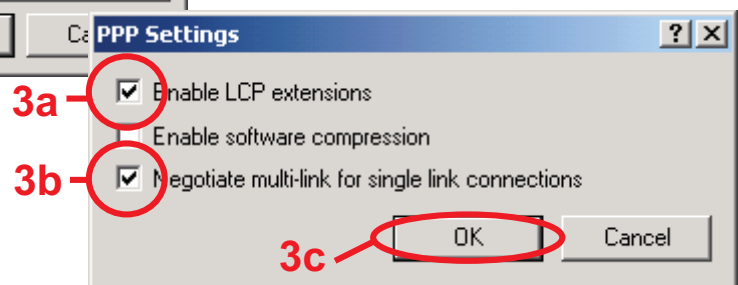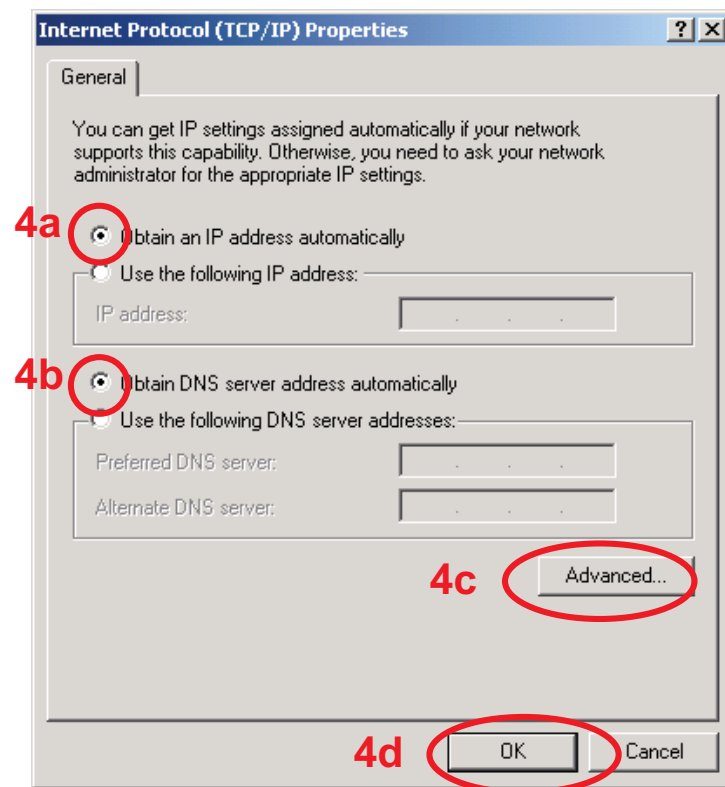
Select: **Obtain an IP address automatically** (4a) and **Obtain DNS server address automatically** (4b).
Click on **Advanced** (4c) in order to make **the Advanced TCP/IP Settings**.
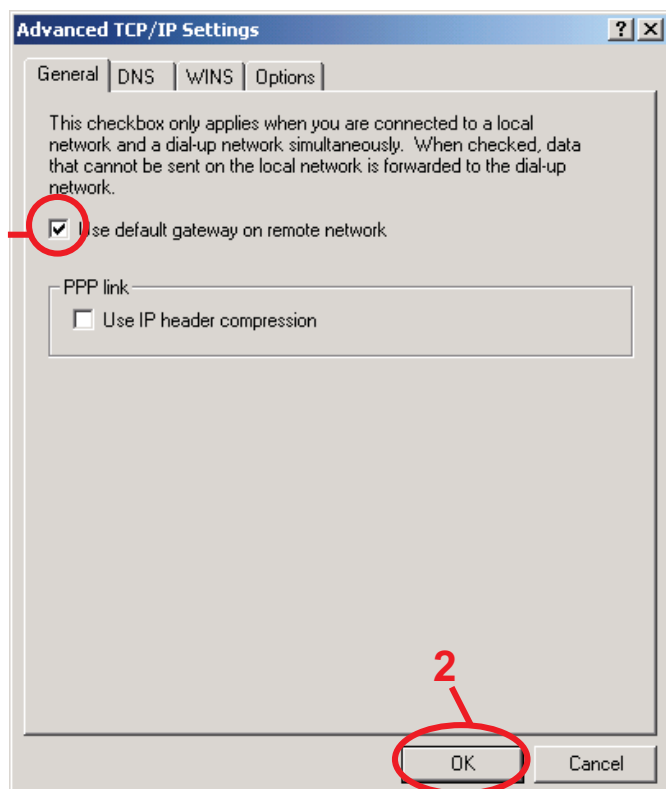
In the **General** tab, select **Use default gateway on remote network** (1) and click **OK** (2) to return to the **TCP/IP Properties** page.
Click on **OK** (4d) to return to the **GPRS over Siemens Module** page.
Click on **OK** to end the configuration.

6 Getting started

Make sure the Siemens Wireless Module connects properly to the application platform. For testing purposes, you can use for example the evaluation kit named DSB35/45 Support Box.

6.1 Registering to the GSM network

To be able to attach to the GPRS services your terminal or mobile must be registered to the GSM network, i.e. PIN authentication must have been done during the current session. You have two ways to do so:

If the used SIM card is unlocked, the terminal or mobile will automatically log on to the network without requesting SIM PIN1.

If the SIM card is locked you can use any terminal program to enter the PIN. The terminal program should be properly connected to the Siemens Wireless Module and configured for 8 Databits, No Parity, 1 Stopbit, flow control and the recommended bit rate of 57600 bps. IMPORTANT: When PIN authentication has been successful, close the terminal program to free the communication port. To enter the PIN use the AT+CPIN command (see [1] for detailed instructions).

> *Example:*
>   AT+CPIN=1234
>   OK

Now, quit the terminal program.

6.2 Defining the PDP context

In order to activate a PDP context with the dial up network, a PDP context needs to be defined before. This means, that the mobile needs to inform the network about certain parameters, so that the context will be activated correctly. The PDP context definition can be done in several ways:

- If no entry has been made in the **Extra settings** of the modem properties (see chapter 4.2) and the dial up network is started with the phone number ***99#**, no individual PDP context values are known. In this case the module will use default values for the connection. The default values are the ones, which had been used for the last connection.

  Note:
  In more and more cases it is required to predefine a PDP context. For example, if the local network provider requests an APN. In these cases the first example does not work and one of the two following options must be chosen.

- If the **Extra settings** of the modem properties have been filled in, the CID is known. In order to activate the PDP context with the predefined values, ***99***<cid>#** instead of ***99#** must be chosen as the phone number entry (see figure below). However, if ***99#** is chosen, the module will ignore the predefined values and activate the PDP context with the default values. Then all statements made in the first example apply.

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- The PDP context may also be defined manually via a terminal program (57600 Baud, 8 Databits, No Parity, 1 Stopbit, flow control), or by the user application respectively.

  Start the terminal program. Define the PDP context using the „AT+CGDCONT" command (see also [1] for details):

  Example: AT+CGDCONT=1,ip,internet.t-d1.de <RETURN>

  Close the terminal program when finished to free the communication port.

Note:
For most of the cases it is advised to activate the PDP context using the predefined values.
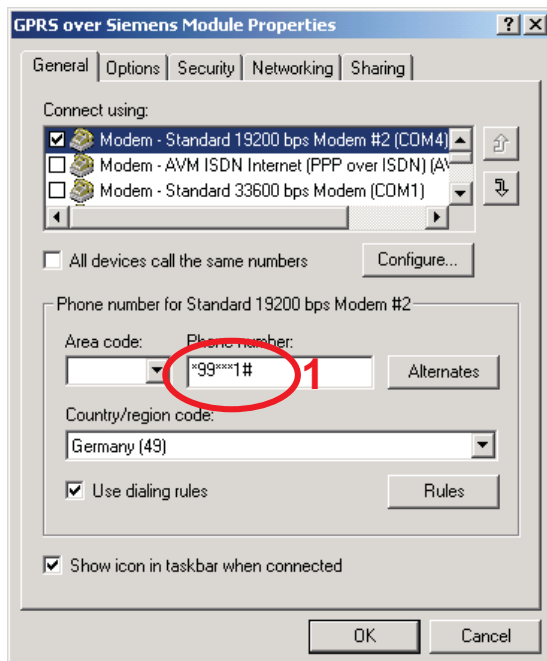
Open the **GPRS over Siemens Module Properties** page as described in chapter 5.2.

If not already entered, choose ***99***<cid>#** (1) instead of ***99#** as the phone number entry in the dial up network, in order to activate the PDP context with the predefined values. Otherwise, the module will ignore the predefined values and activate the PDP context with the default values.

6.3 Defining the QoS profile

After the PDP context definition has been finished, specific optional QoS parameters like **Delay Class** or **Mean throughput rate** can be set before activating the PDP context with the Dial-up network. This can be done via a terminal program (57600 Baud, 8 Databits, No Parity, 1 Stopbit, flow control), or by the user application respectively.:

Start the terminal program. Set the parameters using the „AT+CGQMIN" and/or „AT+CGQREQ" commands (see also [1] for details). Close the terminal program when finished to free the communication port.

Example: AT+CGQREQ=<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean> <RETURN>
AT+CGQMIN=<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean> <RETURN>

Note:
The QoS AT commands can only be used when a PDP context has been defined! In order to activate the PDP context with the predefined QoS values, choose ***99***<cid>#** instead of ***99#** as the phone number entry (see also chapter 6.2). However, if ***99#** is chosen, the module will ignore the predefined values and activate the PDP context with the default QoS values.

6.4 Setting up a GPRS call

If not linked to the desktop, go to the Dial-Up Network folder and select the connection you just created. Enter the phone number as described in 6.2.
Enter the **User name** and **Password**. If you tick **Save password**, no panel requesting the password will open in the future.

Note:
User name and password may in some cases be optional. Address to your network operator for possible changes and more information.
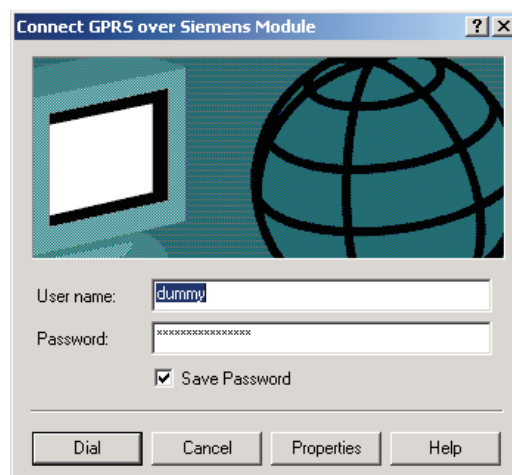
Quick test
To test the connection, simply initiate a ping at the command prompt.

1st test: ping without DNS name resolution:
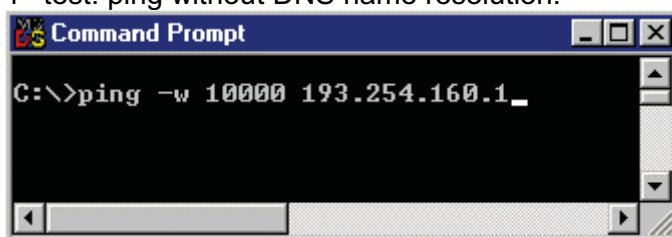
2nd test: ping using DNS name resolution:
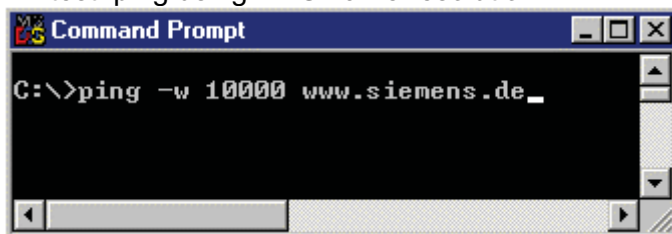
The "-w" parameter specifies the number of milliseconds to wait for the reply. To run the test type for example "ping –w 10000 www.siemens.de". The amount of time may vary with the network access. It is recommended to enter a value in the range from 10000 ms to 20000 ms.

6.5 Browser Settings

No proxy server needs to be configured in the browser.

If you have the Microsoft Internet Explorer installed, you can select the phonebook entry created for the GPRS access as your favorite dial-up networking connection. To do so, go to the Tools menu and tap Internet Options / Connections. Select the phonebook entry and check one of the three dial-out option buttons. The sample phonebook entry used throughout this guide, would be listed as "GPRS over Siemens Module".

Please note that, currently, the GPRS service is not yet implemented to the full extent. This may slow down responses to requested URLs.

6.6 Terminating the GPRS call

For stopping a GPRS data connection, deactivating a PDP context and detaching the module, see chapter 7.4.

7 GPRS AT commands

7.1 General

To transmit data via GPRS, the application software uses a PPP stack. Most standard operating systems (e.g. Windows, Unix/Linux) use it as a part of a standard modem driver. In Windows based operating systems these drivers are part of the Dial-up network. For other operating systems these drivers must be provided by the user in order to enable TCP/IP connections.

However, application software which does not run on a standard OS platform or which does not use the Dial-up network, can establish a PDP context by executing a series of AT commands. Of course, you may also manually type these commands using any terminal program. Afterwards the PPP stack is activated.

Refer to the following chapters for instructions.

7.2 Discrete PDP context activation

- **Entering the PIN (AT+CPIN)**
  The connection of the Siemens Wireless Module to the terminal program and the registration to the GSM network are described in chapter 6.1.

    Example: AT+CPIN=1234 <RETURN>
              OK

- **Defining a PDP context (AT+CGDCONT)**
  Chapter 6.2 describes the procedure of how to define a PDP context.

    Example: AT+CGDCONT=1,ip,internet.t-d1.de <RETURN>

- **Defining a QoS profile (AT+CGQREQ, AT+CGQMIN)**
  Chapter 6.3 describes the procedure of how to define a QoS profile.

    Example: AT+CGQREQ=1,3,4,3,0,0 <RETURN>
                  AT+CGQMIN=1,3,3,3,0,0<RETURN>

    where the numbers correspond to <PDP context identifier>, <Service precedence>, <delay class>, <reliability class>, <peak throughput rate>, <mean throughput rate >.

- **GPRS attach (AT+CGATT)**
  In order to use the GPRS service the Siemens Wireless Module must be GPRS attached. From that moment on the PLMN knows that the Siemens Wireless Module is GPRS capable. This means the Siemens Wireless Module can initiate a GPRS data call and Mobility Management routines apply.

    Example: AT+CGATT=1
                  OK

    Note: The GPRS attach may already be done before the PDP context and the QoS profile definition.

- **PDP context activation (AT+CGACT)**
  Before data can be transmitted, a PDP context must be activated. One way to do this is the CGACT command.

  > **Example:**   AT+CGACT=1,<cid>
  >   OK

  > **Note:** More than one context can be activated. If no GPRS attach has been done before, it will be done automatically by the AT+CGACT command.

- **Entering PPP online mode (AT+CGDATA)**
  In order to set the Siemens Wireless Module to PPP online mode (GPRS data mode) and activate the PPP stack, the CGDATA command may be used.

  > **Example:**   AT+CGDATA=PPP,<cid>
  >   CONNECT
  >   ~ }#+!}!}#} }9}"}&} }*} } }'}"}(}"}%}&µ-r#}#}%-#}%*,~~ }#

When the Siemens Wireless Module has answered with CONNECT, it is in PPP mode and no further AT commands can be sent to the module until the PPP connection has terminated. The cryptic letter combination displayed after the CONNECT is the terminal interpretation of the PPP traffic. For more details about the PPP handshake see also [3] and [4].

Note: The activation of the drivers necessary to make a TCP/IP connection has to be initiated by the OS. It is the user's responsibility to adapt the software accordingly and provide the appropriate drivers.

7.3 Modem compatible PDP context activation

7.3.1 No preceding PDP context activation

The series of discrete AT commands can be replaced by the ATD command as described in chapter 0.

> **Example:**   ATD*99#
>   CONNECT
>   ~ }#+!}!}#} }9}"}&} }*} } }'}"}(}"}%}&µ-r#}#}%-#}%*,~~ }#

7.3.2 Preceding PDP context activation

If setting up a call with defined QoS and PDP context parameters, the following AT commands can be used as described in chapter 7.2.

> **Example:**   AT+CGDCONT=1,IP,volume.d2gprs.de
>   OK
>   AT+CGQREQ=1,3,4,3,0,0
>   OK
>   ATD*99***1#
>   CONNECT
>   ~ }#+!}!}#} }9}"}&} }*} } }'}"}(}"}%}&µ-r#}#}%-#}%*,~~ }#

7.4 Shutting down the connection

The GPRS data connection can be shut down in the Dial-Up Network by taping the **Hang up** button. However the PDP context is still alive. It can be stopped with the AT command AT+CGACT.

      Example: AT+CGACT=0,<cid>
                             OK

When detaching with the AT+CGATT command, no GPRS data connection is possible before reattaching.

      Example: AT+CGATT=0,<cid>
                             OK

Note: The CGATT command also performs a PDP context deactivation, if the context had not been deactivated before.

Another alternative is the ATH command, which closes a data connection, deactivates the PDP context and detaches the module.

      Example: ATH

Note: ATH closes all ongoing voice and data connections!

8 GPRS Features

8.1 Mobile Station Class-B

Siemens GPRS Wireless Modules support Mobile Station Class-B. This means that the MS (Mobile Station) can set up a GSM call (voice, CSD or fax) while GPRS attached. When the MS is already engaged in a GPRS data transfer, an incoming GSM call causes the GPRS data flow to be suspended. This case is only defined for Network Operation Mode I (NOM I, see GSM Recommendation 03.60, chapter 5.4.5). Out of the three Network Operation Modes offered by network operators, NOM I is the only one which supports Paging coordination. Paging coordination is needed to send the Paging Message via the Packet Data Channel (PDCH) to the MS. Once the GSM call is terminated the GPRS transaction will be resumed.

The implemented and tested behaviour of Siemens Wireless Modules can be guaranteed for the Network Operation Mode NOM II. Due to the fact that NOM I is not yet implemented in the networks it was not possible to verify the Class-B capabilities of Siemens Wireless Modules.

When a voice, CSD or fax call is ongoing (dedicated mode), you cannot set up a GPRS connection. As a result, no PSD transfer can be made.

ATH ends all ongoing calls (V25.ter) on the originating logical channel! In order not to stop the GPRS connection, the voice, CSD or fax call must be ended with AT+CHLD=1. Use AT+CHLD=0 to reject incoming calls. Please note that AT+CHLD=(0,1) is available no matter whether or not the Multiparty service has been subscribed to, i.e. the command can be used even though the SIM card does not support Multiparty calls.

The behaviour of the serial interface lines DSR, DTR and DCD is the same for CSD and GPRS data connections. For example, when you switch from PPP online mode to command mode (using +++), the DCD state does not change.

8.1.1 Examples: Using Class-B functionality via the serial interface

This chapter provides step-by-step instructions of how to make use of the mobile's Class-B capabilities in a NOM II or NOM I network. The examples proceed from the fact that the MS is already in PPP online mode and either engaged in a GPRS data transaction (= in PTM) or not engaged (= not in PTM). While the MS is in PTM, GSM calls can only be accepted if the network is type NOM I.

For using the Class-B functionality the Multiplex Mode is not necessary. The scenarios described below are executed on one single logical channel.

Please note that URCs, for example "RING" can only be displayed if the MS is in command mode.

1. **Making a voice call while MS is in PPP online mode, but not in PTM**
   - Use +++ to change from PPP online mode to command mode
   - Set up a voice call with ATD<destination number>;
   - End the voice call with AT+CHLD=1
   - Go back to PPP online mode with ATO

2. **Making a CSD / fax call while MS is in PPP online mode, but not in PTM**
   - Use +++ to change from PPP online mode to command mode
   - Set up a CSD call with ATD<destination number>
   - After the CSD / fax call was established, change from data mode to command mode with +++
   - End the CSD / fax call with AT+CHLD=1
   - Go back to PPP online mode with ATO

3. **Answering a voice call while MS is in PPP online mode, but not in PTM**
   - Hardware ring indicates incoming voice call
   - Use +++ to change from PPP online mode to command mode
   - URC "RING" is displayed
   - Accept the voice call with ATA or reject with AT+CHLD=0
   - After the voice call was accepted, you can end the voice call with AT+CHLD=1
   - Go back to PPP online mode with ATO

4. **Answering a CSD / fax call while MS is in PPP online mode, but not in PTM**
   - Hardware ring indicates incoming data call
   - Use +++ to change from PPP online mode to command mode
   - URC "RING" is displayed
   - Accept the data call with ATA or reject with AT+CHLD=0
   - After the CSD / fax call was accepted, change from data mode to command mode with +++
   - You can end the data call with AT+CHLD=1
   - Go back to PPP online mode with ATO

5. **Answering a voice call while MS is in PPP online mode and in PTM**
   This scenario can only be ensured in Network Operation Mode I, since Paging Coordination is necessary[1].
   - Hardware ring indicates incoming data call
   - Use +++ to change from PPP online mode to command mode
   - URC "RING" is displayed
   - Accept the data call with ATA or reject with AT+CHLD=0
   - End the voice call with AT+CHLD=1
   - Go back to PPP online mode with ATO

6. **Answering a CSD / fax call while MS is in PPP online mode and in PTM**
   This scenario can only be ensured in Network Operation Mode I, since Paging Coordination is necessary[1].
   - Hardware ring indicates incoming data call
   - Use +++ to change from PPP online mode to command mode
   - URC "RING" is displayed
   - Accept the CSD / fax call with ATA or reject with AT+CHLD=0
   - After the CSD / fax call was accepted, change from data mode to command mode with +++
   - End the voice call with AT+CHLD=1
   - Go back to PPP online mode with ATO

[1] When you attempt to follow these steps in a NOM II network, be aware that the "RING" URC usually does not appear since no Paging coordination is done in PTM. However, in a bursty traffic flow where data packets are transferred discontinuously paging messages and, thus, the "RING" URC, may be received. In this case, the scenarios 5) and 6) might be successful even though the network only supports NOM II.

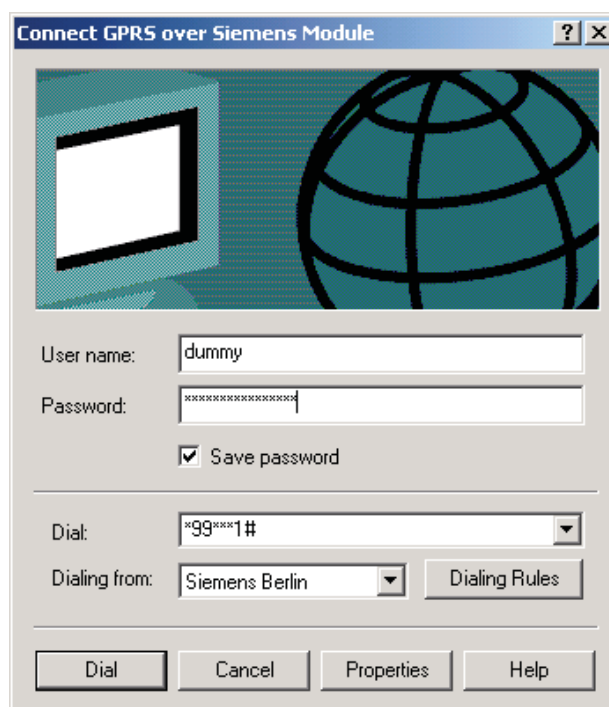# 9 APPENDIX: Selected German service providers

9.1 Configuration example: D2-Vodafone

The procedure for connecting to the German D2 network is the same as described in chapter 0. However, the following commands must be entered in the terminal program before a connection can be made over the dial-up network:

Example: AT+CGDCONT=1,IP,volume.d2gprs.de <RETURN>
AT+CGQREQ=1,3,4,3,0,0 <RETURN>

Note:
Since this configuration uses a predefined context, the dialed phone number must be ***99***1#** (do not use ***99#**).

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9.2 GPRS parameters of German service providers

The following table presents GPRS parameters of selected German service providers and operators.

Table 1: Service provider information, valid 16.10.2001

	T-D1	**D2 Vodafone**	**E-Plus**	**VIAG**
Primary DNS	193.254.160.1	139.7.30.125	212.23.97.2	195.182.96.28
Secondary DNS	free	139.7.30.126	212.23.97.3	195.182.96.61
IP address	Automatic	Automatic	Automatic	Automatic
APN	internet.t-d1.de	volume.d2gprs.de	internet.eplus.de	internet
IP header compression	no	no	no	no
Default QoS	Precedence 3; delay 4; reliability 3; peak 0; mean 0	Precedence 3; delay 4; reliability 3; peak 7; mean 31	Precedence 2; delay 4; reliability 3; peak 9; mean 31	Precedence 2; delay 4; reliability 3; peak 4; mean 31

Note:
These settings may be subject to regular changes by the network providers.