

Manual Supplement



INSYS GSM/GPRS 4.0

Version 1.0 / 07.03

INSYS
MICROELECTRONICS

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1 GENERAL	1
1.1 DIFFERENCES TO INSYS GSM 4.0	1
1.2 TECHNICAL FEATURES GPRS	1
1.3 REQUIREMENTS	2
1.3.1 GPRS	2
1.3.2 System.....	3
2. USAGE WITH WINDOWS DIAL-UP CONNECTION NETWORK	3
2.1 INSTALLATION UNDER WINDOWS XP.....	3
2.1.1 Add Modem	3
2.1.2 Create Dial-Up Connection	9
2.2 PRESETTING THE INSYS GSM/GPRS 4.0	21
2.3 CONNECTION SET-UP.....	21
3. USAGE WITH OWN APPLICATION.....	23
3.1 WHAT TO OBSERVE WITH GPRS	23
3.1.1 No Point To Point Connection Possible.....	23
3.1.2 Firewall/NAT At GPRS Provider.....	23
3.2 MODEM COMPATIBLE GPRS CONNECTION SET-UP	24
3.2.1 Presetting.....	24
3.2.2 Modem Compatible Connection Set-Up	25
3.2.3 Modem Compatible Connection Termination	25

1 General

1.1 Differences To INSYS GSM 4.0

This manual describes the use of the special GPRS functionality of the INSYS GSM/GPRS 4.0.

Fundamental differences to the usual INSYS GSM 4.0 exist only in the use of the GPRS Engine MC35 and the use of the extended AT commands resulting from this.

All functions of the INSYS GSM 4.0 can also be used with the INSYS GSM/GPRS 4.0; please refer to the user manual and the AT command set of the INSYS GSM 4.0 for this.

Power consumption:

The power consumption increases in connection mode (GPRS connect) by approx. 400 mW.

1.2 Technical Features GPRS

Additionally to the connection types of the INSYS GSM 4.0, the INSYS GSM/GPRS 4.0 offers the following GPRS features:

- GPRS multi-slot class 8 (max. 4 RX timeslots and 1 Tx timeslot)
- GPRS terminal device class B (no simultaneous GPRS/ CSD connect possible)
- Coding scheme CS 1 to CS 4 (has to be supported by the provider).

Attention: GPRS offers no guaranteed data rates or bandwidth. The values assigned by the provider (coding scheme, timeslots) can change dynamically during a connection.

The following data rates are possible:

Uplink (TX):

Coding scheme	1 Timeslot
CS-1	9.05 kbps
CS-2	13.4 kbps
CS-3	15.6 kbps
CS-4	21.4 kbps

Downlink (RX):

Coding scheme	1 Timeslot	2 Timeslots	4 Timeslots
CS-1	9.05 kbps	18.1 kbps	36.2 kbps
CS-2	13.4 kbps	26.8 kbps	53.6 kbps
CS-3	15.6 kbps	31.2 kbps	62.4 kbps
CS-4	21.4 kbps	42.8 kbps	85.6 kbps

1.3 Requirements

1.3.1 GPRS

You need a valid GPRS mobile contract and the following information from your provider to access a GPRS network:

- APN (Access Point Name, access address of the provider)
- Primary and secondary DNS
- Information about IP header compression
- Information about the assignment of the IP address
- User name and password (if required)

You find an overview about the access data of 4 selected German GPRS providers below:

	T-Mobile (D1)	Vodafone (D2)	E-Plus	O₂
APN	internet.t-d1.de	volume.d2gprs.de	Internet.eplus.de	Internet:
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 Header Compression	no	no	no	no
IP Address Assignment	automatic	automatic	automatic	automatic

1.3.2 System

The installation procedure in a windows dial-up connection network shown in the following has been performed under Windows XP.

Depending on your computer, it might be necessary to have administrator rights to install the necessary drivers and to set up and configure the network. Please refer to your local system administrator in this case.

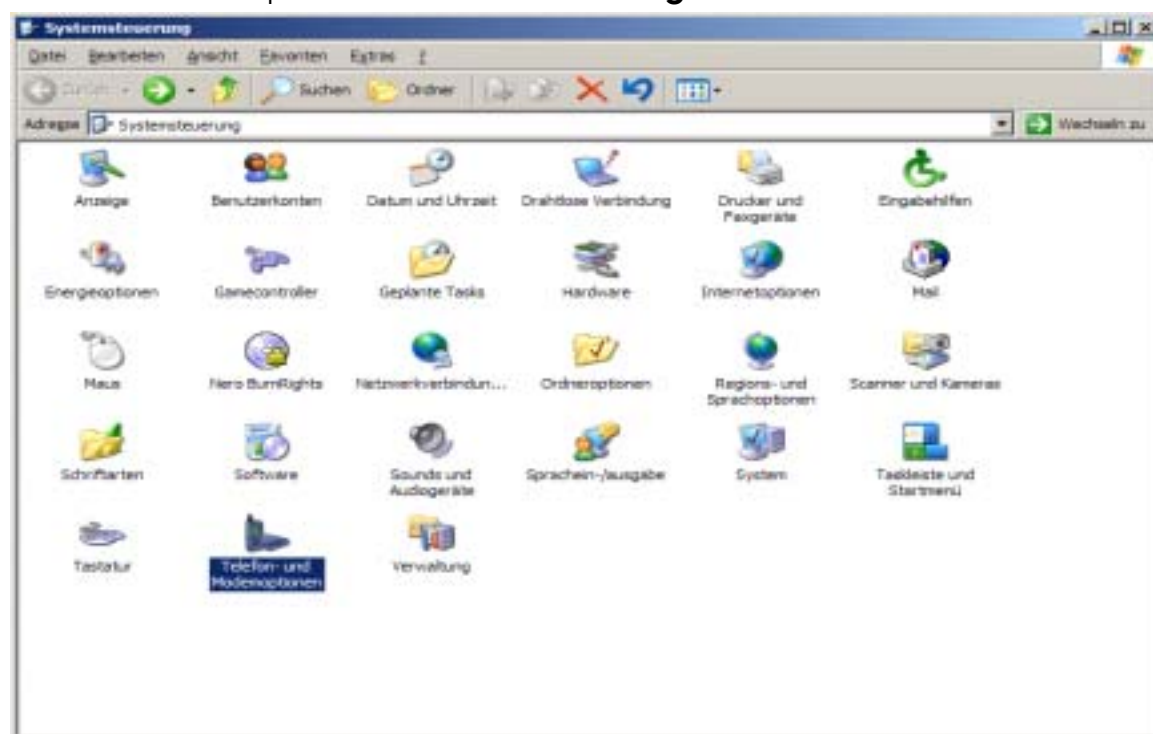
2. Usage With Windows Dial-Up Connection Network

2.1 Installation Under Windows XP

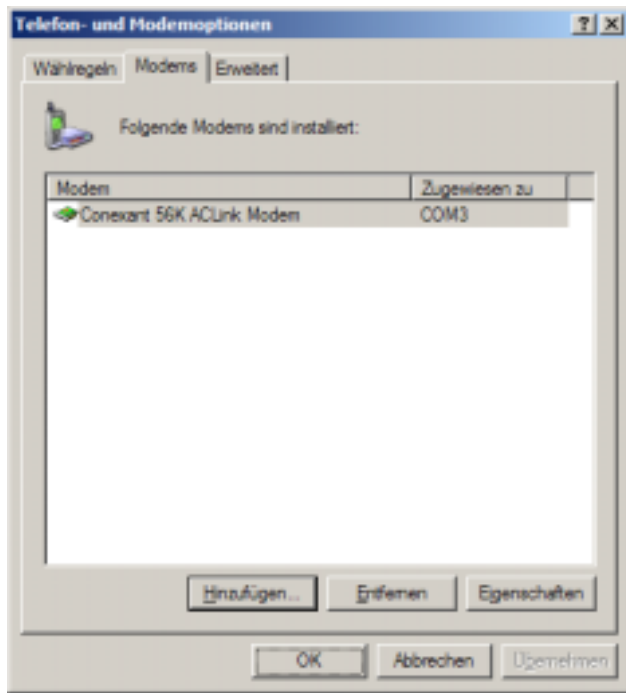
2.1.1 Add Modem

No special driver is required for the INSYS GSM/GPRS 4.0. The best suitable driver is the "Standard Modem 33600 bps".

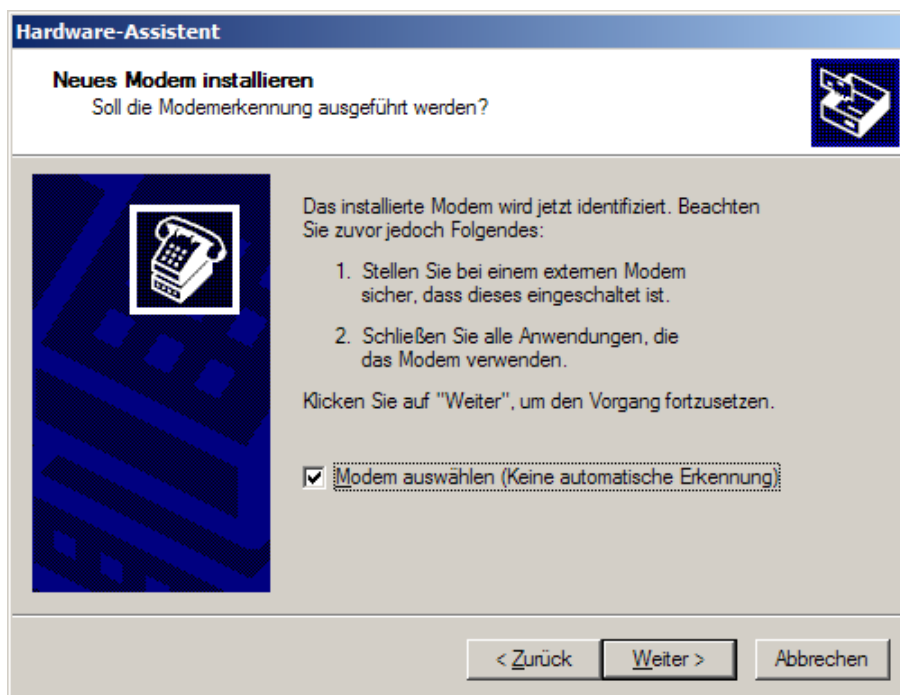
Start the control panel under **Start → Settings → Control Panel**.



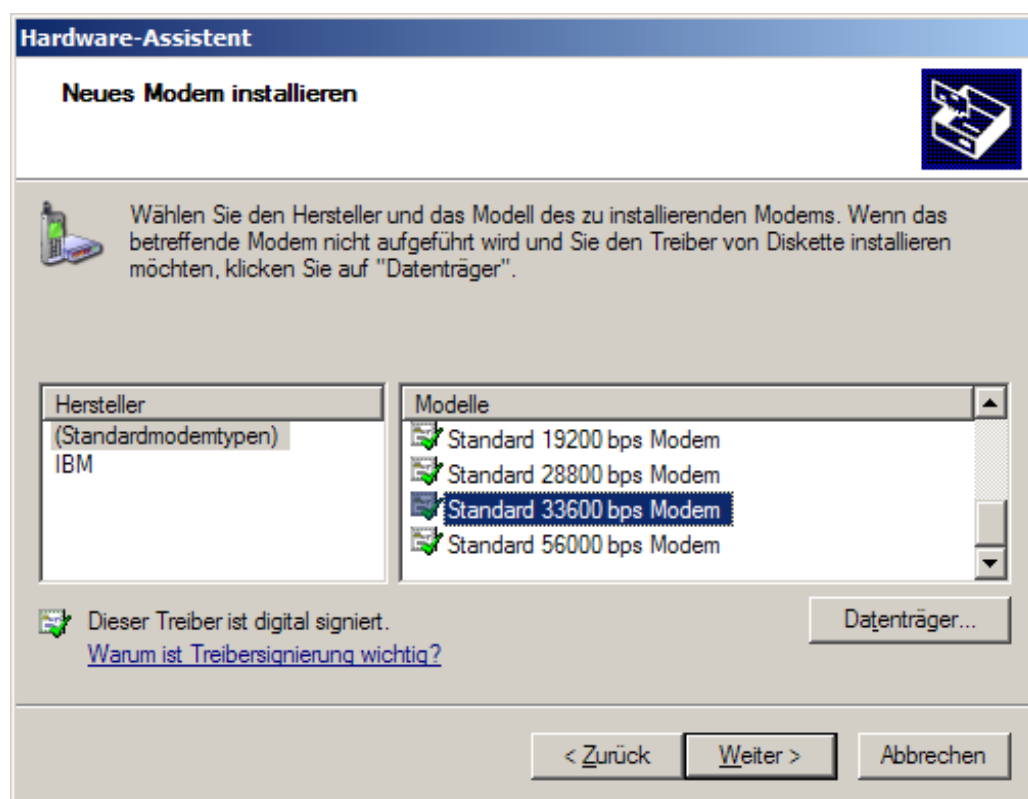
Here you start the modem installation by double-clicking **Phone and Modem Options**



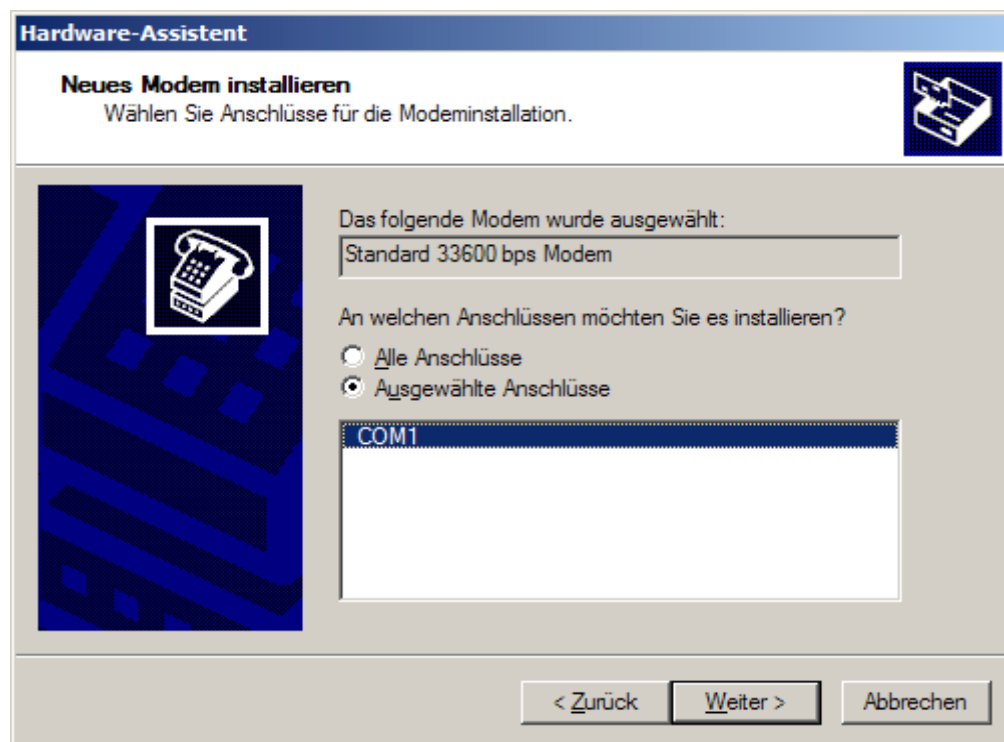
The modems already installed in the system are listed under the tab **Modems**. Select **Add...**



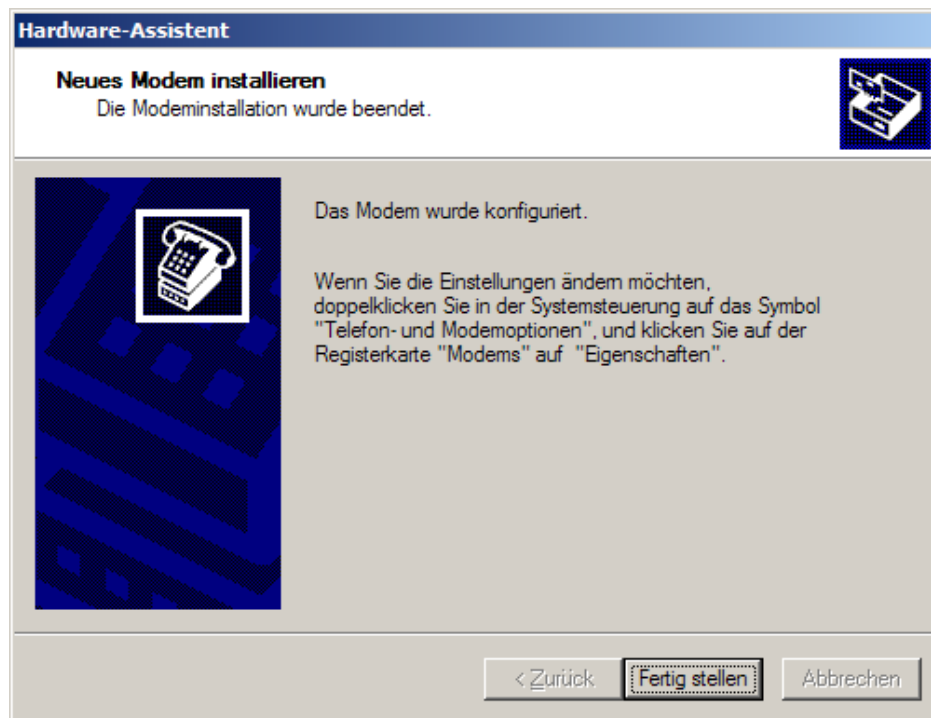
Activate the checkbox **Don't detect my modem. I will select it from a list.** and start the installation with **Next >**.



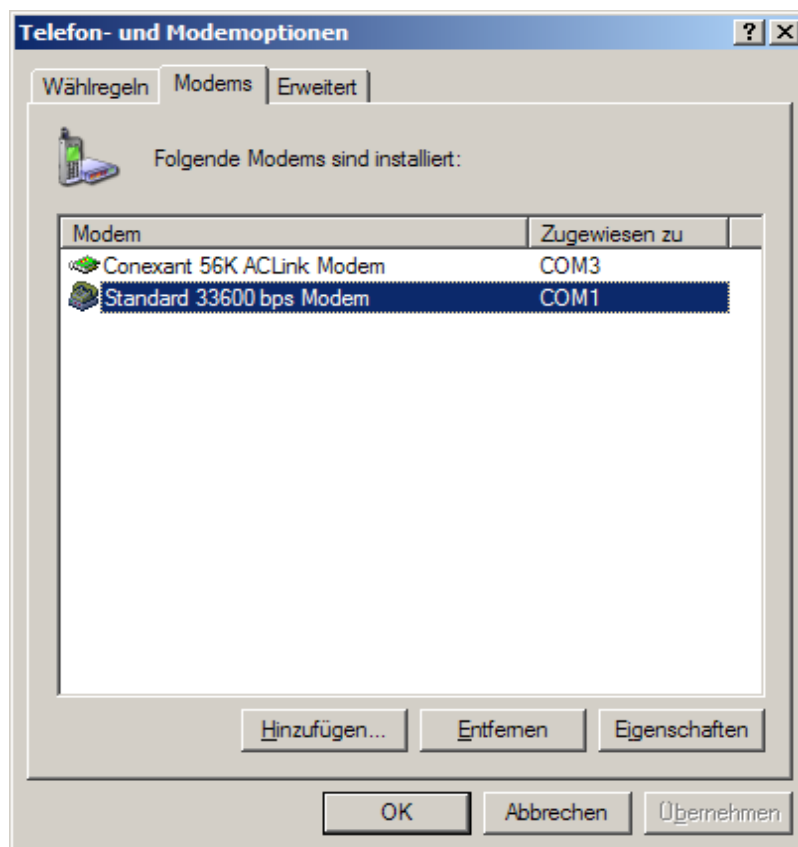
Select under **(Standard Modem Types)** the modem **Standard 33600 bps Modem** and click **Next >**.



Select the serial connection (COM port) to which the modem will be connected and click **Next >**.

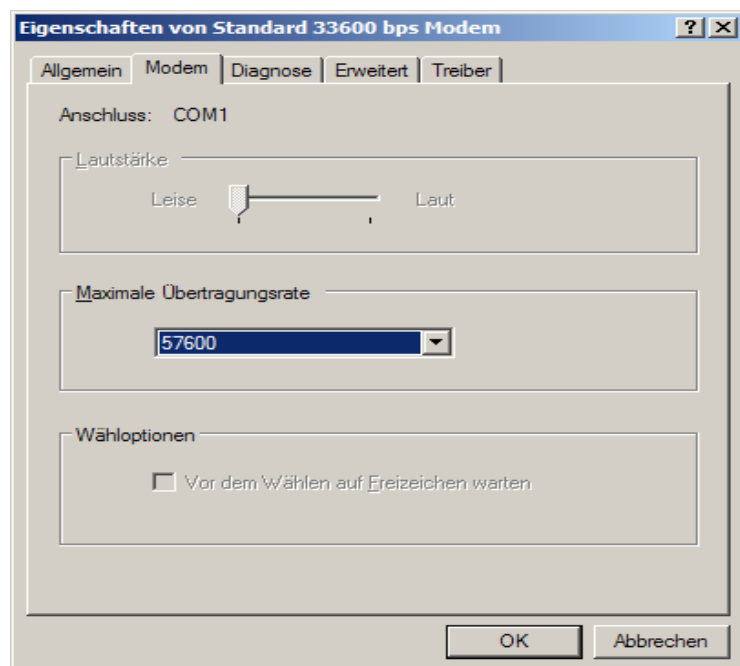


The modem is installed now, click **Finish**.

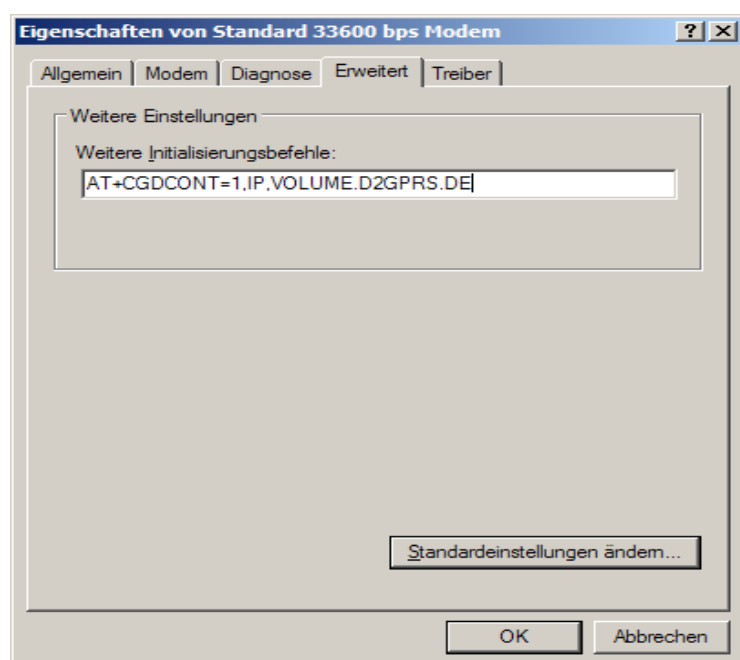


The modem has to be configured in detail now. Select the modem and click **Properties**.

The following settings have to be made:

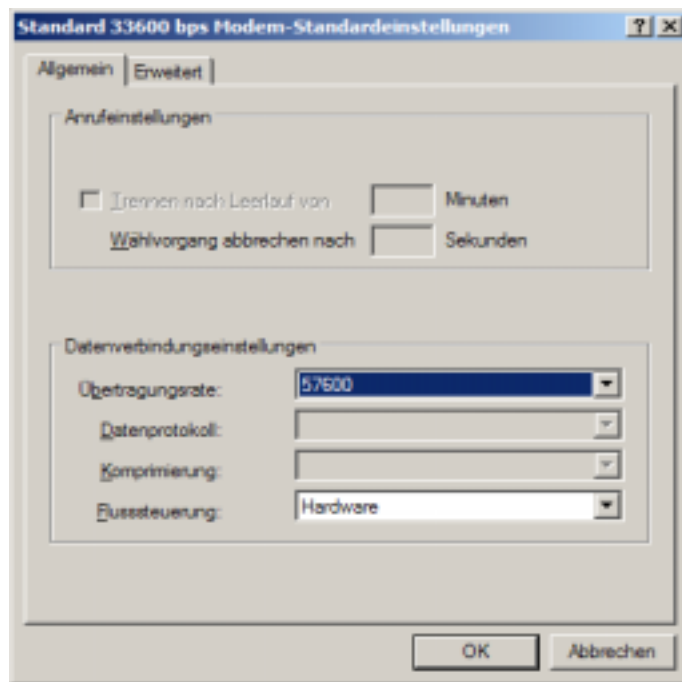


Under the tab **Modem** set 57600 as **Maximum Port Speed**.

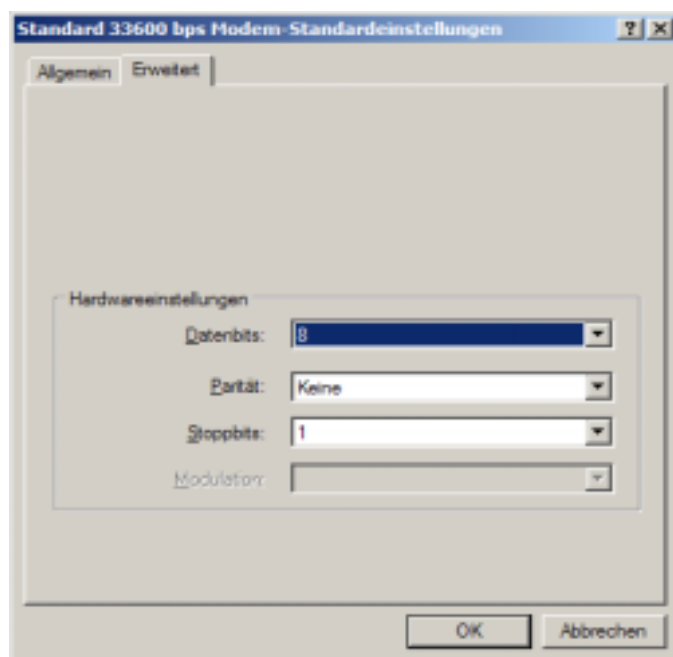


Under the tab **Advanced** enter the initialization string with the APN address of the provider (**AT+CGDCONT=1 , IP , VOLUME . D2GPRS . DE**). The provider Vodafone (D2) is entered here for example, therefore the part "**VOLUME.D2GPRS.DE**" has to be adapted to the APN address of the actual provider.

Then click the button **Change Default Preferences....**



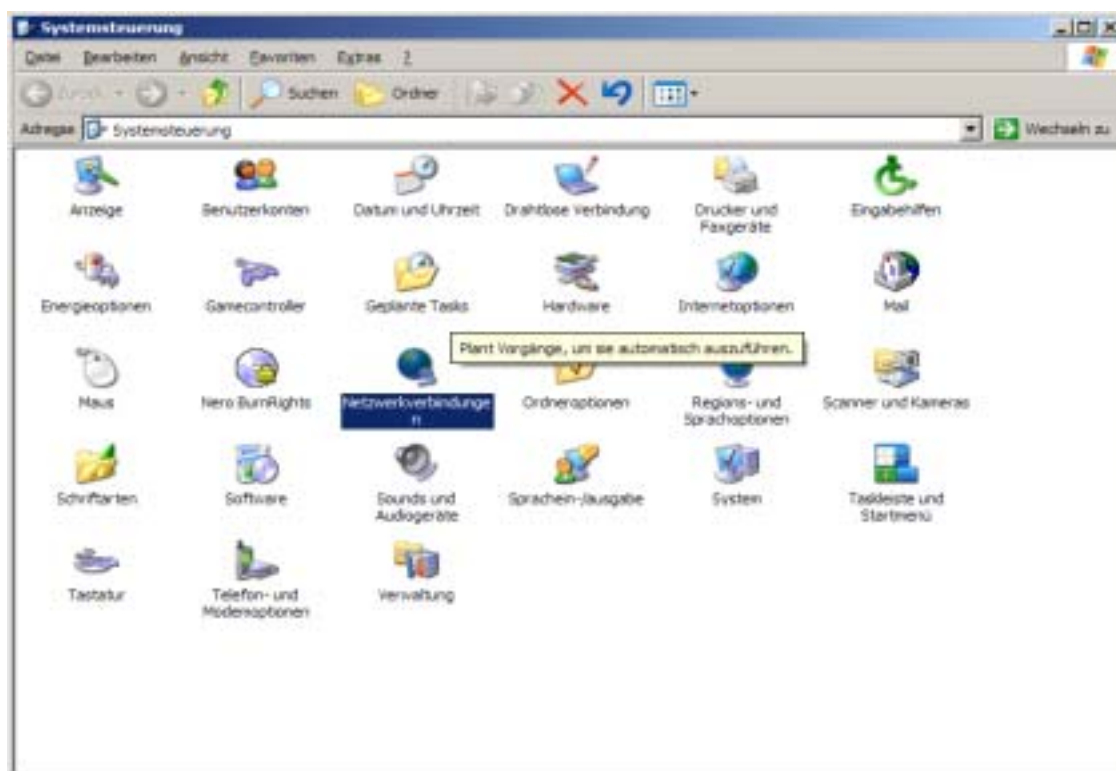
Under the tab **General** you have to set the **Port speed** to **57600** bps here as well and the **Flow control** to **Hardware**.



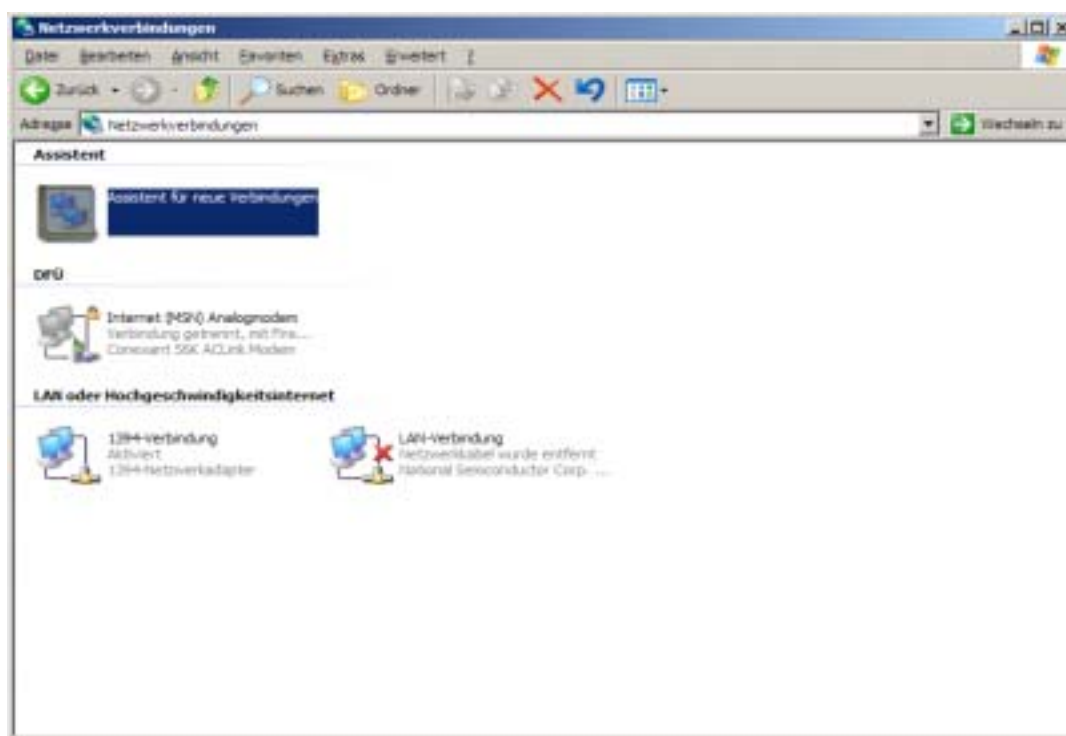
Under the tab **Advanced** you have to set the protocol of the serial interface to **8 Data bits, Parity None and 1 Stop bit**.

Confirm all settings with **OK** to complete the pre-configuration of the modem driver.

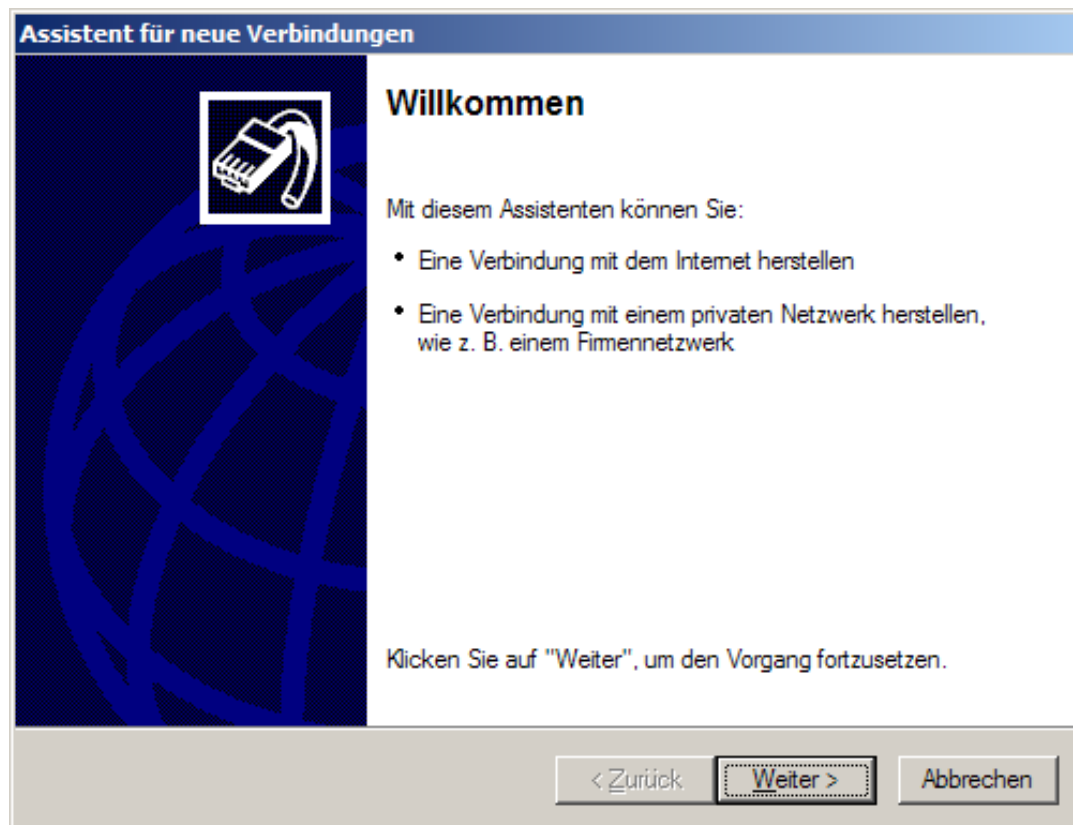
2.1.2 Create Dial-Up Connection



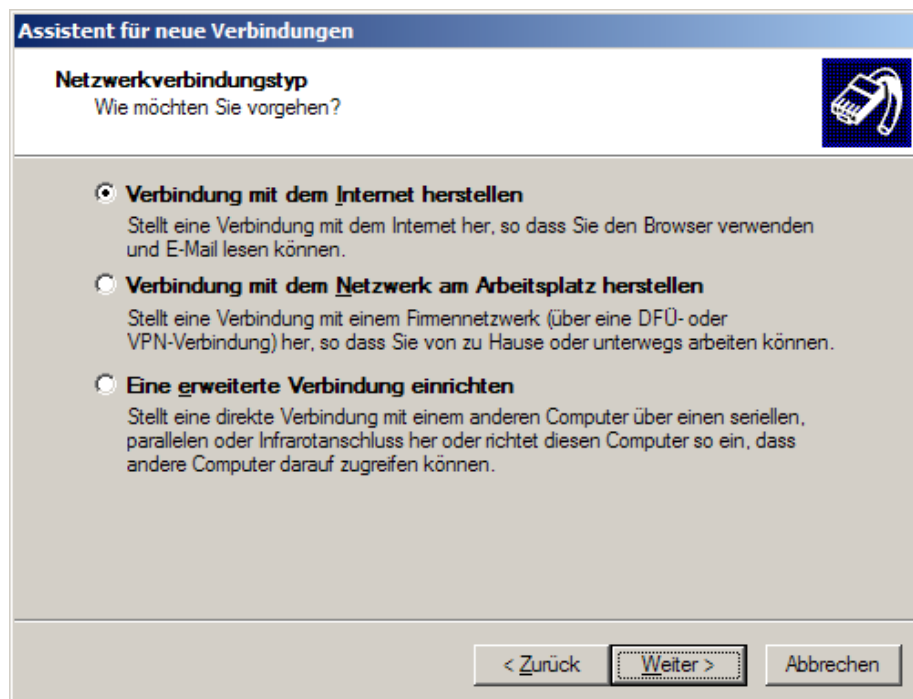
Back in the control panel, start the installation of the dial-up connection network by double-clicking **Network Connections**.



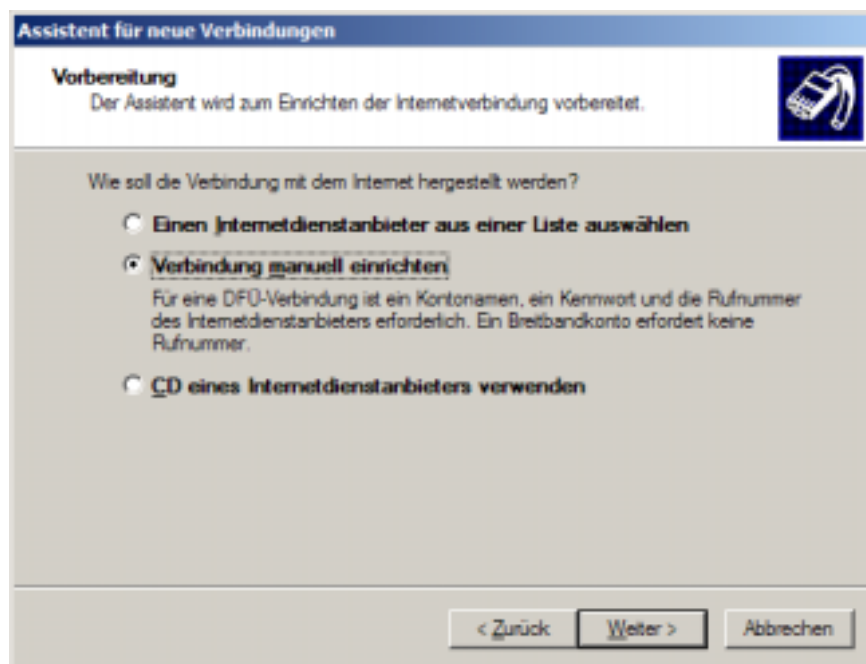
Double-click the assistant for creating a new connection.



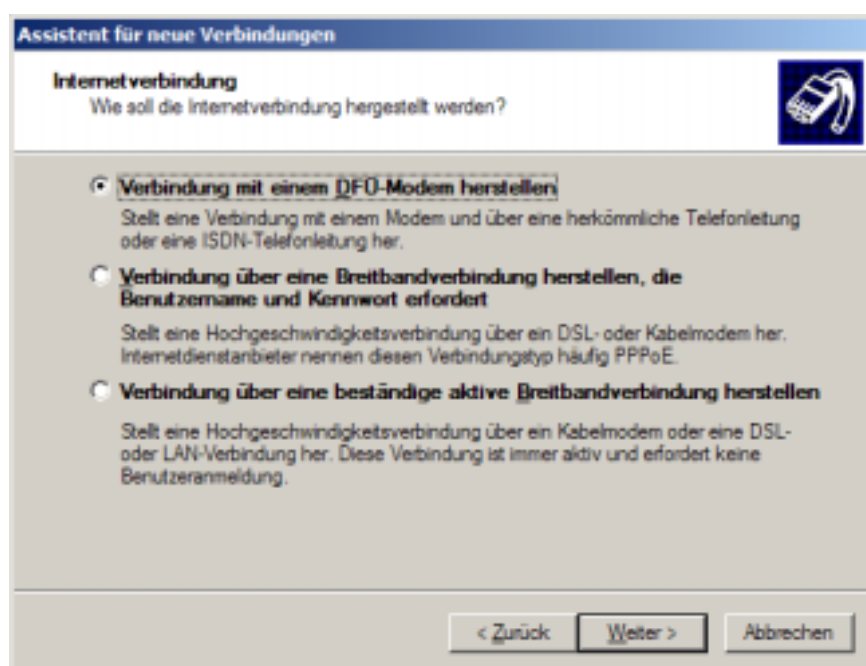
Click **Next** >.



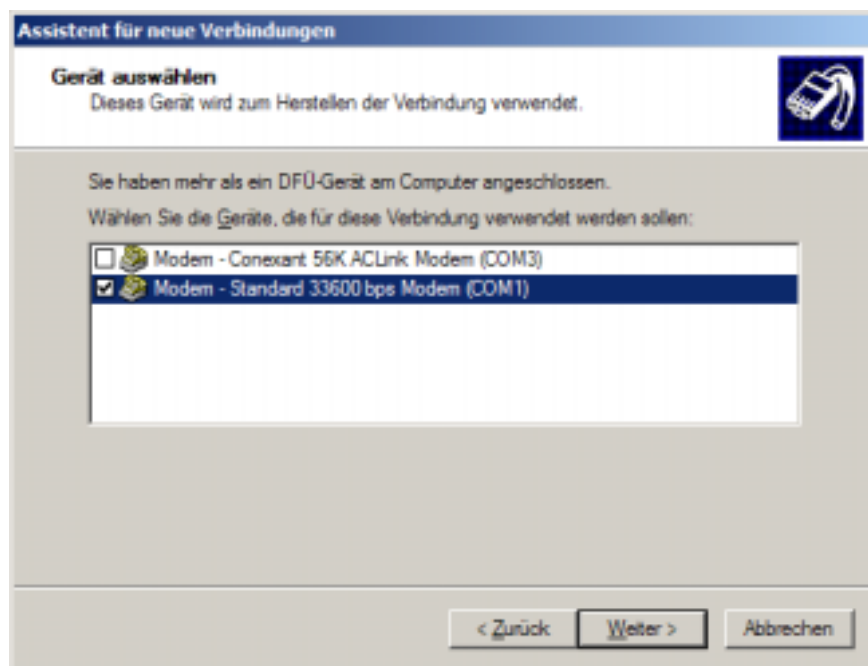
Select **Connect to the Internet** and click **Next** >.



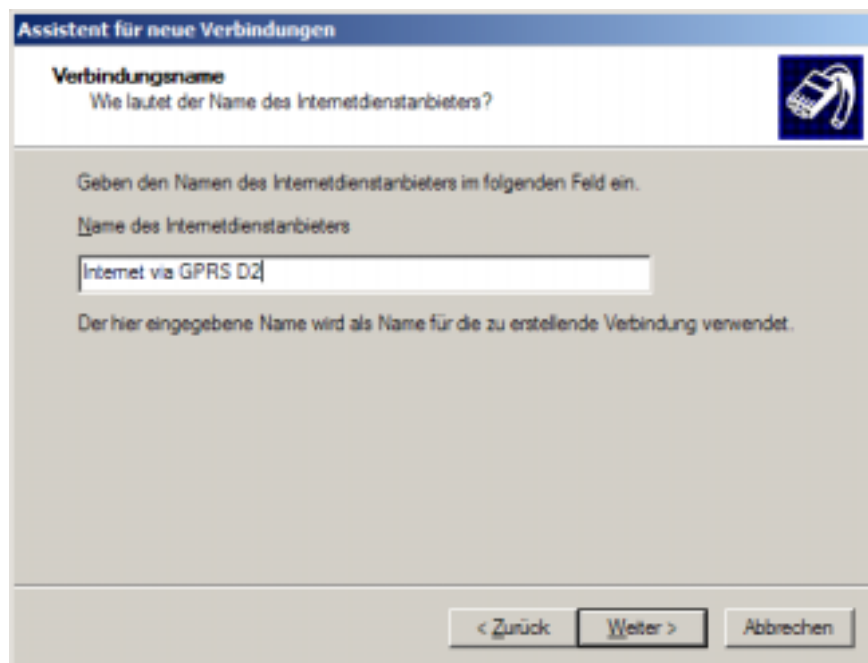
Select **Set up my connection manually** and click **Next >**.



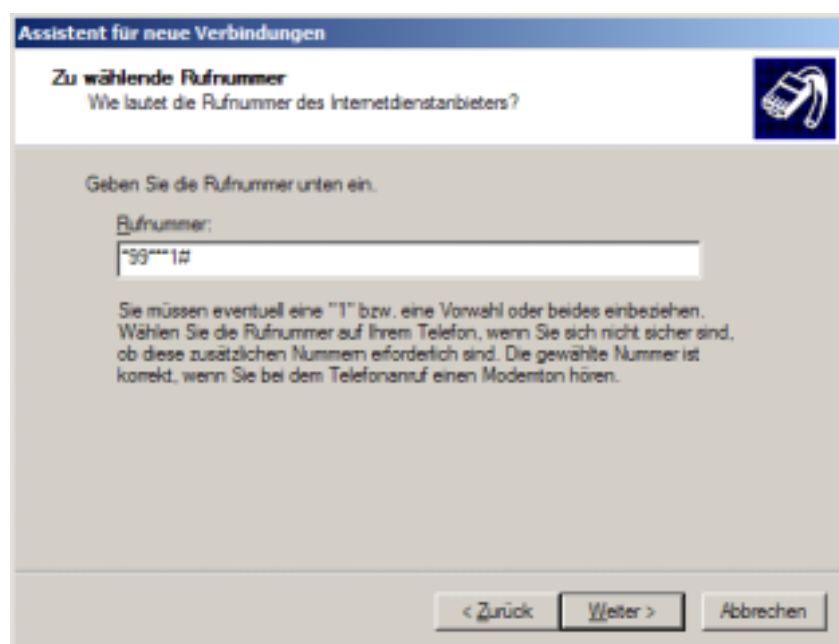
Select **Connect using a dial-up modem** and click **Next >**.



Select the previously installed **Standard Modem 33600 bps** and click **Next >**.



Now assign a name for the connection and click **Next >**.



Assistent für neue Verbindungen

Zu wählende Rufnummer
Wie lautet die Rufnummer des Internetdienstanbieters?

Geben Sie die Rufnummer unten ein.

Rufnummer:
*99***1#

Sie müssen eventuell eine "1" bzw. eine Vorwahl oder beides einbeziehen. Wählen Sie die Rufnummer auf Ihrem Telefon, wenn Sie sich nicht sicher sind, ob diese zusätzlichen Nummern erforderlich sind. Die gewählte Nummer ist korrekt, wenn Sie bei dem Telefonanruf einen Modemton hören.

< Zurück Weiter > Abbrechen

For the GPRS access (independently of the provider) enter the phone number "***99***1#**" and click **Next >**.



Assistent für neue Verbindungen

Verfügbarkeit der Verbindung
Sie können diese Verbindung allen Benutzern zur Verfügung stellen oder nur für sich selbst verwenden.

Eine Verbindung, die nur für die eigene Verwendung erstellt wird, wird in Ihrem Benutzerprofil gespeichert und steht nur zur Verfügung, wenn Sie angemeldet sind.

Verbindung erstellen für:

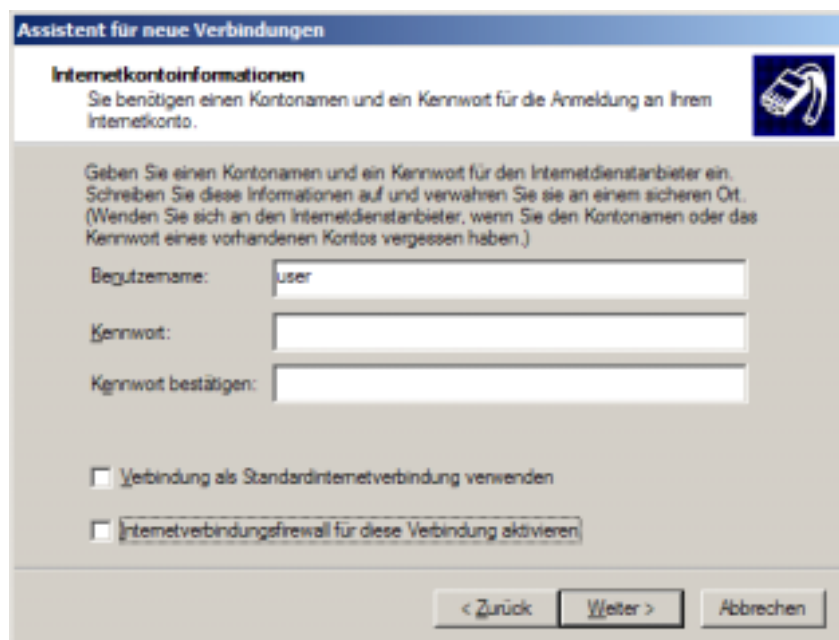
☐ Alle Benutzer

☒ Eigene Verwendung

< Zurück Weiter > Abbrechen

Since the connection can only be created as administrator usually, you have to inform here, which users are allowed to use this dial-up connection.

Make your selection and click **Next >**.



Assistent für neue Verbindungen

Internetkontoinformationen

Sie benötigen einen Kontonamen und ein Kennwort für die Anmeldung an Ihrem Internetkonto.

Geben Sie einen Kontonamen und ein Kennwort für den Internetdiensteanbieter ein. Schreiben Sie diese Informationen auf und verwahren Sie sie an einem sicheren Ort. (Wenden Sie sich an den Internetdiensteanbieter, wenn Sie den Kontonamen oder das Kennwort eines vorhandenen Kontos vergessen haben.)

Begutzename:

Kennwort:

Kennwort bestätigen:

☐ Verbindung als Standardinternetverbindung verwenden

☐ Internetverbindungsfirewall für diese Verbindung aktivieren

< Zurück **Weiter >** Abbrechen

According to the provider, it is required to assign the user name and a password now. For the example shown here with Vodafone (D2), a user name has to exist, but this can be anyone. A password is not necessary.

After the entry, click **Next >**.



Assistent für neue Verbindungen

Fertigstellen des Assistenten

Die erforderliche Schritte zum Erstellen der folgenden Verbindung wurden ordnungsgemäß durchgeführt:

Internet via GPRS D2

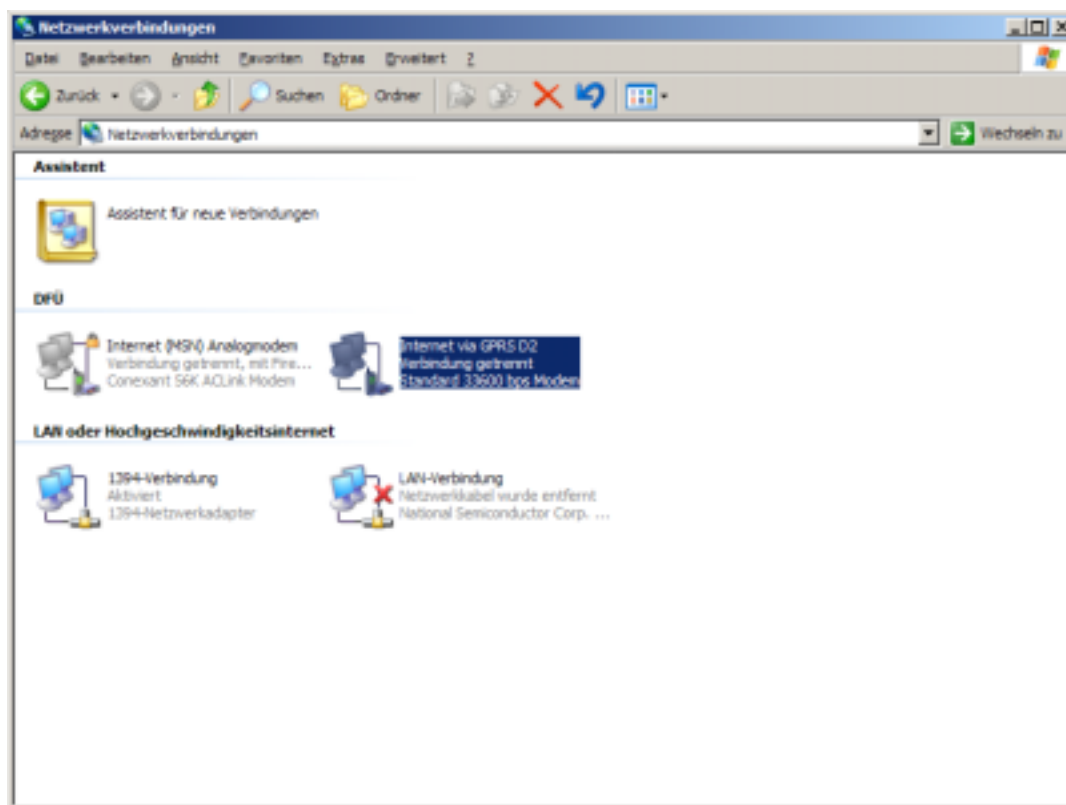
Die Verbindung wird im Ordner "Netzwerkverbindungen" gespeichert.

☐ Verknüpfung auf dem Desktop hinzufügen

Klicken Sie auf "Fertig stellen", um diese Verbindung zu erstellen und den Vorgang abzuschließen.

< Zurück **Fertig stellen** Abbrechen

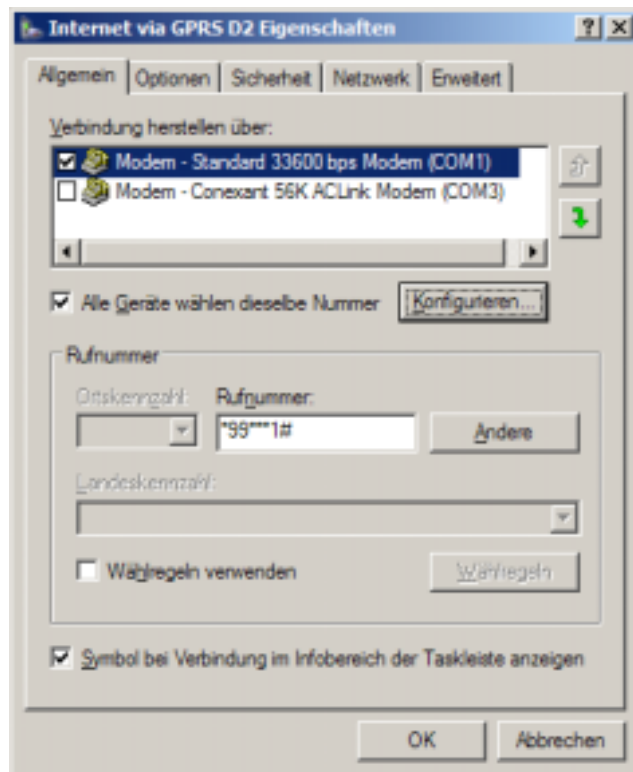
Now, the dial-up connection network is set up basically, click **Finish**.



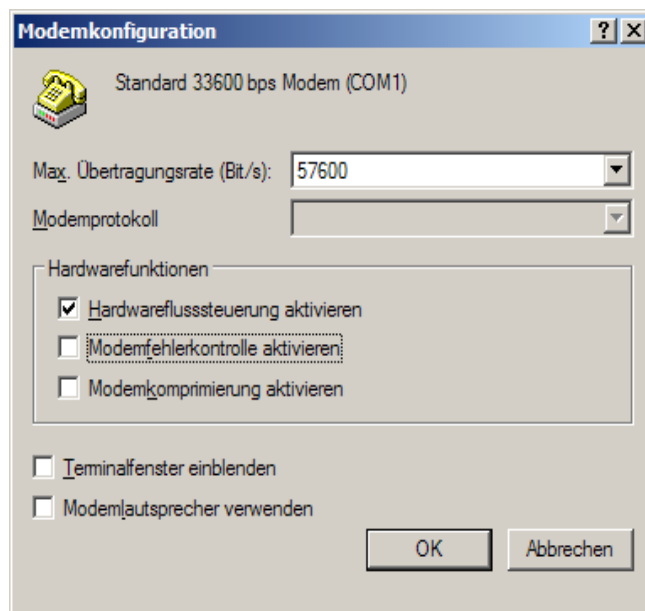
The previously set up network connection appears now; start it with a double-click.



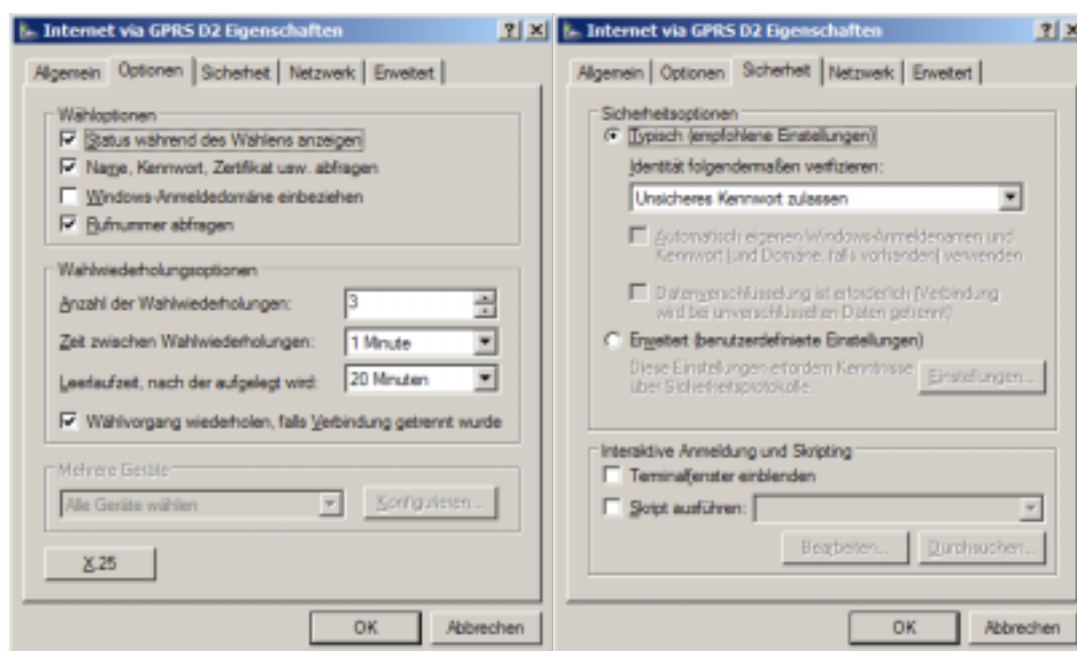
The network connection has to be configured completely before the first dial-up. Click **Properties**.



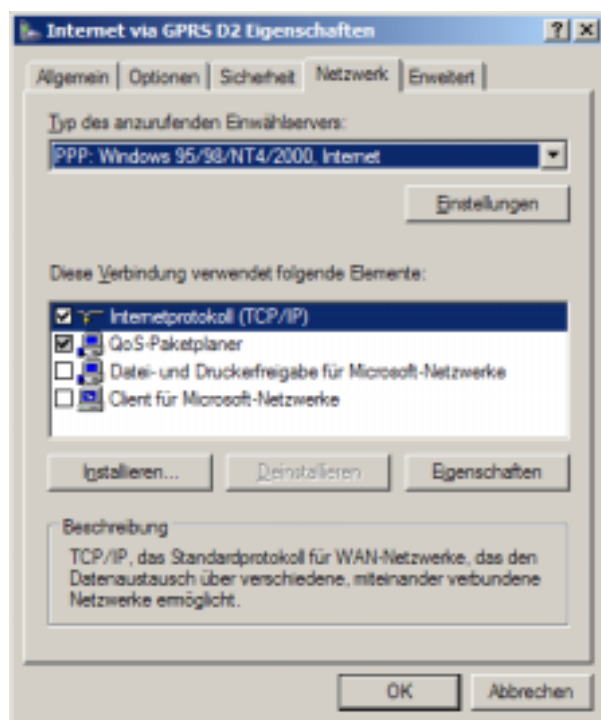
Under the tab **General** the previously installed Modem 33600 bps has to be activated. Click **Configure**.



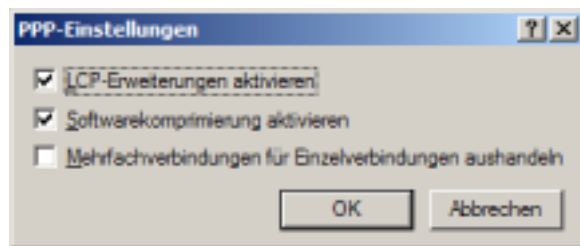
Set the values shown above and confirm with **OK**.



Under the tabs **Options** and **Security** nothing has to be changed normally. The settings can be made according to your demands if necessary.

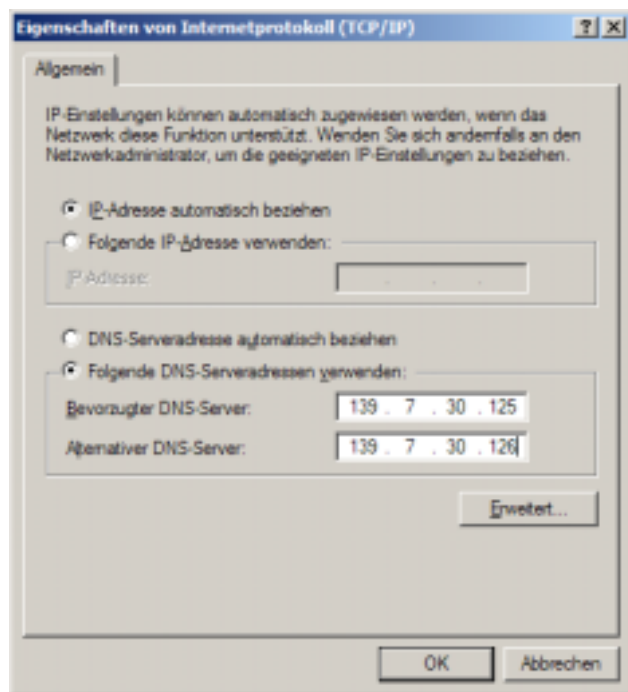


Under the tab **Networking** make the settings shown above. Select a PPP server as dial-up server, click **Settings**.



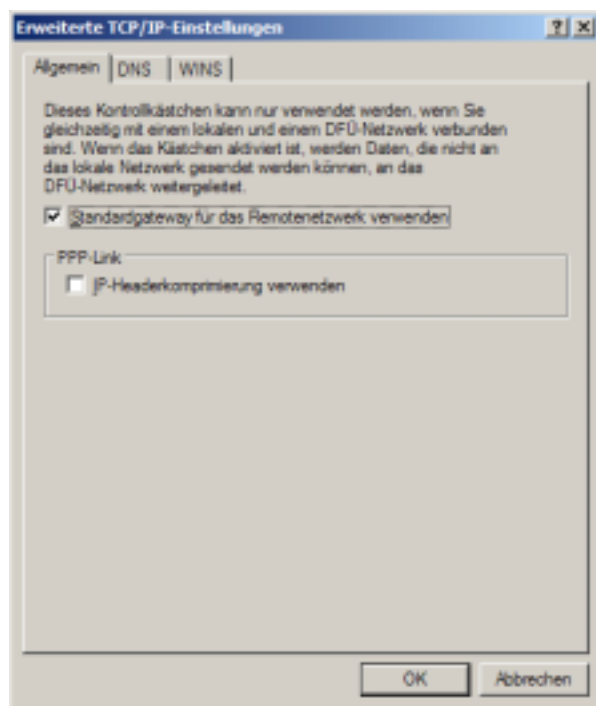
Make the **PPP Settings** as shown and confirm with **OK**.

Back in the tab **Networking** the TCP/ IP protocol will be configured now, for this click **Properties**.

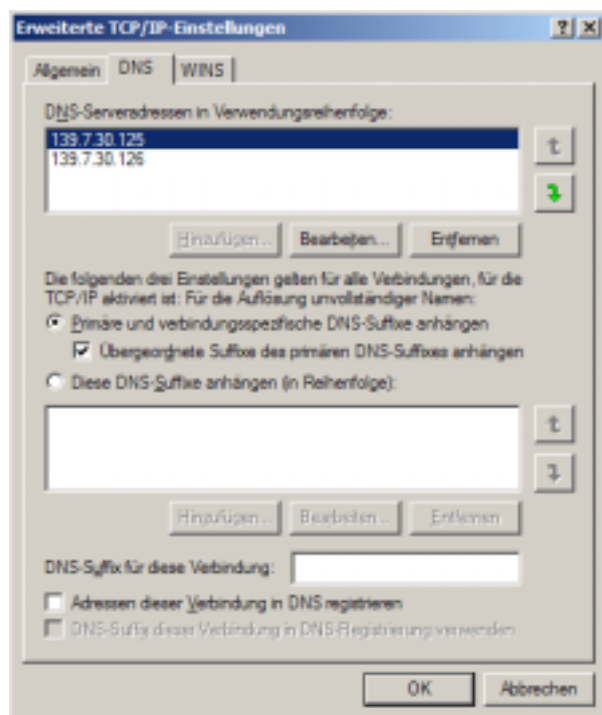


Take over the settings here, which are given by the GPRS provider for dial-up, see also the table with the access data under "General → Requirements → GPRS"

Now click **Advanced...** .

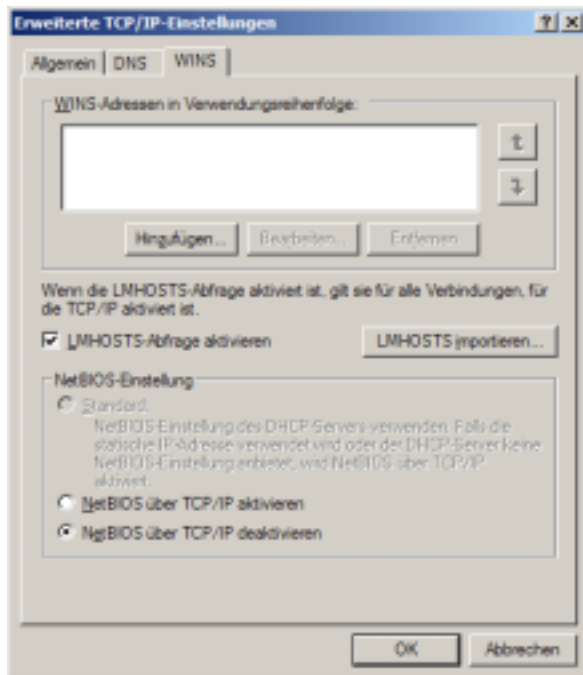


Under the tab **General** the usage of the **default gateway** should be activated and the **IP header compression** should be deactivated.

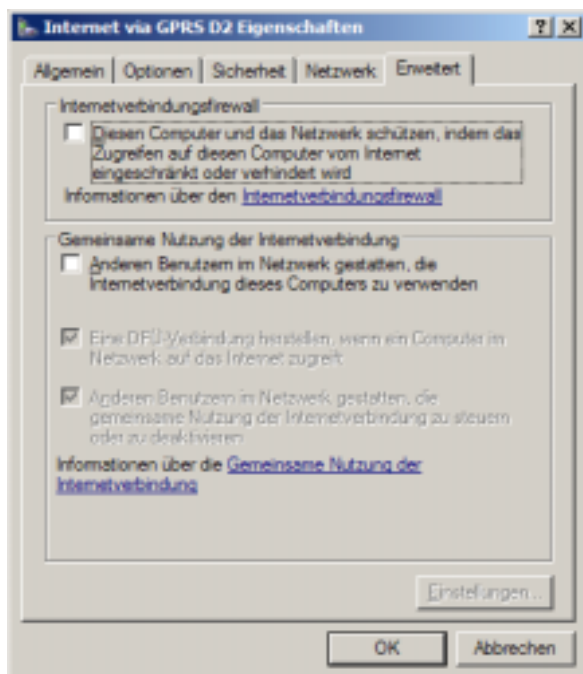


Under the tab **DNS** the previously set DNS addresses should appear in the correct order (primary DNS corresponds to preferred DNS and secondary DNS corresponds to alternative DNS).

The remaining settings have to be adapted.



Under the tab **WINS** the settings have to be adapted as well.
Confirm the settings now with **OK**.



Under the tab **Advanced** nothing has to be changed normally. The settings can be made according to your demands if necessary.
Confirm the settings now with **OK**.

The configuration of the modem and the network connection is finished now.

2.2 Presetting The INSYS GSM/GPRS 4.0

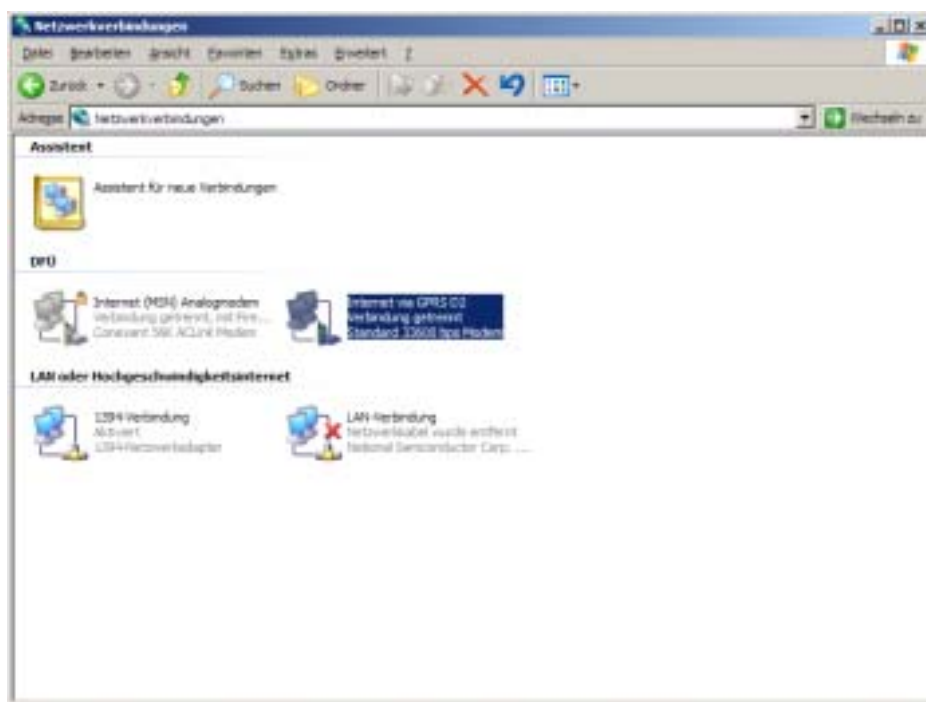
The INSYS GSM/GPRS 4.0 has to be configured once as well because the standard modem drivers do not perform the GSM specific settings.

These settings refer only to the GPRS functionality, of course further functions (alarm messages, ...) can also be configured, but please take this from the regular user's manual.

The following settings should be made, either using a terminal program or the configuration software HS-Comm for GSM.

- Baud rate to 57600 (**AT**BAUD=57600**, then change terminal to 57600 bps))
- Data flow control hardware handshake (**AT\Q3**)
- PIN of the SIM card to automatic login after reset (**AT**PIN=xxxx**), as far as the PIN request is activated at the card.
- Store settings with **AT&W**.

2.3 Connection Set-Up



Start the network connection with a double-click.



Click **Dial**.

The internet browser can be started if the connection is established.

Starting a PING from the DOS command prompt is a quick way to check the GPRS connection:

```
C:\ Eingabeaufforderung

C:\>ping www.insys-tec.de

Ping www.insys-tec.de [212.77.170.209] mit 32 Bytes Daten:

Antwort von 212.77.170.209: Bytes=32 Zeit=690ms TTL=237
Antwort von 212.77.170.209: Bytes=32 Zeit=834ms TTL=237
Antwort von 212.77.170.209: Bytes=32 Zeit=812ms TTL=237
Antwort von 212.77.170.209: Bytes=32 Zeit=770ms TTL=237

Ping-Statistik für 212.77.170.209:
    Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0 (0% Verlust),
    Ca. Zeitangaben in Millisek.:
        Minimum = 690ms, Maximum = 834ms, Mittelwert = 776ms

C:\>
```

3. Usage With Own Application

3.1 What To Observe With GPRS

3.1.1 No Point To Point Connection Possible

In contrast to the usual GSM mode, in GPRS mode no point to point connection is possible between two GPRS devices or between a GPRS device and a modem (analog/ISDN).

Because the INSYS GSM/GPRS 4.0 has still GSM functionality, a point to point connection is possible in GSM operation, but not with the transmission rates available with GPRS.

After registering ("GPRS attach") with the GPRS provider, PPP data is available via the serial interface of the INSYS GSM/GPRS 4.0.

So, the application has to provide a PPP client to complete the dial-up.

The protocols for user data transport and connection management have to be provided by the application as well (e.g. TCP/IP stack).

3.1.2 Firewall/NAT At GPRS Provider

The IP address of the GPRS terminal device is dynamically assigned by the provider and it is temporary, i.e. another IP address will be assigned for the next dial-up to the provider.

The IP address cannot be addressed from outside, because the providers manage the addressing at the transition from the GPRS network to the "regular" internet using a NAT table (Network Address Translation), to be able to manage the address range limited by IPV4.

Furthermore, this increases the security because the GPRS device is not accessible for "scanner" that way. Unintended data traffic can be prevented so, because the data amount is accounted for GPRS.

This means that the following functions are not possible for example:

- "Ping" the device from outside
- Set-up TCP/ IP connections to the GPRS device from outside
- Send UDP packets to the GPRS device from outside

All connections (channels) have to be opened by the GPRS device.

Please refer to your provider, whether a VPN (Virtual Private Network) is available for this functionality, which allows at least the access from a verified address out of this VPN.

3.2 Modem Compatible GPRS Connection Set-Up

3.2.1 Presetting

The device has to be logged in to the GSM network before a GPRS attach. For this, the INSYS GSM/GPRS 4.0 provides the possibility to store the PIN of the SIM card permanently that the device is able to log in to the GSM network automatically for every restart.

The command **AT**PIN** is available for this. Please refer to the user's manual of the INSYS GSM 4.0 for more detailed information about this.

Entering the PDP context with the APN of the GPRS provider is also required:

AT+CGDCONT=1,IP,<APN-Address>

The **<APN-Address>** for Vodafone (D2) is e.g.: **VOLUME.D2GPRS.DE**

More providers can be found in the table under "General → Requirements → GPRS".

Basically it is possible to define different PDP contexts, this one here is stored as context "1".

Attention: The PDP context cannot be stored. It has to be re-defined after each restart of the device.

Note:

Using AT commands it is also possible to request a specific QoS profile (Quality of Service) from the provider at connection set-up (**AT+CGQREQ**) or to define a minimum profile (**AT+CGQMIN**). The QoS has to be at least above it that the device sets-up a connection.

The QoS profile contains e.g. values like data rate per hour, max. data rate, delay times, etc.

Experience has shown that these settings are not successful concerning performance improvements (when this document has been drawn up).

3.2.2 Modem Compatible Connection Set-Up

The INSYS GSM/GPRS 4.0 provides the possibility to perform the dial-up to the GPRS network with the dialing command **ATD** known from the modems.

If a PDP context is defined (see above), this command reads: **ATD*99***1#**

The "1" stands for the PDP context no. 1 in this case, which has been defined before.

The connection establishment is indicated by the control signal DCD and by the message "**CONNECT**".

3.2.3 Modem Compatible Connection Termination

The connection can be terminated as usual for modems with the command **ATH**.