Rohde & Schwarz® Products: ROMES

Remote Control of ROMES using a Pocket PC

Application Note

This Application Note describes how to configure a PDA (Pocket PC) and a notebook to remotely control the notebook running Rohde & Schwarz ROMES SW using wireless network techniques.

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Contents

1 Introduction

For optimization of mobile communication networks, drive tests with coverage measurement systems are being performed. The coverage measurement platform provided by Rohde & Schwarz is based on ROMES®, which is the application software to define and setup measurement devices, acquire and store the measurement data and displaying measured data during the measurement period and a later replay.

Additional drivers are used for attaching different measurement devices, such as the Rohde & Schwarz Radio Network Analyzer TSMU or test mobiles from different manufacturers. Depending on the required measurement tasks, ROMES® can be configured freely to adapt to the user's needs.

As long as the measurements are performed in an outdoor environment using a vehicle traveling around, size of the measurement system is not a problem. As more and more measurements are performed in an indoor environment by walking around, size, weight and mechanical handling is an issue of interest. ROMES® can be used in a light weight configuration, which is small enough to be carried in a back pack. Measurements can be performed for more than four hours, only limited by the operating time of the controlling notebook.

When moving around, the operator must ensure that the measurements are working properly and enter some data into the computer such as the current position or start / stop the measurement. Since the notebook must be connected to the test mobiles and PN-scanner via cables, handling of the notebook is somewhat tedious. This, and the fact, that even light weighted notebooks grow heavy after two or more hours, lead to the desire to control ROMES® with a PDA. While it is not possible to run ROMES® on the PDA itself, it is possible to control the notebook with ROMES® remotely.

This application note describes, how to setup a wireless LAN connection between a PDA and a notebook. Furthermore, some useful packages with which ROMES® running on the notebook can be controlled using the PDA.

Section 3, "Remote Control Tools" on page 4 describes which to use and how to select each of them. This section assumes, that a LAN connection has been set-up and configured correctly.

Section 4, "Network-Connection between PDA and Notebook" on page 44 describes how to configure and set-up the LAN connection used for the remote control tools.

All screen shots shown in this application note have been made using a notebook running Windows XP (SP2) and an iPAQ hx4700. The iPAQ operating system is based on German language due to technical reasons. However, the screens will look similar and will be recognized in other languages, too.

2   Definitions and Trademarks

host	the notebook computer or tablett PC running ROMES®
PDA	personal data assistant, the computer used to controll ROMES® remotely
Pocket PC ®	an operation system running on the PDA; copyright by Micosoft corporation
LAN	Local area network
Bluetooth	A wireless standard, mainly for ad-hoc connections such as audio head-sets, computer – mobile phone, computer – printe etc.; defined and maintained in the Bluetooth interest goup
PAN	Personal Area Network, an ad-hoc network used in Bluetooth
WLAN	Wireless LAN, defined in IEEE Standard 802.11
WiFi	Wireless Fidelity
VNC	Virtual network computing

Table 1: Definitions used in the document

3   Remote Control Tools

This sections describes three different tools which can be used to control ROMES® using a PDA. Each of the tools has it's advantages and disadvantages so that the operator may select the tool best for his needs. All the tools need a (wireless) LAN connection between PDA and Notebook. The setup of the different LANs is described in section 4, Network-Connection between PDA and Notebook on page 44. The following table lists the various tools described in this application note.

	Remote Desktop	NetOp	VNC
Manufacturer	Microsoft	NetOp	open source
Price	none	Cost	none
Start windows Session	yes	Yes	yes
Simultaneously remote and local	no	yes	yes
Speed	real time	real time	slow
Desktop	resizes to PDA screen	unchanged	unchanged

Table 2: Overview of different remote control programs

All the clients of the remote control tools may either run on a PDA or on another computer. They all may be used to remotely control ROMES® on a computer using another computer, e.g. a laptop in front of a car, while ROMES® and the hardware may be installed remotely.

Figure 1: Principle setup of a remote controlled ROMES system

Microsoft's Remote Desktop

Since Windows 2000, windows can be accessed from remote computers using a facility called "remote desktop", resp. "remote desktop connection", which is part of Windows itself.

A Pocket PC such as an iPAQ, may offer a terminal client program, which has got the functionality of the "remote desktop connection" and can be used to control the notebook host remotely.

The notebook has to be configured to enable being remote controlled. Accessed by the terminal client, the notebook closes its local desktop and transfers the desktop to the remote PDA. The desktop uses the screen resolution of the PDA. Since the PDA has got a limited screen resolution, the desktop rearranges all its icons and places all of them in the top left corner of the desktop. Thus the desktop is somewhat crowded after remote control. Also, it is not possible to work simultaneously on both computers.

Configuration of the computer running ROMES®

NOTE: *you need administrator right to configure the computer. However, it is not necessary to have administrator rights, when accessing the host computer from a client such as a PDA.*

Enable remote desktop

The remote desktop can be configured in the System Properties of the Control Panel (Start → Settings → Control Panel → System)

Select the remote panel of the system properties.

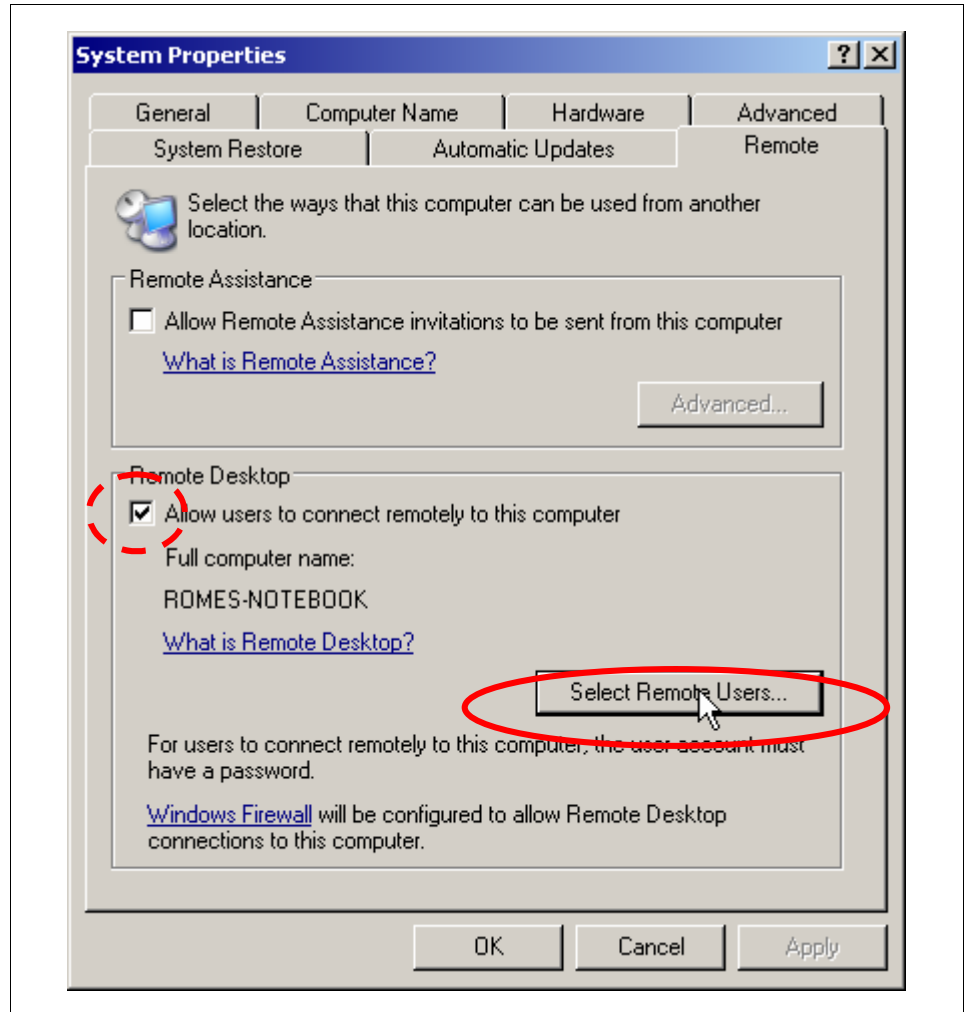Enable "Allow users to connect remotely to this computer".

Figure 2: System Properties: allow users to connect remotely to this computer

If your users don't have administrator rights, you have to add them to the remote user list by clicking "select remote users".
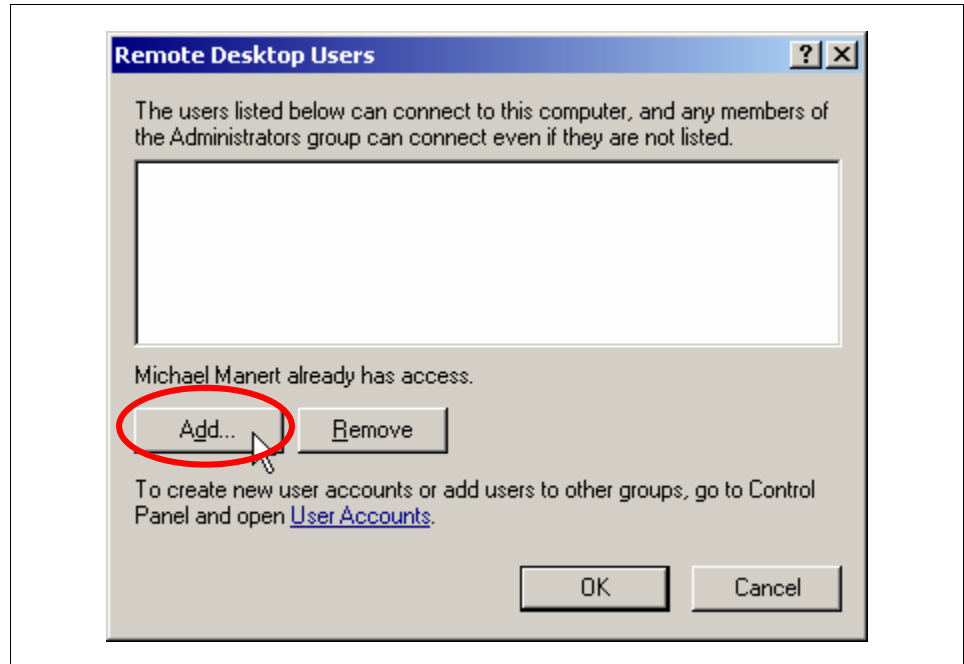
Figure 3: System Properties - Add Remote User
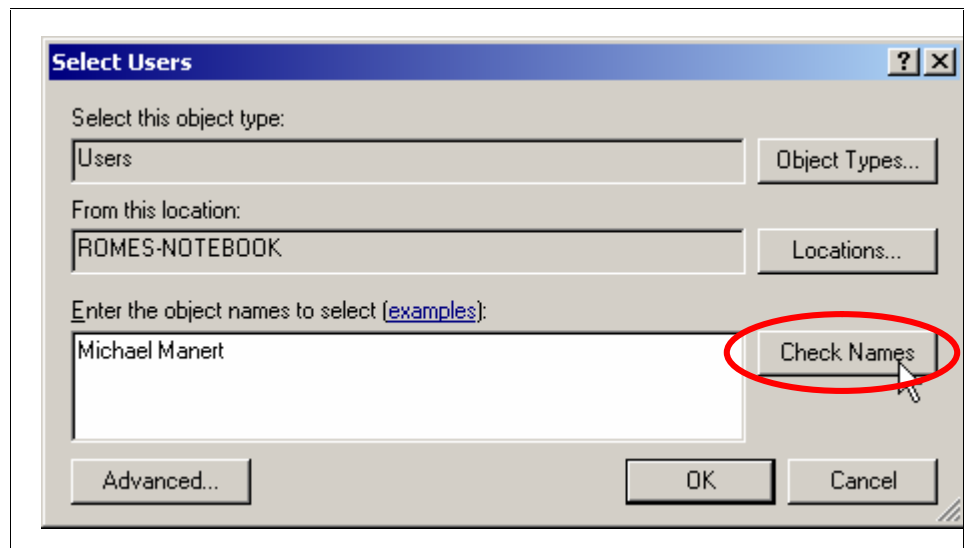
Add a new user by clicking "Add".

Figure 4: Select Users - Check names

Enter the user name an click to "Check Names". If the user name was entered correctly, it gets enhanced to the full name.
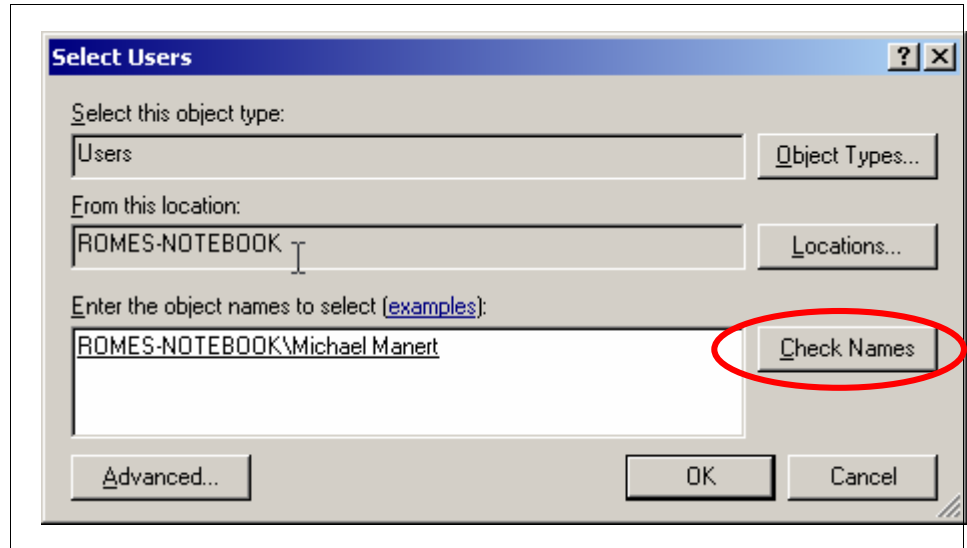
Figure 5: Select Users after the names have been checked.

Click "OK" and the user is added to the remote user list.
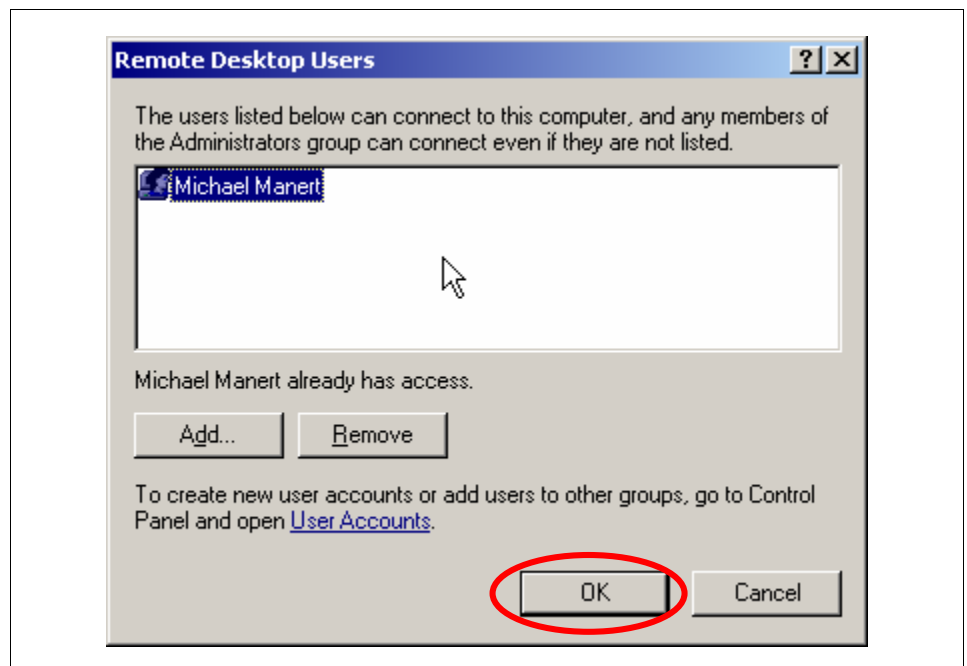
Figure 6: Select Users after the names have been checked.

Accept the list by clicking "OK".

Set Computer Name

This has usually already been done, when the computer was installed. Therefore, this section can safely be skipped, unless the computer name needs to be changed for some reason.

The computer name can be configured in the System Properties of the Control Panel (Start → Settings → Control Panel → System).

Select the "Computer Name" of the system properties.
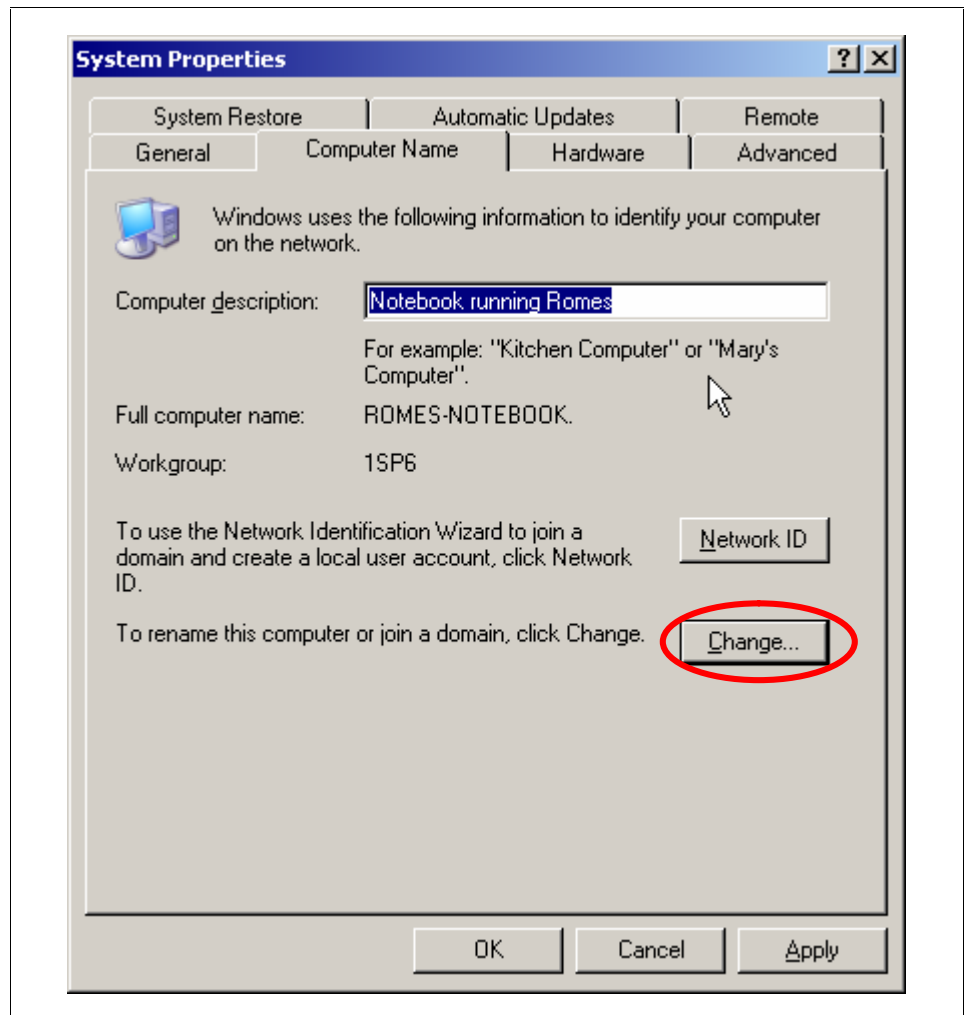
Figure 7: System properties with compute name

If the computer name does not fulfill your needs, it can be changed after clicking "change" in the next form:
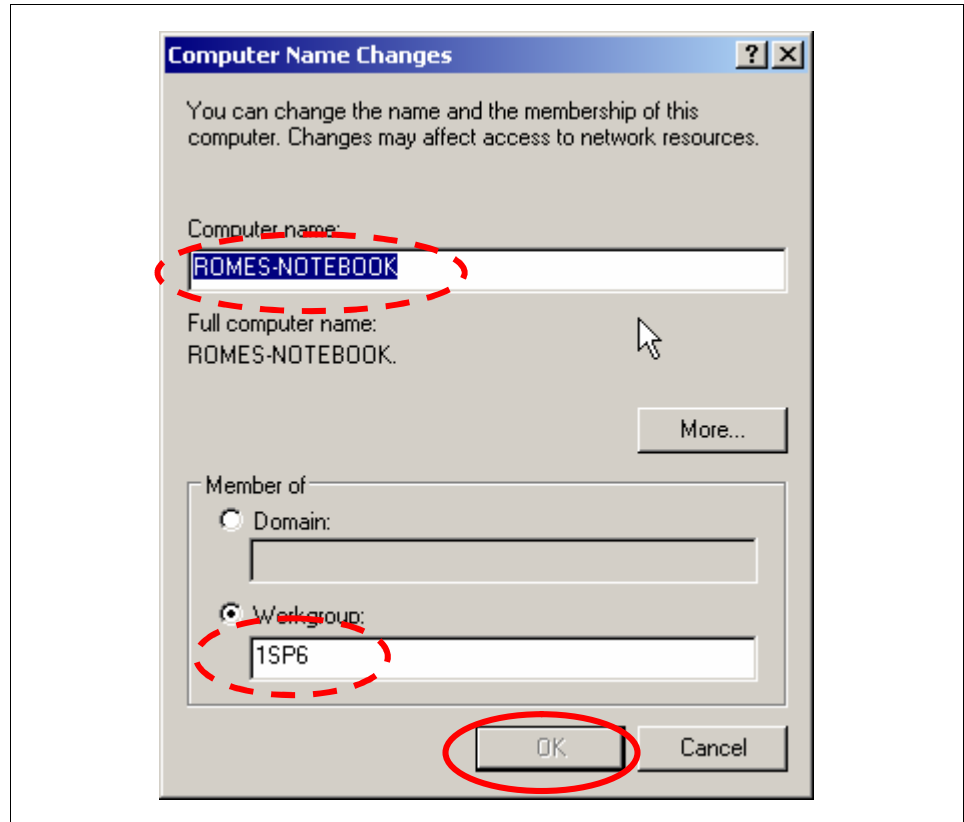
Figure 8: Change computer name

Enter the name you need and confirm it by clicking "OK".

Configure the firewall on the notebook

In case, the windows firewall is activated on the notebook, it must be configured to allow remote desktop connections.

Open the Firewall Configuration of the Windows Control Panel via Start → Settings → Control Panel → Windows Firewall

Ensure that exceptions are not excluded in the tabulator "General".
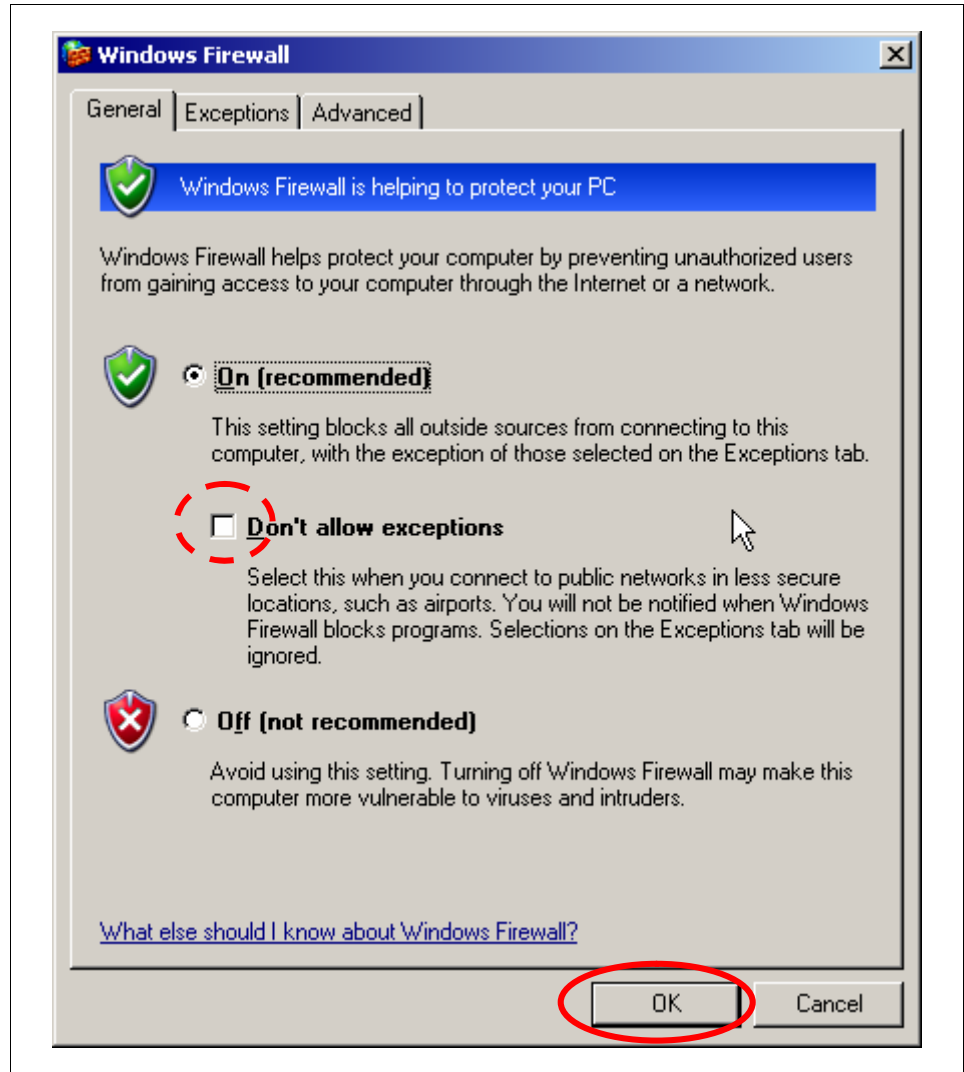
Figure 9: Configuration of exceptions in firewall

Enable "Remote Desktop" in the section "Exceptions":
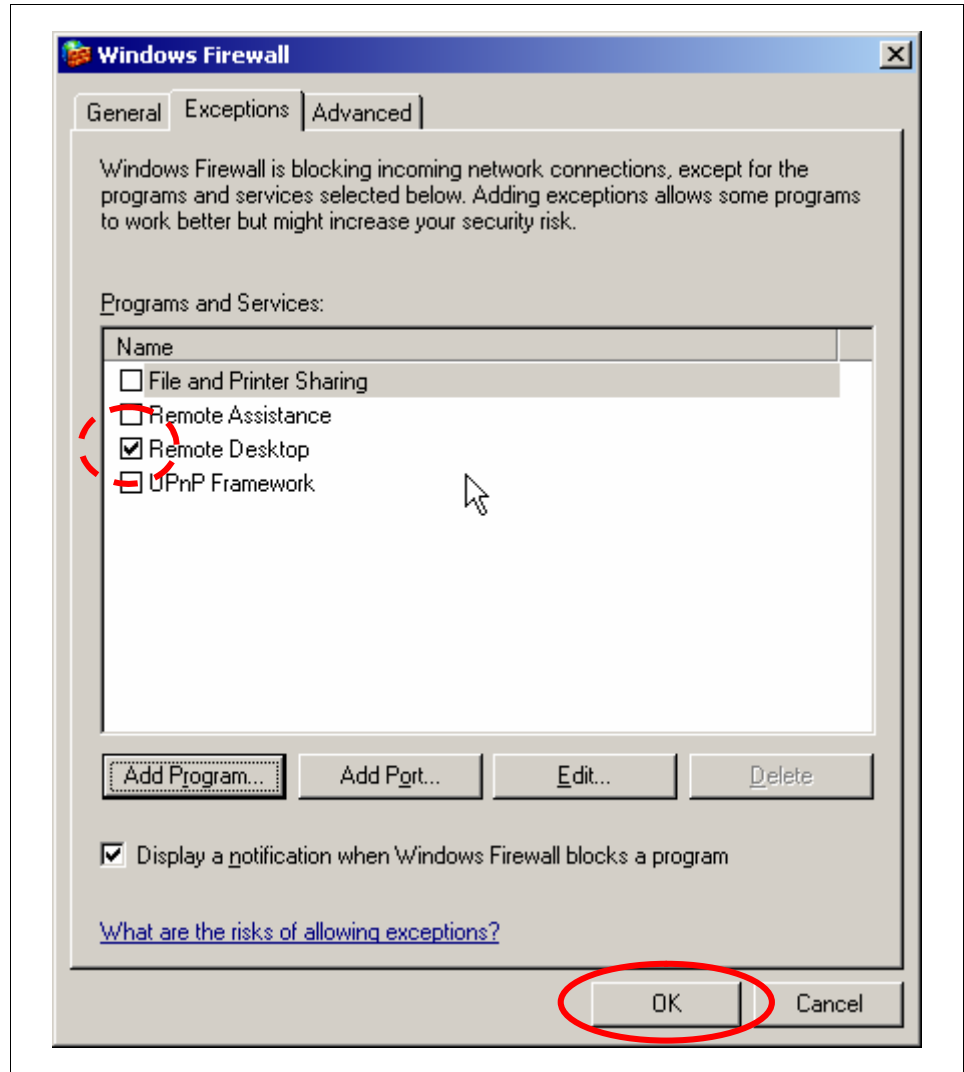
Figure 10: Enable Remote Desktop in the Windows Firewall.

Click "OK" to accept the changes and close configuration of the Windows Firewall.

Configuration of the PDA

It is a good idea, to enable the terminal client in the start menu, where it can easily be started from. To do this, open the list of the menu entries via by Start → Settings → Start menu. Enable the entry of the terminal client.
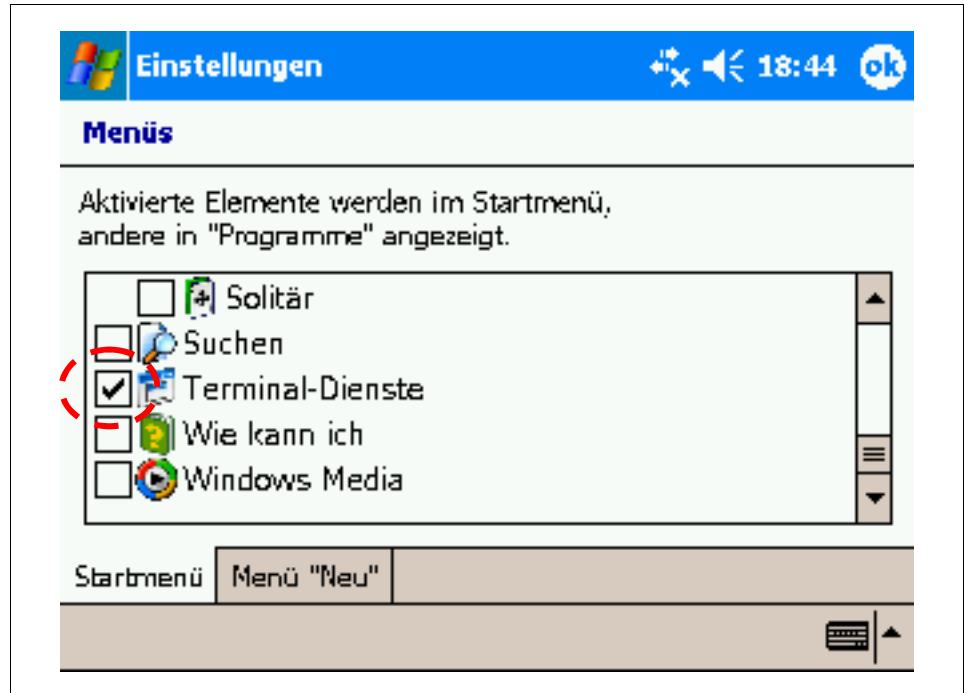
Figure 11: Adding terminal client to start menu

You may add or remove any other programs according to your needs.

Furthermore, it is most convenient to set the desktop of the PDA to landscape mode. Consult the documentation of your PDA for further details.

Using Remote Desktop on a PDA

Entering a remote session

Start the terminal client by either clicking "Terminal Client" in the Start menu, or in the Program Folder, depending on the configuration.

The program presents a list with the last few connections and the latest connections pre-selected, see next picture.
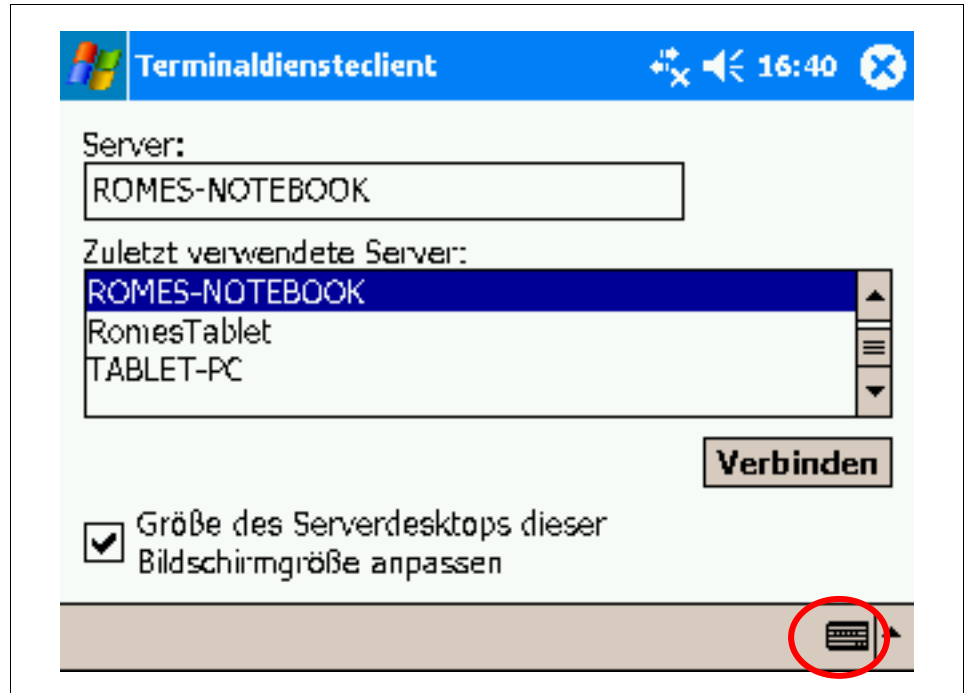
Figure 12: Start a new terminal client session.

To enter the name of the server, click on the symbol of the keyboard in the right lower corner and type in the characters using the pen.
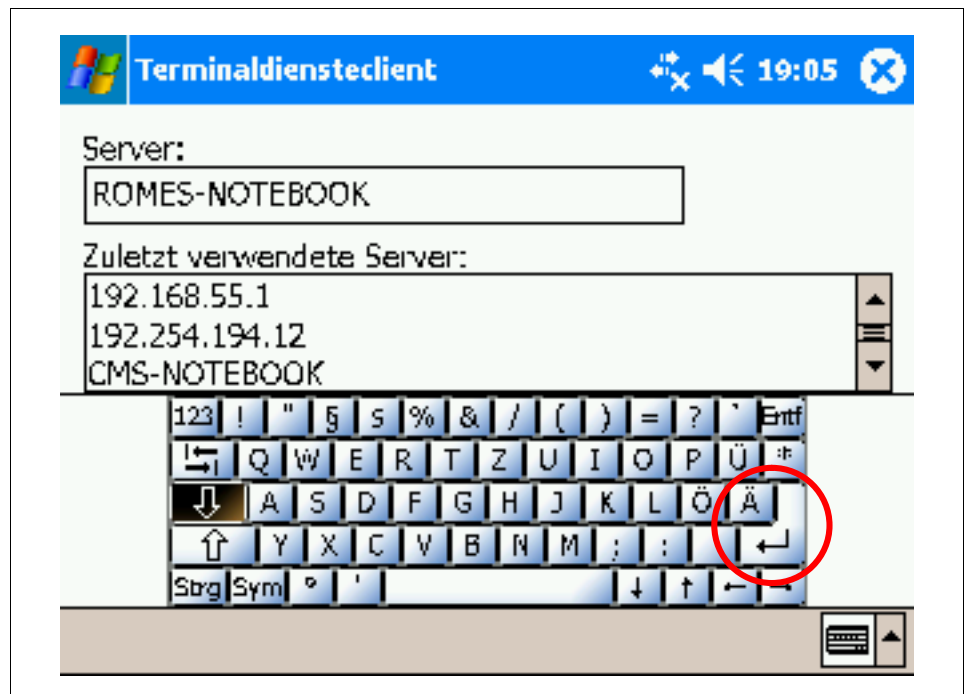

Figure 13: Enter remote server name.

To start connection, either click on the return symbol on the virtual keyboard, or close the keyboard again and click on the "connect" button.
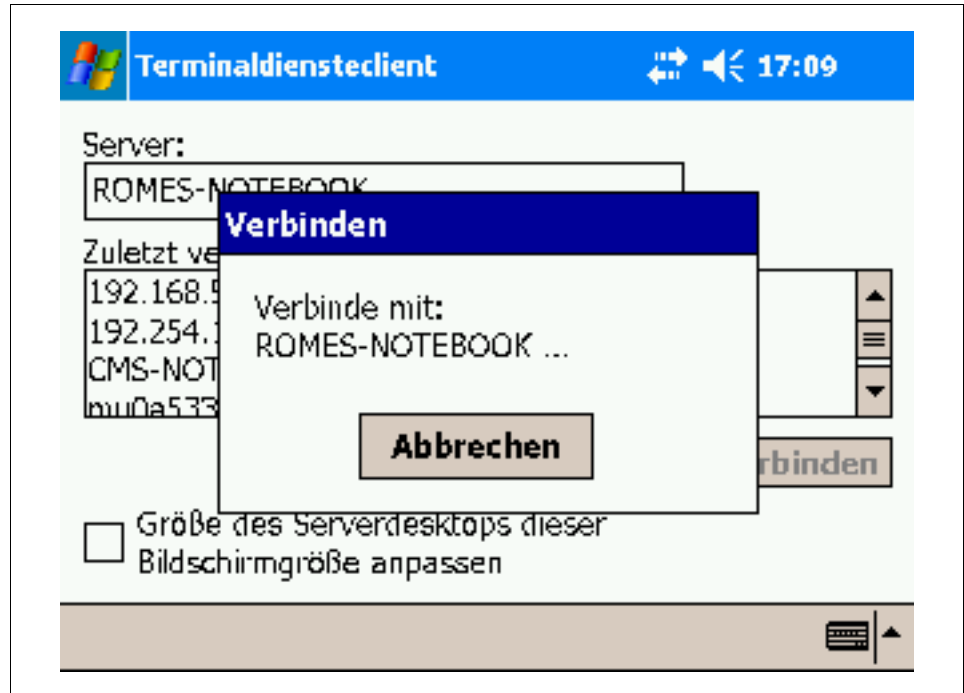
Figure 14: Search remote server.

NOTE: it takes the PDA up to 10 minutes to recognize the Computer Name of your notebook after starting the network connection. IP-Addresses work immediately. So it is not possible to connect to the Notebook using logical names for the first few minutes after Bluetooth or WLAN network connection has been established. Depending on the load and the quality of the Bluetooth or WLAN link, you may need several attempts, until you get a successful connection. This behavior is due to windows network configuration management. In case of fail, an error message as shown below is issued instead:
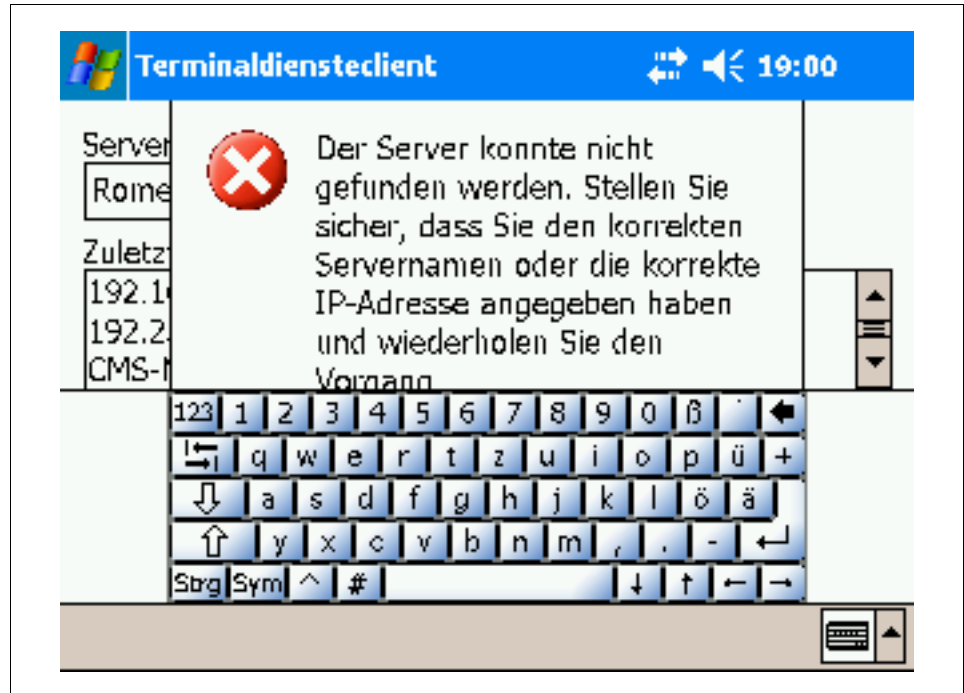
Figure 15: Connection failed.

After all, you should get the login screen of windows anyway. Open the virtual keyboard to type in the user name and password.
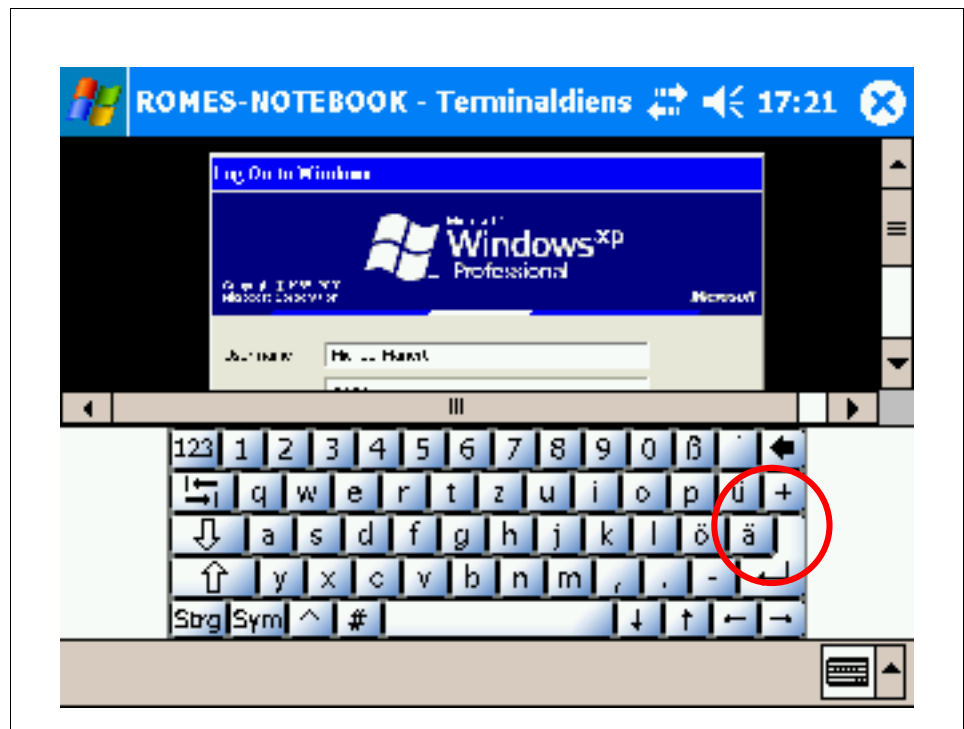

Figure 16: Login screen of windows.

Click on return key of the virtual keyboard of windows to log in.

Disconnection from a remote session

To disconnect from the remote server, simply open the start menu. The entry "Turn off the computer" has been replaced by "Disconnect".
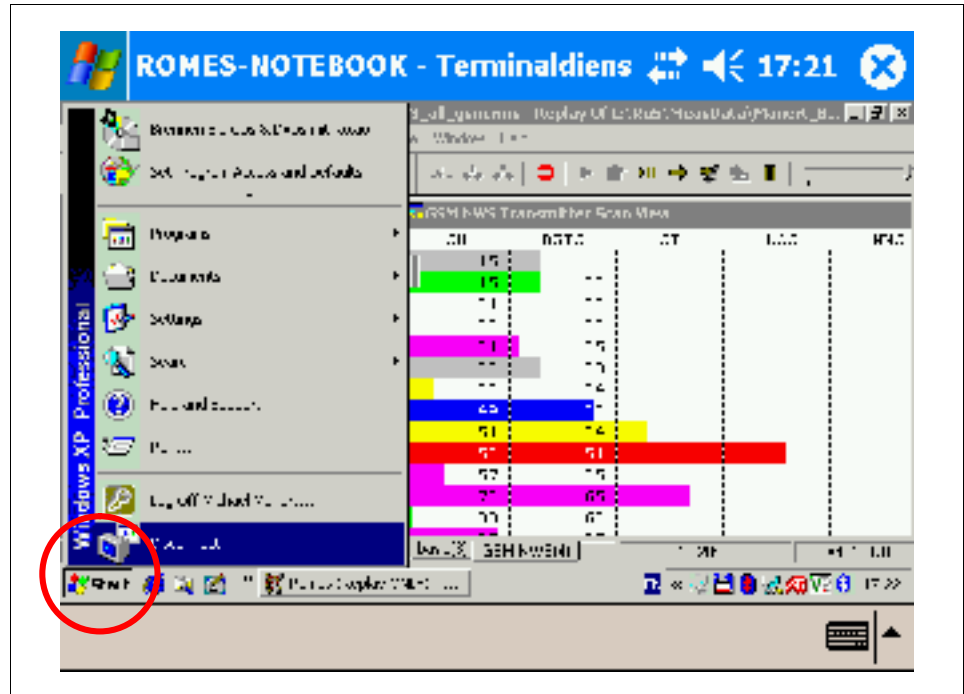

Figure 17: Disconnect from server

After confirmation the connection is closed.

During the remote session, the windows welcome screen is displayed on the notebook. You can log-in directly to the notebook to close the terminal session alternatively.

Using Remote Desktop on a Notebook

Obviously it's also possible to remote control the laptop not only by a Pocket PC, but by another laptop instead. This section describes how to configure this.

Note: *It is strictly recommended to use static IP addresses, i.e. DHCP disabled. Remote desktop connection can be established much earlier, in some cases it is not possible at all to start a remote connection using the logical name of the computer for a second time without rebooting in between.*

Entering a remote session

Start the Remote Desktop Connection via Start → Programs → Accessories → Communications.

The program presents a list with the last few connections and the latest connection pre-selected, see next picture.
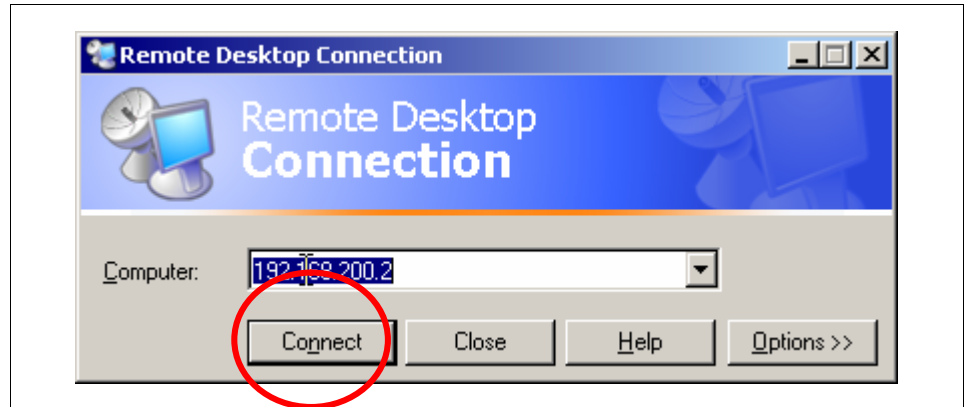
Figure 18: Start remote desktop connection.

Enter the name of the server.

Note: *Better enter the IP-address than the network name of the remote computer, as network resolution does not work reliably in a peer to peer network without a dedicated name server.*

After clicking "Connect", the windows log on screen of the remote computer is being displayed. Enter the user name and password.

Note: *it is not necessary that anybody is logged on to the remote computer already. Only the network connection needs to have been started.*

Note: *it takes the PDA up to 10 minutes to recognize the Computer Name of your notebook after starting the network connection, if DHCP is configured. So it is not possible to use the terminal client for the fist few minutes after Bluetooth or WLAN network connection has been established. Depending on the load and the quality of the Bluetooth link, you may need several attempts, until you get a successful connection. In case of fail, an error message as shown below is issued instead:*
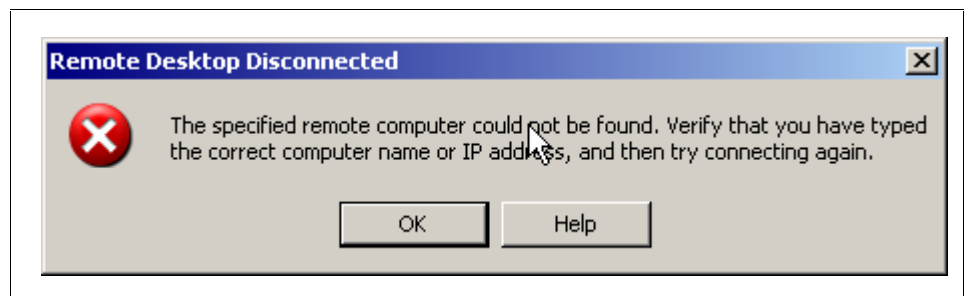

Figure 19: Connection failed

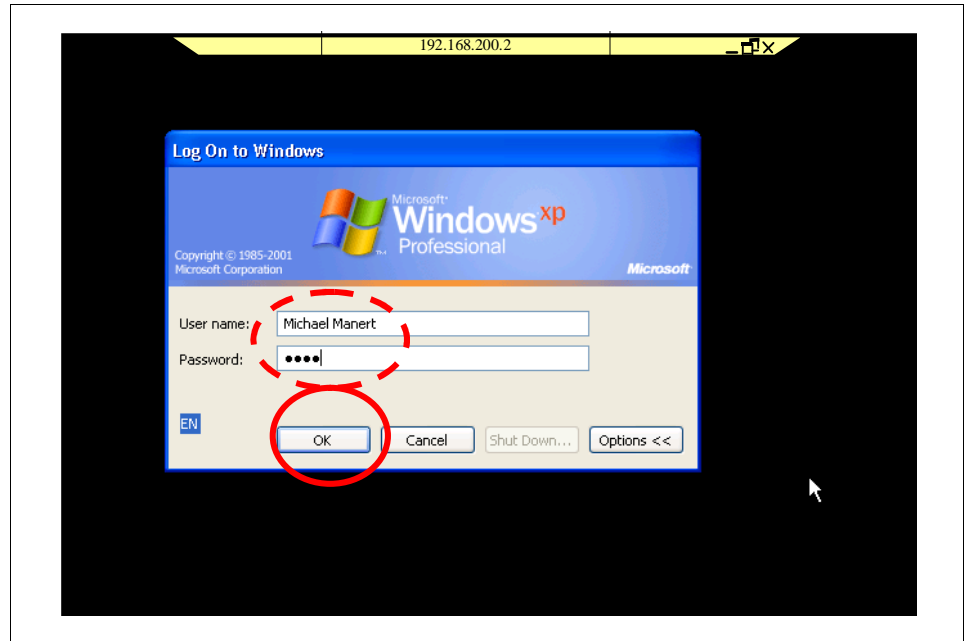After all, you should get the login screen of windows anyway.

Figure 20: Log on screen for a remote desktop session

Click "OK" and you log onto the remote computer.

For the very first time, you log remotely on to the computer, an error message of the desktop manager may be displayed, as shown below. This error message can safely be ignored.
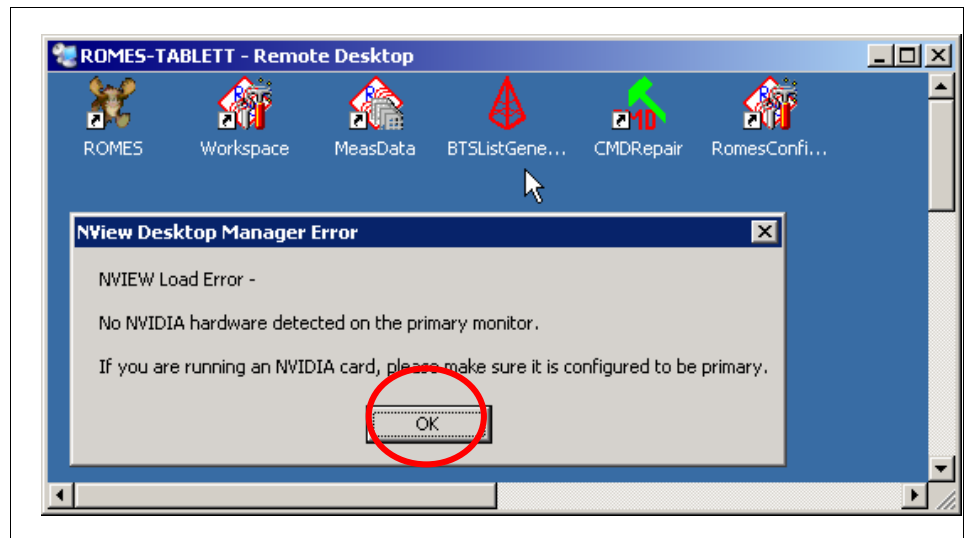

Figure 21: Video card desktop manager error

Click on the return key of the virtual keyboard of windows to log in.

Disconnection from a remote session

To disconnect from the remote server, simply open the start menu. The entry "Turn off the computer" has been replaced by "Disconnect".
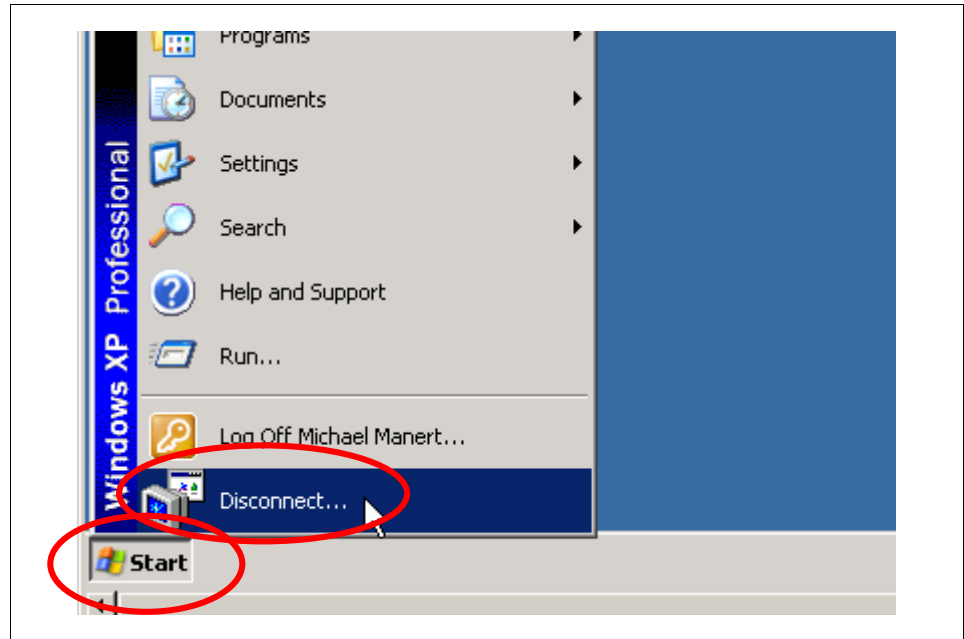
Figure 22: Disconnect from server

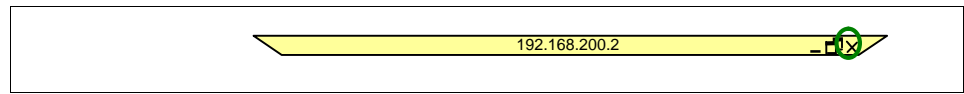After confirmation the connection is closed.

Figure 23: Disconnect from server

As an alternative the session can be closed by clicking to the "close" button, which is displayed on top of the screen.

NetOp

NetOp is a commercial tool for remote control of a windows computer. It is available for all current windows systems, for Pocket PCs and also for Palm OS based hand held computers. A trial version can be downloaded from www.netop.com.

Installation is self explaining.

Configuration of the Notebook

The first time, NetOp is started via Start → Programs → NetOp Remote Control, a configuration wizard starts to configure NetOp. The wizard will ask for the following items:

- Use default settings

- Start with windows

- enter a password according your needs

The configuration wizard updates the Windows Firewall according to its needs:
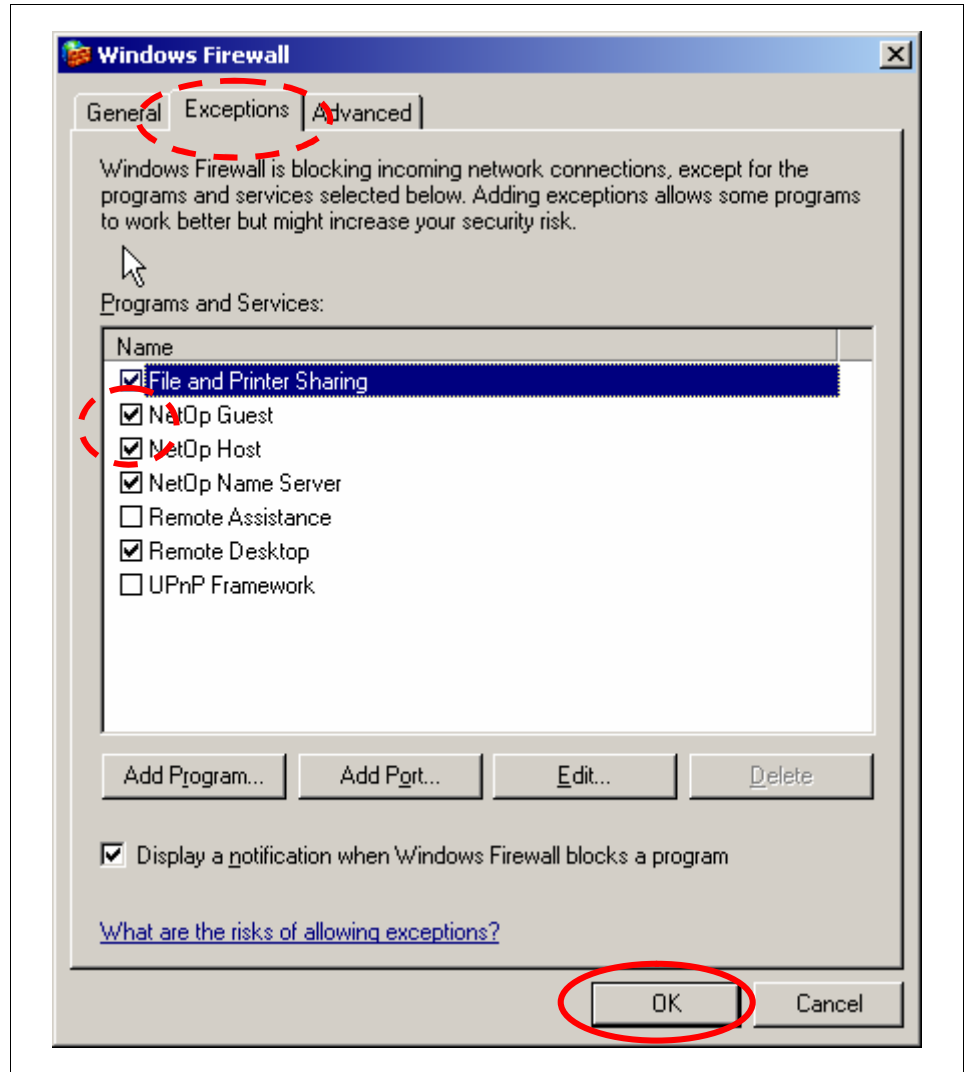
Figure 24: Windows Firewall settings with NetOp

Configuration of the PDA

It is a good idea, to enable the NetOp Guest in the start menu, where it can easily be started from. To do this, open the list of the menu entries via Start → Settings → Start menu. Enable the entry of the NetOp Guest
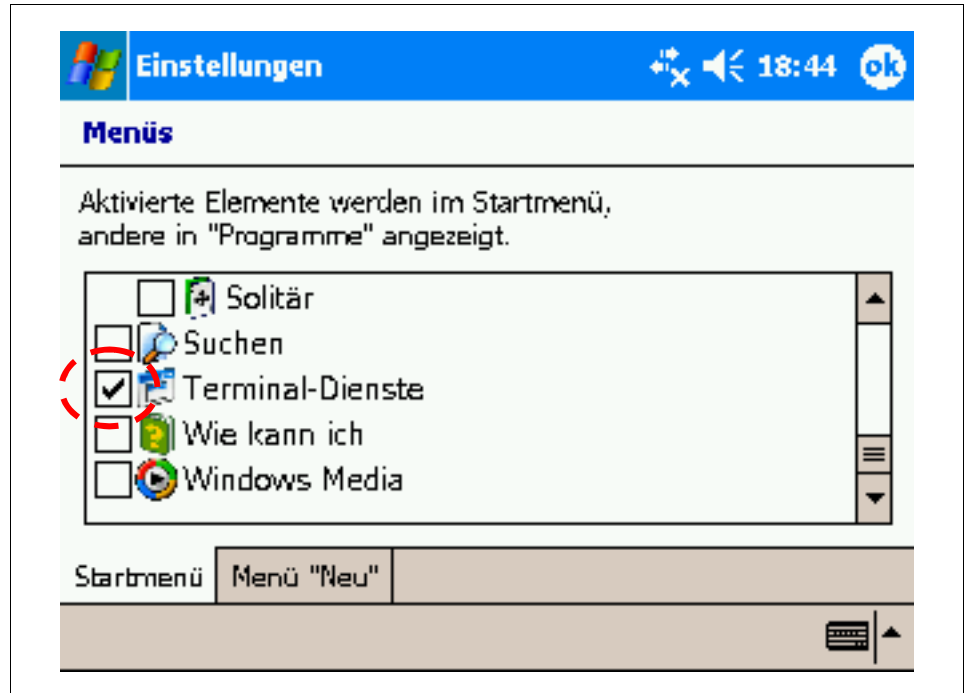
Figure 25: Adding NetOpGuest to the start menu

You may add or remove any other programs according to your needs.

Furthermore, it is most convenient to set the desktop of the PDA to landscape mode. Consult the documentation of your PDA for further details.

Using NetOp

Entering a remote session

Start the NetOp Guest by either clicking "NetOp Guest" in the Start menu, or in the Program Folder, depending on the configuration. For better readability in this application note, the following pictures are formatted in upright position; for practical use, landscape position is recommended.
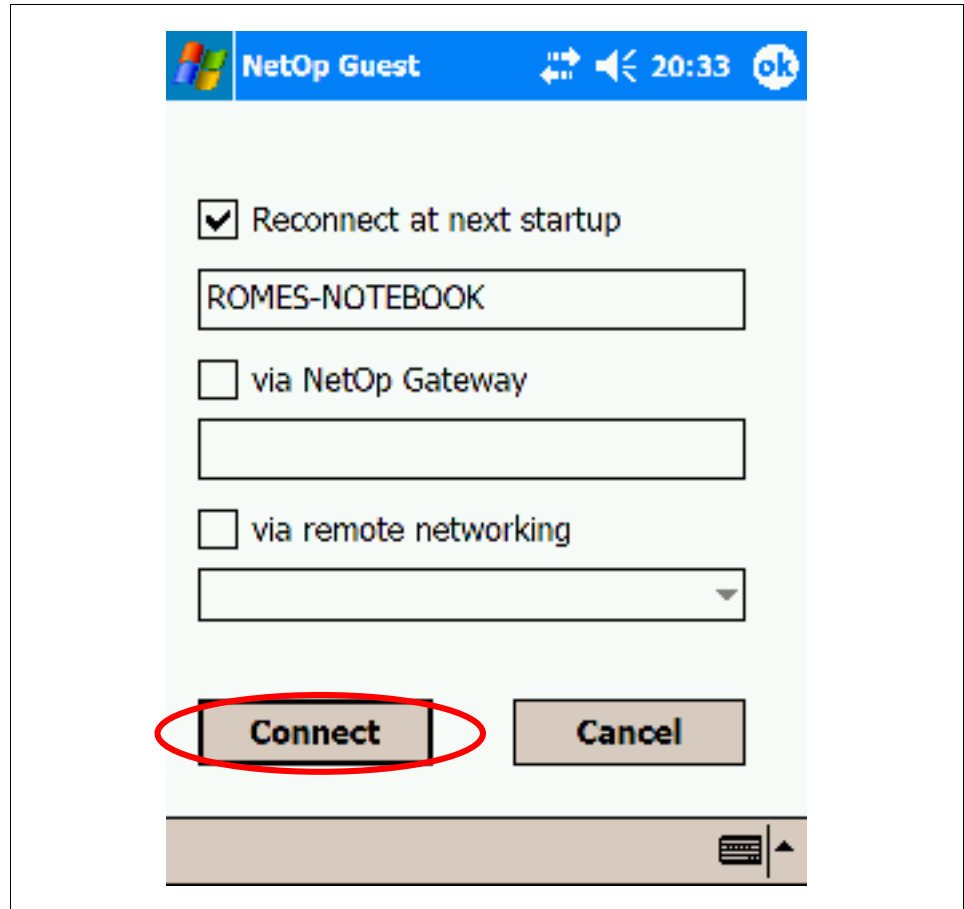
Figure 26: Configuration dialog of NetOp at startup

Enter the name of the remote computer in the first line. You may optionally enable the "Reconnect at next startup", in which case the configuration dialog is skipped at further starts of NetOp.

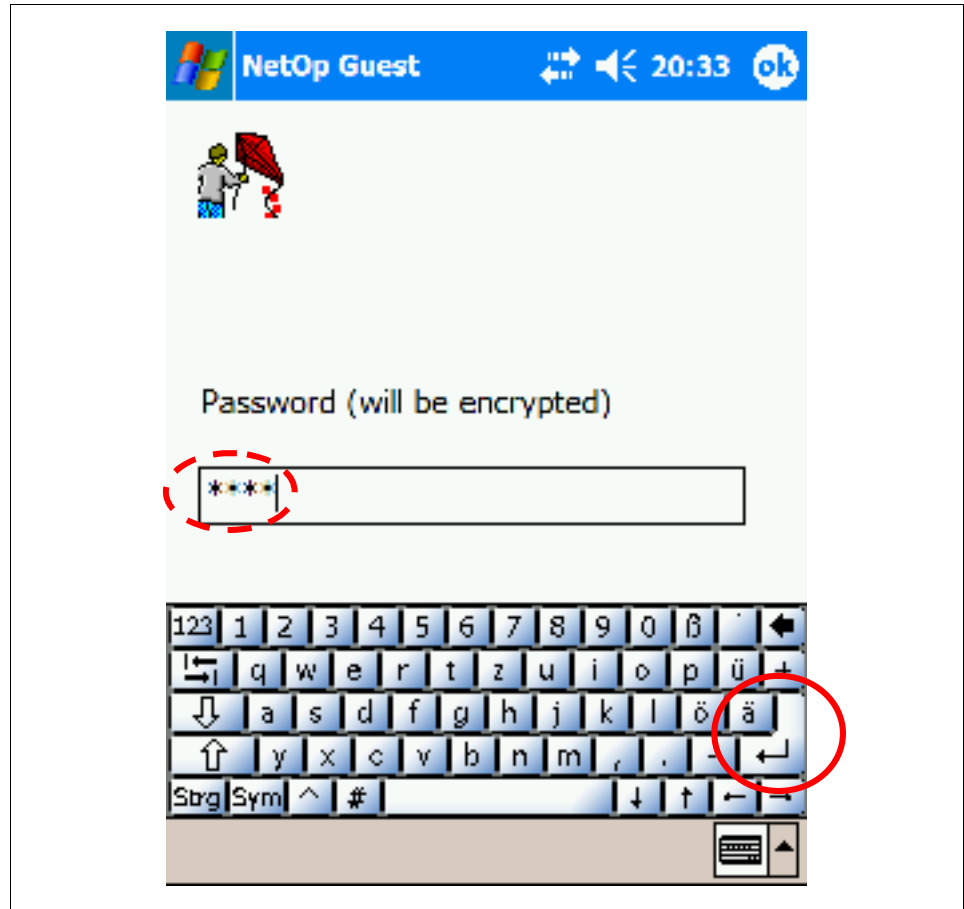After clicking the "Connect" button, the password is requested:

Figure 27: Enter password for NetOp.

NOTE: *it takes the PDA up to 10 minutes to recognize the Computer Name of your notebook after starting the network connection, if the IP-address has not been preset. So it is not possible to use the terminal client for the fist few minutes after Bluetooth or WLAN network connection has been established. Depending on the load and the quality of the Bluetooth or WLAN link, you may need several attempts, until you get a successful connection. In case of fail, an error message as shown below is issued instead:*
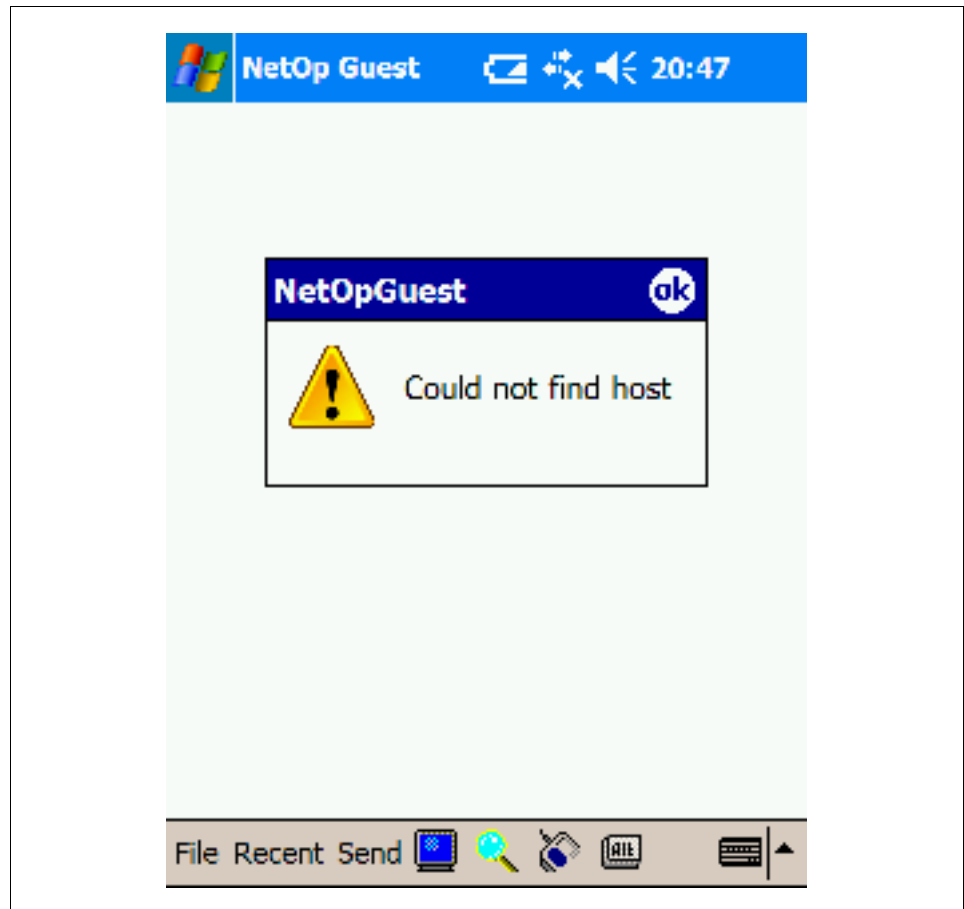
Figure 28: No host found for NetOp connection

Otherwise, the screen of the host is displayed.

Disconnection from a remote session

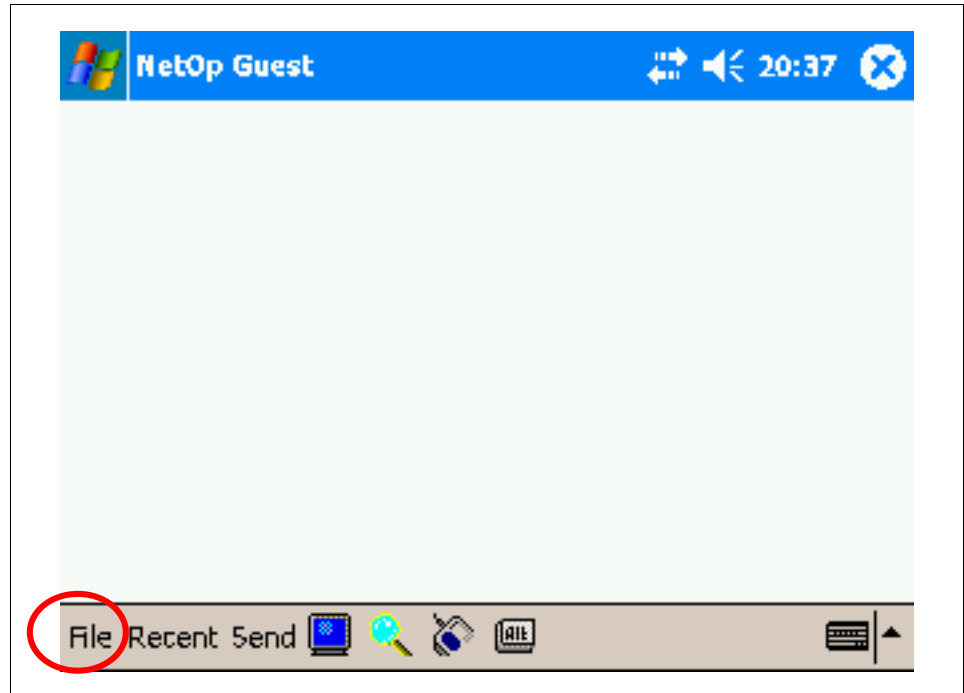To disconnect from the remote server, open the "File" menu and click on "disconnect".

Figure 29: Disconnect a NetOp session

As long as NetOp is not closed again, in the menu "Recent", a session to the Notebook can be reopened.

VNC

VNC (virtual computer networking) is a program suite for remote controlling computers. It is available for various UNIX systems, for Macintosh, for Windows and for Windows CE and Pocket PC. Most of the suites are freeware or supply at least a personal version. In this application note, UltraVNC is described, which can be found on ultravnc.sourceforge.net, and which is GPL copyrighted.

Installation of the server and client on a notebook

Download UltraVNC-101-Setup.exe, or any newer, store it anywhere on the notebook and start the installer. Installation starts with a selector box to select the language requested. Select the language you like and continue by clicking on "OK"
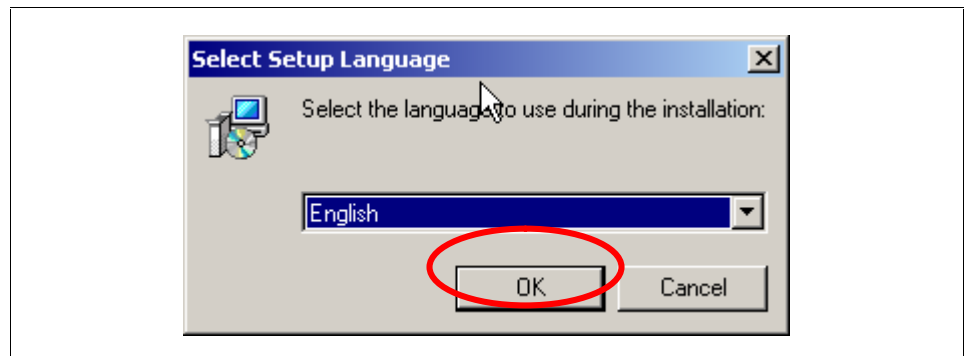

Figure 30: Select language for vnc.

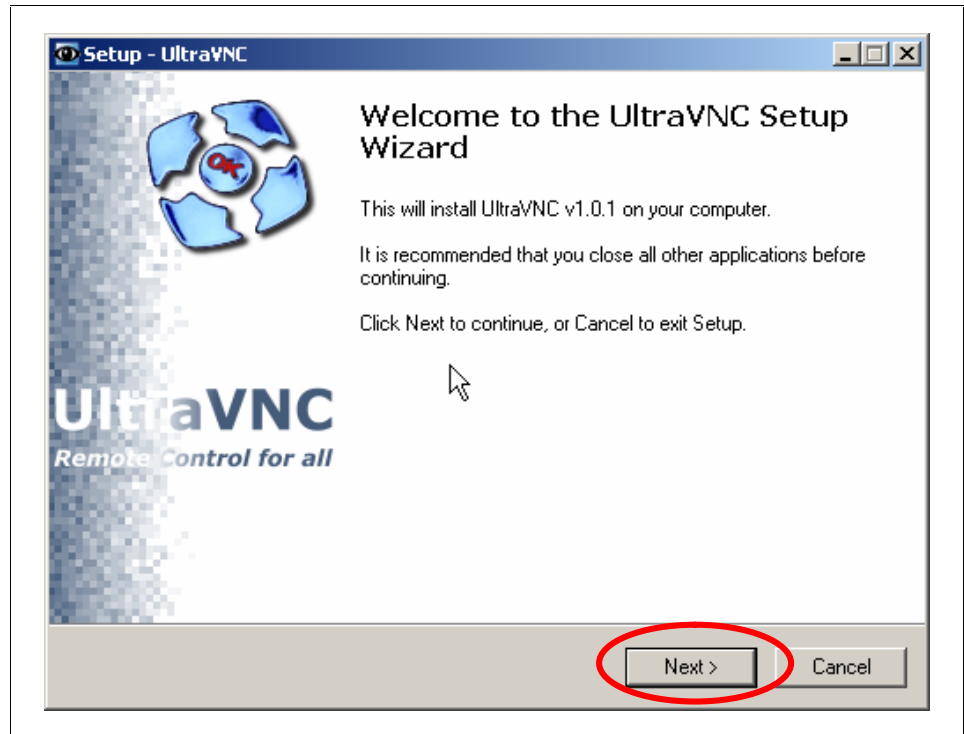The next views all can be accepted by clicking "Next". These are:

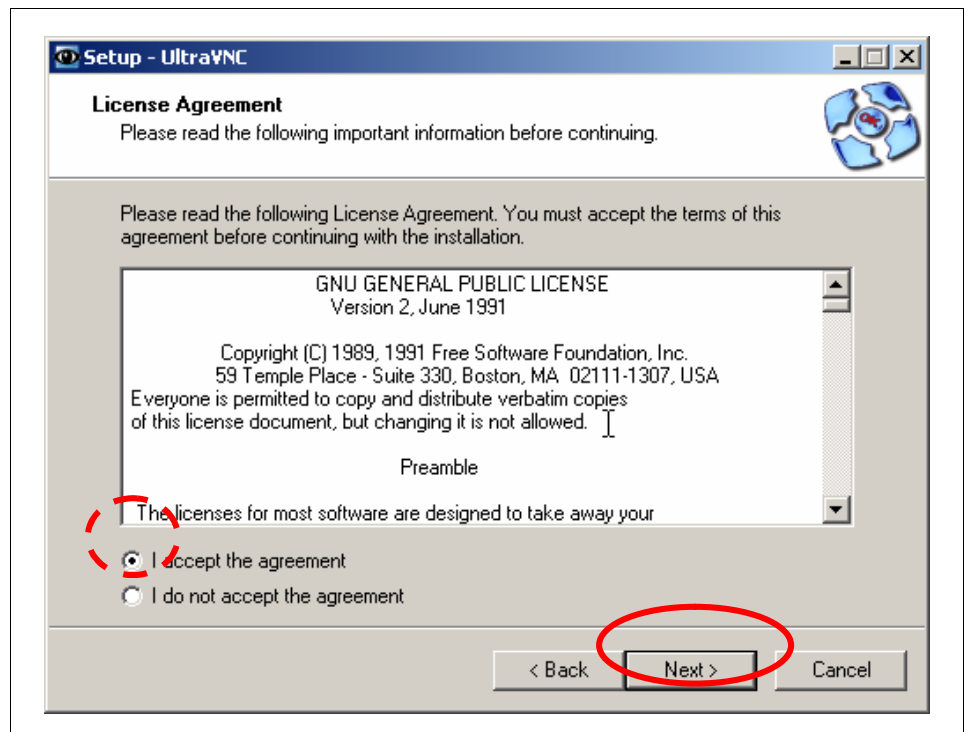Figure 31: Welcome to the UltraVNC setup

Figure 32: License agreement

The license is displayed after that and must also be accepted by clicking "Next".
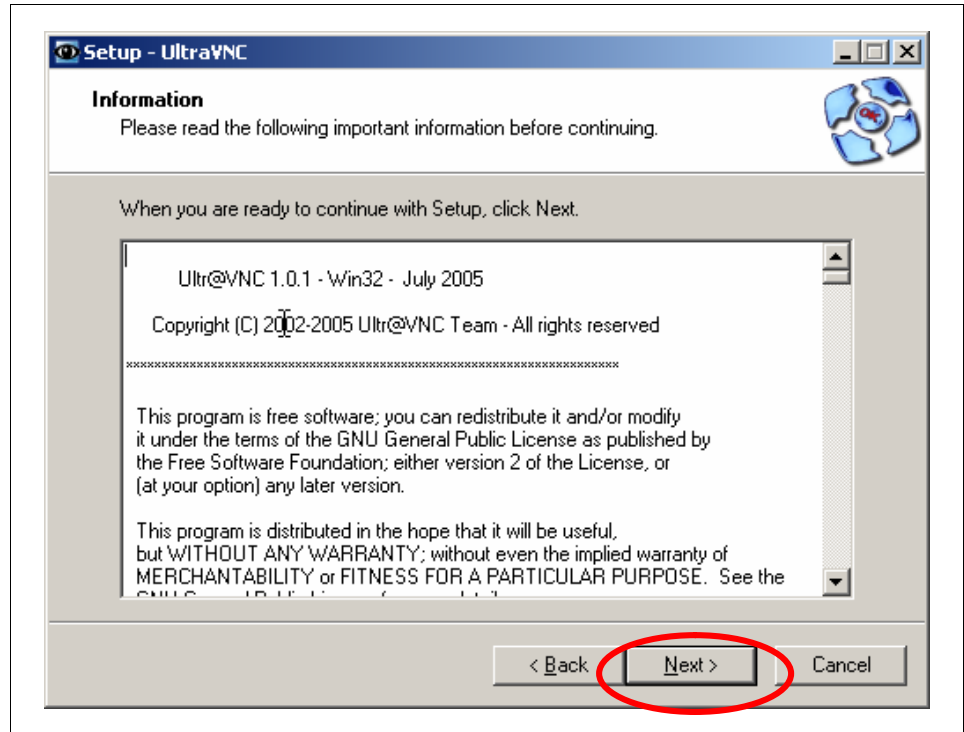
Figure 33: General Public License

The default directory should fit for all purposes and can be accepted by clicking to "Next".
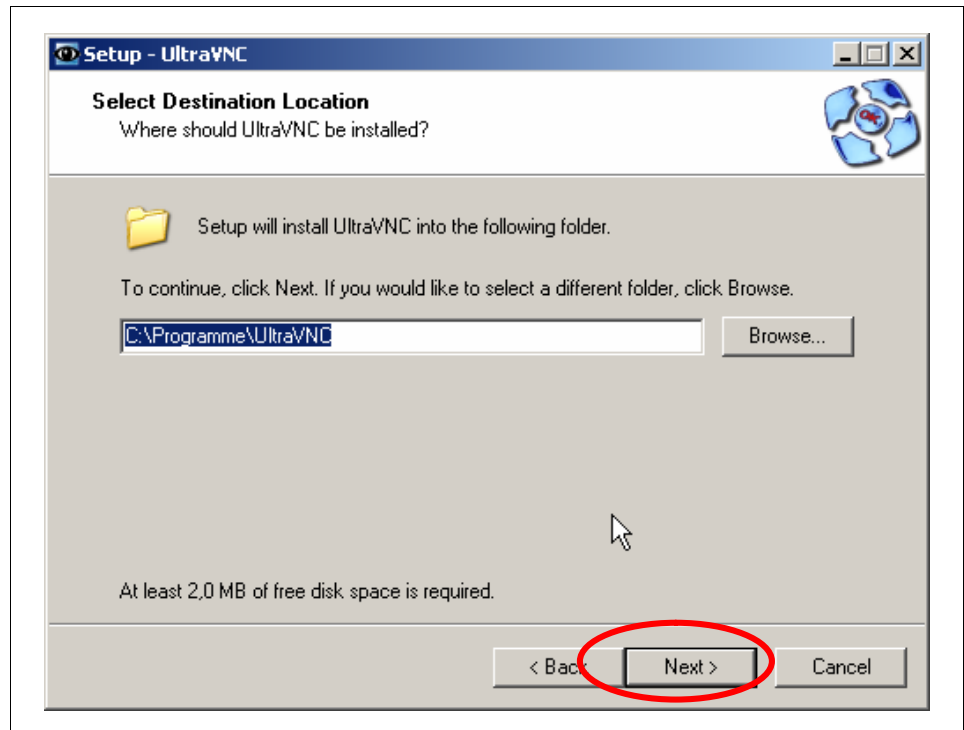

Figure 34: Installation directory of UltraVNC

In case, the computer should be used as server or as viewer, you may deselect one of the following components. In most cases, just accept the dialog, by clicking "Next".
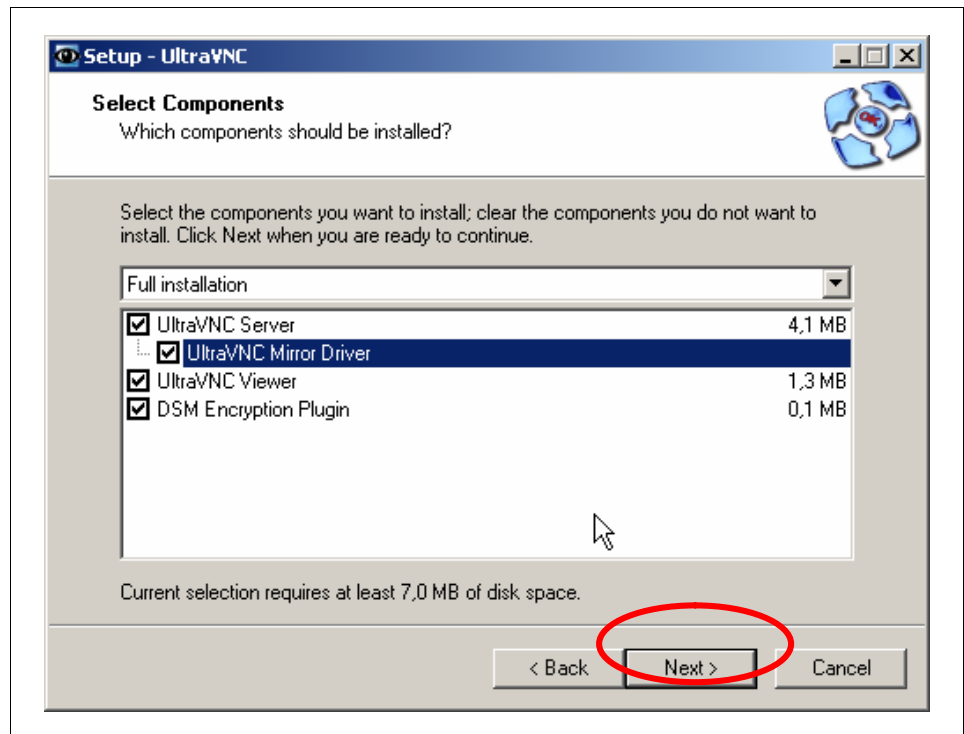

Figure 35: Select components for UltraVNC

Installation continues with the definition of the entry in the start menu folder, which just can be accepted. Click on "Next" to continue.
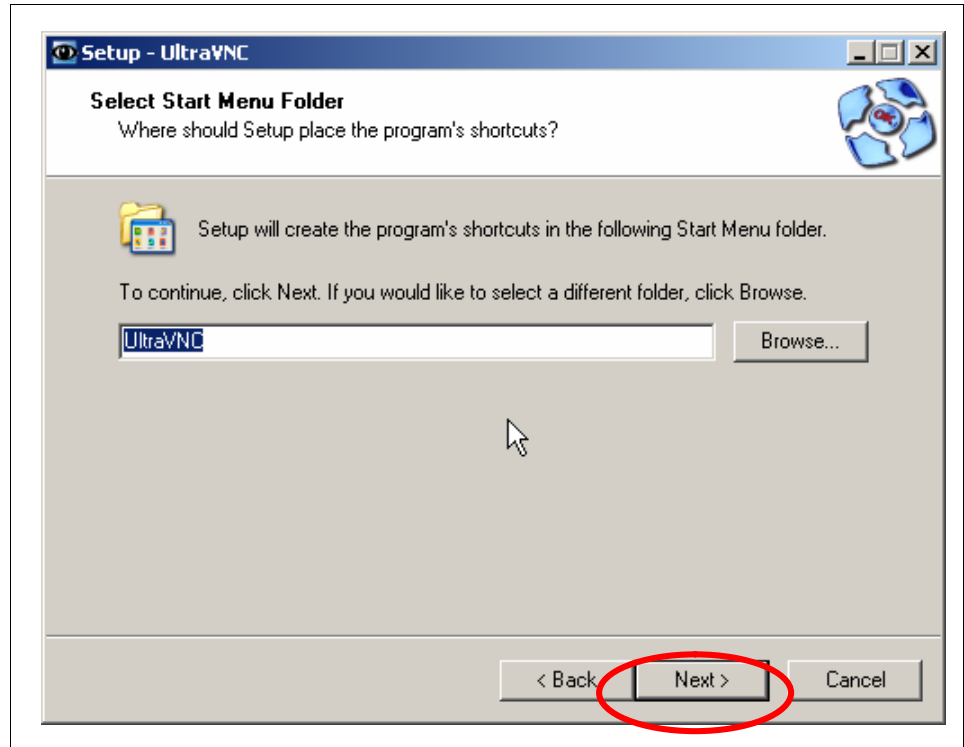
Figure 36: Select short cut of UltraVNC in start menu

Be sure to register the UltraVNC server as a system service, if it is desired to remote log on the computer immediately after system start up. Do not start the UltraVNC service this time, as due to an error in the present installation routine, the VNC-icon does not appear in the task list of Windows immediately. Click "Next" for the next dialog.
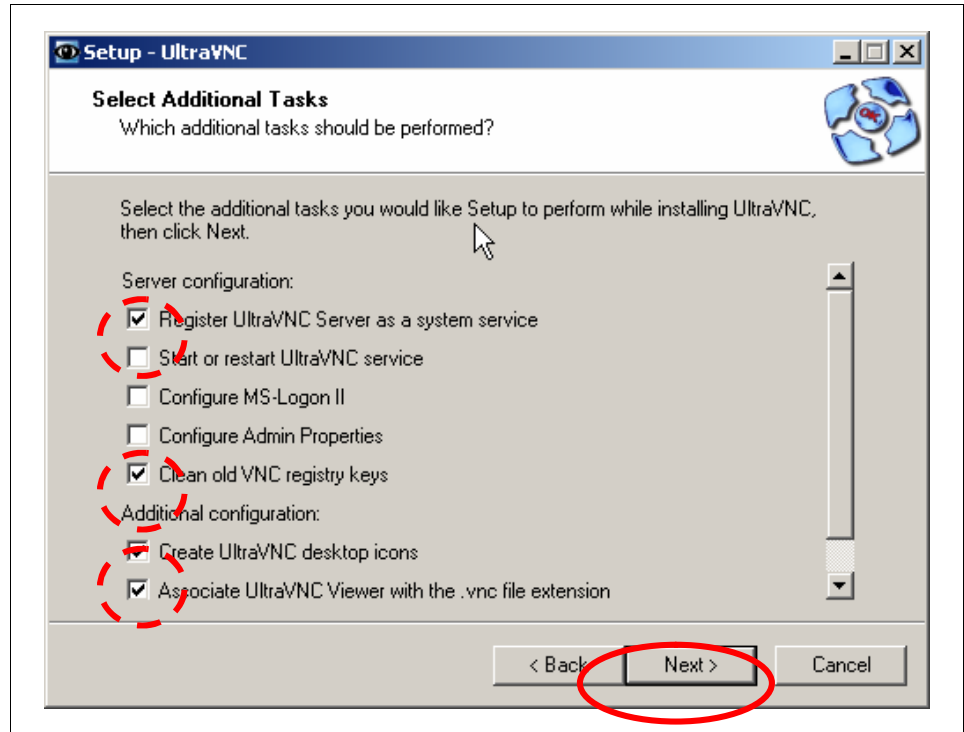
Figure 37: Select additional tasks for vnc.

The following summary of installations can be accepted by clicking "Install".
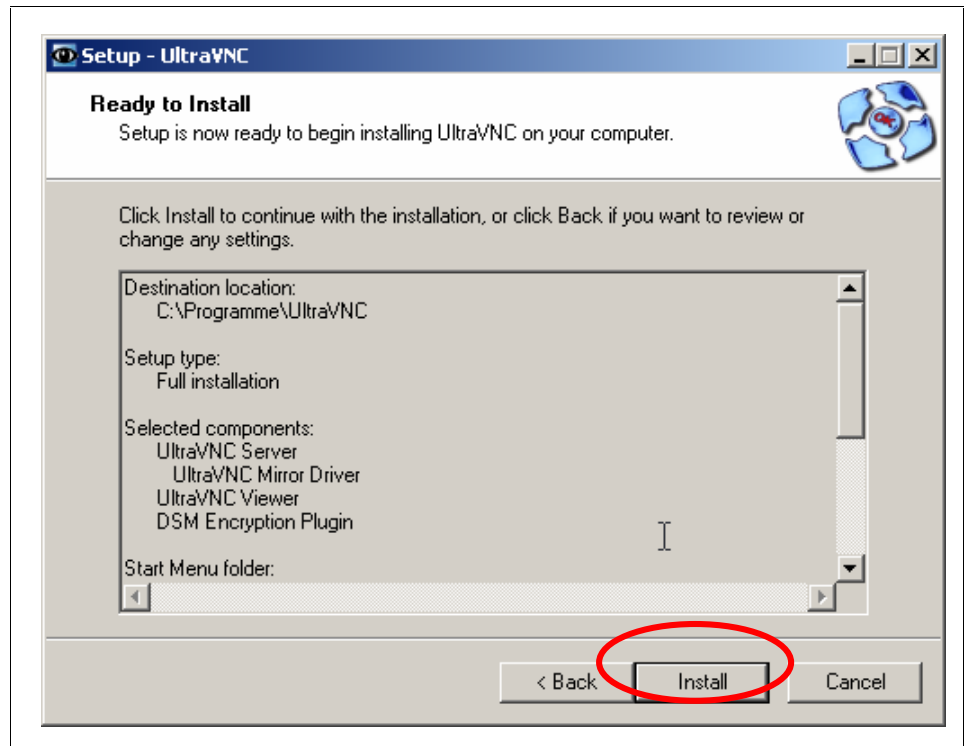

Figure 38: Summary of installations

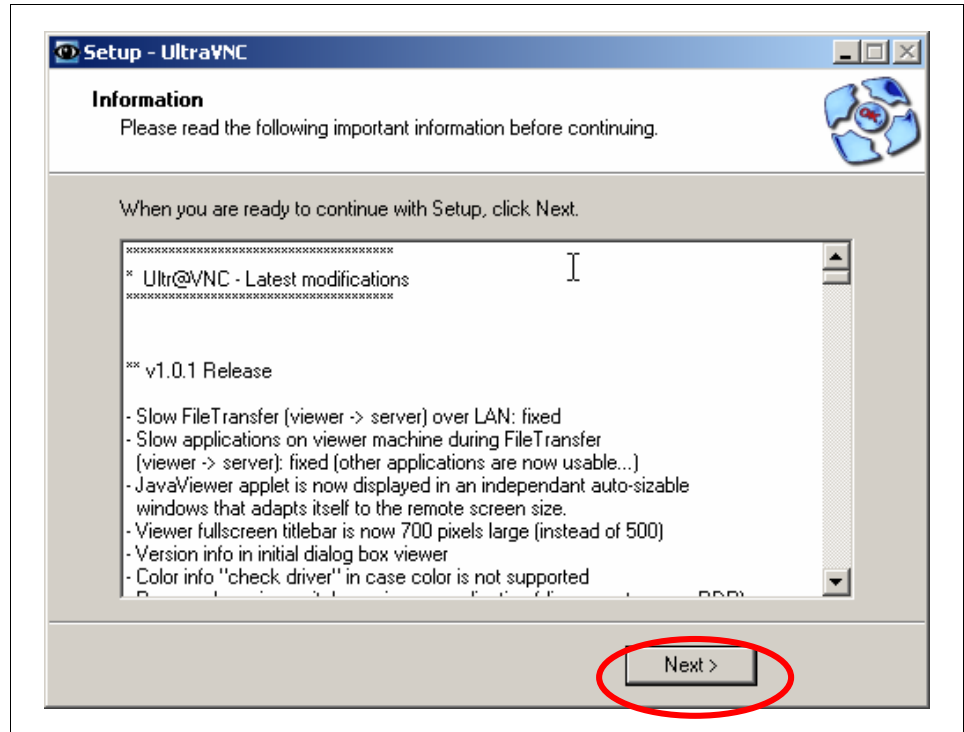Installation process displays the change log, which can be accepted by clicking on "Next".

Figure 39: Change log

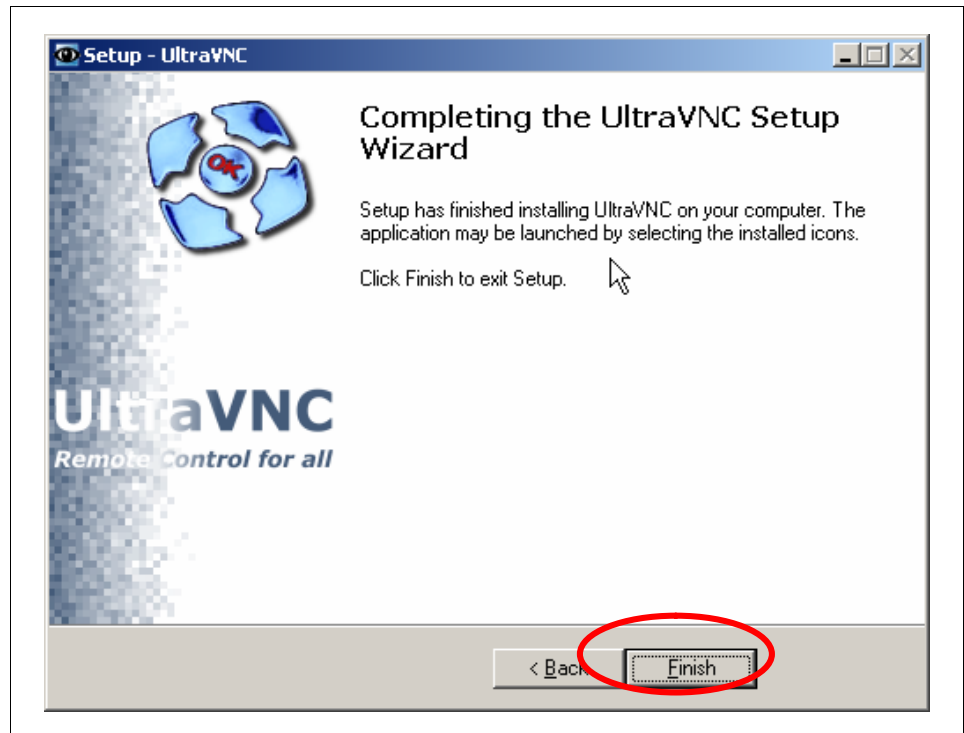The installation can be finished by clicking "Finish" in the next dialog.

Figure 40: Finish setup.

After installation, two new icons can be found on the desktop: one for the viewer, and one for the server. Start the server by double-clicking on the server icon.
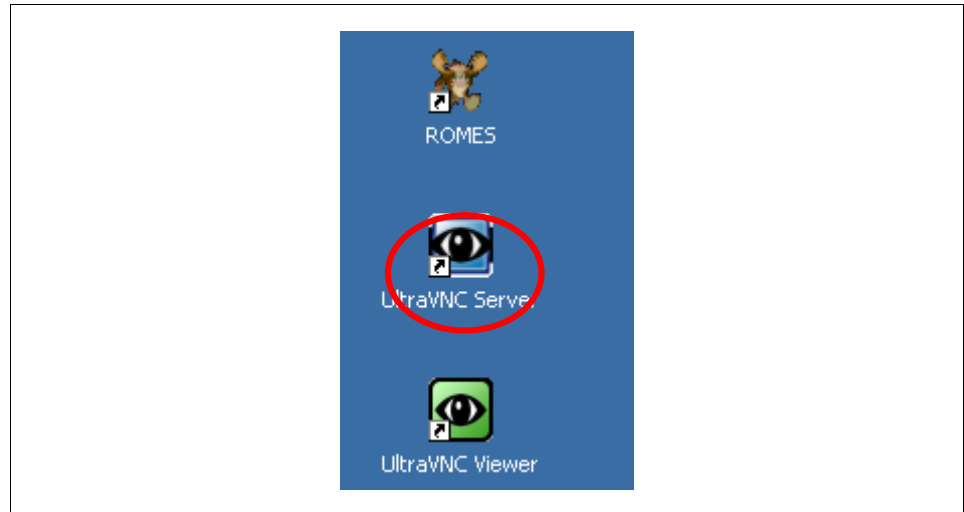
Figure 41: VNC icons on the desktop

When the server starts, the firewall automatically starts a configuration wizard, if the firewall is activated. Unblock the firewall for UltraVNC by clicking "Unblock".
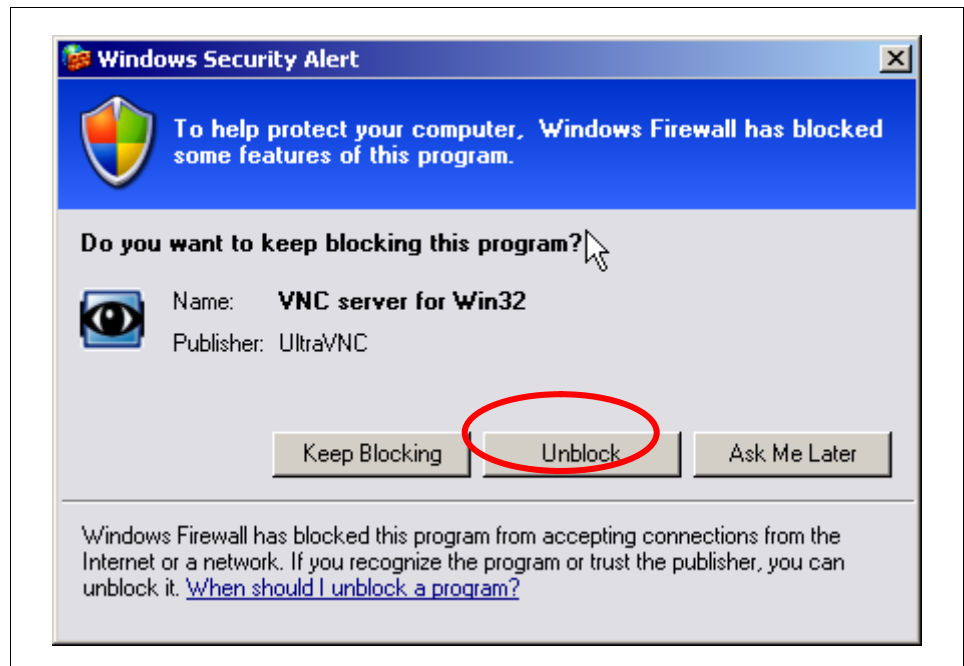

Figure 42: Windows Security Alert

VNC comes up with a configuration dialog when started for the first time.

Fill in the admin dialog, as follows:

1. enable socket connections
2. enter a new password
3. disable the query window
4. remove wall paper for viewer
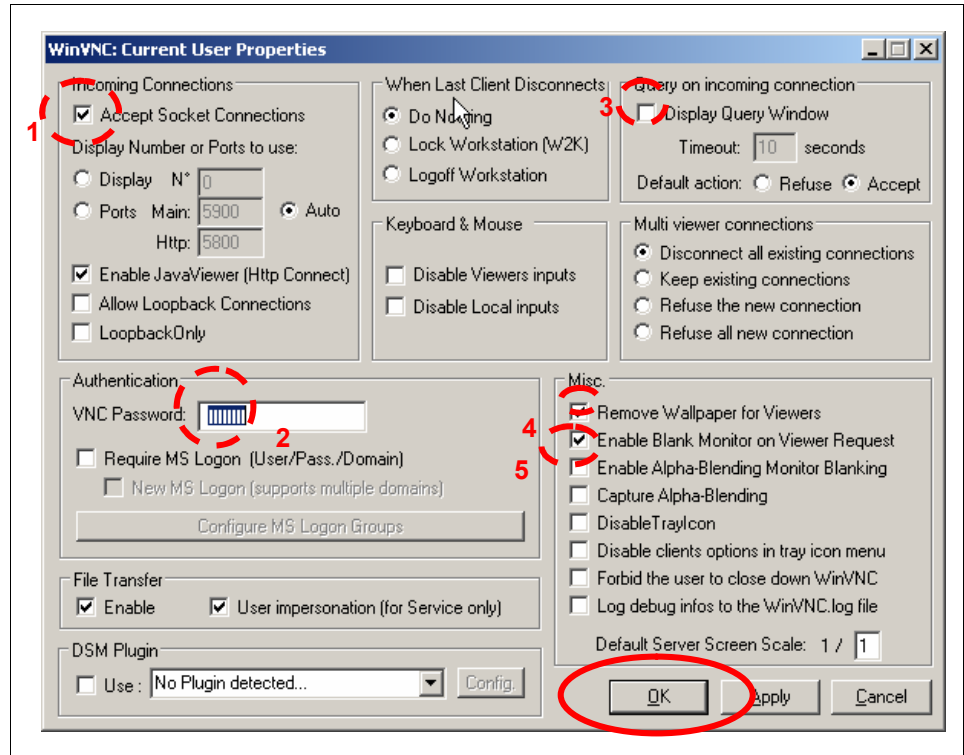5. optional: enable blank monitor on view request and file transfer

Figure 43: Admin settings for UltraVNC

The admin settings can later on be changed in the context menu of the server by right-clicking the server symbol in the notification area of windows, see the next figure.
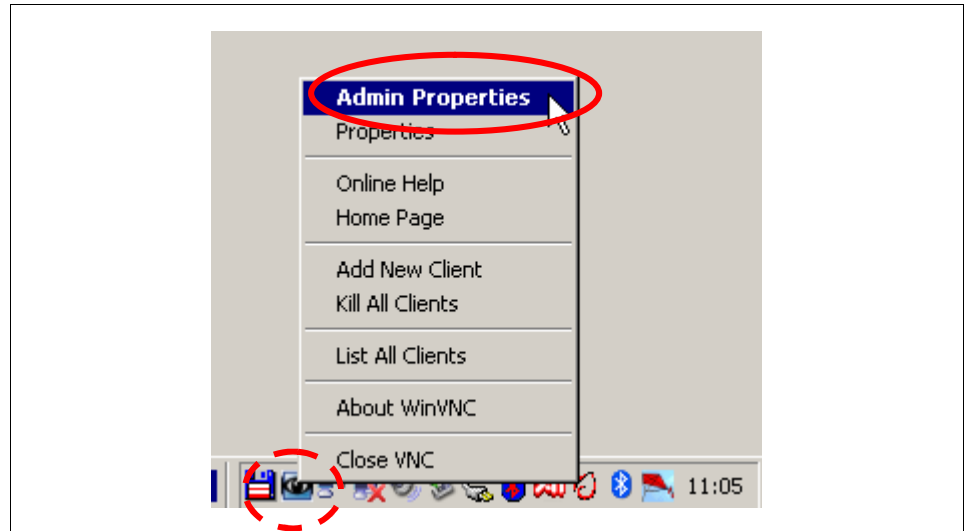

Figure 44: Configuring the admin properties of the server

To optimize speed, start the properties of the server, by right-clicking the server symbol in the notification area of windows, and selecting "properties", see the next figure.
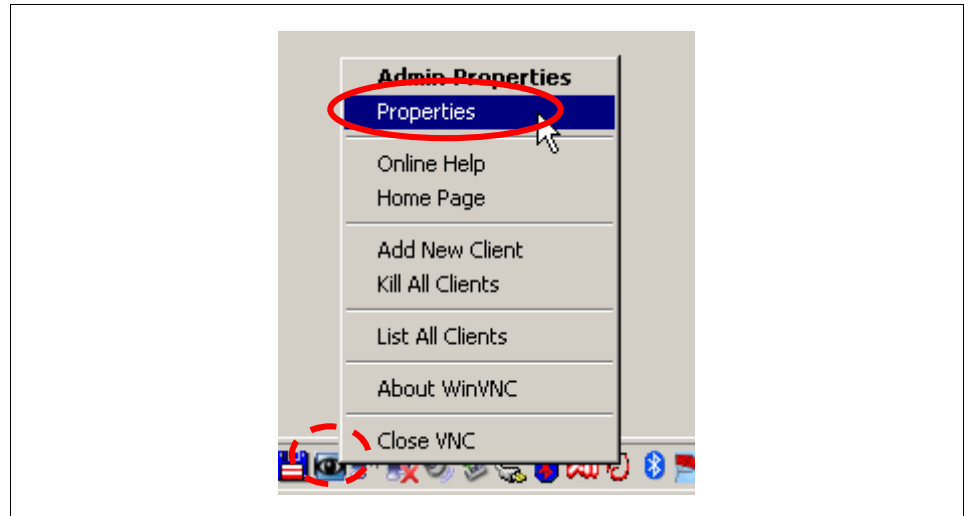
Figure 45: Property settings for UltraVNC

Select "poll full screen" and "low accuracy". Finish the dialog by clicking "OK".

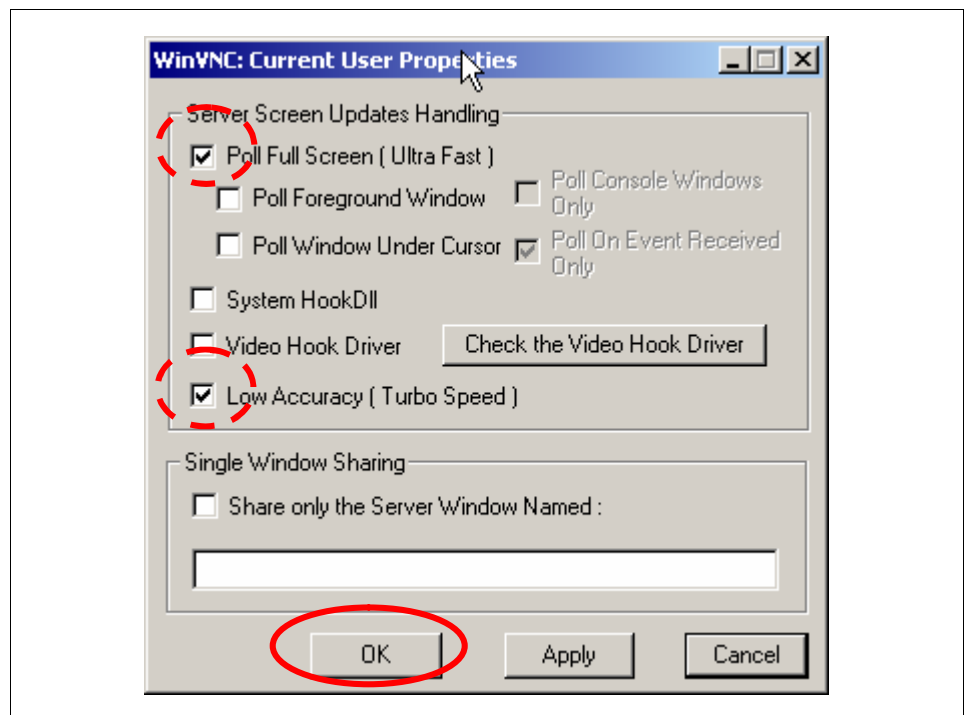

Figure 46: Properties of UltraVNC

UltraVNC is now ready to use.

Installation of the client on a PDA

Download vncview.exe or vncview334.exe, store it anywhere on the PDA. It can be started directly using the file explorer by clicking onto the program icon. There is no special installation necessary.

Sample remote session on a notebook

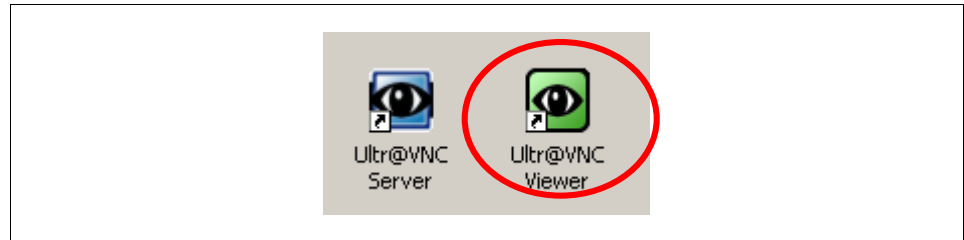Start the UltraVNC viewer by clicking its symbol on the desktop.

Figure 47: Start UltraVNC viewer from the desktop.

Enter the ip-address or the computer name of the remote computer and click on "Connect" to start the session.
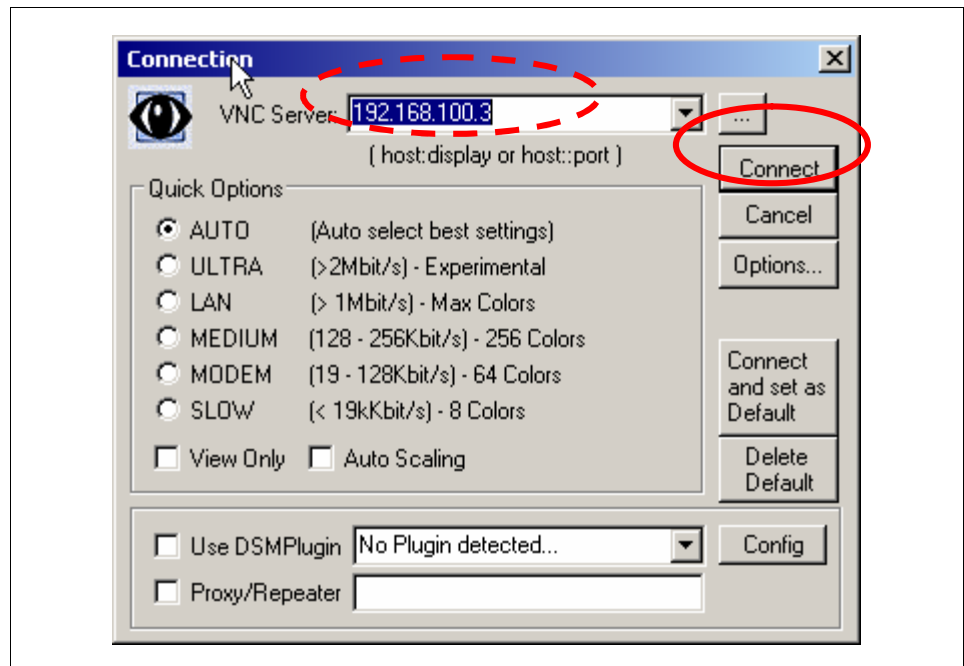

Figure 48: Start a vnc session.

The session needs a password to be entered in the authentication dialog. Choose any password here and remember it for later reference. Enter the session by clicking "Log On".
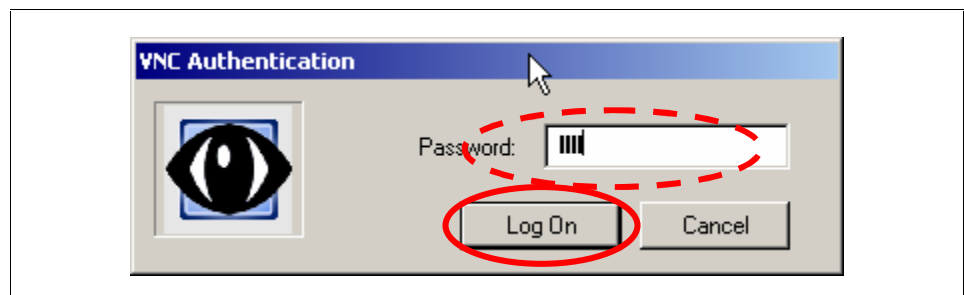

Figure 49: Authentication dialog

The log on dialog of windows appears. Enter your username and password as usual and click "OK" to start the remote session.

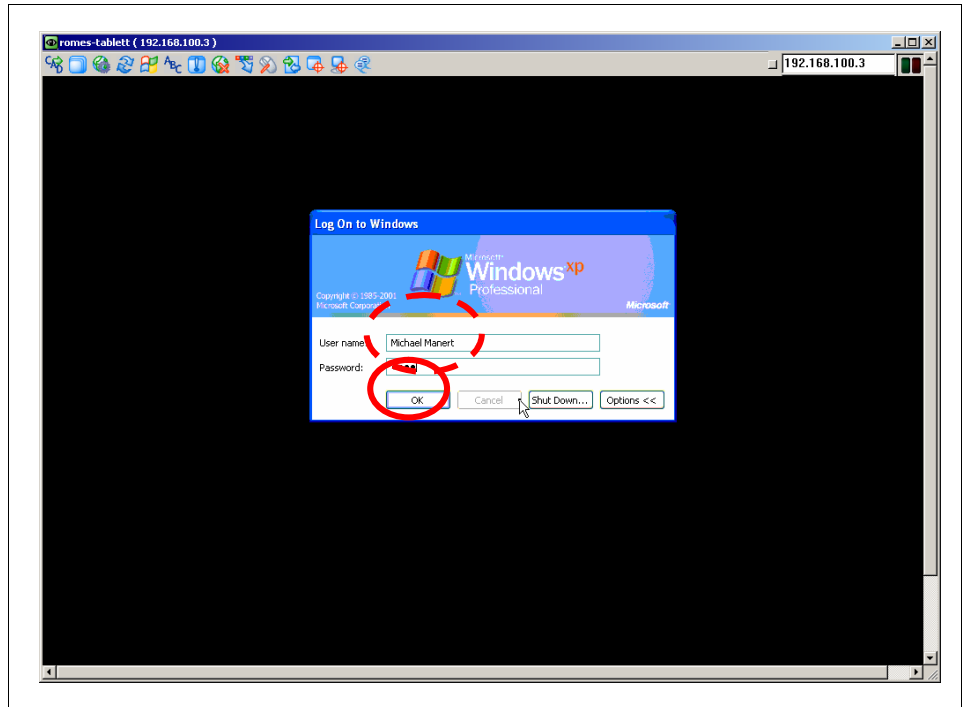***Note****: the log on dialog is skipped, if someone is already logged on the remote computer.*

Figure 50: Windows start up dialog for UltraVNC

To end the session, click to the close connection symbol on the top of the screen, as shown below:
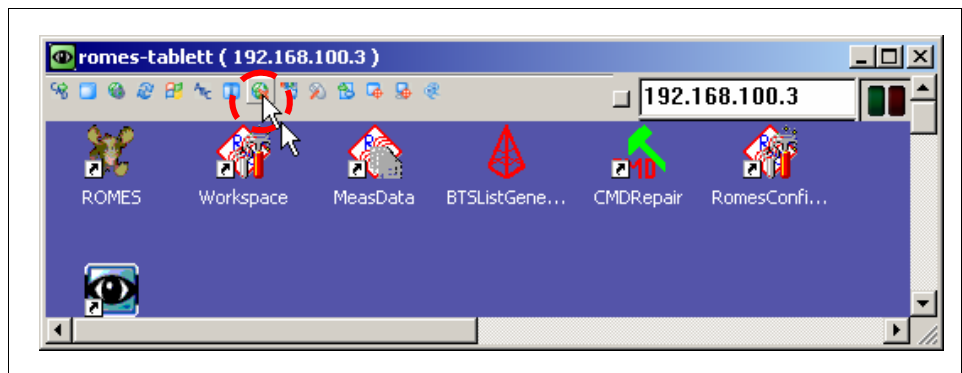
Figure 51: Close the VNC session.

Sample remote session on a PDA

Note*: It is advisable, to set the screen of the PDA to landscape mode, when remote-controlling a notebook. However, for better readability of this section of the application note, the following screen shots are in portrait mode.*

Start the VNC viewer on the PDA using the file explorer by clicking on vncview or vncview334 file in the explorer. The VNC viewer starts with it's

dialog to enter the connection details. When starting the VNC viewer for the first time, it is advisable to enter the connection options by clicking on the "Options" button.

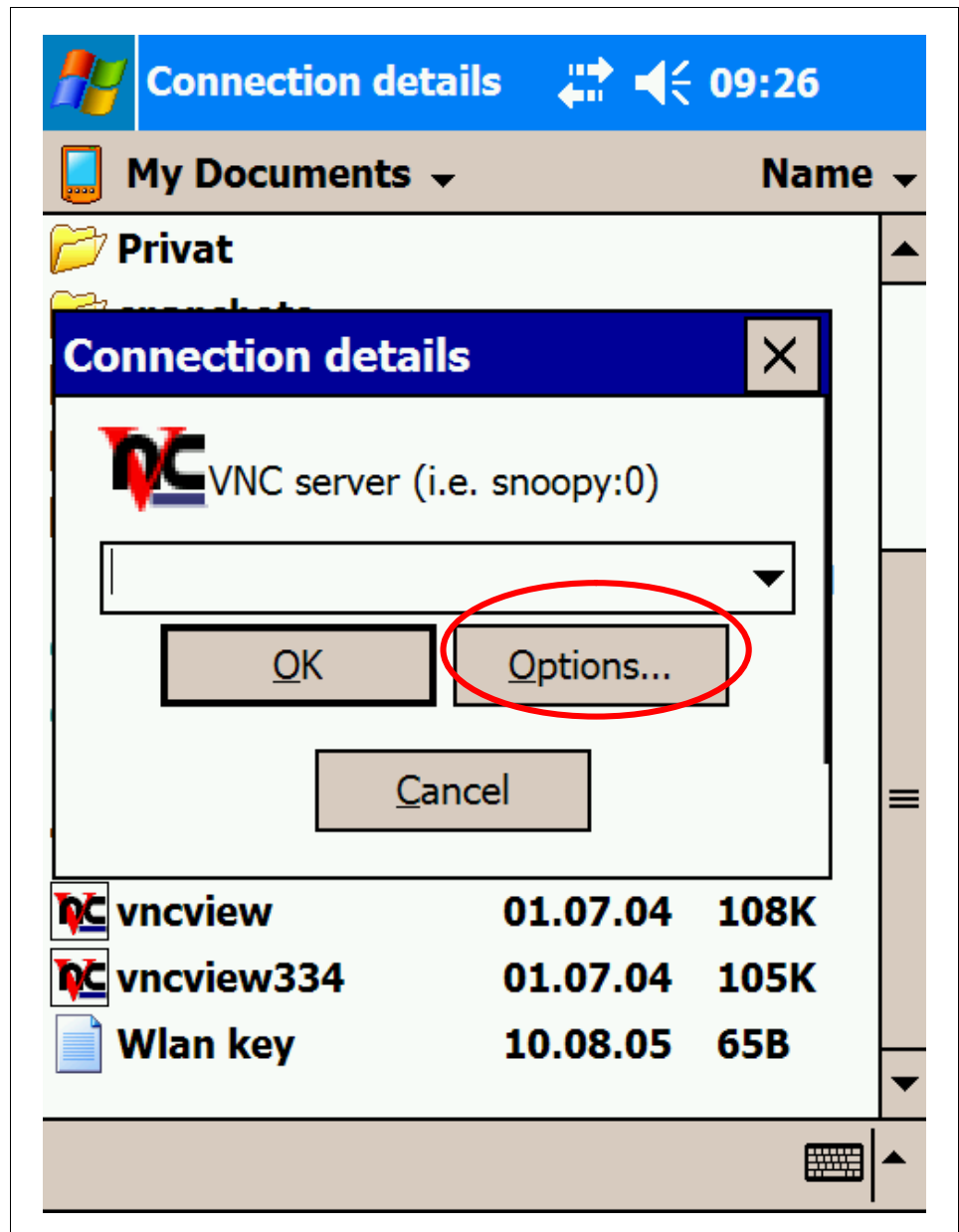Figure 52: Connection details for VNC

The dialog with the options opens. Make sure, that exactly those options are selected that are indicated below. Close the dialog by clicking to "OK".

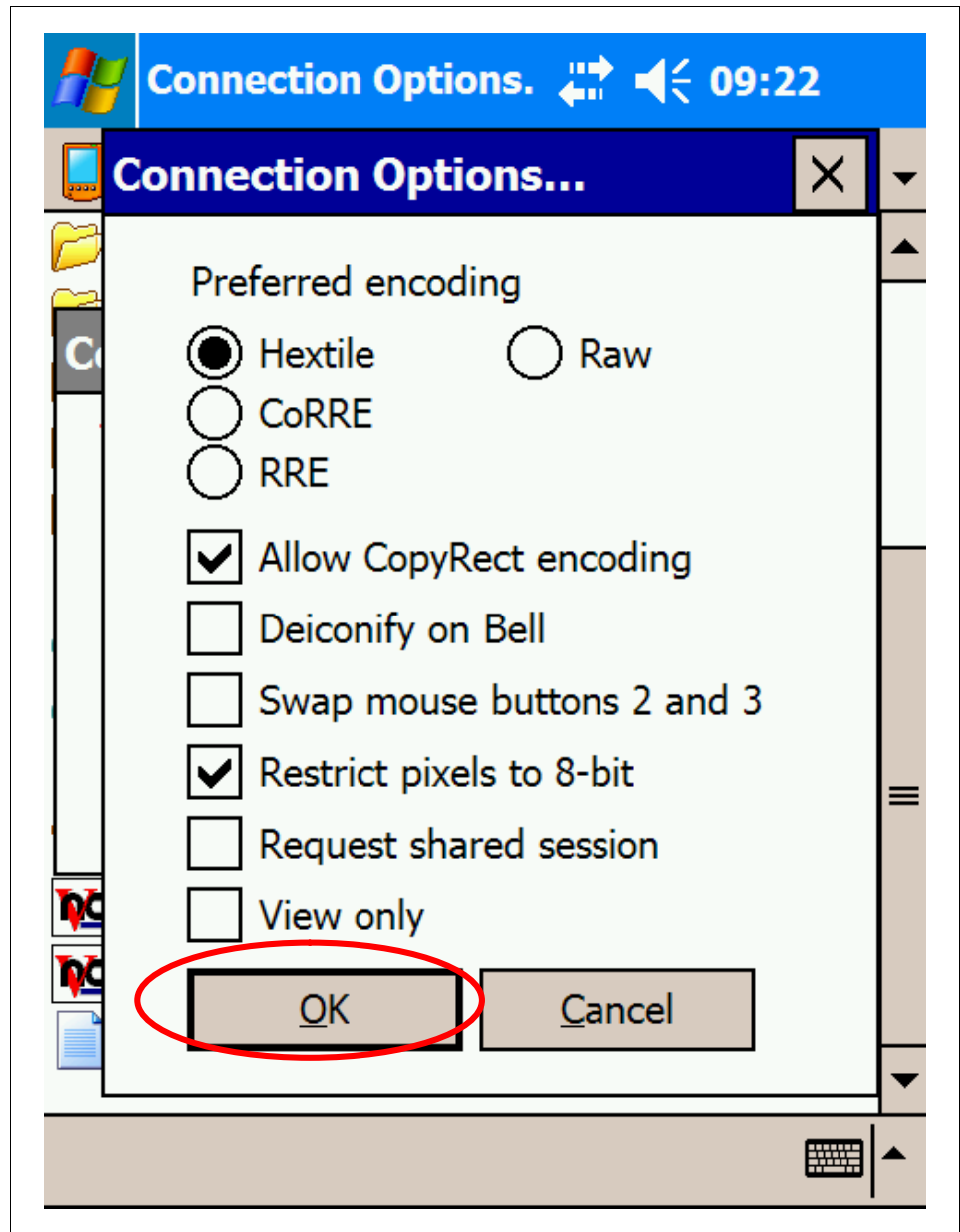Figure 53: VNC options

The dialog with the options is shown again.

Enter the ip-address of the remote computer, a colon and the number of the remote screen (usually a zero), and click on "Connect" to start the session.
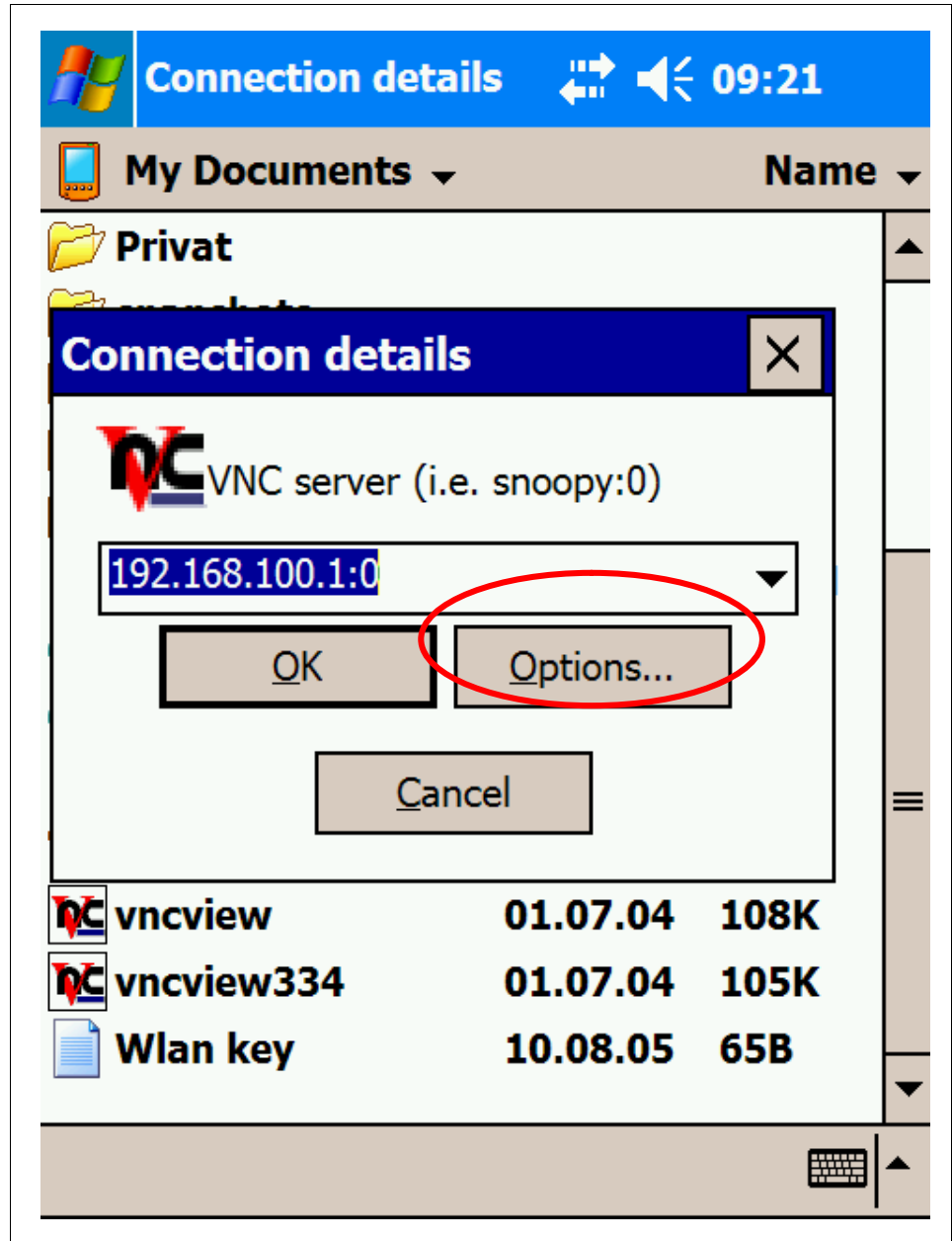
Figure 54: Authentication dialog

A dialog to enter the password of the VNC session opens. Enter the session password (the same as selected earlier) and click OK to enter the session.

Figure 55: VNC authentication

The log on dialog of windows appears. Enter your username and password as usual and click "OK" to start the remote session.

Note: *the log on dialog is skipped, if someone is already logged on the remote computer.*

Figure 56: Windows start up dialog for VNC

To end the session, click to the close connection symbol on the top of the screen, as shown below:

Figure 57: Close the VNC session.

4 Network-Connection between PDA and Notebook
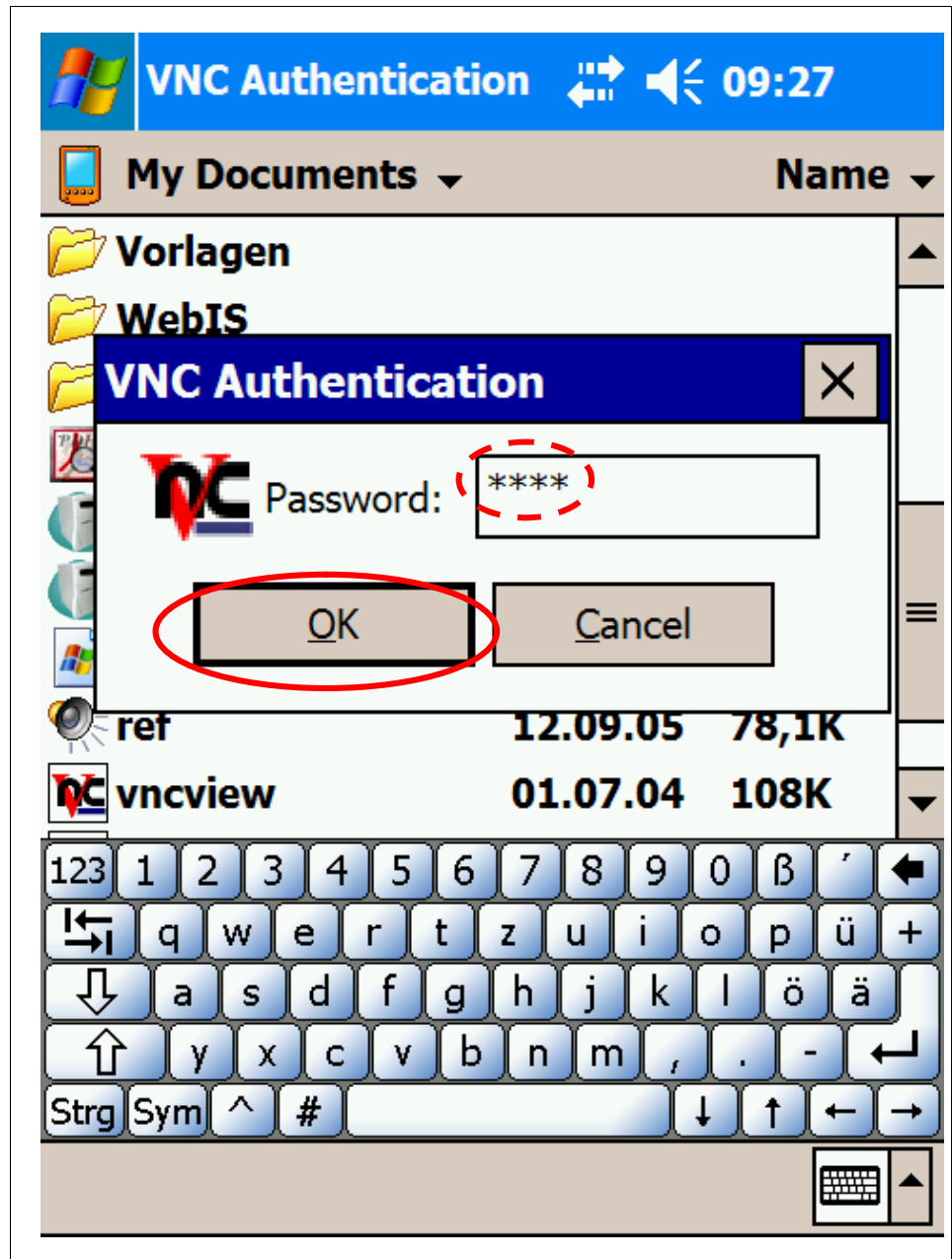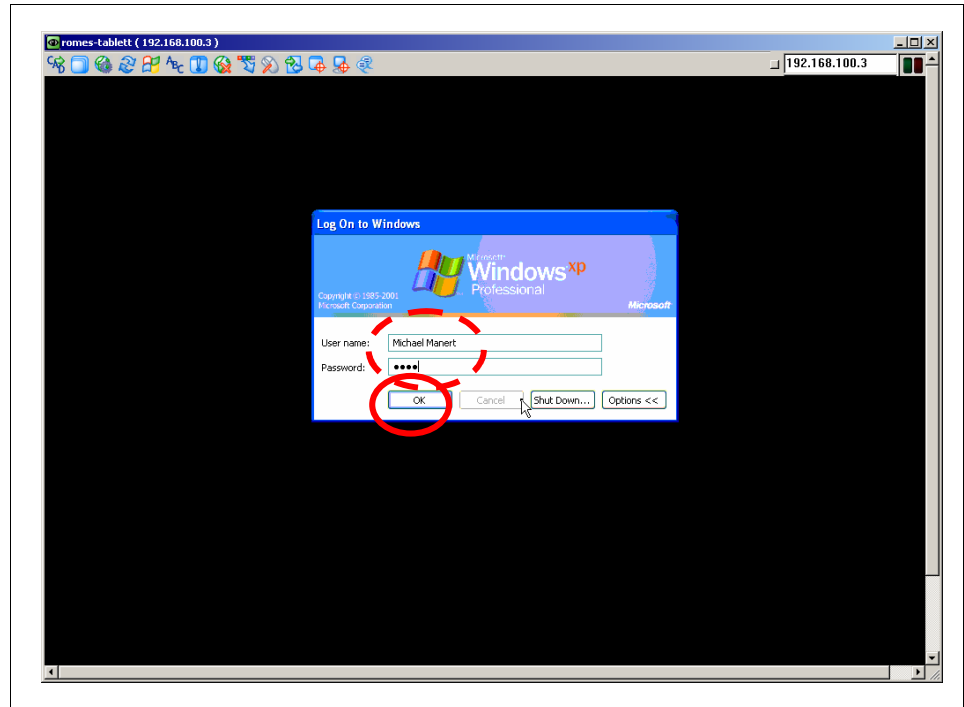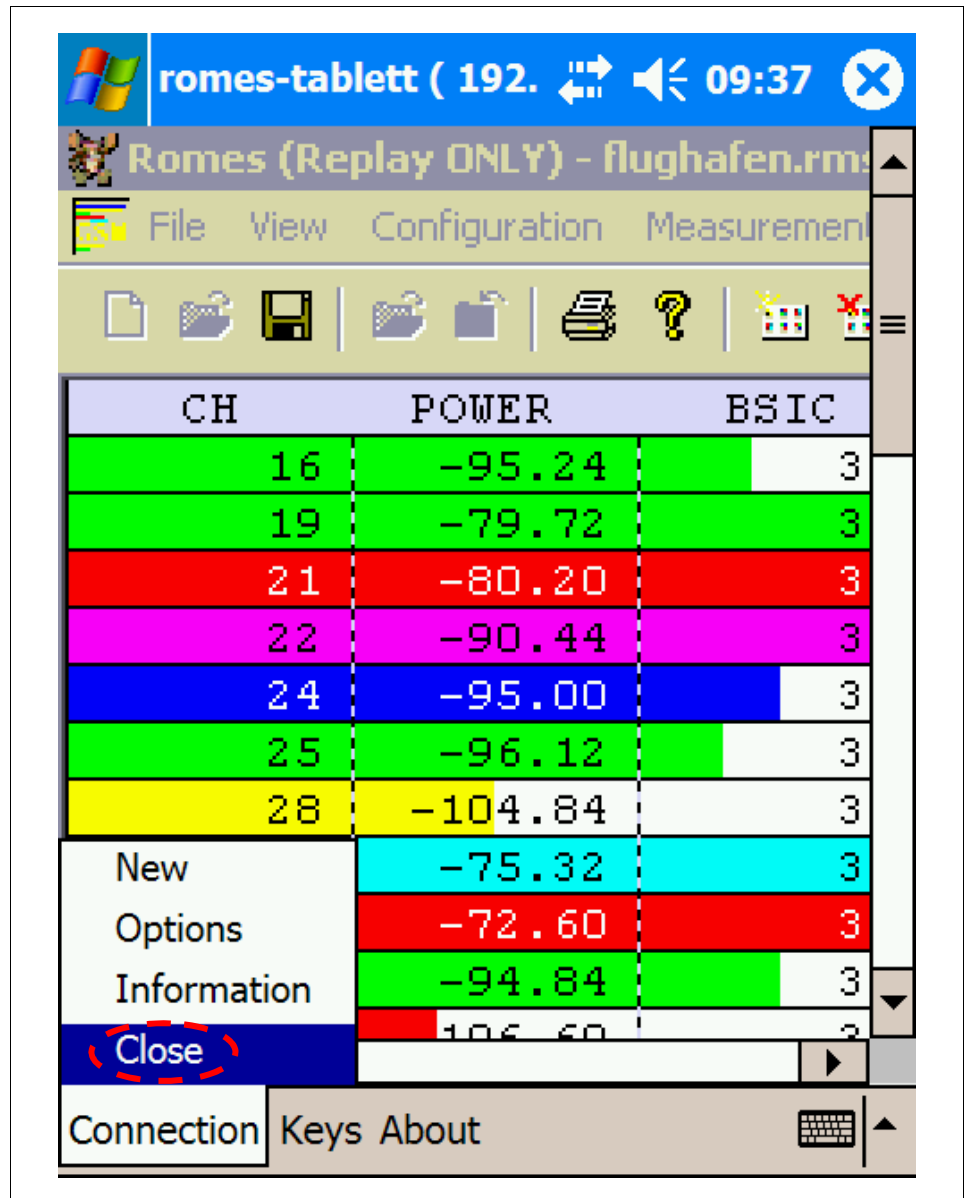
Each of the remote control programs described above needs a (wireless) network connection established between the PDA and the host computer running ROMES®. This chapter describes how to configure and setup the most common Bluetooth connections and the WLANs according to IEEE 802.11.

This section assumes, that the device drivers for Bluetooth or WLAN have been installed according to the installation procedures described in the respective manuals.

Bluetooth is less battery consuming on host and PDA than WLAN and does not interfere with WLAN measurements made by ROMES®, so it is the preferred solution. However it is more difficult to configure Bluetooth, and it is less secure.

Bluetooth ® personal area network, PAN

A personal area network in Bluetooth consists of exactly one server and one or more clients, which may log into the network. Depending on the installed Bluetooth system, either the notebook or the PDA must be configured as the host.

A Bluetooth connection must be configured once on both devices before the Bluetooth connection can be used.

The standard driver of MS Windows does not provide the functionality of a PAN server. So only the PDA server configuration is described in this application note. However, a notebook acting as a server would be preferred, as in this case, a remote login into the notebook would be necessary, like it is in a WLAN configuration as well.

PDA is server

On the host, open the "Bluetooth devices" in the Control Panel (Start → Settings → Control Panel). In tabular "Options", enable "Turn discovery on", so that your PDA can find the host.

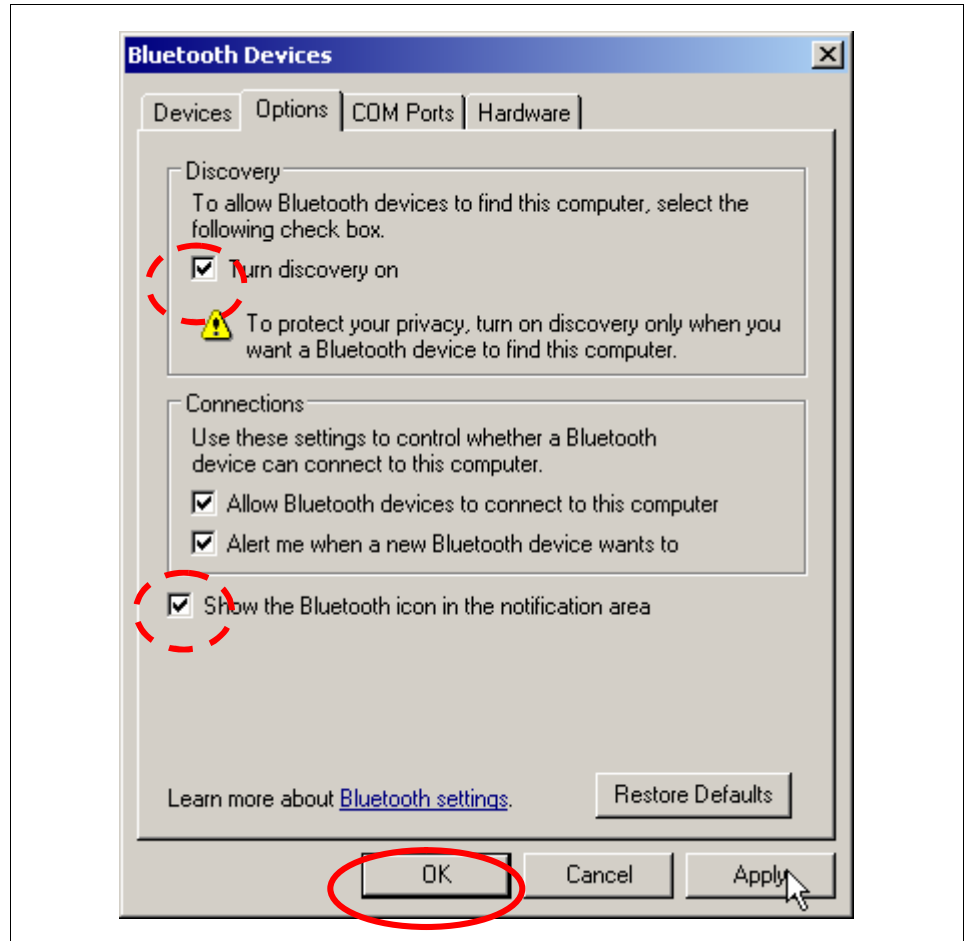Optionally, also enable "Show the Bluetooth icon in the notification area".

Figure 58: Bluetooth devices options

On the PDA, open the wireless via Start → Settings → Connections → (iPAQ) Wireless to get the settings menu for wireless connections. An icon is placed in the lower right corner of the screen after that and may be used as a shortcut to start the settings.

Figure 59: Hot key for wireless setup

In the wireless control center, switch on Bluetooth, by clicking on the Bluetooth symbol and switch off WLAN, if necessary.

Figure 60: Wireless control center

Click settings in the Bluetooth area to open the Bluetooth configuration.

Open the "Enter a new profile," by clicking the magnification glass in the "common" panel.
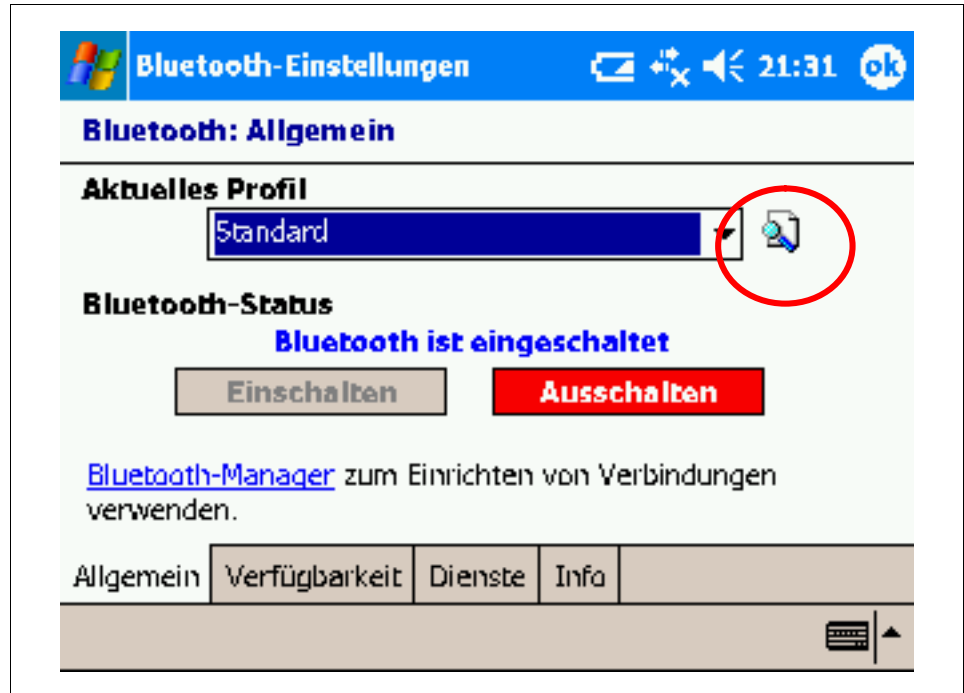
Figure 61: Define a new profile in common Bluetooth settings.

Click "New" and enter a name (e.g. "pan encrypted") for the profile and press OK.
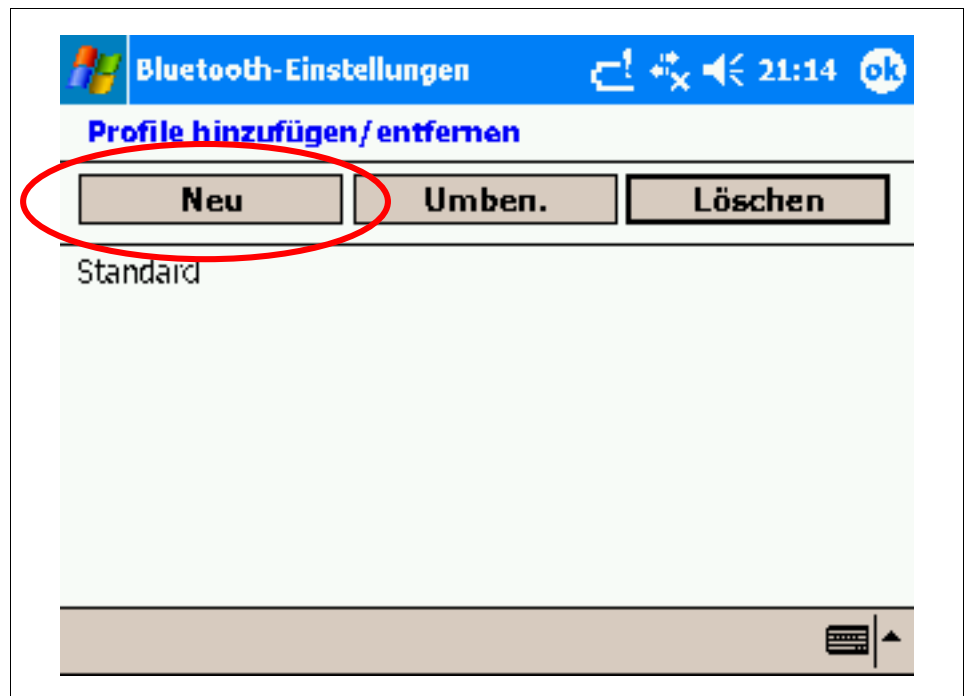

Figure 62: Manage profiles.

Click "OK" to accept the settings.

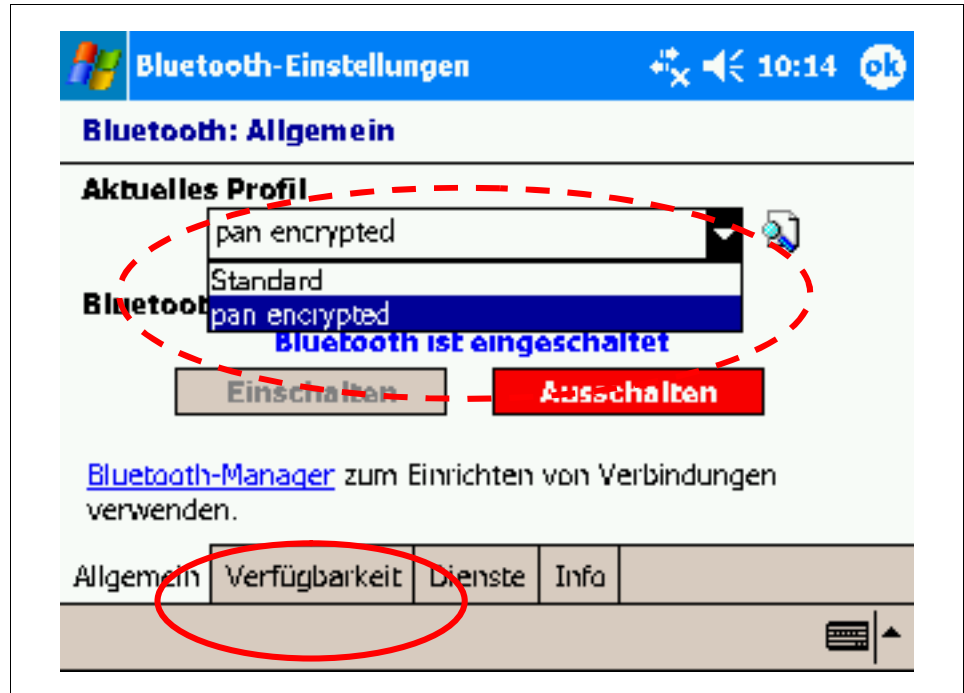Select the new defined profile via the pull down menu.

Figure 63: Select another profile.

Select the panel "Availability" and switch on „Turn discovery on", so that your notebook can find the PDA.

Switch on "coupled devices only", so that other devices may not connect to your PDA.
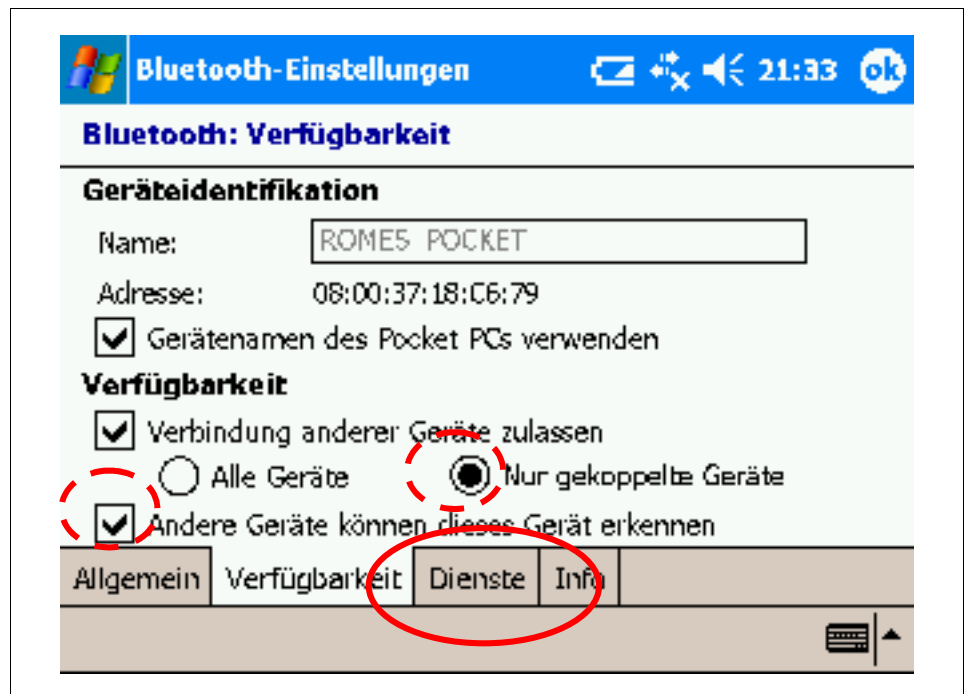

Figure 64: Bluetooth settings for availability on the PDA

Select the panel "Services".

Switch off all services except the "Server for personal area network".

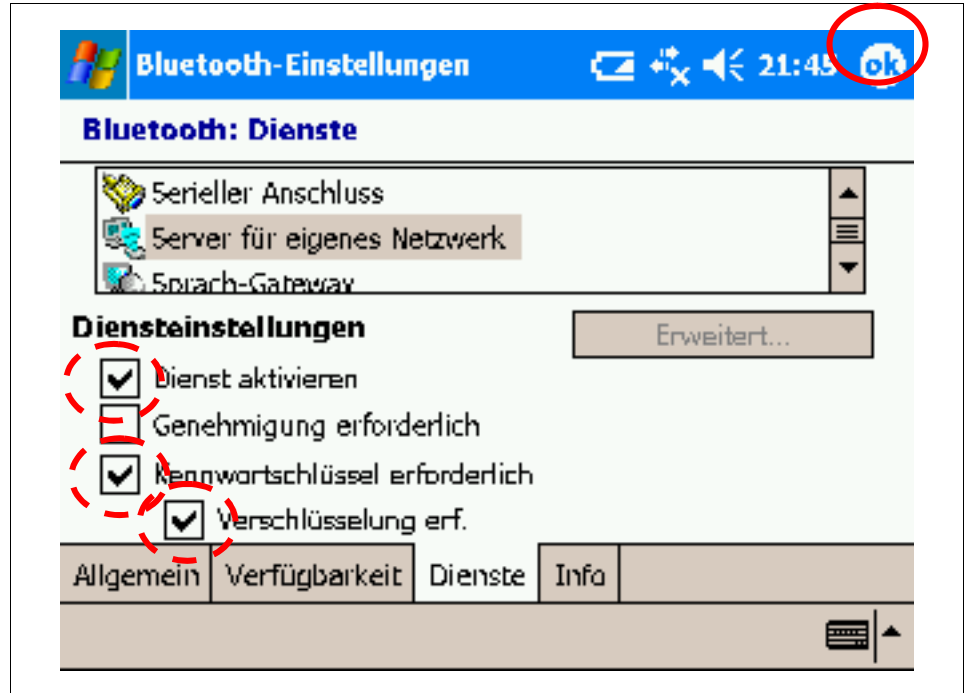Select "passkey required" and, optionally "encryption required".

Figure 65: Settings for Bluetooth personal area net

Note: *The Bluetooth device is configured with the new settings only after it is switched off and on again in the Wireless settings dialog*

To do so, close the form for the Bluetooth Settings by clicking "OK" in the top right corner of the screen to accept all settings.

Figure 66: Switch off and on Bluetooth in wireless control center.

On the host right-click the "Bluetooth devices" icon in the notification area of the taskbar and select "Open Bluetooth settings".
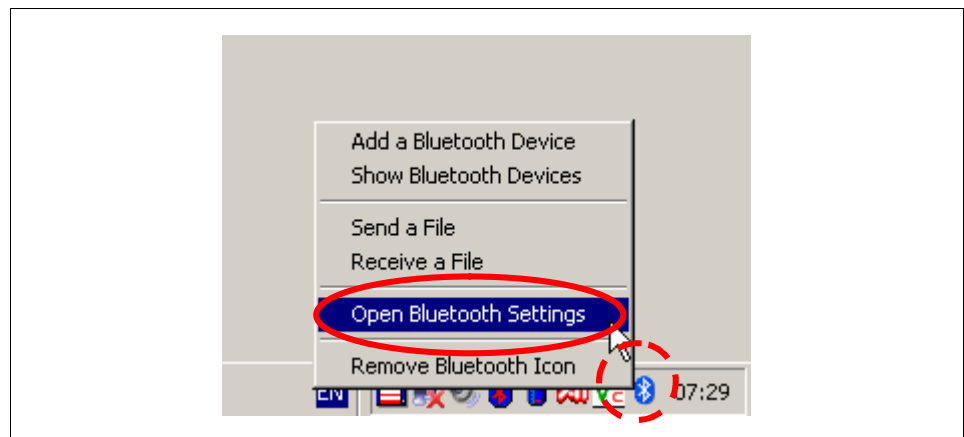
Figure 67: Join a Personal Area Network.

A window opens to find and configure new Bluetooth devices. Click "Add" to add a new device.
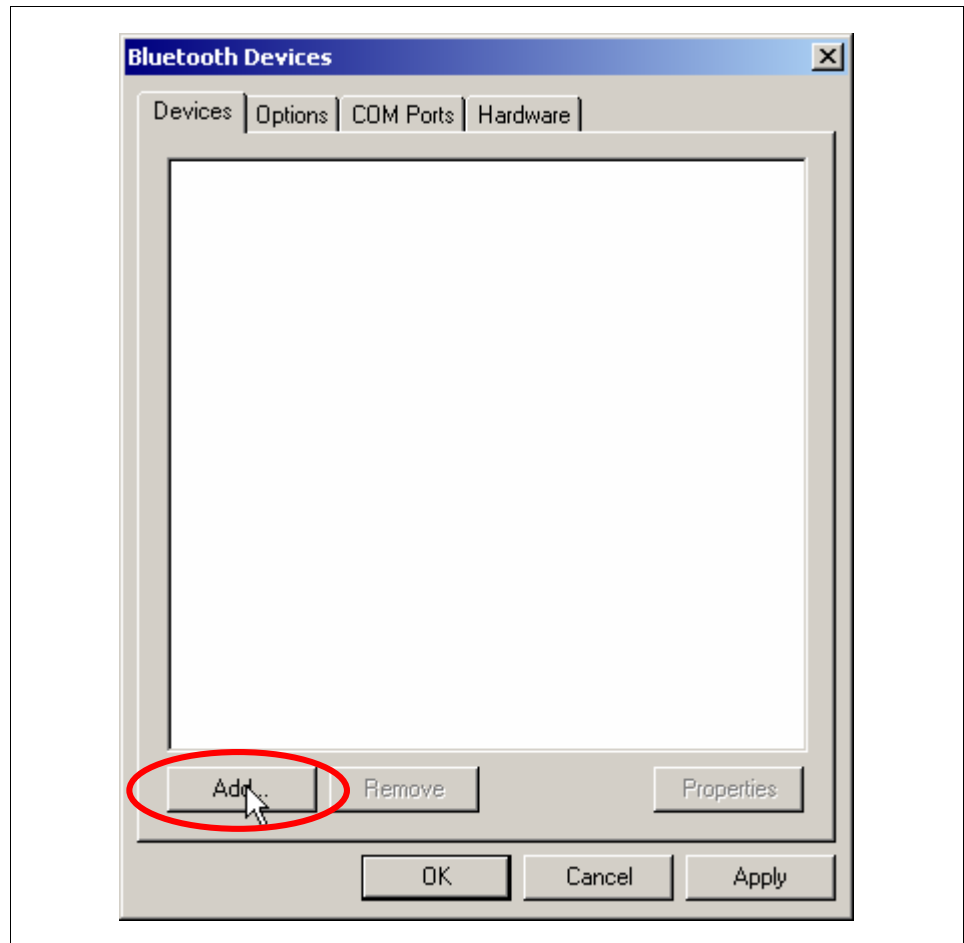
Figure 68: Add Devices

The wizard presents some instructions on how to proceed. Click "my device is set up and ready to be found" in the Bluetooth wizard.

Figure 69: Instructions on how to proceed

Your host is searching for the Bluetooth devices as indicated by a torch.
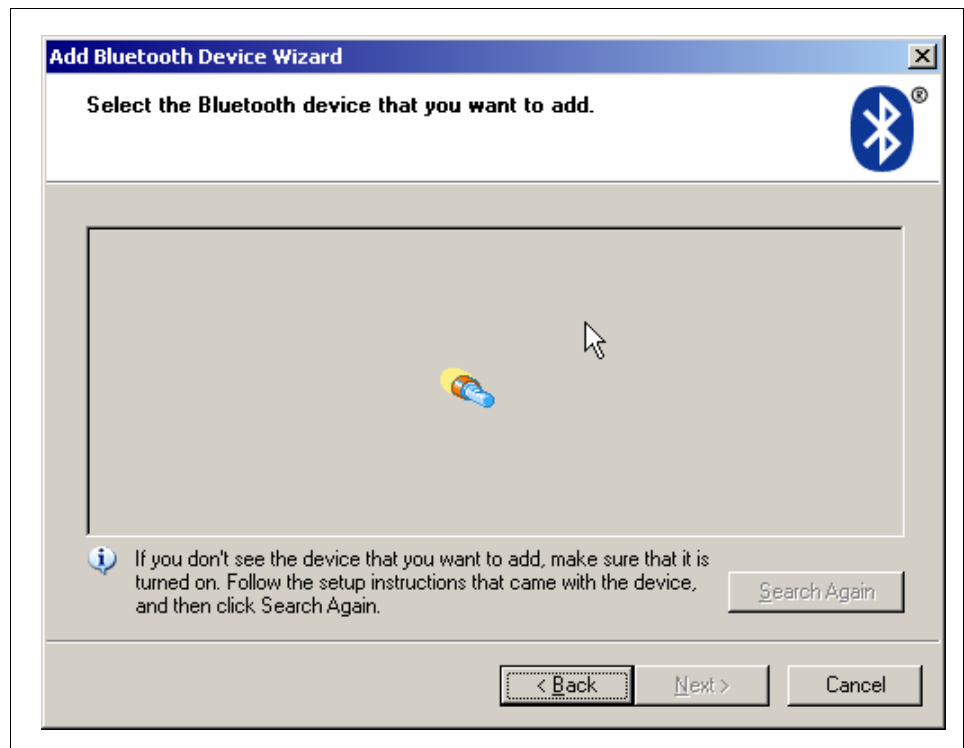
Figure 70: Searching for a Bluetooth device

If the wizard successfully finds your PDA, it presents it in the device list. If not, click on "Search Again", as the Bluetooth devices are not always found on the first time.
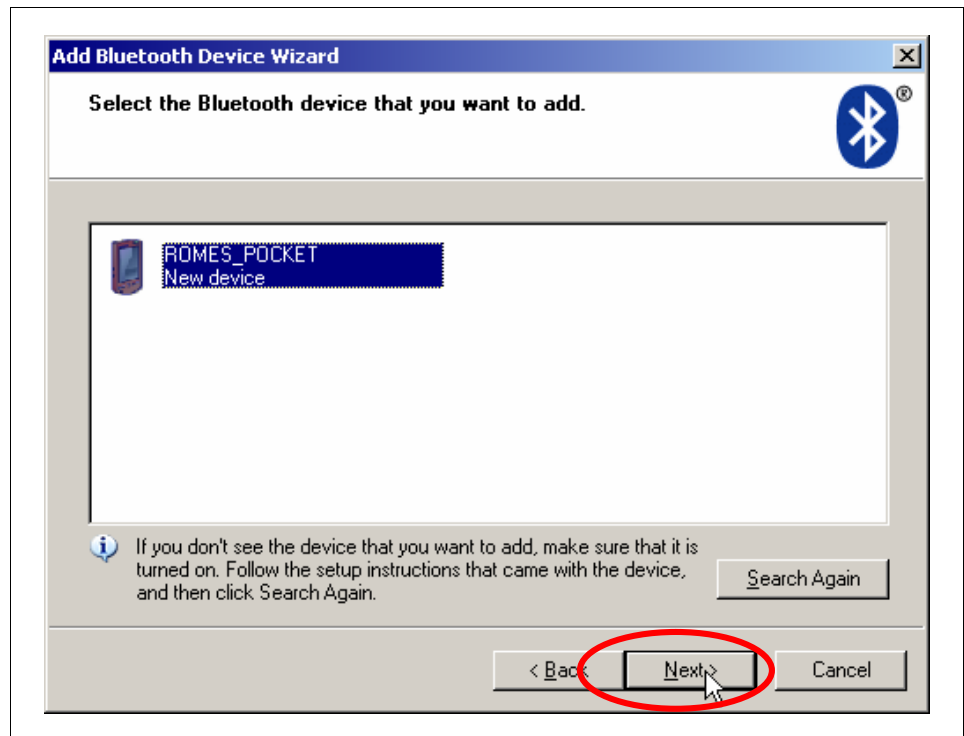
Figure 71: Bluetooth Device List

Select it and click on "next".

You may enter a passkey on your own or let the wizard generate one for you. It will show it in the next menu. In my example, I chose one for my own:
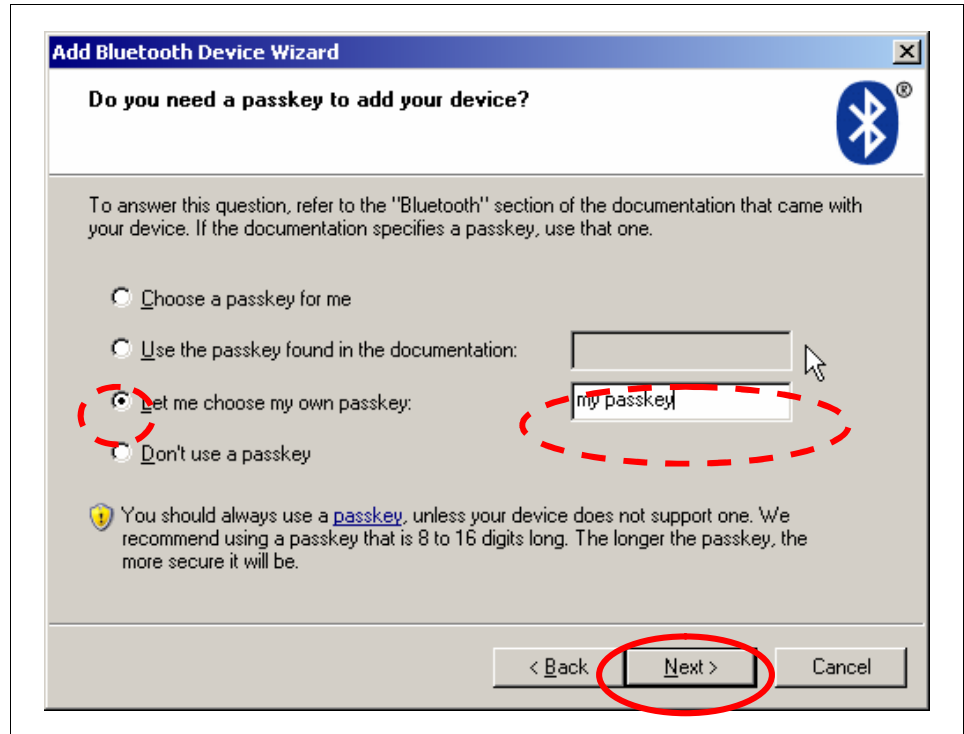
Figure 72: Choose a Passkey for Bluetooth connection.

The wizard sends the passkey to the PDA and indicates this with the next form. Please note the passkey, as you may need it every time, when you establish a connection.
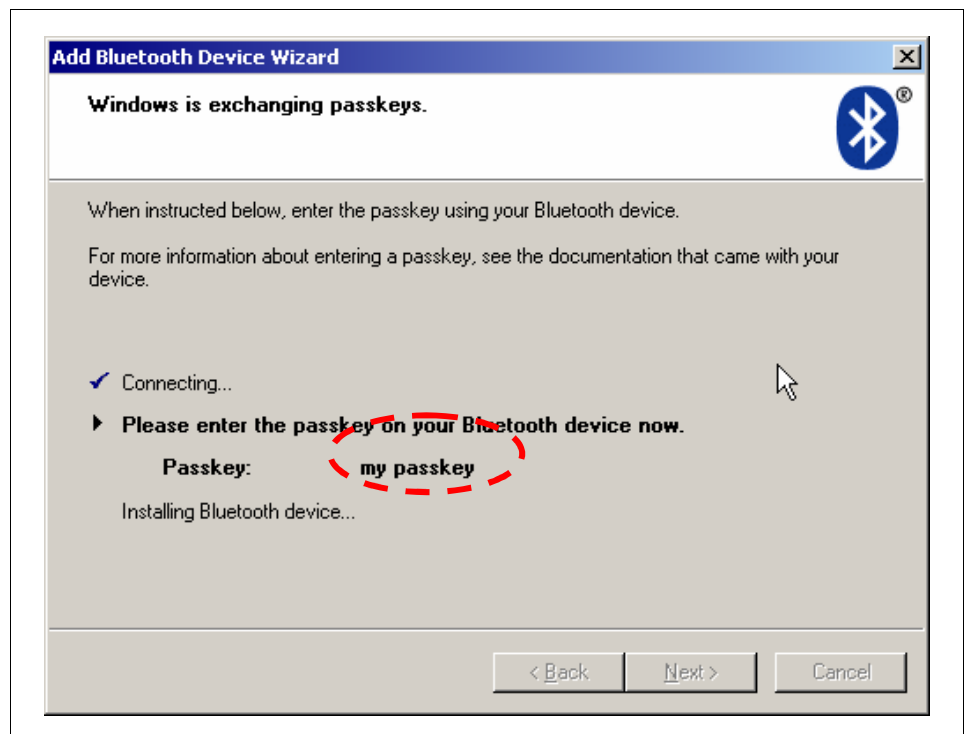
Figure 73: Enter the Passkey for Bluetooth connection on PDA.

On the PDA, you are requested to accept the connection.

Enter the passkey selected above, as shown in the next Figure:

Figure 74: Accept the Bluetooth connection on the PDA.

The wizard completes its work and displays the new found device. Confirm that by clicking to "OK" or the return key on the virtual key board.

Figure 75: Completing Bluetooth Wizard

Don't forget to make your notebook and PDA invisible for other devices again.

On your notebook select "Options" in the "Bluetooth devices" again an click off "Turn discovery on" and "Apply" afterwards.
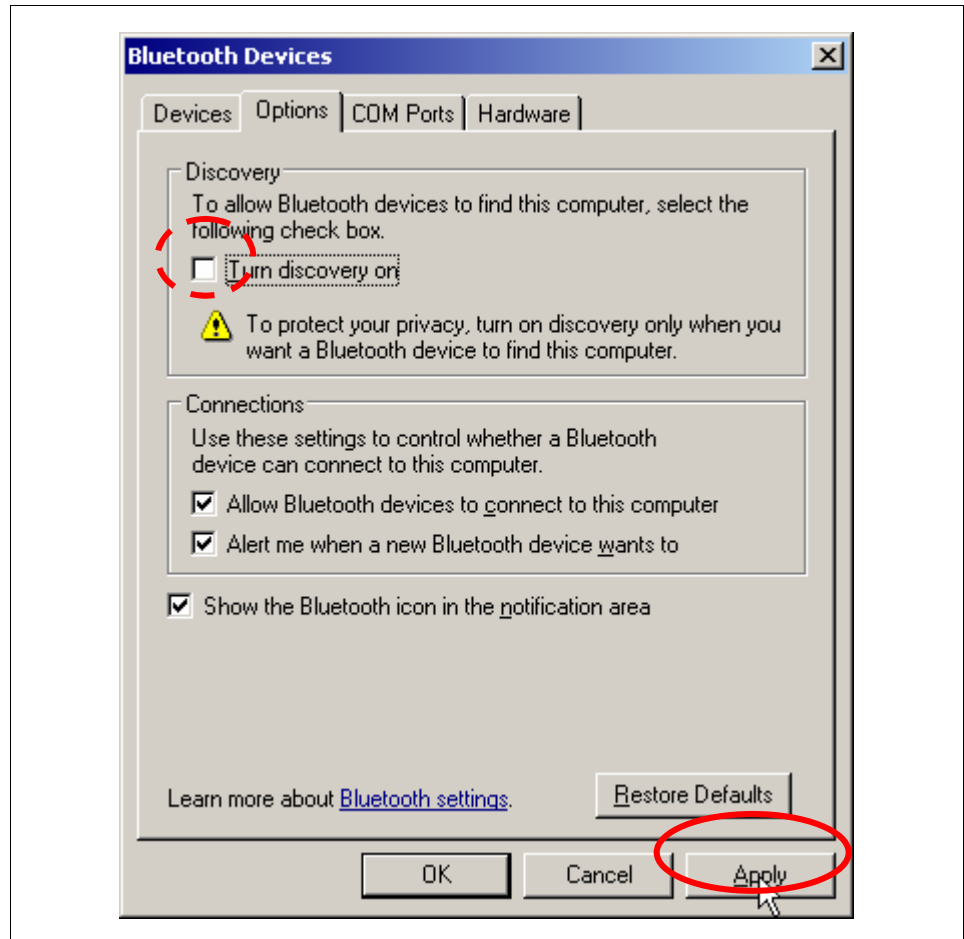
Figure 76: Turn off discovery.

On the PDA switch off "Turn discovery on" in the panel "availability" as shown in the next figure:
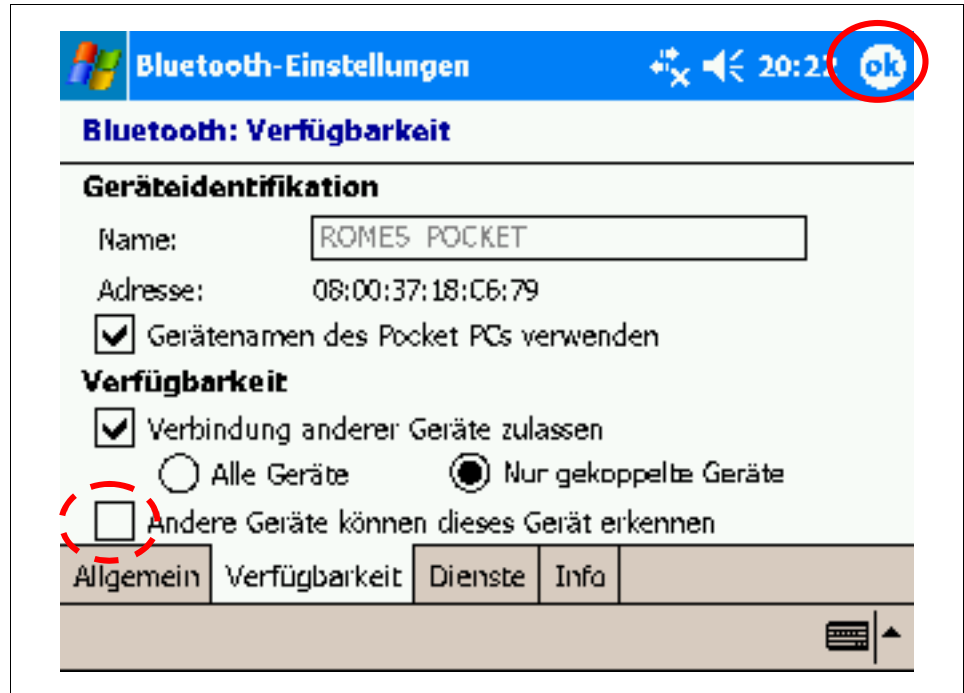
Figure 77: Hide PDA for Bluetooth devices.

Switch off and on the Bluetooth device again, as described above.

Opening the connection

For using a remote session on the PDA, it is advised to switch the screen to landscape on the PDA, consult the documentation of your PDA for further instructions.

Click on the Bluetooth icon in the notification area of the WINDOWS taskbar and select "Join a Personal Area Network"

Figure 78: Join a Bluetooth PAN.

Select your PDA and click to connect in the next windows.
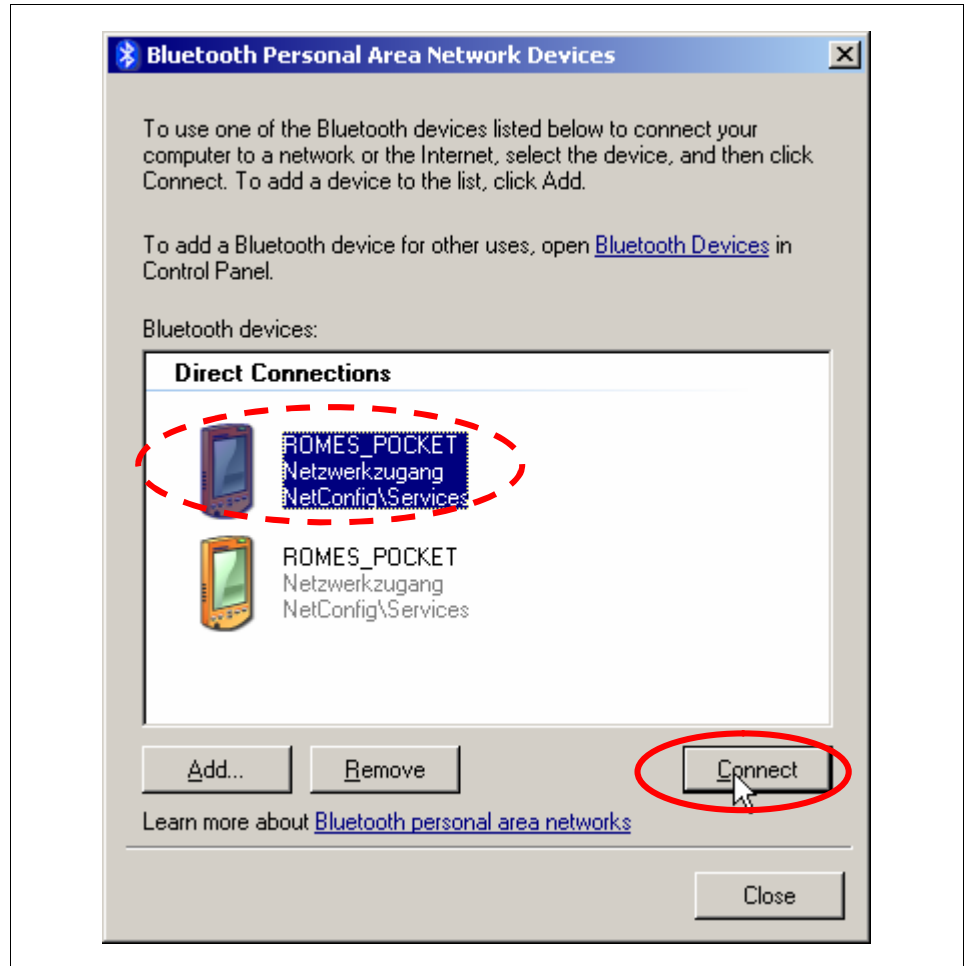
Figure 79: Select a Bluetooth Device.

If you configured the PDA to request a confirmation when a remote device requests for a service, the Notebook waits for confirmation on the PDA with the following form:

Figure 80: Connecting to PDA

Confirm the remote access via Bluetooth on your PDA.
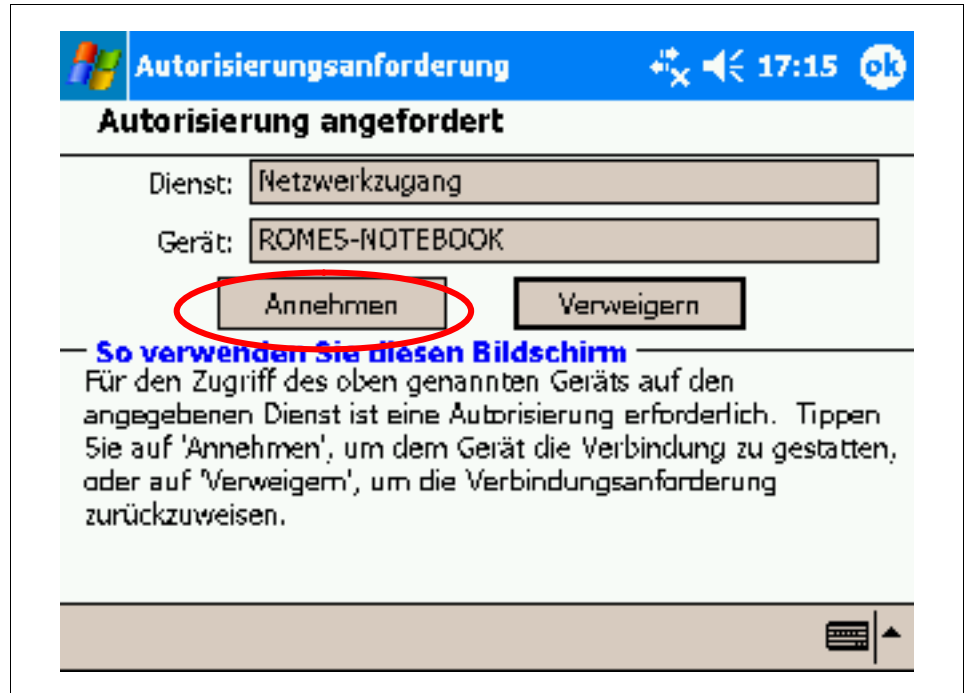
Figure 81: Accept remote service request on PDA.

The connection has been established.

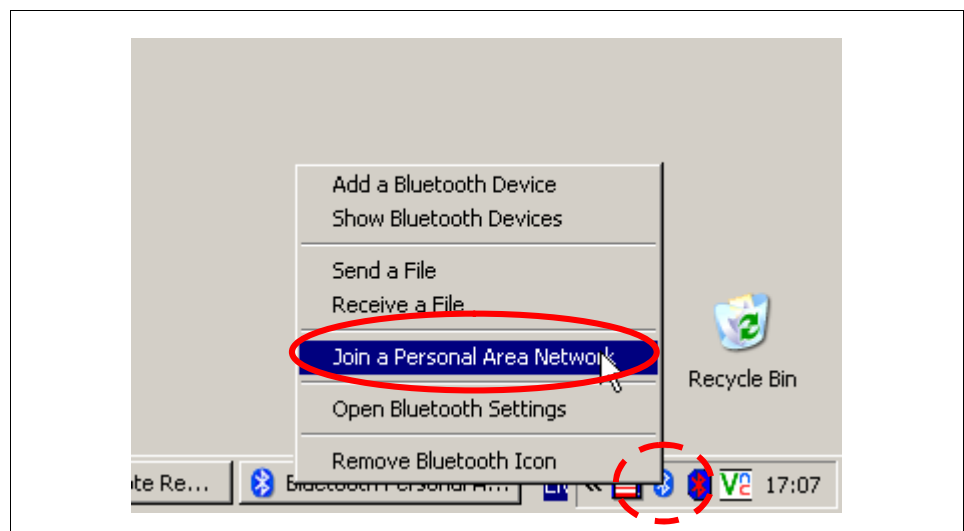***NOTE:*** *it takes the PDA up to 10 minutes to recognize the Computer Name of your notebook after starting the network connection. Until that moment, it is not possible to make a connection from PDA to the Notebook. To speed up this process, use IP addresses instead on logical names*

Set IP-Address of Notebook

Start the "Bluetooth Network Connection Properties" control via Start → Settings → Network Connections → right-click on Bluetooth Network Connections → Properties. Select the tabulator "General" click on "Internet Protocol (TCP/IP)" and start the configuration by clicking on "Properties".
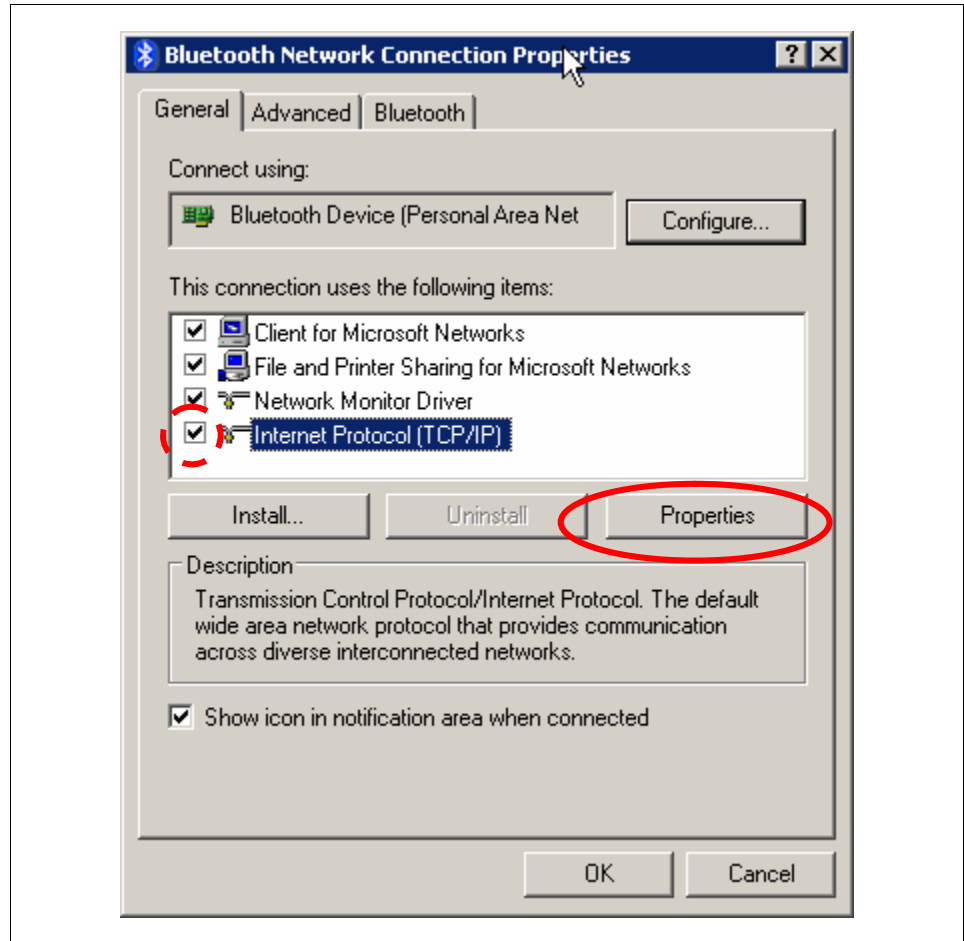
Figure 82: Set the Internet Protocol settings of the Bluetooth adapter.

Microsoft chooses 254.169.x.x for the IP-address in Bluetooth adapters. As the IP-address in the pocket PC cannot be entered manually, the IP address must be selected in the range of 254.169.x.x. Enter e.g. 254.169.2.2 in the following form and confirm by clicking on OK.

Figure 83: Manually set the IP-address for Bluetooth connection.

Click "OK" to close the form

Click "OK" in the Bluetooth Network Connection Properties.

The Bluetooth network is now configured and started.

Note: *The new settings come into effect only after the network connection has been restarted.*

Wireless LAN according IEEE 802.11 (WiFi, WLAN)

Configuration

WiFi must be configured in the following steps

- Configuration of the network adapter (IP-configuration) (optional)

- Definition of the Network

- Adding the computers to the network

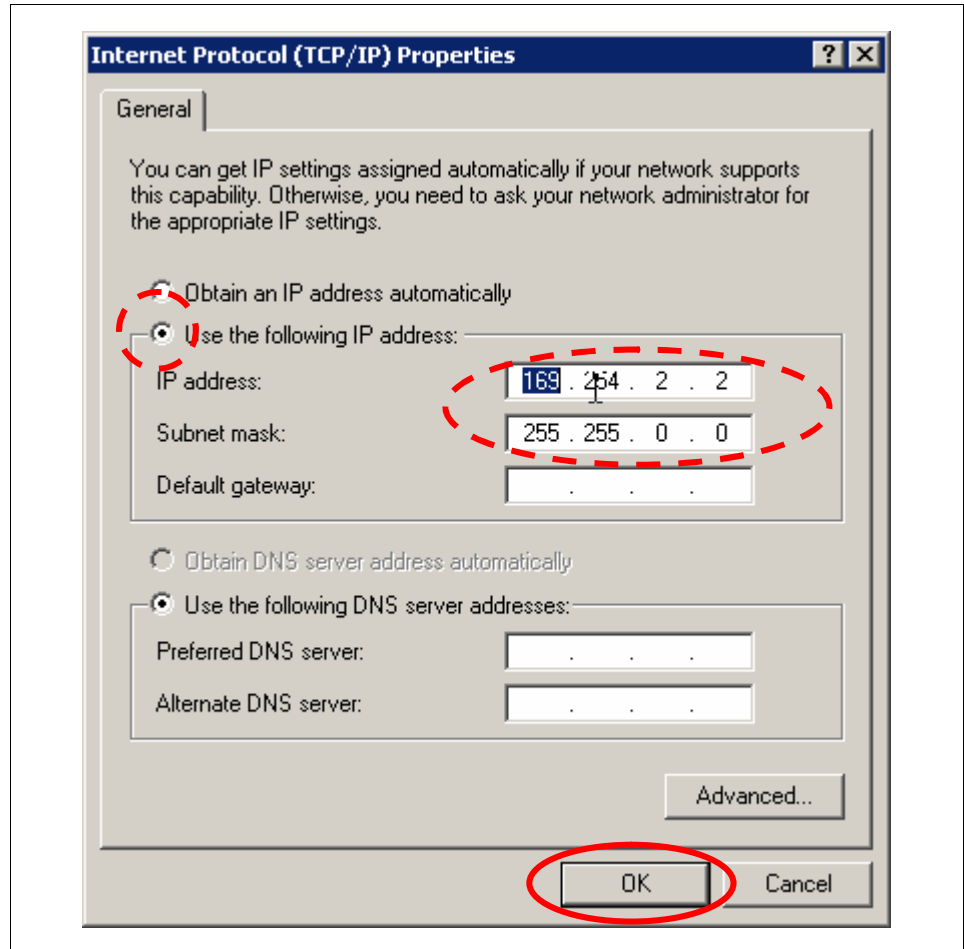*NOTE:*   *ensure, that WiFi is enabled on your host computer. This must be done either in the BIOS settings or using a switch somewhere on your computer. Consult your manual for further explanation. In case you fail do this, the wireless LAN just does not work, no detailed error message will be given.*

NOTE: *In case a new WiFi network is found, both the laptop and the Pocket CP tend to automatically drop the current connection and jump to the network recently found. This is quite annoying in a measurement situation. Please use Bluetooth LAN in these circumstances.*

Setting the IP-Address (optional)

IP addresses are used within networks to address the computers. The IP-address of each computer joining the network must be unique within the network. Many network use a DHCP-server to automatically assign a network-IP to each computer entering the network. If no DHCP-server is present, the computers can assign IP-addresses to themselves. But this procedure takes several minutes and must be restarted every time a computer enters the network. Alternatively, IP-addresses may be assigned statically (=manually) to the computers, i.e. to the various network adapters of each computer in the network. This section describes, how to assign IP-addresses to the network adapters.

First, a set of IP-addresses must be selected. There are several addresses reserved for private use:

class	subnet mask	address range	
A	255.0.0.0	10.0.0.0	10.255.255.255
B	255.255.0.0	172.16.0.0	172.31.255.255
C	255.255.255.0	192.168.0.0	192.168.255.255

Table 3: IP-addresses reserved for private use

Choose an IP-address according to your wish; see an example below:

computer	subnet mask	address
notebook	255.255.255.0	192.168.100.1
PDA	255.255.255.0	192.168.100.2

Table 4: Example of assignment of private IP-addresses

The addresses must be configured for all of the network adapters; the configuration is described below in the settings of WLAN, see Figure 96: Manually set the IP-address, page 73 and Figure 104: Internet Protocol Settings (IP) of the WiFi adapter, page 80, and can be done later.

Settings on the Notebook

Defining the network

The WLAN-Network is configured and started via the Control Center of the Wireless Network, which is started in the Start menu of Windows via Start → Settings → Control Panel → Network Connections → Wireless Network Connections.
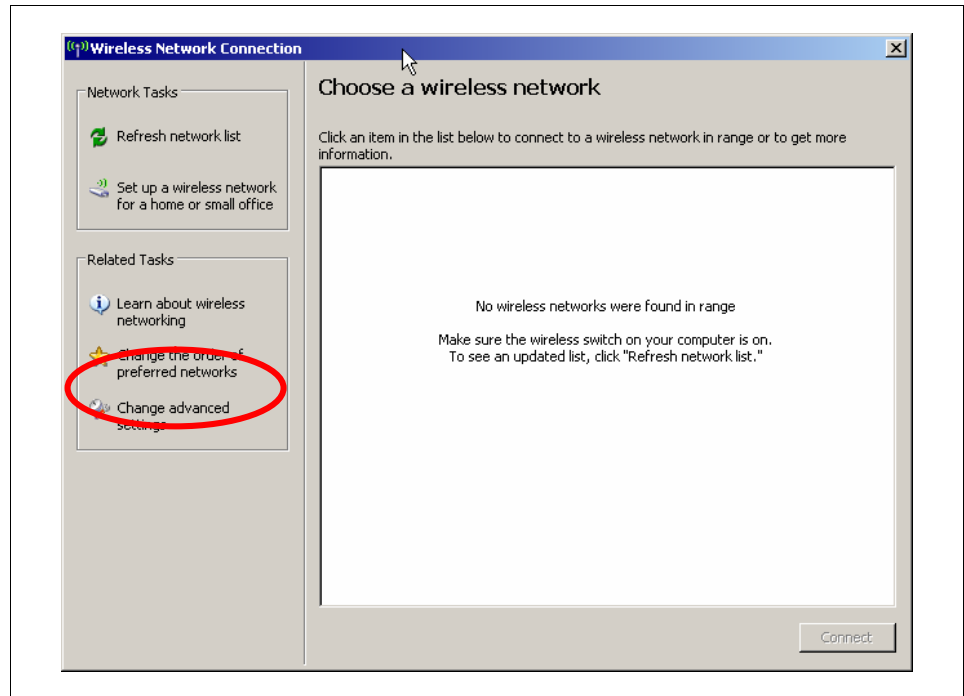

Figure 84: Wireless Network Controls Center

Start the definition of a new wireless network by clicking the appropriate button, as indicated in the figure above. The wireless wizard starts. Click "Next".
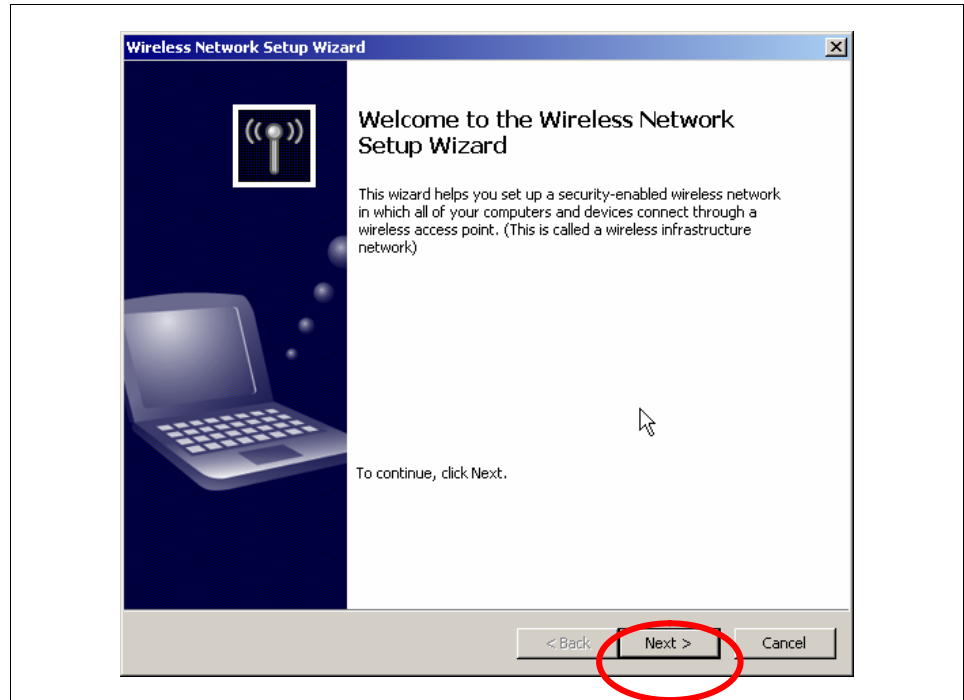
Figure 85: Welcome to wireless network wizard

Select "Set up a new wireless network" and click on "Next".
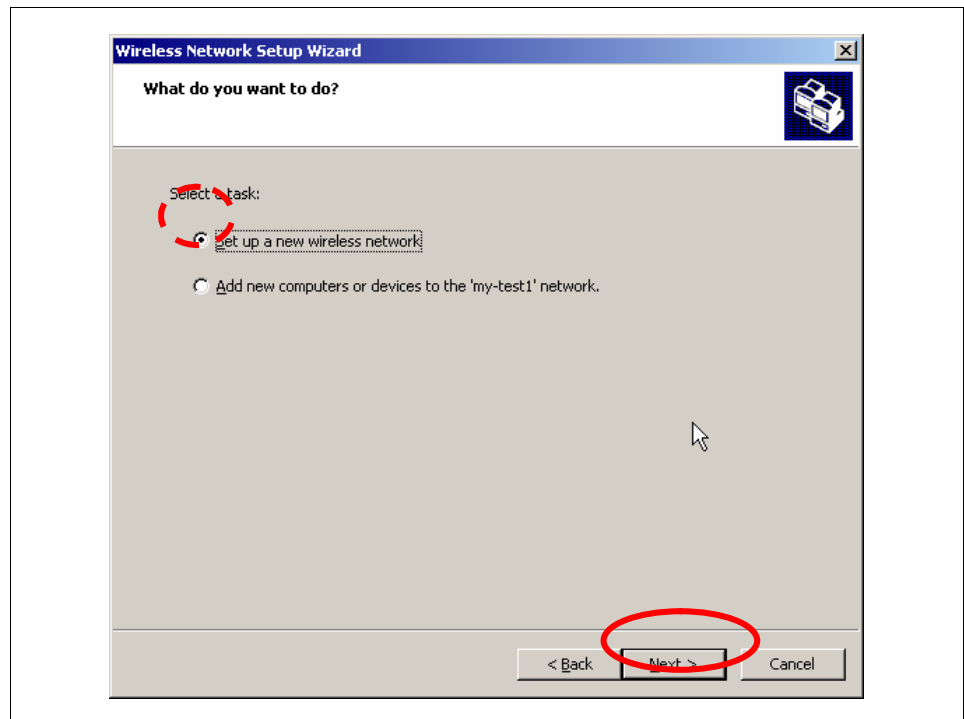

Figure 86: Set wizard to create a new network.

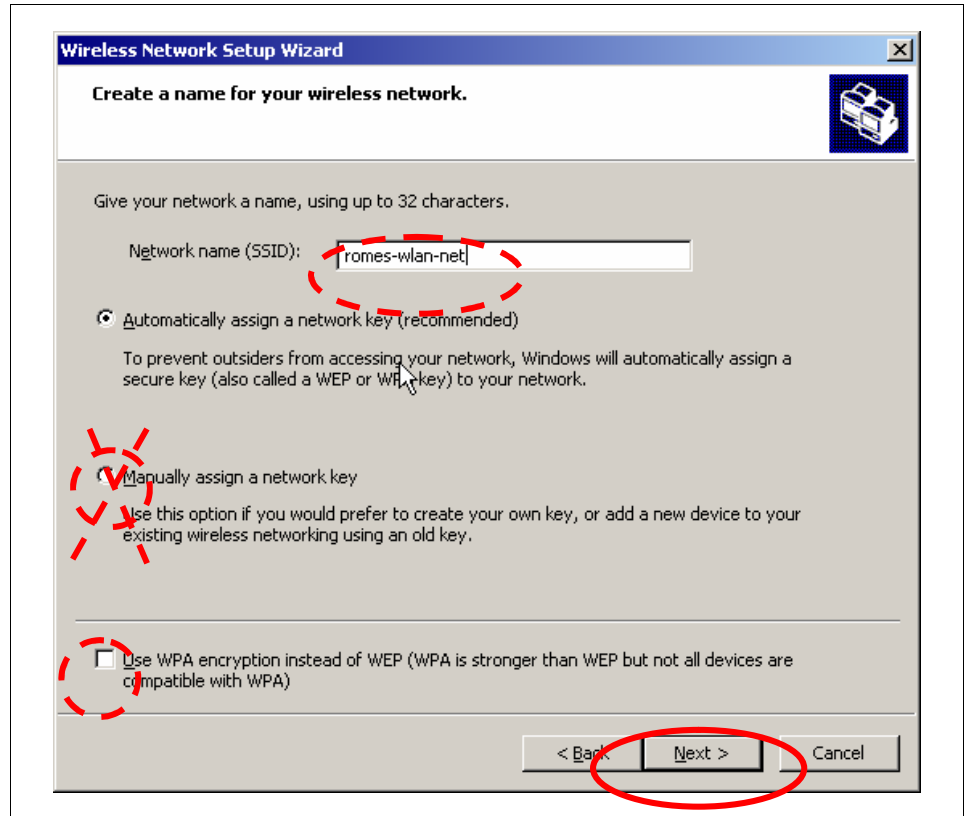Enter a name of your choice as network name (SSID).

Figure 87: Settings for new network

Note: *Do not use "manually assign a network key". This may only work in the rare cases, where the WiFi chipsets of all computers of the network are made by the same manufacturer.*

Note: *WPA encryption is not supported by all PDAs nor by all WLAN cards of the notebook. This may be indicated at the very end of the setup.*

Click "Next".

There are two different ways to add the different computers in the network. They can get the information by means of a flash card (or USB-memory stick) or the information can be entered manually. As USB-memory sticks are not quite common with PDA on the one hand, and flash cards not common with notebooks on the other hand, we use the manual method. So select "Set up network manually" and click "Next".
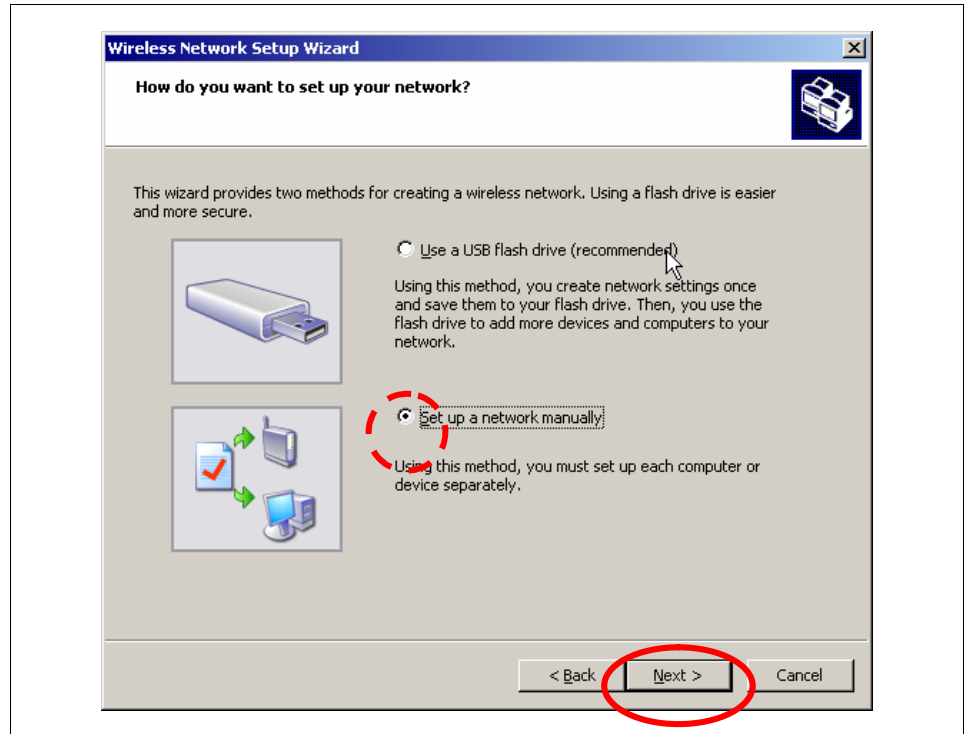
Figure 88: Set up network manually.

The wizard completes it's work and indicates this in the next message. Do not forget to print the network settings. You need the pass phrase and configuration of the net.
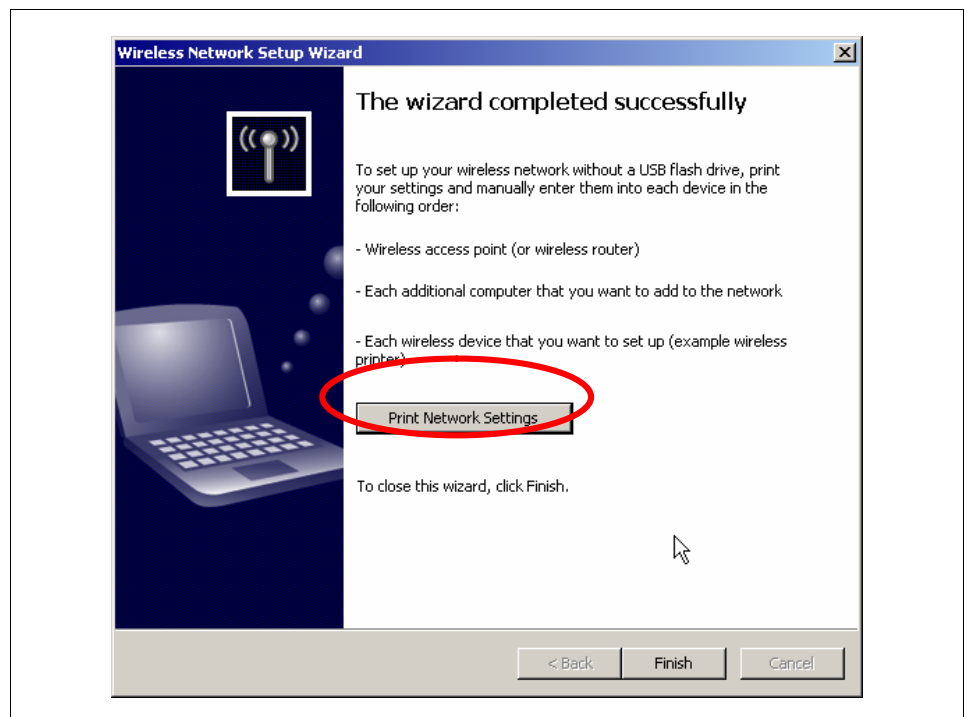

Figure 89: Network wizard completed

Save the network settings to a file. You need the information stated here, when setting up the network in the PDA, as shown in the next section.
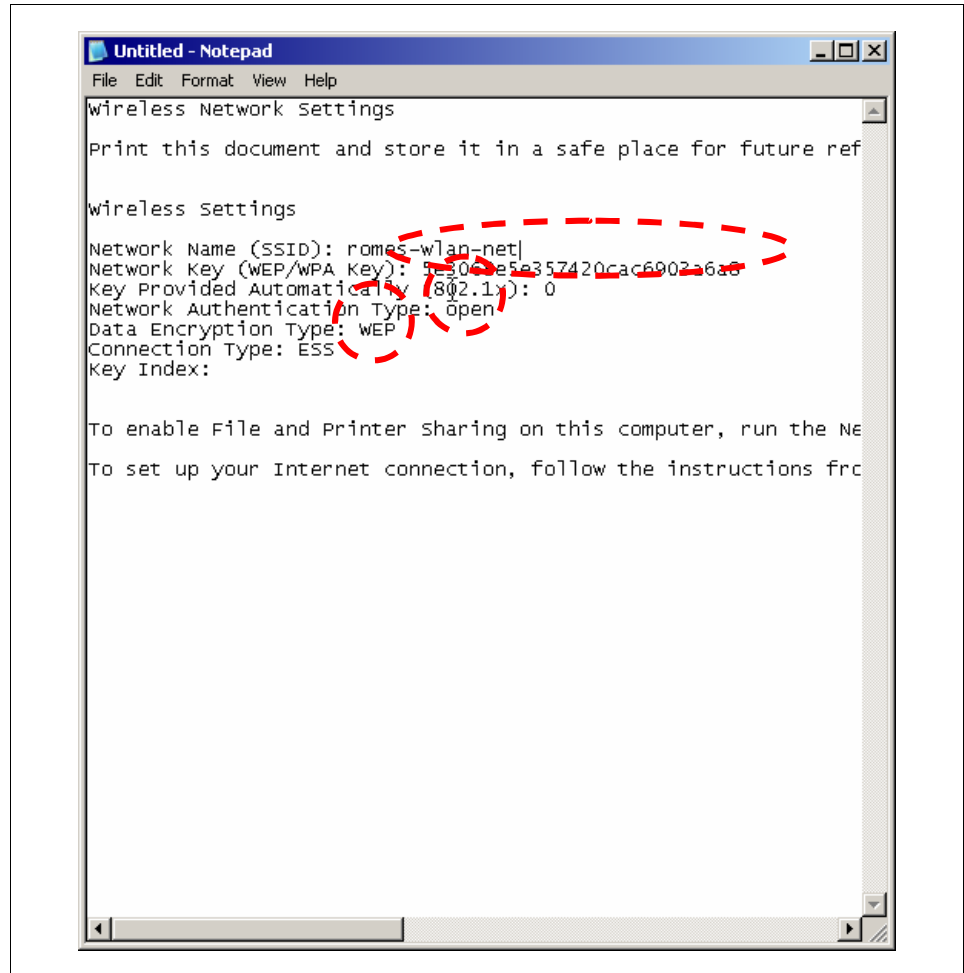

Figure 90: Printed network settings

Click "Finish" after saving the data, but keep open the Notepad editor.

Adding the wireless network to the notebook

The WiFi-net of the notebook is now defined, but the notebook is not assigned to that network. To do this, click "Change the order of preferred order of networks".
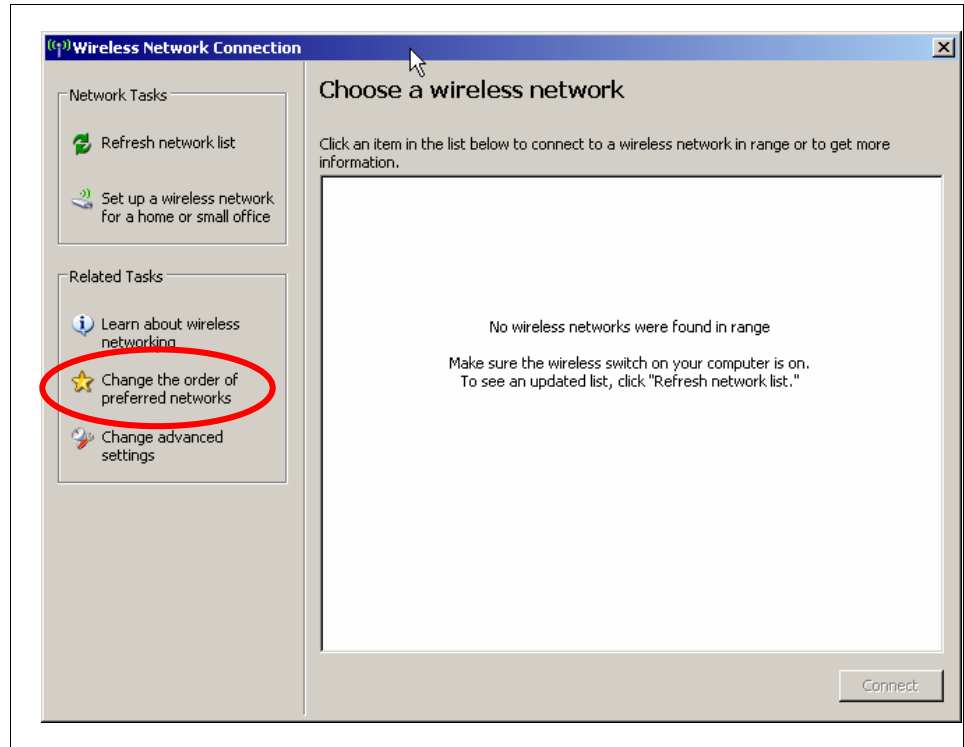
Figure 91: Wireless Network Control Center

The form for the "Wireless Network Connection Properties" opens. Ensure that "Use Windows to configure my wireless network settings" is enabled. Otherwise software of a different manufacturer for configuring the wireless settings is installed, to which this application note may not apply.

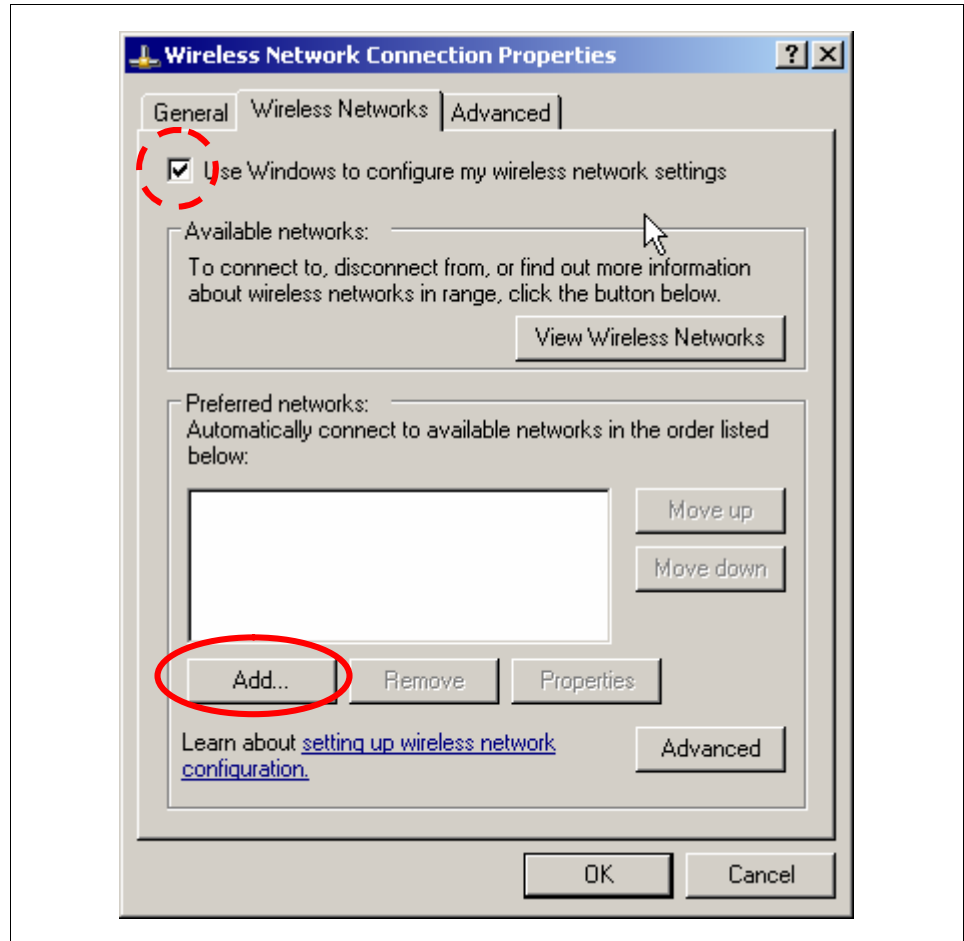Click "Add..." to enter the network just defined.

Figure 92: Wireless Network Connection Properties

Enter the correct settings as displayed in the notebook in the following form. Deselect "This key is provided for me automatically" and enter the network key in the form. This can easily be done by copying it in the notepad editor and pasting it in the form. Ensure, that Network Authentication ("open" in the example) and data encryption ("WEP") are the same, as previously defined and displayed in the Notepad editor.
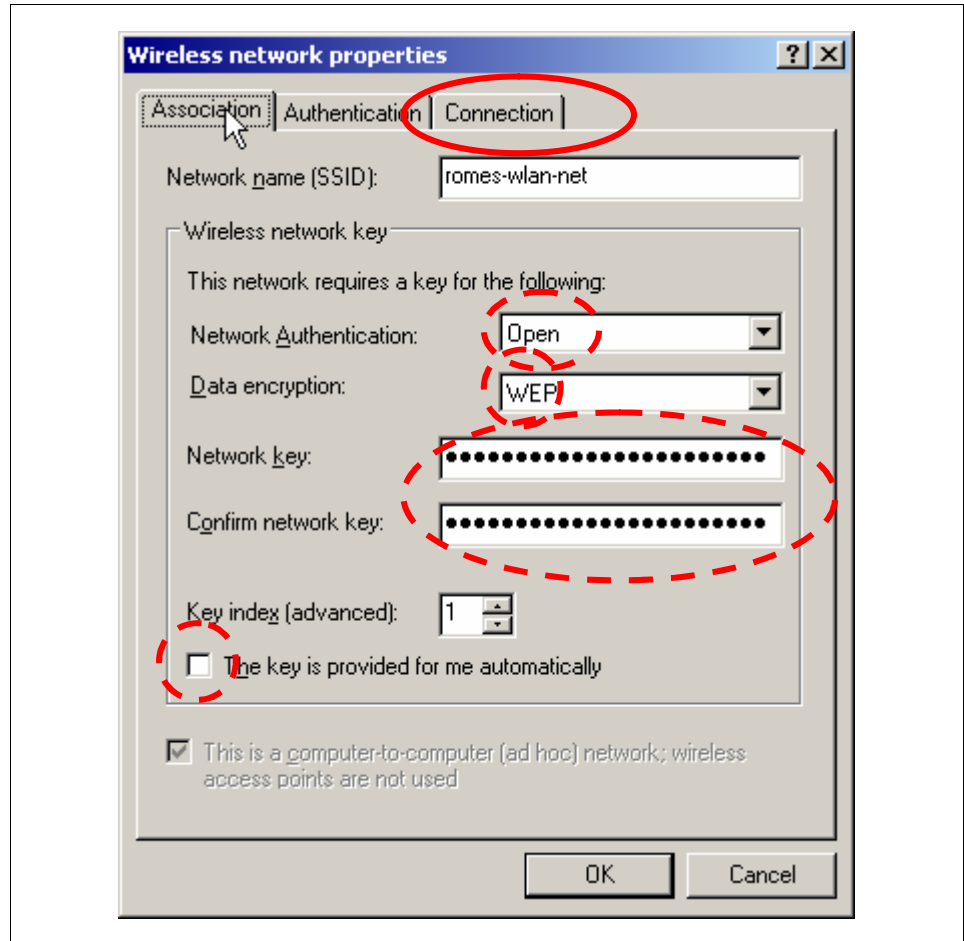
Figure 93: Network properties of the ROMES WLAN net

Enter the tabular "Connection" in the form and ensure, that "Connect, when this network is in range" is enabled. With this setting, a network connection is established automatically, whenever the PDA is nearby. Thus, a remote control session can be started, even if no one is logged into the notebook.
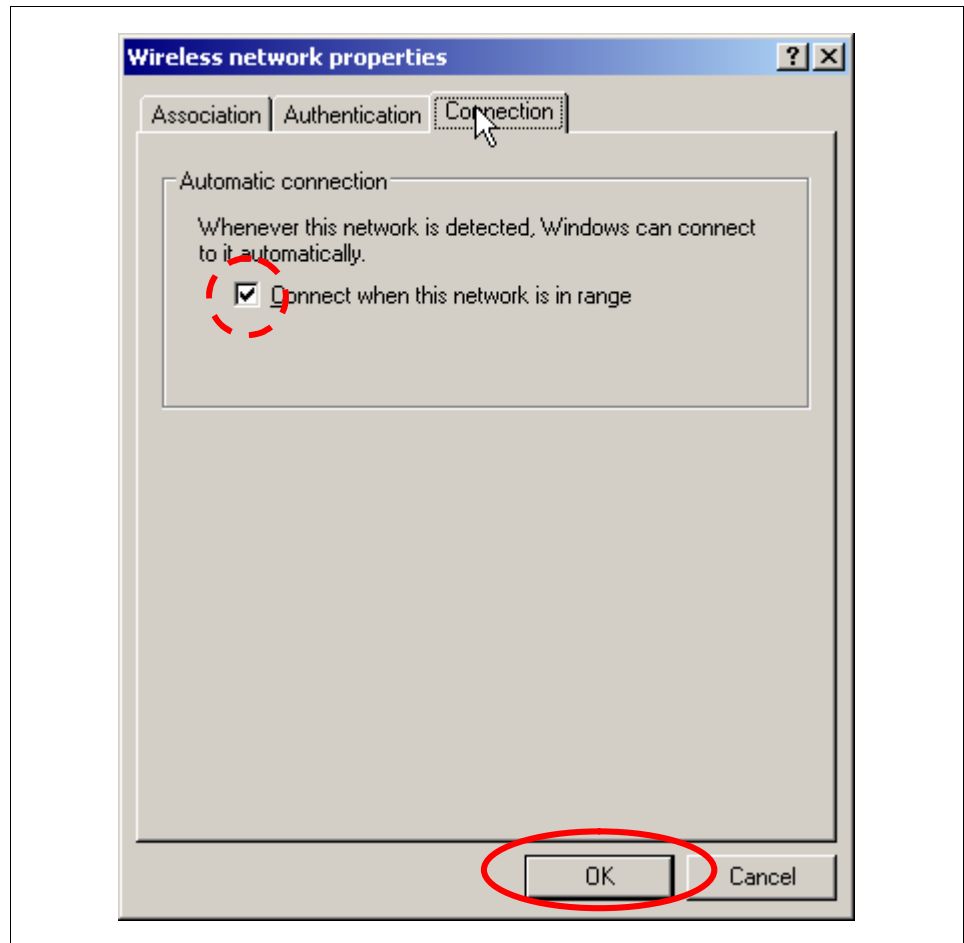
Figure 94: Automated connection

Select the tabulator "General", enable "Internet Protocol (TCP/IP)" and click to "Properties".
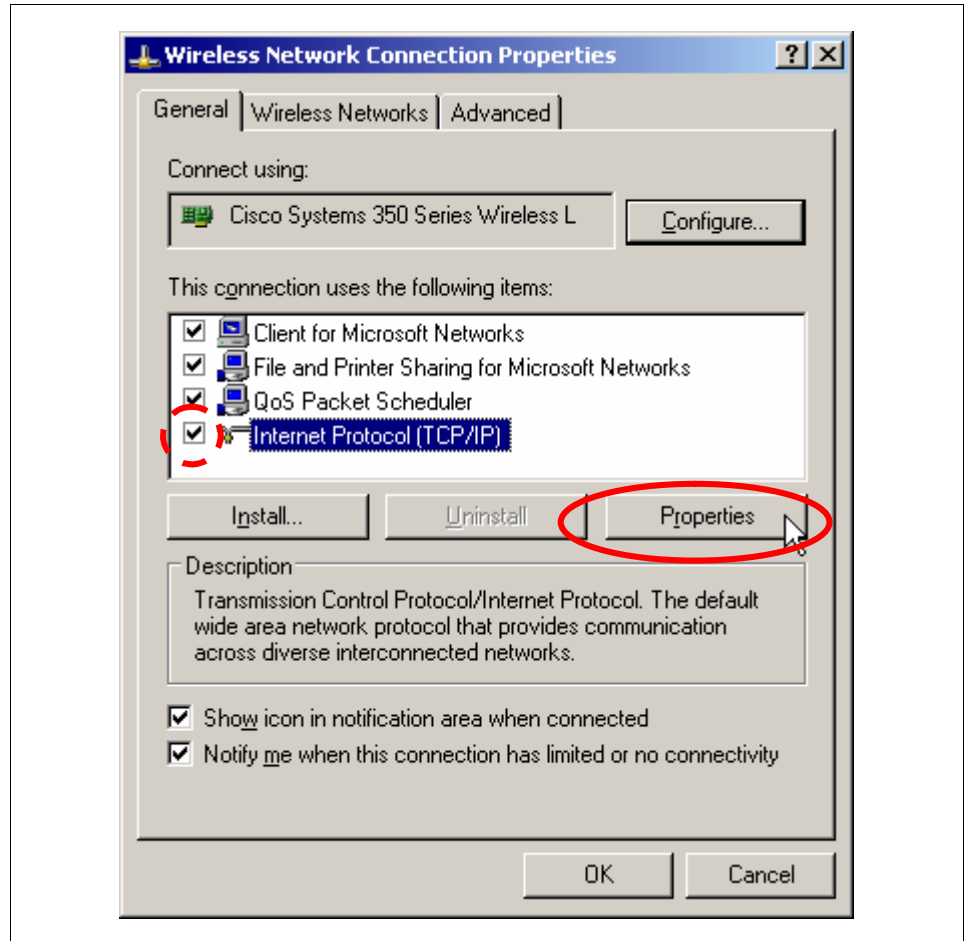
Figure 95: Set the Internet Protocol settings

The IP-address entered in the following form should be selected out of the IPs reserved for private use, see Table 3: IP-addresses reserved for private use, on page 62.
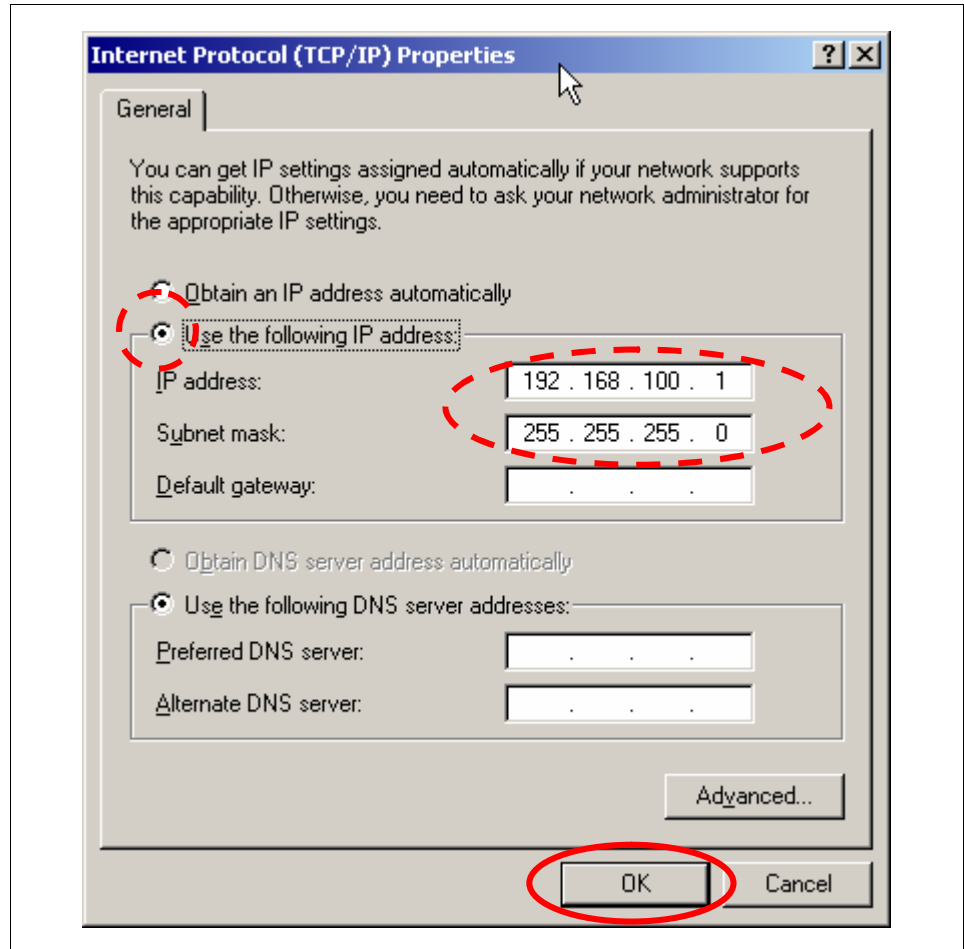
Figure 96: Manually set the IP-address.

Click "OK" to close the form.

Click "OK" in the Wireless Network properties.

The WiFi network is now configured and started. It will start automatically whenever the computer is (re-)started. Connection to the PDA is established automatically, whenever the PDA is closed by.

Settings on the PDA

Note: *It is necessary to set the screen of the PDA to portrait mode, as entering the encryption key is not possible, when the screen is in landscape mode. However, for better readability of this application note, all screen shots are shown in landscape mode.*

On the PDA, open the wireless via Start → Settings → Connections → (iPAQ) Wireless to get the settings menu for wireless connections. An icon is placed in the lower right corner of the screen after that and may be used as a shortcut to start the settings.

Figure 97: Hot key for wireless setup

Note: *It is necessary to set the screen to portrait mode, as entering the encryption key is not possible, when the screen is in landscape mode.*

In the wireless control center, switch on WLAN, by clicking on the WiFi symbol. Switch off Bluetooth, if necessary. The WiFi symbol turns to yellow, to indicate, that WiFi network has been started on the PDA, but a correct network connection has not been established.

Figure 98: Wireless control center

After some seconds, a list of networks found by your PDA is displayed, among them should be the ROMES-network.

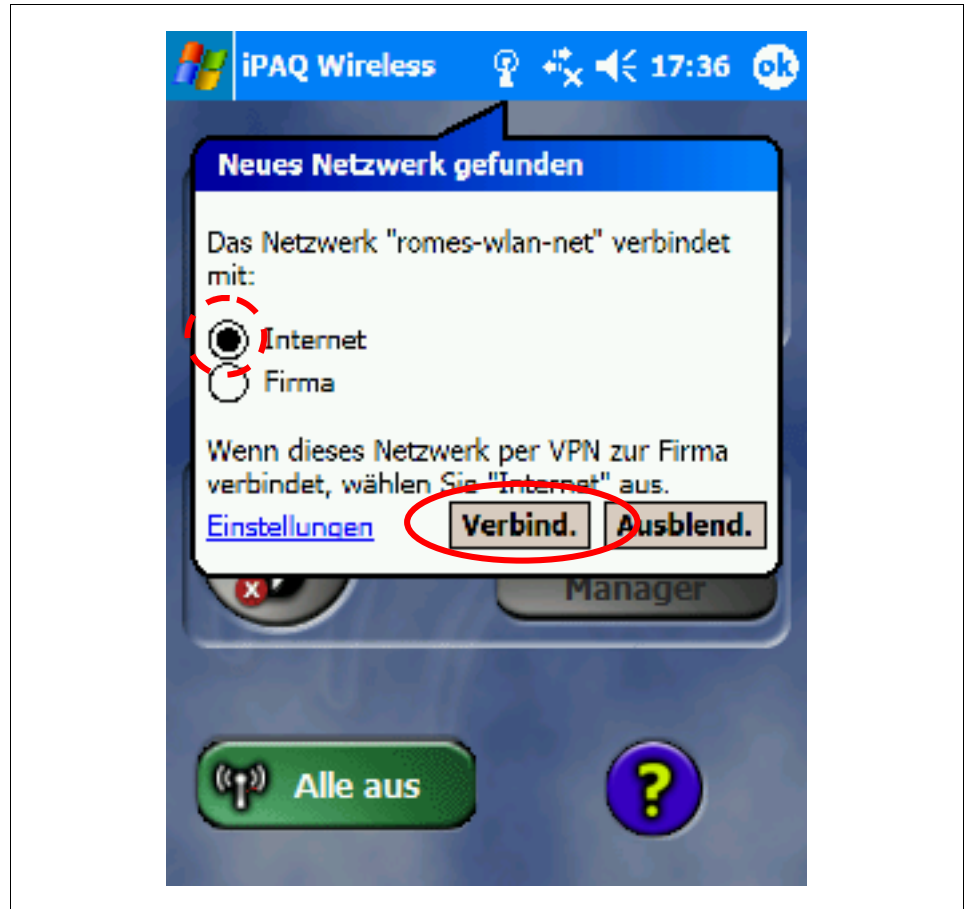*Note*: *Set the screen to landscape mode, if not already done:*

Figure 99: New WiFi Networks found

Select the "romes-wlan-network" and click "Continue". A form is displayed to enter the pass phrase. Click into the area where to enter the pass phrase to open the virtual keyboard. Enter the hex-string, which is still in the notepad editor of the notebook, or has been saved to a file. You can correct the string later on, in case of errors, or if you want to set up the network manually, as described below.
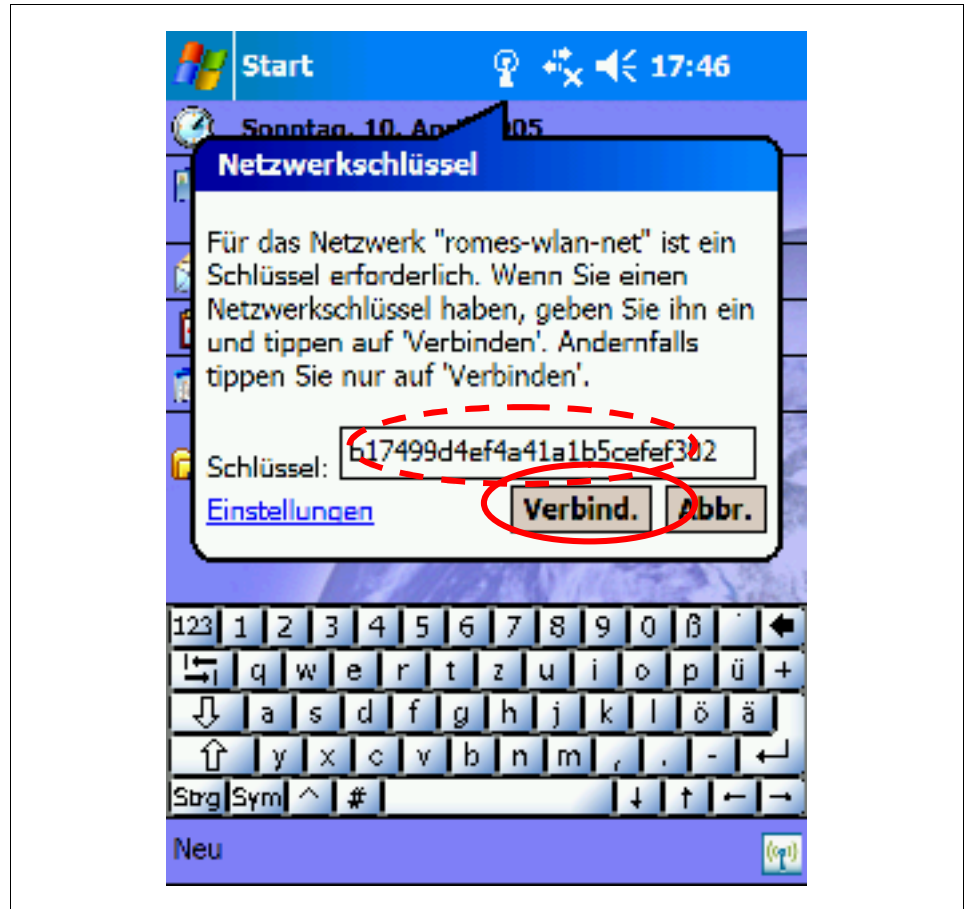
Figure 100: Enter encryption key on PDA.

The list disappears and the WLAN-button turns green to indicate the successful connection.

Note: *The button turns green to indicate the successful connection. It turns green even if the data encryption fails. In that case, all successive services just fail.*

For the following figures, the PDA has been set to landscape mode again.

Click "settings" to open the WLAN-Settings for further configuration. The configuration for wireless network is displayed. Set the connection type to "computer to computer (ad-hoc) networks only" and deselect "automatically connect to non-preferred networks only".
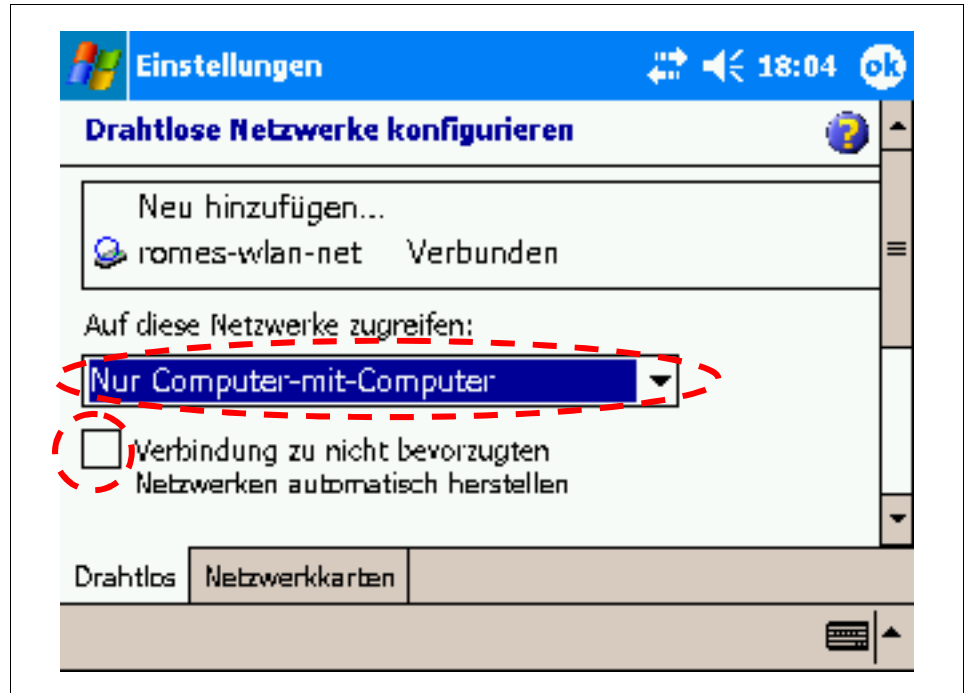
Figure 101: Configure wireless networks on the PDA.

Click on the "romes-wlan-network" to change the setting of the dedicated network. Select the tabular "network key".

Ensure, that Network Authentication ("open" in the example) and data encryption ("WEP") are the same, as previously defined and still displayed in the notepad.

Enter the network key in the corresponding field. It may be useful to copy network settings to the PDA via Microsoft ActiveSync and copy and paste the string from Pocket Word to the field.
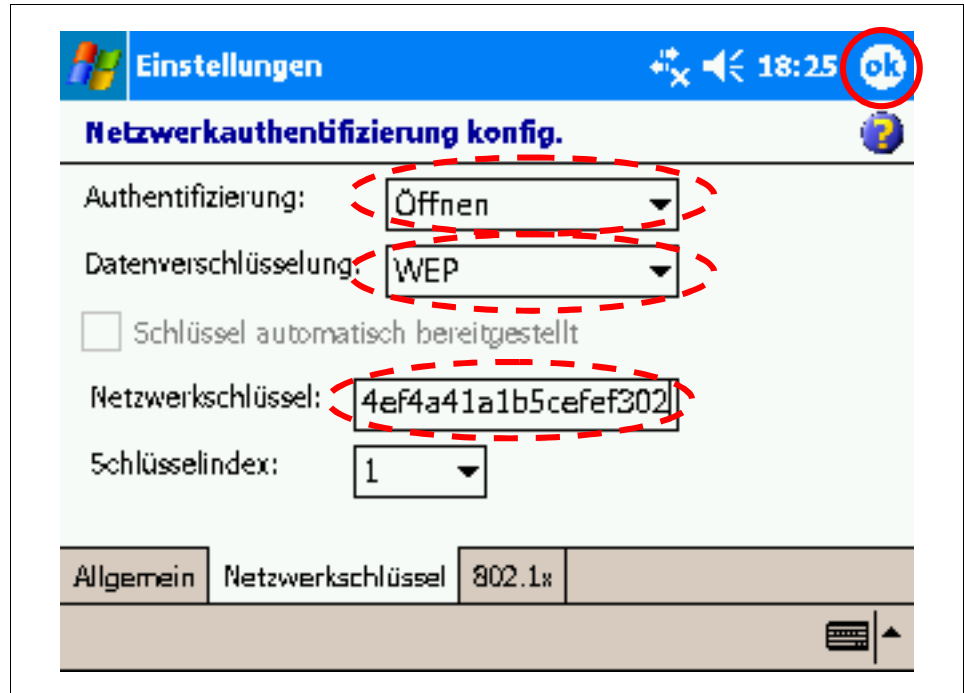
Figure 102: Configuration of network authentication

Click OK to close the configuration of the network authentication.

The next setting is optional, but speeds up establishing the WLAN net connection considerably. It is mandatory, if the settings have been made on the Notebook

Select the tabulator "network cards".

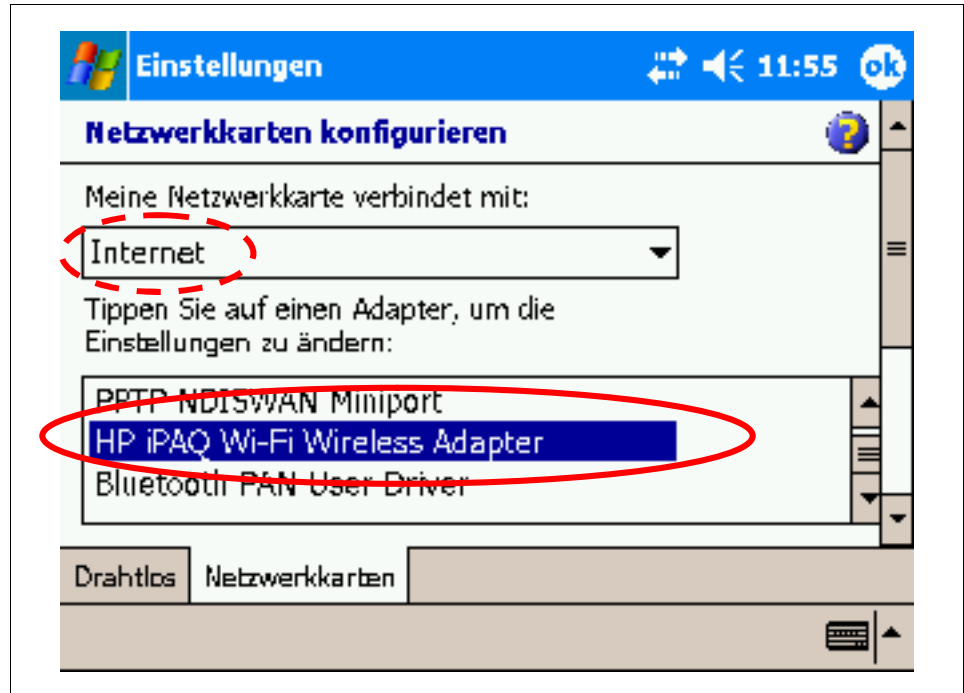Set network card mode to "Internet" and select the WiFi Wireless Adapter:

Figure 103: Settings of the wireless adapter

Enter the TPC/IP address of the adapter. In the example, the next address, 192.168.100.2 is used. But again, the address is your choice – as long as it satisfies the rules mentioned in table 4.
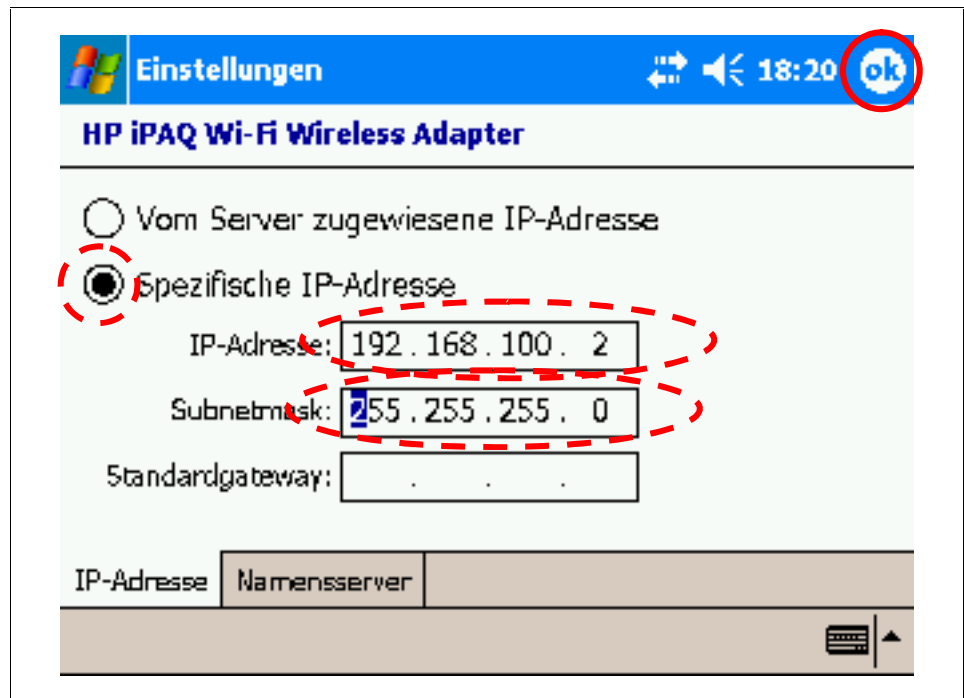

Figure 104: Internet Protocol Settings (IP) of the WiFi adapter

Click "OK" to accept the setting. You get a warning, that the settings are stored only for further use and are valid only after next start of the Wireless

network. Accept the warning by clicking to "OK" and close the wireless control center.
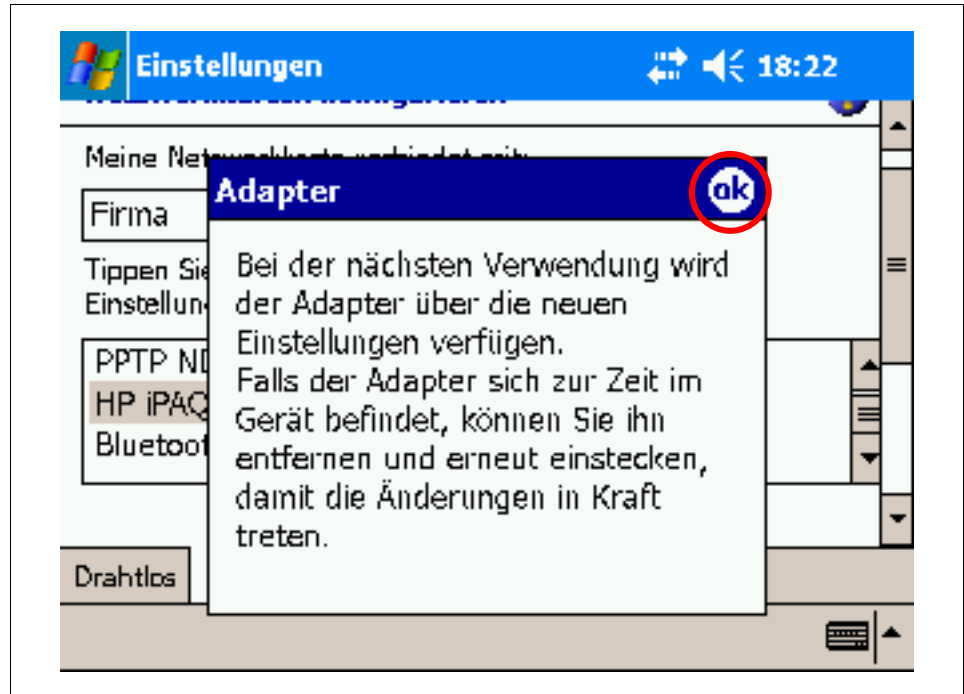

Figure 105: Hint to restart the network adapter

Accept the hint by clicking "OK" and close the settings dialog. The PDA and the notebook try automatically to establish a network connection. The yellow WiFi button turns green, after the connection to the notebook has been established.

Figure 106: WiFi connection has been established

Wired LAN

Setup is not described in this application note, since most commonly used.

Examples for use of wired LAN is to remote control a ROMES computer are:

- Setup a vehicle from laboratory

- Monitoring ROMES

5   Literature

[1]   Mobile Messungen in GSM-Netzen mit bisher unerreichter Qualität. Neues von Rohde & Schwarz (2005); Nr.: 186, S. 4-6

[2]   R&S® ROMES 3: Daten aus Versorgungsmessungen erfassen, analysieren und visualisieren. Neues von Rohde & Schwarz (2000); Nr: 166, S. 29-33

6   Ordering information

Type of instrument

ROMES	1143.7991.30	ROMES DRIVE TEST SOFTWARE PLATFORM V3.5x; *** For Operating System Windows XP Professional *** WITH GPS DRIVER & DATA EXPORT MODULES USB HARDLOCK INCLUDED
TSMU	1153.6000.02	TSMU RADIO NETWORK ANALYZER RF FRONTEND FOR DRIVE TEST SYSTEMS; 12 V DC POWER SUPPLY, IEEE 1394 CONNECTOR; REQUIRES ROMES APPLICATION SOFTWARE
TSMU-Z3	1153.6900.02	INDOOR BACK-PACK SYSTEM FRAME WITH ACCU PACK 3000mAh/12 V; BATTERY CHARGER; INCL. 2ND BATTERY, FIXTURE FOR 2 MOBILES (WITHOUT EXT. ANTENNA CONNECTION), USB HUB, INTERFACE CABLES

The Pocket PC is not offered by Rohde & Schwarz.

ROHDE & SCHWARZ