

SAGEMCOM

SE681 WiMAX

User Guide – User



This device works in a frequency band for which no general licence has been obtained from your National Authority for Frequency Management. Please contact your service provider or your National Authority for Frequency Management about licensing before putting this device into service.

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For your safety

- ▶ Please read the safety instructions carefully before putting into service.

Safety precautions

General safety instructions

- ◆ If you give the SE681 WiMAX to someone else, make sure you also give them its documentation.
- ◆ The SE681 WiMAX must only be used as described in these installation instructions.

Safety instructions for connection

- ◆ Only use the mains adapter supplied, as indicated on the underside of the SE681 WiMAX.

Safety precautions for the SE681 WiMAX

- ◆ The operation of medical appliances may be affected. Be aware of the technical conditions in your particular environment, e.g. doctor's surgery.
- ◆ The SE681 WiMAX and the antenna can interfere with the functioning of medical devices such as pacemakers. Keep at least 20 cm between the devices and the pacemaker. For more information, consult your doctor.
- ◆ The device may cause an unpleasant humming noise in hearing aids.
- ◆ Do not use the devices in environments with a potential explosion hazard, e.g. car paint shops, or in a humid environment (bathroom etc.).
- ◆ The Ethernet function is designed exclusively for connection **inside** a building.

Cleaning and care

Wipe the SE681 WiMAX with a **damp** cloth (do not use solvent) or an antistatic cloth. **Never** use a dry cloth. This can cause static.

Trademarks

- ◆ Microsoft Windows 2000, Windows XP, Windows Vista and Internet Explorer are registered trademarks of the Microsoft Corporation.
- ◆ Mozilla Firefox is a registered trademark of the Mozilla Organization.

Information on Specific Absorption Rate (SAR)

This device meets the limits for protecting the health of the public from the effects of exposure to electromagnetic fields when it is operated in connection with the designated antenna(s) like described in the user manual.

Your device is a radio transmitter and receiver. It is designed and manufactured not to exceed the limits for exposure to emission from electromagnetic fields recommended by international guidelines from the International Commission on Non-Ionizing Radiation Protection (ICNIRP). These limits are part of comprehensive guidelines for the protection of the public and establish permitted levels of exposure to electromagnetic radiation for the population. The guidelines were confirmed by independent scientific organisations through periodic and thorough evaluation of scientific studies. The limits include a substantial safety margin designed to assure the safety of all persons, regardless of age and health.

The exposure limit employs a unit of measurement known as the Specific Absorption Rate, or SAR. The SAR limit stated in the international guidelines is 2.0 W/kg. Tests for SAR are conducted in all frequency bands with the device transmitting at its highest power level with minimum possible distance to the body. The actual SAR level of the device during operation with the designated antenna(s) is below the maximum value and is additionally decreased by a distance to the device. This is because the device is designed to operate at multiple power levels so as to use only the power required to enable seamless network connection.

Information about the optional outdoor antenna



Only one of the antennas listed on page 12 must be used.

The outdoor antenna must be installed and put into service by a qualified electrician.

- ▶ Only commence the outdoor work once you have taken all the necessary steps to make the location safe.

Be sure to observe the safety instructions.

Wall duct:

To connect the SE681 WiMAX to the outdoor antenna, the antenna cable must be fed through the wall to the outside of the building. It must be possible to make a suitable wall or window duct at or near the location of the SE681 WiMAX.

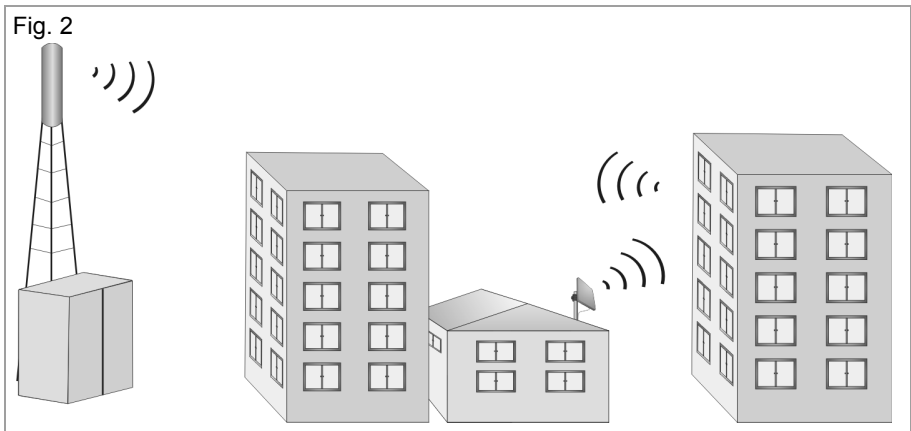
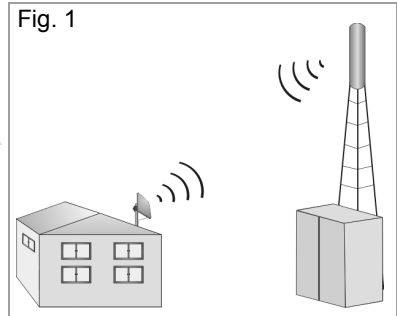
Information about the optional outdoor antenna

Setting up the antenna mast:

There should not be any obstructions (walls, trees etc.) in front of the antenna.

The best results will be obtained if the outdoor antenna is in sight of the WiMAX base station (cf. Fig. 1). →

If a line of sight is not possible, you can reflect the radio waves off neighbouring buildings. To do this, direct the antenna at the building it is to reflect off and not at the base station (cf. Fig. 2).



The antenna mast must be structurally secure. Check how secure the various attachments are.

The antenna mast must be within reach of the cable. Ideally, the antenna cable should be protected outside (from frost, sun, unauthorised and mechanical influences etc.).

In particular, make sure the antenna mast has sufficient load capacity. If you are mounting the mast on the roof, make sure the roof is fully sealed again afterwards.

Lightning protection

The antenna mast should be positioned near a lightning conductor. A suitable lightning conductor must be installed where necessary.

The outdoor antenna is not designed to be struck directly by lightning and must be protected accordingly. The antenna must therefore be mounted in areas that are protected against lightning (Lightning Protection Zone 0B). The corresponding separation distance (IEC 62305) must be complied with.

Earthing and lightning protection work may only be carried out by electricians specifically qualified for such work.

The appropriate earthing clamps must be used to create an equipotential bonding between a cable shield and an equipotential bonding bar that complies with regulations.

Please observe the standard DIN VDE 0855-300 and find out more on the Internet at <http://www.dehn.de>.

Antenna cable and antenna connection:

It must be possible to connect the outdoor antenna to the SE681 WiMAX by means of an antenna cable.

Please note that the antenna connection must be protected from the impact of rain and other weather effects.

Use cable clamps to attach the cable to the mast. Please note that the cable must be long enough to turn the antenna at a later stage.

Antenna alignment:

When aligning the antenna, we recommend asking a second person to run the Basic Setup Wizard on the PC and to check the reception quality on the screen; see Chapter "Basic Setup Wizard" on page 25.

Aligning the antenna using acoustic signals

If neither you nor the assistant are able to check the signal strength on screen while the antenna is being aligned, you can monitor it via a radio system. To do this you will need, for example, two cordless phones, mobile phones or radio devices:

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- ▶ Activate **Tone on** on the configuration PC.
- ▶ Establish an internal connection between the two handsets and switch on the loudspeaker on both devices.
- ▶ Leave one handset next to the configuration PC and carry the other with you (belt clip).

You will now be informed of the signal strength by means of beeps. The closer together the sequence of beeps, the better the connection quality.

After installation:

Tighten all screw connections to the torques listed in the installation instructions.

Secure the antenna cable with cable clamps and cable ties. The cable must be protected from exposure to pressure and tension.

SE681 WiMAX

What is WiMAX?

WiMAX stands for "**W**orldwide Interoperability for **M**icrowave **A**ccess", a modern wireless network technology that enables fast Internet connection even in remote areas. With WiMAX technology you are no longer dependent on a DSL infrastructure in your home or place of work. Instead, you connect your PC or network wirelessly to radio stations operated in your region by your provider. As a result, WiMAX gives you fast, economical broadband Internet access, even in places that are not connected to the DSL cable network.

The WiMAX standard IEEE 802.16 generally defines WiMAX technology. Your SE681 WiMAX already meets the latest IEEE 802.16e-2005 standard, a mobile WiMAX standard that offers many extra possibilities.

SE681 WiMAX

With your SE681 WiMAX, you can make use of everything the Internet has to offer:

◆ Downloads

- Even large files download quickly to your PC.
- Complex Website designs are no longer characterised by the time they take to download – you can enjoy flash animation and high-resolution graphics immediately after clicking a link.

◆ Audio

- Play back audio files straight from the Internet.
- Listen to the radio via the Internet in superb digital quality.

◆ Video

- View short or longer films you find on the Internet without tedious waiting times.
- Watch television via the Internet (IPTV).
- Use "Video on Demand" and order films that are transmitted to you via the Internet.

◆ Real time

- Take part in video conferences and feel as if you are sitting in the same room as the people you are talking to.
- Speak to and see your chat partners.

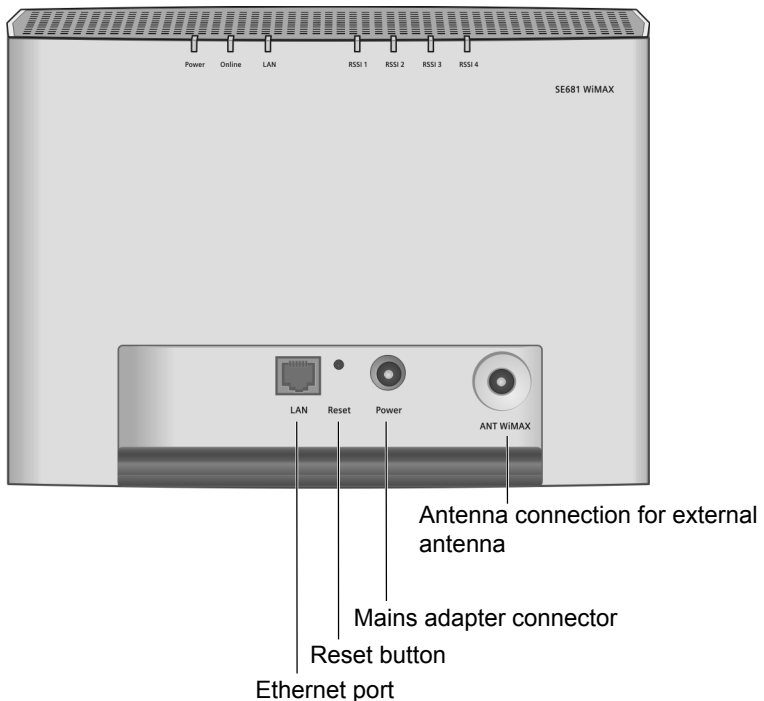
Product features

- ◆ Wireless high-speed Internet access with a transmission rate of up to 20 Mbps (14 Mbps downlink, 6 Mbps uplink)
- ◆ Standard compatibility: IEEE 802.16e-2005
- ◆ Compatible with all current operating systems
- ◆ Suitable for home and business facilities
- ◆ Multi-protocol support: TCP/IP, FTP, HTTP and other Internet related protocols
- ◆ Easy to set up without installing software
- ◆ Internet and VoIP connection without the hassle of entering access data
- ◆ DHCP server and routing functions
- ◆ High performance and quality of service
- ◆ Optional: outdoor antenna for improved connection quality

Product overview

Connectors and LEDs

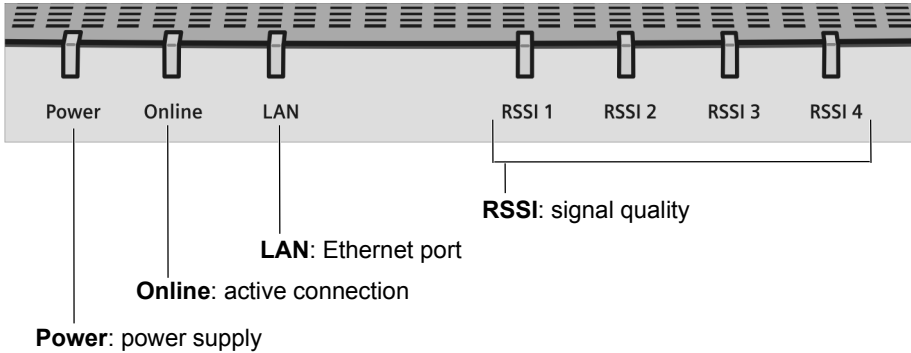
Connectors



Product overview

- ◆ For information about the optional outdoor antenna, please refer to "Connecting the outdoor antenna" on page 15.
- ◆ For information on connecting the mains adapter, please refer to "Switching on the devices" on page 17.
- ◆ For information on the reset button, please refer to "Restarting and resetting the SE681 WiMAX" on page 17.
- ◆ For information on the Ethernet port, please refer to "Connecting the PC" on page 16.

LEDs



The LEDs indicate the status of the SE681 WiMAX and the current signal strength.

Name	LED	Meaning
Power: power supply	Lights up green	The SE681 WiMAX is powered correctly.
	Does not light up	The SE681 WiMAX is not powered correctly or the power supply has failed.
Online: active connection	Lights up green	The SE681 WiMAX is registered with a WiMAX network and ready for use.
	Does not light up	The SE681 WiMAX is not registered with a WiMAX network; it is not possible to establish an Internet connection.
	Flashes green	The SE681 WiMAX is establishing a connection with a WiMAX network.
	Lights up red	The SE681 WiMAX is not ready. Possible cause: device is overheating or faulty.
LAN: Ethernet port	Lights up green	Correct cable connection with a powered connection partner.
	Does not light up	No or incorrect cable connection.
	Flashes green	Data transfer via the Ethernet port.


Name	LED	Meaning
RSSI: signal quality	0 to 4 LEDs light up green	The LEDs on the SE681 WiMAX help you to position the antenna more easily. The LEDs indicate the signal quality; the more LEDs that light up, the better the signal reception.
	All 4 LEDs flash green	The SE681 WiMAX is being reset to the factory settings; see "Returning the SE681 WiMAX to factory settings" on page 18.

<i>i</i>	<p>The connection quality can be detected in two different ways:</p> <ul style="list-style-type: none"> ◆ CINR (Carrier to Interference and Noise Ratio) measures the signal quality. ◆ RSSI (Received Signal Strength Indication) measures the signal strength. <p>The LEDs indicate either RSSI or CINR values. The used method is pre-configured by your operator. If RSSI is used the RSSI 1 - RSSI 4 LEDs will show the signal strength.</p>
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Installing the SE681 WiMAX

The SE681 WiMAX can only be used with the device's integrated antenna or with one of the following outdoor antennas:

3.5 GHz	18 dBi	WiMAX	Antenna Outdoor	"Antenna cable 3 m"
2.6 GHz	15 dBi	WiMAX	Antenna Outdoor	"Antenna cable 3 m"

	<p>3.5 GHz versions should be used for the European Economic Area. The following requirements apply: All the external antennas used for this product must undergo a conformity assessment procedure. The 3.5 GHz antennas listed here meet the European requirements and guarantee the functionality of the complete system. During the conformity assessment procedure it was ensured that the SAR limits set down in directive 99/519/EC are observed. Verification was performed using EN 50385.</p> <p>The outdoor antenna must be installed and put into service by a qualified electrician. The notes in the enclosed installation instructions must be followed.</p>
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This user guide assumes that installation of the outdoor antenna has been completed.

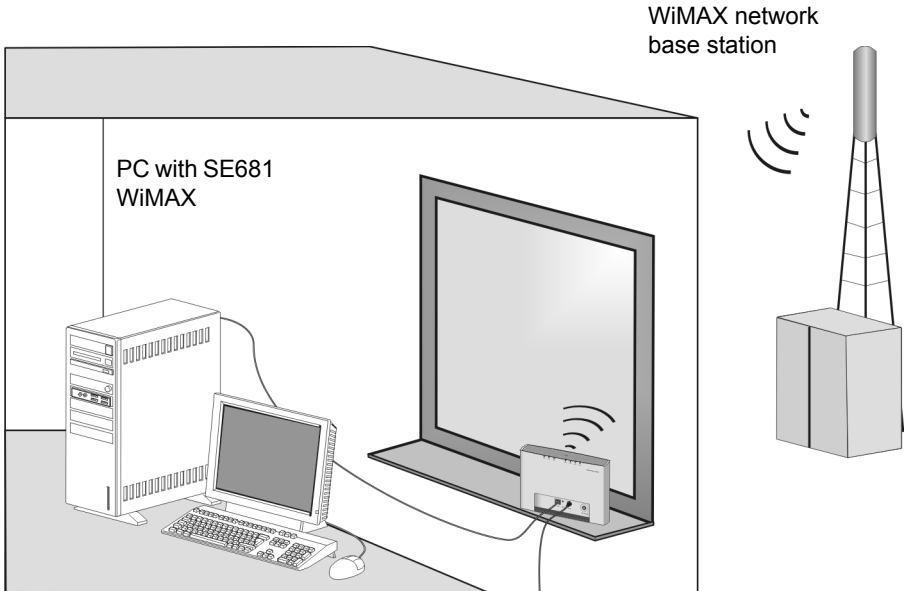
Choosing your location

- ◆ Choose a location that enables you to simply set up the following connections without any further work.
 - Connect the Ethernet cable for connection to a PC or network.
 - Connect the power lead to the mains socket.
- ◆ Stand the SE681 WiMAX upright on an even, non-slip surface.
- ◆ Lay the cables in such a way that nobody can tread on or trip over them.
- ◆ Position the SE681 WiMAX so that you can see the LEDs.
- ◆ Do not cover the openings in the SE681 WiMAX housing to ensure the heat can circulate; otherwise, the duty cycle of the device will be reduced or the SE681 WiMAX switched off to avoid overheating.
- ◆ Do not operate the SE681 WiMAX under the influence of direct heat sources (e.g. directly in the sun).

If you use the integrated antenna:

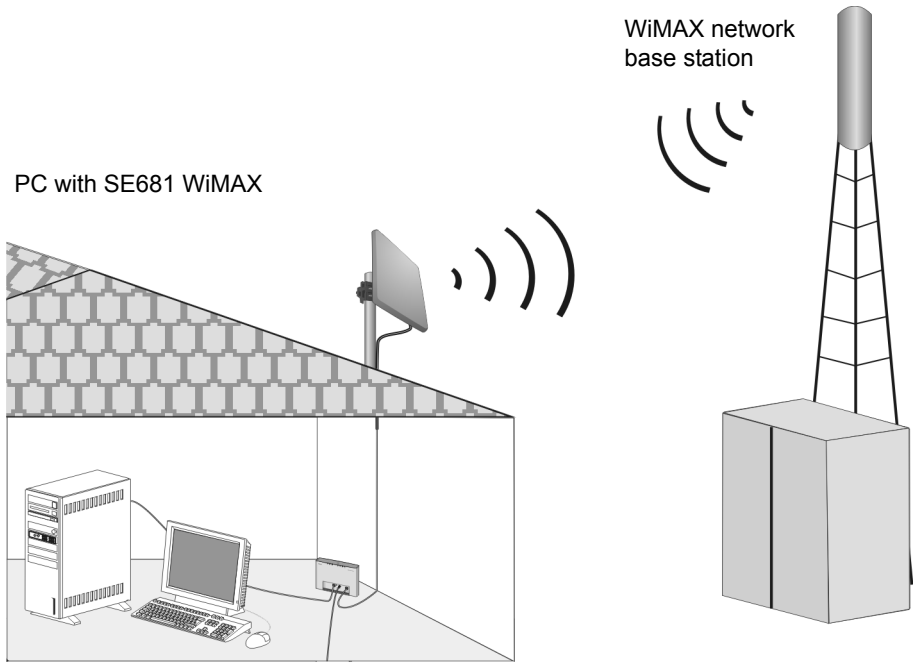
- ◆ Position the SE681 WiMAX directly in a window, so that the side with the LEDs and connectors is pointing into the room, towards you. Wherever possible, position the SE681 WiMAX on one of the upper storeys. Note that obstructions, particularly doors and wall coverings containing metal can affect data transmission.
- ◆ Position the SE681 WiMAX as far away as possible from metallic objects and coated foils.

SE681 WiMAX with integrated antenna



System requirements

SE681 WiMAX with outdoor antenna



When used with the integrated antenna or the outdoor antenna, the SE681 WiMAX complies with the regulations on limiting the effect of electromagnetic fields on the general population.

System requirements

To use the SE681 WiMAX, the following requirements have to be fulfilled.

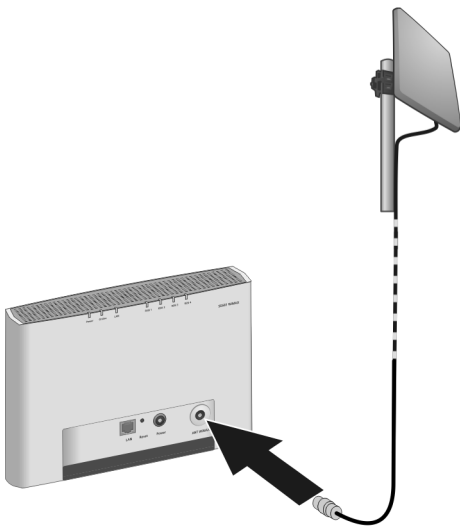
- ◆ You will need a PC that meets the following requirements:
 - PC with a free LAN interface 10/100BaseT (network adapter). The network adapter on the configuration PC must support one of the following modes: 10BaseT Half Duplex, 10BaseT Full Duplex, 100BaseT Half Duplex, 100BaseT Full Duplex. The TCP/IP protocol has to be set up on the PC (standard installation for Windows XP and Windows Vista; if you are using a different Windows operating system, read the separate instructions on network configuration, if necessary).
 - A Web browser is installed on the configuration PC (e.g. Internet Explorer or Mozilla Firefox).
- ◆ To access the Internet you will need to register your SE681 WiMAX with a WiMAX Internet provider.

Connecting the SE681 WiMAX

Connect the SE681 WiMAX in the following order:

1. If you use the outdoor antenna, have it installed by a qualified electrician. Connect the antenna cable from outside to the SE681 WiMAX.
2. Connect the PC to the SE681 WiMAX.
3. Connect the SE681 WiMAX to the mains power supply and switch all the devices on.

Connecting the outdoor antenna



- Screw the connector of the antenna cable into the **ANT WiMAX** connector on your SE681 WiMAX. In order to disconnect the antenna cable from the connector, open the screw connection.

Connecting the SE681 WiMAX

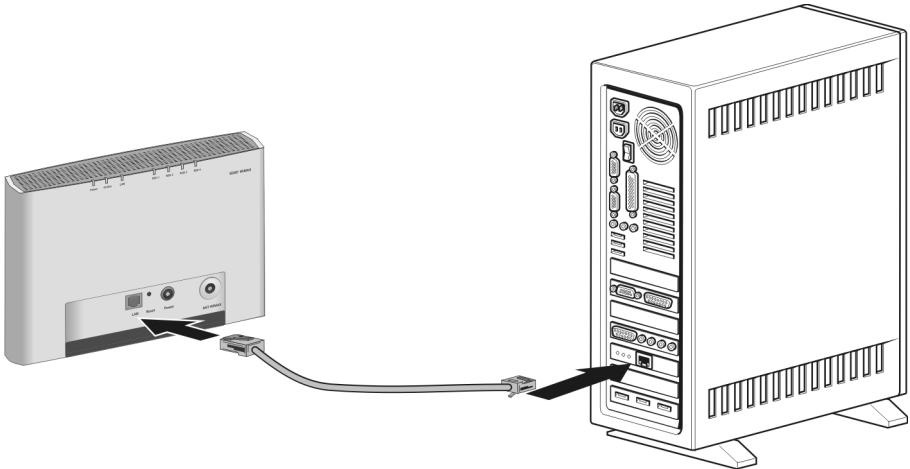
Connecting the PC



Use either the Ethernet cable that is supplied or a standard network cable (CAT-5) to connect the device to the PC. It is not important whether the Ethernet cable has straight or crossed wiring.

Always use a shielded Ethernet cable.

Connecting SE681 WiMAX to the PC



- ▶ Connect one Ethernet cable plug to the Ethernet port on the SE681 WiMAX.
- ▶ Connect the other plug of the Ethernet cable to the LAN interface on the PC.

Optional: connecting several terminals

If you wish to connect several terminals (for example a PC and a laptop) and establish an Internet connection with all the devices, connect a switch or hub to your SE681 WiMAX.



A DHCP server is integrated into your SE681 WiMAX. Please ensure that a second DHCP server is not activated on your server. For details on this, read the operating instructions for your switch/hub.

Switching on the devices



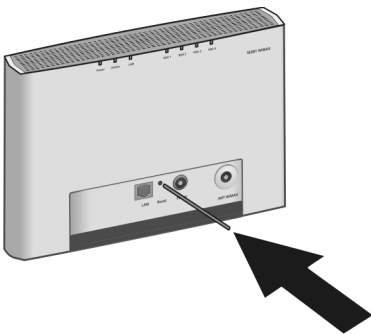
Only use the SE681 WiMAX with the mains adapter supplied.

- ▶ Connect the mains adapter plug to the SE681 WiMAX socket.
- ▶ Power up the PC.
- ▶ Connect the mains adapter to the mains power supply.
The system starts up and performs a self-test. After the self-test, the SE681 WiMAX continually attempts to register with a WiMAX network. Registration may be successful immediately. If not, registration will take place when the SE681 WiMAX is being configured.
- ▶ Check the LEDs during startup:

LEDs during startup:

- The **Power** power supply LED lights up **green**, and the SE681 WiMAX starts a self-test. If the LED does not light up, check that the mains adapter is connected correctly and the power socket is live.
- The **LAN** Ethernet LED is continuously lit **green**. If the LED does not light up, check that the Ethernet cable is connected correctly.
- If registration with a WiMAX network has already been successful, the **Online** LED lights up **green**. If the LED does not light up, register your SE681 WiMAX during configuration.

Restarting and resetting the SE681 WiMAX



The reset button is located inside the SE681 WiMAX so that it cannot be pressed accidentally. If you need to restart or reset the SE681 WiMAX, use a thin object such as an opened up paper clip.

Restarting and resetting the SE681 WiMAX

Rebooting the SE681 WiMAX

- ▶ Briefly press the reset button (for less than 5 seconds). The configuration settings will remain, the SE681 WiMAX will be restarted.

You can also restart the SE681 WiMAX via the user interface or by briefly cutting the power supply.

Returning the SE681 WiMAX to factory settings

If you no longer have access to your SE681 WiMAX, you can also restore factory settings with the reset button on the back of the device.



When the factory settings are restored, all personal settings are deleted.

- ▶ Press and hold the reset button for more than 5 seconds.

The 4 **RSSI** LEDs will begin to flash green. The configuration settings are returned to the factory settings and the SE681 WiMAX is restarted. This process takes about 25 seconds. The SE681 WiMAX will then automatically try to set up a connection to a WiMAX network; depending on the connection quality, 0 to 4 **RSSI** LEDs will permanently light up green.

Factory settings

After restoring the factory settings, your SE681 WiMAX will be in its original condition:

- ▶ Proceed as follows to start operating your device again:

Menu

Basic Setup Wizard

Setting

Execute the Basic Setup Wizard to configure your device and to establish a connection to the WiMAX network, see "Basic Setup Wizard" on page 25.

Advanced Settings – Administration – System Password

Protect the configuration interface of your device with a password, see "System password" on page 39.

If the device came from your provider with a preset system password, this will now be valid again. Please check the documents supplied by your provider.

Configuration with the Web browser

You do not need to install any software on your PC to configure your SE681 WiMAX; the configuration program is stored on the device. Open this software in the same way as an Internet page in the Web browser and make the required settings. Your settings are then stored directly on the device.

On startup, the Basic Setup Wizard helps you set up a connection to the WiMAX network and configure your Internet access.

<i>i</i>	<p>For experienced users:</p> <ul style="list-style-type: none"> – IP address: 192.168.2.1 – Subnet mask: 255.255.255.0
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Presentation of the configuration program

To configure your SE681 WiMAX, we recommend the Microsoft Internet Explorer version 7.0 or Mozilla Firefox version 2.0 or their higher versions. However, you can also use most other or older Web browsers.

<i>i</i>	Number and amount of the functions and settings provided by the configuration program may differ specific to a project.
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User interface

Launching the user interface

- ▶ Open your Web browser.
- ▶ Enter the IP address of your SE681 WiMAX in the address field of your Web browser:

`http://192.168.2.1`

- ▶ Press Enter (Return).

If a system password has been set up on your SE681 WiMAX, the login screen will now open.

- ▶ Enter the system password supplied by your provider in the text box and click **Ok**.

The start page (Home) of the user interface opens, in which you can change the language if necessary (→ page 22).

Change the system password later to one of your own (see "System password" on page 39).

If no system password has been set up on your SE681 WiMAX, a security warning will appear first. You should then assign a system password as soon as possible.

- ▶ Confirm the security warning with **Ok**.

User interface

The user interface start page opens.

If the login screen does not open:

- ▶ Check the connections; see "Connecting the SE681 WiMAX" on page 15.
- ▶ If you use a firewall on the PC, it must allow connection to the SE681 WiMAX. If applicable, switch off the firewall for a test; if you can then open the login screen, configure the firewall accordingly. For details, refer to the user guide for your firewall.

If you have changed the standard settings on your PC, you might not be able to open the configuration pages.

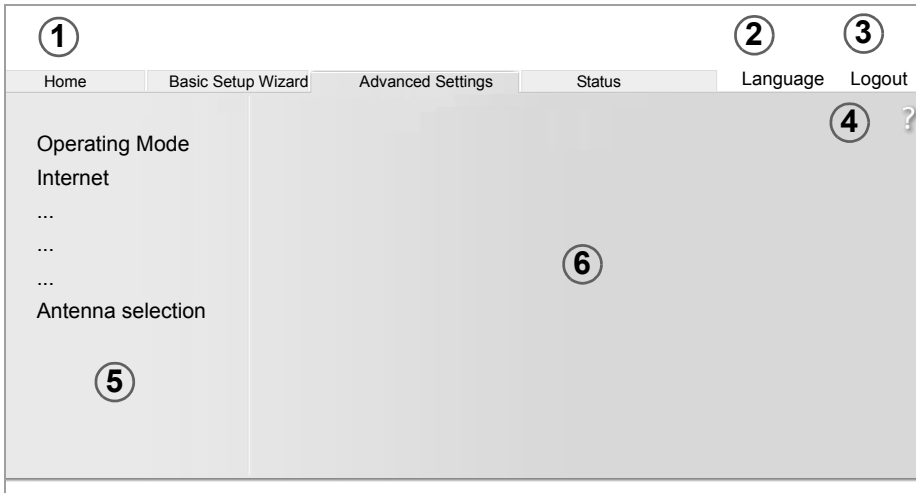
- ▶ For details on how to find and rectify the fault, see "Fault tracing" on page 48.

Saving the user interface address

- ▶ You can add the address of the login screen to your favourites/bookmarks so that you will no longer need to enter the IP address manually in future:
 - Internet Explorer: **Add to Favorites** button
 - Firefox: **Bookmarks > Add Bookmark**

UI elements

The user interface you open with the Web browser is divided into the following sections:



- 1 Tab selection:**
Open the *Home*, *Basic Setup Wizard*, *Advanced Settings* or *Status* tabs to display the contents of each configuration area.
- 2 Language button:**
Select your language. This button is only available on the *Home* screen.
- 3 Logout button:**
This button is only displayed if a system password is set up. Log off from your SE681 WiMAX.
- 4 Open Help window button:**
Open the online Help relating to the menu item currently in the working area.
- 5 Menu area:**
Click the menu items to display the respective pages of the currently open configuration area or a submenu.
- 6 Working area:**
Check the settings on your SE681 WiMAX and change them as necessary.

User interface

Buttons



Open online Help.

Click this button if you require information about the screen you currently have open. The corresponding Help topic is opened.

Logout

Button with which you end the connection between the PC and the SE681 WiMAX.

Back

Return to the previous screen in the Basic Setup Wizard.

Next

Move on to the next screen in the Basic Setup Wizard.

Cancel

Changed settings are not applied and you return to the highest level.

Ok

Save the settings and return to the highest level.

End

Save the settings and exit the Basic Setup Wizard.

You will see other buttons depending on the screen currently open. If you require further information about these, open the online Help at the appropriate place using the question mark button.

Input fields

On the configuration screens, change the required settings using the following input fields:



Option buttons:

Two or more buttons, of which one is activated. As soon as you click another option button, it is activated and the one previously selected is reset. You will find option buttons wherever there is a choice between several possibilities, e.g. whether or not you wish to use an external or the internal antenna.



Text field:

Enter text or digits. Click in the field to activate input mode. You will find text fields at points where you can specify text or numbers as required, e.g. a new system password.

Setting the language

The user interface is initially displayed in the language that has been set by your operator. Other languages may be available.

- ▶ If you wish to change the preset language, click on the **Language** button at the top right. This opens the page for setting the language.
- ▶ Click the arrow next to the selection field to open it and select your language.
- ▶ Click **Ok** to change the language.

Opening online Help

There is an online Help for each screen of the configuration program, which you can open directly on the screen.

- ▶ Click the question mark button at the top right.
The online Help is shown in the right pane of the configuration program.
- ▶ If necessary, click **Open Help window** to open the online Help in a separate window.

Menu structure

The menu of the user interface on your SE681 WiMAX is split into the following main areas: **Home**, **Basic Setup Wizard**, **Advanced Settings** and **Status**. Under these menu options, you will find the following areas:

Menu	Description
Home	Start page and starting point for all configuration and administration tasks. It also shows the connection status and allows you to set the language, see "User interface" on page 19.
Basic Setup Wizard	Establish a connection to the WiMAX network, optimise the antenna direction and set up your Internet connection , see "Basic Setup Wizard" on page 25.
Advanced Settings	Configure your Internet access and your local network and perform administration tasks. For example, you can enter a system password for access to your SE681 WiMAX or change it, see "Configuration with the Web browser" on page 19.
Status	Obtain information on the operating status of your SE681 WiMAX and read off the device and version numbers as well as IP addresses; see "Status" on page 42.
	Internet See "Internet" on page 43.
	Local Network See "Local network LAN" on page 44.
	Device Status See "Device status" on page 44.
	Radio Status See "Radio status" on page 45.

The Home page

Once you have logged in successfully to the SE681 WiMAX, you will see the **Home** page for the device software. The start screen offers an overview of all areas of the configuration program:

Menu	Description
Basic Setup Wizard	Perform the basic configuration and set up the radio connection to the WiMAX network (→ page 25).
Advanced Settings	Perform advanced configuration and administration tasks (→ page 30).
Status	Obtain information on the status of your SE681 WiMAX (→ page 42).

In the area to the right of the start screen, you will see the connection status of your SE681 WiMAX:

- ◆ **connected** = The SE681 WiMAX has established a radio connection with a WiMAX network. You will see the connection duration in brackets and in the format ddd:hh:mm:ss (d=days, h=hours, m=minutes, s=seconds).
- ◆ **disconnected** = The SE681 WiMAX is trying to establish a connection with a WiMAX network.

To configure your SE681 WiMAX, use the Basic Setup Wizard, which will help you establish a radio connection.

Connecting to the Internet manually

Once you have configured your Internet access (see page 25 and page 32), you can establish a manual connection to the Internet on the start screen if you have selected **Connect on demand** as the Connection mode.

To establish or end an Internet connection manually:

- ▶ Open the start screen of the SE681 WiMAX as described on page 19.
- ▶ If you have already started the user interface, click the **Home** tab at the top left of the window.
- ▶ Click **Connect** to establish a connection to the Internet.
- ▶ Click **Disconnect** if you no longer require the connection.

Basic Setup Wizard

The Basic Setup Wizard helps you start up your device and guides you step by step through the configuration process with the most important settings.

The Basic Setup Wizard comprises the following steps:

- ◆ Entering the access data for the WiMAX network
- ◆ Configuring the Internet access
- ◆ Selecting the antenna
- ◆ Positioning the device
- ◆ Scanning the frequencies to establish a radio connection with a WiMAX network
- ◆ Exact alignment of the antenna to optimise the quality of the connection



You can check all the configuration settings that you make with the Basic Setup Wizard later via the Advanced Settings menus and, if necessary, change them, see "Advanced Settings" on page 30.



Depending on the pre-configuration of your device some of the menu entries and configuration possibilities might be missing in your device.

Starting the Basic Setup Wizard

- ▶ To start the Basic Setup Wizard, click the **Basic Setup Wizard** tab.
- ▶ Click **Next**.

Entering access data for the WiMAX network

On this page you enter the data for authentication of your device on the WiMAX base station. You will need the access data supplied by your WiMAX operator for this.

- ▶ Activate the **Authentication** option, if this is required by your WiMAX operator.
- ▶ Enter the access data and click **Next**.

Setting up Internet access

To allow users in your local network access to the Internet, set up the Internet connection of your device using the information supplied by your Internet provider.

- ▶ Enter the access data and click **Next**.



Your SE681 WiMAX can be used as an Internet router or bridge. For more on this see "Setting the operating mode" on page 31.

Selecting the antenna

- ▶ Select whether you want to operate your SE681 WiMAX with an outdoor antenna or the integrated one.
 - Click the first option button if you want to use the integrated antenna. Your SE681 WiMAX must be positioned by the window with the cable connections pointing inwards and must be connected.
 - Click the second option button if your SE681 WiMAX came with an outdoor antenna. This antenna must have been installed and connected by an electrical specialist.
- ▶ Click **Next**.

Adjusting the antenna

- ▶ If you are using the integrated antenna, adjust your SE681 WiMAX by the window. If you are using the outdoor antenna, this must already be installed and facing towards the base station, see "Installing the SE681 WiMAX" on page 12.
- ▶ Click **Next**.

Establishing a radio connection to a WiMAX network

The Basic Setup Wizard will now scan the frequencies to establish an initial radio connection to a WiMAX network.

The frequency scan begins automatically. A progress bar indicates how far the scan has progressed. In addition, you will see in the **Remaining time** area roughly how much time is still needed for the complete scan. Depending on how your SE681 WiMAX has been preconfigured by your provider, the scan can last several minutes before the first radio connection is established.



During the scan, the SE681 WiMAX or antenna must not be moved; this is the only way to guarantee a complete scan with the current antenna alignment.

As soon as a radio connection has been established with a WiMAX network, the scan will end. The progress bar is fully filled in and the display in the **Remaining time** area jumps to **0 seconds**.

- ▶ If the scan has been successful, read on in Chapter "Precisely aligning the antenna" on page 28.

If the scan was not successful:

Both the integrated antenna and the outdoor antenna are directional antennas; this means that they must at least be pointing roughly in the direction of a WiMAX network base station in order to establish a radio connection. The access data must also have been entered correctly.

If the scan was not successful:

- ▶ First check your access data by going back to the WiMAX configuration page (→ page 25).
- ▶ If you have entered your access data correctly, adjust the antenna.

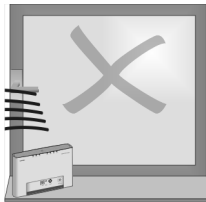
If you are using the integrated antenna:

- ▶ Turn your SE681 WiMAX by approx. 45°.

Correct:



Incorrect:



- ▶ Click **Ok** to restart the scan.



You must not move the SE681 WiMAX during the scan. You should therefore always place the SE681 WiMAX upright and on a level surface directly by the window.

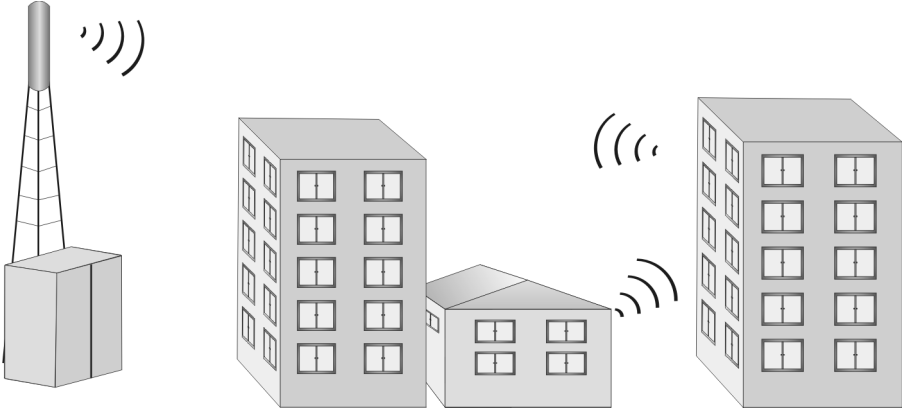
If the scan has still not been successful with the alignment changed:

- ▶ Place the SE681 WiMAX by a window that faces a different direction.
- ▶ If necessary, repeat the scan with all possible locations and alignments.
- ▶ If necessary, ask your provider for the location of the nearest WiMAX network base station and select a location for your SE681 WiMAX that points towards this base station.

The best results will be obtained if the SE681 WiMAX is in sight of a WiMAX network base station.

Basic Setup Wizard

If a line of sight is not possible, you can reflect the radio waves off neighbouring buildings. To do this, direct the SE681 WiMAX at the building it is reflecting off and not at the WiMAX network base station.



If you are using the outdoor antenna:

- ▶ The qualified electrician turns the antenna through 20° in the vertical axis. Then the scan is repeated by clicking the **OK** button.
- ▶ If necessary, the scan should be repeated with all possible antenna alignments.

Precisely aligning the antenna

Once you have established a radio connection to a WiMAX network, align your SE681 WiMAX or antenna precisely using the Basic Setup Wizard.



Take extra care to align the SE681 WiMAX or outdoor antenna precisely. The better the connection quality, the faster your Internet connection will be in the future.

To obtain precise alignment of the SE681 WiMAX or antenna, turn it a little at a time. If you use the antenna integrated in the SE681 WiMAX, you can also move the device a little at a time to optimise the reception quality.

- ▶ When a connection to a WiMAX network has been established, click **Next** to make fine adjustments to the antenna.

The quality of the radio connection is represented graphically by the **Signal quality** bar. The longer the bar is, the better the radio connection. Try to obtain the best possible radio connection setting.

- ▶ If you are using the antenna integrated in the SE681 WiMAX:
Memorise the current location and alignment of your SE681 WiMAX, so that you can restore it if the connection is broken.
- ▶ If you are unable to check the display of the signal quality on the screen while aligning the antenna:
Activate the **Audible feedback** option to obtain information about the signal quality by means of beeps. The closer together the sequence of beeps, the better the connection quality.
- ▶ Turn or move the SE681 WiMAX or turn the antenna a little at a time and note the signal quality display. Use this to move the antenna to the position with the best signal quality.

In addition to the beeps and on-screen bar graph you can also determine the quality of the connection by how many of the 4 LEDs indicating signal quality are lit up on the device (**RSSI 1–RSSI 4**). The more LEDs that light up, the better the connection quality.

If you have turned your SE681 WiMAX or the antenna too far, the connection might break. You should then return to the alignment that provided a connection and repeat the procedure for establishing a connection to the WiMAX network. Then make any fine adjustments step by step.

i	<p>The connection quality can be detected in two different ways:</p> <ul style="list-style-type: none"> ◆ CINR (Carrier to Interference and Noise Ratio) measures the signal quality. ◆ RSSI (Received Signal Strength Indication) measures the signal strength. <p>The bar indicates either RSSI or CINR values. The used method is pre-configured by your operator. If RSSI is used the bar is labeled Signal strength.</p>
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When your SE681 WiMAX or outdoor antenna is optimally aligned:

- ▶ Click **End** to close the Basic Setup Wizard and apply the settings you have made. Make sure that in future your SE681 WiMAX or outdoor antenna is always in the set position.

Advanced Settings

In the **Advanced Settings** menu, you can configure all the options for the SE681 WiMAX. If required, you can also change the settings you made using the Basic Setup Wizard. The following table contains the options available in this menu.

Menu	Description
Operating Mode	Here you can define whether your SE681 WiMAX will be used as a router or a bridge for the Internet access (page 32).
Internet	Here you can configure your Internet access. This menu covers all setting options for the Internet (page 32).
Local Network	Here you can configure your local network, e.g. change the private IP address of the SE681 WiMAX or make settings for the DHCP server (page 36).
Administration	Here you can do various administration tasks, e.g. assign a system password (page 39) or reset the configuration to the factory defaults (page 40). You can also load new firmware (page 41)
WiMAX configuration	Here you can change the access data for your WiMAX access (page 38).
Antenna selection	Here you can choose whether to use the internal antenna or an outdoor one for your WiMAX access (page 38).

All Advanced Settings pages contain **Ok** and **Cancel** buttons.

- ▶ Click **Ok** to confirm your entries.
- ▶ Click **Cancel** to close a page without applying the changes.

i	Depending on the pre-configuration of your device some of the menu entries and configuration possibilities might be missing in your device.
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Setting the operating mode

Via the operating mode, you define the role your SE681 WiMAX will play when establishing and administering Internet connections.

You can run your SE681 WiMAX in the following operating modes:

- Router** Your SE681 WiMAX serves as an Internet router for the network components connected to the LAN port, i.e. it establishes the connection to the Internet and ensures the transfer of the communication data to and from the Internet (default).
- Bridge** The network components initiate and control their Internet connection themselves. Your SE681 WiMAX only allows the communication data to and from the Internet to pass through.

- ▶ To change the operating mode, open the **Advanced Settings** tab and select **Operating Mode** from the menu.

When you change the operating mode, your device is restarted.

In **Bridge** mode, the following functions are no longer available:

- ◆ The DHCP server of the SE681 WiMAX is deactivated (→ page 36) because the network components receive IP addresses in the public network.
If you want to access the configuration program of the SE681 WiMAX via your PC, you must connect the PC directly to the LAN port. You must also temporarily assign it a static IP address in the address range of the SE681 WiMAX. If you want to use the Internet again after this, reset your PC to “automatic IP address”. For details see the document “Configuring the local area network” on the product CD.
- ◆ The firewall of your SE681 WiMAX is disabled and cannot be enabled (→ page 33).
- ◆ The NAT function of your SE681 WiMAX is disabled. This means that the functions Port Forwarding (→ page 34) and Exposed Host (→ page 35) are not available.

If necessary you may have to protect your network components against unwelcome access from the Internet by appropriate means (e.g. firewall software).

Configuring Internet access

If you have configured the SE681 WiMAX using the Basic Setup Wizard, you have also configured your Internet access. You can check or change these settings in the **Internet** menu.

This menu also offers you a wide range of possibilities for setting up security settings and limiting access to the Internet as well as for providing your own services on the Internet.

You can carry out the following via the **Internet** menu:

Internet Connection	Check and edit the Internet connection of the SE681 WiMAX (for further information see below),
DNS Servers	Make DNS server settings (→ page 33),
Firewall	Protect the network against hacker attacks (→ page 33),
Port Forwarding	Provide your own services on the Internet (→ page 34),
Exposed Host	Opening the firewall for a selected PC (→ page 35).

Setting up the Internet Connection

You can set up or change the configuration of your Internet connection in this screen. All the settings you make here must coincide with the features your Internet service provider makes available to you. Incorrect information can lead to problems with your Internet connection.



Depending on the pre-configuration of your device some of the following configuration possibilities might be missing in your device.

- ▶ Open the **Advanced Settings** tab and on the **Internet** menu select **Internet Connection**.
- ▶ Enter the data you have been given by your service provider.
- ▶ Select the **Protocol** used for Internet access.
 - **PPPoE**
 - **Static**
 - **Obtain automatically**
- ▶ Apply the default settings for the other parameters unless your service provider has given you other data.

Connection mode

For a PPPoE connection (Point-to-Point over Ethernet), specify the **Connection mode**:

Always on

This gives the users in your network a constantly active Internet connection. Only choose this setting if your Internet tariff is not time-dependent.

If necessary you can terminate the Internet connection manually (→ page 24).

Connect on demand

The Internet connection is only established if an application, e.g. an Internet browser or an e-mail program, requests it.

PPPoE pass-through

If you activate the **PPPoE pass-through** function, a PC in the network can connect to the Internet via its own connection ID. The router puts this connection through.

Setting up DNS servers

DNS (Domain Name System) is a decentralised database on the Internet which allocates clearly understandable Internet names (domains) to the actual addresses of PCs and services (e.g. IP addresses). The DNS servers required for access to this database are normally provided by your provider and do not have to be set up specially. But if necessary you can change them here.

- ▶ Open the **Advanced Settings** tab and on the **Internet** menu select **DNS Servers**.
- ▶ Activate the **Use custom DNS servers** function and enter the IP addresses for your **Preferred DNS server** and the **Alternate DNS server**.

Enabling or disabling the firewall

Your SE681 WiMAX comes with an integrated firewall, which protects your device and network against unauthorised access from the Internet. If the firewall is enabled, your device can identify certain events, e.g. suspicious incoming data packets from the Internet, as attacks and avert them (hacker defence). Your device's firewall is enabled by default.



We urgently recommend that you leave the firewall of your SE681 WiMAX enabled, otherwise your network will no longer be protected against hacker attacks from the Internet.

If you still want to disable the firewall:

- ▶ Open the **Advanced Settings** tab and on the **Internet** menu select **Firewall**.
- ▶ Disable the firewall.



This function is not available in **Bridge** operating mode, see "Configuring Internet access" on page 32.

PCs in your network should be protected by a separate firewall. You can set up protection against DoS (Denial of Service) attacks in Bridge mode via the local network configuration, see "LAN configuration" on page 36.

Port Forwarding

The SE681 WiMAX comes with the NAT (Network Address Translation) function, which is always activated in Router operating mode. With address mapping, multiple users in the local network can access the Internet via the public IP address. All the local IP addresses are assigned to the router's public IP address by default. All IP addresses of PCs in the local network are converted to the router's public IP address when accessing the Internet.

Most Internet applications can be executed behind the NAT firewall without any problems. However, some applications - such as Internet games - require users in the Internet to send requests to users in the local network so that the players can communicate with each other. Sometimes these applications also require several ports to communicate through. Such applications do not work if NAT is active.

Using port forwarding (the forwarding of requests to particular ports) the router is forced to send requests from the Internet for a certain service, for example a game, to the appropriate port(s) on the PC on which the game is running. If you configure Port Forwarding, the SE681 WiMAX outwardly assumes the role of the server. It receives requests from remote users under its public IP address and automatically redirects them to local PCs. The private IP addresses of the servers on the local network remain protected.

Internet services are addressed via defined port numbers. The SE681 WiMAX needs a mapping table of the port numbers to redirect the service requests to the servers that actually provide the service. Port Forwarding has to be configured for this purpose.

- ▶ Open the **Advanced Settings** tab and on the **Internet** menu select **Port Forwarding**.
- ▶ Define the list of services for which you want requests from the Internet to be forwarded.

Important services are already included in the **Predefined applications** selection field. The list can hold up to 16 entries.



The IP addresses of the PCs for which you set up port forwarding must remain unchanged. If the IP addresses of the PCs are assigned via the DHCP server of the SE681 WiMAX, you must select the option **Never expires** as the **Lease time** when configuring the DHCP server or assign static IP addresses to the PCs, see "Configuring the DHCP server" on page 36.



This function is not available in **Bridge** operating mode, see "Configuring Internet access" on page 32.

Opening the firewall for a selected PC (Exposed Host)

You can set up a client in your local network to be a so-called "exposed host". Your device will then forward all incoming requests from the Internet to this client, with the exception of requests to the port numbers already defined via port forwarding. You can then, for example, operate your own Web server on one of the clients in your local network and make it accessible to Internet users.

As the exposed host, the local client is directly visible to the Internet and therefore particularly vulnerable to attacks (e.g. hacker attacks). Only activate this function if it is absolutely necessary (e.g. to operate a Web server) and other functions (e.g. port forwarding) are not adequate. In this case you should take appropriate measures for the clients concerned.

- ▶ Open the **Advanced Settings** tab and on the **Internet** menu select **Exposed Host**.
- ▶ Define the list of PCs you want to set up as exposed hosts.
- ▶ Activate a PC which you want to function as the current exposed host. Only one PC at a time can be selected.



The IP addresses of the PCs you want to set up as exposed hosts must remain unchanged. If the IP addresses of the PCs are assigned via the DHCP server of the SE681 WiMAX, you must select the option **Never expires** as the **Lease time** when configuring the DHCP server or assign static IP addresses to the PCs, see "Configuring the DHCP server" on page 36.



This function is not available in **Bridge** operating mode, see "Configuring Internet access" on page 32.

LAN configuration

With the help of the LAN configuration you can change the preset values for the computer name and the private IP address for your SE681 WiMAX and configure the integrated DHCP server.

- ▶ Open the **Advanced Settings** tab and select **Local Network**.

The preset IP address is 192.168.2.1. This is the private IP address of the SE681 WiMAX. This is the address under which the device can be reached in the local network. It can be freely assigned from the block of available addresses. The IP address under which the SE681 WiMAX can be reached from outside is assigned by the Internet service provider. The default Subnet mask for the local network administered by the SE681 WiMAX is 255.255.255.0.

Please note which subnet mask is set when assigning the IP address. The preset subnet mask defines the first three parts of the IP address which must be identical for all network components (including routers).

We recommend that you use an address from a block that is reserved for private use. This address block is 192.168.1.1 to 192.168.255.254.

Configuring the DHCP server

The SE681 WiMAX has a DHCP server for which the factory setting is active. Consequently, the IP addresses of the PCs are automatically assigned by the SE681 WiMAX.

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- ◆ If the DHCP server for the SE681 WiMAX is activated, you can configure the network setting on the PC so that the option **Obtain an IP address automatically** is set up.

- ◆ If you deactivate the DHCP server, you will have to assign a static IP address for the PCs that use the network settings.

For more information see the document “Configuring the local area network” on the CD.

- ▶ If the DHCP server is active, you can define a **Lease time**. The lease time indicates how long the client may use the allocated IP configuration.

Note:

If you select **Never expires**, the IP addresses are never changed. Activate this option if you want to make NAT or firewall settings using the IP addresses of the PCs; otherwise you have to assign static IP addresses to these PCs.

- ▶ Define the range of IP addresses the SE681 WiMAX should use to automatically assign IP addresses to the PCs. Define the **Start IP** and the **End IP**.

Assigning static IP addresses to individual PCs

Even if you have activated the DHCP server, you can still assign a static IP address to individual PCs (e.g. when setting up these PCs for NAT functions).

- ▶ Enter the **MAC address** of the PC to which you want to assign a static IP address and the **IP address** you wish to assign to the PC.

Configuring the local network in Bridge operating mode

In **Bridge** operating mode (→ page 32) the SE681 WiMAX DHCP server is deactivated. The network components get their IP addresses from a DHCP server in the public network.

Ageing time for MAC table When a PC in the network is accessed, your SE681 WiMAX writes the MAC address and port number in a MAC table to speed up further accesses. The entry in the MAC table is deleted after a fixed time. If necessary you can change this value via the **MAC table ageing time** parameter.

Protection against DoS attacks DoS (Denial of Service) attacks are attacks on a system in the network to make its services unusable. This is basically done by overloading the system by constantly sending requests. In Bridge mode, the SE681 WiMAX provides protection against DoS attacks, which you can enable or disable via the **activate DOS protection** parameter.



Forwarding on busy cannot both be activated in parallel.

WiMAX configuration

On this page you enter the data for authentication of your device on the WiMAX base station. You will need the access data supplied by your WiMAX operator for this.

If you have executed the Basic Setup Wizard, you will already have entered these details there. If necessary you can change them here.

- ▶ Open the **Advanced Settings** tab and select **WiMAX configuration** from the menu.
- ▶ Select **Authentication**, if authentication is required by your WiMAX operator and enter or change the required access data.

Antenna selection

On this page you select the antenna to be used for your connection.

If you have executed the Basic Setup Wizard, you will already have entered these details there. If necessary you can change the setting here.

- ▶ Open the **Advanced Settings** tab and select **Antenna selection** from the menu.



To establish an optimum connection to the WiMAX base station, you may have to adjust the antenna. Go through the Basic Setup Wizard - it will help you with the exact adjustment of your antenna for optimum reception, see "Establishing a radio connection to a WiMAX network" on page 26.

Administration

The user interface **Administration** menu includes several helpful functions for administering your SE681 WiMAX.

System Password	Changes the system password (page 39)
Factory Reset	Reset the SE681 WiMAX to the factory settings (page 40)
Restart	Reboots the device (page 41)
Firmware Update	Updates firmware (page 41)



Depending on the pre-configuration of your device some of the menu entries and configuration possibilities might be missing in your device.

System password

The system password is the password for configuring your SE681 WiMAX and is requested when you open the configuration pages, see "Launching the user interface" on page 19.

If the device came from your provider with a preset system password, you can change this password here.



The system password protects your SE681 WiMAX and your local network from unauthorised access. For this reason, it is important to set up a password and change the default password.

- ▶ Open the **Advanced Settings** tab and on the **Administration** menu select **System Password**.

Features of a secure password

A password should be difficult for unauthorised users to work out. Note the following points when choosing a password:

- ◆ The more characters a password has, the more secure it is.
- ◆ Choose a series of characters that is as varied as possible (not AAAA, 0000) and alternate between letters and numbers.
- ◆ Do not use any term that could be found in a dictionary.
- ◆ Do not use sequential characters (not 123456, abcd) and no recognisable system (not 1a2b3c).
- ◆ Never use a password several times for different applications.
- ◆ Never save a password on the PC. Instead, make a note of it and store it in a secure place.
- ◆ Change your passwords regularly.

Restoring factory settings

Changing the password

- ▶ Enter the current password in the **Current password** field. If no default system password has been set, leave this field empty.
- ▶ Enter a new password in the **New password** field.
 - Select any series of characters with a minimum length of 4 and a maximum length of 20 characters. You can use the following characters: A–Z, a–z, 0–9 as well as the following special characters: \ ! " \$ % & ' / () = ? | + # * ~ , . - ; : _ ^ < > @ [] { }.
 - Note down your new password on a sheet of paper and store it in secure place.
- ▶ Enter your new password in the **Confirm new password** field again. This entry is case-sensitive.

The new password can only be activated if both entries match. This detects typing errors when the password is entered.
- ▶ Finally, click **Ok** to accept your change and to activate the new password.

The new password is valid immediately for each instance the configuration is called up.



The configuration of the SE681 WiMAX cannot be accessed if you do not enter a valid password. In this case, you must restore all the factory settings of the SE681 WiMAX. To find out how to do this, see chapter "Returning the SE681 WiMAX to factory settings" on page 18.

Restoring factory settings

You can reset the SE681 WiMAX to the factory settings. You should do this before making the device available to others or exchanging it through the dealer. Otherwise unauthorised users may use the Internet access data at your expense.

- ▶ Open the **Advanced Settings** tab and on the **Administration** menu select **Factory reset**.
- ▶ Click **Ok**.

A window will appear prompting you to confirm the procedure.



- ◆ Please remember that when the device is fully reset, **all** the configuration settings are returned to the factory settings. This means that you will have to completely reconfigure the SE681 WiMAX.
- ◆ You can also reset the SE681 WiMAX via the Reset button on the device itself (→ page 18).

Restart

If the SE681 WiMAX is not operating properly, you can reboot it. It should then be ready for use again.

- ▶ Open the **Advanced Settings** tab and on the **Administration** menu select **Restart**.
- ▶ Click **Ok** to reboot the device.

A window will appear prompting you to confirm the procedure.

Updating the firmware

If your WiMAX provider provides a new downloadable firmware version for your SE681 WiMAX with new functions or to fix errors, you can update your device quickly and easily.

- ▶ First download the relevant firmware file from the Internet and save it on your PC. Read the information provided carefully.



Only update the firmware if there is a new version of the firmware that is currently installed on your device on the Internet. The firmware version currently installed is shown under **Active image version**.

- ▶ Open the **Advanced Settings** tab and on the **Administration** menu select **Firmware Update**.
- ▶ Enter the path and file name of the firmware file to be installed or click **Browse** to select a file on your PC.
- ▶ Click **Ok** to start the firmware update.



Do not disconnect your SE681 WiMAX from the PC or the power supply during the firmware update, as this could damage the device. It may take up to five minutes before the device is ready for use again.

Status

You can check the status of your SE681 WiMAX with the pages in the **Status** menu. The menu is divided into several individual pages opened by clicking the entries in the menu area. To help with orientation, in the following sections the path is placed first so that you can quickly find the status messages described.

For example, with the following address you can open the settings of your LAN:

Status > Local Network.

i	<p>If you have problems, before contacting your provider or customer service, check the status of your SE681 WiMAX.</p> <p>When looking for the fault, your provider or customer service will need some details that you will find on the status pages.</p>
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You will find the most important status information summarised on the homepage. For detailed information, click an entry in the submenu.

Information on the Status homepage

- Connection status** The status of the radio connection with the WiMAX network is displayed as follows:
- ◆ **connected** = The SE681 WiMAX has established a radio connection with a WiMAX network. You will see the connection duration in brackets and in the format ddd:hh:mm:ss (d=days, h=hours, m=minutes, s=seconds).
 - ◆ **disconnected** = The SE681 WiMAX is trying to establish a connection with a WiMAX network.
- IP address** For an existing Internet connection only:
Displays the IP address used by the SE681 WiMAX on the Internet.
- IP address** IP address used by the SE681 WiMAX in your local network.
- DHCP server** Displays whether the DHCP server of your SE681 WiMAX is activated. As DHCP server, your SE681 WiMAX assigns an IP address to all the PCs in the network. DHCP must be activated on a PC for the PC to receive an IP address from the DHCP server. For more information see the document "Configuring the local area network" on the product CD.
- System time** Displays the current date and time. The date and time are transmitted to your SE681 WiMAX from the WiMAX network.
- Operating mode** Role played by your SE681 WiMAX during connection setup to the Internet (**Router** or **Bridge**).
- Firmware version** Version number of the currently installed device software. You will also need to give your provider this number.
- If necessary, click the **Refresh** button to refresh the data in the status display.

Internet

Status > Internet

The connection settings for your SE681 WiMAX are displayed in the **Internet** sub-menu.

Connection status	<p>The status of the radio connection with the WiMAX network is displayed as follows:</p> <ul style="list-style-type: none"> ◆ connected = The SE681 WiMAX has established a radio connection with a WiMAX network. You will see the connection duration in brackets and in the format ddd:hh:mm:ss (d=days, h=hours, m=minutes, s=seconds). ◆ disconnected = The SE681 WiMAX is trying to establish a connection with a WiMAX network.
IP address Subnet mask	<p>For an existing Internet connection only: Displays the public IP address and subnet mask via which your SE681 WiMAX establishes the connection with the Internet.</p>
MAC address	<p>The MAC address uniquely identifies a network component within a network, in this case the public MAC address of your SE681 WiMAX within the WiMAX network you use.</p>
Default gateway	<p>For an existing Internet connection only: Displays the gateway the SE681 WiMAX uses for connecting to the Internet.</p>
DHCP server	<p>IP address of the DHCP server with which the SE681 WiMAX is connected. While the SE681 WiMAX has not been assigned an IP address by the WiMAX network, the field stays empty.</p>
Preferred DNS server Alternate DNS server	<p>For an existing Internet connection only: Displays the domain name server the SE681 WiMAX uses to convert names to IP addresses.</p>
Address Translation (NAT)	<p>Displays whether NAT mode is activated on your SE681 WiMAX. NAT converts the internal IP addresses of the PCs in your network to public IP addresses. This maintains the confidentiality of your internal IP addresses.</p>

► If necessary, click the **Refresh** button to refresh the data in the status display.

Local network LAN

Status > Local Network

The configuration of the local network is displayed in the **Local Network** submenu.

IP address	IP address used by the SE681 WiMAX in your local network. Default: 192.168.2.1
Subnet mask	Subnet mask of your local network. Default: 255.255.255.0
MAC address	The MAC address uniquely identifies a network component within a network, in this case the local MAC address of your SE681 WiMAX within your local network.
DHCP server	Displays whether the DHCP server of your SE681 WiMAX is activated. As DHCP server, your SE681 WiMAX assigns an IP address to all the PCs in the network. If the DHCP server is activated, you will see the network subscribers that have received your IP address from the DHCP server in the DHCP clients field. DHCP must be activated on a PC for the PC to receive an IP address from the DHCP server. For more information see the document "Configuring the local area network" on the product CD.

► If necessary, click the **Refresh** button to refresh the data in the status display.

Device status

Status > Device Status

The device status of your SE681 WiMAX is displayed in the **Device Status** submenu.

System uptime	Operating time of your SE681 WiMAX since it was last restarted. The operating time is given in the format ddd:hh:mm:ss (d=days, h=hours, m=minutes, s=seconds).
System time	Displays the current date and time. This information is transmitted to your SE681 WiMAX by the WiMAX network.
Operating Mode	Role played by your SE681 WiMAX during connection setup to the Internet (Router or Bridge).
Device temperature	Current device temperature inside your SE681 WiMAX. In the event of overheating, the SE681 WiMAX switches off.
System Log	Error protocol in which you will find information about problems.

► If necessary, click the **Refresh** button to refresh the data in the status display.

Radio status

Status > Radio Status

Information about the radio connection to the WiMAX network is displayed in the **Radio Status** submenu.

Connected to a base station

Indicates whether or not your SE681 WiMAX is connected to a base station.

Base station ID

ID number of the base station to which the device is connected.

MAC state

Status of the connection setup to the base station. The information shown here is only intended for technically experienced users. Under **Connected to a base station** is shown whether a connection to a base station exists.

Authentication

Indicates whether an authentication method is used for the WiMAX connection.

Protocol

Protocol used for authentication.

Received power level

Receive level from the WiMAX base station. Values in the range -70 dBm to -10 dBm are considered optimum. You can ensure this by optimising the antenna direction.

Transmitted power level

Current transmission power.

Carrier to interference and noise ratio

Measurement of the reception quality of the base station. The higher the value, the better the quality of the data transfer to the base station.

Centre frequency of current uplink channel

Currently used uplink frequency. The reading changes frequently during the measurement.

Centre frequency of current downlink channel

Currently used downlink frequency.

Current channel bandwidth

Currently used bandwidth.

Radio port uplink current average throughput

Average approximate uplink throughput in one second, moving average (5 samples).

Radio port downlink current average throughput

Average approximate downlink throughput in one second, moving average (5 samples).

Radio status

Current uplink modulation scheme

Currently used uplink modulation type.

Current downlink modulation scheme

Currently used downlink modulation type.

- ▶ If necessary, click the ***Refresh*** button to refresh the data in the status display.

Using the SE681 WiMAX

When you have finished configuring your SE681 WiMAX, use it to surf the Internet, send e-mails etc.

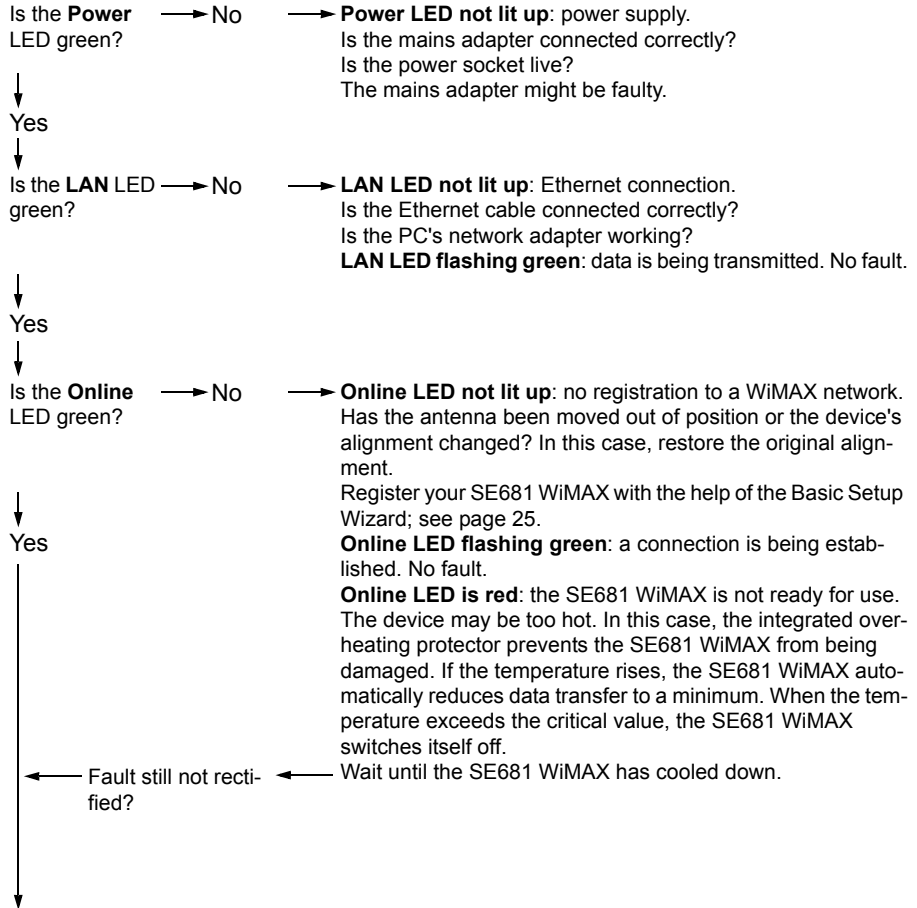
As soon as you attempt to access the Internet with a PC connected to the SE681 WiMAX (for example, by opening the Web browser and calling up an Internet site, or by starting your e-mail program and retrieving e-mails), your SE681 WiMAX automatically establishes a connection to the Internet or uses the permanent Internet connection. Whether the connection needs to be established or is permanently available depends on your provider's default settings.

Appendix

Troubleshooting

Fault tracing

When troubleshooting, start by checking the LEDs on your SE681 WiMAX. Please answer the questions on the left-hand side and follow the arrows to the answers and solutions:



Can the configuration program be accessed? → Yes → Look for a suitable place to set up your SE681 WiMAX; see page 12.
Register your SE681 WiMAX with the help of the Basic Setup Wizard; see page 25.

↓
No

↓
Check the connection to your SE681 WiMAX; see page 51.

↓

Is there a connection? → Yes → The Web browser (Internet Explorer, Mozilla Firefox) is incorrectly configured; see page 52.

↓
No

↓
The TCP/IP network is incorrectly configured on the PC; see document "Configuring the local area network" on product CD.

Other faults and problems

You are using a firewall on the PC that prevents access to the SE681 WiMAX

Test this, if necessary, by briefly switching off the firewall. If access is possible, configure the firewall. For details, refer to the user guide for your firewall.

You have forgotten the system password

If you have assigned your own system password or changed and forgotten it, you need to return your SE681 WiMAX to the factory settings; see Chapter "Returning the SE681 WiMAX to factory settings" on page 18.

The Online LED is lit up permanently in red and the possibility of the device overheating can be excluded

The SE681 WiMAX may be faulty. Restart the SE681 WiMAX; see "Rebooting the SE681 WiMAX" on page 18. If the **Online** LED remains red after the device has been restarted and does not go off, please contact your provider/service technician.

Troubleshooting

Only a few LEDs have lit up to display the signal strength (RSSI) and the Online LED is green

If you are using the antenna integrated in the SE681 WiMAX, turn the SE681 WiMAX until more LEDs light up. Try to place the SE681 WiMAX even closer to the window and check the signal strength bar in the Basic Setup Wizard of the configuration program.

Power failure

No data will be lost.

Before contacting customer service or your provider

- ▶ First exclude all the faults listed in this section.
- ▶ Have the documentation supplied by your provider ready.
- ▶ If you can open the configuration program in the Web browser, click the **Status** tab.
- ▶ Note the number in the **Firmware version** field. This is the number of the currently installed device software.
- ▶ Open the **Local Network** submenu and note the entry consisting of numbers and letters in the **MAC address** field. The MAC address is used for the globally unique identification of your device.
- ▶ Leave the PC switched on and the configuration program open when you phone customer service or your provider. They might need still more information, which you will find on the status pages.

Checking the connection to the SE681 WiMAX

You can check whether the PC is correctly connected to the SE681 WiMAX. This can be done as follows:

- ▶ Open the command prompt on the PC:
 - Click **Start > Run**.
 - Enter `cmd` in the input field and click **OK**.
The **Command prompt** window opens.
- ▶ Check whether the SE681 WiMAX responds with the ping command. Enter `ping 192.168.2.1` and press Enter.

```
C:\>ping 192.168.2.1
```

The PC now sends some test packets via this connection and checks whether the connection partner responds. The connection partner may respond in the following ways:

- ◆ **Reply from the IP address of your SE681 WiMAX;** statistics about the connection are presented. If you receive these statistics, the connection to the device is OK.
- ◆ **The request exceeds the time limit;** it was not possible either to send or receive any packets. There is no physical connection between the PC and your SE681 WiMAX. Check the following points:
 - Is the Ethernet cable between the SE681 WiMAX and the PC properly connected?
The **LAN** LED on the SE681 WiMAX must light up.
 - Has TCP/IP been properly configured on your PC?

If the SE681 WiMAX has the IP address 192.168.2.1, your PC's IP address must be between 192.168.2.2 and 192.168.2.254. The subnet mask must be 255.255.255.0.

To find out the IP address of your PC, enter `ipconfig` in the command prompt.

```
C:\>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix . . . : 
    IP Address . . . . . : 192.168.2.5
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.2.1

C:\>_
```

If the SE681 WiMAX has not responded successfully to the `ping` command, you need to adjust the network settings on the PC. To find out how to do this, please read the document "Configuring the local area network" on the product CD.

If the SE681 WiMAX has responded successfully to the `ping` command, the network is configured correctly. If it is not possible to access the configuration program of your SE681 WiMAX, check and change the settings in your Web browser. To find out how to do this, please read the next chapter.

Configuring the Web browser

If you are using a current Web browser but cannot open the configuration program in it, check the Web browser settings.



We recommend Microsoft Internet Explorer Version 7.0 or Mozilla Firefox 3.0 as the Web browser.

- ◆ Do not use an HTTP proxy for accessing your SE681 WiMAX.
- ◆ Popup windows must be enabled for your SE681 WiMAX.

The following descriptions relate to Internet Explorer Version 7.0 and Mozilla Firefox Version 3.0.

Setting up an HTTP proxy

An HTTP proxy is a buffer for Internet pages that have been called up. For example, once called up, a page can continue to be shown even if you are currently offline. However, this buffer would prevent the configuration pages being read again when you call up the configuration for your SE681 WiMAX; for this reason, your SE681 WiMAX can only be configured if the HTTP proxy is not being used for local pages.

Check the HTTP proxy in the Web browser you wish to use for the configuration.

Internet Explorer 7.0:

- ▶ Open Internet Explorer.
- ▶ Click **Tools** and then **Internet Options**.
- ▶ Open the **Connections** tab.
- ▶ Click **LAN settings**.
- ▶ If the option **Use proxy server for LAN** is activated in the **Proxy server** area, activate the selection field **Circumvent proxy server for local addresses**. If the option **Use proxy server for LAN** is not activated, you do not need to make any settings.
- ▶ Click **OK** and then **OK** again to close the **Internet Options** window.

Firefox 3.0:

- ▶ Open Firefox.
- ▶ Click **Tools** and then **Settings**.
- ▶ Click **Advanced**.
- ▶ Open the **Network** tab and click **Settings** in the **Connection** area.
- ▶ Select either **No Proxy** or **Manual proxy configuration**. If you have chosen **Manual proxy configuration**, in the **No proxy for:** field, enter the IP block in which the IP address of your SE681 WiMAX is found:
192.168.2.0/24
- ▶ Click **OK** and then **OK** again to close the **Settings** window.

Allowing pop-up windows

Pop-up windows are small windows that are opened either as the result of an action or automatically. The device software for your SE681 WiMAX uses pop-up windows to display the online Help, for example.

Many Internet sites, however, call up distracting pop-up windows for effective advertisement placement, for example, without detracting from the layout of the site itself. To prevent these pop-up windows from opening, current Web browsers offer pop-up blockers.

If necessary, you can configure the pop-up blocker to display desirable pop-up windows and to block undesirable windows.



If you are using a different pop-up blocker, configure it to allow pop-up windows for the IP address 192.168.2.1.

Internet Explorer 7.0:

- ▶ Open Internet Explorer.
- ▶ Click **Tools** and then **Pop-up Blocker** and choose **Pop-up Blocker Settings**.
- ▶ Enter the IP address of your SE681 WiMAX as the Website address:
192.168.2.1
- ▶ Click the **Add** button.
- ▶ Click **Close** to apply the settings.

Firefox 3.0:

- ▶ Open Firefox.
- ▶ Click **Tools** and then **Settings**.
- ▶ Click **Content**.
- ▶ If the **Block pop-up windows** check box is activated, click **Exceptions** to its right.
- ▶ Enter the IP address of your SE681 WiMAX as the Website address:
192.168.2.1
- ▶ Click the **Allow** button.
- ▶ Click **Close** and **OK** to apply the settings.

Specifications

Specifications

Model	SE681 WiMAX
Dimensions	Approx. 230 x 160 x 52 mm
Operating temperature	+5°C to +40°C
Network interface	1 Ethernet 10/100BaseT (RJ45) LAN connection (10BaseT Half Duplex, 10BaseT Full Duplex, 100BaseT Half Duplex or 100BaseT Full Duplex)
Frequency	2.3–2.4 / 2.5–2.7 / 3.4–3.6 GHz
Output power	Max. 26 dBm
Power consumption	3–6 W, depending on operating state
Bandwidth	Optional 3.5 / 5.0 / 7.0 / 8.75 or 10.0 MHz
Type of transmission	TDD
Modulation technique	SOFDMA 512/1024
Subcarrier modulation	QPSK, 16/64 QAM
Encoding rate	1/2, 2/3, 3/4, 5/6
Antenna socket	50 Ohm reverse SMA
Antenna type	2 internal antennas (2xRX, 1xTX) for MIMO Matrix A & B; Type DN1 (EN 302 326-3 V1.2.2) Optional: outdoor antenna
Antenna gain	2.5 GHz: max. 7dBi, 3.5 GHz: max. 10 dBi (integrated antennas)
Antenna polarisation	Send direction vertical, Receive direction vertical and horizontal / vertical and vertical
Mains adapter	Input: 100–240 V AC Output: 7 V; 1.8 A DC

Outdoor antenna specifications (optional)

Model	Outdoor antenna
Operating temperature	–40 °C to +70 °C
Frequency	2.5–2.7 GHz or 3.4–3.6 GHz
Antenna socket	50 Ohm
Antenna gain	3.5 GHz: 18 dBi 2.6 GHz: 15 dBi
Antenna polarisation	Vertical or horizontal

Putting into service

This device is intended for use in the country indicated on the device's label.

The device is operated under a single licence, which is held by your service provider.

Contact your service provider regarding licensing before you put the device into service.

Please observe the legal provisions and local restrictions when putting the device into service. Please ask your service provider for further information.

CE declaration

This device is intended for use with WiMAX base stations.

We, Sagemcom Broadband SAS, declare that this device meets the essential requirements and other relevant regulations laid down in Directive 1999/5/EC.

National laws and regulations must be considered before putting the device into service.

A copy of the 1999/5/EC declaration of conformity is available at this Internet address: <http://support.sagemcom.com/>



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Zlib:

'zlib' general purpose compression library version 1.1.4, March 11th, 2002

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The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files <ftp://ds.internic.net/rfc/rfc1950.txt> (zlib format), [rfc1951.txt](ftp://ds.internic.net/rfc/rfc1951.txt) (deflate format) and [rfc1952.txt](ftp://ds.internic.net/rfc/rfc1952.txt) (gzip format).

This manual is converted from `zlib.h` by piaip

Visit <http://ftp.cdrom.com/pub/infozip/zlib/> for the official zlib web page.

Boost lib

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=====

Created by: Dima Skvortsov

Modified by: Chris Hubbard

AES and Combined Encryption/Authentication Modes

(<http://gladman.plushost.co.uk/oldsite/AES/index.php>)

<http://gladman.plushost.co.uk/oldsite/AES/aes-src-29-04-09.zip>

<http://gladman.plushost.co.uk/oldsite/AES/aes-modes-src-23-07-09.zip>

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Issue Date: 21/07/2009

Glossary

Address Translation (NAT)

Network Address Translation. NAT is a method for converting IP addresses (mainly private IP addresses) in a network to one or more public IP addresses on the Internet. With NAT, several network components in a LAN can share a public IP address to connect to the Internet. The network components of the local network are hidden behind the IP address registered on the Internet. NAT is often used as part of the firewall in a network because of this security function.

Bridge

A bridge connects several network segments to form a joint network, e.g. to make a [TCP/IP](#) network. The segments can have different physical characteristics, e.g. different linking such as Ethernet and wireless LANs. Local networks can be expanded by linking individual segments via bridges.

dB

Decibel (a tenth of a Bel). Logarithmic unit of measurement for ratios between two currents, voltages, sound levels or powers. In order to depict large value differences clearly and graphically, these are given in dB; e.g. 60 dB corresponds to the factor 1000 relative to the voltage drops.

dBm

Decibel milliwatt. Power level in decibels relative to 1 milliwatt.

DHCP

Dynamic Host Configuration Protocol. DHCP handles the automatic assignment of IP addresses to network components.

DHCP was developed because in large networks – especially the Internet – the defining of IP addresses is very complex as subscribers frequently move, drop out or new ones join. A [DHCP server](#) automatically assigns the connected network components (DHCP clients) dynamic IP addresses from a defined IP pool range, thus saving a great deal of configuration work. In addition, the address blocks can be used more effectively: since not all subscribers are on the network at the same time, the same [IP address](#) can be assigned to different network components in succession as and when required.

DHCP server

There is a DHCP integrated into the SE681 WiMAX that automatically assigns IP addresses to PCs in the local network.

DNS

Domain Name System. DNS permits the assignment of IP addresses to PC or domain names that are easier to remember. A DNS server must administer this information for each local network with an Internet connection. As soon as a page on the Internet is called up, the Web browser obtains the corresponding IP address from the DNS server so that it can establish the connection.

On the Internet, the assignment of domain names to IP addresses follows a hierarchical system. A local PC only knows the address of the local name server. This in turn knows all the addresses of the PCs in the local network and the superordinated name servers, which again know addresses and the next superordinated name servers.

Domain name

The domain name is the reference to one or more web servers on the Internet. The domain name is mapped via the [DNS](#) service to the corresponding IP address.

Downlink

Files that your SE681 WiMAX receives and forwards to your local network.

DSL

Digital Subscriber Line. DSL is a technique whereby data is transmitted via the conventional phone line. To do this, you require suitable phone lines and special technology to be set up by a [Provider](#). As these preconditions are not satisfied in all areas, it is not possible to use DSL in all locations. In order to make use of high-performance Internet access in these areas as well, technologies such as WiMAX, Wi-Fi or satellite connections are implemented.

Ethernet

Ethernet is a network technology for local networks (LANs) defined by the [IEEE](#) as standard IEEE 802.3. Depending on the network adapter used, the transmission speed on the Ethernet varies between 10 [Mbps](#) and 1 Gbps.

Firewall

Firewalls are used by network operators as protection against unauthorised external access. This involves a whole bundle of hardware and software actions and technologies that monitor and control the data flow between the private network to be protected and an unprotected network such as the Internet.

Firmware

Device software. To correct errors or update the device, a new firmware version can be loaded onto the device's memory (firmware update).

Flat rate

Flat rate is a particular billing system for Internet connections. The [Provider](#) charges a set monthly fee for a certain service package.

Glossary

FTP

File Transfer Protocol. Protocol for exchanging files via the Internet. FTP is used, for example, to make files available for download or to receive files from other users.

Full duplex

Data transmission operating mode in which data can be sent and received at the same time.

FXS

Foreign Exchange Station. Phone port to which an analogue terminal (phone, fax or answer machine) can be connected.

Gateway

A gateway connects networks with one another. In contrast to a [Router](#), a gateway is not dependent on protocol, i.e. it is also able to establish connections between networks with a different architecture (protocols, application interfaces etc.).

Half duplex

Operating mode for data transfer. Only one party can receive or send data at a time.

HTTP

Hypertext Transfer Protocol. Network protocol for the transmission of data, which is mainly used for transmitting and displaying Internet content.

HTTP proxy

An [HTTP](#) proxy is a server that network components use for their Internet traffic. All requests are sent via the proxy.

Hub

A hub is a central distribution point in a network, to which PCs and other network devices are connected. The hub forwards received data to all connected PCs. For this reason, in large networks, a [Switch](#) is recommended to ensure that data is only sent to the PC requesting it.

IEEE

Institute of Electrical and Electronics Engineers. The IEEE is an international body for defining network standards, especially for standardising [LAN](#) technologies, transmission protocols and speeds, and wiring.

IEEE 802.16

Standard defined by the [IEEE](#) for WiMAX. Similarly to other standards in the 802 series (e.g. 802.3 [Ethernet](#), 802.11 WLAN), the WiMAX standard is one of the standards for networks. The standard has progressed in accordance with new developments; there are currently two main versions:

- ◆ IEEE 802.16-2004: WiMAX, which specifies the secure location for connection partners.
- ◆ IEEE 802.16e-2005: Mobile WiMAX, which enables wireless cells to be exchanged during data transmission.

IP

Internet **P**rotocol. The protocol is responsible for addressing of subscribers in a network using IP addresses, and routes data from the sender to the recipient. In doing so, it decides on the way in which data packets will be forwarded between sender and recipient.

IP address

An IP address is the unique network-wide address of a network component in a network based on the [TCP/IP](#) protocol (e.g. in a local network or on the Internet). The IP address consists of four parts (each of up to three-figure strings of digits from 0–255) that are separated from one another by full stops (e.g. 192.168.2.1). The IP address is made up of the network number and the number of the network component. Depending on the [Subnet mask](#), one, two or three parts form the network number, the remainder form the network component number. You can find out the IP address of your PC using the `ipconfig` command.

There are two different types of IP address:

- ◆ **Private IP address:**
IP address of a network component within a local network.
- ◆ **Public IP address:**
IP address that uses a network component for accessing the Internet.

IP addresses can be assigned manually or automatically:

- ◆ **Static IP address:**
The IP address is manually assigned to a network component and never changes.
- ◆ **Dynamic IP address:**
The IP address is assigned to the network component by a DHCP server. The IP address of this network component can change each time it registers with a network or at specific time intervals.

On the Internet, domain names are normally used instead of the IP addresses. DNS is used to assign domain names to IP addresses.

IPTV

Internet **P**rotocol **T**elevisi**O**n. You receive your provider's television service via the DSL connection. To do this, you require an IPTV-capable set-top box and the configuration data of your IPTV provider.

Glossary

ISP

Internet **S**ervice **P**rovider. See [Provider](#).

LAN

Local **A**rea **N**etwork, local network. A local network links network components so that they can exchange data and share resources. The physical range is restricted to a particular area (a site). A local network can be connected to other local networks or a wide-area network (WAN) such as the Internet.

LED

Light **E**mitting **D**iode. An LED is an electronic component (semi-conductor) that generates light at low power consumption. LEDs are often used as signal lights for display and UI elements.

Login

Access to a PC or a service, password e.g. for access to the Internet.

MAC address

Media **A**ccess **C**ontrol. The MAC address is used for the globally unique identification of a network adapter. It comprises six parts (hexadecimal numbers), e.g. 00-90-96-34-00-1A. The MAC address is assigned by the network adapter manufacturer and cannot be changed.

Mbps

Million **b**its **p**er **s**econd. Specification of the transmission speed in a network.

Network

A network is a group of devices connected in wired or wireless mode so that they can share resources such as data and peripherals. A general distinction is made between local networks (LANs) and wide-area networks (WANs).

Network adapter

The network adapter is the hardware device that creates the connection between a network component and a local network. The connection can be wired or wireless. An Ethernet network card is an example of a wired network adapter. A network adapter has a unique address, the [MAC address](#).

Network protocol

The network protocol is the standard via which different PCs exchange data in a network. A connection can only be established between PCs in a network if they all use the same protocol. The [TCP/IP](#) network protocol is the most extensive network protocol, which is also used for connections to the Internet. This must be set up on each PC from which a network connection is to be established.

Port

Data is exchanged between two applications in a network across a port. The port number addresses an application within a network component. The combination of [IP address](#)/port number uniquely identifies the recipient or sender of a data packet within a network. Some applications (e.g. Internet services such as HTTP or FTP) work with fixed port numbers; others are allocated a free port number whenever they need one.

Port forwarding

In port forwarding, the SE681 WiMAX directs data packets from the Internet that are addressed to a particular [Port](#) to the corresponding port of the appropriate network component. This enables servers within the local network to offer services on the Internet without them needing a public IP address. See also: [Virtual server](#)

Protocol

A protocol describes the agreements for communicating on a network. It contains rules for opening, administering and closing a connection, as well as about data formats, time frames and handling possible errors. Communications between two applications require different protocols at various levels, e.g. the [TCP/IP](#) protocols for the Internet.

Provider

A provider (Internet Service Provider) offers access to the Internet for a fee.

RJ

Registered **Jack**. Standardised connection, also known as a modular jack.

Router

A router directs data packets from one local area network ([LAN](#)) to another via the fastest route. A router enables the connection between networks of different network technologies and this is performed on the basis of a common protocol. For example, it can link a local network with WiMAX technology to the Internet.

RSSI

Received Signal Strength Indication. Characteristic value for the signal strength of radio connections, used by communication devices for the automatic selection of a suitable channel.

Server

A server makes services available to other network components (clients). The term "server" is often used to refer to a PC. However it can also mean an application that provides a particular service such as [DNS](#), [DHCP](#) or a Web service.

SMTP

Simple Mail Transfer Protocol. The SMTP protocol is a [TCP/IP](#) protocol and regulates the exchange of electronic post on the Internet. Your [Provider](#) provides you with access to an SMTP server.

Glossary

Subnet

A subnet divides a network into smaller units.

Subnet mask

The subnet mask determines how many parts of the IP addresses of a network represent the network number and how many parts represent the network component number.

If the subnet mask in a network is 255.255.255.0, for example, this means that the first three parts of the [IP address](#) make up the network number and only the last part can be used to assign network component numbers. The first three parts of the IP address of all network components are in this case always the same.

Switch

A switch is a central distributor in a wired network, which, unlike a hub, provides intelligent distribution of data transfer. The switch only ever forwards a data packet to the subnet or network component the data packet is intended for. Unnecessary transfer of data in the network thus avoided.

TAE

Telecommunications connecting unit (German: **Telekommunikations-Anschlusseinheit**). Connector for connecting analogue telecommunications devices. F for phone, N for additional devices such as fax or answer machines.

TCP

Transmission Control Protocol. TCP is part of the [TCP/IP](#) protocol family. TCP handles data transport between communication partners (applications). TCP is a session-based transmission protocol, i.e. it sets up, monitors and terminates a connection for transporting data.

TCP/IP

Transmission Control Protocol/Internet Protocol. Protocol family on which the Internet is based. IP forms the basis of each PC to PC connection. [TCP](#) provides applications with a reliable transmission link in the form of a continuous data stream. TCP/IP is the basis on which services such as WWW, Mail and News are built. There are other protocols as well. In order to access the Internet from a PC, TCP/IP must be set up on the PC.

UDP

User Datagram Protocol. UDP is a [Protocol](#) of the [TCP/IP](#) protocol family that handles data transport between two communication partners (applications). Unlike [TCP](#), UDP is a non-session based protocol. It does not establish a fixed connection. The recipient is responsible for making sure the data is received. The sender is not notified about whether it is received or not.

Uplink

Data that your SE681 WiMAX forwards from your PC or local network to external sites (e.g. to the Internet).

URL

Universal Resource Locator. Globally unique address of a domain on the Internet, e.g. <http://www.sagemcom.com>.

Virtual server

A virtual [Server](#) provides a service on the Internet that runs not on itself, but on another network component. The SE681 WiMAX can be configured as a virtual server. It will then direct incoming calls for a service via [Port forwarding](#) directly to the appropriate [Port](#) of the network component in question.

WAN

Wide Area Network. A WAN is a network that is not restricted to one particular area, such as the Internet. A WAN is run by one or more public providers to enable private access. You access the Internet via a [Provider](#).

WiMAX

Worldwide Interoperability for Microwave Access. WiMAX is a modern wireless network technology that enables fast Internet connection even in remote areas where no other connection possibility (e. g. DSL) is available.

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