WLL550 Pro
Operating manual

Index:
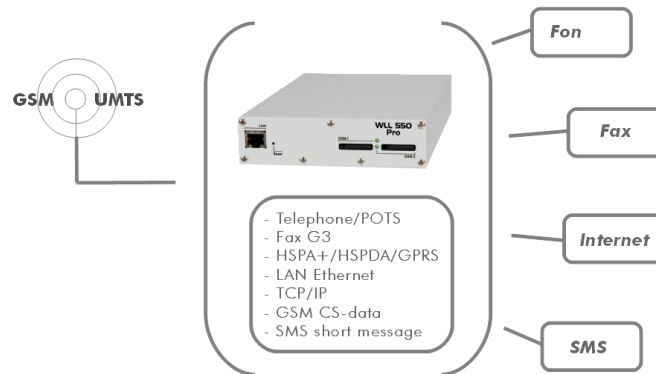
1 Basic Functions

The *WLL550 Pro* supports voice and G3-fax calls via GSM network in combination with a broadband internet access via UMTS/HSPA+ or HSDPA and SMS short messaging.
Fully equipped with two radio modules all services are available at the same time

The sockets for fax and telephone are located on the back panel. To connect a G3 fax machine use the connector tagged with '*Fax'*. Please consider that you need a SIM-card with an extra number for fax service. Telephone devices are connected to the '*Tel'* connector. Please use this connection for voice calls. The '*Tel'* connector is also used if the *WLL550 Pro* is setup as a local loop interface on a PABX. The internet connection uses the LAN jack on the front panel. A SIM card with high speed data capabilities is mandatory at this point.
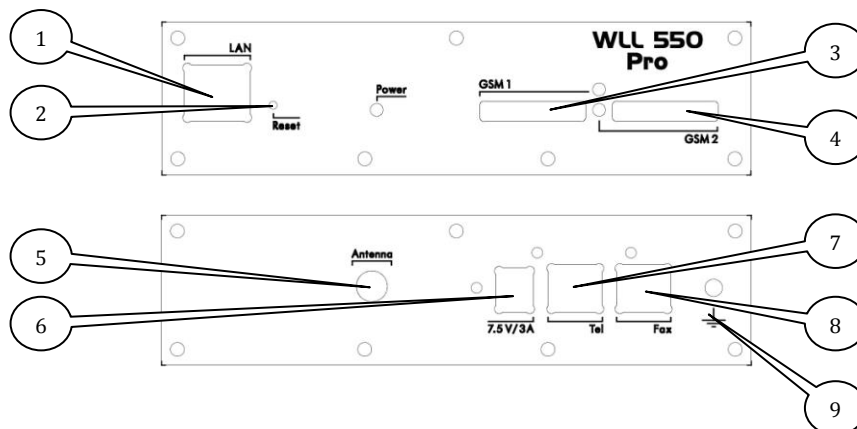
1. Network connector: LAN 10/100 Mbit/s
   (For configuration setup and internet access)
2. RESET button
3. SIM card reader – channel 1   (UMTS/GSM)
4. SIM card reader – channel 2   (GSM)
5. SMA antenna connector
6. Power supply: 7,5V – 15V DC
   (9V/2A wall power supply included)
7. Telephone-/PBX-connector - RJ11
8. G3 fax connector - RJ11
9. Earth terminal , GND

1.1   Phone

The *WLL550 Pro* supplies an analogue local loop interface. This is designed for the use with custom telephone and PABX devices (POTS). It is the basic function of all types of *WLL550 Pro*. To use this basic function you need a valid SIM card, a suitable antenna and a power supply. If your SIM is PIN protected you can execute the PIN request with DTMF digits on the telephone device or within the *WLL550 Pro* service software '*AS55X-Service'* of course.

For further settings please refer to 2.1

1.2   Fax G3

The second basic feature of *WLL550 Pro* is a special local loop interface which supports the operation of an analogue G3 fax machine to transmit and receive facsimiles via the GSM mobile network.

Generally fax transmissions over the GSM network are difficult to handle because the handshake is very time critical. For better results the *WLL550 Pro* splits the transmission into two phases:

First the fax is submitted from the sending fax station to the *WLL550 Pro* buffer and then time-delayed from the *WLL550 Pro* buffer to the receiving fax station.
The *WLL550 Pro* tries up to three attempts to submit a fax document. During this time the '*GSM'* LED is flashing continuously and no further fax or voice call is possible via this radio channel. However a fax transmission can fail for some reason and by splitting the transmission handshake it might happen that the first phase of the transmission is successful but the second phase fails. To ensure that the sender gets information about an unsuccessful transmission the *WLL550 Pro* can generate a receipt for all successful and failed fax transmissions via a response receipt.

A SIM card with an additional fax number is mandatory for fax transmissions via mobile phone network. Incoming fax calls to this number are automatically forwarded to the analogue fax port. Outgoing fax calls are send via radio channel two (*WLL550 Pro* with two channels). All settings in global and individual call setup are exclusively for voice calls and do not concern fax calls.

Hints: There is no fax service available within the UMTS-network.

For programming instruction see 2.2

1.3   Internet

To fulfil the requirements for a mobile office use the *WLL550 Pro* can work as a broadband-internet access which is another basic function of the *WLL550 Pro*. The related radio channel with an UMTS/HSPA+/HSDPA module is the radio channel one. A SIM card with high speed data capabilities is mandatory in this case. Please also check the conditions of your mobile phone contract for a special data tariff to avoid unexpected high charges.

The internet speed depends on various parameters, such as the capabilities of your mobile phone network, the local field strength quality and the operating grade of the shared medium. Providing you have the optimal conditions an internet speed of 7,2 MB/s is possible.

The *WLL550 Pro* connects to the internet, if valid APN information is configured in the internet settings.

For the use with a single computer you can connect it directly to the LAN interface of the *WLL550 Pro*. But you need an external NAT-router if the internet access should be available for further network devices.

One (GSM) channel versions of the *WLL550 Pro* do not support broadband internet access.

For further information please refer to 2.3 and 2.4

1.4   SMS short message

Due to the fact the *WLL550 Pro* has no display or keyboard external controlling software is nessesary to manage SMS short messages. There are two *'Extended feature'* available which enable transmission of short messages via the *WLL550 Pro* LAN interface*:* '*SMS Center*' and '*TELNET* ' mode.

An easy-to-use solution is the '*SMS Center*'- client software for Windows operating system. This is free software and it works similar to a custom messenger-client.

Use the *TELNET* connection or the short message-API for third party software to get direct access to the *WLL550 Pro* radio modules for SMS short messaging.

 For further information please refer to 2.5

2   Installation - configuration

The minimum requirements to put a *WLL550 Pro* into operation are a suitable power supply, an antenna and one valid SIM card. But to supply all services a *WLL550 Pro* uses two valid SIM cards. One SIM for the broadband-internet access in SIM reader of the first radio channel *GSM1* with ability for UMTS/HSPA+ and a second SIM with an additional fax service in SIM reader of radio channel *GSM2*.

The connectors for the power supply, the antenna and the interfaces for phone and fax are on the back panel of the device. The SIM readers and the LAN interface are located on the front panel.

Usually the configuration is made with the *'AS55X-Service'* configuration software via a LAN connection. But some simple settings like entering the PIN number can be done by DTMF sequences at the analogue telephone interface (also refer to 2.8).
All basic settings need to be done in a service session with the service tool.

The service tool for *WLL550 Pro 'AS55X-Service'* is available as a direct download at:
> www.kuhnt.com/down/55xwin32.zip <   .

If the *WLL550 Pro* is set to factory defaults it works as a DHCP server that can be directly connected with the LAN of your computer. Check the network settings of your computers network interface and activate DHCP if it is not running already.
Now select from '*Access Type* ' > '*Access via LAN* ' from *'AS55X-Service'* menu to start a service session. If you are not sure about the IP of the *WLL550 Pro* try to detect it in your LAN by using '*Search for AS55X in LAN* '.

The default IP-address of the *WLL550 Pro* is: **192.168.0.2** .
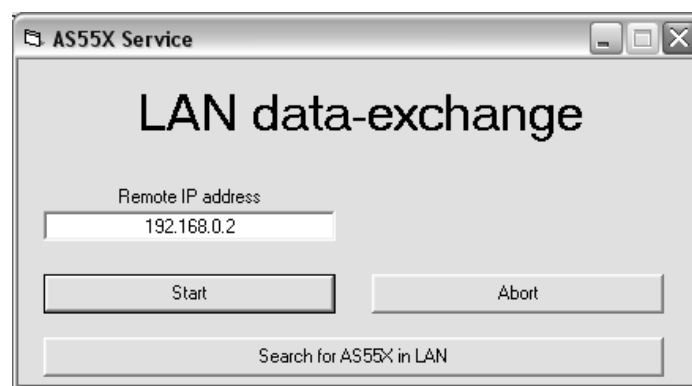
If you can not access your *WLL550 Pro* via LAN check your LAN setup or try to reset the *WLL550 Pro* to factory default by using the RESET button*. Press and hold the button then plug in the power supply. Keep holding the button until the Power LED is on.

* Using the RESET button will delete all configuration and security data!

When you are successfully connected, please begin with an upload of the configuration data from your device > '*Upload from AS55X* ' . Now you can start to set the basic configuration within the configuration menu:
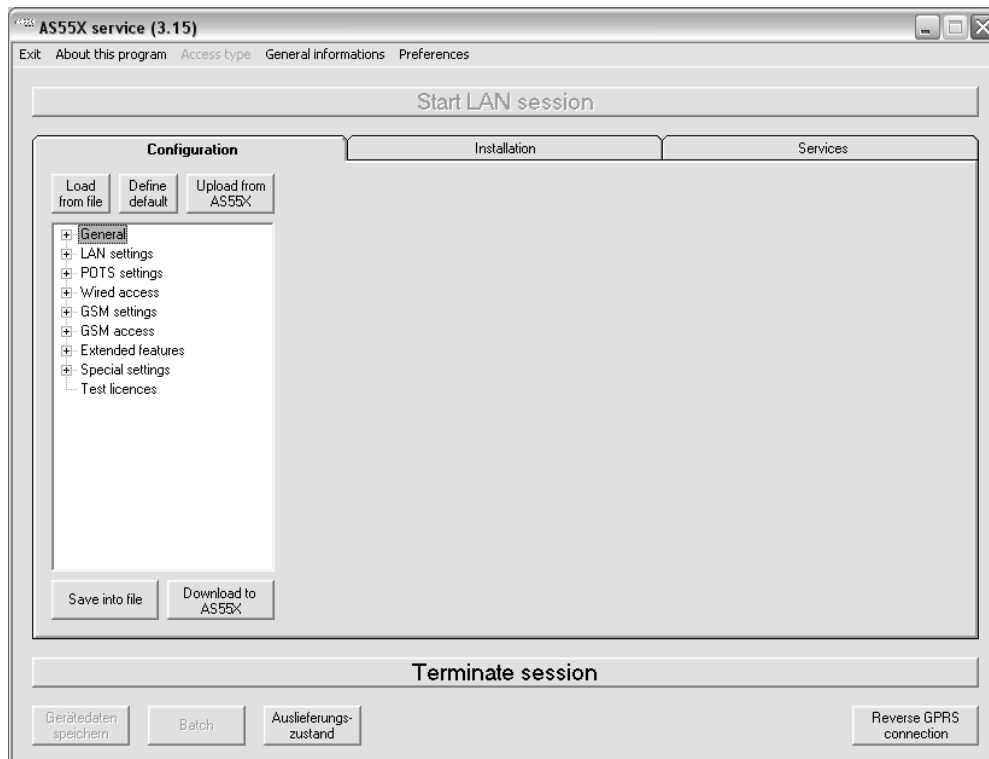
- The PIN numbers of your SIM cards
> *Installation > Set SIM PIN*

- The amount of digits for autostart
> *Configuration > POTS settings > Interface settings > amount of digits*

- LAN settings for *WLL550 Pro*
> *Configuration > LAN settings > LAN interface mode*

- APN settings for the internet access
> *Configuration > GSM access > internet*

- Country code for roaming
> *Configuration >Wired access > Country specific settings*

Now continue with configuration of further settings.

Please keep in mind to download the modifications into the *WLL550 Pro* before you quit the service session! *> Configuration > Download to AS55X*

2.1   Phone/Fax (POTS settings)

By default a voice call is forwarded to the telephone interface '*Tel*' and all fax calls are always signalised at the fax connector '*fax*'. Unless the *WLL550 Pro* is set to work in '*trunk mode*' with a PABX or with a tel/fax combination device all fax calls are routed via the telephone socket '*Tel*' too.

An outgoing voice call chooses the next available radio channel by default, but fax calls use exclusively the radio channel two '*GSM2'* (*WLL550 Pro* equipped with just a single radio channel uses the first channel only). By setting '*GSM groups* ' and the ' *Global-* ' or ' *Individual call setup* ' you can configure your own routing for outgoing voice calls. .

The configuration of the analogue telephone interface is made within the '*POTS interface settings* ':
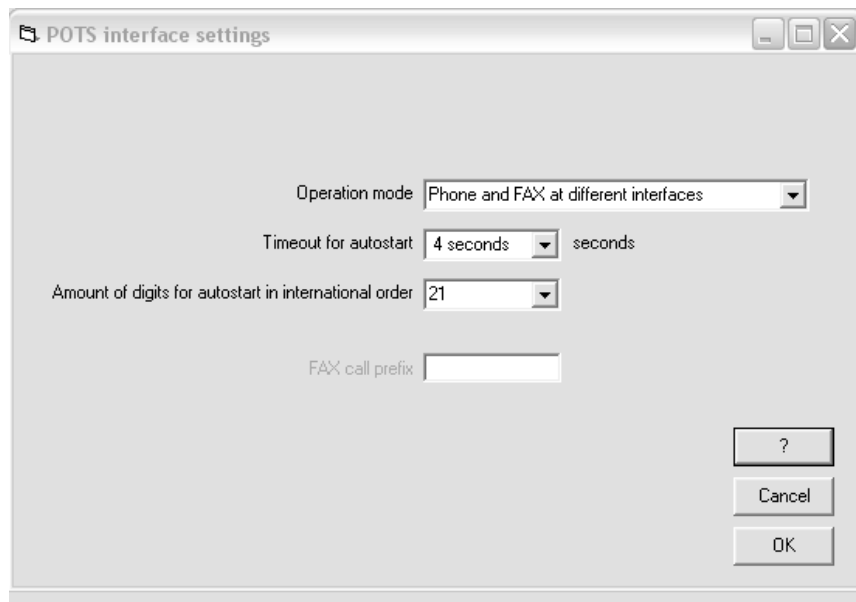
- *Operation mode / Fax call prefix:*

    There are two ways to run a fax machine with the *WLL550 Pro*. First you can attach your phone and fax directly to its dedicated connectors. The second way is to attach the *WLL550 Pro* to an analogue PBX or a Phone/Fax combo. In default mode all incoming faxes and calls are directed to different POTS ports. In *'trunk mode'* all calls are routed to the phone connector. To separate outgoing fax calls from voice calls in *'trunk mode'*, you have to dial a fax prefix (e.g. *8 004944130005…) for each fax to identify the service. This prefix (*8) is not a part of the called number is deleted by the *WLL550 Pro.*

    Default value: *Phone and fax at different interfaces*

    Fax call prefix

    Default value: *not reported*

- *Timeout for autostart / Amount of digits for autostart in international order –*

  On the POTS interfaces all dialling is made digit by digit but a GSM call setup is en bloc only. Therefore the *WLL550 Pro* must collect all digits until the dialled number is complete.

  There are two ways to indicate the number to be complete:

  1st: Define a fix amount of digits for dialling to the GSM network. Set this amount to the maximum number of digits referring to your destination numbers.

  2nd: Define a timeout for waiting for the next digit. After this timeout expires, the call-setup to the GSM network starts immediately.

  At the menu item "Timeout for autostart", the timeout for waiting for the next digit can be chosen.

  Default value: *4.0 seconds*

  At the menu item "Amount of digits for autostart in international order", the fix amount of digits can be chosen. Select the maximum length of the called numbers in international form. E.g. for the longest dial number +491234567890 select 12 digits.

  Please note! If you are not sure about the maximum lengths of the number set this value to higher than 15.

  Default value: *11*

2.2   Fax function (fax settings)

To improve the fax transmission within the GSM network, the *WLL550 Pro* buffers the fax data so sender and receiver do not communicate directly.
Due to this two step transmission all error indications must be generated by the *WLL550 Pro*. If you need to know if a fax transmission has been successful or not fill in this free form text boxes.

For further information about the fax function see also 1.2.

Configuration window of the *WLL550 Pro* service tool *AS55X-Service*

- *Positive acknowledge text to far FAX / Error feedback text to far FAX*
  Acknowledge receipt for the external (distant) fax machine

- *Positive acknowledge text to near FAX / Error feedback text to near FAX*
  Acknowledge receipt for the local fax machine

Please enter a text for each receipt in the form field. The function is activated by completing the form field. You can a write free text and enter a placeholder for the destination number with the '*Insert destination number*' button.

For further information please refer to 3. Special settings

2.3   Configuration internet

A basic function of the *WLL550 Pro* is the mobile broadband internet access via UMTS and HSPA+ or HSPDA. Start the *AS55X-service* software and open the menu:

'*GSM access* ' / '*Internet* ' to enter the APN* with username and password.
* Glossary / Tips

The internet access is activated by entering the APN information within the internet configuration. From the moment a valid APN entry is detected and the UMTS radio module is successfully logged into the mobile phone network the *WLL550 Pro* is continuously *online*.

To check, whether the gateway is successfully connected to the internet or not, please open menu '*Services* ' / '*View WAN status* ' . The internet connection is ready when an IP address and the DNS server are assigned by the proxy.

To disconnect the *WLL550 Pro* from the internet the device must be switched off or all APN information have be removed from the configuration setup.

Configuration window of the *WLL550 Pro* service program *AS55X-Service*:

- Access point name (APN)

  Please enter the APN information here. Ask your service provider for details.
  > Also see Glossary / Tips

- Username / Password

  Because the authentication is already done by the SIM card username and password are not mandatory. In doubt it depends on the service provider.

Some *WLL550 Pro* are equipped with a single GSM radio module only. However to reduced access to the internet is possible by GPRS via Dial-up network and *Telnet**.

*Telnet is optional, please ask your service partner for details.

2.4   Configuration of network

Depending on the amount of computers that should be use the internet via the *WLL550 Pro* there are different scenarios for the LAN setup of the *WLL550 Pro.* This is caused by the fact that it has neither an integrated firewall nor any internal routing so all connections are directly relayed to the connected LAN device.

- Single computer setup
If you want to connect a single computer to your *WLL550 Pro*, set the LAN-interface of the *WLL550 Pro* to '*default gateway*' and activate DHCP on your computer. Alternatively do not change the LAN settings of your *WLL550 Pro* and configure the network interface of your computer manually. First define the computer's IP within the same IP range as the *WLL550 Pro* and enter a valid network mask. Then set the standard gateway and the DNS server to the IP-address of your *WLL550 Pro* (default: 192.168.0.2).
Please note! You need a cross cable or a LAN-hub if the LAN interface of your computer does not support 'auto-sensing'.

- Multi-computer/Router setup
To establish a small local network with the *WLL550 Pro* as internet gateway you need an external NAT-router. The router WAN input must be connected to the *WLL550 Pro* and all computers and LAN devices to the LAN or WLNA side. If possible try to establish a point-to-point connections '*Direct connection to endpoint* 'between router and *WLL550 Pro*. Set your *WLL550 Pro* to '*default gateway* 'and the router to DHCP if this is not supported.

LAN settings within the *WLL550 Pro* service tool *AS55X-Service*:
> *Configuration > LAN settings > LAN interface mode*

2.5   Configuration of short messaging

Please connect your *WLL550 Pro* to a computer via LAN network. Check the extended features (software options) of your *WLL550 Pro* for an '*SMS Center*' or '*TELNET* ' subscription. You need at least one of them.

The '*SMS Center*' is a free client software that is available at www.kuhnt.com. It uses the LAN to communicate with the *WLL550 Pro*. Basic requirements are a Microsoft Windows operation system with .NET Frameworks 2.0 or higher.

TELNET is a system-independent standard protocol to transmit modem commands via TCP. Some applications for managing SMS short messages like '*SMS comfort*' are able to access directly to the *TELNET* Ports of the *WLL550 Pro.* Others may additionally require a virtual COM-Port driver. *TELNET* based application work on Apple or Linux operation systems, too.

Please look for further information at www.kuhnt.com or your dealer for support.

2.6   ProviderSimSwitch

The *ProviderSimSwitch* is a modified *WLL550 Pro* hardware with additional SIM switch. The *'ProviderSimSwitch'* automatically changes the GSM and UMTS network to detect the best available service.

How it works

With powering up the *WLL550 Pro* the 'ProviderSimSwitch' starts testing the GSM networks by two criteria. First is the speed of the internet connection (UMTS, GPRS or no access). Second is the signal field strength quality of the GSM network itself. If a full working network is detected (100% signal quality and full UMTS internet service) any further testing is stopped immediately. The search is continuously repeated until a working GSM/UMTS network is found.

The time out for each SIM card logging into a GSM network is 45 seconds after the restart of the GSM module. For testing the APN setup there is an additional period of about 30 seconds to connect to the internet access point.

The 'ProviderSimSwitch' remains at the SIM with the best available network until a network connection is lost for more than 10 seconds during normal operation or if a new search is triggered manually. The new network search restarts considering all previously detected network data.

A net search can be initialized manually by DTMF sequences entered on the telephone interface '*TEL'*. You can hear an acoustic acknowledgement when the restart sequence begins:
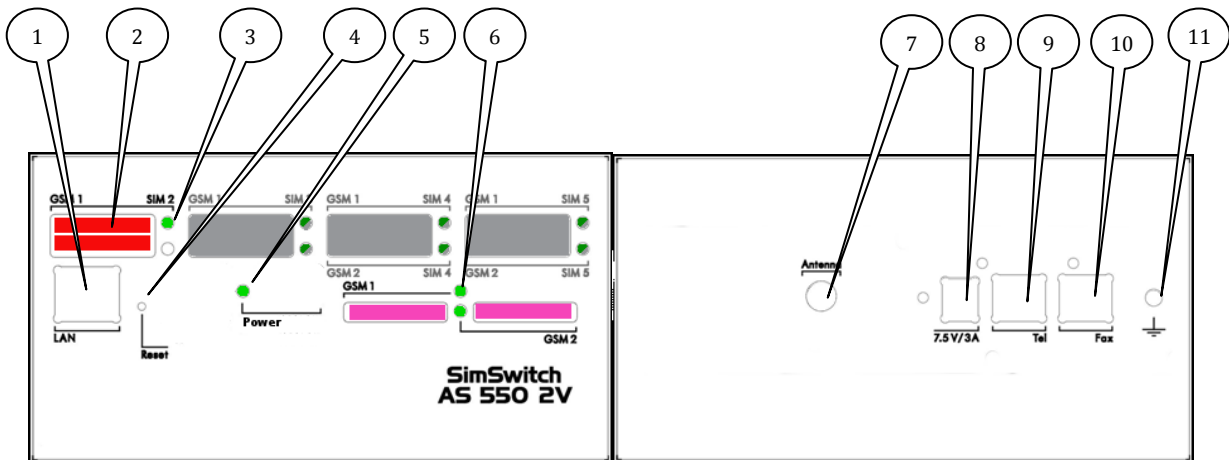
> *#77#*   for both GSM/UMTS radio channels
> *#77n#*   for a single radio channel *n* = 1 or 2

It is helpful to define a minimum signal field strength for each radio channel to improve the quality of the various network services. A network search automatically starts if the field strength goes below that limit.

- Front panel
- Back panel

1. LAN network 10/100 Mbps connection for LAN/network
   (Internet and configuration)
2. SIM slots
   up to 5 SIM for 3V mini-SIM cards.
   (channel 1 is marked with GSM1; channel 2 is marked with GSM2)
3. SimSwitch LED - display of the SIM switch
4. Reset – button to restore factory defaults
5. Power LED
6. Status LED of the GSM radio channel
7. Antenna connector SMA (female)
8. Power jack for external power supply
9. Phone jack for analogue telephone, PABX or Tel-Fax combination devices.
10. Phone jack for G3-fax machine
11. Earth terminal, GND

Configuration of the ProviderSimSwitch

To configure the '*ProviderSimSwitch*' activate the SIM reader of SIM 1 to 5 by setting it
to '*Yes*'. Please start with SIM 1 and do not skip any SIM slots such as using SIM 1, SIM 2
and SIM 4. Each GSM channel can manage different numbers of SIM cards. Entering the
GSM netcode is optional to avoid international roaming for example.

> also see Glossary / Tips

This setup below is for *WLL550 Pro* with two SIM cards for each GSM channel.
APN information is only necessary for GSM channel 1 because GSM channel 2 does not
support internet access via UMTS with HSPA+ or HSDPA.

GSM channel	SIM number	Inserted	GSM netcode	Internet access APN	Internet access Username	Internet access Password
Master / Ch. 1	1	Yes	26201	internet-t-d1.de	td1	gprs
	2	Yes	26202	web.vodafone.de	any	any
	3	No				
	4	No				
	5	No				
Master / Ch. 2	1	Yes	26201			
	2	Yes	26202			
	3	No				
	4	No				
	5	No				

The '*ProviderSimSwitch'* cannot be used with a standard "SimSwitch" at the same time.
Entering data into "ProviderSimSwitch" deactivates all standard "SimSwitch" settings
and vice versa.

> *Default value:*   *not reported*

General recommendation:

-       Call forwarding for all services on channel *GSM2* might be useful
        to improve your availability.

-       Deactivate your mailboxes or turn off call forwarding to the mailboxes

2.7   Factory settings (Reset)

Using the reset button to deletes all configuration and security data and restores the factory defaults.

To initialise a *WLL550 Pro* to factory settings disconnect the power supply. Then reconnect the power supply with the reset button hold. Keep holding it until the power LED is on.

Hint! Using the RESET button will not only delete all configuration data, but also all security information , like PIN and passwords etc.. !

2.8   DTMF Codes

DTMF tone sequences to configure the *WLL550 Pro* via telephone interface:

- Enter PIN for each SIM card by DTMF please use this code:

  *#*1*xxxx#* for GSM/UMTS channel one and *#*2*xxxx#* for GSM channel two. *xxxx* is placeholder of the PIN.

- To log into the home net of your SIM, you can force a restart of the radio module ,

  #734# (REG) reset of all GSM/UMTS channels.
  #7341# reset of channel one and *#7342#* reset of channel two.

- In ' *trunk mode* ' outgoing fax messages must be assign to the GSM fax service. Otherwise it is treated like a voice call which will fail. Each fax call must be prefixed (e.g. *8 0044123456789 ...). This prefix (*8*) does not become part of the called number itself and is ignored during the connection setup by the *WLL550 Pro*.

- To restart the best net detection with the *'ProviderSimSwitch'* , please use this codes

  #77#   all GSM/UMTS channels
  #771#   UMTS/GSM channel one only
  #772#   GSM channel two only

3 Special settings
3.1 Unnamed bits

- *Unnamed bit 55,* FAX speed restriction

  If this bit is set, FAX speed is limited to 4800bps. This setting only makes sense, if due to bad line quality, the training procedures often are too long.

  Default value: *Not set*

- Unnamed bit 56, no FAX function restriction

  Normally enhanced FAX modes like error correction, colour transmission etc. are disabled, as this is strongly recommended with FAX over GSM. These modes can be enabled by setting this bit.

  Default value: *Not set*

- Unnamed bit 59, do not store local parameters

  For faster synchronisation of both FAX devices during incoming calls, the parameters of the local FAX device will be stored in the WLL. If this bit is set, there is no storing and the parameters will newly be read from the local FAX device with every call.

  Default value: *Not set*

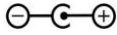- Unnamed bit 60, do not store remote parameters

  For faster synchronisation of both FAX devices during outgoing calls, the parameters of some remote FAX devices will be stored in the WLL. If this bit is set, there is no storing and the parameters will newly be read from the remote FAX device with every call.

  Default value: *Not set*

3.2   Unnamed bytes

- Unnamed byte 109, pause between FAX call-setup trials
  If a FAX call-setup failed, after this time in seconds, the WLL is trying again.

    Default value: *0, same as 60*

- Unnamed byte 110, pause between FAX call-setup trials after connection
  If a FAX connection failed, after this time in seconds, the WLL is trying again.

    Default value: *0, same as 10*

- Unnamed byte 113, maximum call trials to local FAX
  The maximal number of call trials to the local FAX device, that is connected to the analog interface of the WLL.

    Default value: *0, same as 3*

- Unnamed byte 114, maximum call trials to remote FAX
  The maximal number of call trials to the remote FAX device, that is connected via GSM to the WLL.

    Default value: *0, same as 3*

- Unnamed byte 121, for EU-3 (and PH8) to allocate network type

    Normally the EU-3 module preferably registers to an UMTS network. If byte 121 is set to 1, it exclusively registers to a GSM Network and if the byte 121 is set to 2, if exclusively registers to a UMTS network. This setting is globally for all channels.

    Default value: *0*

4   Technical data

- Power supply:

  External power supply:
  Voltage: 7,5V to 15V DC
  > Wall power supply included<
  Polarity: ⊖—Ɛ—⊕
  Power consumption: 2 channel (TC63i / EU3-E):
  Min. approx. 4,5W / max. ca. 10W
  (With Mascot type 9619)

- Radio modules:

  Cinterion TC63i
  Quad band GSM/CSD/GPRS/EDGE   850/900/1800/1900 MHz

  Cinterion EU3-E
  Dual band UMTS/HSDPA   900/2100 MHz
  Dual band GSM/GPRS/EDGE   900/1800 MHz

  Cinterion PH8
  Quad-band GSM/GPRS/EDGE   850/900/1800/1900MHz
  Five-band UMTS/HSPA+   800/850/AWS/1900/2100MHz
  EDGE Class 12, GPRS Class 12

- Antenna: 1 x antenna combiner 2 in 1 - SMA female connector

- 3V mini-SIM cards

- Interfaces: LAN/Ethernet 10/100 Base-T, RJ45, 'auto sensing'
  Two analogue telephone jacks (POTS) for
  fax machine and phone (CLIP), RJ11

- Network protocols: DHCP, DNS, ARP

- Maintenance: Service software *AS55X-Service*
  for WINDOWS operating systems
  (Download link: http://www.kuhnt.com/down/55xwin32.zip)
  Interfaces: LAN, Reverse IP or GSM CS-data
  (Secured by: username and password)

- Size/weight: Aluminium desktop case
  Approx. width 150mm x height 38mm x depth 245 mm
  Approx. 1050 g (2 radio modules)

- Environment: Operating temperature: 5°C to 40°C
  Storage temperature: -10°C to 70°C
  Humidity: 0% to 90%

5   Glossary / Tips

APN   'Access point name' is he name of the gateway in a mobile phone
network when packet data with GPRS, HSDPA or HSPA+ is involved.
Usually you need a server name, a user name and a password.

WAN   'Wide area network' global computer network. The 'Internet'

LAN   'Local area network' local (wired) computer network

POTS   'Plain old telephone service' describes the classic telephone system
based on local loop interfaces.

TCP   'Transmission control protocol' is a protocol of the IP system and a basic
part of the internet.

TELNET   'Telecommunication network' is a classic client/server-protocol,
to establish modem connections via TCP/LAN.

Netcode   The Mobile Network Code MNC is a five-digit number and identifies a GSM
network. The first three digits stand for the country the last two digits for
the provider. E.g. >26202< is >262< for Germany and >02< for Vodafone.

CSD
GPRS
HSPDA
HSPA+   Various methods for data transmission within a mobile phone network

General advices:

- Block roaming for the UMTS channel '*GSM1*' by entering a '*netcode* ' if you are
  not sure about the roaming cost for data traffic

- Deactivate call forwarding into mail boxes for all SIM cards.

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