WLAN clientadapter

– 802.11 a/b/g –

G 76341-A

English, Revision 02	Developed by: C.M.
Date: 23.03.2009	Author: RAD / SIS / L.S.
Götting KG, Celler Str. 5, D-31275 Lehrte - Röddensen (Germany), Tel.: +49 (0) 51 36 / 80 96 -0, Fax: +49 (0) 51 36 / 80 96 -80, eMail: techdoc@goetting.de, Internet: www.goetting.de	

GÖTTING

Contents

1 Essential Information for Reading this Manual

In documentations of Götting KG the following symbols and assignments are being used at the time of printing this manual:

- Security advices have the following symbols, depending on the emphasis and the degree of exposure:

NOTE!

ATTENTION!

CAUTION!

WARNING!

- Continuative information and tips are identified as follows:

Tip!

- Program texts and variables are highlighted by using the `font 'Courier'`.
- Whenever input of key combinations is required for the operation of programms, the corresponding Keys are Highlighted (in Götting KG programs it is usually possible to use small and capitalized characters equally).
- Sections, figures and tables are automatically numbered consecutively throughout the entire document. In addition, each document has an index listed behind the front page, including pages and - whenever the document has more than 10 pages - following the actual system description a figure and table index in the back. In certain cases (for long and/or complicated documents) a subject index is added.
- Each document provides a table block with metainformation on the front page, indicating the system designer, auther, revision and date of issue. In addition, the information regarding revision and date of issue are included within the footer of each page, enabling the exact allocation of the information with a date and certain a system revision.
- Online-Version (PDF) and printed manual are generated from the same source. Due to the consistent use of Adobe FrameMaker for the generation of documentation, all directory entries (including page numbers and subject index) and cross references in the PDF file can be clicked on with the mouse and will lead to the corresponding linked contents.

2 Introduction

G 76341-A is a WLAN adapter for connecting devices with ethernet- or serial interfaces to wireless networks according to 802.11 a/b/g standard. It connects all devices of the LAN segment to which it is linked via the Ethernet interface with a WLAN network.

Via its serial interface it is able to receive and transmit data that is transmitted/received by a communication partner linked via the networks (WLAN or LAN). This communication partner in turn may be an G 76341-A or a PC/controller, receiving or transmitting this data via a compatible application.

The following picture illustrates the operational subsystems.

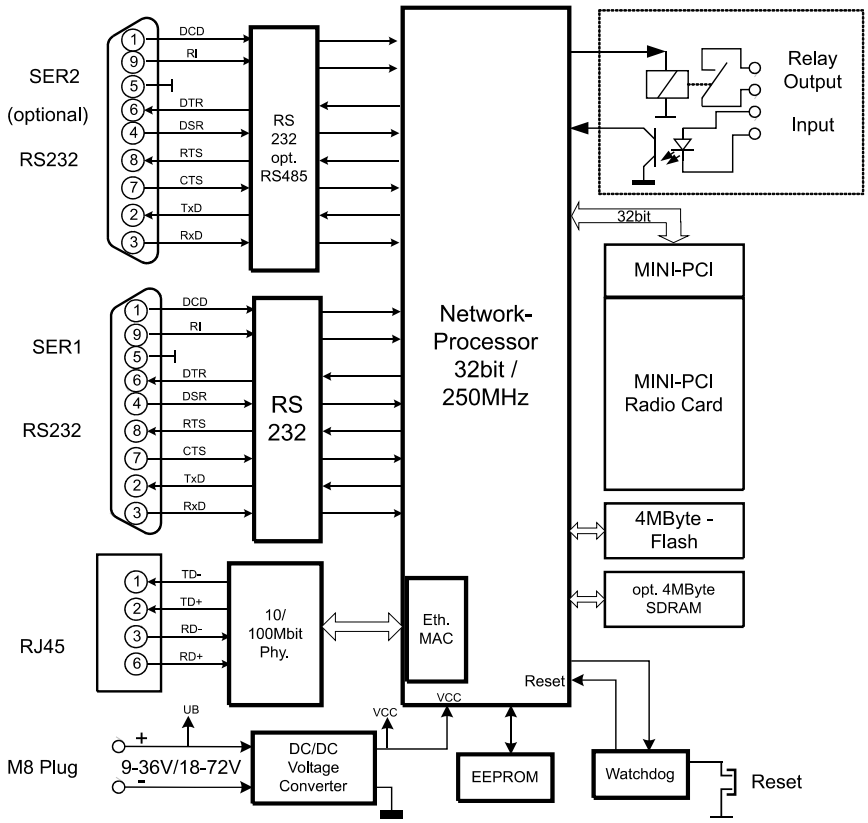


Figure 1 Block diagram

The main component of G 76341-A is a 32 bit network processor, controlling all functions. The interfaces are:

1. Mini PCI socket
2. Ethernet interface with 10/100 Mbit + Auto MDI (auto crossover function)
3. 1 or 2 serial interfaces with 6 control lines per interface (2nd serial interface optional)
4. Relay switching contact and switching input with optocoupler (not available with 2nd serial interface)

The Ethernet connection is designed as a RJ45 plug. The auto- MDI- function enables connecting the G 76341-A to a HUB (switch) as well as directly to the LAN- connection of a PC/controller without changing the patchcable. The G 76341-A Ethernet interface identifies the polarity of the lines automatically and switches the signal lines internally correctly.

The serial interfaces will be connected via a 9-pin SUB- D socket. The pin allocation is chosen in such a way that this interface can be linked to the COM-port of a PC through a one-to-one serial cable. For the detailed allocation please refer to Figure 1 on page 5.

For power supply HG 76341 requires a voltage source in the range of 8-30V (12 V typ.). The current consumption at 12 V is approximately 300 mA. The following sketches show the LED display and connections on the G 76341-A front panel.

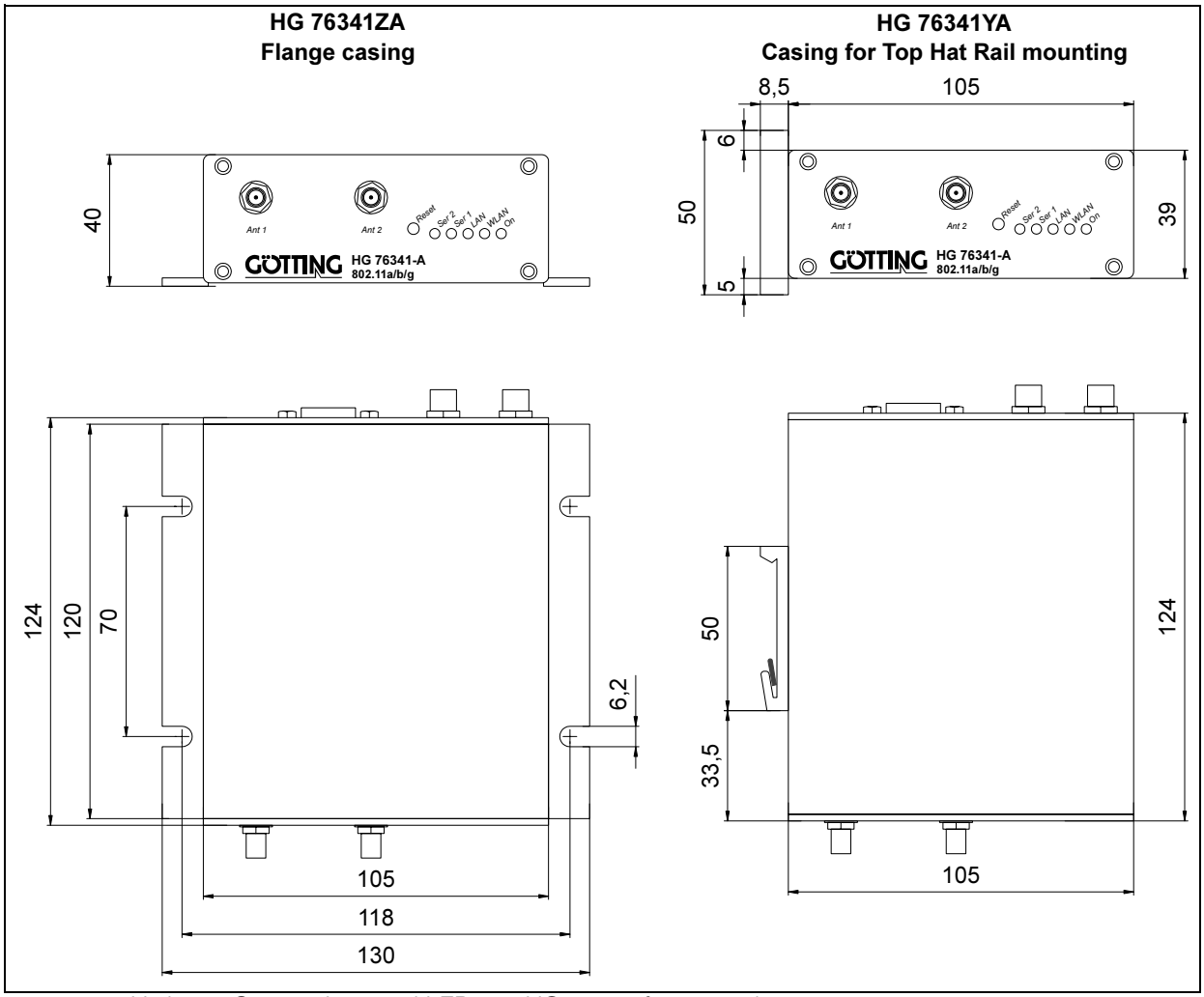


Figure 2 Variants: Connections and LEDs on HG 76341 front panel

The 5 LEDs on the front panel display the operational status of G 76341-A (see Table 1 on page 7).

LED	Function
On	*Illuminated green* as long as the supply voltage is connected.
WLAN	*Blinks orange* while searching for a radio link (scanning process active). *Illuminated green* after having determined a compatible Access Point and having established the connection successfully. *Blinks orange* during activity (transmitting or receiving).
LAN	*Off* while no link is detected on LAN- connection *Short orange flashes* during interface activity.
Ser1 (2)	*Off* while the interface is inactive or no communication partner connected. *Illuminated green* while a communication partner is linked to the interface. *Blinks orange* during activity (transmitting and receiving).

Table 1 LED functions

3 Commissioning

For the initial start- up please connect a PC/controller with an ethernet interface to the ethernet interface of G 76341-A using a patch cable. As the LAN interface of the G 76341-A is able to determine the polarity of the cable and automatically connect it correctly, it does not matter whether a “parallel / straight” or a “crossover” patch cable is used.

Once the power supply has been switched on, the green LED at the G 76341-A LAN interface illuminates if a LINK- impulse is identified. The yellow LED lights up whenever a connection is run with 100 Mbits.

The LAN LED on the G 76341-A front panel lights up green whenever a connection at the Ethernet port has been identified. The WLAN LED on the front panel blinks orange as long as no suitable radio network has been identified.

3.1 The HG 76341 Locator Program

Start the provided “Locator” program on the connected PC. This program scans suitable devices within the network using the network interface. For activation please press button “Scan”.

Independent of the parameters currently being set, G 76341-A displays its settings:

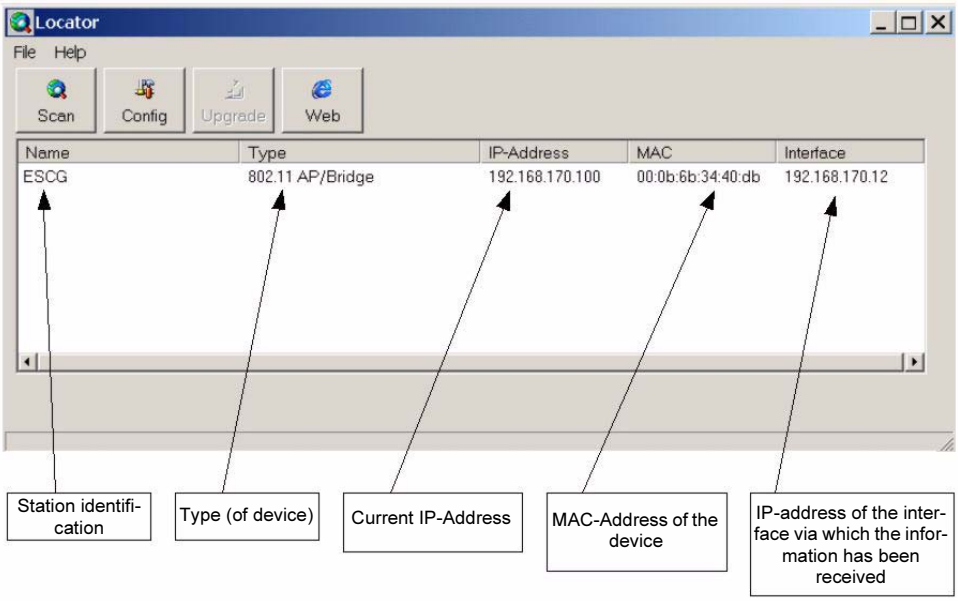


Figure 3 Locator Program

Using “Config” the IP address can be set in such a way that a TCP connection with G 76341-A can be established and the configuration effected via a web browser.

3.2 Resetting of the Parameters to Default Values

G 76341-A can be reset to the factory set default values by pressing the reset key for appr. 20 sec. Having pressed the key for 5 sec. the LEDs “SER1” and “SER2” blink orange and green alternatingly. Continue pressing the key for a few more seconds and the factory settings will be activated. The reset procedure has been completed when all LEDs are off. Now release the reset key.

G 76341-A has the following factory default settings:

```
SSID =       „ESCG_WLAN“
WEP =        OFF
WPA =        OFF
MODE =       802.11b/g
IP =         192.168.170.100
Netmask =    255.255.255.0
SER1+2:      TCP Server on port 8888, respectively 18888
             9600 baud 8N1 no handshake
```

4 Setting of the Parameters via WEB Interface

Having established a connection with the http server of G 76341-A using the WEB browser you will be asked for a password. If you have not defined a password you can quit without entering a password. Otherwise you enter the user data previously defined under “Admin”.

4.1 Information Page

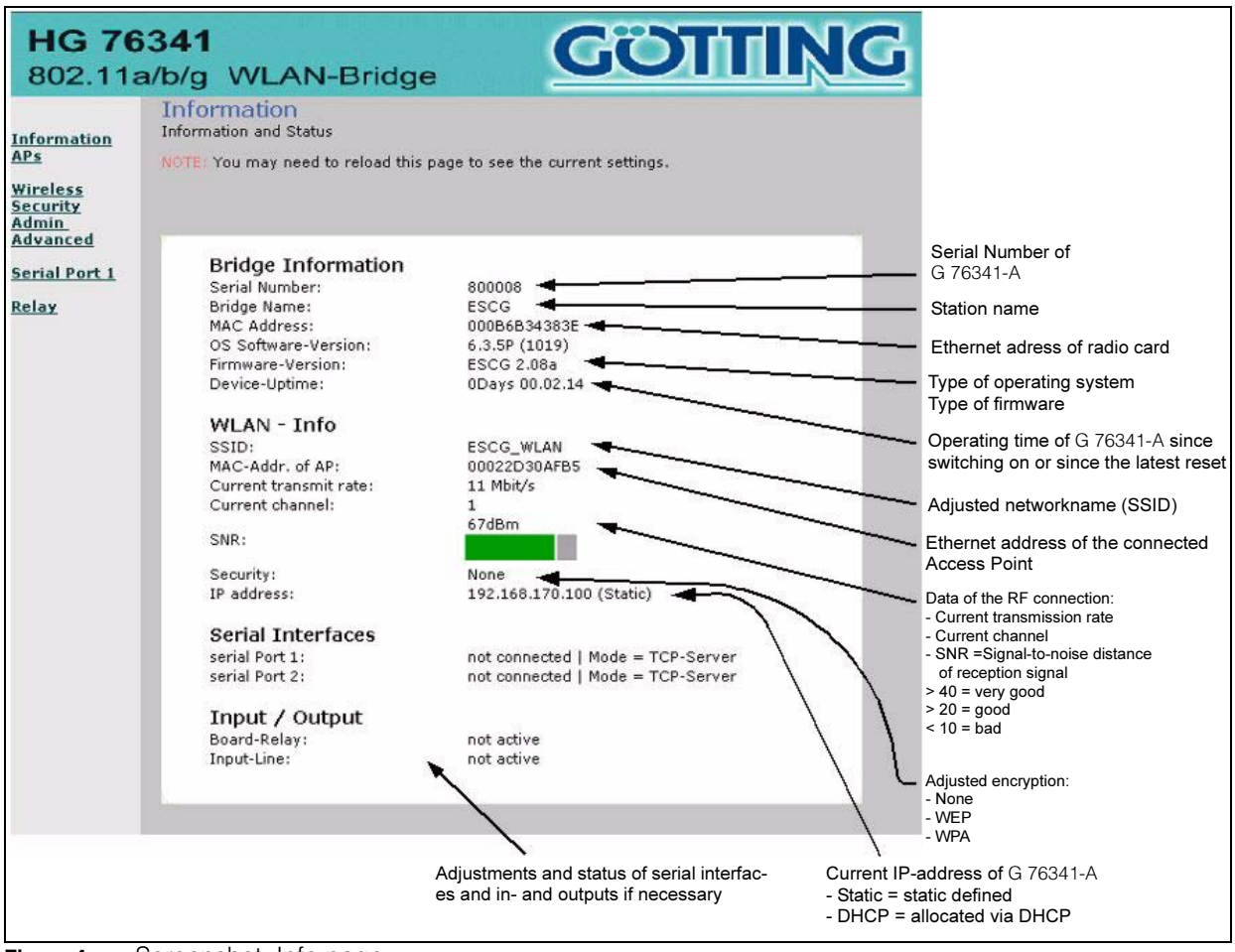


Figure 4 Screenshot: Info page

The first page offers general information concerning firmware status and the status of G 76341-A. The page includes all relevant information on hardware, software and the status of G 76341-A.

On the left hand side of this page you will find links to different pages for more information or parameter setting:

1. Information — General information on the status of G 76341-A (see Figure 4)
2. APs — Display of a table with those Access- points from which a signal has been received (see Figure 5 on page 12).

3. Wireless — Setting of parameters of WLAN interface such as SSID, modus, frequency band, etc. (see Figure 6 on page 13)

4. Security — Settings of WLAN- interface encryption (WPA, WEP) (see Figure 7 on page 14)

5. Admin — On this page it is possible to reset G 76341-A or the parameters.
Furthermore the following adjustments can be effected: (see Figure 8 on page 15):

- IP-address, network mask, Gateway-IP,
- Configuration options
- User name and password

6. serial Port 1 — Parameters for the first serial Port (see Figure 11 on page 21)

7. Advanced — Setting of further parameters for the operation within the WLAN (e. g. cloning, roaming) (see Figure 9 on page 17)

8. Relay — Relay: Settings of the switching relay on the board. This relay is optional (but included by default) and not installed in every version (when serial Port 2 is present) (see Figure 12 on page 22)

9. AUX-Input — Settings for input signal. This input signal is optional as well and not accessible in any case. (see Figure 13 on page 23)

Depending on the G 76341-A version, further menu points will be provided. For example:

10. serial Port 2 — Parameters for the second serial Port
This relay is optional and not installed in every version.
In versions where this port is included Relay and AUX input are missing.

4.2 Access Point Page

On this page G 76341-A indicates the access points from which signals are being received.

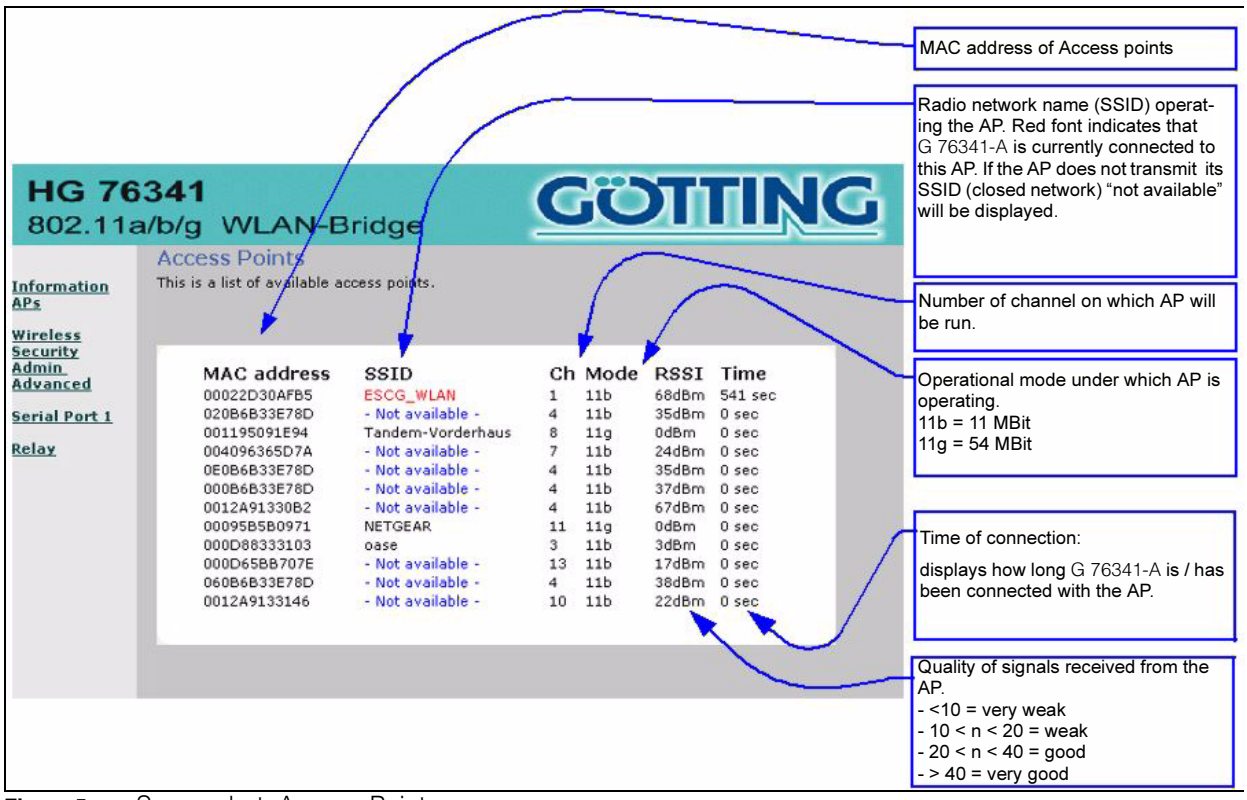


Figure 5 Screenshot: Access Point page

4.3 Wireless Page

It is possible to define the parameters of the WLAN interface on the “Wireless” page.

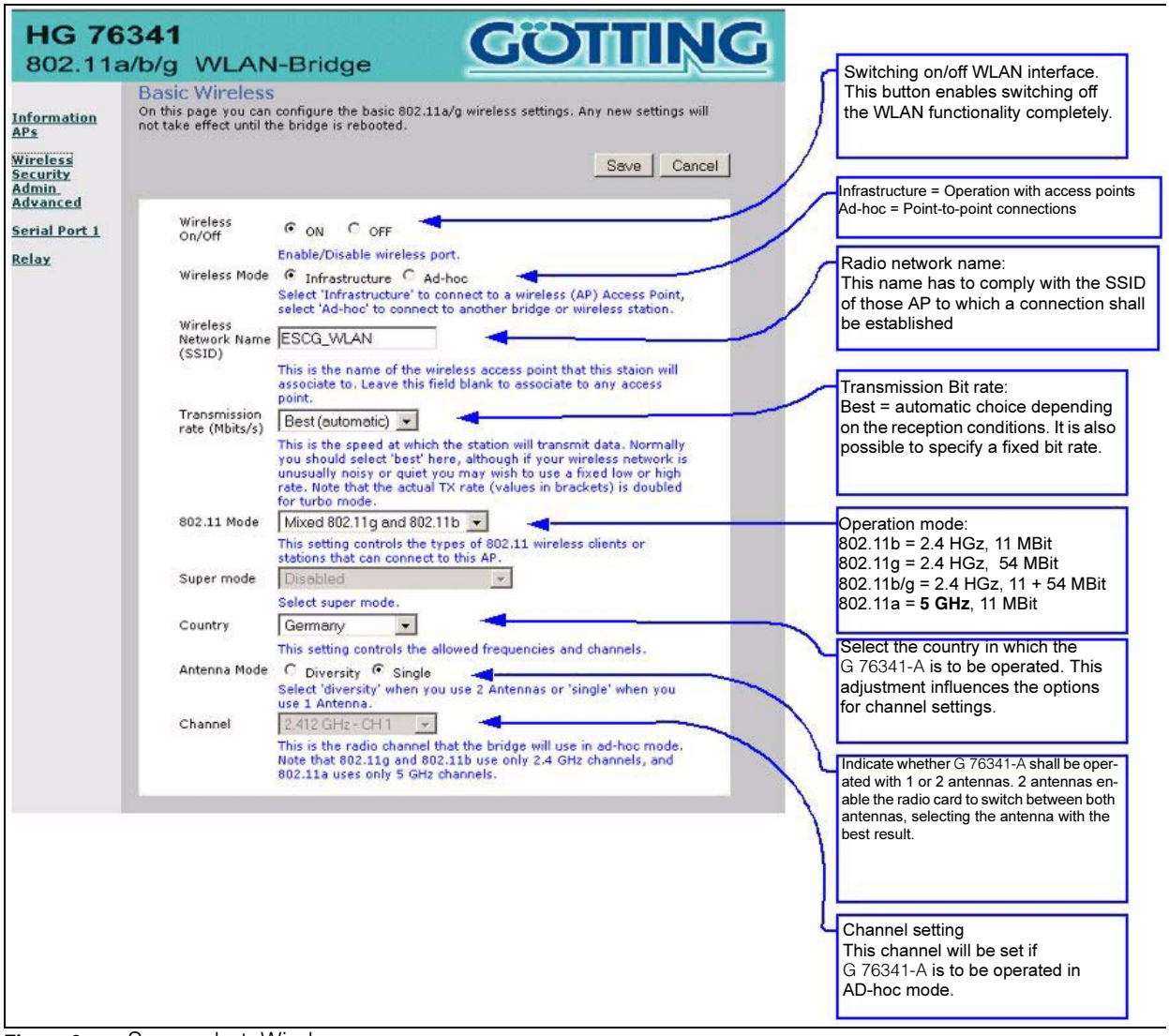


Figure 6 Screenshot: Wireless page

Pressing the button “save” will save all settings. When pressing the button “Cancel”, current settings will be re-entered into the displayed form. Following the “Save” procedure, the user will be asked to carry out a reset, so that the latest setting will become valid. This reset should only be carried out if all intended modifications have been completed.

4.4 Security Page

On the security page all encryption procedures will be set. Here you have the choice between WEP standard or WPA (WiFi Protected Access) encryption.

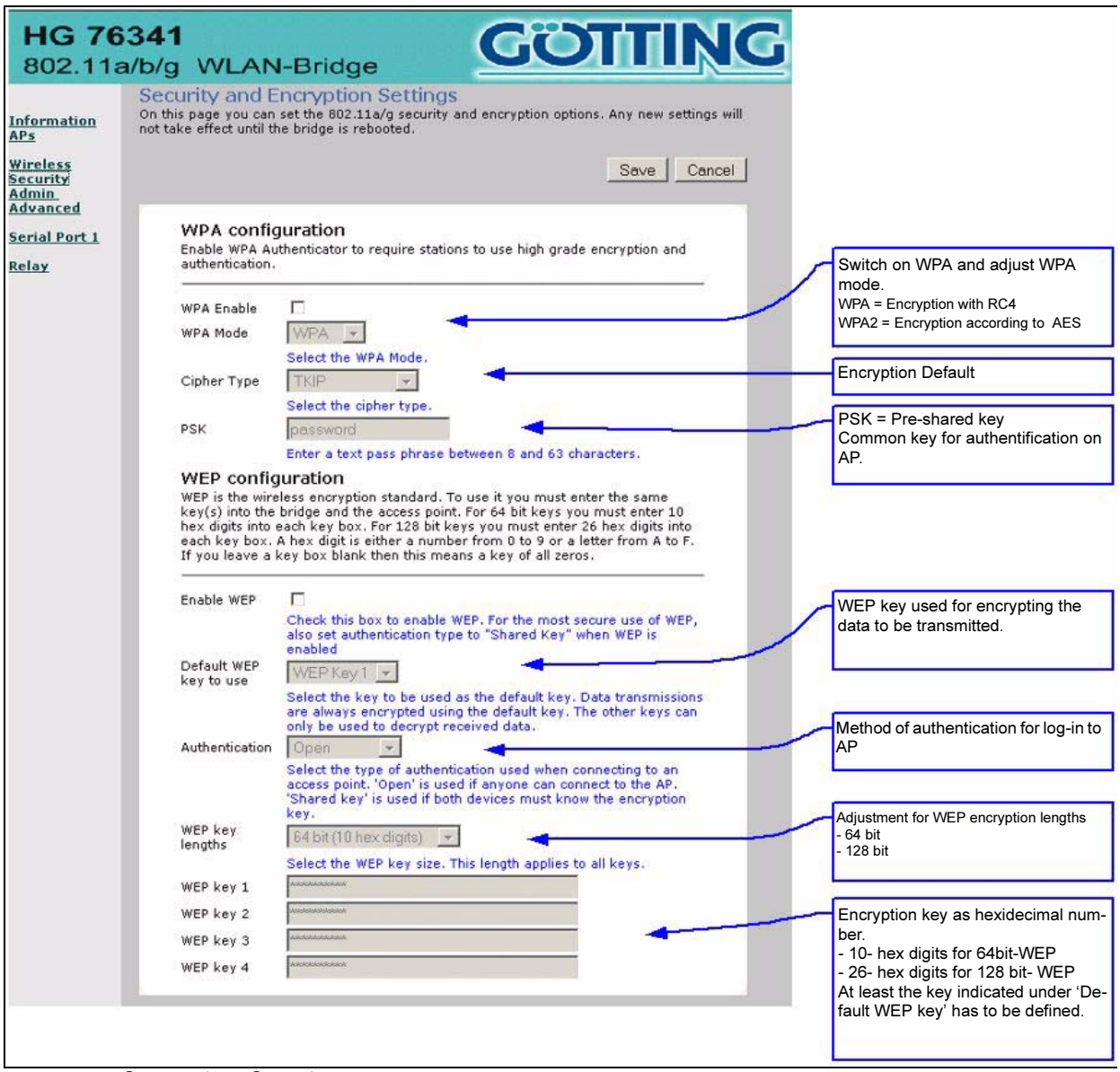


Figure 7 Screenshot: Security page

4.5 Admin Page

On the Admin Page fundamental settings of the G 76341-A, such as IP address and username with password, are made. Furthermore it is possible to restart G 76341-A and to reset the configuration to factory settings. This page provides the opportunity to select a new firmware and to transfer this file to G 76341-A. Then the G 76341-A programs its flash memory with the new software.

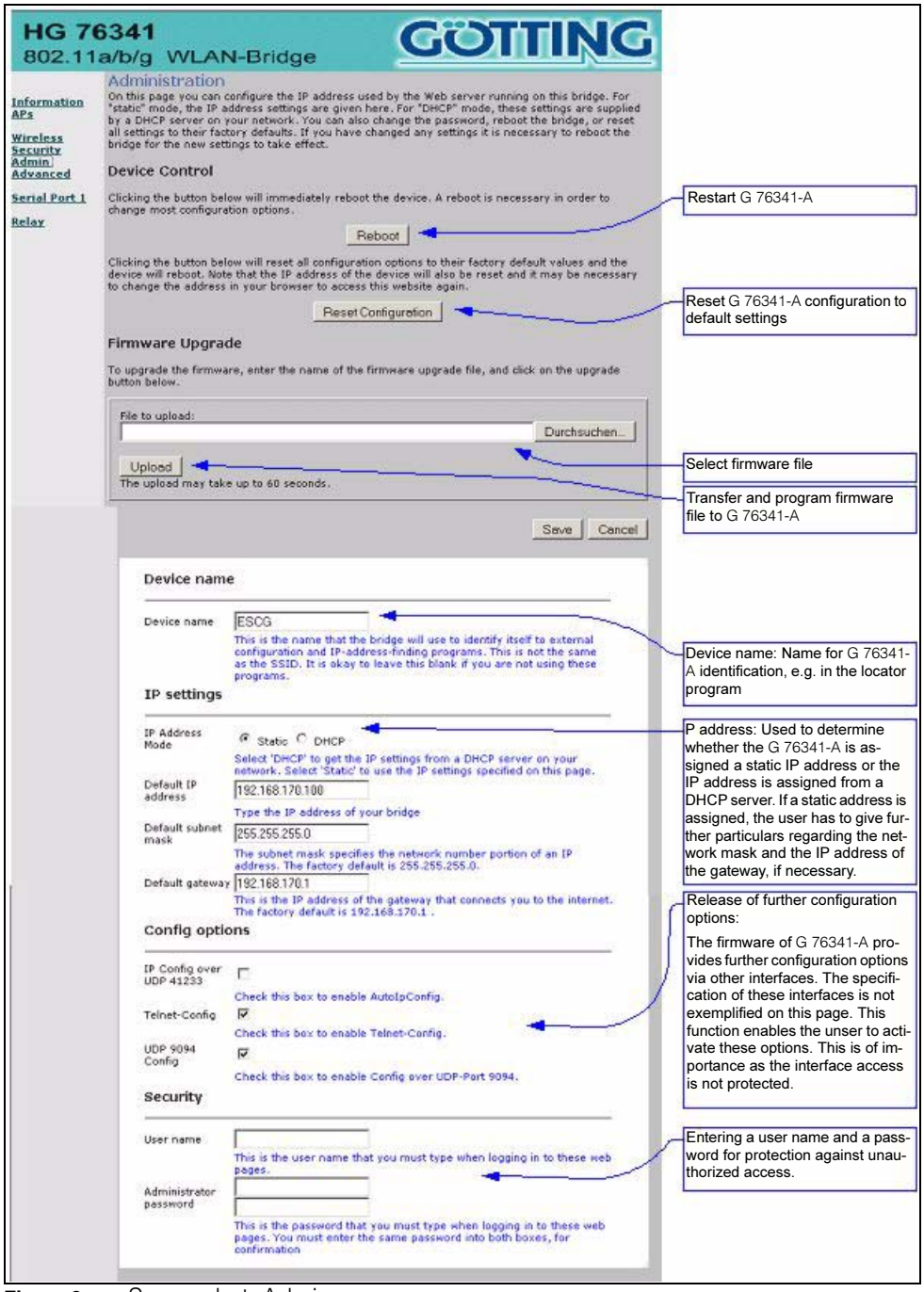


Figure 8 Screenshot: Admin page

4.6 Advanced Page

The “Advanced page” offers the setting of further parameters for the G 76341-A operation within the WLAN.

4.6.1 Cloning

The parameter defined as cloning determines which kind of MAC address the radio card of G 76341-A uses. Normally the MAC address will be allocated by the producer of the radio card and remains unchanged. All devices connected to WLAN via the ethernet interface communicate with this MAC address.

The original MAC address of the user at the Ethernet connector related to the IP address of the user is specified in a table included in the G 76341-A. If a data packet reaches G 76341-A via Ethernet, G 76341-A verifies whether an input with this source MAC address already exists. If not, a corresponding entry will be executed. Afterwards it will be checked if there exists an entry for the Destination-MAC-Address. If so, this indicates that the receiver of this data packet is located on the wire bound side and data does not have to be transmitted via WLAN. If not, the source MAC address will be overwritten with the MAC address of the radio card and the data packet can then be transmitted via WLAN.

Whenever the G 76341-A receives a data packet via WLAN, the Destination-IP-Address will be determined. In addition to the destination IP address the original MAC address will be determined using the internal table. This MAC address will be inserted into the data packet and then transmitted via the Ethernet interface.

This procedure is only possible in networks transmitting data via the IP protocol. Should other protocols be applied, G 76341-A can be induced to transmit the MAC address of the first received data packet via Ethernet interface to the radio card. This procedure is called Cloning. Thus it is guaranteed that all data packets of the WLAN side, destined for the connected device, will reach the G 76341-A. G 76341-A is able to transfer all data packets received via the Ethernet interface without any further processing. This method implicates that only one device can be connected to the Ethernet interface of the G 76341-A.

4.6.2 Roaming

Roaming means the automatic switching of the Access Points carried out by G 76341-A if the reception area of an AP is left and another AP, providing a better signal quality is available. For this purpose G 76341-A lists all APs from which signals (beacons) are received.

In order to receive beacons from other APs G 76341-A over a short period of time, the user has to switch to the corresponding channel and listen to any incoming signals. This might interfere the normal data traffic G 76341-A has to process. Therefore this procedure will be executed in a different intensity – depending on the reception quality of the AP currently being active. For maximum effectiveness during this process, the user may enter the channels to be searched for Aps on the ‘Advanced page’ of the G 76341-A.

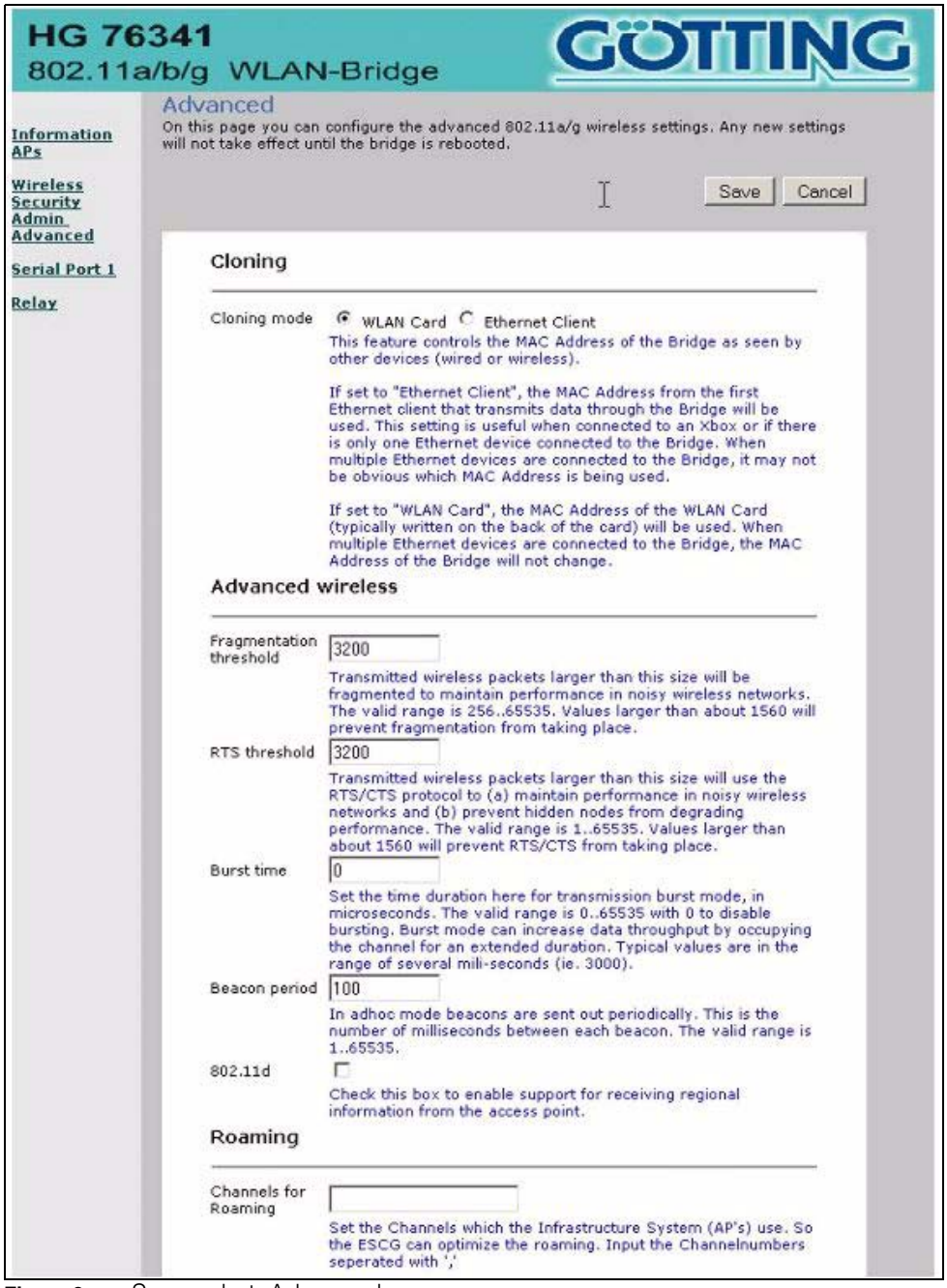


Figure 9 Screenshot: Advanced page

4.7 Serial Interface Settings

G 76341-A provides up to 2 serial interfaces. The setting of the parameters is carried out via two separate WEB sites.

4.7.1 Section “Network-Configuration“

Different user modes are available for the serial interfaces:

1. TCP/IP server mode:
   Using this setting G 76341-A opens a socket in the “List Mode”, i.e. a certain local port expects a connection set-up. G 76341-A keeps only one connection at a time. In this mode only the port number is indicated as a parameter.

2. TCP/IP client mode:
   Here G 76341-A actively opens a TCP connection on the indicated port of another network node. This node may be another G 76341-A or the controller, waiting for a connection on the named port. Besides the port number the IP address of the communication partner has to be specified as well.

3. UDP/IP mode:
   In UDP mode G 76341-A waits for data over the “Local Port”, being transmitted via UDP/IP. The serial data received will be transmitted by UDP/IP to the “remote port” of the remote IP address. The UDP mode shall be used in those particular cases where a disconnection of the communication partners occurs frequently. Please note that the UDP protocol does not guarantee a correct data transfer.

4. Printserver mode:
   In the printserver mode G 76341-A starts a TCP/IP socket in the server- mode, waiting for link establishment on Port 515. In this mode the program of G 76341-A is able to accept print jobs according to the method described in RFC1179. If you want to integrate a printer under Windows applying this method, the connection in Windows has to be configurated as follows:

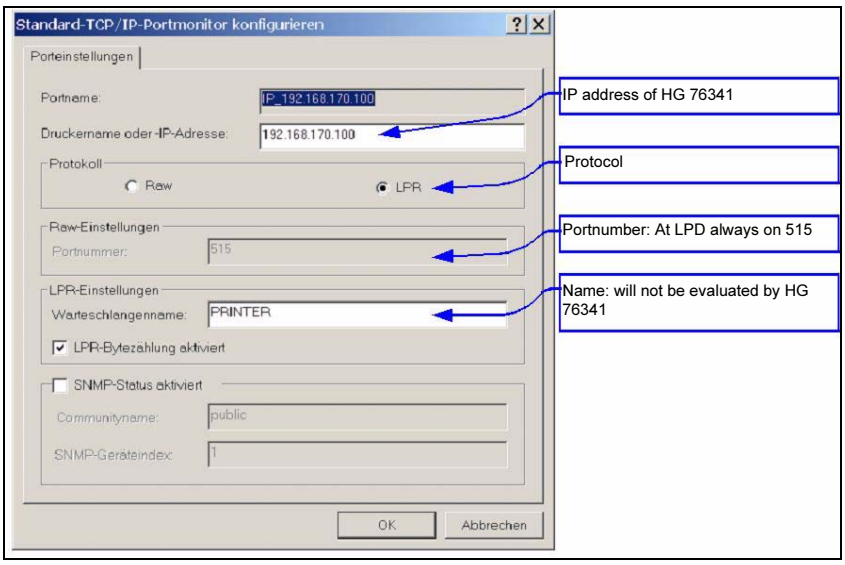


Figure 10 Example: Available Windows-features for a printer connected via LPR

5. COMSERVER-Mode:
   Using Windows G 76341-A is able to provide virtual COM-ports in this mode. Therefore a software product of Wiesemann & Theis (www.wut.de) will be installed on the Windows- PC. The software tool is designated / is operated as COM redirection. The W&T COM redirection, in connection with G 76341-A, is able to address serial data terminals.
   Simply install the COM redirection driver for Windows and enter the IP address as well as the Port of G 76341-A. Periphal equipment of all kind, provided with a serial interface, can be addressed via WLAN or ethernet network quite simply.

4.7.2 Explanations concerning the “keep alive”- settings

Once a TP/IP connection has been established, it remains until one of the communication partners terminates the link. Should the connection between G 76341-A and the network communication partner be disconnected without having closed the TCP/IP connection before, it might happen that G 76341-A does not reconnect.

TCP/IP socket can be induced to transmit a data package without any data content in certain intervals (keep alive periods) to its counterpart. Supported by the communication partner, a corresponding answer will be returned. If this answer is entered, the connection will be considered as existent / established. If the answer fails for a certain number of attempts / trials (keep alive probes), the connection will be closed and G 76341-A restarts the TCP/IP socket.

4.7.3 Comments on “Send- Trigger Configuration”

Initially characters received by G 76341-A will be buffered. Certain criteria have to be met / fulfilled when the buffer’s content will be transmitted via network.

1. **Byte Trigger:** The user specifies a number of bytes. If this number is achieved, the buffer will be transmitted via network.
2. **Timeout:** A timer with the indicated value will be started if a character has been received. Each further character received restarts the timer. If the timer runs out, data received up to now will be transmitted via network.
3. **Delimiter:** The user sets a certain character. If this character will be received, all bytes buffered up to now as well as the delimiter will be send.

4.7.4 Comments on “Handshake Mode”

This paragraph determines, how the ready-to-transmit / ready- to-receive state of the communication partner is signalized. Applying signals RTS, DTR G 76341-A is ready to receive. Using input signals CTS, DSR the serial device being connected signals that it is ready to receive. Signals DCD and RI applied to G 76341-A can be transferred to the network communication partner of G 76341-A.

G 76341-A is able to control data flow by remote control or independently (local). The following modes are available for the user:

1. **no Handshake:** Signals CTS/DSR will not be evaluated. Only RTS and DTR will be set active, if the serial interface is connected via network.
2. **XON / XOFF:** G 76341-A transmits and receives the flow control characters XON= 0x11 and XOFF = 0x13. G 76341-A sends a XOFF character to the serial partner if the buffer in G 76341-A is nearly filled. If the buffer is almost empty, G 76341-A transmits an XON character.
3. **RTS/CTS:** Applying signal line RTS G 76341-A is ready to receive. It analyzes signal DSR to identify the ready-to-receive state of the serial partner
4. **DTR/DSR:** Applying signal line DTR G 76341-A is ready to receive. Signal DTR is analyzed to identify the ready-to-receive state of the serial partner.

5. **Remote:** In this mode G 76341-A transfers the status of signal lines CTS, DSR, RI and DCD to the network communication partner, using a separate socket (Port). Thus the user has to indicate further details for this setting.
   The states of the signal lines are designated as character strings. Certain letters describe the state of a certain signal line. If the letter is written with a capital it means that the signal is active. Small letters indicate an inactive signal.
   The allocation is as follows:

'D' = DSR active	'd' = DSR inactive
'R' = CTS active	'r' = CTS inactive
'C' = DCD active	'c' = DCD inactive
'I' = DSR active	'i' = DSR inactive

   The data received will be interpreted in G 76341-A as follows:

'D' -> set DTR active	'd' = set DTR inactive
'R' -> set RTS active	'r' = set RTS inactive

   C and/or c and I and/or I are not translated in G 76341-A.

6. **3964R:** This is a special protocol, particularly applied to communication with PLC components. In this case the ready-to-transmit / ready-to-receive state is signalized by using special characters and sequences. You will find the specification of this protocol in the relevant literature.

HG 76341
802.11a/b/g WLAN-Bridge

Information
APs
Wireless
Security
Admin
Advanced
Serial Port 1
Relay

Serial Client on Port 1

On this page you can configure the serial client on port 1. Any new settings will not take effect until the bridge is rebooted.

Save Cancel

PORT active ☑
Check this box to enable this serial Port.

Port 1 Baudrate and Format

Baudrate 9600
Baudrate for this serial Port

Parity Bit none
Select the parity bit.

Databits 8
Select the number of databits

Stopbits 1
Select the number of stopbits.

Port 1 Network-Configuration

Port Mode TCP/IP-Server
Select the port mode.

Server IP 192.168.170.242
Server IP in client mode

Local Port 8888
local Portnumber

Remote Port 8888
remote Portnumber

keep alive period 0
time between two "TCP Keep-Alives" in seconds.

keep alive probes 0
amount of "keep alive probes" - failure till the TCP-Connection is closed.

Port 1 Send-Trigger Configuration

Byte Trigger 128
Number of bytes in the buffer to trigger the sendroutine.

Character Timeout 10
Timeout in milliseconds between 2 characters to trigger the sendroutine.

Frame End Delimiter
This is a single HEX-Value. When the delimiter-byte is received the receivebuffer will be send.

Handshake - Mode

XON/XOFF, RTS/CTS or DTR/DSR are local Handshake-Modes. In 'Remote-Mode' the status of the Handshake-Input-Signals (DSR+CTS) will be send to the remote side via an extra port. 3964R means that the serial port handles this protocol for sending and receiving data

Handshake Protocol no Handshake
Select the method of doing the handshake.

Local Port 8880
local Portnumber for Handshake.

Remote Port 8880
remote Portnumber for Handshake.

Figure 11 Screenshot: Serial Client page

5 Optional Adjustments

5.1 Configuration of the Onboard- Relay

G 76341-A is optionally equipped with a switching relay. Thus a switching relay, which can be guided via network or a switching input, is available to customers. Each relay contact can be configured to be a break or normally open contact.

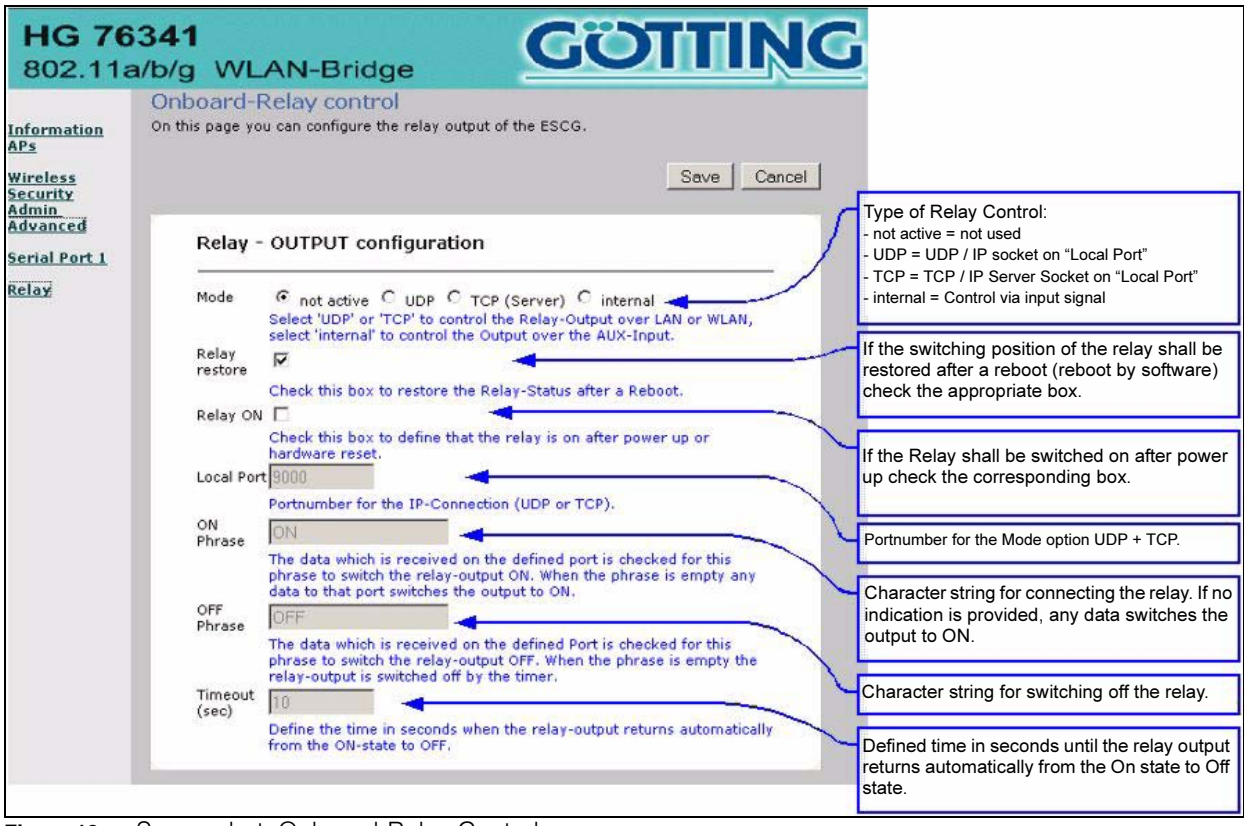


Figure 12 Screenshot: Onboard-Relay Control page

5.2 Configuration of the Switching Input

An optional feature of G 76341-A is the switching input. This switching input is connected to the processor via an optocoupler. There are two ways to configure the switching input: either it indicates the switching condition using the network or it operates the onboard relay.

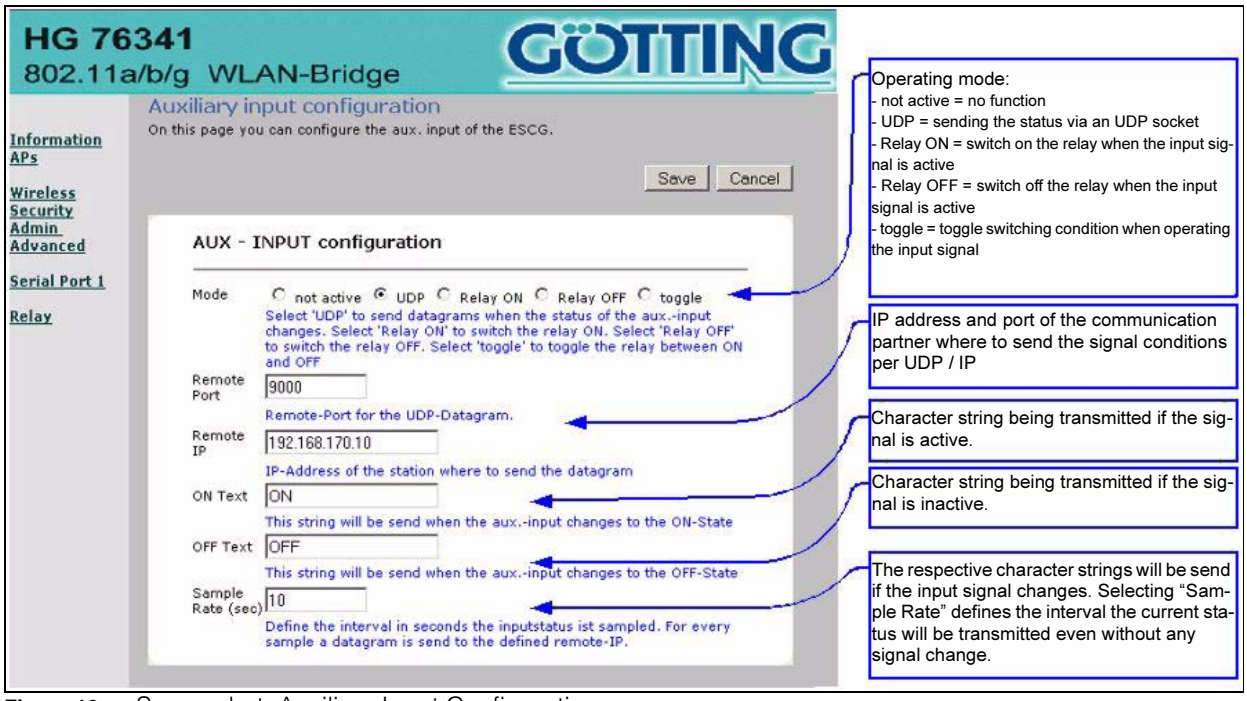


Figure 13 Screenshot: Auxiliary Input Configuration page

6 Technical Data

6.1 Hardware

Hardware		
Processor	Type	32 bit network processor with 250 MHz clock
	Memory	- 256 KByte Program (internal) - 64 KByte Data (internal) - 4 MByte Flash (external) - 4 MByte SDRAM (external, optional)
Interfaces	Ethernet	10/100 Mbps Fast Ethernet Auto MDI/MDIX
	Serial 1	RS232 with control lines RTS, CTS, DSR, DTR, DCD (input), RI (input)
	Serial 2 (optional)	Identical to Serial 1 or optional RS485, RS422
	Mini PCI	Suitable for different RF Chipcards from Atheros (AR5112, AR5113)
	Relay	Relay switching contact (break or normally open contact [1A]) Can be switched via WLAN or LAN Connector for M8-4 pin plug connector
	GP input	Input for a switching signal (galvanically separated) [24V]
Signal Lamps	LEDs	- Power (green) - WLAN (green, orange) - LAN (green, orange) - SER1 (green, orange) - SER2 (green, orange)
Power Supply	Connector	Hirschmann M8-3-pin plug connector
	Power	- < 2,5 W (typ.) - < 3 W (max.)
	Voltage range	- Standard: 9-36V (galvanically separated) - Optional: 18-72V (galvanically separated)
Temperature range		0 to 70° C
Dimensions	Printed Circuit Board	120 x 100 x 20 mm
	Casing	Standard: 125 x 105 x 40 mm
	Weight	approx. 500 g

Table 2 Technical Data Hardware

6.2 WLAN interface

WLAN	Encryption	64, 1128bit WEP
	Security	WPA (Wifi Protected Access) (PSK/TKIP) WPA2
	Data rates	- 802.11b 11, 5,5, 2 & 1 MBit/Sec. - 802.11g 54, 48, 36, 24, 18, 12, 9, 6 MBit/Sec. - 805.11a 54, 48, 36, 24, 18, 12, 9, 6 MBit/Sec.
	Frequencies	ISM-Band: 2.400 MHz to 2.483 MHz U-NII Band: - 5.150 MHz to 5.350 MHz (ETSI, RegTP Indoor) - 5.470 MHz to 5.725 MHz (ETSI, RegTP Outdoor)
	Channels	- 802.11b/g: ETSI: 1-13, (3 non overlapping) - 802.11a: ETSI: 12 non overlapping (5.150-5.350 & 5.470-5.725 MHz)
	Transmission Power	- 802.11b/g: 18dBm peak - 802.11a: 18 bzw. 17dBm

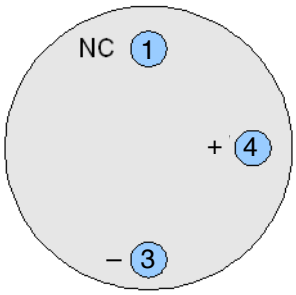
Table 3 Technical Data WLAN

6.3 Pin allocations

6.3.1 Terminal connector for the voltage supply of G 76341

An optional equipment for G 76341-A is a 3-pin screwed connector for the voltage supply. This plug has the following allocations:

Figure 14 Sketch: 3 pin Hirschmann M8 socket voltage



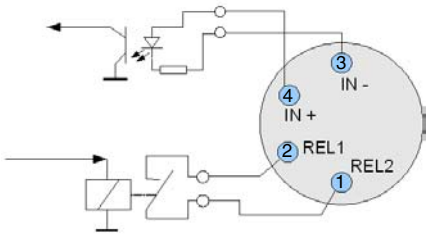
Pin	Function
1	not connected
3	GND
4	voltage supply (see Table 2 on page 24)

Table 4 Assignment: 3 pin Hirschmann M8 socket voltage

6.3.2 Terminal Connector for the Relay and the Switching Input

If G 76341-A is equipped with the optional relay, instead of SER2 connector a 4pin Hirschmann M8 socket will be installed at the rear cover. You will find the allocation of this port in the following sketch:

Figure 15 Sketch: 4 pin Hirschmann M8 socket relay



Pin	Name	Function
1	REL2	relay contact (break/normally open)
2	REL1	relay contact (break/normally open)
3	IN-	digital input: GND
4	IN+	digital input: + 24 V

Table 5 Assignment: 4 pin Hirschmann M8 socket relay

6.4 List of Variants

6.4.1 Standard Version

Specification of the standard version	
Voltage range	9 to 36 V
Relay	wired as normally open
2nd serial interface	not included
Types	- HG 76341ZA: Flange mounting - HG 76341YA: For 35 mm rail mounting - HG 76341XA: Extended temperature range (-20 to +70° C). Available on request. Please contact sales for further information.

Table 6 Specification of the standard version

6.4.2 Options

Options	
Voltage range	18 to 72 V
1st serial interface	As RS485 or RS422
2nd serial interface	instead of relay/digital input (RS232)

Table 7 Options

7 List of Figures

8 List of Tables

9 Copyright and Terms of Liability

9.1 Copyright

9.2 Exclusion of Liability

Any information given is to be understood as system description only, but is not to be taken as guaranteed features. Any values are reference values. The product characteristics are only valid if the systems are used according to the description.

This instruction manual has been drawn up to the best of our knowledge. Installation, setup and operation of the device will be on the customer's own risk. Liability for consequential defects is excluded. We reserve the right for changes encouraging technical improvements. We also reserve the right to change the contents of this manual without having to give notice to any third party.

9.3 Trade Marks and Company Names

Unless stated otherwise, the herein mentioned logos and product names are legally protected trade marks of Götting KG. All third party product or company names may be trade marks or registered trade marks of the corresponding companies.