![HIRSCHMANN — A BELDEN BRAND]

User Manual

Installation
OWL3G (Industrial Cellular Router)

Contents

Contents

About this Guide

This document provides technical specifications for the Industrial Cellular Router and illustrates the hardware installation for a Hirschmann Industrial Cellular Router. It also helps the developers to validate their application design using the Industrial Cellular Router.

The information in this publication contains general descriptions or performance factors which, when applied in an actual situation, do not always correspond with the described form and may be amended by way of further development of products. The desired performance factors shall only be deemed binding if these are expressly agreed on conclusion of the contract. Please note that some characteristics of the recommended accessory parts may differ from the appropriate product. This might limit the possible operating conditions for the entire system.

Legend

The designations used in this manual have the following meanings:

▶	List
☐	Work step
■	Subheading
Link	Cross-reference with link
Note:	A note emphasizes an important fact or draws your attention to a dependency.
`Courier`	ASCII representation in the graphical user interface

GPL License

Source codes under the GPL license are available free of charge. Send an email request to:

hac-support@belden.com

Safety Instruction

■ General safety instructions

You operate this device with electricity. The safe operation of the device depends on proper handling during transportation, storage and assembly, and proper use of operation and maintenance procedures. Improper use of this device can cause injury or property damage.

☐ Read this documentation, safety instructions and warnings before connecting any cables.

☐ Never start an operation with damaged components.

☐ The device does not contain any service components. If the device is not functioning correctly, or if it is damaged, turn off the power supply and return the device to Hirschmann for inspection.

⚠ WARNING

UNCONTROLLED MACHINE ACTIONS

To avoid uncontrolled machine actions caused by data loss, configure all the data transmission devices individually.

Before you start any machine which is controlled via data transmission, be sure to complete the configuration of all the data transmission devices.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

■ Qualification requirements for personnel

☐ Allow qualified personnel to work on the device who have the following characteristics:

▶ Properly trained personnel who have practical knowledge and experience. This is the prerequisite for grounding and labeling circuits, devices, and systems in accordance with current technology safety standards.

▶ Qualified personnel are aware of the dangers that exist in their work.

▶ Qualified personnel are familiar with appropriate measures against these hazards in order to reduce the risk for themselves and others.
▶ Qualified personnel receive training on a regular basis.

■ Intended usage

☐ Use the product only for the application cases described in the Hirschmann product information, including this manual.
☐ Operate the product according to the technical parameters. See chapter 6 for details.
☐ Connect components which are suitable for the requirements of the specific application case to the product.

■ National and international safety regulations

Verify that the electrical installation meets local or nationally applicable safety regulations.

■ Working voltage

☐ Connect only a working voltage that corresponds to the type plate of your device.
☐ Make sure the following requirements are met every time you connect the electrical conductors:
  ▶ The power supply conforms to overvoltage category I or II.
  ▶ The power supply has an easily accessible disconnecting device (such as a switch or a plug) which is clearly identified. So in case of an emergency, it is clear which disconnecting device belongs to which power supply cable.
  ▶ The electrical wires are voltage-free.
  ▶ The power supply is Class 2 compliant.
  ▶ The working voltage inputs are designed for operation with safety extra-low voltage. Connect only SELV circuits with voltage restrictions in line with IEC/EN 60950-1 to the working voltage connections.

▶ The wire diameter of the power supply cable is at least 1 mm² (North America: AWG16) on the working voltage input.

▶ The wire diameter of the ground conductor is at least 1 mm² (North America: AWG16).

▶ The power supply cables used are permitted for the temperature range required by the application case.
The power cords are suitable for ambient air temperatures of at least 167 °F (75 °C). The power cord wires are made of copper.

Switch on the operating voltage for the device only when the following requirements are fulfilled:

▶ The housing is closed

▶ The terminal block is wired correctly

▶ The terminal block for the operating supply is connected

■ Installation site requirements

☐ Verify that there is at least 4 in (10 cm) of space above and below the device.

☐ Verify that there is at least 0.8 in (2 cm) of space on the right and left sides of the device.

■ Housing

The router cannot be opened.

☐ Never insert pointed objects (narrow screwdrivers, wires, etc.) into the device or into the connection terminals for electric conductors. Do not touch the connection terminals.

■ **Please, observe the following instructions:**

Note: Keep the SIM card away from small children as it can be easily swallowed.

☐ Before handling the SIM card, disconnect the router from the power supply.
☐ The SIM card must not exceed the maximum voltage 30 V DC power connector on the router.
☐ Do not expose the router to extreme ambient conditions. Protect the router against dust, moisture and high temperature.
☐ The router should not be used at the petrol stations and around flammable and explosive materials. We remind the users of the duty to observe restrictions concerning the utilization of radio devices at petrol stations, in chemical plants, or in the course of blasting works in which explosives are used.
☐ When using the router in the close proximity of personal medical devices, such as cardiac pacemakers or hearing aids, you must proceed with heightened caution.
☐ If the router is in the proximity of TV sets, radio receivers, personal computers, and telephone it may cause interference.
☐ It is recommended that you should create an appropriate copy or backup of the important settings that are stored in the memory of the device.

Note: Insert the SIM Card holder in the SIM card slot very carefully. When inserted improperly, you can damage the SIM card slot. Also, the SIM card can fall out of the holder and end up in the router. If you open the router, then the warrantee is voided.

1   Router Description

Hirschmann has designed the OWL router for wireless communication in mobile networks that make use of the following technologies:
- ▶ HSPA+
- ▶ UMTS
- ▶ EDGE
- ▶ GPRS

Due to the high speed data transfer, up to 14.4 Mbit/s (download) and up to 5.76 Mbit/s (upload), this router is an ideal wireless solution for connecting the data stream and security camera systems, individual computers, LAN networks, automatic teller machines (ATM) and other self-service terminals.

Due to the high speed of data transfer up to 100 Mbit/s (download) and up to 50 Mbit/s (upload) is this router an ideal solution for wireless connection of data stream and security camera systems, individual computers, LAN networks, automatic teller machines (ATM) and other self-service terminals.

As a standard, the router is supplied in a metal casing. The cellular router is also equipped with the following interfaces located on the front panel:
- ▶ 2 Ethernet 10/100
- ▶ 2 SIM card readers, 3 V and 1.8 V

Configuring the cellular router is possible using a graphical user interface which is password protected. The graphical user interface provides, after logging in, detailed statistics about the activities of the router such as, signal strength, and a detailed system log. This device supports the creation of VPN tunnels using technologies such as IPSec, OpenVPN and L2TP for secure communications. The router also supports the following functions:
- ▶ DHCP
- ▶ NAT
- ▶ DynDNS
- ▶ IPSec
- ▶ OpenVPN
- ▶ NTP
- ▶ VRRP
- ▶ control by SMS
- ▶ primary/backup connection

Diagnostic functions, which provide for continuous communication, include an automatic inspection of a PPP connection, offering an automatic restart feature in case of an unexpected termination of the connection. Another diagnostic function is the hardware watchdog, which monitors the status of the router.

Using a special window, the start up script window, you can insert Linux scripts for various actions. For some applications, it is crucial to create several different configurations for a router. You can exchange these configurations as necessary for example, using SMS. The HSPA+ router OWL can automatically upgrade a configuration and firmware from a server. This allows you to configure several routers at a time.

2 Contents of Package

The basic router set available for delivery includes the following items:
- ▶ router
- ▶ clip for the DIN rail
- ▶ loose power connector
- ▶ quick installation guide

Figure 1: Contents of Package

Contents of Package

3 Router Design

3.1 Router Versions

The OWL 3G is supplied with 2 Ethernet 10/100 and 2 SIM card readers for 3 V and 1.8 V SIM cards. The Ethernet ports and SIM card slots are located on the front panel of the router. This router is available in a metal casing.

Figure 2:   Front panel

3.2 Delivery Identification

Product Name	Product Code	Product Group
OWL 3G	OWL 3G-S20TT9999209SDAHH01.0	Industrial Cellular Router

Table 1:   Delivery identification

Figure 3: Example of Router Label
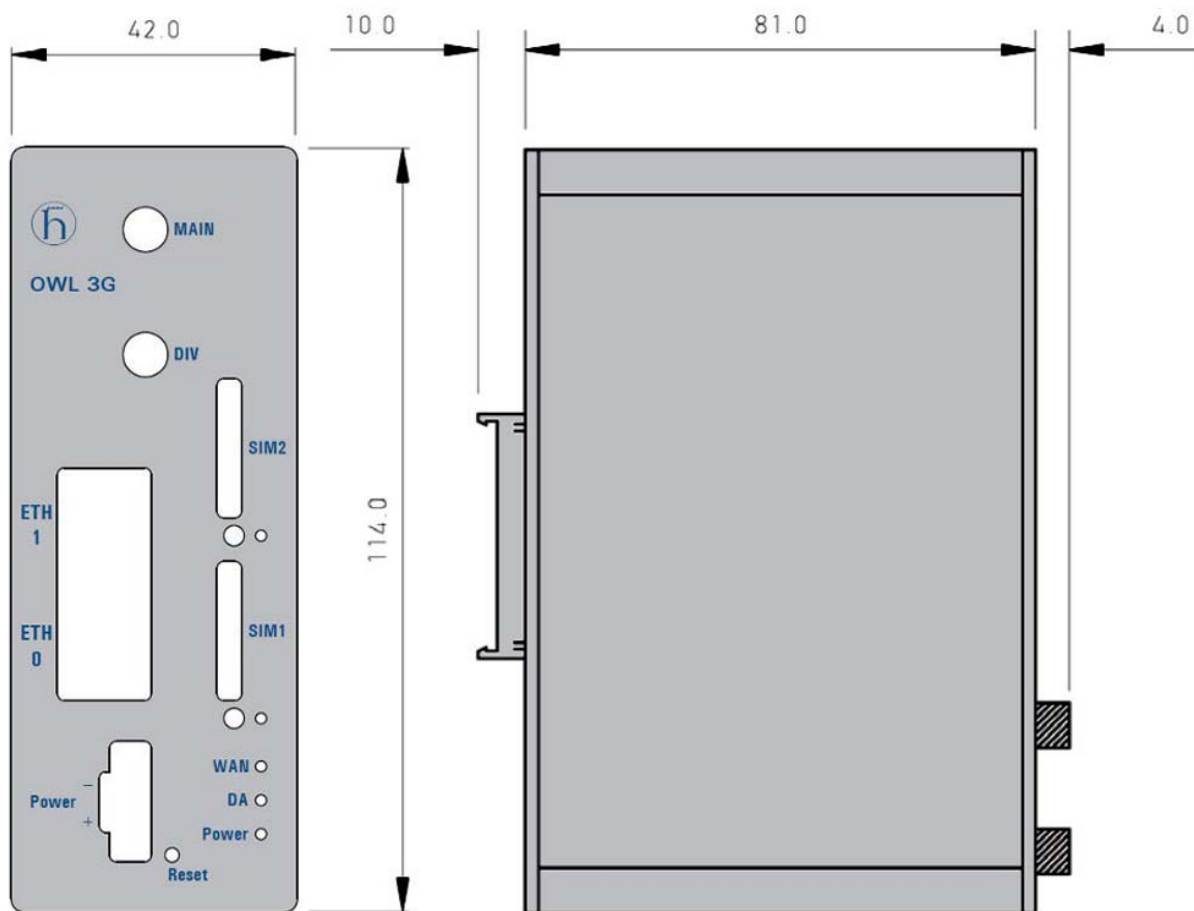
3.3 Basic Dimensions of Router Box

Figure 4:   Basic Dimensions of Router Case

3.4 Mechanical Dimensions and Mounting Recommendations

Mounting recommendations:
▶ possibility to be put on a work surface
▶ DIN rail with ELPAC clip are included

For most of the applications with a built-in router in a switch board, it is possible to recognize two kinds of environments:
▶ no public and industrial environment, having low voltage and high interference
▶ public environment, having low voltage, but without high interference

For both of these environments, it is possible to mount router to a switch board. There is no need to have examination immunity or issues in connection with EMC according to EN 60439-1.

For compliance with the EN 60439-1 standard, it is necessary to connect the router to a switch:
▶ For whip antennas, we recommend to observe a distance of 6 cm from the cables and metal surfaces on every side according to the next picture. To eliminate interference while using an external antenna except for the switch, it is necessary to fit a lightening conductor.
▶ Before mounting a router on sheet-metal, we recommend using an external antenna:
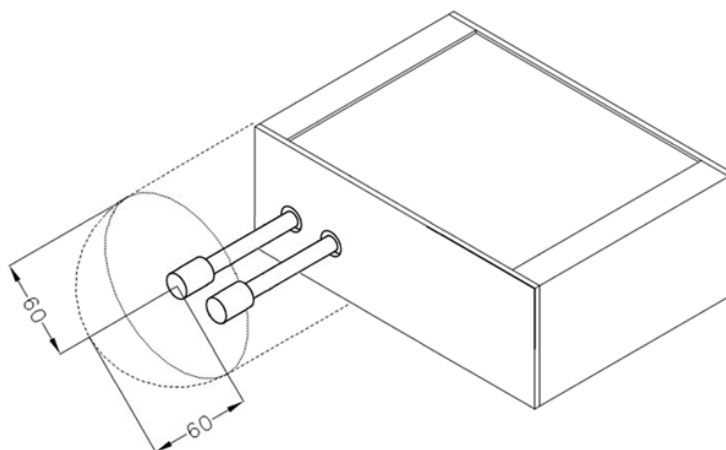
Figure 5:   Space around antennas

For every cable we recommend you bind the bunch according to the following picture. For this use we recommend:

▶ Length of the bunch (combination of power supply and data cables) can be maximum 1.5 m. If the length of data cables exceeds 1.5 m or the cable leads towards the switch, we recommend installing over – voltage protectors (surge suppressors).

▶ With data cables they must not carry cables with working voltage 230 V/50 Hz.

▶ All signals to the sensors must be twisted pairs.

Figure 6:   Cable routing

Sufficient space must be left before individual connectors for handling of the cables:
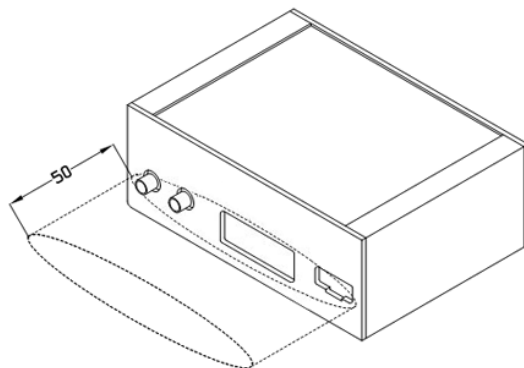
Figure 7:   Space in front of connectors

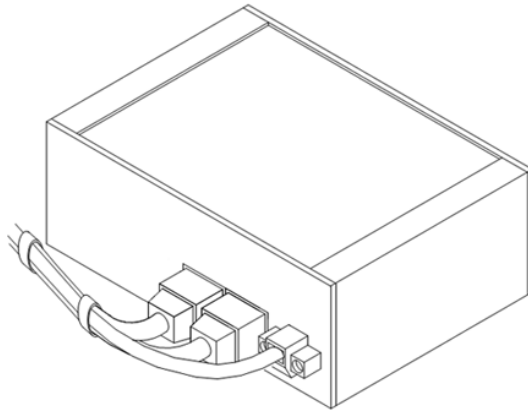For the correct function of the router in the switch-board, use earth-bonding distribution frame for grounding of power supply of router, data cables and antenna.

3.5   Removing from the DIN rail

Default position of holder, used for mounting the router on a DIN rail, is shown in the following figure:

Figure 8:   Default position of DIN holder

To remove the router from the DIN rail, it is necessary to lightly push the router downward so that the bottom part of the holder clears the rail. After the holder clears the rail rotate the bottom part of the router out away from the DIN rail.
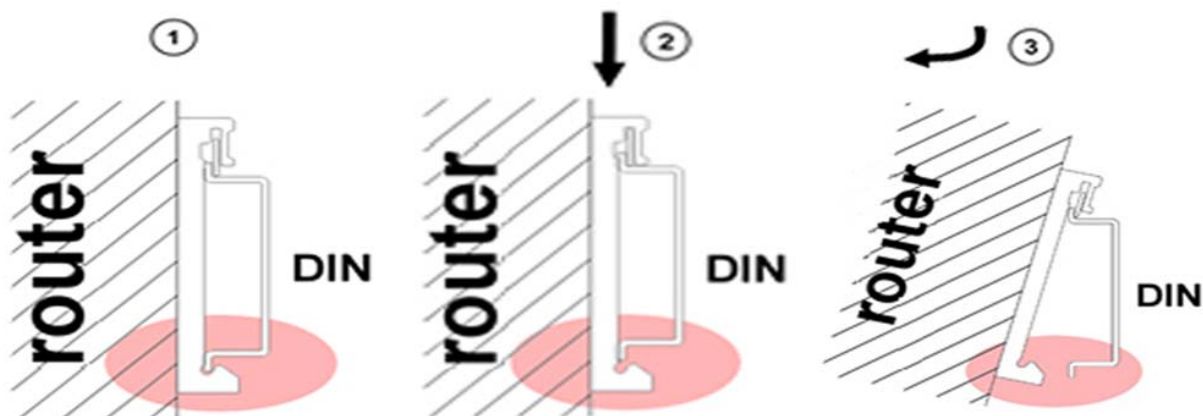
Figure 9:   Removing from the DIN rail

3.6 Description of the Front Panel

The front panel of router contains the following connectors:

Caption	Connector	Description
Power	2-pin	Connector for the power supply adapter
ETH0	RJ45	Connector for connection into the local computer network
ETH1	RJ45	Connector for connection into the local computer network
MAIN	SMA	Connector for main antenna
DIV	SMA	Connector for diversity antenna
SIM1	-	Holder for the first SIM card
SIM2	-	Holder for the second SIM card
Reset	-	Returns the configuration in the router to the default settings.

Table 2:   Delivery identification

Figure 10: Router Front Panel

3.6.1 Status Indication

There are three LED indicators on the front panel and two LED indicators on every port, that provide information about the port status.

Caption	Color	State	Description
Power	Green	Blinking On Fast blinking	Router is ready Starting of the router Updating firmware
WAN		1x flash per sec. 2x flash per sec. 3x flash per sec.	Signal strength is from -50 dBm to -69 dBm Signal strength is from -70 dBm to -89 dBm or difference between neighbors cells is exactly 3 dBm Signal strength is from -90 dBm to -113 dBm or difference between neighbors cells is smaller than 3 dBm
DA	Red	Blinking	Communication in progress on radio channel
ETH0 ETH1	Green	On Off	Selected 100 Mbit/s Selected 10 Mbit/s
ETH0 ETH1		On Blinking Off	The network cable is connected Data transmission The network cable is not connected
SIM1		On	SIM card 1 is active
SIM2		On	SIM card 2 is active

Table 3:   Router Status Indication

The WAN status is updated every 10 seconds. The WAN LED displays the current status.

3.6.2 Power Connector

Panel socket 2-pin.

Pin number	Signal mark	Description
1	VCC(+)	Positive pole of DC supply voltage (+12 to +24 V DC)
2	GND(-)	Negative pole of DC supply voltage (connected to ground)

Table 4:   Connection of Power Connector
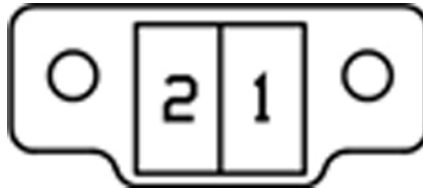
Figure 11: Power connector

The power supply for the router should be between +12 V to +24 V DC supply. Protection against reversed polarity without signaling is built into the router.

The power consumption during receiving is 2.3 W. The peak power consumption during data sending is 5.5 W. For correct operation, it is necessary that the power source is able to supply a peak current of 0.9 A.

Circuit example:

Figure 12: Connection of power supply

3.6.3 Grounding the device (functional earth)

Ground the device by connecting the minus pole (GND) of the power supply to earth. When you mount the device on a DIN rail, then the DIN rail provides the ground.The shield of a shielded twisted pair cable is connected to the housing and the minus pole of the power supply socket.

3.6.4   Antenna Connectors

Main and diversity antennas are connected to the router using the SMA connector on the front panel. The "MAIN" connector is used to connect the main antenna to the router. To connect the diversity antenna, use the second "DIV" antenna connector.
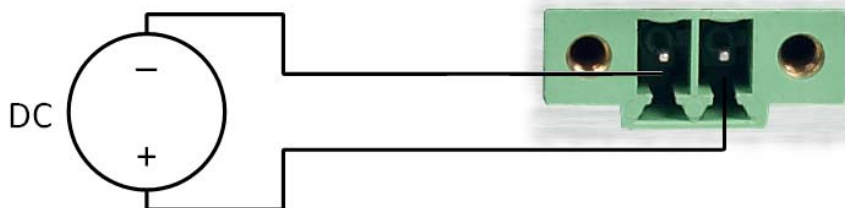
Note: The router can not operate without the main antenna connected.

For connecting the antenna, use an SMA connector. Screw the antennas to the SMA connector on the front panel of the router (see figure below).

Note: Be very careful when tightening the antenna. If you over tighten the antenna, then you will twist the antenna connector off of the circuit board.
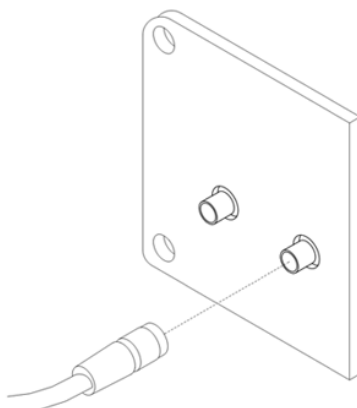
Figure 13: Connecting of the Antenna

The diversity antenna improves radio features of the router at a low signal strength.

3.6.5   SIM Card Reader

Two SIM card readers for 3 V and 1.8 V SIM cards are placed on the front panel of the router. In order for the router to function properly, insert an activated SIM card with the PIN code unblocked in to the Sim card holders. Each SIM cards can have a different APN (Access Point Name).

Note: When changing the SIM Card, pay close attention to the following rules:
▶   Before handling the SIM card, disconnect the router from the power supply.
▶   Press the small button under the SIM slot to eject the SIM Card holder.
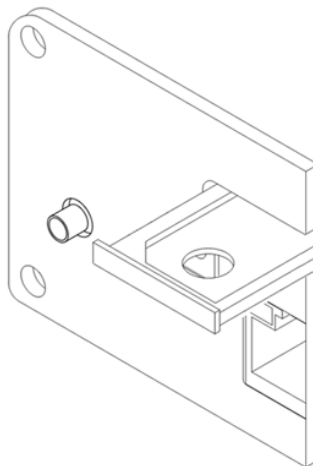
Figure 14: Example of an Ejected SIM Card Holder

3.6.6   **Ethernet Ports ETH0 & ETH1**

Panel socket RJ45.

Pin	Signal mark	Description	Data flow direction
1	TXD+	Transmit Data - positive pole	Input/Output
2	TXD-	Transmit Data - negative pole	Input/Output
3	RXD+	Receive Data - positive pole	Input/Output
4	-	-	
5	-	-	
6	RXD-	Receive Data - negative pole	Input/Output
7	-	-	
8	-	-	

Table 5:   Connection of Power Connector
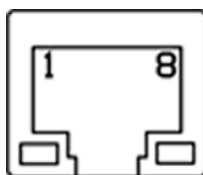
Figure 15: Ethernet Connector

Note: ETH0 and ETH1 ports are not POE (Power Over Ethernet) compatible.

Ethernet cable plugged into the RJ45 connector is labeled as ETH0 or ETH1 (see figure below).
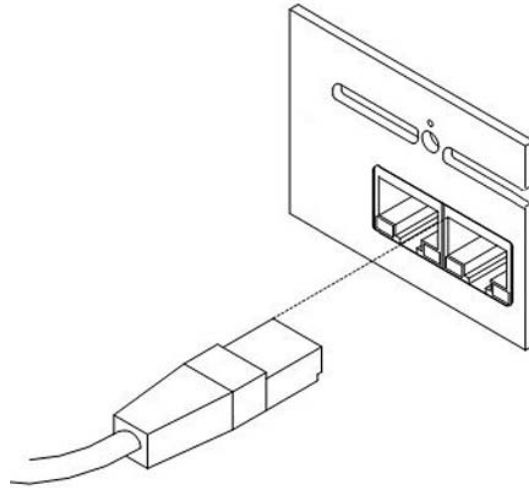
Figure 16: Connection of Ethernet Cable

3.6.7   Reset

When the "Power LED" on the front panel is illuminated, it is possible to restore the default configuration of the router by pressing the "Reset" button. After pressing the "Reset" button, the default configuration is restored and the router reboots (green LED is on).

Note: We recommend that you back up the router configuration before reseting the router. For detailed information about resetting the router refer to the UM-Configuration manual. Resetting the router returns the configuration to the default state.

Use a narrow screwdriver for pressing the "Reset" button located on the front panel.
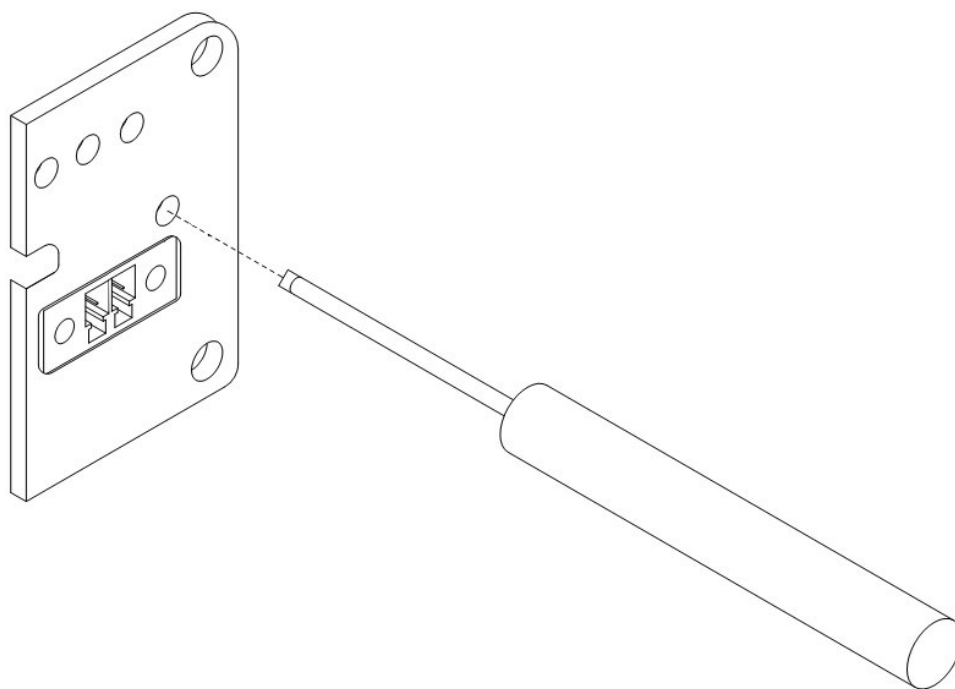
Figure 17: Router Reset

It is important to distinguish the difference between resetting and rebooting the router.

Action	Router behavior	Invoking events
Reboot	Turn off and then turn on router	Disconnect and connect the power, Press the Reboot button in the web configuration
Reset	Restore default configuration and reboot the router	Press Reset button

Table 6:   Description of Reset and Restart Router

4   First Use

4.1 Connecting Components before the First Use

Before putting the router into operation, it is necessary to connect the components which are required to run your applications. Do not forget to insert at least 1 SIM card.

Note: The router can not operate without connecting the main antenna, at lease 1 SIM card and the power supply. If the antenna is not connected, the router can be damaged.

Note: Be very careful when tightening the antenna. If you tighten the antenna beyond firm, then you will twist the antenna connector off of the circuit board.
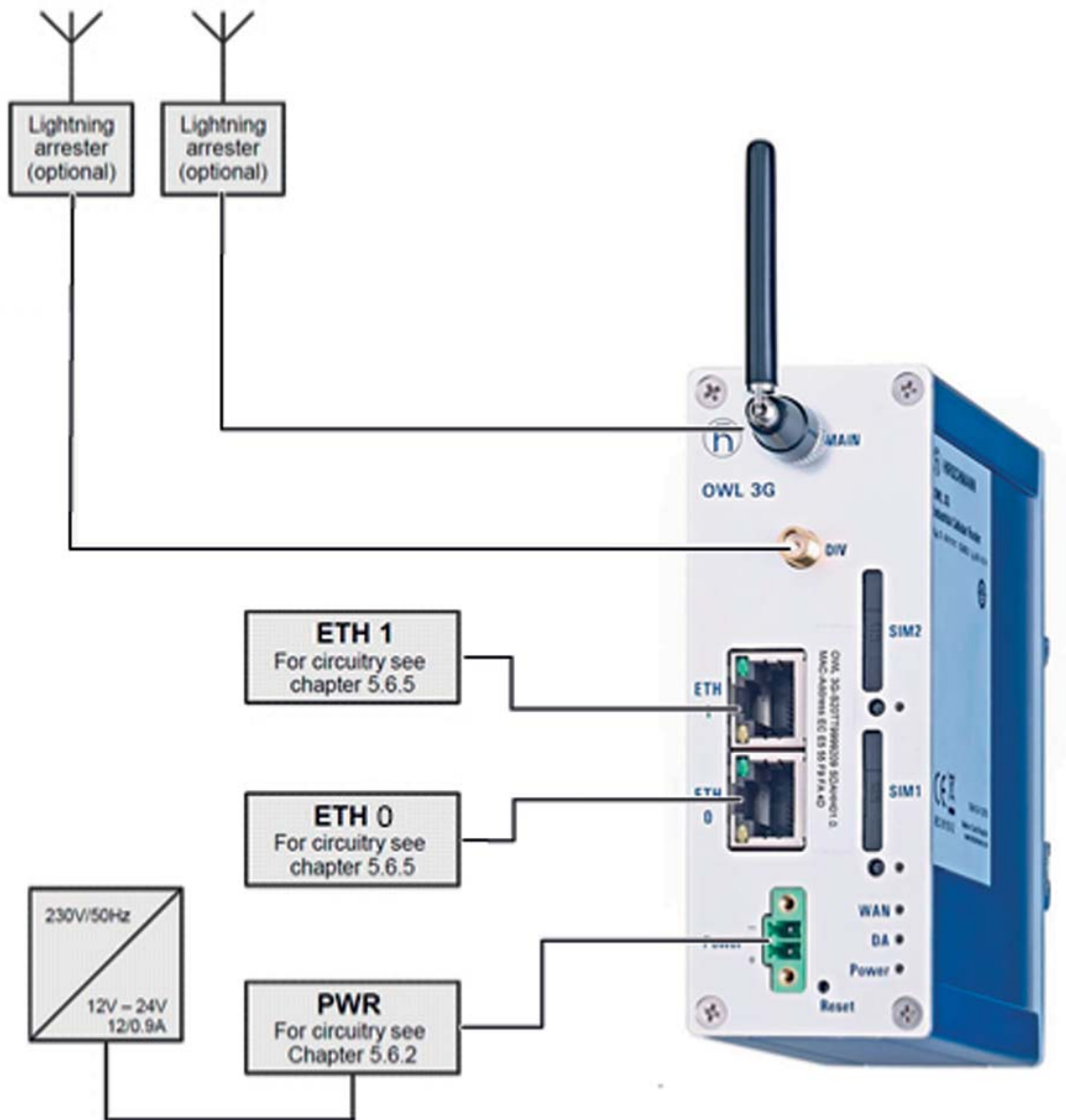
Figure 18: Router Connection

4.2 Start

The router operates when the power supply is connected to this router. By default, the router automatically starts to log in to the default APN. You can change the parameters in router behavior using the web interface. A detailed description of the parameters can be found in the UM-Configuration manual.

The power consumption during receiving is 2.3 W. The peak power consumption during data sending is 5.5 W. For correct operation, it is necessary that the power source supplies a peak current of 0.9 A.

4.3 Configuration

Note: If the SIM card is not inserted in the router, it is impossible to operate the router. Activate the SIM card before inserting it into the SIM card reader.

4.3.1 Configuration using a Web Browser

Status monitoring, configuration and administration of the router is available using the graphical user interface which can be accessed by entering the IP address of the router into your web browser. The default IP address of the router is 192.168.1.1 netmask 255.255.255.0. The default settings allow only the user "admin" with the default password "private" to configure the router.

Note: Use the HTTPS protocol for secure communication.

5 Technical Parameters

5.1 Basic parameters

OWL 3G		
Complies with standards		EN 300 440-2 EN 301 908-1 & -2: ETSI EN 301 489-1 EN 301 489-3 EN 301 489-24, EN 60950-1 IEC 61131-2
Temperature range	Operation Storage	-40°C to +70°C -40°C to +85°C
Cold start	-35 °C -40 °C	Data transfers via mobile network are available immediately Data transfers via mobile network are available approximately in three minutes after the start of the router. Everything else is functional immediately.
Humidity	Operating Storage	0 to 95 % relative humidity non condensing 0 to 95 % relative humidity non condensing
Altitude	Operating	2000 m/ 70 kPa
Protection		IP30
Supply voltage		12 to 24 V DC
Consumption	Reception GPRS UMTS	2.3 W to 3.5 W (GPRS transmission) to 5.5 W (UMTS/HSDPA transmission)
Dimensions		42 x 87 x 113 mm (DIN 35 mm)
Weight		280 g
Antenna connectors		2x SMA - 50 Ohm
Use interfaces	2x ETH	Ethernet (10/100 Mbit/s)

Table 7:   Technical Parameters of the Router

5.2 Technical Parameters of HSPA+ Module

HSPA+ module	
HSPA+ parameters	Bit rate 14.4 Mbps (DL) / 5.76 Mbps (UL) 3GPP rel. 6/7 standardData compress 3GPP
UMTS parameters	Bit rate 384 kbps (DL) / 384 kbps (UL) 3GPP rel. 4 standard
GPRS/EDGE parameters	EDGE bit rate 237 kbps (DL) / 237 kbps (UL)GPRS bit rate 85.6 kbps (DL) / 85.6 kbps (UL)Multi slot class 12, CS 1 to 4, 3GPP rel. 99/4 standard
Support channels	GSM/GPRS/EDGE: Quad band, 850/900/1800/1900 MHz UMTS/HSDPA/HSUPA/HSPA+: Five band, 800/850/900/1900/2100 MHz

Table 8: Technical Parameters of the Module

Depending on the capabilities of the operator.

5.3 Technical Parameters of the Procesor

32b ARM microprocessor	
Memory	512 Mb DDR SDRAM 128 Mb FLASH 1 Mb MRAM
Interface	Serial interface RS232 Ethernet interface 10/100 Mbit/s USB 2.0 interface

Table 9:   Technical Parameters of Processor

6   Recommended literature

6.1　Available Literature

▶ Quick Installation Guide
▶ UM-Configuration Manual

7 Possible problems

7.1 Solutions

Some network cards are able to be set in a situation, when it is not possible to connect directly to the router. Follow the steps below to solve this problem:

▶ manually select the `10 Mb/s` communication rate for the network cards
▶ connect the computer to the router through a switch
▶ start the computer only after the router has completed the boot process

8 FAQ

▶ I can't access the equipment from the internet, which is connected to the router and I have NAT enabled.
  – The device's gateway has to be configured as the router.
▶ Router resets itself, connection on Ethernet fails.
  – It is necessary to use an antenna, which is situated far from the power supply.
▶ I cannot get on the web server at NAT.
  – The remote http access of the router has to be disabled, default server address has to be your web server and the gateway of the web server has to be the IP of router.
▶ PPP connection fails.
  – Check the power signal. If the signal power is weak, you will have to use a better antenna. If the environmental cells have a similar signal, it will be necessary to use a directive antenna. Signal levels have to be in the range -50 dBm and -90 dBm.
  – It is necessary to set ping, which will check the connection and, in the case of fail ping, restart the connection.
▶ PPP connection won't be established.
  – Recheck GPRS settings – APN, name, password and IP address.
  – Try to enter the PIN – verification if the SIM card hasn't set PIN code.
  – In private APN, it is appropriate to switch the DNS server send off.
  – Switch log system on and observe where the error turns up
▶ Connection fails on Ethernet or connection not established.
  – It is possible to switch the auto negotiation off and set a rate and duplex by hand on the ethernet interface of the router.
▶ DynDNS is not functional.
  – In a private APN DynDNS does not function.
  – If the same IP address is recorded in your canonic name as dynamically assign address, it means that the operator is using NAT or firewall.
  – NAT is possible to verify by the help of the ping on address of your server with static IP address and by the help of the router address verify and address in ping.

- – Firewall is possible to verify by remote access on the web interface.
- – The operator does not give out the address of DNS servers and without DNS servers, it is impossible to connect to the server dyndns.org. The following message appears in the log system:
- – DynDNS daemon started
- – Error resolving hostname: no such file or directory
- – Connect to DynDNS server failed
▶ IPSec tunnel is established but communication does not function.
- – Probably it is badly set up route conditionals of connected equipment or it is bad set up GW.
▶ FTP does not function.
- – Router does not support the active FTP mode, supports the passive mode only.
▶ L2TP or IPSec is not established.
- – Verify the reason in the log system.
▶ I switched the router to the offline mode by the SMS message, but the router is in the online mode after restart.
- – Control SMS messages does not change the router configuration. For example, if the router is switched to offline mode by the SMS message, the router will be in this mode up to next restart. This behavior is the same for all the control SMS messages.

9 Customers Support

You can find current information about this product on our website:
http://www.hirschmann.com/en/QR/OWL-Industrial-Cellular-Routers

Upkeep-advices:
– The SIM-card must be handled carefully like a credit card. Do not bend, do not scratch on this and do not expose to static electricity.
– During the cleaning of the router, do not use aggressive chemicals, solvents and abrasive cleaners!

Router fits values of coefficient SAR defined by association ICNIRP and values of "About protection of health before non-ionized radiation".

9.1   CE-marking

Hirschmann hereby declares that the labeled devices comply with the regulations contained in the following European directives:

◼ **2011/65/EU (RoHS)**

Directive of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

◼ **1999/5/EC (R&TTE)**

Directive of the European Parliament and the council for radio installations and telecommunication systems and for the mutual recognition of their conformity.

This product may be operated in all EU (European Union) countries.

In accordance with the above-named EU directives, the EU declaration of conformity will be at the disposal of the relevant authorities at the following address:

Hirschmann Automation and Control GmbH
Stuttgarter Str. 45-51 72654 Neckartenzlingen Germany Tel.: +49 1805 141538

The product can be used in living areas (living area, place of business, small business) and in the industrial areas.

9.2 E marking

The labeled devices comply with the regulations contained in the following European directive:Rule No. 10 of the Economic Commission for Europe (ECE): Devices with an approval are labeled with the E type-approval mark.

A Further Support

■ **Technical Questions**
For technical questions, please contact any Hirschmann dealer in your area or Hirschmann directly.

You will find the addresses of our partners on the Internet at
http://www.hirschmann.com

Contact our support at
https://hirschmann-support.belden.eu.com

You can contact us

in the EMEA region at
▶ Tel.: +49 (0)1805 14-1538
▶ E-mail: hac.support@belden.com

in the America region at
▶ Tel.: +1 (717) 217-2270
▶ E-mail: inet-support.us@belden.com

in the Asia-Pacific region at
▶ Tel.: +65 6854 9860
▶ E-mail: inet-ap@belden.com

■ **Hirschmann Competence Center**
The Hirschmann Competence Center is ahead of its competitors:

▶ Consulting incorporates comprehensive technical advice, from system evaluation through network planning to project planning.
▶ Training offers you an introduction to the basics, product briefing and user training with certification.
The current technology and product training courses can be found at
http://www.hicomcenter.com
▶ Support ranges from the first installation through the standby service to maintenance concepts.

With the Hirschmann Competence Center, you have decided against making any compromises. Our client-customized package leaves you free to choose the service components you want to use.
Internet:
http://www.hicomcenter.com