LTE Industrial Router

ICR-3831

USER MANUAL

ADVANTECH

Used symbols

⚠ *Danger* – Information regarding user safety or potential damage to the router.

❗ *Attention* – Problems that can arise in specific situations.

ℹ *Information, notice* – Useful tips or information of special interest.

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1. Safety Instructions

Please, observe the following instructions:

- The router must be used in compliance with all applicable international and national laws and in compliance with any special restrictions regulating the utilization of the router in prescribed applications and environments.
- To prevent possible injury and damage to appliances and to ensure compliance with all relevant provisions, use only the original accessories. Unauthorized modifications or the use of unapproved accessories may result in damage to the router and / or a breach of applicable regulations. Unauthorized modifications or use of unapproved accessories may void the warranty.
- The router can not be opened.
- Turn off the router and disconnect it from power supply before handling the SIM card.
- **Caution!** This equipment is not suitable for use in locations where children are likely to be present. The SIM card could be swallowed by small children.
- Power supply must not exceed 36 V DC max.
- Do not expose the router to extreme ambient conditions. Protect the router against dust, moisture and high temperature.
- Only routers with appropriate certification and labelling should be used in locations where flammable and explosive materials are present, including gas stations, chemical plants, or locations in which explosives are used. We remind users of the duty to observe the restrictions concerning the utilization of radio devices at such places.
- Switch off the router when travelling by plane. Utilization of the router on a plane may endanger the operation of the plane or interfere with the mobile telephone network, and may be unlawful. Failure to observe these instructions may result in the suspension or cancellation of telephone services for the respective client and / or may result in legal sanctions.
- When using the router in close proximity to personal medical devices, such as cardiac pacemakers or hearing aids, you must proceed with heightened caution.
- The router may cause interference when used in close proximity to TV sets, radio receivers or personal computers.
- It is recommended that you create an appropriate copy or backup of all important settings that are stored in the memory of the device.

2. Product Disposal Instructions

The WEEE (Waste Electrical and Electronic Equipment: 2012/19/EU) directive was introduced to ensure that electrical/electronic products are recycled using the best available recovery techniques to minimize the environmental impact. This product contains high quality materials and components which can be recycled. At the end of it's life this pro- duct MUST NOT be mixed with other commercial waste for disposal. The device contains a battery. Remove the battery from the device before disposal. The battery in the device needs to be disposed of apart accordingly. Check the terms and conditions of your supplier for disposal information.

3. Router Description

ICR-3831 is an industrial cellular router Cat.4 intended for the market in Europe, Middle East and Africa (EMEA) area. This router is designed for railways application. ICR-3831 is an ideal device for wireless communication in mobile networks that make use of LTE, HSPA+ or UMTS technology. Due to the high speed of data transfer up to 100 Mbps (download) and up to 50 Mbps (upload) is this router an ideal solution for railways application. The router has industrial grade operating temperature range is -40 °C to +70 °C.

The standard configuration includes two Ethernet 10/100 ports, one USB 2.0 Host port, two binary inputs and two output (I/O connector) and one serial line RS232. The device also has two readers for 3 V and 1.8 V SIM cards, which are located on the front panel of the router. The router also includes a microSD card port that supports up to 64 GB card storage (32 GB in the case of SDHC cards) and onboard GNSS (GPS, GLONASS, BeiDou, Galileo, QZSS).

The router can be equipped with PoE PD (Power over Ethernet – Powered Device), which allows the router to be powered via Ethernet.

Configuration of the router may be done via a password-protected Web interface. Web interface provides detailed statistics about the router's activities, signal strength, detailed system log etc. The router supports the creation of VPN tunnels using IPSec, OpenVPN and L2TP to ensure safe communication. DHCP, NAT, NAT-T, DynDNS, NTP, VRRP, control by SMS, backup primary connection and many other functions are supported.

The router provides diagnostic functions which include automatically monitoring the PPP connection, automatic restart in case of connection losses, and a hardware watchdog that monitors the router status. The user may insert Linux scripts which are started on various actions. It is possible to create up to four different configurations for the same router. These configurations can be switched whenever necessary via Web interface, SMS or binary input status. The router can automatically upgrade its configuration and firmware from your central server. This allows for mass reconfiguration of numerous routers at the same time.

The router also supports additional software like R-SeeNet for permanent traffic monitoring of routers.

Examples of possible applications

- railways application
- mobile office
- fleet management
- security system
- telematic
- telemetric
- remote monitoring
- vending and dispatcher machines

3.1 Usage of the Router

The router is primarily intended for these four basic situations:

I. Access to the Internet from LAN

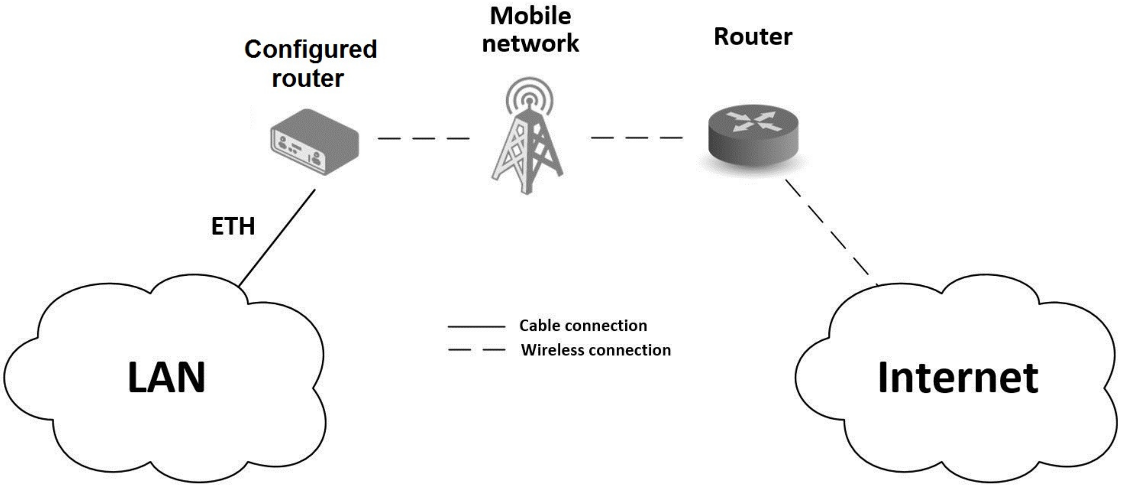


Figure 1: Access to the Internet from LAN

II. Backed up access to the Internet (from LAN)

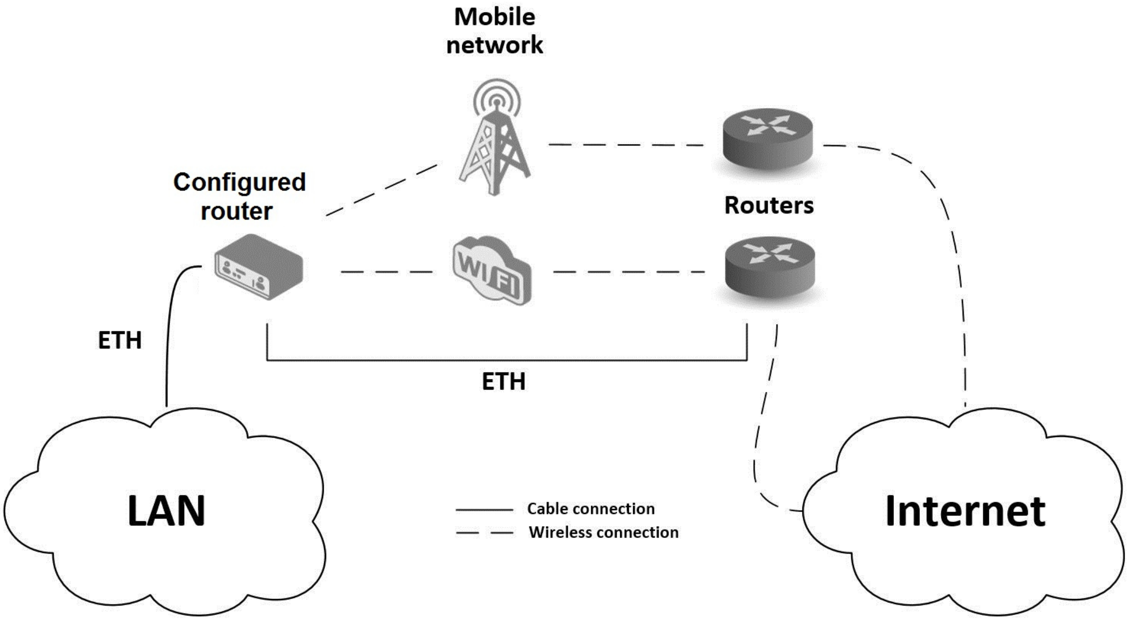


Figure 2: Backed up access to the Internet

III. Secure networks interconnection or using VPN

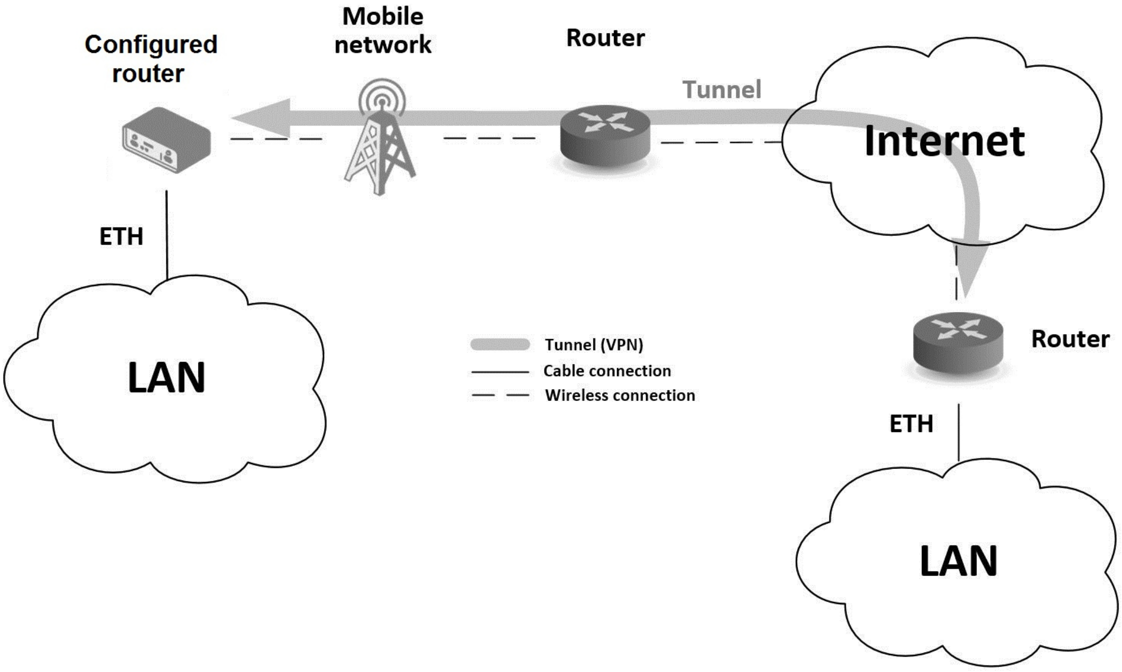


Figure 3: Using VPN tunnel

IV. Serial Gateway

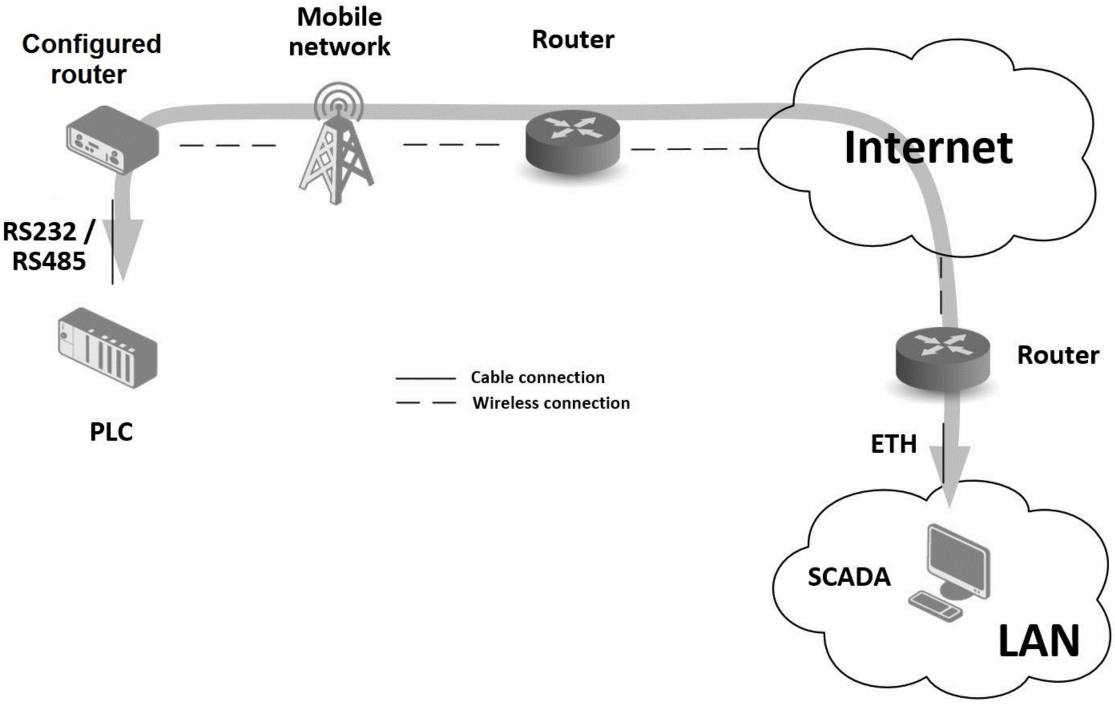


Figure 4: Serial Gateway

4. Contents of Package

The standard package of router includes items listed in the following table:

Item#	Description	Figure	Q’ty
1	ICR-3831B or ICR-3831BD router		1 pcs
2	Printed *Quick Start Guide Leaflet*		1 pcs

Table 1: Contents of package

5. Router Design

5.1 Router Versions

ICR-3831 router is supplied in the following versions (see table below). All versions are available in metal box.

Router versions	**SIM**	**BIN**	**BOUT**	**ETH**	**GNSS**	**PoE PD**	**RS232**
ICR-3831B	2 x	2 x	2 x	2 x	1 x		1 x
ICR-3831BD	2 x	2 x	2 x	2 x	1 x	1 x	1 x

Table 2: Router versions

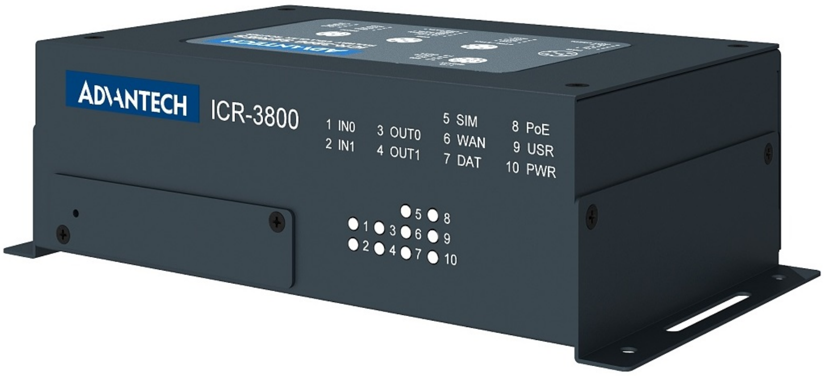
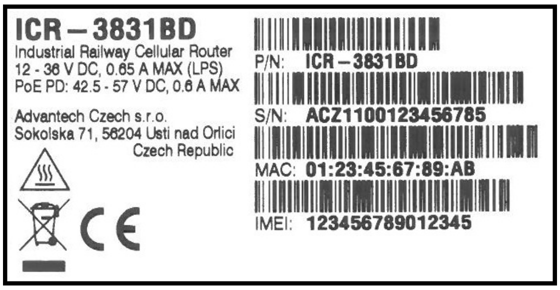


Figure 5: Both versions

5.2 Device Labels



ICR – 3831BD
Industrial Railway Cellular Router
12 - 36 V DC, 0.65 A MAX (LPS)
PoE PD: 42.5 - 57 V DC, 0.6 A MAX

Advantech Czech s.r.o.
Sokolska 71, 56204 Usti nad Orlici
Czech Republic

P/N: ICR – 3831BD
S/N: ACZ1100123456785
MAC: 01:23:45:67:89:AB
IMEI: 123456789012345

Figure 6: Labels Example

5.3 Order Codes

Order codes overview is shown in the table below.

Product type	Product name	Order code	Features – interfaces
ICR-3800	ICR-3831	ICR-3831B	LTE module for EMEA, 2x ETH, 2x BI, 2x BO, 1x RS232, 1x USB, 2x SIM reader, GNSS
ICR-3800	ICR-3831	ICR-3831BD	LTE module for EMEA, 2x ETH, 2x BI, 2x BO, 1x RS232, 1x USB, 2x SIM reader, GNSS, PoE PD

Table 3: Order Codes Overview

5.4 Basic Dimensions of the Router Box

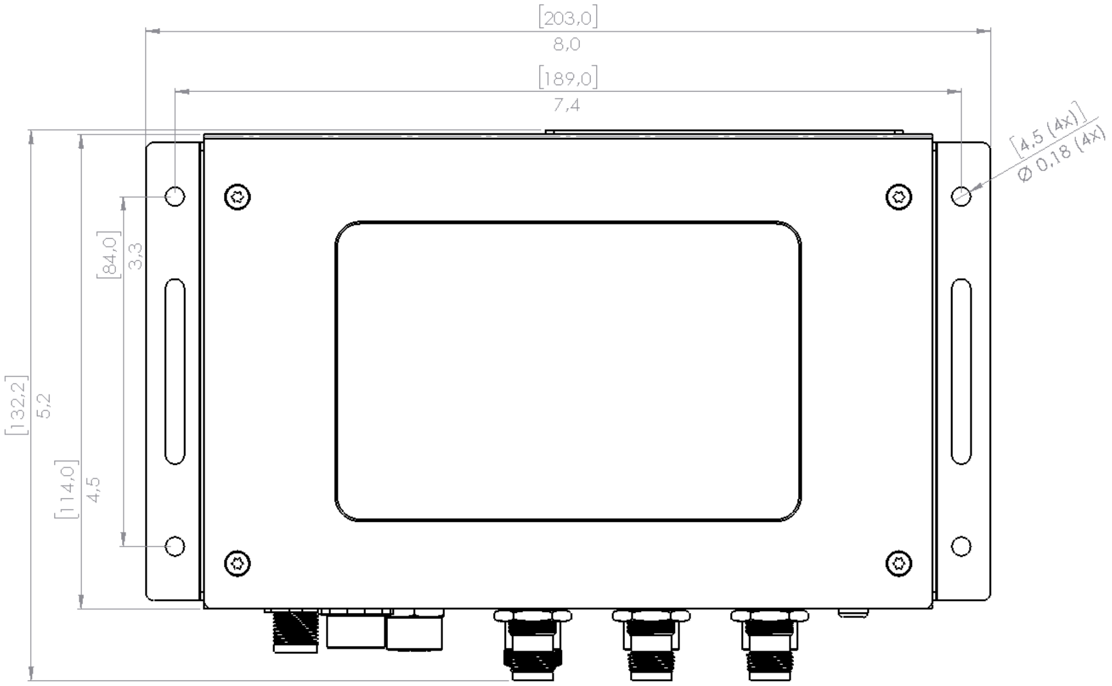


Figure 7: Basic dimensions of the router box

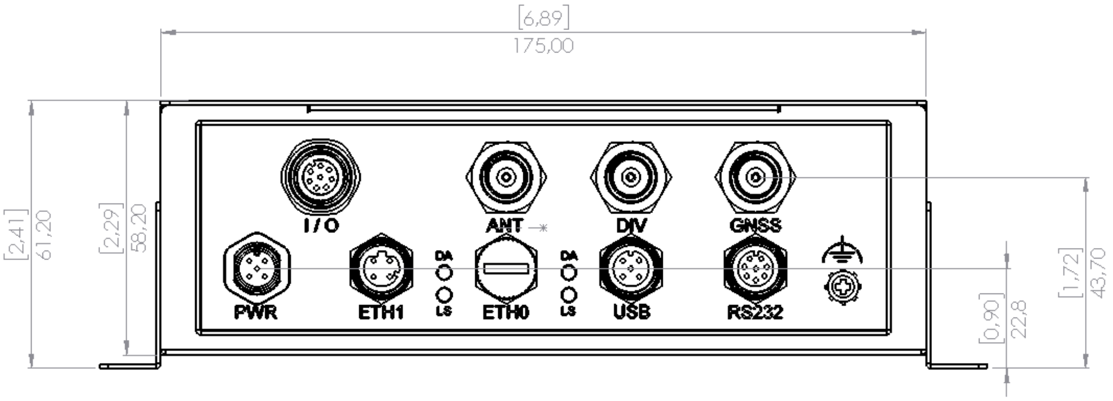


Figure 8: Basic dimensions of the router box

5.5 Mounting Recommendations

The router can be placed:

- on a flat surface,
- on a wall (or another surface) using the side wings.

For most applications with a built-in router within a switchboard, it is possible to recognize two kinds of environments:

- A non-public, industry environment of low voltage with high interference,
- a public environment of low voltage and without high interference.

For both of these environments, it is possible to mount the router to a switchboard, after which there is no need to have examination immunity or issues in connection with EMC according to EN 61439-1:2011.

> ! In compliance with the EN 61439-1:2011 specification, it is necessary to observe the following assembly instructions for a router attached to a switchboard:

- For whip antennas it is recommended to observe a minimum distance of 6 cm from cables and metal surfaces on every side in order to avoid interference. When using an external antenna separate from the switchboard it is necessary to fit a lightning conductor.
- When mounting a router on sheet-steel we recommend using a cable antenna.
- For all cables, we recommend to bind the bunch, and for this we recommend:
  - The length of the bunch (the combination of power supply and data cables) should be a maximum 1.5 m. If the length of data cables exceeds 1.5 m or if the cable is leading towards the switchboard, we recommend installing surge protectors.
  - Data cables must not have a reticular tension of $\sim$ 230 V/50 Hz or $\sim$ 120 V/60 Hz.
- Sufficient space must be left between each connector for the handling of cables,
- To ensure the correct functioning of the router we recommend the use of an earth-bonding distribution frame for the grounding of the power supply of the router, data cables and antenna within the switchboard.

5.6 Description of the Front Panel

On the front panel of the router, there are located:

Caption	Description
RST	*RST* button used to restore the default configuration and reboot the router
SIM1	SIM card reader for 3 V and 1.8 V SIM cards
SIM2	SIM card reader for 3 V and 1.8 V SIM cards
SD	Micro SD card reader

Table 4: Description of the front panel

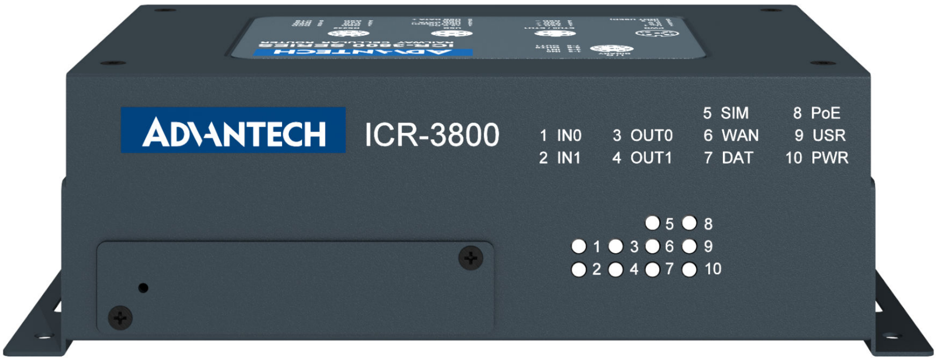


Figure 9: The front panel of the router

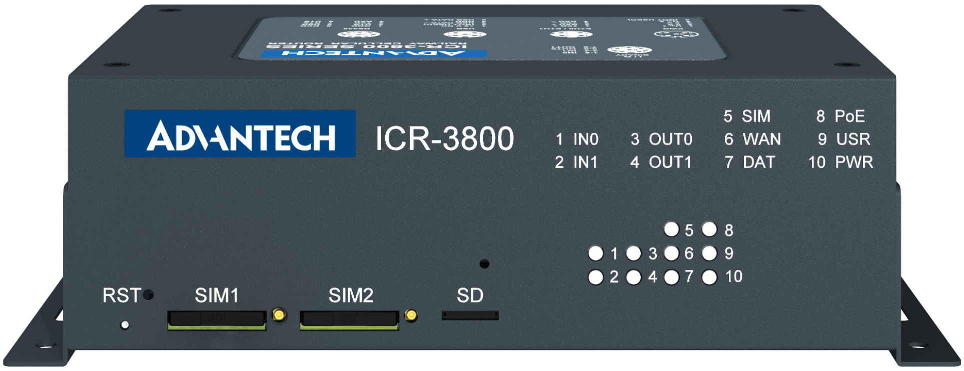


Figure 10: The front panel of the router with removed the metal plate

5.6.1 Reset

When the *PWR* LED starts flashing on the front panel, it is possible to restore the default configuration of the router by pressing the *RST* button on the front panel. After pressing this button the default configuration will be restored and the router will reboot (after which the green LED will be on).

It is necessary to use a narrow screwdriver or any other small tool to press the *RST* button.

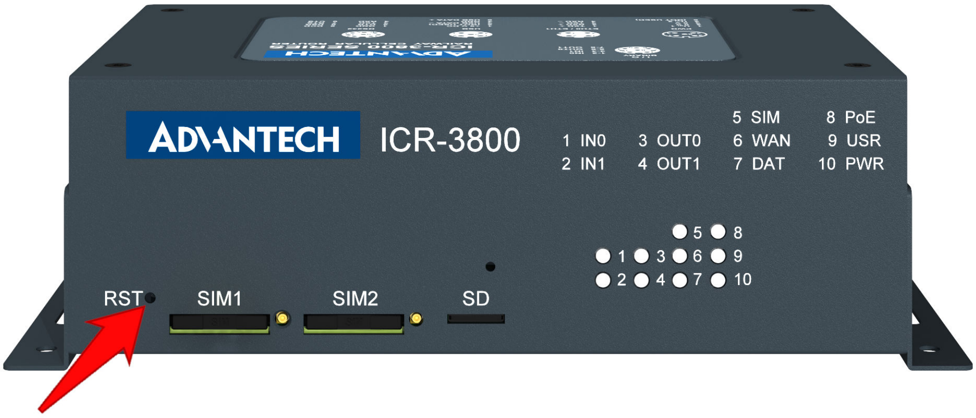


Figure 11: Router reset

Before resetting the router, it is recommended to back up the router configuration settings (see *Configuration manual*) because resetting the router will return all configuration settings to their default states.

It is important to distinguish between the router reset and reboot.

Action	Router behavior	Invoking events
Reboot	Turns off and then turns on the router	Disconnect and reconnect the power, press the *Reboot* button in the web configuration
Reset	Restores the default configuration and reboots the router	Press the *RST* button

Table 5: Description of router reset and restart

5.6.2 SIM Card Reader

Two SIM card readers for 3 V and 1.8 V SIM cards are located on the front panel of the router. To access the SIM card readers, remove the metal plate by removing the screws. In order for the router to function, it is necessary to insert an activated SIM card with an unblocked PIN code, or you can enter the PIN code in the router web interface. The SIM cards may have different APNs (Access Point Names) adjusted.

Type of SIM cards: Mini SIM (2FF) 25.0 x 15.0 x 0.76 mm.

Changing the SIM card:

- Always disconnect the router from the power supply before handling the SIM card.
- Unscrew the SIM card cover.
- To remove the SIM card, use the flat end of a spudger, or your fingernail, press the SIM card slightly into its slot until you hear a click.
- After hearing this click, release the card, and it will pop out of its slot.
- Remove the SIM card and push any other SIM card into the slot until it clicks into place.

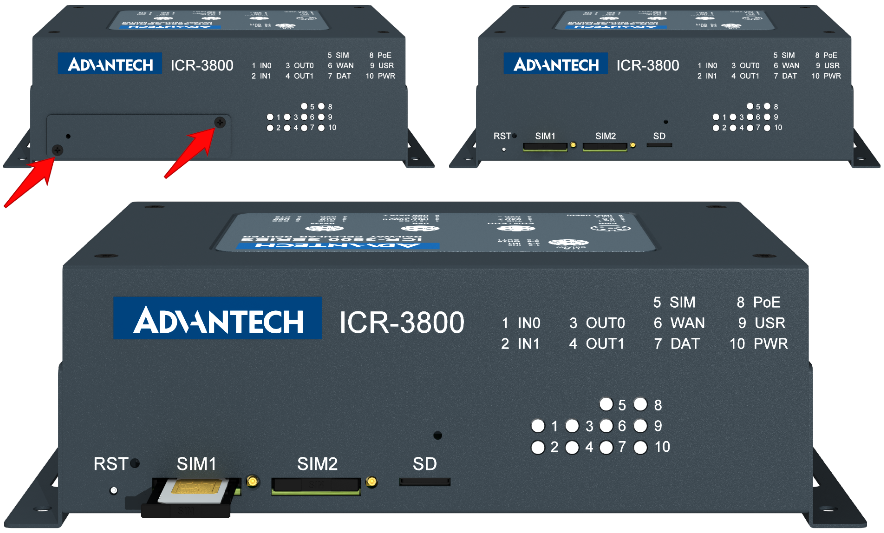


Figure 12: SIM card reader

5.6.3 MicroSD card reader

The microSD card reader is located on the front panel of the router (the third slot) under a metal cover. This card reader allows the router to operate with microSD memory cards. The technical specifications are stated in the table below. The microSD card changing procedure is described below.

Technical specifications of microSD card		
Supported technologies		SDHC, SDXC
Supported capacity	SDHC	up to 32 GB
	SDXC	from 32 GB to 64 GB
Supported microSD card filesystems		vfat, ext2, ext3, ext4

Table 6: Technical specifications of microSD card

Changing the microSD card:

- To remove the microSD card, use the flat end of a spudger, or your fingernail, press the microSD card slightly into its slot until you hear a click.
- After hearing this click, release the card, and it will pop out of its slot.
- Remove the microSD card and push any other microSD card into the slot until it clicks into place.

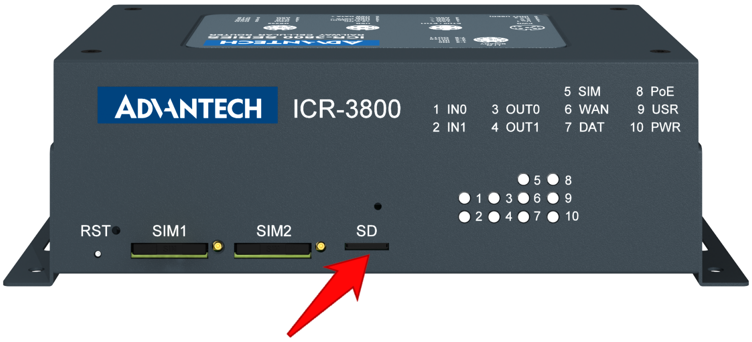


Figure 13: MicroSD card

Mounting microSD Card to the System

It is necessary to mount the microSD card to be able to access it in the system of the router. Follow these steps to mount the card:

- Use the *dmesg* command to see the list of recently connected devices.

- In the output of the command find out the entry for the microSD card, for example:
  `mmcblk0: p1`
- To mount the card to to *mnt* directory, use the *mount* command:
  `mount /dev/mmcblk0p1 /mnt`

For more information about the commands for creating, mounting, checking and unmounting a file system on a microSD card, see the application note for Ext4_tools router app.

5.6.4 Status Indication

There are ten LED indicators on the front panel to provide router status information.

	Caption	Color	State	Description
1	IN0	Green	Blinking	Binary input no. 0 is active
2	IN1	Green	Blinking	Binary input no. 1 is active
3	OUT0	Yellow	Blinking	Binary output is active
4	OUT1	Yellow	Blinking	Binary output is active
5	SIM	Yellow Green	Blinking (Yellow color) On (Green color)	SIM card 1 is active SIM card 2 is active
6	WAN	Yellow	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 betwwen neighbors cells is smaller than 3 dBm
7	DAT	Red	Blinking	Communication in progress on radio channel
8	PoE	Green	Blinking	PoE is active
9	USR	Yellow	—	Function of this LED diode can be selected by user
10	PWR	Green	Blinking Blinking Fast blinking	Router is ready Starting of the router Updating firmware

Table 7: Status indication

5.7 Description of the rear panel

The rear panel of the router contains the following conectors:

Caption	Connector	Description
Power	5-pin A-coded M12	Connector for the power supply adapter
ETH0	4-pin D-coded M12	Connector fort connection into the local computer network
ETH1	4-pin D-coded M12	Connector fort connection into the local computer network
ANT	TNC	Connector for main antenna
DIV	TNC	Connector for diversity and MIMO diversity
GNSS	TNC	Connector for GNSS antenna
USB	5-pin A-coded M12	Connector for connection of USB devices to the router. Supports devices with PL-2303 and FTDI USB/RS232 converters.
I/O	8-pin A-coded M12	Connector for connection of the binary inputs and output
RS232	8-pin A-coded M12	Connector for serial RS232 connection

Table 8: Description of the rear panel

5.7.1 I/O Port

8-pin A-coded M12.

Pin number	Signal mark	Description
1	IN0	Binary input 0
2	IN0	Binary input 0
3	IN1	Binary input 1
4	OUT0	Binary output 0
5	OUT1	Binary output 1
6	OUT0	Binary output 0
7	IN1	Binary input 1
8	OUT1	Binary output 1

Table 9: I/O connector pin-outs of power connector

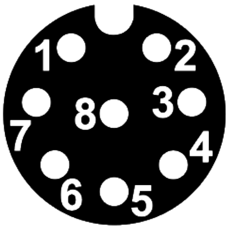


Figure 14: I/O connector

The I/O user interface is designed for processing binary input and control binary output. The binary output is inactive in the default configuration. The insulation strength is 1.5kV. The pins are isolated from each other with the same strength.

The input circuits are bipolar and allow connections as needed with a common plus or minus, according to connection of the external voltage.

Binary inputs

Charakteristics of inputs:

Logical O/1	Voltage	Current
log. 0 max	3 V	0.4mA
log. 1 min	5 V	0.7mA
log. 1 type	12 V	2mA
log. 1 max	60 V	7mA

Table 10: Characteristics of inputs

To retrieve the binary input status from the Shell use either *io get bin0* or *io get bin1*.

Binary output

- Binary output parameters:
  - 60 V AC / 300 mA
  - 60 V DC / 300 mA
- The current of the binary output is limited by a resettable fuse (300 mA).

Binary inputs and output connections

Binary inputs and output connections example:

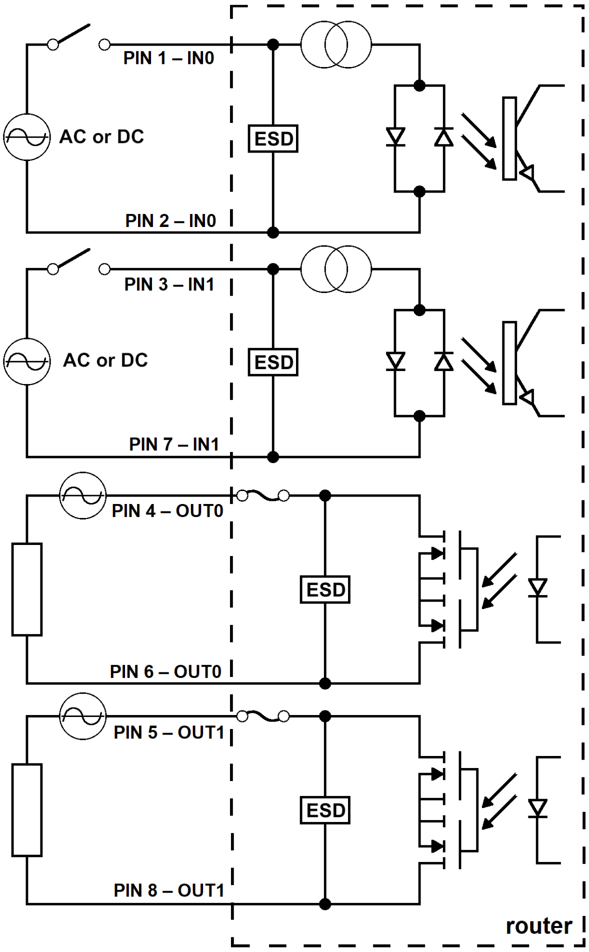


Figure 15: Binary connection

5.7.2 Antenna Connector ANT, DIV and GNSS

The main and diversity antennas are connected to the router using the TNC connectors on the rear panel.

The *ANT* connector is used to First, connect the main antenna to the router. To connect the diversity antenna, the second antenna connector *DIV* is used. The third connectors named *GNSS* is used to connect the GNSS antena.

! The router can not operate without a main antenna connected through the port marked as *ANT*!

Recommended tightening moment for screwing the antenna to TNC connectors is 0.9 Nm.

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

5.7.3 Power Connector PWR

5-pin A-coded M12.

Pin number	Signal mark	Description
1	U$_{IN}$ 1	Positive pole of DC supply voltage (+12 to +36 V DC)
2	0 V	Negative pole of DC supply voltage
3	0 V	Negative pole of DC supply voltage
4	U$_{IN}$ 2	Positive pole of DC supply voltage (+12 to +36 V DC)
5	—	Not used

Table 11: Connection of power connector

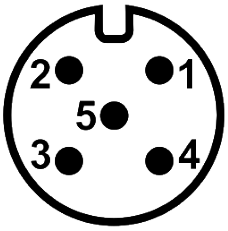


Figure 16: Power connector

Power supply for router is required between +12 V to +36 V DC supply. Protection against reversed polarity without signaling is built into the router.

Note: The protection against reversed polarity is lost if the negative pole is grounded! The only protection left is the fuse inside of the device.

For correct operation it is necessary that the power source is able to supply a peak current of 1.2 A.

Unit has to be supplied by a power supply specified as a Limited Power Source (LPS) or CEC/NEC Class 2 source of supply.

The router power supply is galvanically isolated. All metal parts, including the box, are connected together. To ground the router can be used the grounding screw located on the front panel.

5.7.4 Low Power Model

> In applications requiring low power consumption (such as solar power - not 7/24 mode) is strictly recommended to use LPM mode prior to powering down the entire router.

LPM (Low Power Mode) is a router mode where the router is in sleep mode with minimal power consumption; see Chapter 7.1 for the LPM consumption. The router can be woken up from this mode by a signal applied to the BIN1 input or after a predetermined period of time. Putting the router into LPM mode can be done using the `lpm` command, see Commands and Scripts application note for more details.

5.7.5 Ethernet Port ETH0 and ETH1

4-pin D-coded M12 socket.

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

Table 12: Connection of Ethernet connector

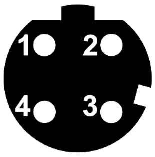


Figure 17: Ethernet connector

5.7.6 Status Indication

There are four LED indicators on the rear panel to provide router status information.

Caption	Color	State	Description
ETH0 ETH1	Green	On Off	Selected 100 Mbit/s Selected 10 Mbit/s
ETH0 ETH1	Yellow	On Blinking Off	The network cable is connected Data transmission The network cable is not connected

Table 13: Status indication

5.7.7 USB Port

Panel 5-pin A-coded M12 USB

Pin	Signal Mark	Description	Data flow direction
1	+5 V	Positive pole of 5 V DC supply voltage, 0.5 A	
2	N.C.	Not used	
3	USB data -	USB data signal – negative pole	Input/Output
4	GND	GND Negative pole of DC supply voltage	
5	USB data +	USB data signal – postive pole	Input/Output

Table 14: Connection of USB connector

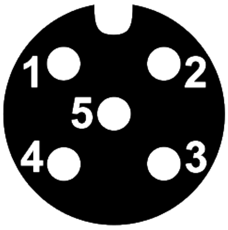


Figure 18: USB connector

The USB port is disabled on overload to prevent its damage (connected device is trying to get too high current). The port is enabled again after the reboot of the router.

The router supports the following USB/RS232 converters:

- FTDI
- Prolific PL2303
- Silicon Laboratories CP210x

5.7.8 Serial Port RS232

8-pin A-coded M12 socket.

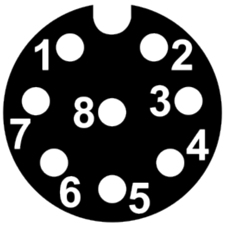


Figure 19: RS232 connetor

Pin	Signal mark	Description
1	GND	Signal ground
2	DTR	Data terminal ready
3	TXD	Transmit Data
4	RXD	Receive Data
5	DCD	Data carrier detect
6	DSR	Dataset ready
7	RTS	Request to send
8	CTS	Clear to send

Table 15: Connection of RS232

The RS232 converter is protected against as overload on the bus.

5.7.9 Grounding the Device

The device is grounded via the separate ground screw.

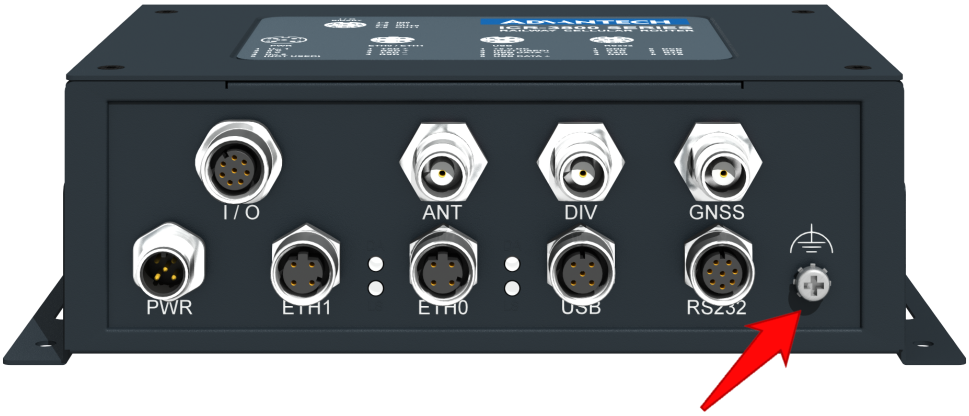


Figure 20: Grounding screw

All metal parts, including the box, are connected together. To ground the router use the grounding screw located on the rear panel.

6. First Use

6.1 Connecting the Router Before First Use

Before putting the router into operation it is necessary to connect all of the components that are required to run your applications. Don't forget to insert a SIM card.

> ! The router can not operate without a connected antenna, SIM card and power supply. If the antenna is not connected, the router may be damaged.

6.2 Start

The router will start when a power supply is connected to the router. By default, the router will automatically start to log on to the default APN. The DHCP server will start to assign addresses for devices connected through the Ethernet port ETH0. Router's behavior can be changed via the web interface. This is described in detail in the *Configuration manual for ICR-3800 routers*.

6.3 Configuration

> ! If no SIM card is inserted in the router, it is not possible for the router to operate. Any inserted SIM card must have active data transmission.

6.3.1 Configuration by Web Browser

For status monitoring, configuration and administration of the router a web interface is available which can be accessed by entering the IP address of the router into the web browser. The default IP address of the router is 192.168.1.1. **Attention, it is necessary to use HTTPS protocol for secure communication over a network!**

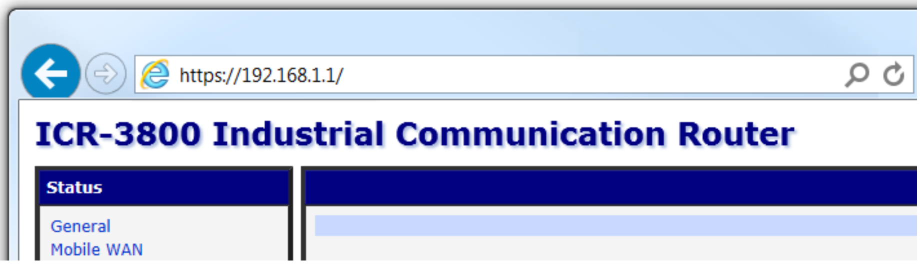


Figure 21: Entering the IP address of the router

By default, configuration of the router can only be performed with the default username **"root"**. The default password is printed on the router's label.[1] Change the default password as soon as possible!

All routers have the *WebAccess/DMP* client pre-installed by default. The activated client periodically uploads router identifiers and configuration to the *WebAccess/DMP* server. See the configuration manual [1], chapter *Basic Information -> WebAccess/DMP Configuration*, for more information.

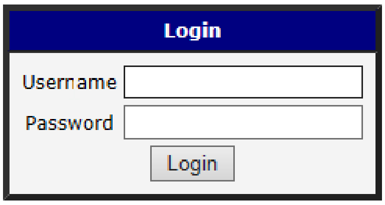
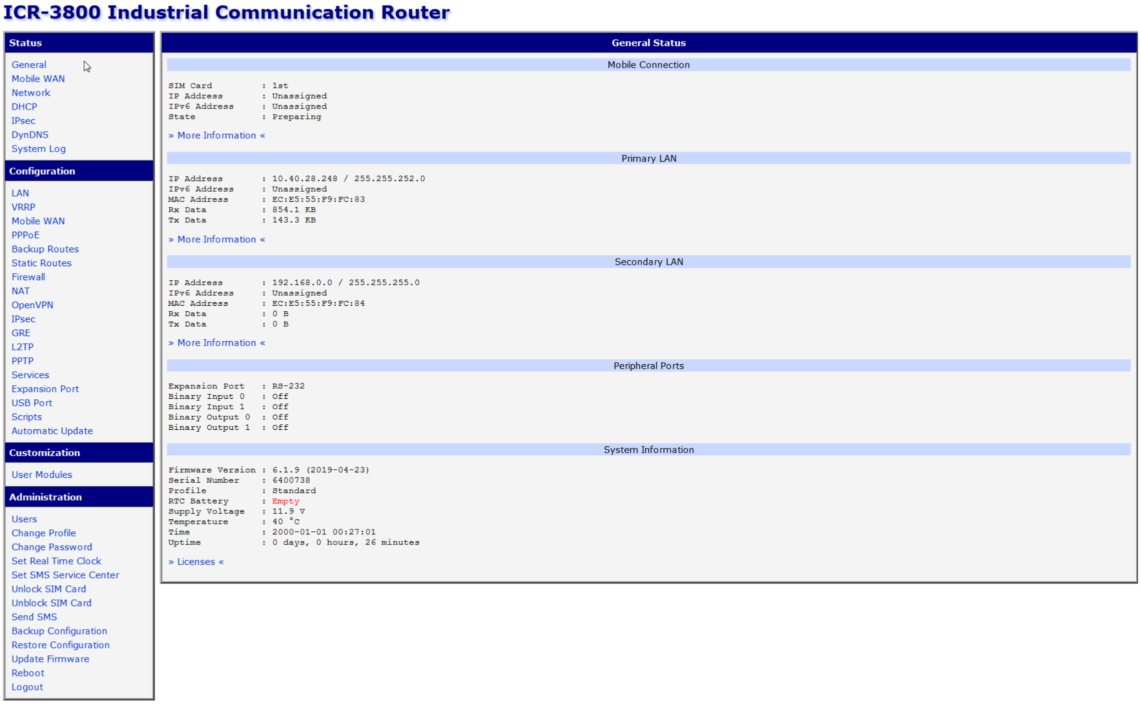


Figure 22: Entering login information

After successfully entering login information, the user will have access to the router web interface via their browser.



```
SIM Card         : 1st
IP Address       : Unassigned
IPv6 Address     : Unassigned
State            : Preparing

IP Address       : 10.40.28.248 / 255.255.252.0
IPv6 Address     : Unassigned
MAC Address      : EC:E5:55:F9:FC:83
Rx Data          : 854.1 KB
Tx Data          : 143.3 KB

IP Address       : 192.168.0.0 / 255.255.255.0
IPv6 Address     : Unassigned
MAC Address      : EC:E5:55:F9:FC:84
Rx Data          : 0 B
Tx Data          : 0 B

Expansion Port   : RS-232
Binary Input 0   : Off
Binary Input 1   : Off
Binary Output 0  : Off
Binary Output 1  : Off

Firmware Version : 6.1.9 (2019-04-23)
Serial Number    : 6400738
Profile          : Standard
RTC Battery      : Empty
Supply Voltage   : 11.9 V
Temperature      : 40 °C
Time             : 2000-01-01 00:27:01
Uptime           : 0 days, 0 hours, 26 minutes
```

Figure 23: Router web interface

A detailed description of the router settings in the Web interface can be found in the *Configuration manual for ICR-3800 routers*.

---

[1] If the router's label does not contain a unique password, use the password "root".

7. Technical Parameters

7.1 Basic Parameters

Router parameters		
Temperature range	Operating Storage	-40 °C to +70 °C -40 °C to +85 °C
Humidity	Operating Storage	0 to 95 % relative humidity non condensing 0 to 95 % relative humidity non condensing
Altitude	Operating	2000 m / 70 kPa
Degree of protection		IP40
Supply voltage		12 to 36 V DC
Consumption	Idle Average Peak Sleep mode	4 W 6.8 W 11 W 2.8 W
Dimensions of device		61,4 x 131 x 214 mm
Weight	Metal box	approximately 950 g
Antenna connectors		2x TNC for cellular – 50 Ω 1x TNC for GNSS – 50 Ω
User interface	1x I/O 2x ETH USB RS232	8-pin A-coded M12 panel socket Ethernet (10/100 Mbit/s) USB 2.0 (8-pin A-coded M12 socket)

Table 16: Basic parameters

7.2 Standards and Regulations

The router complies with the following standards and regulations:

Standards and regulations	
Radio	EN 301 511, EN 301 908-1, EN 301 908-2, EN 301 908-13, EN 303 413
EMC	EN 301 489-1, EN 301 489-19, EN 301 489-52, EN 61000-4-2 EN 61000-6-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 50121-3-2
Safety	IEC 62368-1
Climatic	EN 60068-2-2, EN 60068-2-1, EN 60068-2-14, EN 60068-2-14, EN 60068-2-30
Mechanical	EN 61373, EN 60529
Transportation	EN 50155, EN 45545-1
National	CE
Environmental	REACH, RoHS3 and WEEE compliant

Table 17: Standards and regulations

7.3 Type Tests and Environmental Conditions

Phenomena	Test	Description	Test levels
ESD	EN 61000-4-2	Enclosure contact	± 6 kV (crit. A)
RF field AM modulated	IEC 61000-4-3	Enclosure	20 V/m (80 – 1000 MHz) 10 V/m (1000 – 4000 MHz)
Fast transient	EN 61000-4-4	Signal ports Power ports Ethernet ports	± 2 kV ± 2 kV ± 2 kV
Surge	EN 61000-4-5	Ethernet ports Power ports I/O ports	± 2 kV, shielded cable ± 1 kV, L to L ± 2 kV, L to GND ± 1 kV, L to L ± 2 kV, L to GND
RF conducted	EN 61000-4-6	All ports	10 V/m (0,15 – 80 MHz)
Radiated emission	EN 55022	Enclosure	Class A
Conducted emission	EN 55022	DC power ports Ethernet ports	Class A Class A
Dry heat	EN 60068-2-2	+70 °C *, 40 % rel. humidity	
Cold	EN 60068-2-1	-40 °C *	
Damp heat	EN 60068-2-30	95 % rel. humidity (+55 °C)	

Table 18: Type tests and environmental conditions

7.4 Technical Parameters of Cellular Module

Technical parameters of cellular module	
LTE parameters	**Bit rates:** 150 Mbps (DL) / 50 Mbps (UL) LTE FDD Cat.4, 3GPP release 9 compliant **Supported frequencies:** B20 (800 MHz), B8 (900 MHz), B3 (1800 MHz), B1 (2100 MHz), B7 (2600 MHz) **Typical max. power:** 23 dBm
HSPA+ parameters	**Bit rates:** 42.0 Mbps (DL) / 5.76 Mbps (UL) **Supported frequencies:** B8 (900 MHz), B1 (2100 MHz) **Typical max. power:** 24 dBm
UMTS parameters	**PS bit rates:** 384 kbps (DL) / 384 kbps (UL) **Supported frequencies:** B8 (900 MHz), B1 (2100 MHz) **Typical max. power:** 24 dBm
GPRS/EDGE parameters	**Bit rates:** 236 kbps (DL) / 236 kbps (UL) **Supported frequencies:** 900 MHz, 1800 MHz
Other parameters	Rx Diversity and MIMO DL 2x2 SMS over IMS

Table 19: Technical parameters of cellular module

Antenna Requirements

- VSWR – <2:1 (Antenna input impedance response as function of frequency. This shows the antenna resonances and its bandwidth).
- TNC – 50 Ω
- For good diversity performance, the primary and secondary antennas should have different polarizations.

7.5 Parameters of GNSS

GNSS specifications	
Antenna	50 Ω – active
Protocols	NMEA 0183
GNSS Systems	GPS, GLONASS, BeiDou, Galileo, QZSS
Frequency	GPS/Galileo/QZSS: 1575.42 ± 1.023 MHz GLONASS: 1597.5 – 1605.8 MHz BeiDou: 1561.1 ± 2.046 MHz
Sensitivity (autonomous)	Tracking: -157 dBm Reacquisition: -157 dBm Cold start: -146 dBm
Acquisition time (autonomous)	Hot start: 2.5 s Warm start: 26 s Cold start: 35 s
Accuracy	< 1.5 m

Table 20: Technical parameters of GNSS

7.6 Technical parameters of I/O port

- Characteristics of inputs:

Logical 0 / 1*	Voltage	Current	Web interface status
log. 1 max	3 V	0.4 mA	Off
log. 0 min	5 V	0.7 mA	On
log. 0 type	12 V	2 mA	On
log. 0 max	60 V	7 mA	On

Table 21: Characteristics of inputs

* The binary input status in the Shell is returned via `io get bin0` or `io get bin1`.

- Binary output parameters:
  - 60 V AC / 300 mA
  - 60 V DC / 300 mA

7.7 Other Technical Parameters

Other technical parameters	
CPU power	2 DMIPS per MHz
Flash memory	256 MB
RAM	512 MB
M-RAM	128 kB

Table 22: Other technical parameters

8. Related Documents

[1] Advantech Czech: **ICR-3800 – Configuration Manual** (MAN-0045-EN)

Product-related documents can be obtained on *Engineering Portal* at www.icr.advantech.cz address.

9. Troubleshooting

If you cannot connect to the router from your PC, your network card may be configured in such a way that it is not possible to connect to the router. Take one or more of the following steps in order to solve the problem:

- Make sure your PC's network card is configured to obtain the IP address form the DHCP server (by default the DHCP server is running in the router).
- Connect the router to the PC via Switch.
- Connect the router to the PC, start the router first and then start the PC after the router's initialization.

9.1 FAQ

✍ **Ethernet connection fails or is not establishing.**

- *It is possible to turn auto negotiation off and set a rate and duplex manually on the Ethernet interface of the router. Available on "LAN Configuration" page in the router.*

✍ **Mobile WAN connection fails.**

- *Check the signal power ("Mobile WAN status" page). If the signal power is weak, you will have to use a better antenna. If the neighbouring cells have a similar signal strength, you will need to use a directional antenna. For proper operation, the signal levels have to be good.*
- *Try to enable automatic ping from the router, which will check the connection when there are no data running and in the case of a failed ping, restart the connection. This can be done on the "Mobile WAN Configuration" page in the router in the "Check connection" section. "Enable + bind" option is to ensure the ping goes always through Mobile WAN network interface.*

✍ **Mobile WAN connection cannot be established.**

- *Check the "Mobile WAN Configuration" – APN, name, password and IP address (all can be blank).*
- *Try to enter the SIM card PIN – verify that the SIM card has the PIN code entered. Available on "Unlock SIM Card" page in the "Administration" section.*
- *In a private APN it is not recommended to get the DNS settings from operator (on "Mobile WAN" page)*
- *Go to "System Log" page in "Status" section and observe where the error occurs.*

✍ **I cannot connect from the Internet to the device behind the router. I have NAT enabled.**

- *The device's gateway has to be configured so it points to the router.*

✍ **I can't access my Web server placed behind the router over NAT.**

- *The remote HTTP access to the router has to be disabled on "NAT Configuration" page in the router. Also enable "Send all remaining incoming packets to default server" feature and fill in the IP address of your Web server. On the Web server, the default gateway has to be the IP address of the router.*

✍ **DynDNS doesn't work.**

- *With private APN this will not work.*
- *If the same IP address is recorded in your canonic name as a dynamically assigned address, it means that the operator is using NAT or a firewall.*
- *You can verify NAT using ping to your server with static address and then compare with router's IP address.*
- *You can verify a Firewall by accessing remotely to the router's Web interface.*
- *The operator may not provide the address of DNS server and without DNS server's address it is impossible to connect to the dyndns.org server. The following messages will be shown in the System Log:*
  - *DynDNS daemon started*
  - *Error resolving hostname: no such file or directory*
  - *Connect to DynDNS server failed*

✍ **L2TP or IPSec isn't establishing.**

- *Check the "System Log" page for error messages.*

✍ **IPSec tunnel establishes but the communication does not run.**

- *Probably there are bad routing rules defined in the connected devices, or the default gateway.*

✍ **I switched the router to offline mode by SMS message, but the router is in online mode after reboot.**

- *SMS messages do not change the router configuration. They remain in effect only until the router is rebooted.*

✍ **Serial communication is not working.**

- *Verify that the router model supports serial communications. Also verify the serial communication settings. To do so, open the router's configuration menu via the web browser, select the appropriate "Expansion Port" from "Configuration" part of the menu and verify the settings.*

✍ **Is the router Cisco compatible? Can I use the Cisco configuration?**

- *No, the Firmware in the router (Conel OS) is based on Linux with BusyBox. Thus the Cisco configuration cannot be used. But network connections are defined by standards so connecting the router to the Cisco or other networking devices is possible and will be compatible.*

✍ **FTP or SFTP does not work**

- *FTP will work on v2 routers only. You can use SFTP on all routers to transfer files to/from the router. If having troubles with FTP on v2 routers, make sure you have FTP enabled: "Configuration" section, "Services", "FTP". Then you can connect with any client on port 21 with name and password same as for the Web interface. If having troubles with SFTP, make sure you have SSH enabled: "Configuration" section, "Services", "SSH". Then you can connect with any client on port 22 with name and password same as for the Web interface.*

✍ **How can I connect to the router's command line? (SSH, Telnet)**

- *You can use SSH on all routers or Telnet on v2 routers only. SSH is enabled by default, but you can verify in Web interface in "Configuration" section, "Services", "SSH". Then connect with any SSH client on port 22 of the router. User and password is the same as for the Web interface. Telnet on v2 routers can be enabled here: "Configuration" section, "Services", "Telnet".*

10. Customer Support

Customer Support for Europe

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Web: www.advantech.com

Upkeep – Advices:

- The SIM-card must be handled carefully as with a credit card. Don't bend, don't scratch on this and do not expose to static electricity.
- During cleaning of the router do not use aggressive chemicals, solvents and abrasive cleaners!