

LTE Industrial Router

ICR-2834

USER MANUAL



ADVANTECH

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Used symbols



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



Attention – Problems that can arise in specific situations.



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

GPL license

Source codes under GPL license are available at <https://icr.advantech.cz/source-code> address.



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1. Product Overview

1.1 Product Introduction

Industrial cellular router ICR-2834 is designed for wireless communication in mobile networks that use traditional cellular technologies.

The primary purpose of this router is its use in the Category 4 (**Cat.4**) services on the cellular **LTE** network. Cat.4 rated router is capable of achieving typical speeds in 4G coverage areas where the network is enabled with 20 MHz of contiguous spectrum.

The peak **downlink** data rate for Category 4 is approximately **150 Mbps**. In the **uplink**, LTE Category 4 provides a peak data rate of **50 Mbps**.

The router, which may have a **metal** or **plastic** box, is equipped with two independently configurable **Ethernet ports**, two **Mini SIM slots** (2FF), main and diversity cellular **antenna connectors**, two **RS232** or two **RS485** independently selectable serial ports, four **digital inputs** together with two **digital outputs**, with one **USB 2.0** host interface and with **LEDs for status** indication. **GNSS** is also supported.

The router provides **diagnostic functions**, which include automatically monitoring the PPP connection, automatic restart in case of connection losses, **Low Power Mode** and **hardware watchdog** that monitors the router status.

The router supports **VPN tunnel** creation using various protocols to ensure safe communications. The router provides diagnostic functions which include automatic monitoring of the wireless and wired connections, automatic restart in case of connection losses, and a hardware watchdog that monitors the router status.

With open Linux platform and wide possibilities of programming customer SW applications in **Python, C/C++**. The Advantech existing app library **Router Apps** (formerly *User modules*) with apps already developed to enhance specific router functionality including industrial protocol conversions and support of IoT platforms such as **MS Azure, Cumulocity, ThingWorx**, and others are supported on the router.

Examples of possible applications

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

1.2 Product Usage Examples

The router is primarily intended for these four basic situations:

I. Access to the Internet from LAN

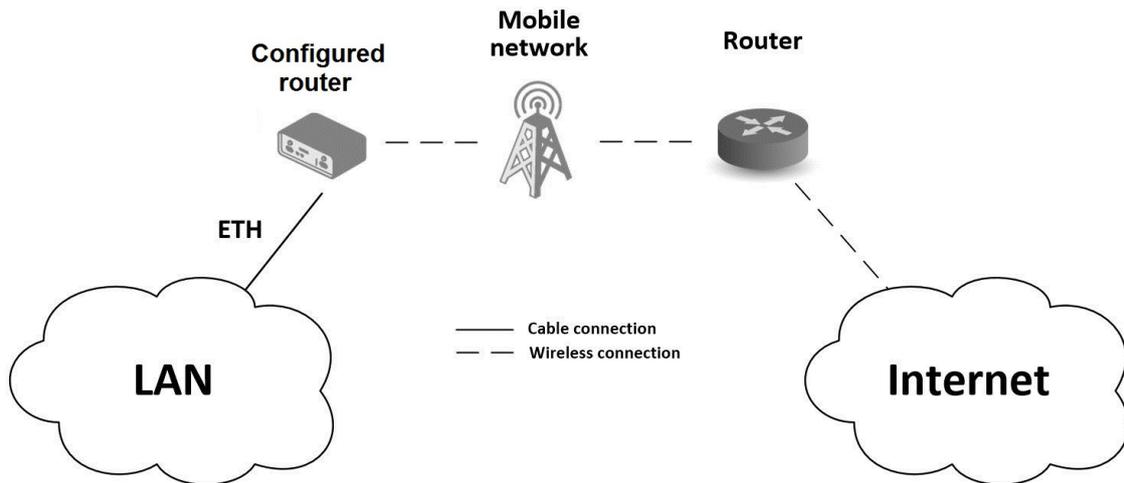


Figure 1: Access to the Internet from LAN

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

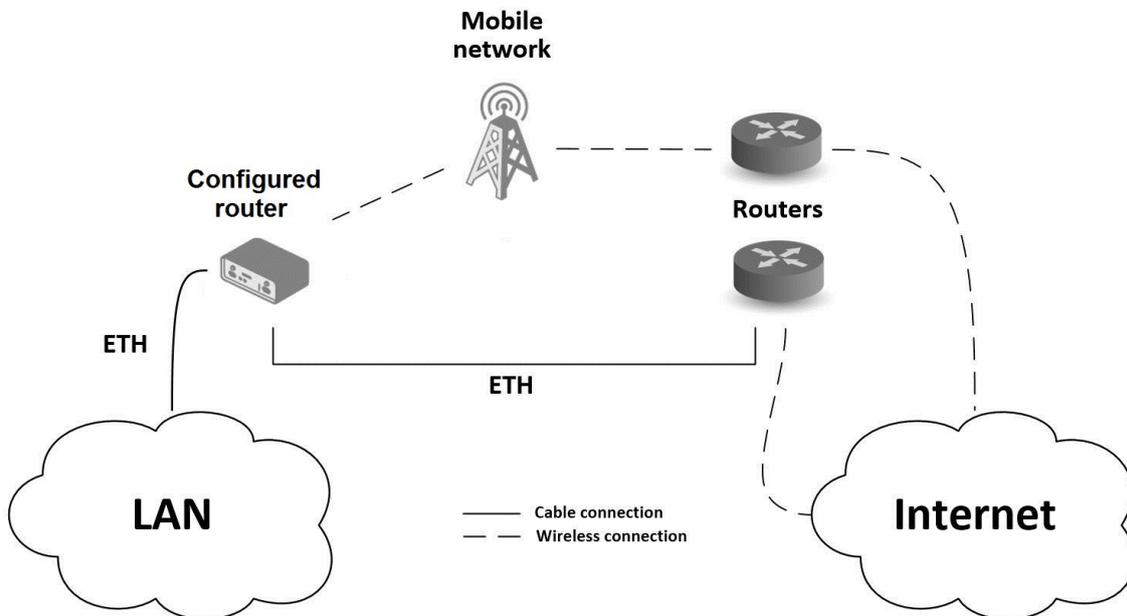


Figure 2: Backed up Access to the Internet

III. Secure networks interconnection or using VPN

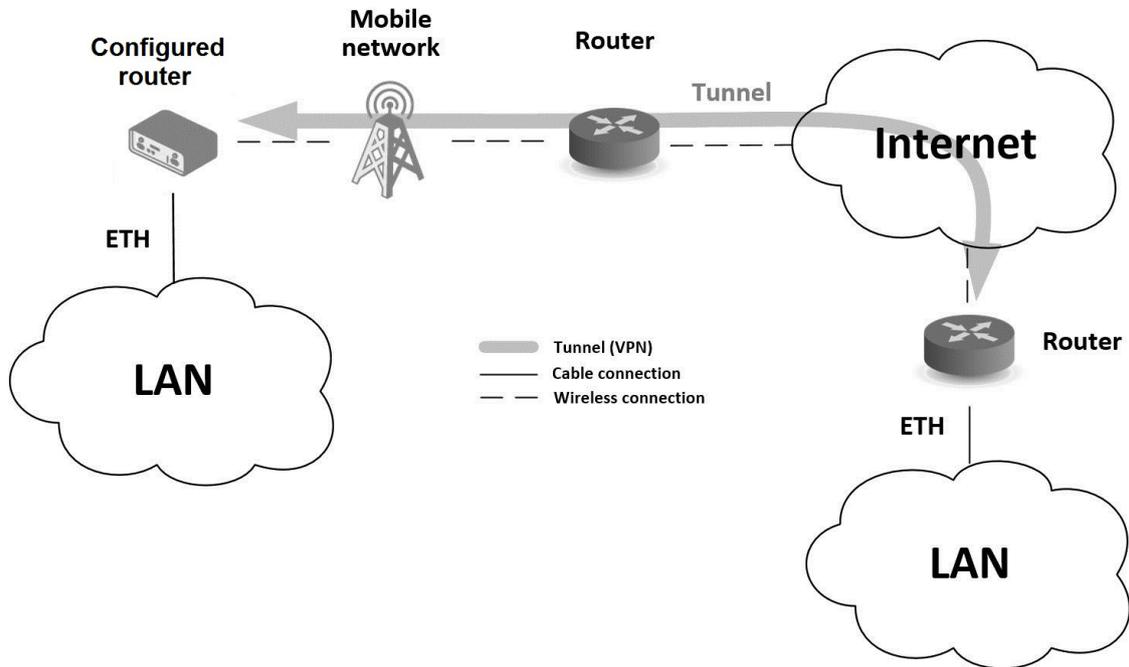


Figure 3: Using VPN Tunnel

IV. Serial Gateway

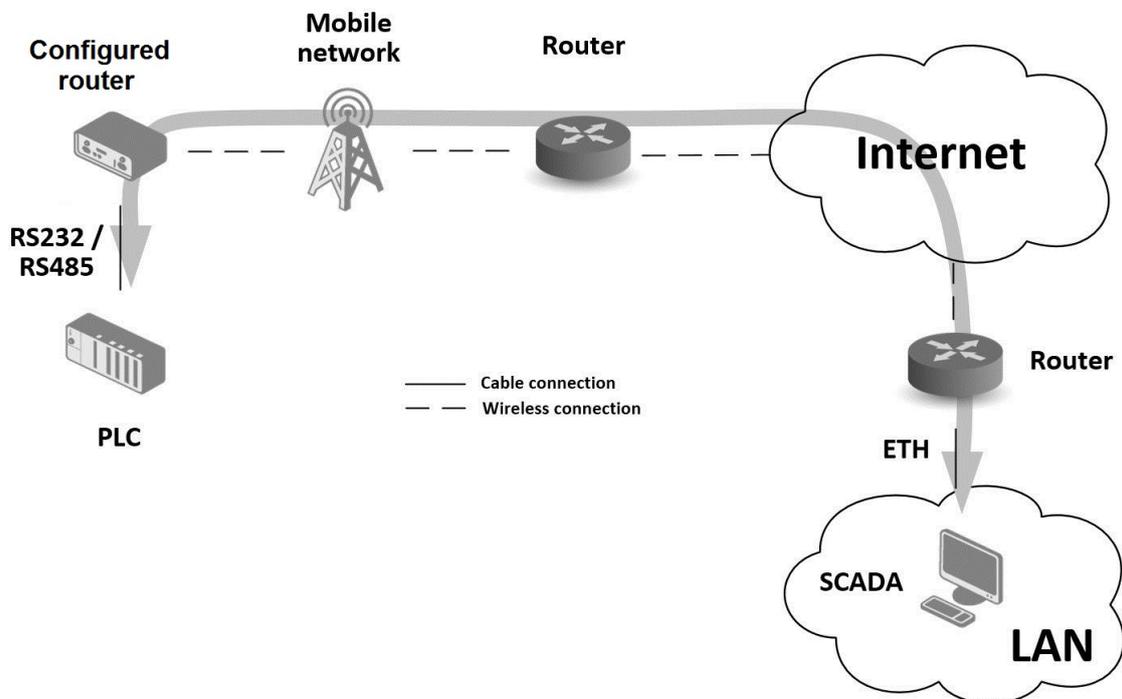


Figure 4: Serial Gateway

1.3 Hardware Overview

The router case preview is shown in Figure 5. A short description of hardware parts of the router is listed in Table 1, including the links to the chapters with a detailed description. For a router in a plastic box, the description of the components is similar.



Figure 5: Hardware Overview of the Router

#	Item/Caption	Type	Description
1	LEDs	-	Status LED indication; see Chapter 2.9.
2	SIM slots	Mini SIM	Two SIM card slots; see Chapter 2.1.
3	ANT	SMA	Connector for the first main antenna of the cellular module; see Chapter 2.2 and Chapter 4.4 for cellular module parameters.
4	DIV	SMA	Connector for the first diversity antenna of the cellular module; see Chapter 2.2 and Chapter 4.4 for cellular module parameters.
5	USB	USB-A	USB-A type socket connector; see Chapter 2.8.
6	ETH0, ETH1	RJ45	100 MB Ethernet connection for the first and second LAN; see Chapter 2.3.

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#	Item/Caption	Type	Description
7	PWR	2-pin terminal	Power supply socket; see Chapter 2.4.
8	RST	-	Button to reboot the router or to restore the default configuration; see Chapter 2.10.
9	SERIAL I/O	16-pin terminal	RS232, RS485, binary inputs, and binary outputs interfaces. See Chapter 2.7 for more information, Chapter 4.6 for I/O parameters, and Chapter 4.7 for serial interface parameters.
10	GNSS	SMA	GNSS antenna connector. See Chapter 2.2 for more information and Chapter 4.5 for GNSS parameters.
11	DIN clip	-	DIN rail clip, included as standard accessories; see Chapter 1.8.
12	Grounding screw	M3	Pay attention to proper grounding of model with metal box; see Chapter 2.4.

Table 1: Hardware Overview of the Router

1.4 Order Codes

Order codes overview is shown in the table below.

Order code	Configuration
ICR-2834 G	metal box, LTE Cat.4 with 3G/2G fallback module, GNSS , ETH0, ETH1, USB, four binary inputs, two binary outputs, two SIM readers
ICR-2834 GP	plastic box , LTE Cat.4 with 3G/2G fallback module, GNSS , ETH0, ETH1, USB, four binary inputs, two binary outputs, two SIM readers
ICR-2834 GA01	metal box, LTE Cat.4 with 3G/2G fallback module, GNSS , ETH0, ETH1, USB, four binary inputs, two binary outputs, two SIM readers, accessories with Ethernet cable, two antennas, and EU power supply
ICR-2834 GPA01	plastic box , LTE Cat.4 with 3G/2G fallback module, GNSS , ETH0, ETH1, USB, four binary inputs, two binary outputs, two SIM readers, accessories with Ethernet cable, two antennas, and EU power supply
ICR-2834 GA02	metal box, LTE Cat.4 with 3G/2G fallback module, GNSS , ETH0, ETH1, USB, four binary inputs, two binary outputs, two SIM readers, accessories with Ethernet cable, two antennas, and UK power supply
ICR-2834 GPA02	plastic box , LTE Cat.4 with 3G/2G fallback module, GNSS , ETH0, ETH1, USB, four binary inputs, two binary outputs, two SIM readers, accessories with Ethernet cable, two antennas, and UK power supply

Table 2: Order Codes Overview

1.5 Package Contents

The standard router set includes items listed in Table 3: For other optional accessories, see Table 4.

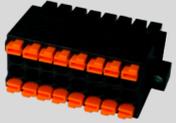
Item#	Description	Figure	Q'ty
1	Router in metal or plastic box		1 pcs
2	DIN rail clip with screws (screws differ for metal and plastic versions)		1 set
3	2-pin terminal block for power supply (deployed on the router)		1 pcs
4	16-pin terminal block for serial and I/O interfares (deployed on the router)		1 pcs
5	Printed <i>Quick Start Guide</i> notes		1 pcs

Table 3: Contents of Package

Table 4 lists items that may be included as accessories or can be ordered separately. See Chapter 1.4 for more information.

Description	Figure
Ethernet cross cable of length 1.5 m. It can be ordered separately under <i>BB-KD-ETH</i> part number.	
Antenna 5G/LTE. It can be ordered separately under <i>ANT-LTE5G-025</i> part number.	
Wall mount power supply, 12V/1A with EU plug. It can be ordered separately under <i>BB-RPS-v2-EU</i> part number.	
Wall mount power supply, 12V/1A with UK plug. It can be ordered separately under <i>BB-RPS-v2-UK</i> part number.	
Wall mount power supply, 12V/1A with US plug. It can be ordered separately under <i>BB-RPS-v2-US</i> part number.	

Table 4: Other Accessories

1.6 Product Dimensions

For the dimensions of the product in metal and plastic boxes see the figures below. Note that all sizes are measured in millimeters.

Variant with Metal Box

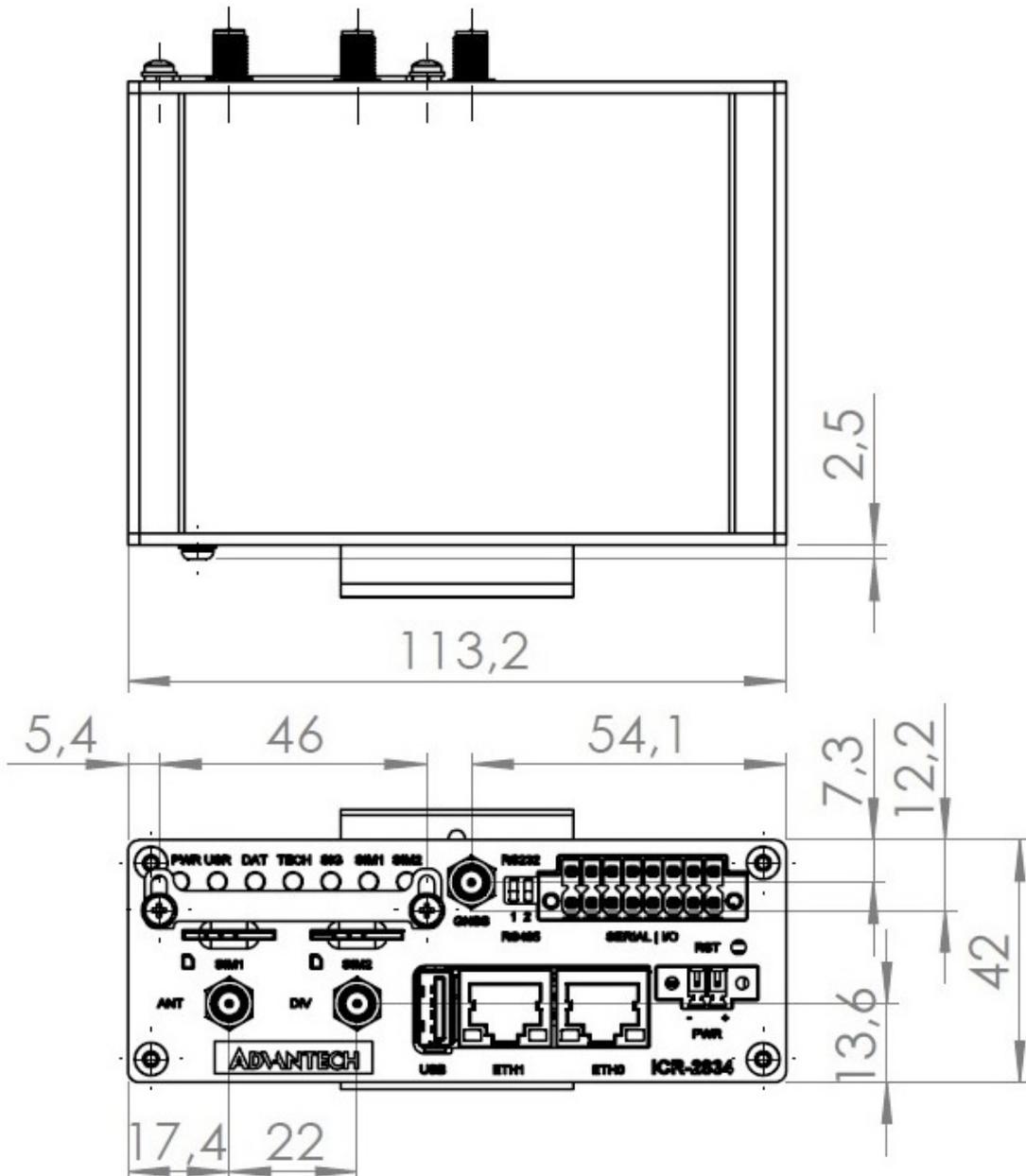


Figure 6: Metal Box – Top and Front View

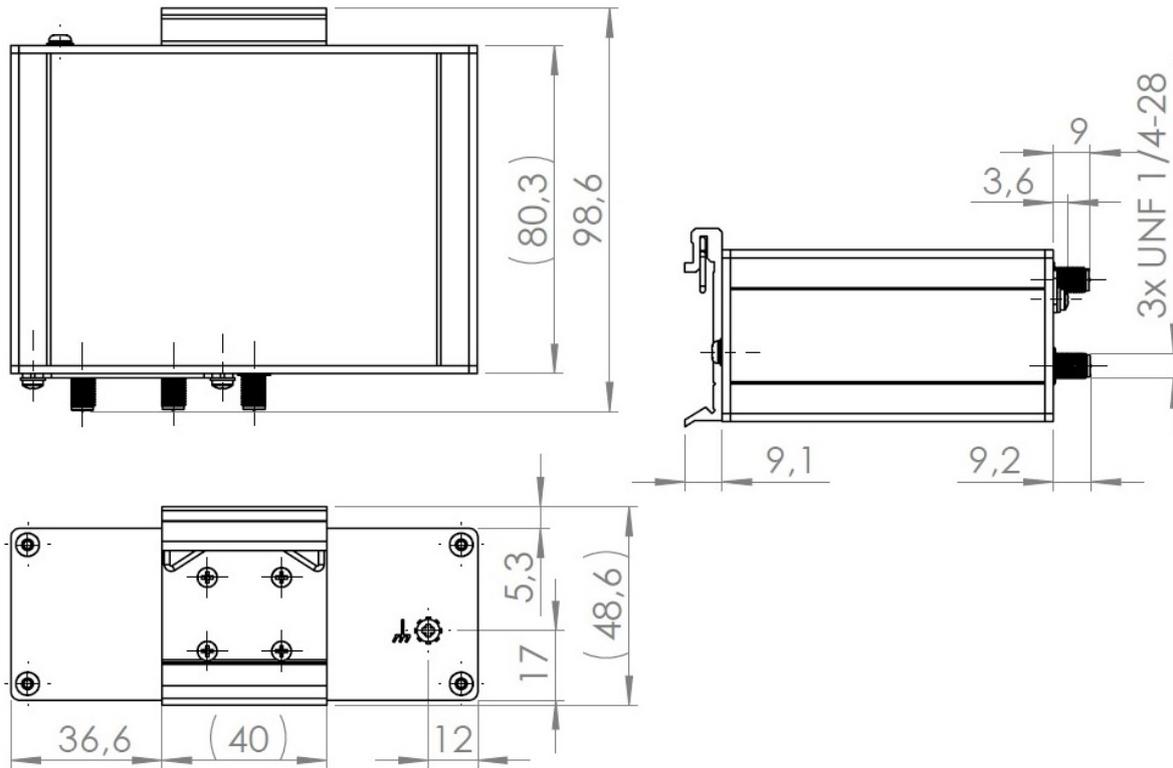


Figure 7: Metal Box – Bottom, Side and Back View

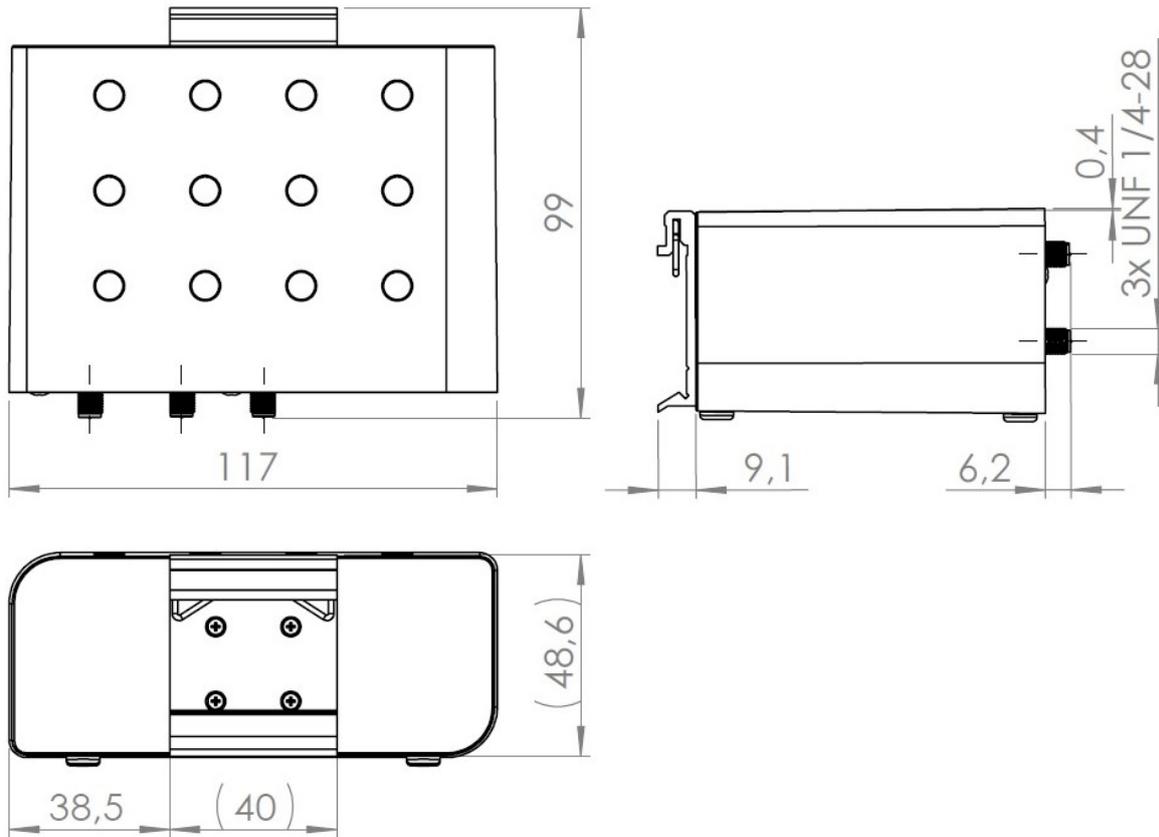


Figure 9: Plastic Box – Bottom, Side and Back View

1.7 Mounting Recommendations

The router can be placed:

- on a flat surface,
- on a DIN rail EN 60715 with the metal DIN rail clip (see Chapter 1.8)

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 ~ 230 V/50 Hz or ~ 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 grounding screw, see Chapter 2.4.

1.8 DIN Rail Mounting

The DIN rail clip is suitable for a DIN rail according to EN 60715 standard only. There are four possible positions of the clip as shown in Figure 10.

i The DIN rail clip is the same for the metal and plastic router box. It just differs by the screws used.



When mounting the DIN rail clip, tighten the screws with max. torque of 0.4 Nm.

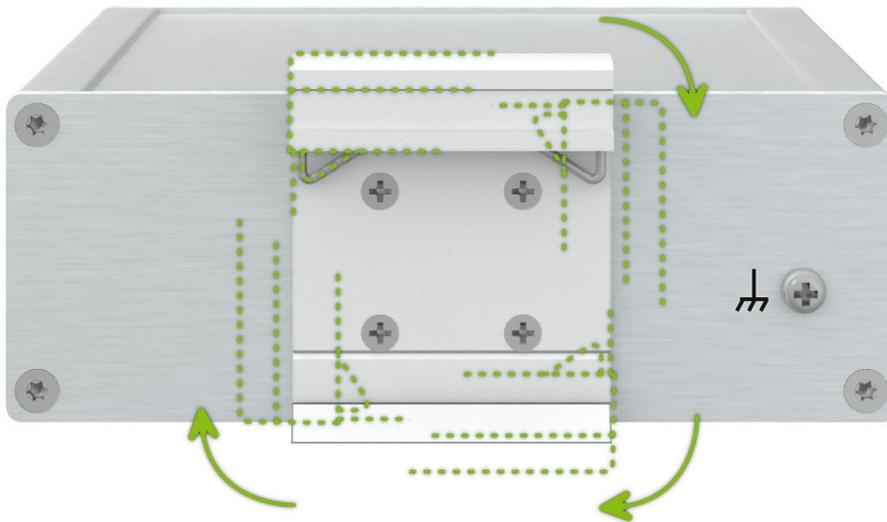


Figure 10: Position of the DIN Rail Clip

To remove the router from the DIN rail it is necessary to lightly push down the router so that the bottom part of the DIN rail clip hitched to the DIN rail get out of this rail and then fold out the bottom part of the router away from the DIN rail, see Figure 11.

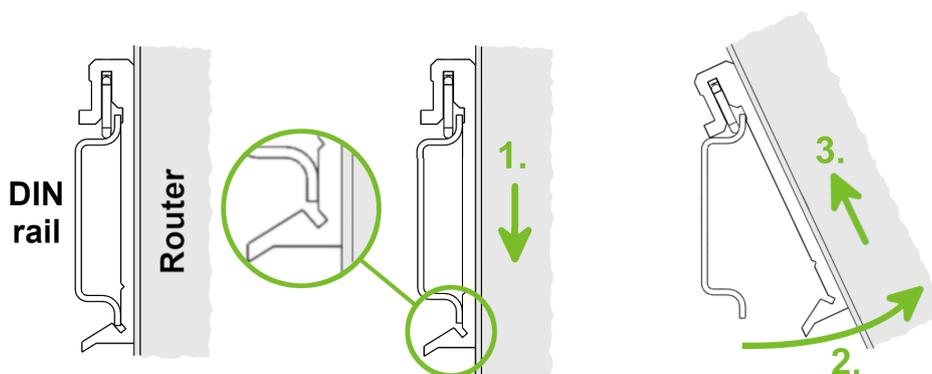


Figure 11: Removing Router from the DIN Rail

1.9 Product Label

An example of the product labels, with all the information printed on it, is in the figure below.



Figure 12: Labels Example

2. Hardware Functionality

See Chapter 1.3 for the product hardware overview. Table 1 lists a short description of the hardware, including the links to the chapters with a detailed description.

2.1 SIM Card Slots

Slots for two SIM cards are located on the router under a metal cover. It is necessary to insert an activated SIM card, to work properly. If the PIN is required for the SIM, enter it in the router’s web interface. The SIM cards may have different APNs (Access Point Names) adjusted. The SIM card changing procedure is described below.



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

Inserting the SIM card:



- Always disconnect the router from the power supply before handling the SIM card.
- Release two screws on the SIM card cover and swipe up the cover.
- To remove an inserted 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.
- To insert a SIM card push card into the slot until it clicks into place.
- Swipe down the cover and tight the cover screws.

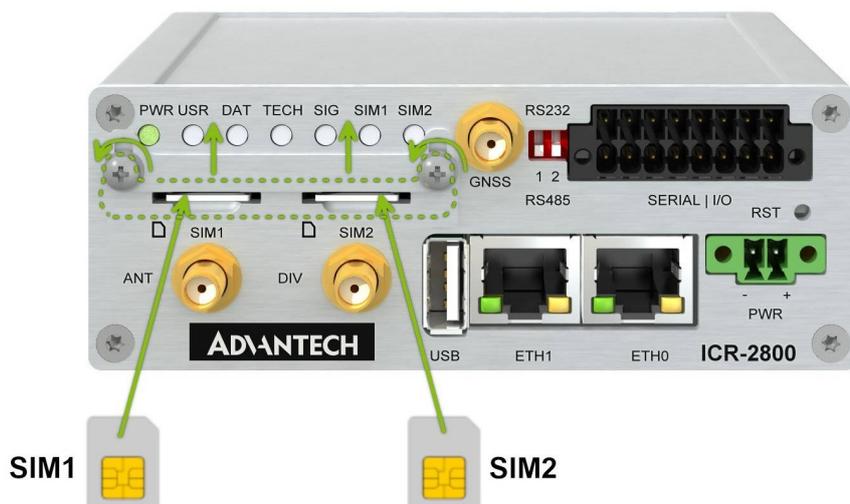


Figure 13: SIM Cards Insertion

2.2 Antennas

Connect cellular antennas to the router to main (ANT) and diversity (DIV) SMA connectors on the front panel. Connect the GNSS antenna to the router to GNSS SMA connector on the front panel.



Only run the router with a cellular antenna connected to the main antenna connector, as the energy from the transmission is effectively reflected by the open end and can damage the equipment.



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



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

2.3 Ethernet Interfaces

The panel socket of RJ45 is used for Ethernet interface. The pinout of the socket is shown in Figure 14 and described in Table 5.

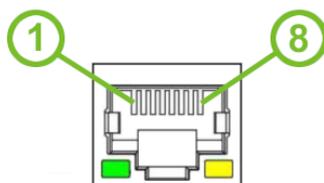


Figure 14: Ethernet Connector Pinout

Pin	Signal mark	Description
1	TXD+	Transmit Data – positive pole
2	TXD-	Transmit Data – negative pole
3	RXD+	Receive Data – positive pole
4	—	—
5	—	—
6	RXD-	Receive Data – negative pole
7	—	—
8	—	—

Table 5: Ethernet Connector Pinout Description



The isolation barrier of the Ethernet ports against the ground is 1500 V.

2.4 Power Supply

The pins of power supply are physically connected to the 6-pin terminal block panel socket located on the left panel. The connection of power supply is shown in Figure 15 and described in Table 6.

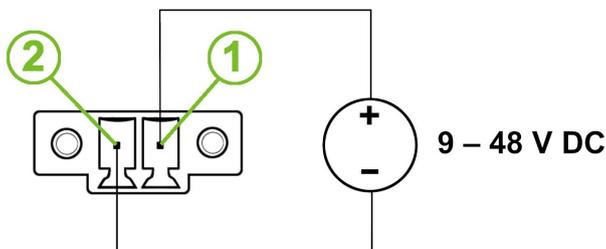


Figure 15: Connection of Power Supply

Pin	Signal mark	Description
1	PWR(+)	Positive pole of DC supply voltage (+9 to +48 V DC)
2	PWR(-)	Negative pole of DC supply voltage

Table 6: Power Supply Pinout

Required power supply voltage for the router is between +9 V and +48 V DC, see the connection scheme on Figure 15. Protection against reversed polarity without signaling is built into the router. For correct operation it is necessary that the power source is able to supply a peak current of 1 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.

All metal parts of the router in a metal box, including the box itself, are connected with the negative pole of the power supply (common pole). If recommended for the installation environment, protect the router by grounding it properly by the grounding screw, see Figure 16.

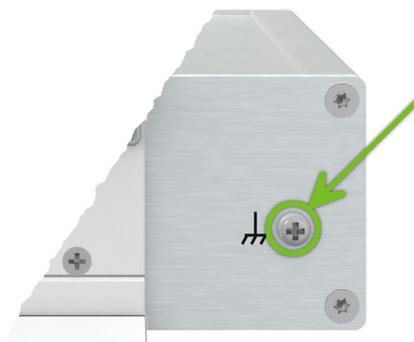


Figure 16: Position of the Grounding Screw

2.5 Low Power Mode



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 4.1 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.

2.6 I/O Port Interfaces

The pins of I/O interface are physically connected to the 16-pin terminal block panel socket. The pinout of the I/O interface is described in Figure 17 and Table 7.

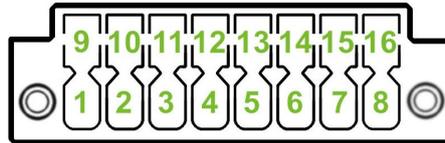


Figure 17: I/O Connector Pinout

Pin	Signal mark	Description
14	BIN0	The first binary input
6	BIN1	The second binary input
15	BIN2	The third binary input
7	BIN3	The fourth binary input
16	BOU0	The first binary output
8	BOU1	The second binary output
5, 13	GND	Ground (common negative pole)

Table 7: I/O Ports Pinout



The I/O interface is not electrically isolated from the router.

The I/O user interface is designed for binary input processing and binary output control. For detailed electrical parameters see Chapter 4.6. The functional scheme of connection for the binary input and binary output is in Figure 18.

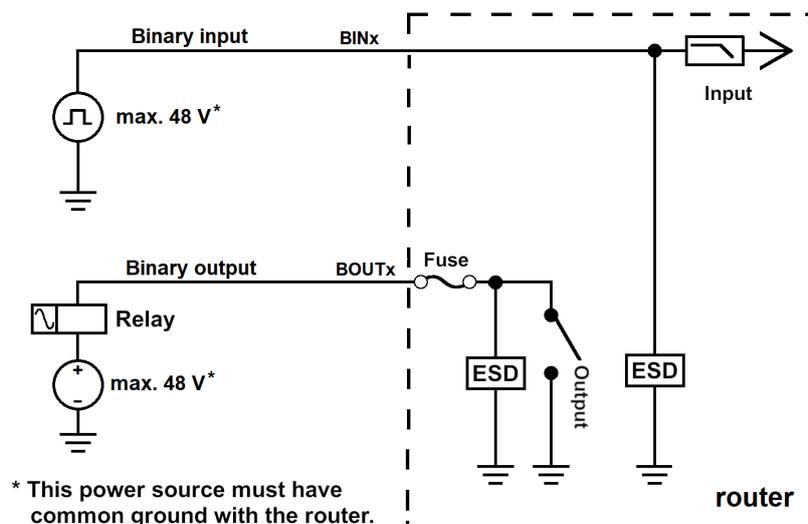


Figure 18: Functional Scheme of the Binary Interface

2.7 Serial Interfaces

Two independently switchable serial interfaces are connected to the 16-pin terminal block panel socket. Both interfaces can be switched independently to the RS232 or RS485 serial interfaces by the switch located on the left of the terminal socket.

If switches are switched off, serial interfaces are switched to operate as RS485, see Figure 19, Table 8 and Table 9.

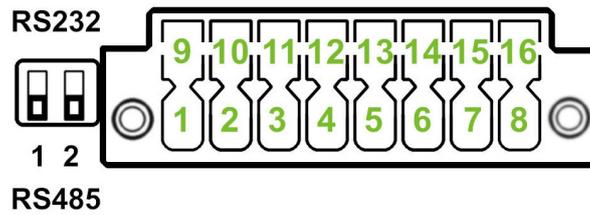


Figure 19: Both interfaces in RS485 mode

Pin	Signal mark	Description
2	D (+)	In/Out
1	D (-)	In/Out
5	GND	Ground

Table 8: Connection of the first serial interface switched to RS485 mode

Pin	Signal mark	Description
10	D (+)	In/Out
9	D (-)	In/Out
13	GND	Ground

Table 9: Connection of the second serial interface switched to RS485 mode

If switches are switched on, serial interfaces are switched to operate as RS232, see Figure 20, Table 10 and Table 11.

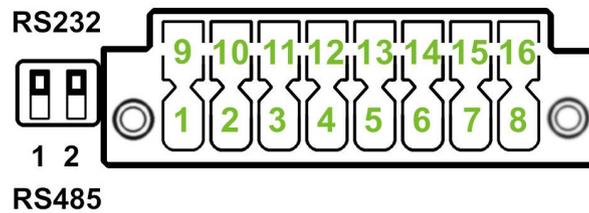


Figure 20: Both interfaces in RS232 mode

Pin	Signal mark	Description
1	RXD	Received Data
2	TXD	Transmit Data
3	RTS	Request to Send
4	CTS	Clear to Send
5	GND	Ground

Table 10: Connection of the first serial interface switched to RS232 mode

Pin	Signal mark	Description
9	RXD	Received Data
10	TXD	Transmit Data
11	RTS	Request to Send
12	CTS	Clear to Send
13	GND	Ground

Table 11: Connection of the second serial interface switched to R232 mode



The serial interfaces are not electrically isolated from the router.

2.8 USB Port

There is one USB 2.0 host port with socket of USB-A type. USB Mass Storages and FTDI serial converters are supported. For a piece of advice, how to fix an unsupported FTDI chip, see the [Commands and Scripts](#) application note, chapter *How to Use Unsupported FTDI Chip*.

i 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.

Mounting USB Flash Drive to the System

It is necessary to mount the USB flash drive to be able to access it in the system of the router. Follow these steps to mount the drive:

- 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:
sda: sda1
- To mount the card to `mnt` directory, use the `mount` command:
mount /dev/sda1 /mnt

i For more information about the commands for creating, mounting, checking and unmounting a file system on a USB Flash Drive, see the application note for [Ext4_tools](#) router app.

USB Socket Pinouts

USB socket pinouts is described in Figure 21 and Table 12.

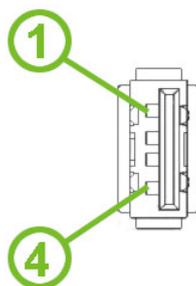


Figure 21: USB Connector Pinout

Pin	Signal mark	Description	Data flow direction
1	+5 V	Positive pole of 5 V DC supply voltage, 0.5 A	
2	USB data -	USB data signal – negative pole	Input/Output
3	USB data +	USB data signal – positive pole	Input/Output
4	GND	Negative pole of DC supply voltage	

Table 12: USB Connector Pinout

2.9 LED Status Indication

There are LED indicators on the front panel of the router to provide router status information. Moreover, ETH connector, has two additional LEDs providing information about the port status.

Caption	Color	State	Description
PWR	Green	On	Starting of the router
	Green	Blinking	Router is ready
	Green	Fast blinking	Updating firmware
USR	Green		Function of this LED diode can be selected by user
DAT	Green	Blinking	Communication in progress on radio channel
TECH	Green	On	4G technology is used by the active SIM
	Orange	Blinking	3G technology is used by the active SIM
	Red	Fast blinking	2G technology is used by the active SIM
SIG	Green	On	Good signal
	Orange	Blinking	Fair signal
	Red	Fast blinking	Poor signal
SIM1	Green	On	SIM1 is selected
	Red	Fast blinking	SIM1 card problem (missing SIM1 or PIN not entered)
SIM2	Green	On	SIM2 is selected
	Red	Fast blinking	SIM2 card problem (missing SIM2 or PIN not entered)
ETH0	Green	On	Selected 100 Mbps bit rate
ETH1	Green	Off	Selected 10 Mbps bit rate
ETH0 ETH1	Orange	On	The network cable is connected
	Orange	Blinking	Data transmission
	Orange	Off	The network cable is not connected

Table 13: LED Status Indication

2.10 Reset Functions



Consider creating a router configuration backup before performing the router's factory reset.

The *RST* button can be used in three different scenarios:

- **Reset:** Hold the *RST* button for **less than 4 seconds**; the router will reboot, applying its customized configuration. The router reset can be initiated by clicking the *Reboot* menu item in the router web GUI.
- **Factory Reset:** To restore the default factory configuration of the router, press and hold the *RST* button for **more than 4 seconds**. After that, the *PWR* LED turns off and on again. We recommend holding the *RST* button for 1 second after turning on the *PWR* LED.
- **Emergency Factory Reset:** If the router cannot boot up due to the incorrect configuration, turn off the router (disconnect the power supply). Then, push and hold the *RST* button, turn on the router and hold the *RST* button for **at least 10 seconds**. The router configuration will be set to the default one.



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



Figure 22: Resetting the Router

3. First Use

3.1 Powering up the Router

The router will start up when a power supply is connected to it. By default, the router will automatically log on to the default APN of the inserted SIM card. The DHCP server will assign an addresses to the devices connected through the Ethernet port ETH0.

3.2 Router Configuration

Initial router configuration can be made via a web browser running on your PC. Here you can perform router monitoring, configuration, and administration. First, connect the PC to the default LAN interface as described in the *Start Guide* application note [1]. To get the router interface, enter the <https://192.168.1.1> address in a web browser. Please note that usage of the HTTPS protocol for secure communication over the network is required.

There is just the `root` **user account** created on the router by default. See the **product label** on the router for its **default password**¹. Log in to the web interface by the `root` user and his password. If logged in successfully, the user will have access to the router web interface, see Figure 23. See the configuration manual [2] of the router for a detailed description and examples of the router configuration.



After logging on to the device for the first time, we strongly recommend changing the default password due to security reasons.



For security reasons, we highly recommend updating the router's firmware to the latest version regularly. Downgrading the firmware to an older version than the production version or uploading firmware intended for a different device may cause the device's malfunction.



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 [2], chapter *Basic Information -> WebAccess/DMP Configuration*, for more information.

¹Use the password `root` if the router's label does not contain a unique password.

ICR-2834 LTE Router

Name: N/A
Location: N/A

Status	General Status
<ul style="list-style-type: none"> General Mobile WAN Network DHCP IPsec WireGuard DynDNS System Log 	<div style="background-color: #e6f2ff; padding: 2px; margin-bottom: 5px;">Mobile Connection</div> <p>SIM Card : 1st IP Address : 10.80.0.100 IPv6 Address : Unassigned Rx Data : 588 B Tx Data : 846 B Uptime : 0 days, 9 hours, 5 minutes</p> <p style="text-align: right;">» More Information «</p> <div style="background-color: #e6f2ff; padding: 2px; margin-bottom: 5px;">ETH0</div> <p>IP Address : 10.64.0.120 / 255.255.252.0 IPv6 Address : fd00:a40::120 / 56 MAC Address : 02:AD:FF:00:01:20 Rx Data : 173.7 KB Tx Data : 39.7 KB</p> <p style="text-align: right;">» More Information «</p> <div style="background-color: #e6f2ff; padding: 2px; margin-bottom: 5px;">ETH1</div> <p>IP Address : 10.65.0.120 / 255.255.252.0 IPv6 Address : fd00:a41::120 / 56 MAC Address : 02:AD:FF:01:01:20 Rx Data : 7.8 KB Tx Data : 680 B</p> <p style="text-align: right;">» More Information «</p> <div style="background-color: #e6f2ff; padding: 2px; margin-bottom: 5px;">Peripheral Ports</div> <p>Expansion Port 1 : RS-232 Expansion Port 2 : RS-485 Binary Input 0 : Off Binary Input 1 : Off Binary Input 2 : On Binary Input 3 : On Binary Output 0 : On Binary Output 1 : On</p> <div style="background-color: #e6f2ff; padding: 2px; margin-bottom: 5px;">System Information</div> <p>Firmware Version : 6.3.4 (2022-01-04) BETA #1506 Serial Number : ACZ119900001205 Hardware UUID : N/A Profile : Standard Supply Voltage : 24.0 V Temperature : 49 °C Time : 2022-01-06 10:20:43 Uptime : 0 days, 9 hours, 6 minutes</p> <p style="text-align: right;">» Licenses «</p>
<div style="background-color: #003366; color: white; padding: 2px; margin-bottom: 5px;">Configuration</div> <ul style="list-style-type: none"> Ethernet VRRP Mobile WAN PPPoE Backup Routes Static Routes Firewall NAT OpenVPN IPsec WireGuard GRE L2TP PPTP Services Expansion Port 1 Expansion Port 2 USB Port Scripts Automatic Update 	
<div style="background-color: #003366; color: white; padding: 2px; margin-bottom: 5px;">Customization</div> <ul style="list-style-type: none"> Router Apps 	
<div style="background-color: #003366; color: white; padding: 2px; margin-bottom: 5px;">Administration</div> <ul style="list-style-type: none"> Users Change Profile <li style="color: red;">Change Password Set Real Time Clock Set SMS Service Center Unlock SIM Card Unblock SIM Card Send SMS Backup Configuration Restore Configuration Update Firmware Reboot Logout 	

Figure 23: Router's Web Interface



A detailed description of the router settings in the web interface can be found in the configuration manual of the router.

4. Technical Specifications

4.1 Basic Parameters

Router parameters		
Temperature range	Operating Storage	-40 °C to +75 °C -40 °C to +85 °C
Humidity	Operating Storage	5 to 95 % relative humidity non condensing 5 to 95 % relative humidity non condensing
Altitude	Operating	2000 m / 70 kPa
Degree of protection		IP30
Supply voltage		9 to 48 V DC
Battery for RTC		CR1225
Consumption	Idle Average Maximum LPM mode	1.9 W 3.5 W 7.4 W 6 mW
Dimensions of device w/o clip		113,2 x 80,3 x 42 mm (metal box) 117 x 83,8 x 51,4 mm (plastic box)
DIN rail clip specification		DIN 35 mm, EN 60715
Weight		300 g (metal box) 240 g (plastic box)
Antenna connectors	ANT, DIV GNSS	SMA connectors for LTE – 50 Ω SMA connector for GNSS – 50 Ω
Interfaces	ETH0 ETH1 USB SERIAL & I/O	RJ-45 socket for 10/100 Mbps Ethernet RJ-45 socket for 10/100 Mbps Ethernet USB-A socket 16-pin socket for I/O and two serial interfaces

Table 14: Basic Parameters

4.2 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 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11, EN 61000-6-2, EN 61000-6-3, EN 55032
Safety	IEC 62368-1, IEEE 802.3
Transportation	E-Mark (E8), homologation number: 10R-06 13493
National	CE, UKCA compliant
Environmental	REACH, RoHS3 and WEEE compliant

Table 15: Standards and Regulations

4.3 Type Tests and Environmental Conditions

Phenomena	Test	Description	Test levels
ESD	EN 61000-4-2	Enclosure	CD ±6 kV, L3 AD ±8 kV, L3
RF field AM modulated	EN 61000-4-3	Enclosure	20 V/m, 80 MHz – 1 GHz, LX 10 V/m, 1 GHz – 6 GHz, L3
Fast transient	EN 61000-4-4	DC ETH - FTP RS232 RS485 Binary input Binary output AC/DC	±1 kV, 5/50Tr/Th ns, 100 kHz, L2 ±1 kV, 5/50Tr/Th ns, 100 kHz, L3 ±1 kV, 5/50Tr/Th ns, 100 kHz, L3 ±2 kV, 5/50Tr/Th ns, 100 kHz, L3
Surge	EN 61000-4-5	DC ETH AC/DC	±1 kV, 1,2/50(8/20) Tr/Th us L2 ±1 kV, 1,2/50(8/20) Tr/Th us L2 ±2 kV, 1,2/50(8/20) Tr/Th us L3
RF conducted	EN 61000-4-6	DC ETH RS232 RS485 I/O AC/DC	10V,0.15-80MHz,80% AM(1kHz),L3 10V,0.15-80MHz,80% AM(1kHz),L3 10V,0.15-80MHz,80% AM(1kHz),L3 10V,0.15-80MHz,80% AM(1kHz),L3 10V,0.15-80MHz,80% AM(1kHz),L3 10V,0.15-80MHz,80% AM(1kHz),L3
Dips & interruptions	EN 61000-4-11	AC/DC	dip 0% 0,5cycle, 0% 1 cycle, 70% 25 cycles, interruption 0% 250 cycles
Radiated emission	EN 55032	Enclosure DC ETH RS232 RS485 AC/DC	Cl. B,30MHz-1GHz,1GHz-6GHz Class B, 150 kHz – 30 MHz Class B, 150 kHz – 30 MHz

Table 16: Type Tests and Environmental Conditions

4.4 Parameters of Cellular Module

Technical parameters of cellular module	
Antenna	Connector type: SMA Impedance: 50 Ω
LTE parameters	LTE: LTE Cat.4, 3GPP Rel. 10 FDD frequencies: B28 (700 MHz), B20 (800 MHz), B5 (850 MHz), B8 (900 MHz), B3 (1800 MHz), B1 (2100 MHz), B7 (2600 MHz) Bit rates: up to 150 Mbps (DL), 50 Mbps (UL)
HSPA+/UMTS parameters	HSPA: 3GPP Release 7 UMTS: 3GPP Release 4 Supported frequencies: B8 (900 MHz), B3 (1800 MHz), B1 (2100 MHz) Bit rates: max. 21 Mbps (DL) / 5.7 Mbps (UL)
EDGE/GPRS parameters	Supported frequencies: B5 (850 MHz), B8 (900 MHz), B3 (1800 MHz), B2 (1900 MHz) Bit rates: max. 237 kbps (DL) / 237 kbps (UL)

Table 17: Technical Parameters of Cellular Module

4.5 Parameters of GNSS



Supported by models with GNSS only, see Chapter 1.4 Order Codes.

GNSS specifications	
Protocol	NMEA
GNSS Systems	GPS, GLONASS, Beidou, Galileo
Antenna	Impedance: 50 Ω Connector type: SMA Power Mode: 3 V / 20 mA power supply for the active antenna Automatic power saving modes. DC feed bridge and control of power supply for active antenna.
Frequency	GPS: min. 1574.4 MHz, typ. 1575.42 MHz, max. 1576.4 MHz GLONASS: min. 1597.5 MHz, typ. 1575.42 MHz, max. 1605.9 MHz
Tracking Sensitivity (open sky)	GPS (active antenna): -159 dBm GLONASS (active antenna): -158 dBm GPS (passive antenna): -156 dBm GLONASS (passive antenna): -156 dBm
Acquisition Sensitivity (open sky)	GPS (active antenna): -147 dBm GLONASS (active antenna): -146 dBm GPS (passive antenna): -145 dBm GLONASS (passive antenna): -144 dBm
TTFF (av. at -130 dBm)	Warm: 28 s Cold: 32 s

Table 18: Technical Parameters of GNSS

4.6 Parameters of I/O Ports

Electrical characteristics of the binary inputs are in Table 19. Status of the binary input can be retrieved in the router's web interface (on the *General Status* page) or by the `status ports` and `io get` commands, see [Commands and Scripts](#) application note.

Logical ¹	Voltage	Current	Status ²
1	3 V	0.5 mA	Off
0	5 V	0.8 mA	On
0	12 V	1.6 mA	On
0	48 V	3.4 mA	On

Table 19: Electrical Characteristics of Binary Inputs

The maximum binary output load is **500 mA** at **48 V**.

4.7 Parameters of Serial Interfaces

Supported parameters of the RS232 and RS485 interfaces, which can be configured in *Expansion Port 1* resp. *Expansion Port 2* menu items, are in Table 20.

Serial Interfaces Specifications	
Baudrate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400.
Data Bits	5, 6, 7, 8.
Parity	none, even, odd.
Stop Bits	1, 2.
Flow Control	none, hardware.

Table 20: Parameters of Serial Interfaces

¹The binary status returned by the `io get` shell command.

²The binary status returned by the `status ports` shell command and displayed on the *General Status* page.

4.8 System Configuration

The main parameters of the system are listed in Table 21.

Other technical parameters	
CPU architecture	ARM926EJ-S
CPU frequency	600 MHz
CPU power	4,72 DMIPS/MHz
Flash memory	4 MB of NOR 4 096 MB of eMMC <ul style="list-style-type: none"> • 838 MB for Router Apps • 512 MB for customer data
RAM size	128 MB
Watchdog	HW Watchdog
RTC	Battery Backup RTC
TPM ¹	Trusted Platform Module (TPM) 2.0

Table 21: System Configuration

¹Not assembled by default, for a dedicated customer order only.

Appendix A: 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 from 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.

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".*

Appendix B: Customer Support

Customer Support for Europe

Advantech Czech s.r.o.

Sokolska 71
562 04, Usti nad Orlici,
Czech Republic

Phone: +353 91 792444
Fax: +353 91 792445
E-mail: iiotcustomerservice@advantech.eu
Web: www.advantech.com

Customer Support for NAM

Advantech B+B SmartWorx

707 Dayton Road
Ottawa, IL 61350 USA

Phone: +1-800-346-3119 (Monday – Friday, 7 a.m. to 5:30 p.m. CST)
Fax: +1-815-433-5109
E-mail: support@advantech-bb.com
Web: www.advantech-bb.com

Customer Support for Asia

Phone: +886-2-2792-7818 #1299 (Monday – Friday, 9 a.m. to 5:30 p.m. UTC+8)
Fax: +886-2-2794-7327
E-mail: icg.support@advantech.com.tw
Web: www.advantech.com

Appendix C: Regulatory & Safety Information

Safety Notices



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 48 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.



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 its life this product **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.

Appendix D: Related Documents

- [1] Quick Start Guide for v2i Platform
- [2] Configuration Manual for v2i Platform



[EP] Product-related documents and applications can be obtained on **Engineering Portal** at <https://icr.advantech.cz/download> address.



We, Advantech Czech s.r.o., declare that the radio equipment narrated in this user's manual complies with Radio Equipment Regulations 2017 (**S.I. 2017 No. 1206**).



We, Advantech Czech s.r.o., declare that the radio equipment narrated in this user's manual complies with Directive **2014/53/EU**.

The full text of the EU Declaration of Conformity is available at the following internet address:
icr.advantech.cz/eudoc