

# **Hardware Manual**

# Industrial Cellular Router

# **ICR-2734**





Advantech Czech s.r.o., Sokolska 71, 562 04 Usti nad Orlici, Czech Republic Document No. MAN-0066-EN, revision from 15th November, 2023.



# **Used symbols**



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

- Attention Problems that can arise in specific situations.
- Information Useful tips or information of special interest.





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# 1. Product Overview

#### 1.1 Product Introduction

Industrial cellular router ICR-2734 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**, with one **USB 2.0** host interface and with **LEDs for status** indication. The router can be equipped with a **dual-band WiFi module**, but this must be part of the initial configuration – it cannot be assembled to the router at some point in the future.

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

#### Access to the Internet from LAN

- This example illustrates a typical case when the cellular router is used to access the Internet through the cellular network.
- Not supported by LAN routers without a cellular interface.

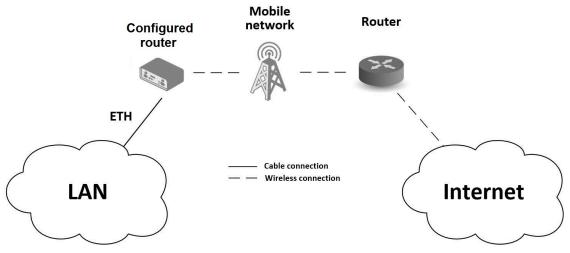


Figure 1: Access to the Internet from LAN

# Backed up access to the Internet (from LAN)

- This example illustrates the function of backing up the access to the Internet for a cellular router.
- The access can be backed up by a PPPoE connection, Ethernet wired connection, or by WiFi (for models supporting WiFi).

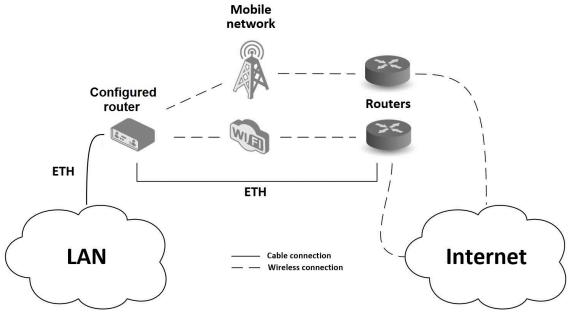


Figure 2: Backed up Access to the Internet

### Secure networks interconnection or using VPN

• This example illustrates the secure VPN tunnel interconnection between the configured Advantech router and a router of a remote network behind the Internet. The cellular network is used to connect the configured router to the Internet.

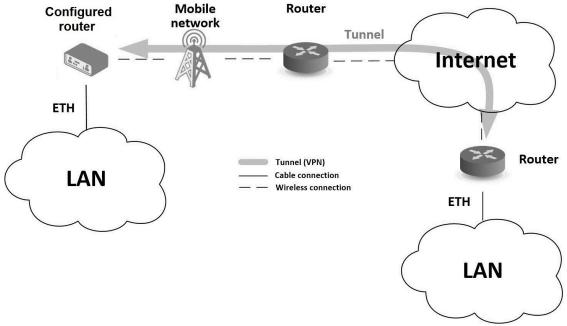


Figure 3: Using VPN Tunnel

1. Product Overview 1.3 Hardware Overview

### 1.3 Hardware Overview

The router case preview is shown in Figure 4. 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 4: Hardware Overview of the Router

| # | Item/Caption | Туре              | Description   |  |
|---|--------------|-------------------|---|--|
| 1 | LEDs         | -                 | Status LED indication; see Chapter 2.7.   |  |
| 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 2.6.   |  |
| 6 | ETH0, ETH1   | RJ45              | 100 MB Ethernet connection for the firts and second LA see Chapter 2.3.   |  |
| 7 | PWR          | 2-pin<br>terminal | Power supply socket; see Chapter 2.4.   |  |

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1. Product Overview 1.3 Hardware Overview

### Continued from previous page

| #  | Item/Caption    | Type          | Description   |
|----|-----------------|---------------|---|
| 8  | RST             | -             | Button to reboot the router or to restore the default configuration; see Chapter 2.8.             |
| 9  | WiFi            | RP-SMA female | WiFi antenna connector; see Chapter 2.2 for more information and Chapter 4.5 for WiFi parameters. |
| 10 | DIN clip        | -             | DIN rail clip, included as standard accessories; see Chapter 1.9.                                 |
| 11 | 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. Product Overview 1.4 Order Codes

### 1.4 Order Codes

Order codes overview is shown in the table below.

| Order code            | Configuration  |
|-----------------------|--|
| ICR-2734              | metal box, LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers  |
| ICR-2734 <b>P</b>     | <b>plastic box</b> , LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers  |
| ICR-2734 <b>A01</b>   | metal box, LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers, <b>accessories</b> with Ethernet cable, two cellular antennas, and <b>EU power supply</b>   |
| ICR-2734 <b>PA01</b>  | <b>plastic box</b> , LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers, <b>accessories</b> with Ethernet cable, two cellular antennas, and <b>EU power supply</b>                                       |
| ICR-2734 <b>A02</b>   | metal box, LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers, <b>accessories</b> with Ethernet cable, two cellular antennas, and <b>UK power supply</b>   |
| ICR-2734 <b>PA02</b>  | <b>plastic box</b> , LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers, <b>accessories</b> with Ethernet cable, two cellular antennas, and <b>UK power supply</b>                                       |
| ICR-2734 <b>W</b>     | metal box, LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers, <b>dual-band WiFi</b>   |
| ICR-2734 <b>WP</b>    | <b>plastic box</b> , LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers, <b>dual-band WiFi</b>   |
| ICR-2734 <b>WA01</b>  | metal box, LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers, <b>dual-band WiFi</b> , <b>accessories</b> with Ethernet cable, two cellular with one WiFi antennas, and <b>EU power supply</b>           |
| ICR-2734 <b>WPA01</b> | <b>plastic box</b> , LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers, <b>dual-band WiFi</b> , <b>accessories</b> with Ethernet cable, two cellular with one WiFi antennas, and <b>EU power supply</b> |
| ICR-2734 <b>WA02</b>  | metal box, LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers, <b>dual-band WiFi</b> , <b>accessories</b> with Ethernet cable, two cellular with one WiFi antennas, and <b>UK power supply</b>           |
| ICR-2734 <b>WPA02</b> | <b>plastic box</b> , LTE Cat.4 with 3G/2G fallback module, ETH0, ETH1, USB, two SIM readers, <b>dual-band WiFi</b> , <b>accessories</b> with Ethernet cable, two cellular with one WiFi antennas, and <b>UK power supply</b> |

Table 2: Order Codes Overview

1. Product Overview 1.5 Product Revisions

### 1.5 Product Revisions

For the product revision history, see the table below. The revision number is printed on the packaging and product labels.

The router GUI can also display the product revision under *Status -> General -> System Information -> Product Revision*. Please note that the default revision (Rev.1.0) is unavailable here.

| Rev.# | Description   |
|-------|---|
| 1.0   | Initial version (revision number not printed on the labels).      |
| 2.0   | WiFi support added to the mainboard; see PCN-2023-10 for details. |
| 2.1   | Changed color of the DAT LED; see PCN-2023-11 for details.        |

Table 3: HW Revisions History

# 1.6 Package Contents and Accessories

Table 4 refers to router package contents and other accessories, which depend on the order code; see Chapter 1.4. You can order an accessory separately; use the order code mentioned.

| Description  | Figure          | Q'ty      |
|--|-----------------|-----------|
| Router in metal or plastic box   | CASTO Libration | 1 pc      |
| DIN rail clip with screws (screws differ for metal and plastic versions) | 11              | 1 set     |
| 2-pin terminal block for power supply (deployed on the router)           |                 | 1 pc      |
| Printed Quick Start Guide Leaflet  |                 | 1 pc      |
| Ethernet cross cable of length 1.5 m. Order code: <i>BB-KD-ETH</i>       |                 | 0 / 1 pc  |
| 5G/LTE Antenna (SMA male).<br>Order code: <i>ANT-LTE5G-025</i>           |                 | 0 / 2 pcs |
| WiFi Antenna (RP-SMA male). Order code: BB-AW-A2458G-FSRPK               |                 | 0 / 1 pc  |

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| Description   | Figure | Q'ty     |
|---|--------|----------|
| Wall mount power supply, 12V/1A with EU plug. Order code: <i>BB-RPS-v2-EU</i> |        | 0 / 1 pc |
| Wall mount power supply, 12V/1A with UK plug. Order code: <i>BB-RPS-v2-UK</i> |        | 0 / 1 pc |
| Wall mount power supply, 12V/1A with US plug. Order code: <i>BB-RPS-v2-US</i> |        | 0 / 1 pc |

Table 4: Contents of Package

1. Product Overview 1.7 Product Dimensions

### 1.7 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**

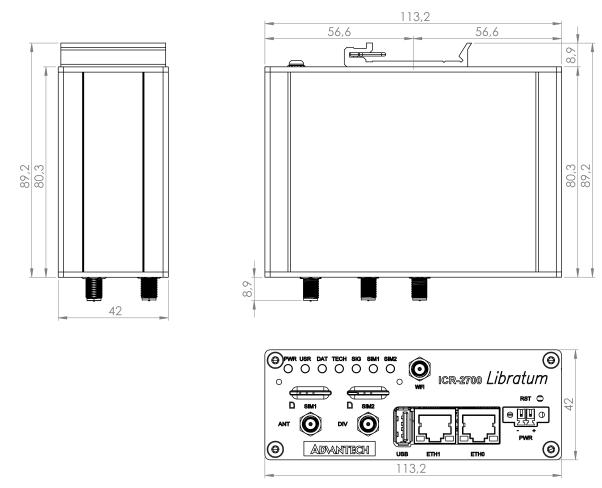


Figure 5: Metal Box - Top, Side and Front View

1. Product Overview 1.7 Product Dimensions

### **Variant with Plastic Box**

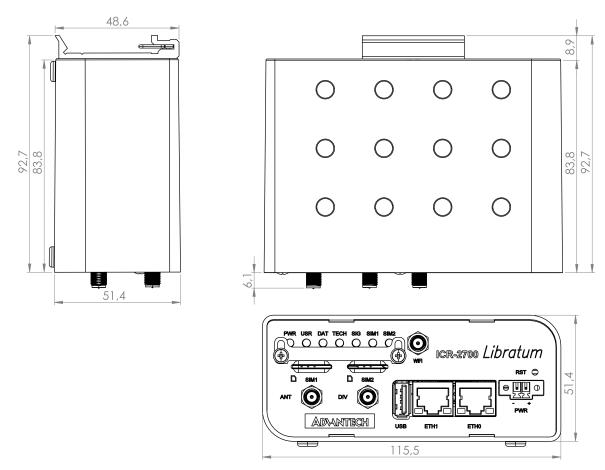


Figure 6: Plastic Box - Top, Side and Front View

### 1.8 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 1.9)

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 grounding screew, see Chapter 2.4.

1. Product Overview 1.9 DIN Rail Mounting

### 1.9 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 7.

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.

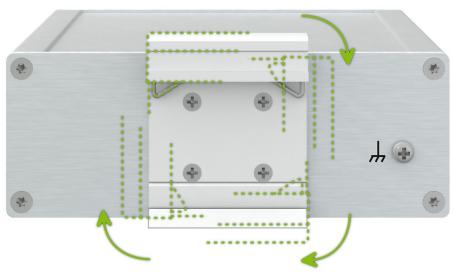


Figure 7: Position of the DIN Rail Clip

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 8.

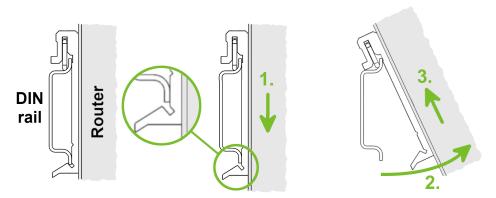


Figure 8: Removing Router from the DIN Rail

1. Product Overview 1.10 Product Label

### 1.10 Product Label

The figure below shows an example of the product labels with all the information printed on them.



Figure 9: Product Label

# 2. Hardware Functionality

See Chapter 1.3 for an overview of the product's hardware. Table 1 provides a concise description of the hardware, along with links to chapters offering detailed explanations.

### 2.1 SIM Card Slots

Slots for two SIM cards are located on the router beneath a metal cover. If you plan to use this device for cellular network communication, insert an activated data-provisioned SIM card into the SIM card reader.

You have the option to install two SIM cards simultaneously for utilizing the switching feature. The SIM cards can have different Access Point Names (APNs) configured. The procedure for changing SIM cards is outlined below. If the SIM requires a PIN, input it in the router's web interface (*Administration -> Unlock SIM Card*).



### Inserting the SIM card:

- Always disconnect the router from the power supply before handling the SIM card.
- Release the 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 to press the SIM card slightly into its slot until you hear a click. Upon hearing the click, release the card, and it will pop out of its slot.
- To insert a SIM card, push the card into the slot until it clicks into place.
- Swipe down the cover and tighten the cover screws.



Figure 10: SIM Cards Insertion



### 2.2 Antennas

Connect cellular antennas to the router to main (ANT) and diversity (DIV) SMA female connectors on the front panel. If the router is WiFi equipped, connect the WiFi antenna to the WiFi RP-SMA female 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.

- The DIV cellular antenna is required for the MIMO DL functionality.
- Recommended tightening moment for screwing the antenna to the SMA female connectors is 0.9 Nm.

#### 2.3 Ethernet Interfaces

The panel socket of RJ45 is used for Ethernet interface. The pinout of the socket is shown in Figure 11 and described in Table 5.

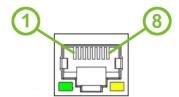


Figure 11: Ethernet Connector Pinout

| Pin | Signal mark | Description                    |
|-----|-------------|--------------------------------|
| 1   | Tx+         | Transmit Data+ (positive pole) |
| 2   | Tx-         | Transmit Data- (negative pole) |
| 3   | Rx+         | Receive Data+ (positive pole)  |
| 4   | _           | -                              |
| 5   | _           | -                              |
| 6   | Rx-         | 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 12 and described in Table 6.

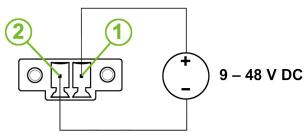


Figure 12: Connection of Power Supply

| 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 12. 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 13.

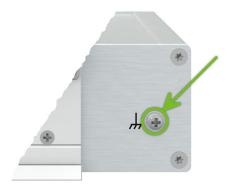


Figure 13: Position of the Grounding Screw

#### 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 after a predetermined period of time. Putting the router into LPM mode can be done using the 1pm command, see Commands and Scripts application note for more details.

#### 2.6 USB Port

There is one USB 2.0 host port with a USB-A type socket. The router supports USB Mass Storages and FTDI serial converters. For guidance on how to address an unsupported FTDI chip, refer to the Commands and Scripts application note, specifically the chapter on *How to Use Unsupported FTDI Chip*.

The USB port is designed to disable on overload to prevent potential damage (occurs when a connected device draws excessive current). The port is re-enabled after the router is rebooted.

### Mounting USB Flash Drive to the System

To access a USB flash drive in the router's system, it must be mounted. Follow these steps to mount the drive:

- Use the *dmesg* command to view the list of recently connected devices.
- Identify the entry for the USB flash drive in the command's output, for example:
   sda: sda1
- To mount the drive to the mnt directory, use the mount command: mount /dev/sda1 /mnt
- For more information about the commands for creating, mounting, checking, and unmounting a file system on a USB Flash Drive, consult the application note for the Ext4\_tools router app.

### **USB Socket Pinouts**

The USB socket pinouts are described in Figure 14 and Table 7.

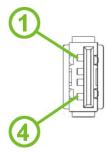


Figure 14: USB Connector Pinout

| 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 7: USB Connector Pinout

### 2.7 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<br>Green<br>Green    | On<br>Blinking<br>Fast blinking | The router is booting up. The router booted up and is ready. The router firmware is being updated.       |
| USR          | Green                      | _                               | The function of this LED is user-defined.  |
| DAT          | Red                        | Blinking                        | Cellular communication is in progress.   |
| TECH         | Green<br>Orange<br>Red     | On<br>Blinking<br>Fast blinking | The active SIM uses 4G technology. The active SIM uses 3G technology. The active SIM uses 2G technology. |
| SIG          | Green<br>Orange<br>Red     | On<br>Blinking<br>Fast blinking | Good cellular signal.<br>Fair cellular signal.<br>Poor cellular signal.                                  |
| SIM1         | Green<br>Red               | On<br>Fast blinking             | SIM1 is active for the cellular connection. A SIM1 issue (missing card or PIN not entered).              |
| SIM2         | Green<br>Red               | On<br>Fast blinking             | SIM2 is active for the cellular connection. A SIM1 issue (missing card or PIN not entered).              |
| ETH0<br>ETH1 | Green<br>Green             | On<br>Off                       | Selected 100 Mbps bit rate.<br>Selected 10 Mbps bit rate.  |
| ETH0<br>ETH1 | Orange<br>Orange<br>Orange | On<br>Brief off blinks<br>Off   | The network cable is connected.  Data transmission.  The network cable is not connected.                 |

Table 8: LED Status Indication

### 2.8 Reset Functions



Before initiating a factory reset on the router, consider creating a backup of its configuration.

The *RST* button serves three different purposes:

- Reset: Hold the RST button for less than 4 seconds; the router will reboot, applying its customized
  configuration. You can also trigger the router reset by selecting the Reboot menu option in the router
  web GUI.
- **Factory Reset**: To restore the router to its default factory configuration, press and hold the *RST* button for **more than 4 seconds**. The *PWR* LED will turn off and then back on. It's recommended to hold the *RST* button for an additional 1 second after the PWR LED comes on.
- Emergency Factory Reset: If the router fails to boot due to incorrect configuration, power off the router by disconnecting its power supply. Then, while holding the *RST* button, power on the router and continue holding the *RST* button for at least 10 seconds. This action will reset the router's configuration to the default settings.
- Use a narrow screwdriver or any small tool to press the RST button.



Figure 15: Resetting the Router

# 3. First Use

#### 3.1 Accessories Connection

Before putting the router into operation, make sure to connect all the components required for running your applications. Refer to Chapter 1.3 for an overview of the hardware. Also, remember to insert a SIM card for the cellular connection as explained in Chapter 2.1.



Ensure you do not operate the router without an antenna connected to the main antenna connector. Transmitting energy is effectively reflected by the open end, which could potentially damage the equipment.

### 3.2 Router Configuration

You can perform the initial configuration of the router using a web browser on your PC. This interface allows for router monitoring, configuration, and administration.

Begin by connecting the power supply to the router (refer to Chapter 2.4). The router will initiate its boot process. By default, the router will automatically establish a connection to the default Access Point Name (APN) of the inserted SIM card. Ensure your PC is configured to obtain IP settings automatically from the network. Connect your PC's network card to the default LAN interface of the router, Ethernet port ETH0. The DHCP server will assign an IP address to your PC.

To access the router's web interface, enter the following address in your web browser: https://192.168.

1.1. Please note that using the HTTPS protocol for secure communication over the network is mandatory. There is just the root user account created on the router by default. Check the **product label** on the router for the **default password**<sup>1</sup> Access the web interface by logging in with the root user and the corresponding password. Successful login grants access to the router's web interface. Consult the router **Configuration Manual** [1] for detailed descriptions and examples of 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 recommend regularly updating the router's firmware to the latest version. 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 [1], chapter *Basic Information -> WebAccess/DMP Configuration*, for more information.

<sup>&</sup>lt;sup>1</sup>If the router's label lacks a unique password, use the password root.

# 4. Technical Specifications

### 4.1 Basic Parameters

| Parameter                               |  | Description  |
|---|--|--|
| Temperature range                       | Operating<br>Storage                   | -40 °C to +75 °C<br>-40 °C to +85 °C   |
| Humidity                                | Operating<br>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 for non-WiFi (WiFi) version | Idle<br>Average<br>Maximum<br>LPM mode | 1.6 W (2.3 W)<br>3.0 W (4.0 W)<br>6.9 W (7.7 W)<br>3 mW  |
| Dimensions of device w/o clip           |  | 113,2 $\times$ 80,3 $\times$ 42 mm (metal box)<br>117 $\times$ 83,8 $\times$ 51,4 mm (plastic box) |
| DIN rail clip specification             | on                                     | DIN 35 mm, EN 60715  |
| Weight                                  |  | 260 g (metal box)<br>200 g (plastic box)   |
| Antenna connectors                      | ANT, DIV<br>WiFi                       | SMA female connectors for LTE – 50 $\Omega$ RP-SMA female connector for WiFi – 50 $\Omega$         |
| Interfaces                              | ETH0<br>ETH1<br>USB                    | RJ-45 socket for 10/100 Mbps Ethernet<br>RJ-45 socket for 10/100 Mbps Ethernet<br>USB-A socket     |

Table 9: Basic Parameters

# 4.2 Standards and Regulations

The router complies with the following standards and regulations:

| '              | 9   |
|----------------|---|
| Parameter      | Description   |
| Radio          | EN 301 511, EN 301 908-1, EN 301 908-2, EN 301 908-13, EN 301 893, EN 300 328   |
| EMC            | EN 301 489-1, EN 301 489-17, 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 10: Standards and Regulations

# 4.3 Type Tests and Environmental Conditions

| <b>P</b> henomena     | Test          | Description                     | Test levels   |
|-----------------------|---------------|---------------------------------|---|
| ESD                   | EN 61000-4-2  | Enclosure                       | CD $\pm 6$ kV, L3 AD $\pm 8$ kV, L3   |
| RF field AM modulated | EN 61000-4-3  | Enclosure                       | 20 V/m, 80 MHz – 1 GHz, LX<br>10 V/m, 1 GHz – 6 GHz, L3   |
| Fast transient        | EN 61000-4-4  | DC<br>ETH - FTP<br>AC/DC        | $\pm 1$ kV, 5/50Tr/Th ns, 100 kHz, L2 $\pm 1$ kV, 5/50Tr/Th ns, 100 kHz, L3 $\pm 2$ kV, 5/50Tr/Th ns, 100 kHz, L3 |
| Surge                 | EN 61000-4-5  | DC<br>ETH<br>AC/DC              | $\pm 1$ kV,1,2/50(8/20) Tr/Th us L2 $\pm 1$ kV,1,2/50(8/20) Tr/Th us L2 $\pm 2$ kV,1,2/50(8/20) Tr/Th us L3       |
| RF conducted          | EN 61000-4-6  | DC<br>ETH<br>AC/DC              | 10V,0.15-80MHz,80% AM(1kHz),L3<br>10V,0.15-80MHz,80% AM(1kHz),L3<br>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, interuption 0% 250 cycles   |
| Radiated emission     | EN 55032      | Enclosure<br>DC<br>ETH<br>AC/DC | CI. B,30MHz-1GHz,1GHz-6GHz<br>Class B, 150 kHz – 30 MHz<br>Class B, 150 kHz – 30 MHz<br>Class B, 150 kHz – 30 MHz |

Table 11: Type Tests and Environmental Conditions

# 4.4 Parameters of Cellular Module

| Parameter             | Description  |
|-----------------------|--|
| Antenna               | Connector type: SMA Impedance: 50 $\Omega$   |
| 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  | <b>Supported frequencies:</b> B5 (850 MHz), B8 (900 MHz)<br>B3 (1800 MHz), B2 (1900 MHz)<br><b>Bit rates:</b> max. 237 kbps (DL) / 237 kbps (UL)   |

Table 12: Technical Parameters of Cellular Module

# 4.5 Parameters of WiFi

| Parameter             | Description   |
|-----------------------|---|
| Supported Standards   | IEEE802.11 ac/a/b/g/n 2.4 GHz / 5 GHz   |
| Antenna connector     | 1x RP-SMA Input impedance: 50 $\Omega$  |
| Data Rate             | 802.11b: 1, 2, 5.5, 11Mbps<br>802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n: Max. 72 Mbps @ 20 MHz channel<br>802.11n: Max. 150 Mbps @ 40 MHz channel   |
| Frequency Ranges      | 2.4 GHz ISM Bands 2.412-2.472 GHz<br>5.15-5.25 GHz (FCC UNII-low band) for US/Canada and EU<br>5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and EU<br>5.47-5.725 GHz for EU<br>5.725-5.825 GHz (FCC UNII-high band) for US/Canada |
| Modulation            | DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM   |
| 2.4 GHz Channels      | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13   |
| 5 GHz Channels        | 36, 38, 40, 42, 44, 46, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165  |
| Type of Device        | Access point (AP) (up to 8 clients) Station (STA) Multirole (STA&AP)  |
| Security – Standards  | WPA, WPA2, WPA3, 802.1X   |
| Security – Encryption | WEP, TKIP, AES  |
| TX Power              | Max. 18 dBm @ 2.4 GHz<br>Max. 15 dBm @ 5 GHz  |

Table 13: Technical Parameters of WiFi

# 4.6 System Configuration

The main parametes of the system are listed in Table 14.

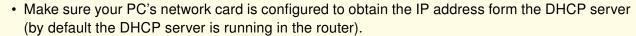
| Parameter        | Description  |
|------------------|--|
| CPU architecture | ARM926EJ-S   |
| CPU frequency    | 600 MHz  |
| CPU power        | 4,72 DMIPS/MHz   |
| Flash memory     | <ul><li>4 MB of NOR</li><li>4 096 MB of eMMC</li><li>838 MB for Router Apps</li><li>512 MB for customer data</li></ul> |
| RAM size         | 128 MB   |
| Watchdog         | HW Watchdog  |
| RTC              | Battery Backup RTC   |
| TPM <sup>1</sup> | Trusted Platform Module (TPM) 2.0  |

Table 14: System Configuration

<sup>&</sup>lt;sup>1</sup>Not 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:



- · 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.

### Mow 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 adhere to all relevant international and national laws, including any specific restrictions governing its use in designated applications and environments.
- To prevent potential injury and appliance damage, ensure compliance with regulations by using only authorized accessories. Unauthorized modifications or use of unapproved accessories could damage the router, violate regulations, and void the warranty.
- · Do not attempt to open the router.
- Before handling the SIM card, turn off the router and disconnect it from the power supply.



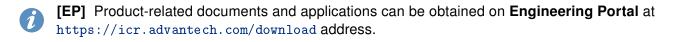
- Caution! This equipment is not suitable for use in areas with children. Small children could swallow the SIM card.
- Ensure the power supply does not exceed 48 V DC maximum.
- Avoid exposing the router to extreme ambient conditions. Safeguard it against dust, moisture, and high temperatures.
- Only deploy routers with appropriate certification and labeling in environments containing flammable
  or explosive materials, such as gas stations, chemical plants, or areas involving explosives. Users
  must observe restrictions pertaining to radio device usage in such settings.
- When traveling by plane, switch off the router. Using it onboard could jeopardize flight operations, disrupt mobile networks, and potentially violate regulations. Non-compliance may result in telephone service suspension, cancellation, or legal repercussions.
- Exercise heightened caution when operating the router near personal medical devices like cardiac pacemakers or hearing aids.
- The router may cause interference when operated in close proximity to TV sets, radio receivers, or personal computers.
- It's advisable to create a suitable backup of all critical settings stored in the device's memory.

# **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.

# **Appendix D: Related Documents**

[1] ICR-2[78]00 Configuration Manual





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



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).

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