

Hardware Manual

Industrial Cellular Router SmartStart SL305



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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 – Useful tips or information of special interest.

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1. Router Description

Cellular router SmartStart is designed for wireless communication in mobile networks that use traditional cellular technologies. The primary purpose of this router is its use in the newest Category 4 (Cat.4) services on the cellular LTE network.

1.1 LTE Category 4 (Cat.4)

LTE Category 4 (Cat.4) is the next step in 4G LTE device capability. Cat.4 rated SmartStart routers are 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 a Category 4 is approximately 150 Mbps. Also in the uplink, LTE Category 4 provides a peak data rate of 50 Mbps.

1.2 Basic HW Information

As a standard, the SmartStart router is equipped with one Ethernet 10/100 Mbps, one serial interface RS232, one binary input and one output. SL305 also contains two readers for 3 V and 1.8 V SIM cards, which are placed on the rear panel of the device. The router can be equipped with a 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 SmartStart router is supplied in a plastic casing.

1.3 Configuration and Diagnostics

The router can be configured using a password-protected Web interface. The web interface provides (after logging in) detailed statistics about the router activities, signal strength, detailed system logs etc. This device supports the creation of VPN tunnels using technologies IPSec, OpenVPN and L2TP for secure communications. There are also supported functions such as IPv6 (the latest revision of the Internet Protocol), DHCP, NAT, NAT-T, DynDNS, NTP, VRRP, control by SMS, primary connection backups and many other functions are also supported.

Other diagnostic functions ensuring continuous communication include automatic inspection of PPP connection offering an automatic restart feature in case of connection is lost, or hardware watchdog which monitors the status of the router. Using a special window (start up script window) you may insert Linux scripts for various actions. For some applications is the key possibility to create several different configurations for one router which can be switched as needed (e.g. using SMS or status of the binary input). Cellular routers may automatically update configuration and firmware from server. This allows mass reconfiguration of many routers in one time.

The router also supports additional software like *R-SeeNet* for permanent traffic monitoring of routers or *WebAccess/VPN* for remote access.



Examples of possible applications

- mobile office
- smart meters for utilities
- fleet management
- security systems
- telematic
- telemetric
- remote monitoring
- vending and dispatcher machines

1.4 Usage of the Router

The router is primarily intended for these four basic situations:

I. Access to the Internet from LAN

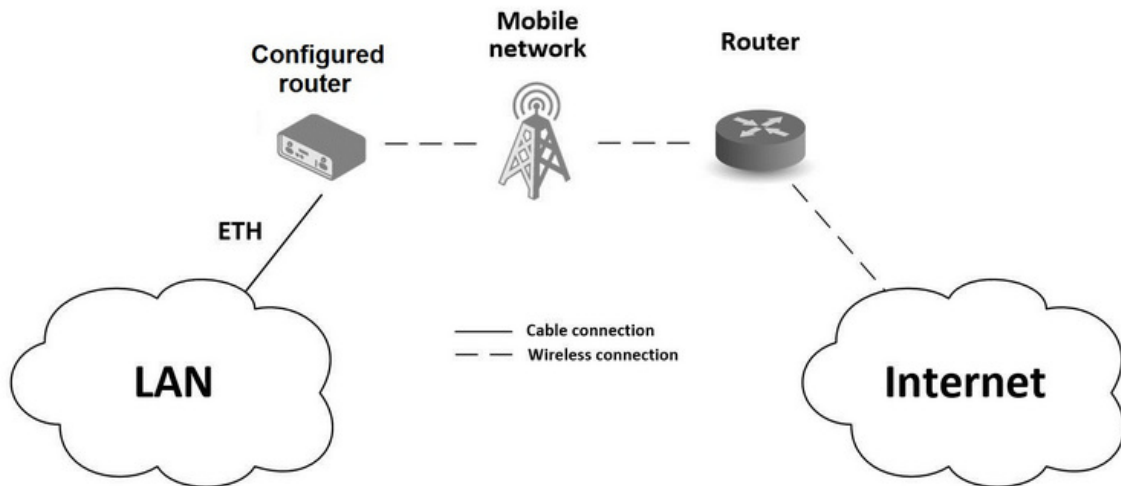


Figure 1: Access to the Internet from LAN

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

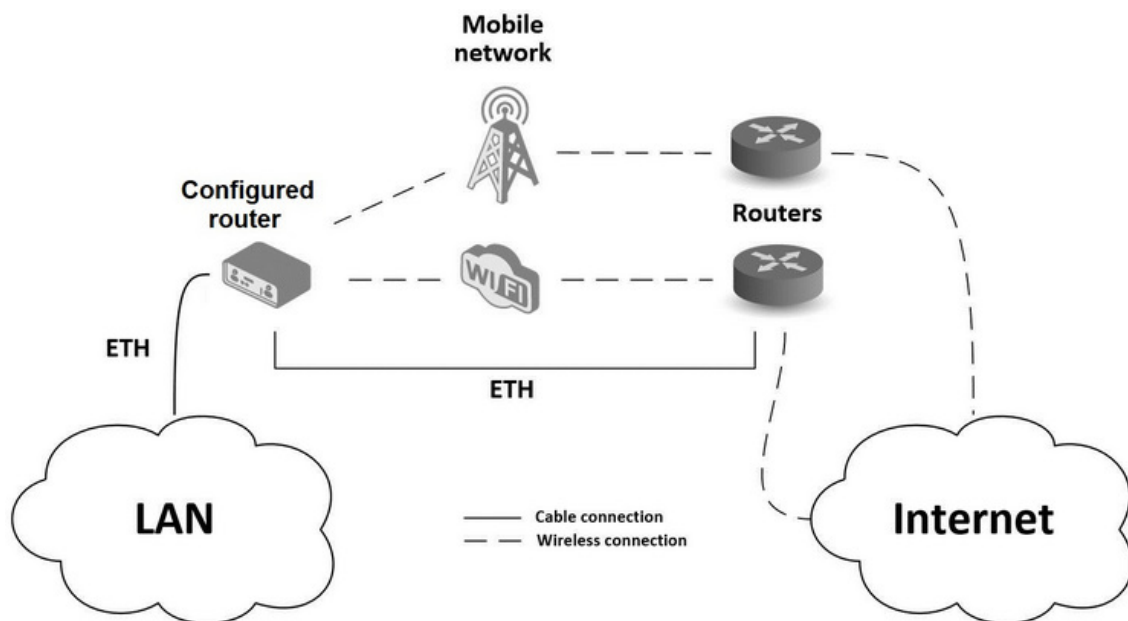


Figure 2: Backed up access to the Internet

III. Secure networks interconnection or using VPN

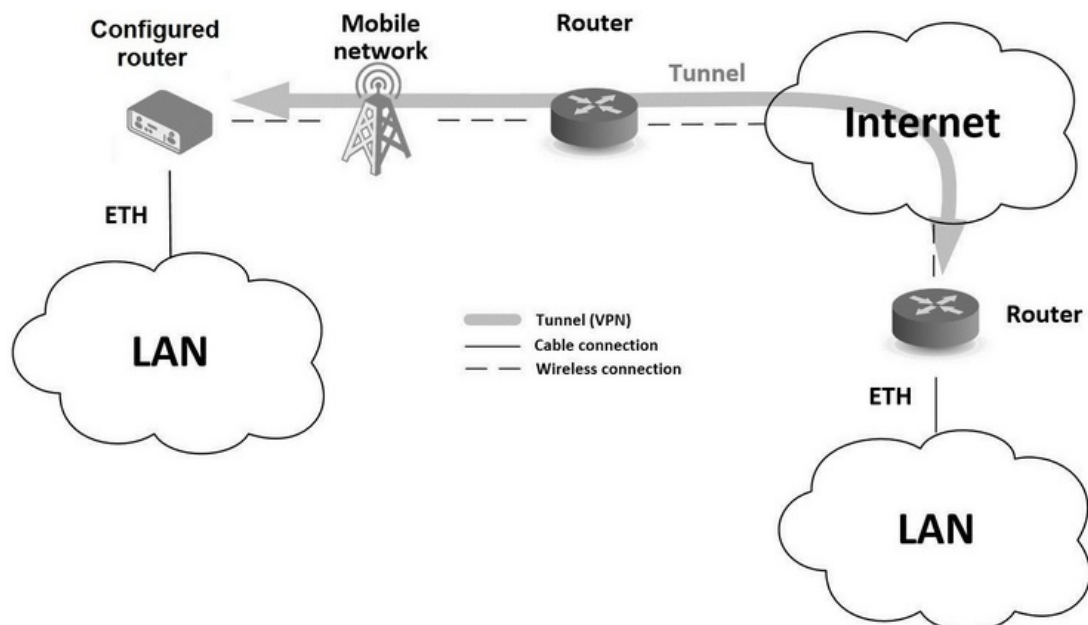


Figure 3: Using a VPN tunnel

IV. Serial Gateway

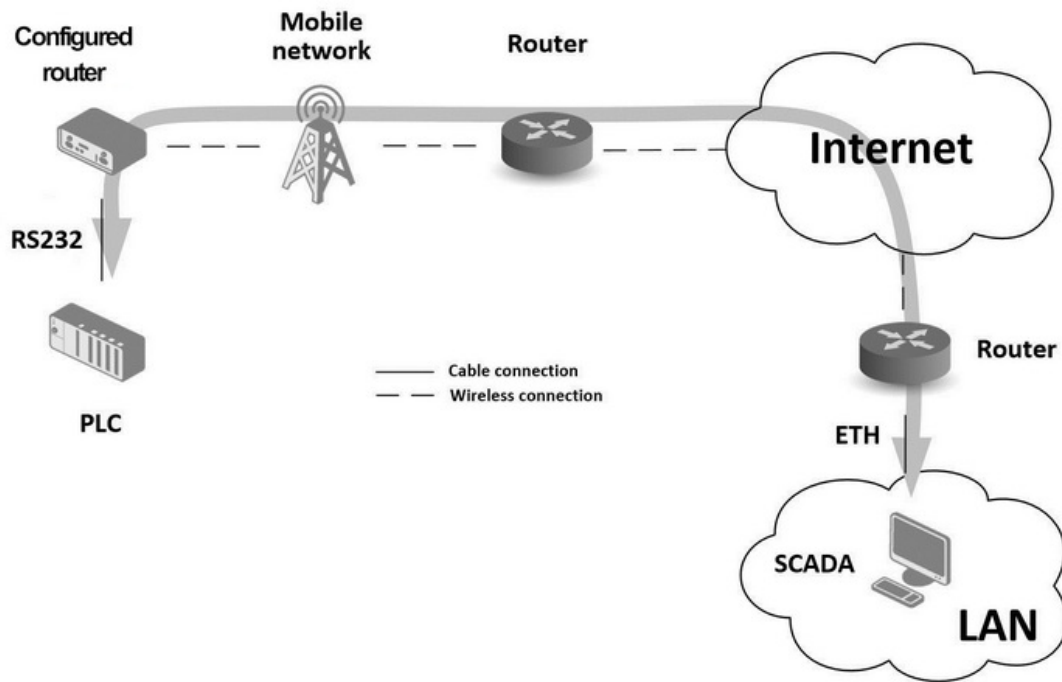


Figure 4: Serial Gateway

2. Contents of Package

The basic router set available for delivery includes the following items:

- router,
- power and IO cable (1.5 m long),
- clip for the DIN rail (two screws are included),
- printed *Quick Start Guide Leaflet*.

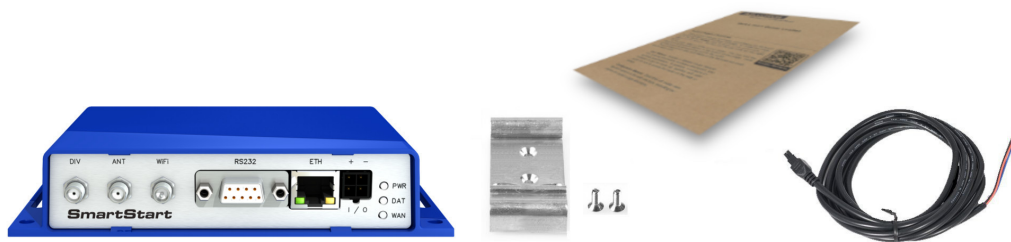


Figure 5: Contents of package

3. Router Design

3.1 Router Versions

The SmartStart SL305 router is supplied in the following versions (see table below). All versions are available only in plastic casing.

Router versions	SIM	BIN	BOUT	ETH	RS232	WiFi
SL305 with RS232	2 x	1 x	1 x	1 x	1 x	
SL305 with RS232 & WiFi	2 x	1 x	1 x	1 x	1 x	1 x

Table 1: Router versions



Figure 6: Front panel

3.2 Product Revisions

For the product revision history of the entire product platform, refer to the table below. Please note that some revisions may not be available for certain order codes. The revision number is printed on both 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) may not be available here.

Rev.#	Description
1.0	Initial version (revision number not printed on the labels).
2.0	New SIM slot type; see PCN-2022-03 for details.

Table 2: HW Revisions History

3.3 Delivery Identification

Trade name	Product name	Description
SL305	SmartStart	LTE router (Cat.4) for EMEA

Table 3: Delivery identification



Figure 7: Product label

3.4 Order Codes

The table below shows an overview of order codes.

Name	Order code	Features – interfaces
SmartStart SL305	BB-SL30500110	LTE module Cat.4 EMEA, 1x ETH, 1x RS232, 1x BI, 1x BO, 2x SIM reader
SmartStart SL305	BB-SL30510110	LTE module Cat.4 EMEA, 1x ETH, 1x RS232, 1x BI, 1x BO, 2x SIM reader, WiFi

Table 4: Order codes overview

3.5 Basic Dimensions of the Router

3.5.1 Front view

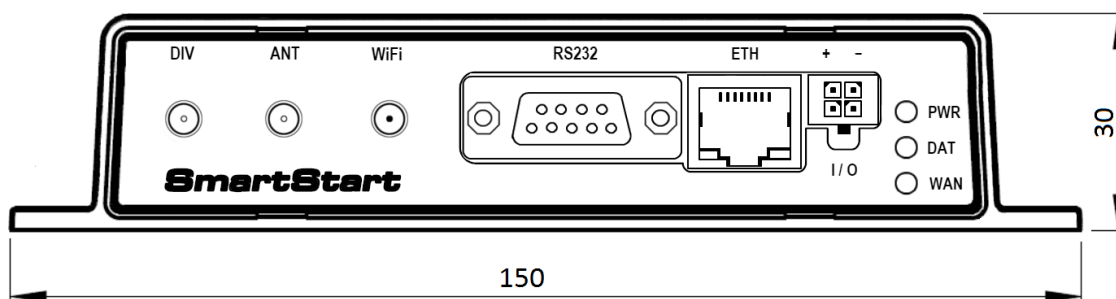


Figure 8: Front view

3.5.2 Top view

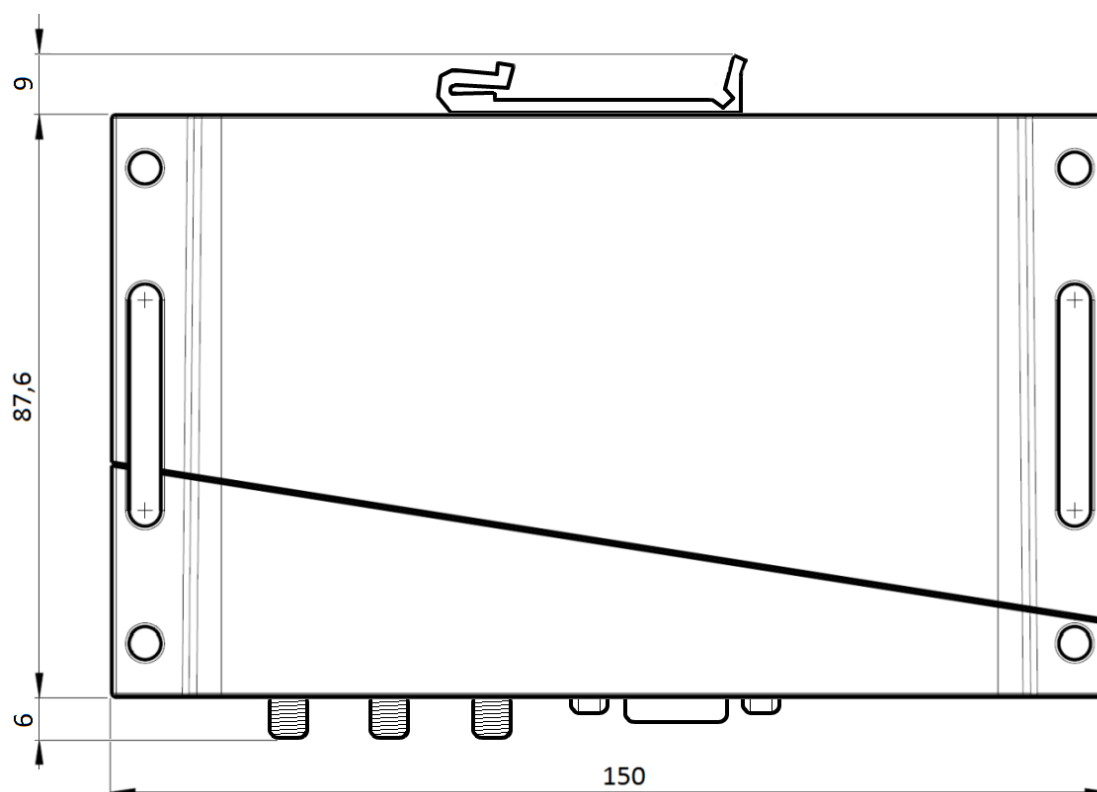


Figure 9: Top view

3.5.3 Bottom view

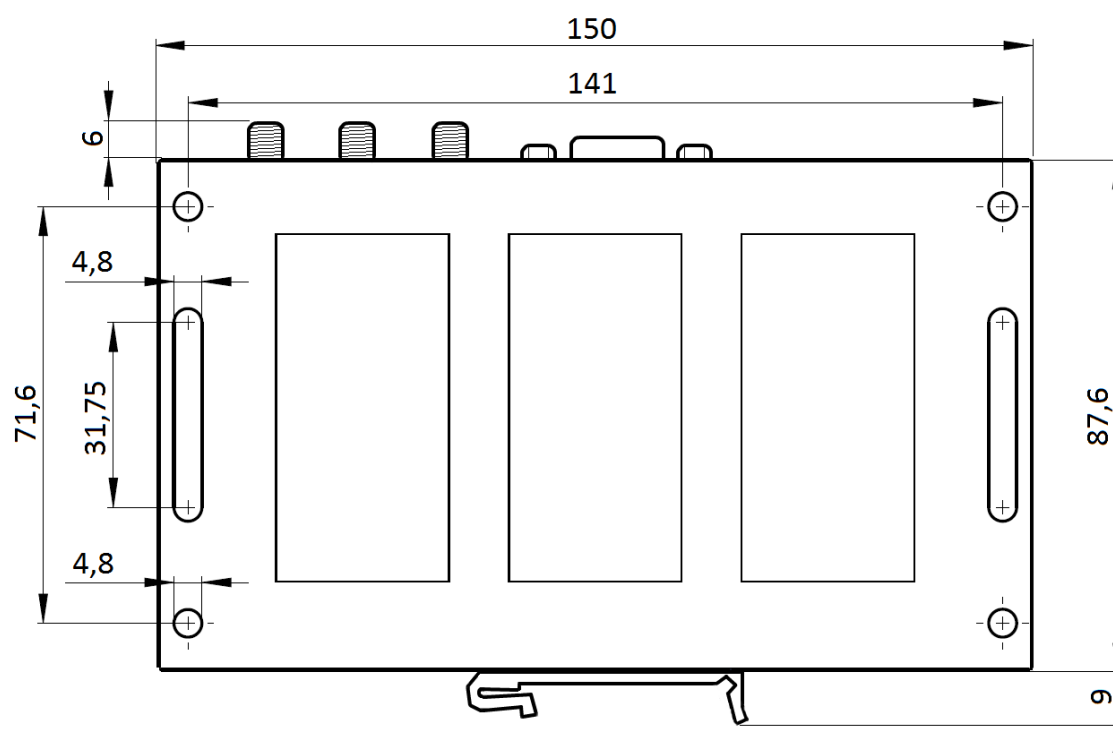


Figure 10: Bottom view

3.5.4 Rear view

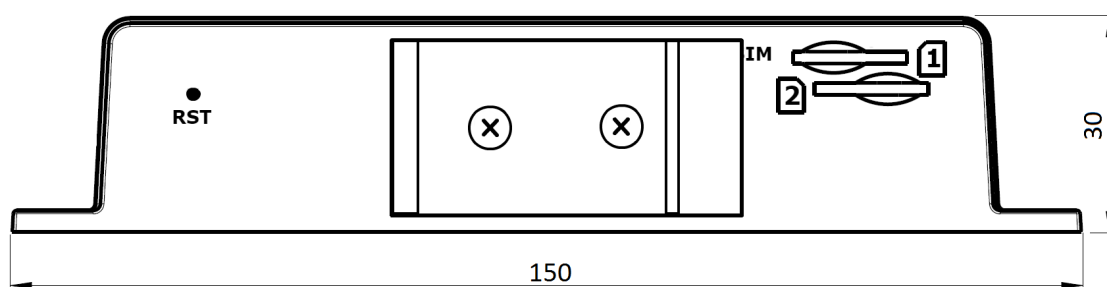


Figure 11: Rear view

3.6 Mounting Recommendations

You can place the router on a flat surface or mount it on a wall using the four holes in the chassis corners, as shown in Figure 10. For wall mounting, use M4 screws (diameter 4 mm) that comply with DIN 912 or DIN 967 standards. Use M4 washers along with these screws. Tighten with a **torque of 1 Nm**.

Alternatively, you can mount the router on a DIN rail (EN 60715) using the included DIN rail clip *BB-SBD25*.

The router meets EN 61439-1:2011 requirements/certifications for low-voltage switchgear and control gear assemblies. These environments are described as:

- 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.



To comply with the EN 61439-1:2011 specification, follow these instructions:

- 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 power supply of the router, data cables and antenna within the switchboard.

3.7 Removal from the DIN rail



The DIN rail clip is suitable for a DIN rail according to EN 60715 standard only. The default position of metal rail clip, which is used for mounting the router on a DIN rail, is shown in the following figure. When mounting the DIN rail clip, tighten the screws with max. 0.4 Nm torque.



Figure 12: Default position of metal DIN rail clip

To remove the router from the DIN rail, push the router down lightly, so the bottom part of the DIN rail clip (hitched to the DIN rail) gets out of the rail and then pull out the bottom part of the router away from the DIN rail.

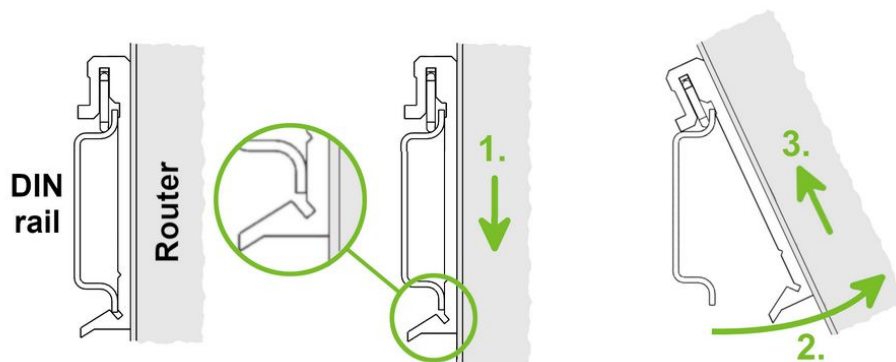


Figure 13: Removal from the DIN rail

3.8 Description of the Rear Panel

The rear panel contains two holders for SIM cards (*SIM1*, *SIM2*) and *RST* button used to restore the default configuration followed by rebooting of the router. Picture with the rear view of the router is on figure 11. Description of resetting procedure is described in chapter 3.9.7.

3.9 Description of the Front Panel

On the front panel is the following:

Caption	Connector	Description
PWR/IO	4-pin	Connector for the power supply and connection of the binary input and output.
ETH	RJ45	Connector for connection into the computer network.
RS232	DB9 female	Connector for serial interface RS232.
ANT	SMA	Connector for main antenna.
DIV	SMA	Connector for diversity antenna.
WiFi	R-SMA	Connector for WiFi antenna (only for versions with WiFi module!).

Table 5: Front panel description



Figure 14: SmartStart front panel

3.9.1 Status indication

There are three LED indicators on the front panel to provide router status information. The ETH port has two additional LEDs that provide information about the port status.

Caption	Color	State	Description
PWR	Green	On Blinking Fast blinking.	Router is ready. Starting of the router. Updating firmware.
DAT	Red	Blinking	Communication in progress on the radio channel.
WAN	Yellow	Fades out 1x/5 s Fades out 1x/2 s Fades out 1x/1 s	Signal strength is good. Signal strength is fair ¹ . Signal strength is poor ² . For value ranges of signal strength see <i>Configuration manual</i> , chapter <i>Mobile WAN Status</i> .
ETH	Green	On Off	Selected 100 Mbps. Selected 10 Mbps.
ETH	Yellow	On Blinking Off	The network cable is connected. Data transmission. The network cable is not connected.

Table 6: Status indication



The status indication of the WAN LED is updated every 10 seconds.

¹Or the difference between neighbouring cells is exactly 3 dBm.

²Or the difference between neighbouring cells is smaller than 3 dBm.

3.9.2 Power PWR/IO Connector

Panel socket 4-pin.

Pin number	Signal mark	Description
1	GND(-)	Negative pole of DC supply voltage
2	VCC(+)	Positive pole of DC supply voltage (+9 to +36 V DC, 1 A)
3	IN0	Binary input
4	OUT0	Binary output

Table 7: Connection of PWR / IO connector

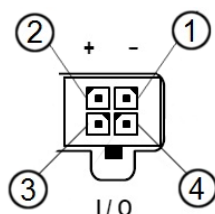


Figure 15: PWR / IO connector



Unit has to be supplied by a power supply specified as a Limited Power Source (LPS) according to Annex Q of IEC 62368-1:2014. If the power supply/cable provided with device is not used, always use the cables with minimum wire size (nominal cross section) 0.5 square mm for power supply.

The power supply for the router must be between +9 V to +36 V DC, with current output 1 A. 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 router is awakened after the power supply outage and subsequent renewal.

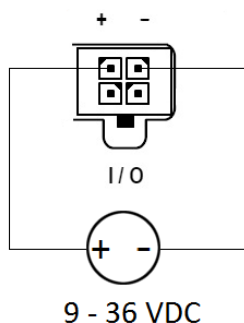


Figure 16: Circuit example – connection of power supply

The PWR / IO interface is also designed for the processing of binary input and control (setting) of binary output.

Binary Input

Logical 0/1*	Voltage	Web interface status
logic 0	0 – 0.7 V	On
logic 1	1.6 – 36 V	Off

Table 8: Characteristics of binary input

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

Binary Output

The binary output is open in the default configuration. The current of the binary output is limited by a resettable fuse (200 mA).

Binary inputs and output connections

Binary inputs and output connections example:

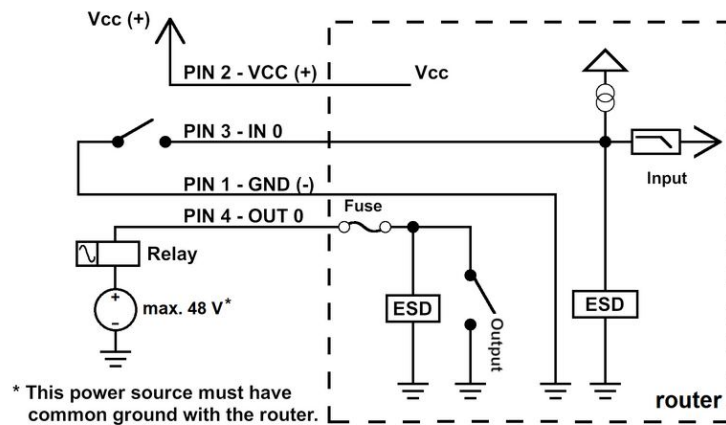


Figure 17: Binary connection



All metal parts are connected together with the negative pole of power supply (common pole). However, the router box may not be connected to the negative pole properly.

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. The router can be woken up from this mode by a signal applied to the BIN0 input or after a predetermined period of time. Putting the router into LPM mode can be done using the `lpm` command, see [Command Line Interface](#) application note for more details. Consumption in LPM mode may vary depending on the configuration of the router.

3.9.3 Antenna Connector ANT, DIV and WiFi

The main and diversity antennas are connected to the router using the SMA connector on the front panel. There is also an R-SMA antenna connector available, through which an additional antenna can be connected, if the router is equipped with a WiFi module.

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. An R-SMA connector named *WiFi* is designed for the connection of a WiFi antenna (available only for versions with a WiFi module).



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



The DIV cellular antenna is required for the MIMO DL functionality.



An SMA connector is used for the connection of the antenna. The antenna is connected by screwing this antenna to the SMA connector on the router's front panel (see the figure below). Recommended tightening moment is 0.9 Nm.

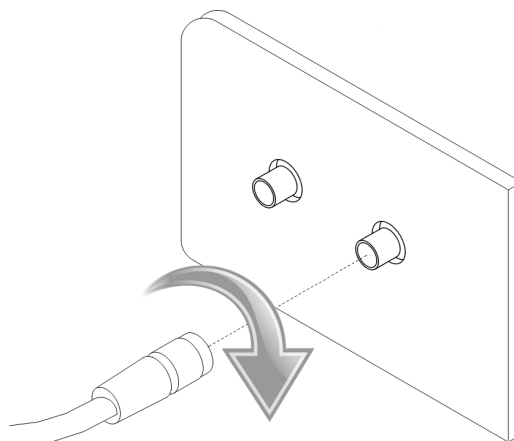


Figure 18: Connecting the antenna



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

3.9.4 SIM Card Reader

The SmartStart SL305 contains two readers for 3 V and 1.8 V SIM cards, which are located on the rear panel of the device. In order for the router to function, it is necessary to insert an activated SIM card with an unblocked PIN code. The SIM cards may have different APNs (Access Point Names) adjusted.



Supported type of SIM cards: **Mini SIM** (2FF), dimensions 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.
- 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.

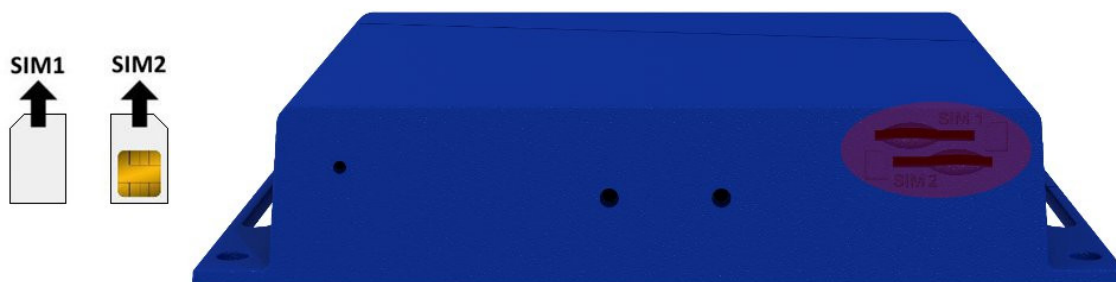


Figure 19: SIM cards

3.9.5 Ethernet Port ETH

The panel socket RJ45 is used for this interface. The isolation barrier of the Ethernet signal ports against the ground is 1500 V.

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

Table 9: Connection of Ethernet connector

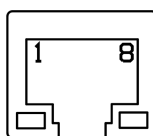


Figure 20: Ethernet connector

The Ethernet cable plugs into the RJ45 connector labeled as ETH (see the figure below).

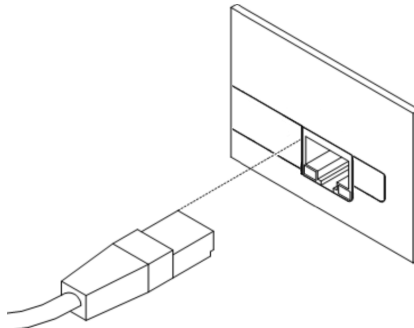


Figure 21: Connection of Ethernet cable

3.9.6 Serial Port RS232

This interface is physically connected through the DB9 Female connector.

Pin	Signal mark	Description	Data flow direction
1	DCD	Data Carrier Detect	Output
2	RXD	Receive Data	Output
3	TXD	Transmit Data	Input
4	DTR	Data Terminal Ready	Input
5	GND	System Ground	—
6	DSR	Data Set Ready	Output
7	RTS	Request to Send	Input
8	CTS	Clear to Send	Output
9	RI	Ring Indicator	NC

Table 10: Connection of RS232 connector

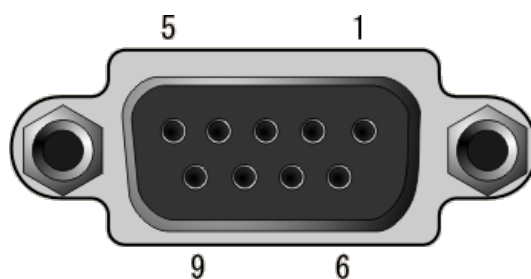


Figure 22: RS232 connector

3.9.7 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 rear panel. After pressing this button, the default configuration will be restored and the router will reboot (after which the green LED will be on).

In order to press the *RST* button it is necessary to use a narrow screwdriver or other small tool.

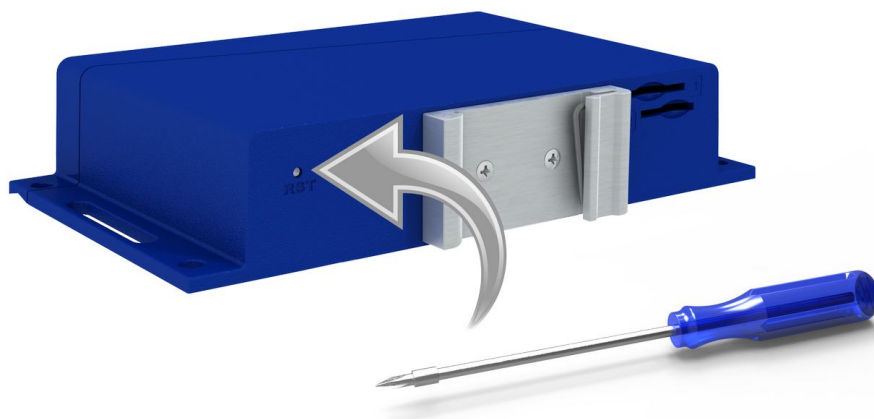


Figure 23: Router reset



Before resetting the router, it is recommend 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 a 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 <i>Reboot</i> button in the web configuration
Reset	Restores the default configuration and reboots the router	Press the <i>RST</i> button

Table 11: Description of router reset and restart

4. First Use

4.1 Connecting the Router Before the 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.

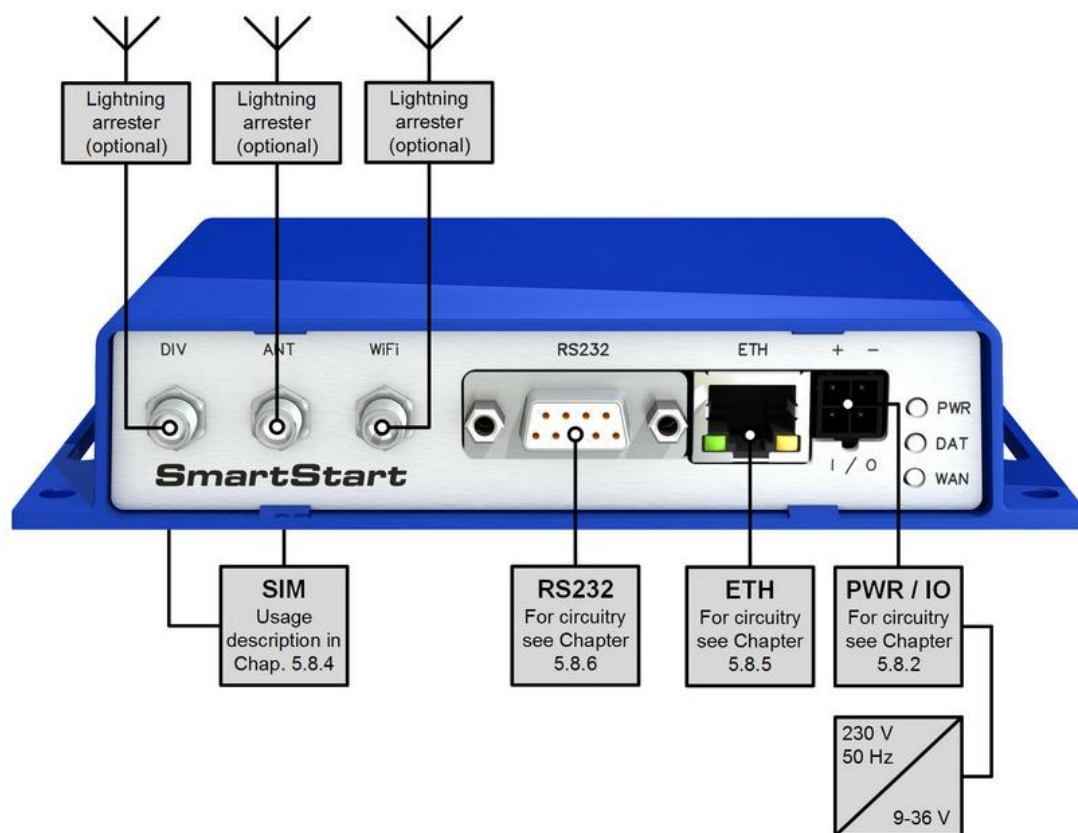


Figure 24: Router connection

4.2 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 ETH. Router's behavior can be changed via the web interface. This is described in detail in the *Configuration manual for SmartStart* [1].

4.3 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.

4.3.1 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!**

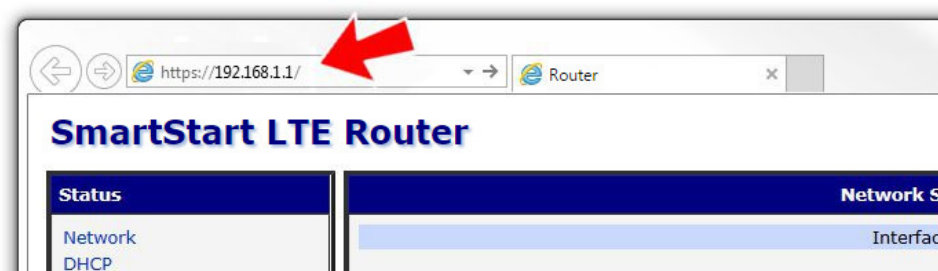


Figure 25: Entering the IP address of the router

By default, configuration may be performed only by the user "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.

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

Once the login information are entered successfully, the user will have access to the router's web interface via the web browser.

ADVANTECH SmartStart LTE Router	
Status	General Status
General	Mobile Connection
Mobile WAN	SIM Card : 1st
WiFi	IP Address : 10.80.0.71
Network	IPv6 Address : Unassigned
DHCP	Rx Data : 580 B
IPsec	Tx Data : 1.9 KB
DynDNS	Uptime : 0 days, 9 hours, 10 minute
System Log	» More Information «
Configuration	Primary LAN
LAN	IP Address : 10.64.0.69 / 255.255.252.0
VRRP	IPv6 Address : fd00:a40::69 / 56
Mobile WAN	MAC Address : 02:AD:FF:00:00:69
PPPoE	Rx Data : 50.2 KB
WiFi	Tx Data : 30.8 KB
Backup Routes	» More Information «
Static Routes	WiFi AP
Firewall	IP Address : Unassigned
NAT	IPv6 Address : Unassigned
OpenVPN	MAC Address : 00:22:88:03:7A:78
IPsec	» More Information «
GRE	WiFi STA
L2TP	IP Address : Unassigned
PPTP	IPv6 Address : Unassigned
Services	MAC Address : 00:22:88:03:7A:79
Expansion Port	» More Information «
Scripts	Peripheral Ports
Automatic Update	Expansion Port : RS-232
Customization	Binary Input : Off
User Modules	Binary Output : On
Administration	System Information
Users	Firmware Version : 6.2.5 (2020-05-20)
Change Profile	Serial Number : ACZ11990000000694
Change Password	Profile : Standard
Set Real Time Clock	RTC Battery : Ok
Set SMS Service Center	Supply Voltage : 23.9 V
Unlock SIM Card	Temperature : 39 °C
Unblock SIM Card	Time : 2020-05-26 13:14:35
Send SMS	Uptime : 0 days, 9 hours, 11 minutes
Backup Configuration	» Licenses «
Restore Configuration	
Update Firmware	
Reboot	
Logout	

Figure 26: Router web interface



A detailed description of the router settings in the Web interface can be found in the *Configuration manual for SmartStart* [1].

5. Technical Parameters

5.1 Basic Parameters

SmartStart		
Temperature range	Operating Storage	-40 °C to +75 °C (-40 °F to +167 °F) -40 °C to +85 °C (-40 °F to +185 °F)
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		IP30
Supply voltage		9 to 36 V DC
Battery for RTC		CR1225
Consumption without WiFi	Average	2.1 W
	Maximum	4.8 W
Consumption with WiFi	Average	2.7 W
	Maximum	5.5 W
Sleep mode consumption		40 mW
Dimensions		30 x 87 x 150 mm (1.18" x 3.43" x 5.91") (DIN 35 mm, EN 60715)
Weight		approximately 190 g (0.41 lbs) (depends on interface)
Antenna connectors		2x SMA – 50 Ohm 1x R-SMA – 50 Ohm (only for WiFi)

Table 12: Basic parameters



* Temperature range for routers equipped with WiFi module is reduced to -25 °C to +55 °C (-40 °F to +131 °F)!

5.2 Technical Specification of User Interfaces

Parameter	ETH	RS232
Connector	RJ45	DB9 Female
Standard	IEEE 802.3	
Min. data rate	10 Mbps	300 bps
Max. data rate	100 Mbps	230400 bps
Max. total cable length (300 Bd, 200 nF/km)	100 m	20 m

Table 13: Technical Specification of User Interfaces

5.3 Standards and Regulations

The router complies with the following standards and regulations.

Parameter	Description
Radio	ETSI EN 301 511, ETSI EN 301 908-1, ETSI EN 301 908-2, ETSI EN 301 908-13
EMC	ETSI EN 301 489-1, ETSI EN 301 489-52, EN 55032, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-3
Safety	EN IEC 62368-1, EN IEC 62311, IEEE 802.3
Transportation	E-Mark E8 homologation number: 10R – 04 8634
Cybersecurity	EN 18031-1
National	CE, UKCA
Environmental	REACH, RoHS and WEEE compliant

Table 14: Standards and Regulations

5.4 Type Tests and Environmental Conditions

Phenomena	Test	Description	Test levels
ESD	EN 61000-4-2	Enclosure Enclosure	AC port ± 6 kV (crit. A) DC port ± 8 kV (crit. A)
Radiated RF immunity	EN 61000-4-3	Enclosure	10 V/m, 80mHz - 6 GHz
Fast transient	EN 61000-4-4	Power port Ethernet port RS485 port I/O port AC-DC	± 2 kV (crit. A) ± 2 kV (crit. A) ± 2 kV (crit. A) ± 2 kV (crit. A) ± 2 kV (crit. A)
Surge	EN 61000-4-5	Ethernet port Power port AC-DC	± 1 kV (crit. A), shielded cab. $\pm 0,5$ kV (crit. A) ± 1 kV (crit. A) L-L
RF conducted	EN 61000-4-6	All ports AC-DC	10 V (crit. A) (0,15 – 80 MHz) 10 V (crit. A)
Voltage dips, interruptions	EN 61000-4-11	AC-DC	
Dry heat	EN 60068-2-2	Operation Storage	+75 °C, 40 % rel. humidity, 16 hours +85 °C, 40 % rel. humidity, 16 hours
Cold	EN 60068-2-1	Operation Storage	-40 °C, 16 hours -40 °C, 16 hours
Damp heat	EN 60068-2-30, test Db	+55 °C / +25 °C, 6 h – 6 h, 2 cycles	
Temperature variation	EN 60068-2-14 Nb	-40 °C / +75 °C, 3 h / 3 h, 2 cycles, 3 K/min	
Vibration	EN 60068-2-64 ed. 2	Transport. box DIN rail direct mounting	3 axis, 1 hour per axis 3 axis, 0.5 hour per axis 3 axis, 8 hours per axis
Shock	EN 60068-2-27 ed. 2	half-sine, 15 g peak, 11 ms, 6 pulses per axis	
Isolation	–	Ethernet port	1.5 kV

Table 15: Type tests and environmental conditions

5.5 Technical Parameters of Module

LTE module for EMEA	
LTE parameters	Bit rate 150 Mbps (DL) / 50 Mbps (UL) LTE FDD Cat.4, 3GPP release 9 compliant Supported frequencies: FDD frequencies: B28A (700 MHz), B20 (800 MHz), B8 (900 MHz), B3 (1800 MHz), B1 (2100 MHz), B7 (2600 MHz) TDD frequencies: B40 (2300 MHz), B41 (2500 MHz), B38 (2600 MHz) Max power – typical 23 dBm
HSPA+ parameters	Bit rate 42.0 Mbps (DL) / 5.76 Mbps (UL) Supported frequencies: B8 (900 MHz), B1 (2100 MHz) Max power – typical 24 dBm
UMTS parameters	PS bit rate 384 kbps (DL) / 384 kbps (UL) Supported frequencies: B8 (900 MHz), B1 (2100 MHz) Max power – typical 24 dBm
GPRS/EDGE parameters	Bit rate 296 kbps (DL) / 236 kbps (UL) Supported frequencies: 900 / 1800 MHz
Other parameters	Rx Diversity and MIMO DL 2x2

Table 16: Technical parameters of module for EMEA

Antenna Requirements

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

5.6 Technical Parameters of WiFi

WiFi	
Antenna connector	R-SMA – 50 Ω
Supported WiFi band	2.4 GHz
Standards	802.11b, 802.11g, 802.11n
2.4 GHz supported channels	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
RX Sensitivity	11b, 11 Mbps: typ. -85 dBm 11g, 54 Mbps: typ. -70 dBm (HT20) 11n, MSC7: typ. -66 dBm (HT40) 11n, MSC7: typ. -62 dBm
TX Output Power	11b, 11 Mbps: min. 18, typ. 19, max. 20 dBm 11g, 54 Mbps: min. 14.5, typ. 16, max. 17.5 dBm 802.11n (HT20): min. 13.5, typ. 15, max. 16.5 dBm 802.11n (HT40): min. 13.5, typ. 15, max. 16.5 dBm
Type of device	Access point, station
AP maximum users	Unlimited (WiFi module does not support multi-role operation).

Table 17: Technical parameters of WiFi

5.7 System Configuration

Parameter	Description
CPU	Cortex A8, 32-bit, 1 GHz 2 DMIPS per MHz
Flash memory	Available memory space 1 862 MB • 2x 256 MB – FW • 512 MB – User data storage • 838 MB – Space for Router Apps
RAM	512 MB

Table 18: System Configuration

Appendix A: Troubleshooting

If you cannot connect to the router from your PC, your network card may be configured in a way that prevents a connection. Try one or more of the following steps to resolve the issue:

- Ensure your PC's network card is configured to obtain an IP address automatically from a DHCP server (the router's DHCP server is enabled by default).
- Connect the router to the PC via a network switch.
- Connect the PC directly to the router, but start the router first and wait for it to initialize completely before starting the PC.

Ethernet Connection Fails or Is Unstable

- On the router's *Configuration* → *LAN* page, you can disable auto-negotiation and manually set a specific link speed and duplex mode. This can resolve compatibility issues with some network devices.

Mobile WAN Connection Fails or Is Intermittent

- Check the signal strength on the *Status* → *Mobile WAN* page. If the signal is weak, a more powerful antenna is required. If neighboring cells have similar signal strength, a directional antenna may be necessary to lock onto the optimal cell tower.
- Enable the connection check feature on the *Configuration* → *Mobile WAN* page in the *Check connection* section. Select the *Enable + bind* option. This will send periodic pings to check connectivity and restart the connection if it fails. The "bind" option ensures the ping is always sent through the Mobile WAN interface.

Cannot Establish Mobile WAN Connection

- Verify all settings on the *Configuration* → *Mobile WAN* page, including the *APN*, *username*, *password*, and *IP address*. For many public networks, these fields can be left blank.
- Check if the SIM card requires a PIN. If so, enter it on the *Administration* → *Unlock SIM Card* page.
- For private APN networks, it is often not recommended to obtain DNS server addresses from the operator. Disable this option on the *Configuration* → *Mobile WAN* page.
- Check the *Status* → *System Log* for error messages that can help diagnose the issue.

Cannot Connect to a Device Behind the Router from the Internet (NAT)

- The device behind the router must be configured to use the router's IP address as its default gateway.

Cannot Access a Web Server Behind the Router via NAT

- Remote HTTP access to the router itself must be disabled. This can be done on the *Configuration* → *NAT* page.
- On the same page, enable the *Send all remaining incoming packets to default server* feature and enter the IP address of your web server.
- Ensure the web server's default gateway is set to the router's IP address.

DynDNS Does Not Work

- DynDNS will not work with a private APN if the router's IP address is not publicly accessible.
- If your DynDNS hostname resolves to the same private IP address that is assigned to the router, it means your mobile operator is using NAT or a firewall, preventing direct connections.
- You can verify operator NAT by pinging a server with a static public IP and comparing the source IP (seen by the server) with the IP address shown on the router's status page.
- You can test for a firewall by trying to access the router's web interface remotely.
- The operator may not be providing DNS server addresses. Without DNS, the router cannot resolve the DynDNS service hostname. The System Log would show errors like:
 - Error resolving hostname: no such file or directory
 - Connect to DynDNS server failed

L2TP or IPsec Tunnel Fails to Establish

- Check the *Status* → *System Log* for specific error messages related to the VPN tunnel negotiation.

IPsec Tunnel Establishes, but No Data Is Transferred

- This is typically caused by incorrect routing rules or a misconfigured default gateway on either the client device or the remote network.

Router Reverts to Online Mode After a Reboot, Despite Being Set to Offline via SMS

- State changes made via SMS commands are temporary and do not alter the saved configuration. They remain in effect only until the router is rebooted.

Serial Communication Is Not Working

- Verify that your router model is equipped with a serial port. Check the serial communication settings on the *Configuration* → *Expansion Port* page.

Is the Router Cisco Compatible?

- No. The router's operating system (ICR-OS) is based on Linux, not Cisco IOS. Therefore, Cisco configuration commands cannot be used.
- However, since all network connections are based on open standards, the router is fully compatible and can be connected to Cisco devices or any other standard networking equipment.

FTP or SFTP Does Not Work

- **FTP** is available on v2 platform routers only. Ensure it is enabled in *Configuration* → *Services* → *FTP*. Connect using any FTP client to port **21** with the same username and password as the web interface.
- **SFTP** (SSH File Transfer Protocol) is available on all routers. Ensure SSH is enabled in *Configuration* → *Services* → *SSH*. Connect using any SFTP-capable client (like FileZilla or WinSCP) to port **22** with the same credentials as the web interface.

How to Access the Router's Command Line

- You can connect to the router's command line using SSH (all routers) or Telnet (v2 routers only).
- **SSH** is enabled by default. You can verify this in *Configuration* → *Services* → *SSH*. Use any SSH client to connect to the router's IP address on port **22**.
- **Telnet** can be enabled on v2 routers in *Configuration* → *Services* → *Telnet*.
- For both methods, use the same username and password as for the web interface.

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.iiot.ana@advantech.com
Web: www.advantech.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

For your safety and the appropriate operation of the device, please observe the following instructions:

- The router must comply with all applicable international and national laws, including any specific regulations or restrictions concerning its operation in designated applications and environments.
- To avoid personal injury and damage to the device, use only accessories that are approved or supplied by the manufacturer. Unauthorized modifications or the use of non-approved accessories could damage the router, violate regulations, and result in loss of warranty coverage.
- Do not attempt to open the router enclosure under any circumstances.
- Before handling the SIM card, always switch off the router and disconnect it from the power supply.



This equipment is not suitable for use by or near young children. Small children could accidentally swallow the SIM card.

- Ensure that the power supply voltage does not exceed 48 V DC.
- Do not expose the router to harsh environmental conditions. Protect it from dust, moisture, and excessive temperatures.
- Use routers with correct certifications and markings only in areas containing flammable or explosive materials (such as gas stations, chemical plants, or locations with explosives). In these environments, follow all restrictions regarding the use of radio devices.
- When traveling by airplane, always switch off the router. Using the router on board may endanger flight safety, interfere with mobile networks, and violate local regulations. Non-compliance can result in suspension or cancellation of telecommunications services, or legal penalties.
- Take special care when operating the router in close proximity to personal medical devices such as cardiac pacemakers or hearing aids.
- This device may cause interference if used close to television sets, radio receivers, or personal computers.
- Maintain a safe separation distance of at least 20 cm between the router and the human body during operation.
- It is strongly recommended to regularly back up all critical device settings stored in the router's memory.

Product Disposal Instructions

The WEEE directive (Waste Electrical and Electronic Equipment: 2012/19/EU) ensures the environmentally responsible recycling and recovery of electronic products. This device contains high-quality materials and components suitable for recycling. At the end of its life, **do not dispose of this product with ordinary commercial waste**. The router also contains a battery. Remove the battery before disposing of the device, and ensure the battery is disposed of separately and in accordance with local regulations. For detailed information on product and battery disposal, consult your supplier's terms and conditions.

Appendix D: Related Documents

[1] [Configuration Manual for SmartStart Routers](#)

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