



ELECTRONICS

USER'S GUIDE

GSM/3G/LTE-routers iRZ:

RU21w, RL21w, RU22w, RL22w





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1. Introduction

1.1. Document Description

This document provides explanatory information on technical specifications of iRZ routers of R2 series (RU21w, RL21w, RU22w, RL22w), as well as information on express setting of the routers.

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1.2. Terms and Abbreviations

Router – iRZ router.

3G – General name for a set of standards describing the operation in UMTS and GSM networks like GPRS, EDGE, HSPA.

Server – This term may be used to describe:

- the server part of a software package used by a computer system,
- the role of a component or an object in the structural and functional design of a technical solution deployed with the use of the router,
- a computer providing particular services (network services, data processing and storing services, etc.)

Technical Solution – An idea or a document describing a set of technical measures and/or procedures aimed at solving a particular problem; this is implemented through involving functionalities of components of such a technical solution which are interrelated and interacting in a particular way.

Public IP address – An Internet IP address assigned by an Internet service provider to the customer for use on the provider's or the client's equipment for direct connection with the customer's equipment through the Internet.

Static Public IP Address – A public IP address which can not be changed under any circumstances (change in client's equipment type, etc.) or in any event (reconnection to the provider's network, etc.); static IP address can only be changed through submission of a relevant application to the Internet service provider.

Authentication – The procedure of user/client/host authenticity verification by comparing details provided by them at connection with the details correlating with the username/login in the database.

Router Web Interface – An administration tool built in the router to control and configure its functions and to monitor the state of these functions.

Remote Device (Remote Host) – A device physically removed from the location or facility/host which is under discussion in a particular context.



2. Information on Device

2.1. Purpose

The router is a multipurpose radio communication user device operating in mobile networks. The router is capable of data transmitting, receiving and protecting and supporting computer network. Support of UMTS/HSPA+/EDGE/GPRS provides highspeed access to Internet. The main feature of these routers is Wi-Fi hotspot (IEEE 802.11b/g/n standard base), that provides wireless internet connection for other devices.

2.2. Communication Standards

Table 1. Mobile Networks Standards*

Model	GPRS/EDGE	UMTS	HSDPA/HSUPA	HSPA+	LTE	GNSS
RU21w	Yes	Yes	Yes	Yes	–	–
RL21w	Yes	Yes	Yes	Yes	Yes	–
RU22w	Yes	Yes	Yes	Yes	–	Yes
RL22w	Yes	Yes	Yes	Yes	Yes	Yes

* Specifications of the models may be changed by the Manufacturer without preliminary notice.

2.3. Hardware Specifications

Table 2. Basic Specifications*

Type	Characteristic
Processor	MIPS 24KEc 580 MHz
Dynamic RAM	64 MB
Flash memory	16 MB
Ethernet connector	4 × 10/100 Mbit
DB9 connector	RS232
Terminal block	7 × GPIO, power supply, RS485
SD card slot	MicroSDHC
Wi-Fi	2.4 GHz 802.11 b/g/n 2T2R MAC

* Specifications of the models may be changed by the Manufacturer without preliminary notice.



2.4. Physical Specifications

Table 3. Physical Specifications

Type	Characteristic
Overall dimensions (including connectors)	Max. 121 × 118 × 40 mm (L x W x H)
Weight	Max. 300 g
Operating temperature range	−40°C to 65°C
Storage temperature range	−40°C to +85°C
Permissible humidity	The router remains operable at relative humidity of max. 80% @ 25°C

2.5. Storage and Operating Conditions

The router shall be stored in a dry place, protected against water. The risk of static voltage (lightning, household static electricity) shall be eliminated.

Rating of ingress protection is IP20 per GOST 14254-96.

Permissible vibration:

The router maintains its strength characteristics under mechanical loads corresponding to 15th grade of sinusoidal vibration severity per GOST 30631-99: as a part of equipment operated in motion, installed on tractors, tracked vehicles and water transport (speed boats, hydrofoil vessels, etc.) and on process equipment or land transport, in case vibration frequency exceeds 80 Hz.

The router is not provided with any vibration isolation.

2.6. Electrical Specifications

Power supply characteristics:

- Supply voltage of 8 to 30 VDC
- Max. current consumption:
 - At supply voltage of +12 V: 1000 mA
 - At supply voltage of +24 V: 500 mA



2.7. Safety Precautions

Limitations to the router use in proximity of other electronic devices:

- Switch off the router in hospitals or in proximity of medical equipment (for example, cardiac pacemakers, hearing aid devices) as it may interfere with medical equipment
- Switch off the router in aircraft and take measures to prevent its accidental switching on
- Switch off the router in proximity of fueling stations, chemical facilities, areas of blasting operations. The router may interfere with equipment; at short distances it may also interfere with TV and radio sets.

Protect the router against dust and moisture.

Observe the permissible levels of power supply and vibration at the place of router installation.

2.8. Router Functional Diagram

Basic functional assemblies of the router (see Figure 1):

- Power connector (Power)
- Voltage converter (PMIC)
- SMA-connectors for external antennas (SMA: Wi-Fi, GPS, GSM)
- Communication module(s) (GSM)
- CPU + integrated functions (Ethernet Switch, Wi-Fi)
- RAM (SDRAM)
- Ethernet interfaces (LAN: 4×RJ45)
- DB9 connector for RS232
- Terminal block for GPIO, RS485
- SIM card 1/2 holder
- SD card reader
- LED indication block
- Internal software reset button (RST)

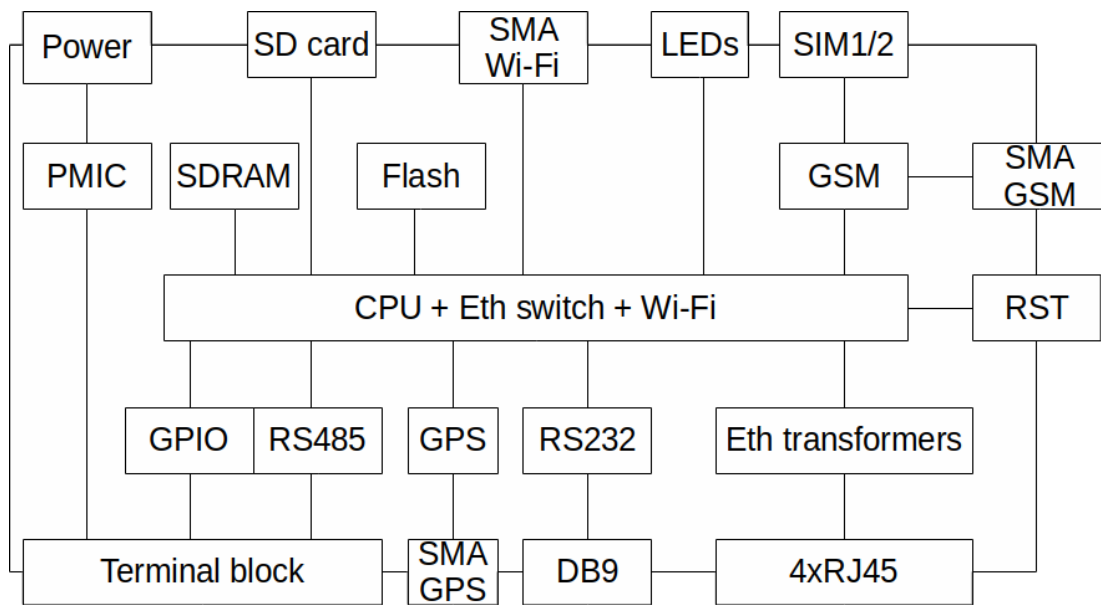


Figure 1. R2 Router Functional Diagram



3. Appearance and Interfaces

3.1. Appearance

3.1.1. Connectors and External Elements

The router is of industrial design with a rugged and lightweight aluminum case.

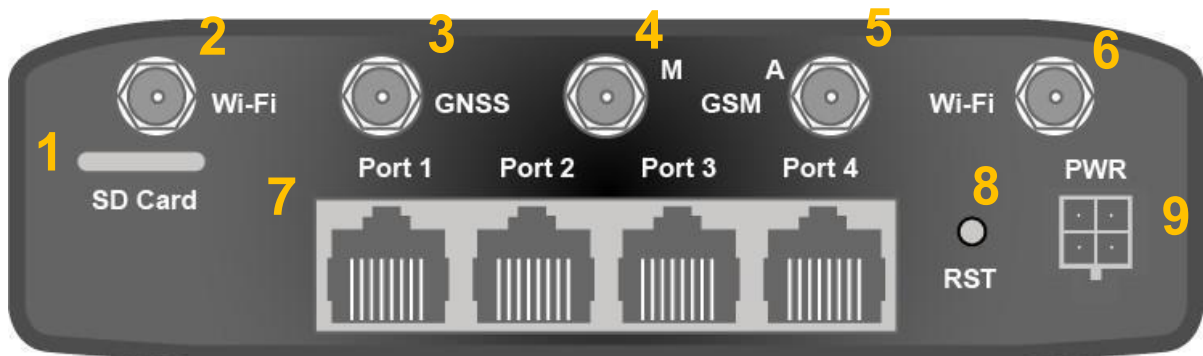


Figure 2. Rear View (RU22w, RL22w)

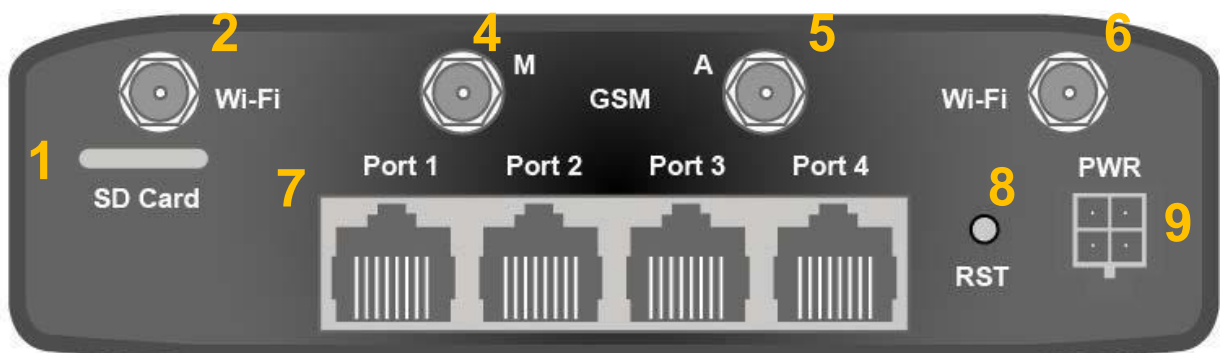


Figure 3. Rear View (RU21w, RL21w)

Legend for Figures 2 and 3:

1. SD card slot
2. SMA connector for Wi-Fi antenna
3. SMA connector for GPS/GLONASS antenna
4. SMA connector for GSM antenna (MAIN)
5. SMA connector for GSM antenna (AUX)
6. SMA connector for Wi-Fi antenna
7. LAN connectors 1 to 4
8. Factory settings reset button
9. Power supply connector

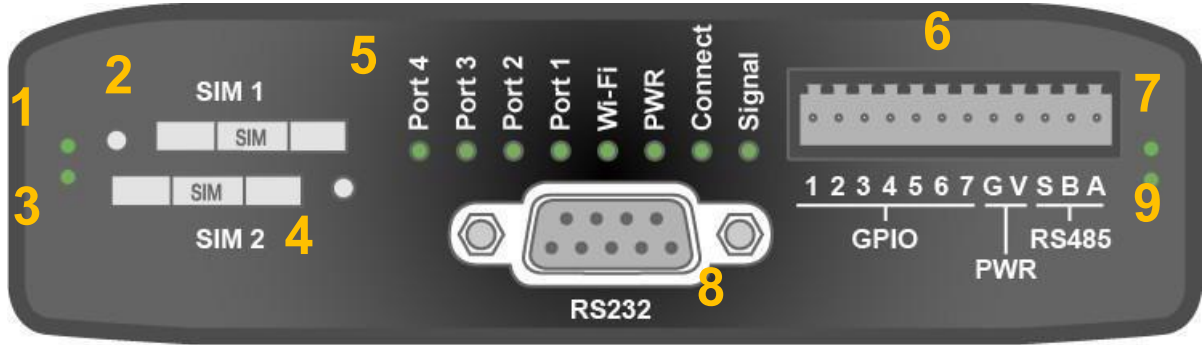


Figure 4. Front View

Legend for Figure 4:

1. SIM1 activity indicator
2. SIM1 slot
3. SIM2 activity indicator
4. SIM2 slot
5. Router operating status indicators (see Section 3.1.2)
6. Terminal block (see Section 3.2.2)
7. RS485 activity indicator
8. DB9 connector for RS232 interface (see Section 3.2.4)
9. RS232 activity indicator



3.1.2. Router Indication

Router indicators are located on the side panel (see Figure 4). For explanation of signals and indicator colors, see Table 4.

Table 4. Router Indication

Status	Explanation
Port 1 to 4 (LAN Port 1 to 4 Status Indicators) – show the operating state of the Ethernet ports	
○ Off	Cable is not connected
🟢 Blinks green	Data transmission
● Lights green	Cable is connected
Wi-Fi (Wi-Fi Operation Indicator) – shows the operating state of wireless module	
○ Off	Wi-Fi is disabled
🟢 Blinks green	Wi-Fi data transmission
● Lights green	Wi-Fi is enabled
PWR (Power indicator) – shows the router state	
○ Off	Router is off
● Lights green	Router is on and in operation mode
🟢 Blinks green	Router is on, loading or updating software
Connect (Mobile network indicator) – shows the mobile connection type	
○ Off	No connection established.
● Lights red	2G connection established
● Lights green	3G connection established
🟢 Blinks green	4G (LTE) connection established
Signal (Indicator of Connection Level) – shows the mobile network connection quality	
○ Off	Module is off
● Lights red	Low signal level
● Lights yellow	Medium signal level
● Lights green	High signal level
SIM card 1/2 Operation Indicator	
○ Off	SIM card not used
● On	SIM card used
RS485 / RS232 Operation Indicator	
○ Off	Interface not used
● Lights red	Data transmission
● Lights green	Data reception



3.2. Connectors and Interfaces

3.2.1. Power Connector

Microfit4 type power connector is designed to connect the router to power supply source.

Requirements to power source: 8 to 30 VDC, min. current of 1 A at 12 V.

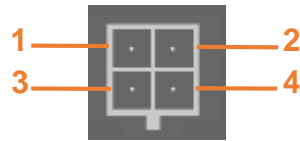


Figure 5. Power Connector

Table 5. Power Connector Pin Assignment

Contact	Signal	Purpose
1	GND	Optocoupler negative
2	OPTO	Optocoupler positive
3	GND	Supply voltage negative
4	+U	Supply voltage positive



3.2.2. Interfaces Terminal Block

The terminal block accommodates RS485 serial interface and input/output lines.

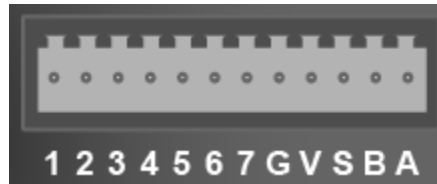


Figure 6. Interface Connector

Table 6. Interface Connector Pin Assignment

Pin	Purpose
1	GPIO1 contact
2	GPIO2 contact
3	GPIO3 contact
4	GPIO4 contact
5	GPIO5 contact
6	GPIO6 contact
7	GPIO7 contact
G	GND – negative supply voltage input/output
V	VCC – positive supply voltage input/output
S	Shield – signal wire shield contact
B	Signal B of RS485 interface
A	Signal A of RS485 interface



3.2.3. Local Area Network Connectors

Local area network connectors are designed to connect LAN Ethernet devices supporting data rate of 10/100 Mbit/s.



Figure 7. Ethernet Connector

Table 7. Ethernet Connector Pin Assignment

Contact	Signal	Direction	Purpose
1	TX+	Router → PC	Transmission positive
2	TX-	Router → PC	Transmission negative
3	RX	PC → Router	Reception positive
4	VCC*		Positive supply voltage input/output*
5	VCC*		
6	RX-	PC → Router	Reception negative
7	GND*		Negative supply voltage input/output*
8	GND*		

* Passive PoE, available only for Port1



3.2.4. DB9 Connector (COM port)

DB9 connector is designed to connect COM port via RS232 interface. For description of connector pins, see Table 3.5.

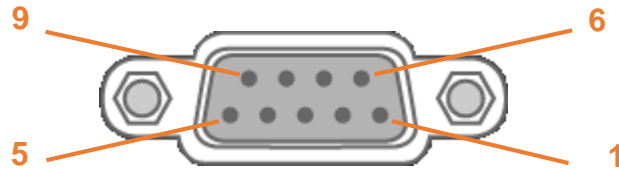


Figure 8. DB9 connector

Table 8. DB9 Connector Pin Assignment

Pin	Signal	Direction	Purpose
1	RS232 - DCD	Device → Router	Data carrier detect
2	RS232 - RXD	Device → Router	Receive data
3	RS232 - TXD	Router → Device	Transmit data
4	RS232 - DTR	Router → Device	Data terminal ready
5	GND	Ground	Router case
6	RS232 - DSR	Device → Router	Data set ready
7	RS232 - RTS	Router → Device	Request to send
8	RS232 - CTS	Device → Router	Clear to send
9	RS232 - RI	Device → Router	Ring indicator

CAUTION! Connect devices to the router serial port only when both devices are off.

3.2.5. Reset Button

The reset button is designed to restore the router's factory settings in case it can not be accessed.



4. Preparation for Operation

4.1. Connection

1. Connect necessary antennas to antenna connectors (Figure 3.1).
2. Insert SIM cards in the slots (Figure 3.2, items 2 and 4).
3. Connect LAN cable to Port 1 – Port 4 (Figure 3.1, item 7)
4. Connect power cable to the PWR connector (Figure 3.1, item 9).
5. Make sure the local area network IP address 192.168.1.1 is available and the computer is configured to receive IP address dynamically (DHCP) or has an address from the range of 192.168.1.0/24
6. Type the address **http://192.168.1.1** in the address bar.
7. Enter login and password **root/root**.



4.2. Local Area Network Configuration

The screenshot displays the 'Local Network Configuration' page. The navigation menu on the left includes: Local Network, Wired Internet, Mobile Interfaces, Loopbacks, Wireless Network, Routes, Dynamic Routes (QUAGGA), DNS Servers, and Switch. The main configuration area is titled 'Local Network (lan)' and includes a 'Remove' button. The configuration fields are: CPU port (eth0), VLAN ID (1), Switch Ports (lan1, lan2, lan3, lan4, wan), IP (192.168.1.11), Mask (255.255.255.0), and MAC (f0:81:af:00:e4:19). There are 'Add VLAN' and 'Save' buttons at the bottom right.

Figure 9. Local Area Network Configuration

1. Select a CPU port to be assigned to VLAN
2. VLAN identifier
3. Select physical ports to be linked with the CPU port (or VLAN)
4. Router IP address
5. Network mask
6. MAC address

For details, see "User Manual. iRZ Routers Control and Monitoring Tools".



4.3. Global Network Configuration

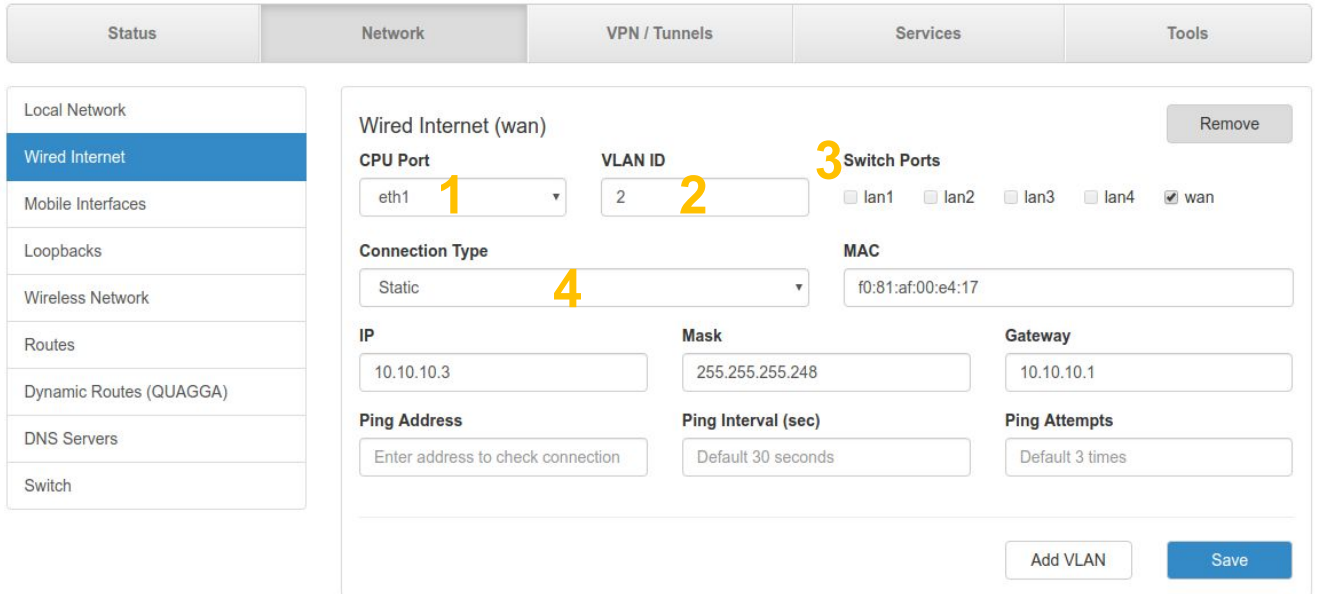


Figure 10. Global Network Configuration

1. Select a CPU port to be assigned to VLAN
2. VLAN identifier
3. Select physical ports to be linked with the CPU port (or VLAN)
4. Select connection type

For details, see "User Manual. iRZ Routers Control and Monitoring Tools".



4.4. Mobile Network Connection Configuration

Status	Network	VPN / Tunnels	Services	Tools
--------	---------	---------------	----------	-------

Local Network	1 <input checked="" type="checkbox"/> Enable SIM1 APN <input type="text"/> 2 Network Access Mode <input type="text" value="Auto"/> 4 Username <input type="text"/> 5 Password <input type="text"/> 6 Authentication Type <input type="text" value="Any"/> 3 PIN <input type="text" value="Leave blank if not needed"/> 7 Additional PPPD Options <input type="text" value="example: debug"/> 8 Force MCC MNC <input type="text" value="example: 25066"/> Ping Address <input type="text" value="Enter address to check connection"/> Ping Interval (sec) <input type="text" value="30"/> Ping Attempts <input type="text" value="3 by default"/> <input type="checkbox"/> Allow roaming <input checked="" type="checkbox"/> Use peer DNS servers <input type="checkbox"/> Enable SIM2 APN <input type="text"/> Network Access Mode <input type="text" value="Auto"/> Show advanced settings Manage SIM Connection Timeout (sec) <input type="text" value="360"/> Primary SIM <input type="text" value="SIM1"/> Return to Primary SIM After (sec) <input type="text" value="3600"/> <input type="button" value="Save"/>
Wired Internet	
Mobile Internet	
Loopbacks	
Wireless Network	
Routes	
Dynamic Routes (QUAGGA)	
DNS Servers	
Switch	
9	
10	

Figure 11. Wireless Network Configuration

1. Select the 1st SIM card to be used
2. Access point name
3. Server authentication type
4. Network access mode
5. User name
6. Password
7. PIN code, if necessary
8. Additional options for PPPD daemon
9. Roaming on/off
10. Enable/disable provider's external DNS servers

The second SIM card can be configured in the same way.

For details, see "User Manual. iRZ Routers Control and Monitoring Tools".



5. Contacts and Support

To obtain new versions of firmware, documents and respective software, contact us using the details below:

St. Petersburg	
Company website:	www.radiofid.ru
Contact phone in St. Petersburg:	+7 (812) 318 18 19
e-mail:	support@radiofid.ru

Our specialists are always ready to answer all your questions and assist in installing, configuring or troubleshooting of your equipment.

In case of any problem, contact the technical support service and specify the router software version. It is also recommended to attach any problematic service startup logs, configuration screenshots and any other relevant information to your letter. The more information you provide to the technical support specialist, the less time it will take to handle the situation.

Note: It is strongly recommended to update the router software to the current version prior to contacting the technical support service.

Warning! Failure to observe the operation conditions (improper use of the router) will make the warranty null and void.