ELPRO 641M 4G-LTE Router

IoT Connectivity 4G-LTE Router Gateway

Configuration Manual

Version 1.0

General Notices

ELPRO products are designed to be used in industrial environments by experienced industrial engineering personnel with adequate knowledge of safety design considerations.

ELPRO products use communications channels that are subject to noise and interference. The products are designed to operate in the presence of noise and interference, but in an extreme case noise and interference can cause product operation delays or operation failure. Like all industrial electronic products, ELPRO products can fail in a variety of modes due to misuse, age, or malfunction. We recommend that users and designers design systems using design techniques intended to prevent personal injury or damage during product operation and provide failure tolerant systems to prevent personal injury or damage in the event of product failure. Designers must warn users of the equipment or systems if adequate protection against failure has not been included in the system design. Designers must include this Important Notice in operating procedures and system manuals.

These products should not be used in non-industrial applications, or life-support systems, without first consulting ELPRO.

To avoid accidents during maintenance or adjustment of remotely controlled equipment, all equipment should be first disconnected from the 415U module during these adjustments. Equipment should carry clear markings to indicate remote or automatic operation. For example: “This equipment is remotely controlled and may start without warning. Isolate at the switchboard before attempting adjustments.”

The 415U modules are not suitable for use in explosive environments without additional protection.

The 415U modules operate proprietary protocols to communicate. Nevertheless, if your system is not adequately secured, third parties may be able to gain access to your data or gain control of your equipment via the radio link. Before deploying a system, make sure that you have carefully considered the security aspects of your installation.

Follow instructions - Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow the instructions can cause personal injury and/or property damage.

Proper use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (1) constitute “misuse” and/or “negligence” within the meaning of the product warranty, thereby excluding warranty coverage for any resulting damage; and (2) invalidate product certifications or listings.

Product disposal

When your product reaches the end of its useful life, it is important to take care in the disposal of the product to minimize the impact on the environment.

General instructions

The product housing is made of die-cast aluminium and may be recycled through regular metal reclamation operators in your area.

The product circuit board should be disposed according to your country’s regulations for disposing electronics equipment.

Europe

In Europe, you can return the product to the place of purchase to have the product disposed in accordance with EU WEEE legislation.

Deployment of ELPRO products in customer environment

There is increasing concern regarding cybersecurity across industries, where companies are steadily integrating field devices into enterprise-wide information systems. This is why ELPRO has incorporated secure development life cycle in their product development to ensure that cybersecurity is addressed at all levels of development and commissioning of our products.

There is no protection method that is completely secure. Industrial Control Systems continue to be the target for attacks. The complexities of these attacks make it very difficult to have a complete secure system. A defence mechanism that is effective today may not be effective tomorrow as the ways and means of cyber-attacks constantly change. Therefore, it’s critical that our customers remain aware of changes in cybersecurity and continue to work to prevent any potential vulnerability of their products and systems in their environment.

At ELPRO we are focusing on helping our customers deploy and maintain our solutions in a secure environment. We continue to evaluate cybersecurity updates that we become aware of and provide the necessary communication on our website as soon as possible.

Product Notices

⚠ ATTENTION

INCORRECT TERMINATION OF SUPPLY WIRES MAY CAUSE INTERNAL DAMAGE AND WILL VOID THE WARRANTY. TO ENSURE THAT YOUR 415U-2 WIRELESS I/O AND GATEWAY ENJOYS A LONG LIFE, CHECK THIS USER MANUAL TO VERIFY THAT ALL CONNECTIONS ARE TERMINATED CORRECTLY BEFORE TURNING ON POWER FOR THE FIRST TIME.

Safety notices

Exposure to RF energy is an important safety consideration. The FCC has adopted a safety standard for human exposure to radio frequency electromagnetic energy emitted by FCC regulated equipment as a result of its actions in Docket 93-62 and OET Bulletin 65 Edition 97-01.

⚠ CAUTION

TO COMPLY WITH FCC RF EXPOSURE REQUIREMENTS IN SECTION 1.1310 OF THE FCC RULES, ANTENNAS USED WITH THIS DEVICE MUST BE INSTALLED TO PROVIDE A SEPARATION DISTANCE OF AT LEAST 20 CM FROM ALL PERSONS TO SATISFY RF EXPOSURE COMPLIANCE.

DO NOT OPERATE THE TRANSMITTER WHEN ANYONE IS WITHIN 20 CM OF THE ANTENNA. ENSURE THAT THE ANTENNA IS CORRECTLY INSTALLED WITH A MAXIMUM ANTENNA GAIN NOT EXCEEDING THE SPECIFICATIONS LISTED BELOW IN ORDER TO SATISFY THIS SAFETY REQUIREMENT.

Devices	Band	Gain
EL-641M-2-W, EL-641-6-W	Cellular Band	4.0 dBii
	PCS Band	3.0 dBii
	Band 2	3.0 dBii
	Band 4	4.0 dBi
	Band 7	9.0 dBi
	Band 13	4.0 dBi
	Band 17	4.0 dBi
	Band 25	3.0 dBi
	Band 26	6.0 dBi
	Band 41	9.0 dBi

Avoid

- Operating the transmitter unless all RF connectors are secure and any open connectors are properly terminated
- Operating the equipment near electrical blasting caps or in an explosive atmosphere

⚠ **Note**: All equipment must be properly grounded for safe operations.
All equipment should be serviced only by a qualified technician.

FCC notice

Part 15.19—This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Part 15.21—The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

Part 15.105(b)—This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However,

there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

⚠ **Note**: This device should only be connected to PCs that are covered by either a FCC DoC or are FCC certified.

Contents

Product Overview

Introduction

ELPRO 641M series industrial cellular VPN router offers a single, flexible platform to address a variety of wireless communications needs with over-the-air configuration and system monitoring for optimal connectivity. This router enables wireless data connectivity over public and private 4G-LTE cellular networks at 4G speeds.

ELPRO 641M series router has dual SIM backup, 2 or 4 LAN ports, 1 port could be changed to Ethernet WAN connection (for fixed internet fail over to cellular). An optional 802.11 b/g/n Wi-Fi interface access point and client operations supports connectivity to IP applications in a variety of different connection scenarios. RS232 and RS485 interfaces are provided to support Serial to IP communication. 641M series router also supports 2 x digital input and 2 x Digital output for alarms and gateway for MQTT, SparkplugB, Modbus, DNP3 and IEC103.

Supporting 9 to 48 VDC wide range power inputs, designed with reverse-voltage protection mechanism for reliability in industrial applications. It is a ideally suited for IOT connectivity and wireless M2M applications with need reliable features for data transmission.

Features and Benefits

Industrial internet access

- Wireless Mobile Broadband 2G / 3G / 4G Connection
- IOT Gateway for industrial devices
- Remote access to SCADA System for Industrial Automation
- Reduce high costs for on-site maintenance

Designed for industrial usage

- Power Input Range 9 to 48 VDC
- Industrial designed for harsh environment
- Compact metal casing and DIN rail clip for easy installation

Secure and reliable remote connection

- Connection manager ensure seamless communication
- Support Multiple VPN tunnels for data encryption
- Firewall prevents unsafe and unauthorized access

Easy to use and easy maintenance

- User-friendly web interface for human interaction
- Easy configuration for deployment

General Specifications

Cellular Interface

- Standards: FDD-LTE/TDD-LTE, WCDMA/UMTS/HSPA/HSPA+/EDGE/GPRS

- 2× SMA female antenna connector
- 2 x SIM (3.0V & 1.8V)

Wi-Fi Interface (Optional)

- Standards: 802.11b/g/n, 300Mbps
- 2 x RP-SMA male antenna connector
- Support Wi-Fi AP and Client modes
- Security: WEP, WPA and WPA2 encryption
- Encryption: TKIP, CCMP

Ethernet Interface

- Standard: IEEE 802.3, IEEE 802.3u
- Number of Ports:
    - 641M-Standard: 2 x 10/100 Mbps, RJ45 connector
    - 641M-Pro: 4 x 10/100 Mbps, RJ45 connector
- 1 x WAN interface (configurable on Web GUI)
- 1.5KV magnetic isolation protection

Serial Interface

- 1×RS232 (3 PIN): TX, RX, GND
- 1 x RS485 (2 PIN): Data+(A), Data-(B)
- Baud rate: 300 bps to 115200 bps
- Connector: terminal block
- 15KV ESD protection

DI/DO Interface

- Type: 2 x DI + 2 x DO
- Connector: terminal block
- Isolation: 3KVDC or 2KVrms
- Absolute maximum VDC: 36Vdc
- Absolute maximum ADC: 100mA

Other Interfaces

- 1× RST button
- LED instruction: 1 x SYS, 1 x NET, 1 x USR, 3 x RSSI

Software

- Network protocols: DHCP, ICMP, PPPoE, HTTP, HTTPS, DNS, VRRP, NTP…
- VPN: IPSec, GRE, OpenVPN, DMVPN
- Policy: RIPv1/RIPv2/OSPF/BGP dynamic route (optional)
- Firewall & Filter: Port forwarding, DMZ, anti-DoS, ACL
- Serial port: TCP server and client, UDP
- Protocol gateway for MQTT, SparkplugB, Modbus RTU/TCP, DNP3

Power Supply and Consumption

- Connector: 3-pin 3.5 mm female socket with lock
- Input voltage range: 9-48Vdc
- Power consumption:
- Idle: 100 mA@12V
- Data link: 400 mA (peak) @12V

Physical Specification

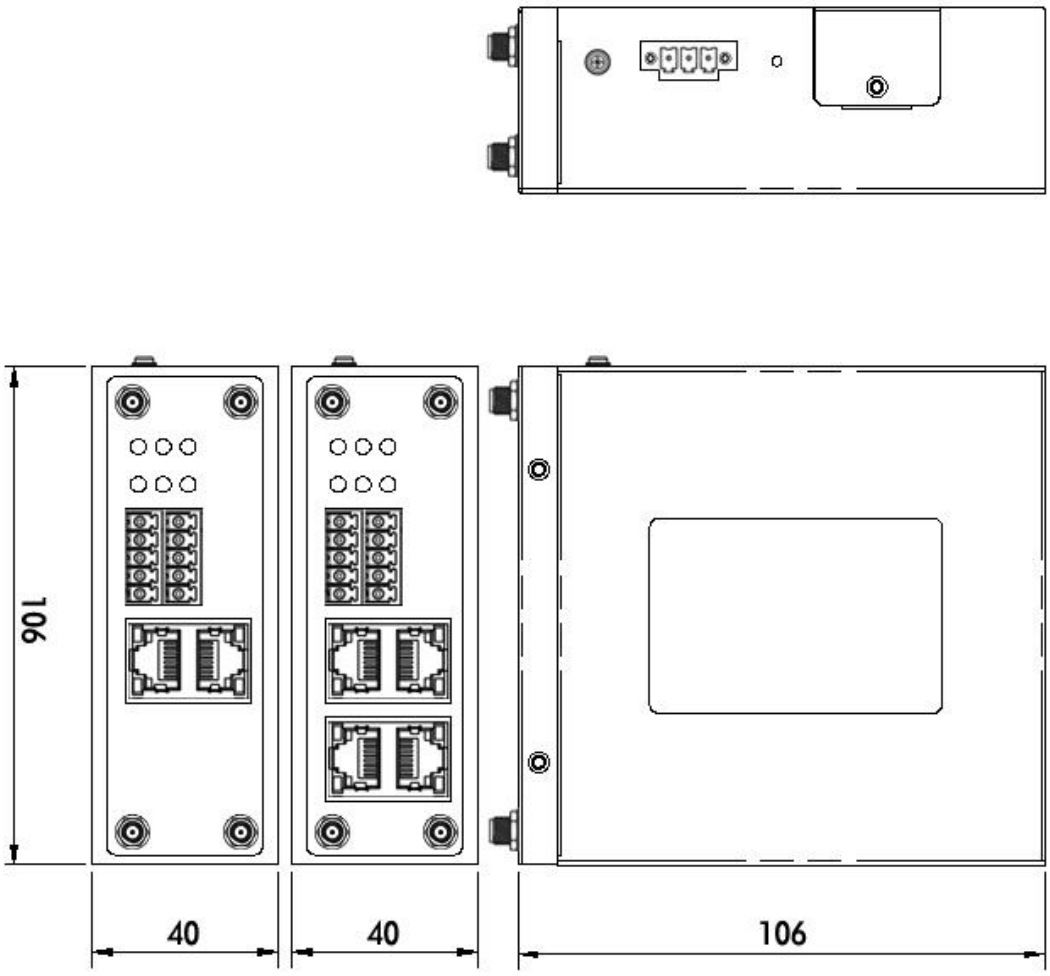
- Ingress Protection: IP30
- Housing & Weight: Metal, 300g
- Dimension: 104mm x 104mm x 38mm (excluding antenna)
- Installations: Din-rail mounting

Environmental

- Operation temperature: -40 to +75℃
- Store temperature: -40 to +85℃
- Operation humidity: 5% to 95% non-condensing

Mechanical Specifications

Dimension: 106mm x 106mm x 40mm (excluding antenna)



Package Checklist

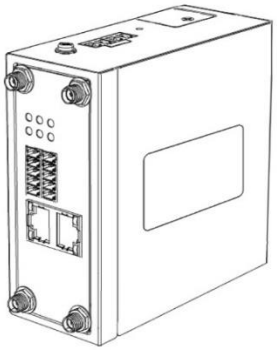
The ELPRO 641M series Router includes the parts shown in below, please verify your components.

NOTE: if any of the below items is missing or damaged, please contact your sales representative.

Included equipment

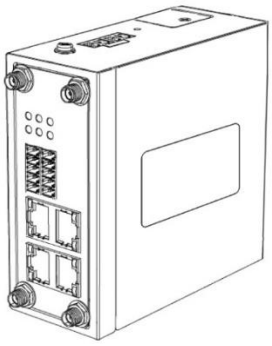
- 1 x ELPRO 641M series Industrial Cellular VPN router (Wi-Fi optional)

641M-2

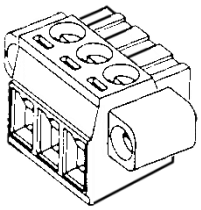


or

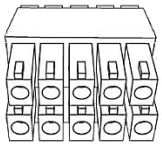
641M-6



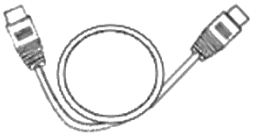
- 1 x 3-pin 3.5 mm male terminal block with lock for power supply



- 1 x 10-pin 3.5 mm male terminal block for RS232/RS485/DI/DO



- 1 x Ethernet cable

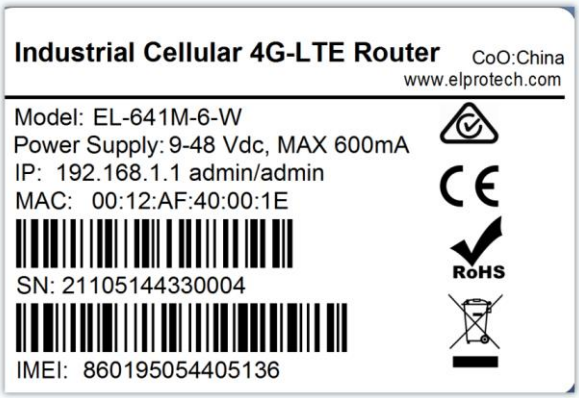


- 1 x Quick Start Guide

Ordering Information

The 415U-1 can be delivered as several different models and/or options. To identify the correct model and options that you have, first locate the compliance label, which is located inside the unit on the side opposite to the battery (if fitted).

The compliance label will look like the sample below but may have difference due to sales region/model.

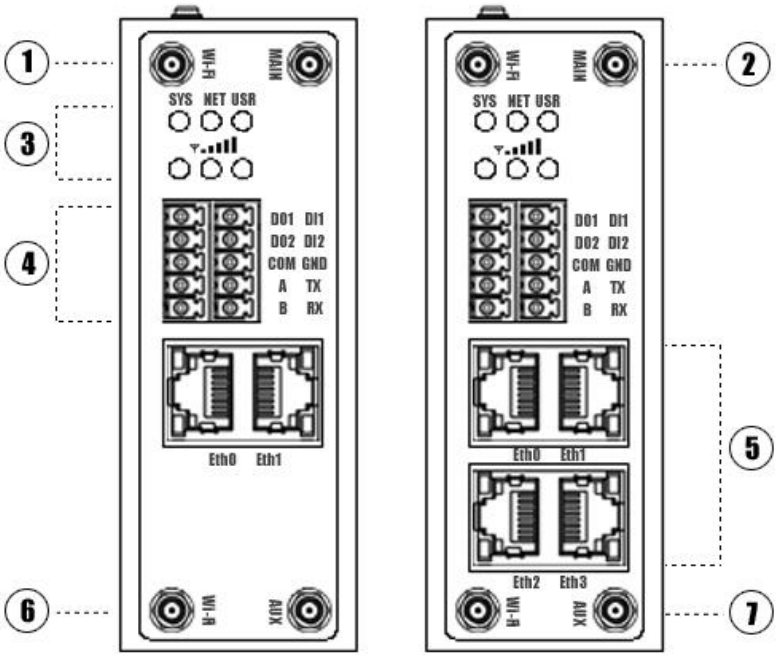


The 415U-1 is available in several options and accessories as detailed below:

Model	
EL-641M-2-W	IOT Connectivity 4G-LTE Router Gateway Global, 2 Eth, RS-232, RS-485, 2DI, 2DO, 9-48Vdc, DIN Rail
Accessories	
ANTWHLTE-3	Omni-directional LTE Cellular Antenna: 115mm (4.5”) long, 690-960/1710-2700MHz, 2dBi gain, includes 3m (10ft) cable w/ SMA (male) connector & magnetic base mount
ANTCSNEXTGGSM3G-2	824-2500MHz 1.8/2.0/3.5 dBi Omni-directional Cellular Antenna, IP65 , 1,250mm Cable, SMA Male connector with integral 13mm stud mount
SURCSD-N-6000	Coaxial surge diverter, bulkhead N-female to N-female
PS-WW-XP-24DC	AC Plug Pack Universal Input, 24V DC 1.25A Output - wall plug
PS-DINAC-24DC-OK	Power Supply: DIN mount, transforms 85-264Vac to 24Vdc @ 2.5A
CBLETH-C5A	Ethernet cable: 1.8m (6ft) long, RJ45(male) to RJ45(male) - Straight
Input/Output Ethernet and Serial Expansion Modules	
EL-115E-2	Ethernet to I/O Expansion Module: I/O = (8)DI/O + (4)AI + (2) AO + (4)PI/O, Modbus RTU/TCP master/slave gateway
EL-115S-11-24	Serial to I/O Expansion Module: I/O = (16)DIO + (4)PI
EL-115S-12-24	Serial to I/O Expansion Module: I/O = (8)DIO + (4 floating / 8 commoned) AI
EL-115S-13-24	Serial to I/O Expansion Module: I/O = (8)DIO + (8)AO

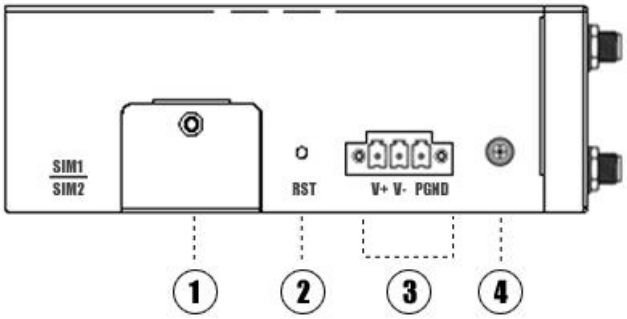
Installation

- **Front Panel**



① Wi-Fi Antenna
② MAIN Cellular Antenna
③ LED Indicator
④ Serial port & DIDO
⑤ Ethernet port
⑥ Wi-Fi Antenna
⑦ AUX Cellular Antenna

- **Left Side Panel**



① SIM Card Slot
② Reset Button
③ Power Connector
④ Grounding Stud

LED Indicators

Name	Colour	Status	Description
SYS	Green	Slow Blinking (500ms duration)	Operating normally
		Fast Blinking	System initialing
		Off	Power is off
NET	Green	On	Register to Highest priority network service (depend on Radio, e.g. Radio support LTE as Highest priority network).
		Fast Blinking (500ms duration)	Register to Non-Highest priority network service (depend on Radio, e.g. Radio support LTE as Highest priority network, then WCDMA and GPRS is non-highest priority network).
		Off	Register failed
USR: SIM	Green	On	Router is trying cellular connection with SIM1
		Fast Blinking (250ms duration)	Router is trying cellular connection with SIM2
		Off	No SIM detected
USR: Wi-Fi	Green	On	Wi-Fi is enable but without data transmission
		Blinking	Wi-Fi is enabled and data transmission
		Off	Wi-Fi is disable or initialize failed
Signal Strength Indicator	Green	On, 3 LED light up	Signal strength (21-31) is high
		On, 2 LED light up	Signal strength (11-20) is medium
		On, 1 LED light up	Signal strength (1-10) is low
		Off	No signal

Ethernet Port Indicator

Name	Status	Description
Link indicator	On	Connection is established
	Blinking	Data is being transmitted
	Off	Connection is not established

NOTE： There are two LED indicators for each Ethernet port. The router would only light up the green one (Link indicator) on left side, the right LED is unused.

Connection Details of Terminal Blocks

Serial Port & DIDO

PIN	RS232	RS485	DI	DO	Direction
1	--	--	--	DO1	Router-->Device
2	--	--	--	DO2	Router-->Device
3	--	--	--	COM	--
4	--	A	--	--	Router<-->Device
5	--	B	--	--	Router<-->Device
6	--	--	DI1	--	Router<--Device
7	--	--	DI2	--	Router<--Device
8	GND	--	--	--	--
9	TX	--	--	--	Router-->Device
10	RX	--	--	--	Router<--Device

Power Input

PIN	Description
V+ (Red line)	Positive
V- (Yellow line)	Negative
PGND	GND

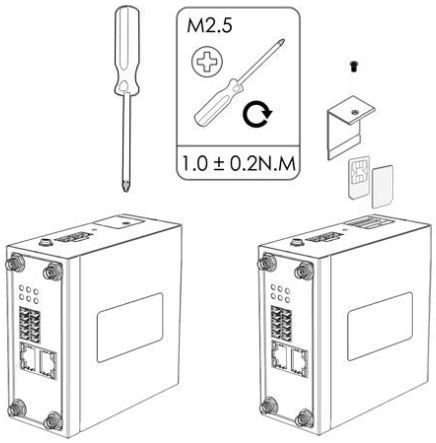
Reset Button

Function	Action
Reboot	Press the RST button within 3s under operation status
Factory Reset	Press the RST button between 3s to 10s, all LEDs blink few times then reboot the router manually.
Run Normally	Press the RST button more than 10s, router will run normally without reboot or factory reset.

Insert or remove SIM card

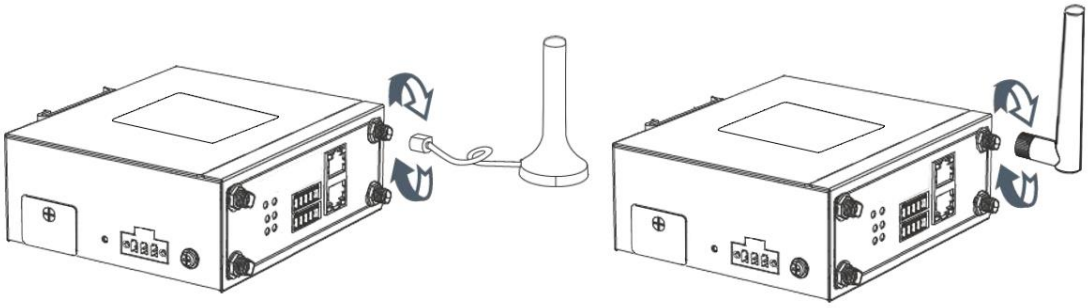
The 641M has facility for 2 SIM cards and is simply access though cover on side of unit. To insert SIM follow these steps:

1. Make sure the power is disconnected.
2. Use a Phillips-head screwdriver to remove SIM slot cover.
3. Insert the SIM card(s) into the SIM sockets. Care should be taken to ensure SIM card is inserted correct orientation. When inserted its should smoothly go in until there is a positive click. Do not force.
4. Replace the SIM slot cover.



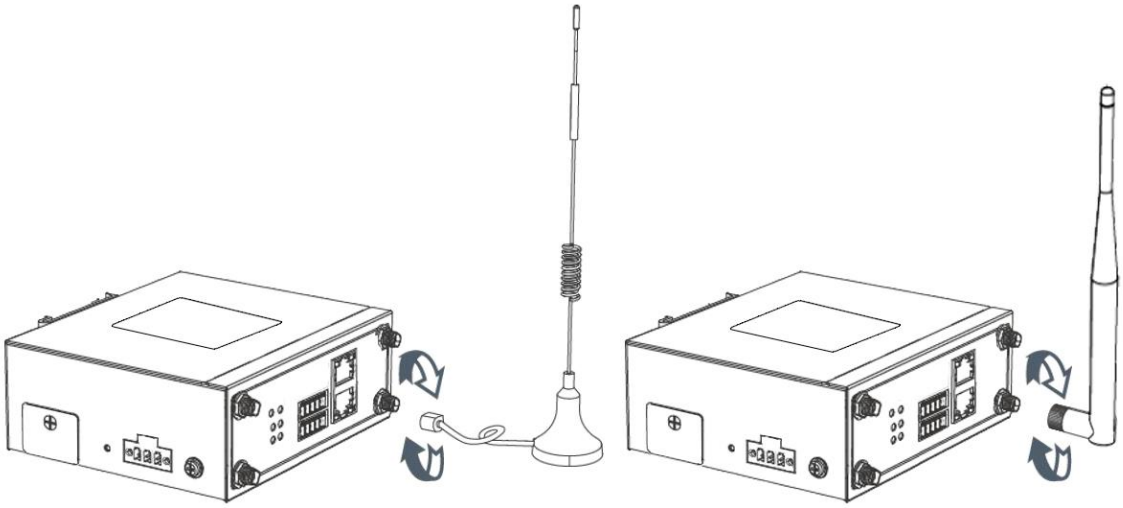
Install Antenna

- **Connect the cellular antenna to the MAIN and AUX connector on the unit.**



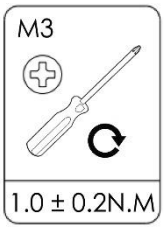
NOTE: 641M router supports dual antennas with MAIN and AUX connectors. MAIN connector is for data receiving and transmission. AUX connector is for enhancing signal strength, which cannot be used separately.

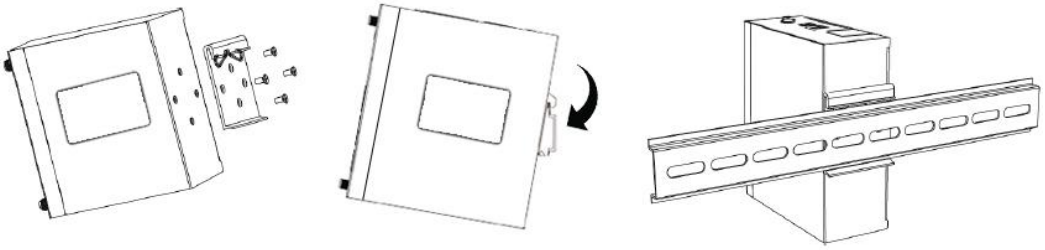
- **Connect the Wi-Fi antenna to the Wi-Fi connector on the unit.**



DIN-rail Mounting

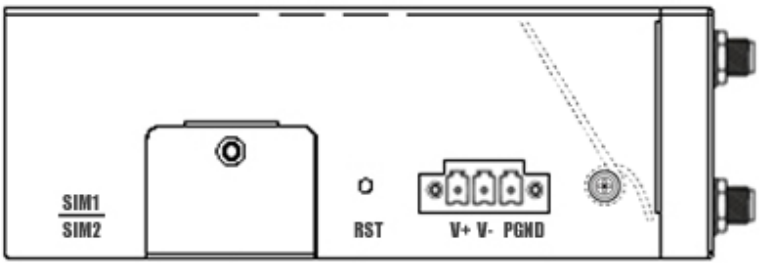
1. Use 4 pcs of M3x6 flat head phillips screws to fix the DIN-rail to the router.
2. Insert the upper lip of the DIN-rail into the DIN-rail mounting kit.
3. Press the router towards the DIN-rail until it snaps into place.





Protective Grounding Installation

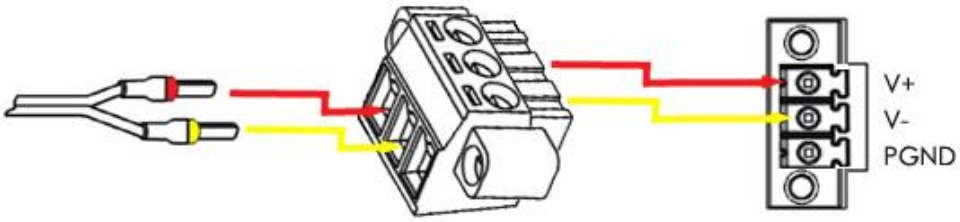
1. Remove the grounding nut.
2. Connect the grounding ring of the cabinet's grounding wire onto the grounding stud and screw up the grounding nut.



NOTE: Strongly recommended the router to be grounded when installed to provide maximum protection against surges and lightening strikes.

Power Supply Installation

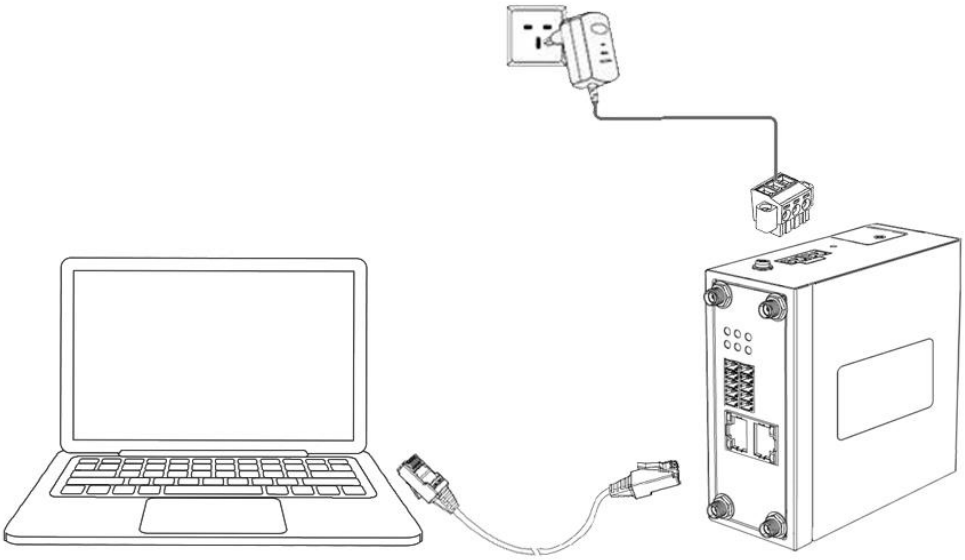
1. Remove the pluggable connector from the unit, then loosen the screws for the locking flanges as needed.
2. Connect the wires of the power supply to the terminals.



COLOR	POLARITY
RED	V+
YELLOW	V-

Applying Power to the 641M Router

1. Connect one end of the Ethernet cable to the LAN port on the unit and the other end to a LAN port on a PC.
2. Connect the AC power to a power source.
3. Router is ready when SYS LED is blinking slowly.



Access to Web page

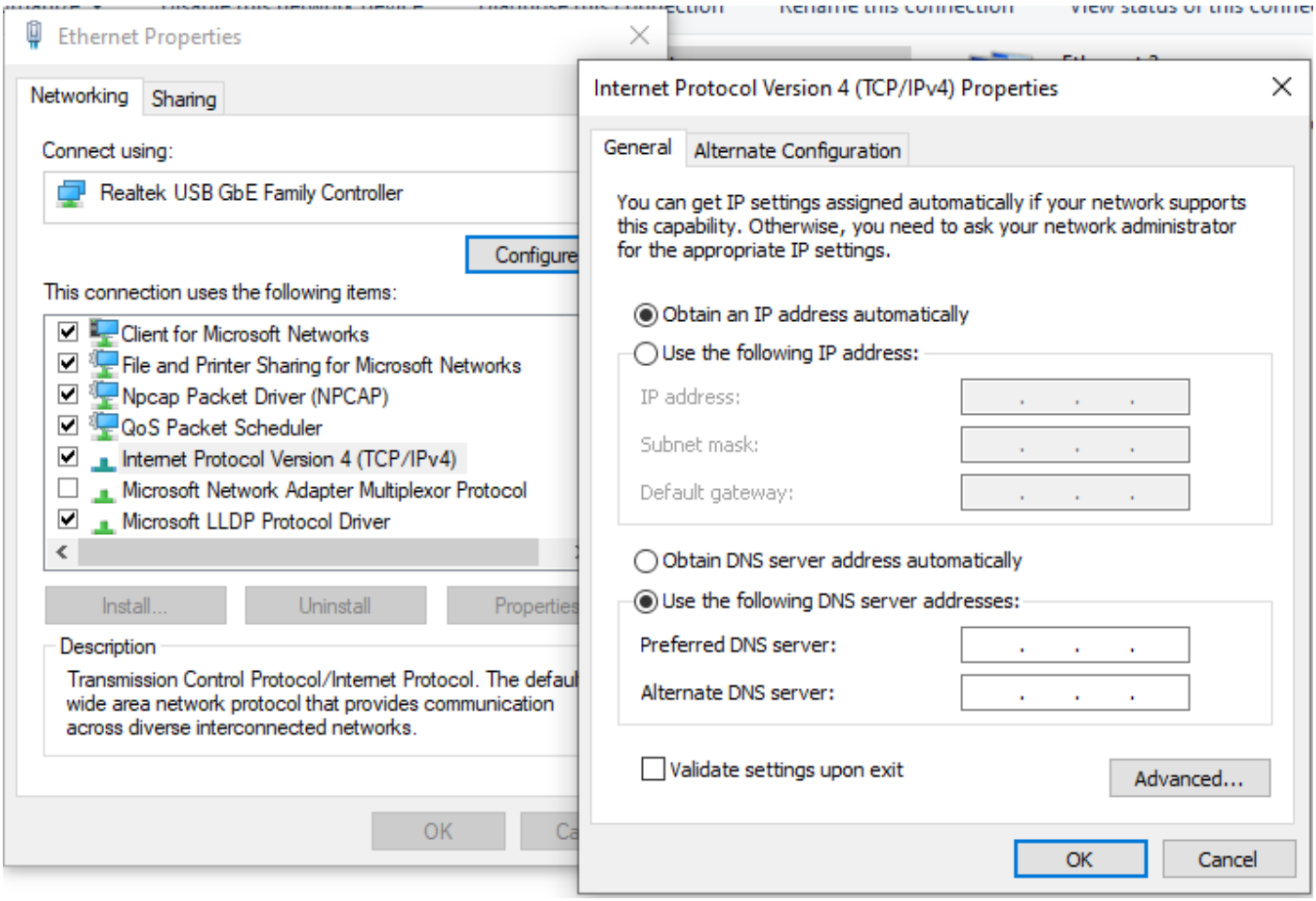
PC Configuration

The 641M router contains a DHCP server which will automatically assign an IP address to your PC, however in some cases the user may need to change the network settings on their PC to accept the IP address from the 641M. or you can configure a static IP address manually.

- **Obtain an IP address automatically**

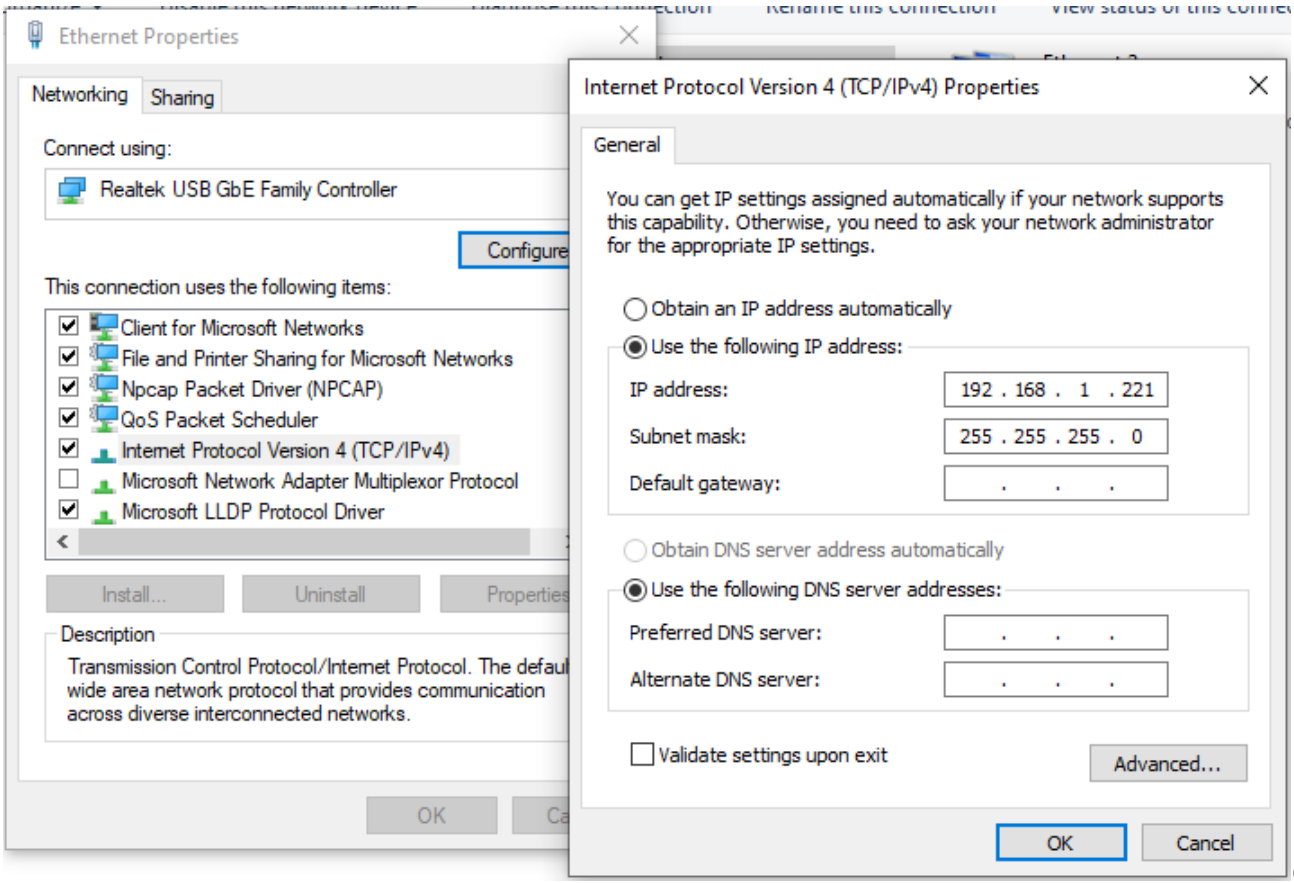
The process required to do this differs depending on the version of Windows you are using.

NOTE: The following steps are based on Windows 7.



Select **Start » Control Panel » Network Connections**. Right click **Local Area Connection** and select **Properties** to open the configuration dialog box for Local Area Connection. Select **Internet Protocol (TCP/IP)** and click **Properties** to open the TCP/IP configuration window. On the General tab, select **Obtain an IP address automatically** and **Obtain DNS server address automatically**. Click **OK** to complete TCP/IP configuration.

- **Set to a static IP address**



click "**Use the following IP address**" to assign a static IP manually within the same subnet of the router.

NOTE : ***Default gateway*** and ***DNS server*** is not necessary if PC not routing all traffic go through 641M router.

Factory Default Login Details

641M router supports Web-based configuration interface for management. If this is the first time for you to configure the router, please refer to below default settings.

Username: **admin**

Password: **admin**

LAN IP Address: **192.168.1.1** (All Ethernet ports are setup by default as a bridge, so any port can be used)

DHCP Server: **Enabled**

Login to Web Page

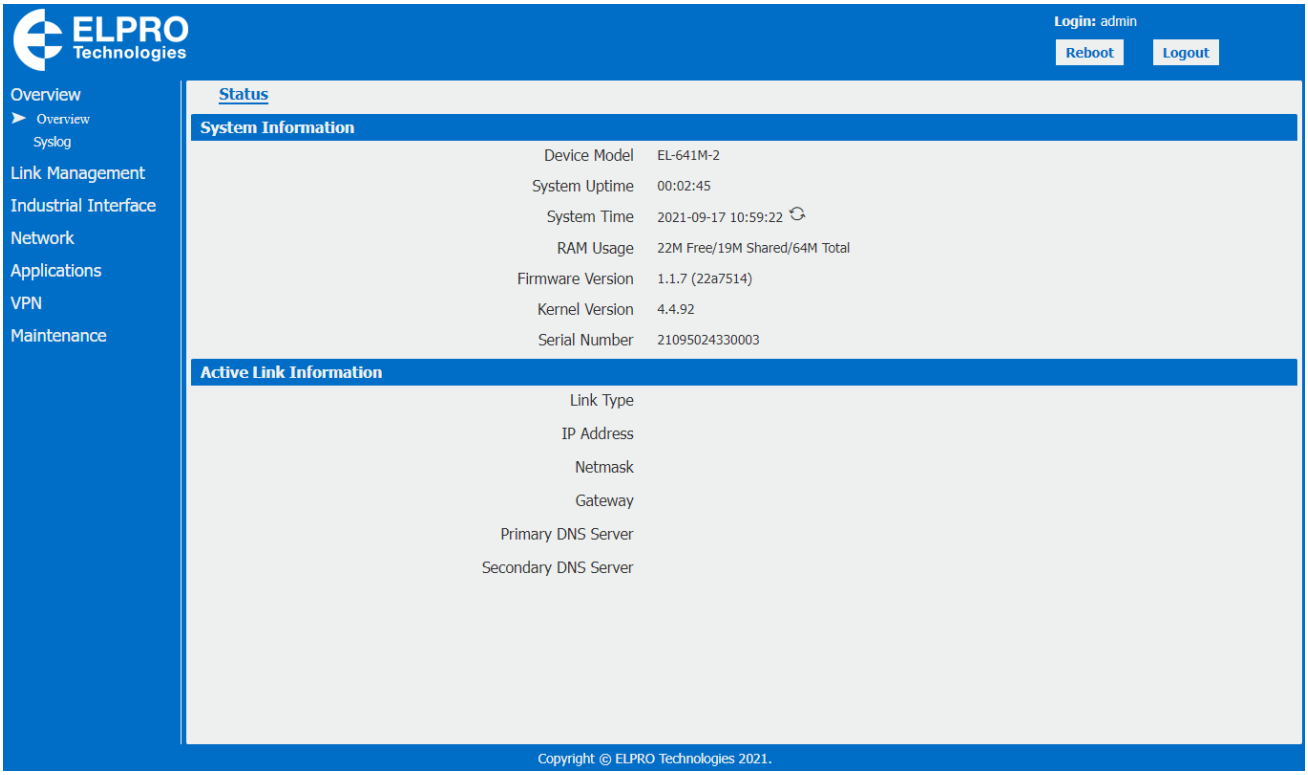
1. Start a Web browser on your PC (Chrome and IE are recommended), enter 192.168.1.1 into the address bar of the web browser.
2. Then use the default username and password(admin/admin), to log in to the router.

Router Configuration

Web Interface

The 641M router Web interface is divided into two sections. In the left pane is the main navigation menu. On the right is the content area for each page.

NOTE: The navigation menu may contain fewer sections than shown here depending on which options are installed.



- **Reboot:** reset the router within power disconnect.
- **Logout:** logout to web authorization page.

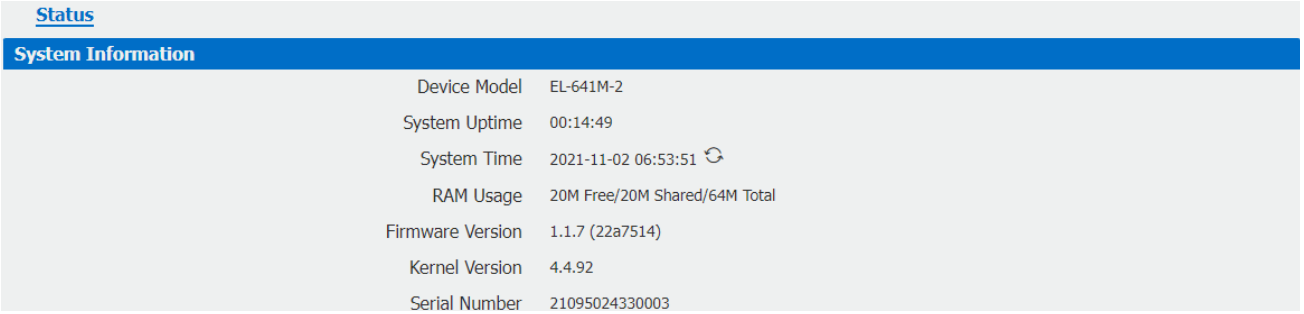
- **Save:** save the configuration on current page.
- **Apply:** apply the changes on current page immediately.

- **Close:** exit without changing the configuration on current page.

Configuration Overview

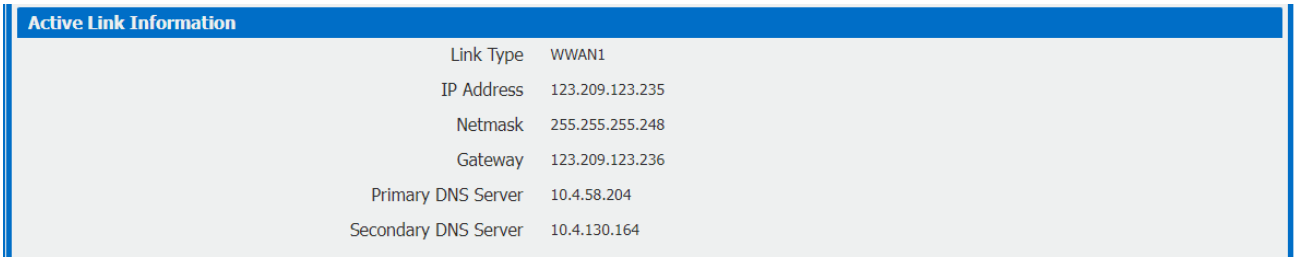
Status

You can view the system information of the router on this page.



System Information

- **Device Module**
  Displays the model name of router
- **System Uptime**
  Displays the duration the system has been up in hours, minutes and seconds.
- **System Time**
  Displays the current date and time.
- **RAM Usage**
  Displays the RAM capacity and the available RAM memory.
- **Firmware Version**
  Displays the current firmware version of router.
- **Kernel Version**
  Displays the current kernel version of router.
- **Serial Number**
  Display the serial number of router.

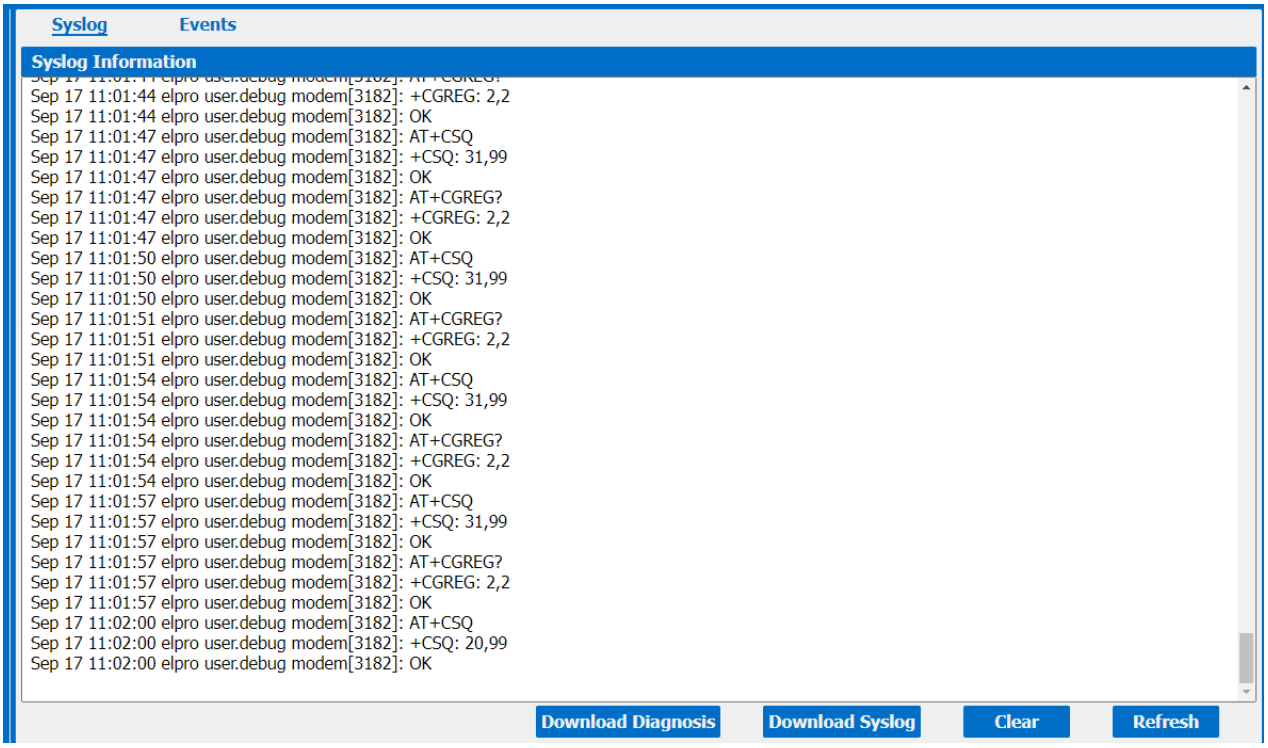


Active Link Information

- **Link Type**
  Current interface for internet access.
- **IP Address**
  Displays the IP address assigned to this interface.
- **Netmask**
  Displays the subnet mask of this interface.
- **Gateway**
  Displays the gateway of this interface. This is used for routing packets to remote networks.

- **Primary DNS Server**
  Displays the primary DNS server of this interface.
- **Secondary DNS Server**
  Displays the secondary DNS server of this interface.

Syslog



Syslog Information

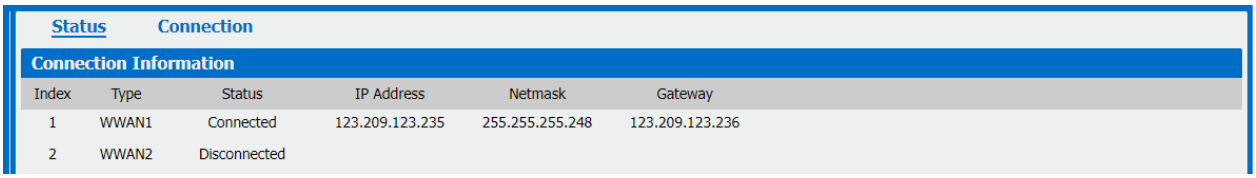
- **Download Diagnosis**
  Download the Diagnosis file for analysis.
- **Download Syslog**
  Download the complete syslog since last reboot.
- **Clear**

  Clear the current page syslog printing.
- **Refresh**
  Reload the current page with latest syslog printing.

Link Management

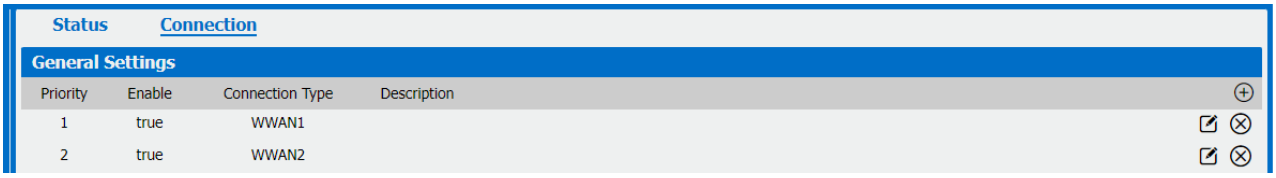
This section shows you the setup of link management for the wide area network (WAN) connections. This is the 4G-LTE cellular connection and its associate SIM settings to allow network conection.

Connection Manager



Connection Manager->Status

- **Type**
  Displays the connection interface
- **Status**
  Displays the connection status of this interface.
- **IP Address**
  Displays the IP Address of this interface.
- **Netmask**
  Displays the subnet mask of this interface.
- **Gateway**
  Displays the gateway of this interface. This is used for routing packets to remote networks.



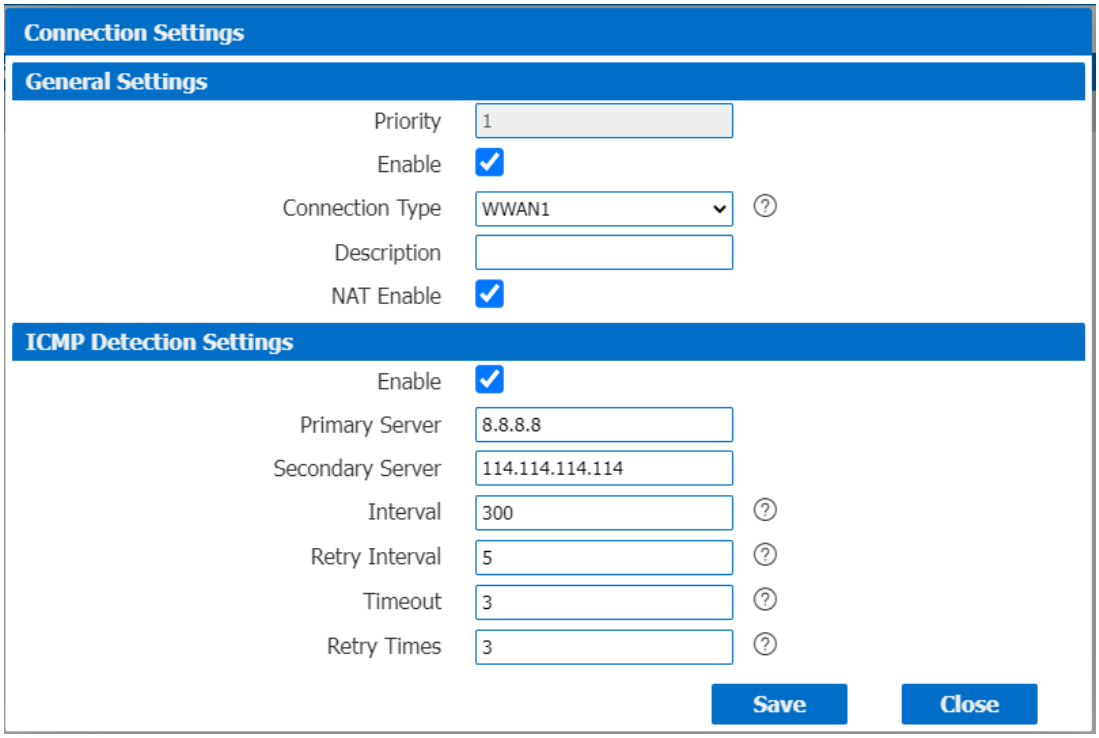
Click  to add a new priority interface.

Click  to edit current interface settings.

Click  to delete current interface.

Connection Manager->Connection

- **Priority**
  Displays the priority list of default routing selection.
- **Enable**
  Displays the connection enable status.
- **Connection Type**
  Displays the name of this interface.
- **Description**
  Displays the description of this connection.



Connection Settings

- **Priority**
  Displays current index on priority list.
- **Connection Type**
  Select the available interface as outbound link.
  NOTE: specify SIM1 carrier link as WWAN1, SIM2 carrier link as WWAN2.
- **NAT Enable**
  Check this box to enable NAT (Network Address Translation) on the current link.
- **ICMP Detection Settings->Enable**
  Check this box to detect link connection status based on pings to a specified IP address.
- **Primary Server**
  Enter the primary IP address that pings will be sent to, to detect the link state. Recommend entering the IP address of known external reachable server or network (e.g. 8.8.8.8).
- **Secondary Server**
  Enter the secondary IP address that pings will be sent to, when the primary server is ping failed, router would try to ping the secondary server.
- **Interval**
  The duration of each ICMP detection in seconds.
- **Retry Interval**
  The interval in seconds between each ping if no packets have been received.
- **Timeout**
  Enter timeout for received ping reply to determine the ICMP detection failure.
- **Retry Times**
  Specify the retry times for ICMP detection.

Cellular

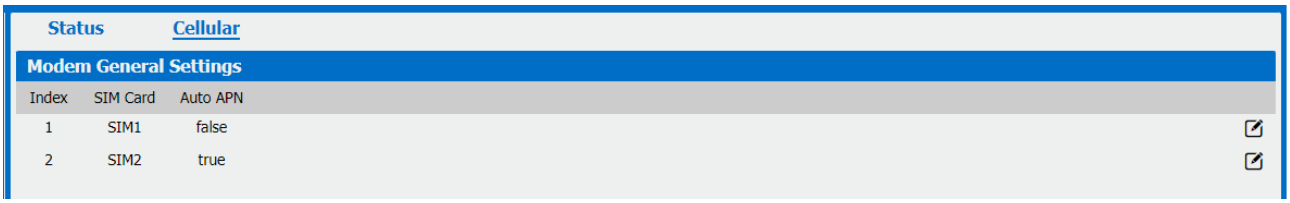
641M Router main function is connecting to Internet by cellular modem.

Cellular->Status

- **Modem**
  Displays the module of the modem used by this WWAN interface.
- **Registration**
  Displays the registration status of SIM card.
- **CSQ**
  Displays the signal strength of the carrier network.
- **Operator**
  Displays the wireless network provider.
- **Network Type**
  Displays the RF technology currently active. Example: LTE, UMTS, or CDMA.
- **IMEI**
  International Mobile Electronic Identifier. Depending on the carrier and technology used, this may be required for the carrier when activating the data contract. In some cases this will be blank.
- **PLMN ID**

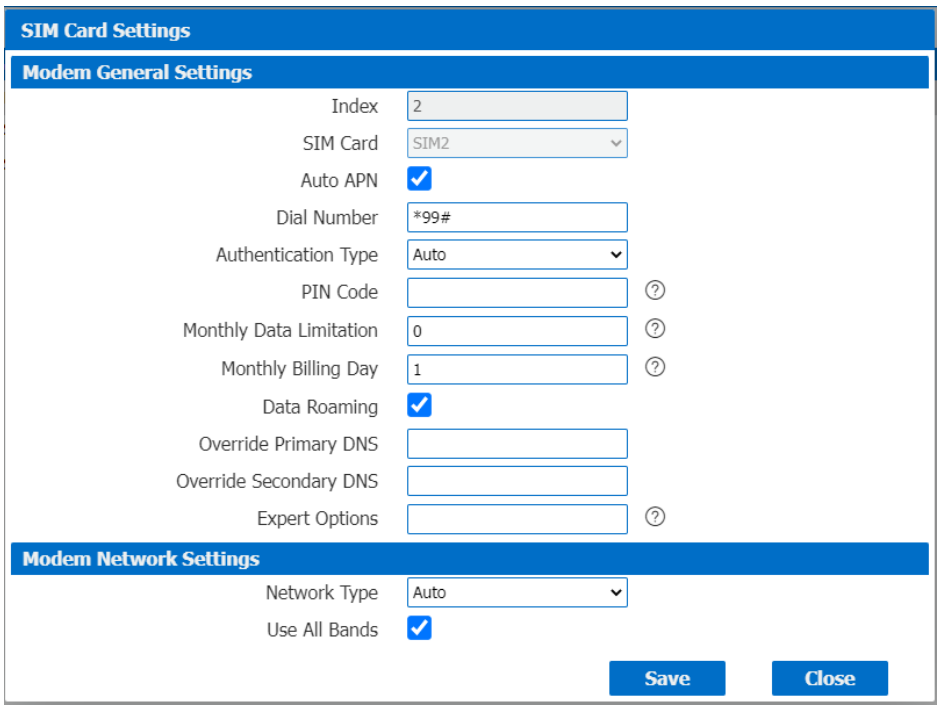
  Displays the current PLMN ID, including MCC, MNC, LAC and Cell ID.
- **Local Area Code**
  Displays the location area code of the SIM card.
- **Cell ID**
  Displays the Cell ID of the SIM card location.

- **IMSI**
  International Mobile Subscriber Identity, as read from the SIM. This is the user's network subscription.
- **TX Bytes**
  Displays the total bytes transmitted since the time the unit was connected. 641M router would record this data with same SIM card, reboot would not erase this data.
- **RX Bytes**
  Displays the total bytes received since the time the unit was connected. 641M router would record this data with same SIM card, reboot would not erase this data.
- **Modem Firmware**
  Displays firmware version of the module used by the WWAN interface.



Cellular

- **SIM Card**
  Displays the SIM card support on this unit.
- **Auto APN**
  Displays the Enable status of auto APN function.



SIM Card Settings

- **SIM Card**
  Displays the current SIM card settings.
- **Auto APN**
  Check this box enable auto checking the Access Point Name provided by the carrier.

- **Dial Number**
  Enter the dial number of the carrier.
- **Authentication Type**
  Authentication method used by the carrier. Possible selections are Auto, PAP, CHAP.
- **PIN Code**
  Enter a 4-8 characters PIN code to unlock the SIM.
- **Monthly Data Limitation**
  Enter the data total amount for SIM card, SIM card switchover when data reach limitation.
- **Monthly Billing Day**
  Enter the date of renew data amount every month.
- **Data Roaming**
  Enable or disable the data roaming function on the router.
- **Override Primary DNS**
  Enter the primary DNS server will override the automatically obtained DNS.
- **Override Secondary DNS**
  Enter the secondary DNS server will override the automatically obtained DNS.
- **Network Type**
  Select the mode of operation of the cell module (Auto, 4G Firstly, 4G Only, etc.).
- **Use All Bands**
  Check this box to enable all bands selection or choose specified bands.

Ethernet

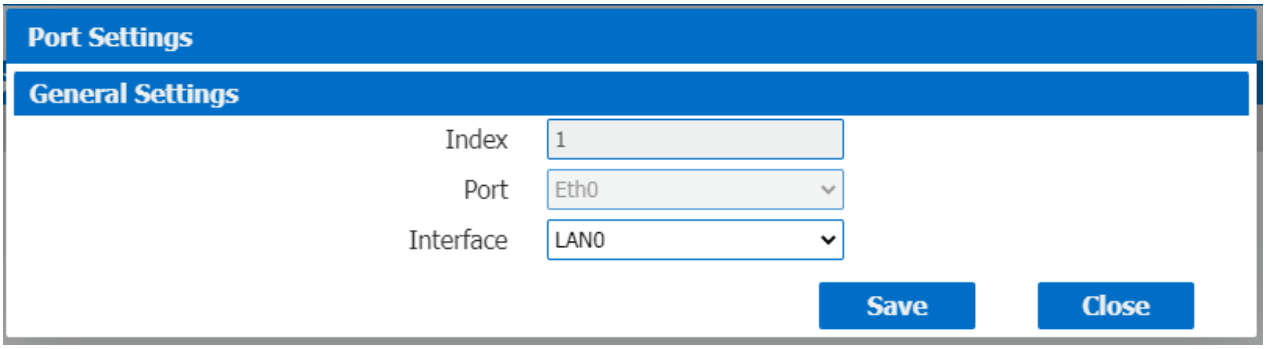
The same instructions apply to settings for all Ethernet interfaces.

Ethernet->Status

- **Ethernet Port Information**
  Displays the port physical connected states.
- **Interface Information**
  Displays the name and MAC address of Ethernet interface.
- **DHCP Lease Table**
  Displays the current IP address assigned to DHCP client.

Ethernet->Port Assignment

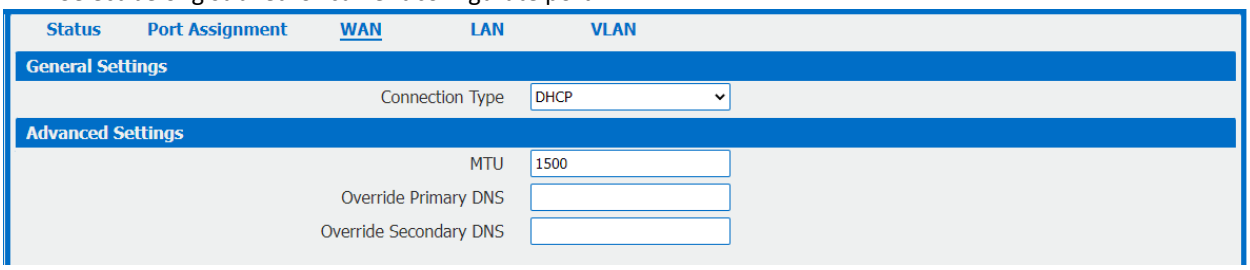
- **Port**
  Displays the port states and numbers of this unit.
- **Interface**
  Displays the port states of belong subnet.



Note: Please make sure LAN0 is assigned and existing.

Ethernet->Port Settings

- **Port**
  Indicate the current configurate port.
- **Interface**
  Select belong subnet for current configurate port.



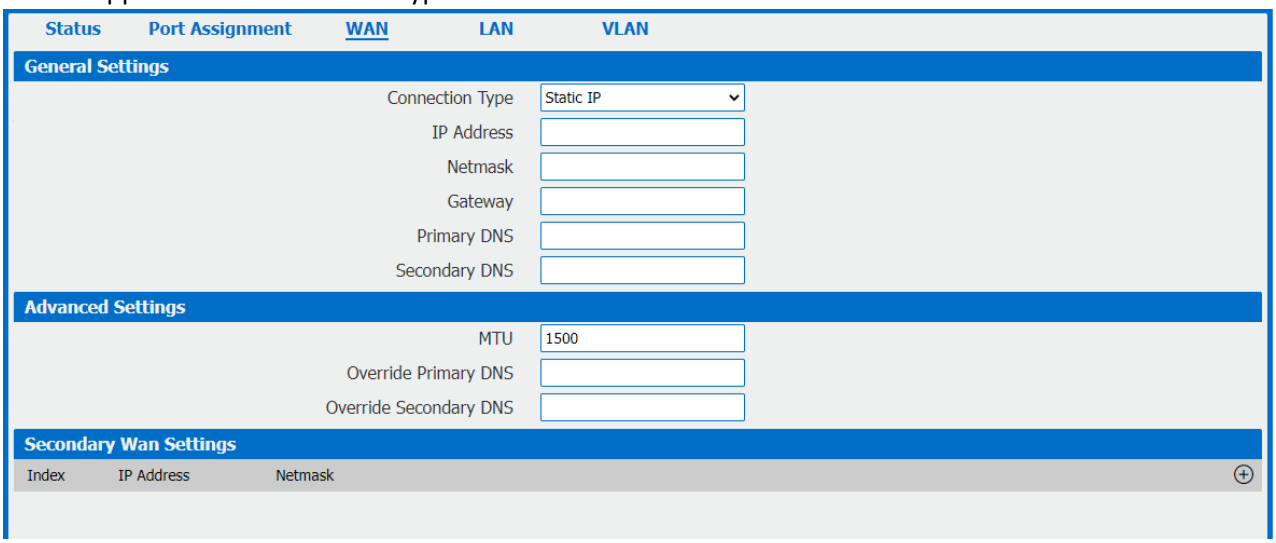
Ethernet->WAN

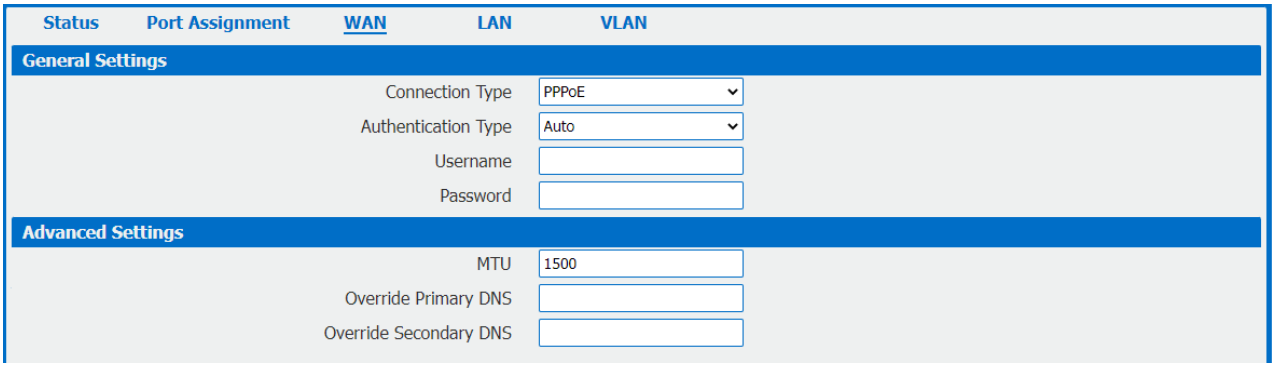
- **Connection Type**
  If you select DHCP Client, external DHCP server will assign an IP address to this unit.
- **MTU**
  Maximum Transmission Unit, maximum packet size allowed to be transmitted. Should be left as default value of 1500 in most cases.
- **Override Primary DNS**
  Enter the primary DNS server will override the automatically obtained DNS.
- **Override Secondary DNS**
  Enter the secondary DNS server will override the automatically obtained DNS.

Ethernet->WAN->Secondary Wan Settings

- **IP Address**
  Enter the IP address of secondary wan interface.
- **Netmask**
  Enter the netmask of secondary wan interface.

641M supports WAN connection type set to Static IP and PPPoE mode.





Ethernet->WAN->Static IP or PPPoE

- **IP Address**
  Static address for this interface. It must be on the same subnet as the gateway.

- **Netmask**

  Will be assigned by the gateway.

- **Gateway**
  IP address of the Gateway (DHCP Host). If not known this can be left as all zeros.

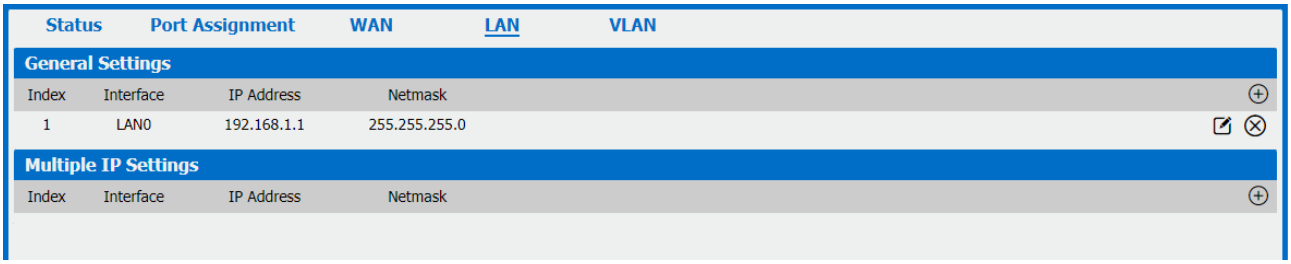
- **Primary DNS**
  IP address of the primary DNS server.

- **Secondary DNS**
  IP address of the secondary DNS server.

- **Authentication Type**
  Authentication method used by the carrier. Possible selections are Auto, PAP, CHAP.

- **Username**
  Username to provide when connecting.

- **Password**
  Password to provide when connecting.

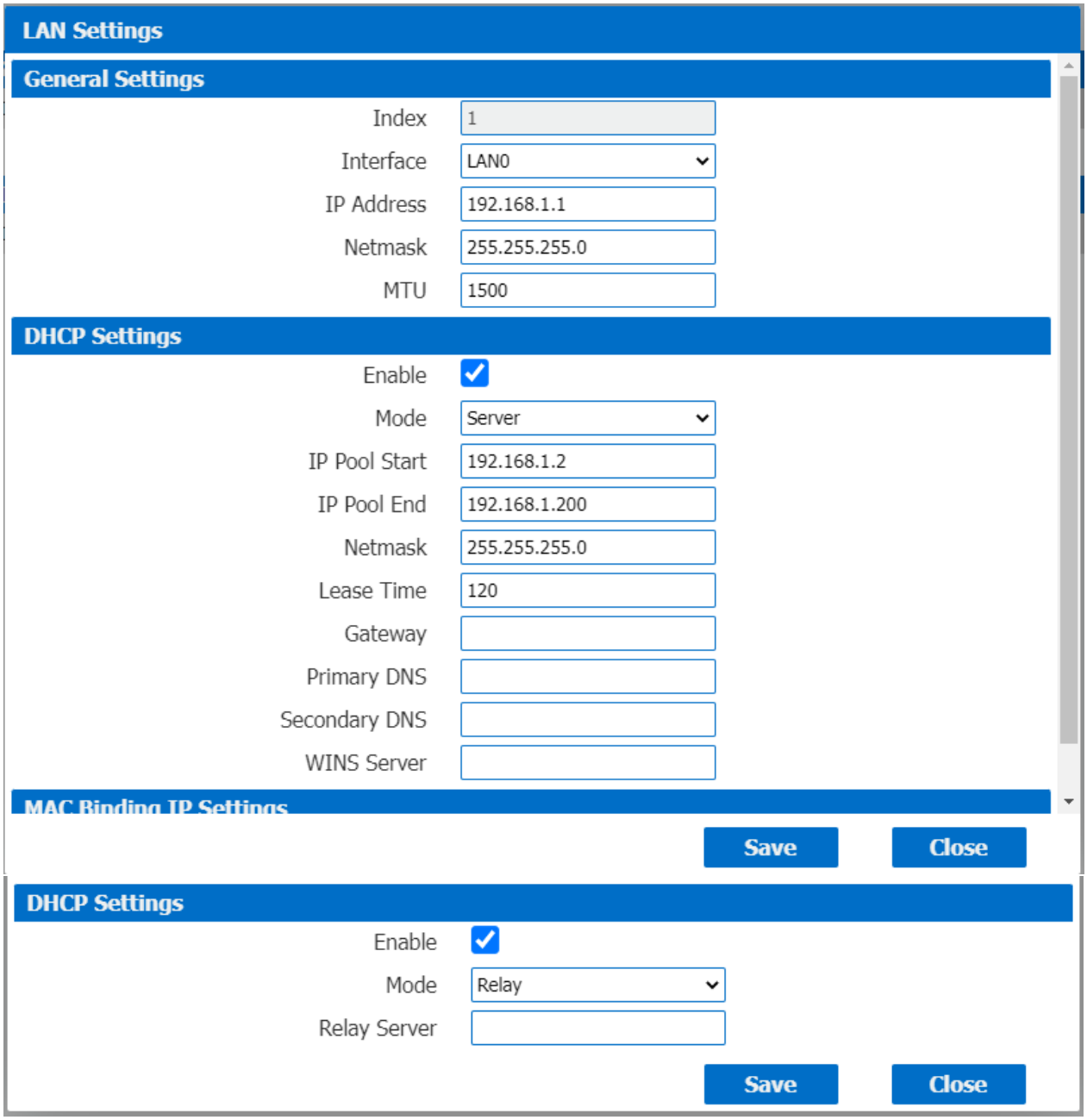


Ethernet->LAN

- **Interface**
  Displays current name of LAN subnet.

- **IP Address**
  Displays LAN IP address of this subnet.

- **Netmask**
  Displays subnet mask for this subnet.



Ethernet->LAN

- **Interface**
  Select the configurate LAN port of this subnet.
- **IP Address**
  Enter LAN IP address for this interface.
- **Netmask**
  Enter subnet mask for this subnet.
- **MTU**
  Maximum Transmission Unit, maximum packet size allowed to be transmitted. Should be left as default value of 1500 in most cases.
- **Enable**
  Check this box to enable DHCP feature on current LAN port.

- **Mode**
  Select the DHCP working mode from “Server” or “Relay”.

- **Relay Server**
  Enter the IP address of DHCP relay server.

- **IP Pool Start**
  External LAN devices connected to this unit will be assigned IP address in this range when DHCP is enabled. This is the beginning of the pool of IP addresses.

- **IP Pool End**
  This is the end of the pool of IP addresses.

- **Netmask**
  Subnet mask of the IP address obtained by DHCP clients from DHCP server.

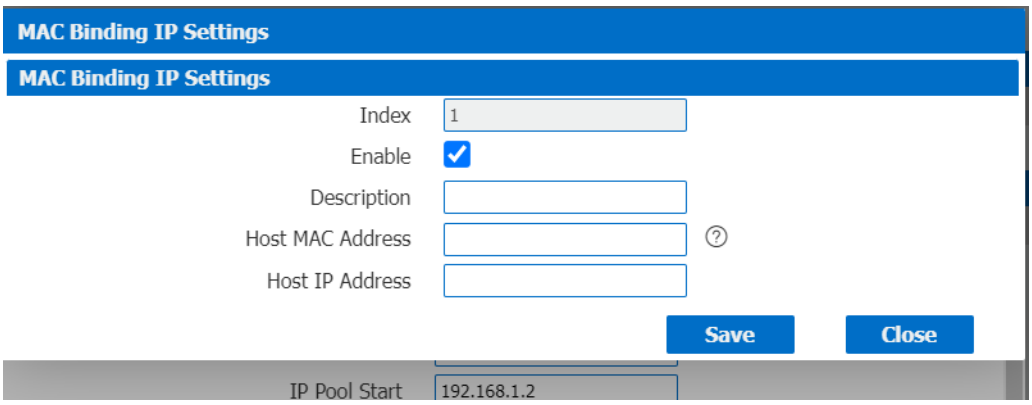
- **Lease Time**
  The lease time of the IP address obtained by DHCP clients from DHCP server.

- **Gateway**
  The gateway address obtained by DHCP clients from DHCP server.

- **Primary DNS**
  Primary DNS server address obtained by DHCP clients from DHCP server.

- **Secondary DNS**
  Secondary DNS server address obtained by DHCP clients from DHCP server.

- **WINS Server**
  Windows Internet Naming Service obtained by DHCP clients from DHCP server.

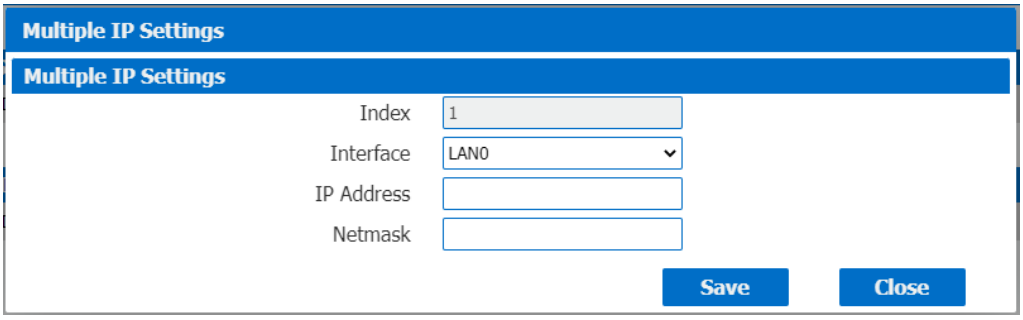


Ethernet->LAN->MAC Binding IP Settings

- **Enable**
  Check this box to enable MAC binding IP feature.
- **Description**
  Enter the description for MAC binding IP feature.

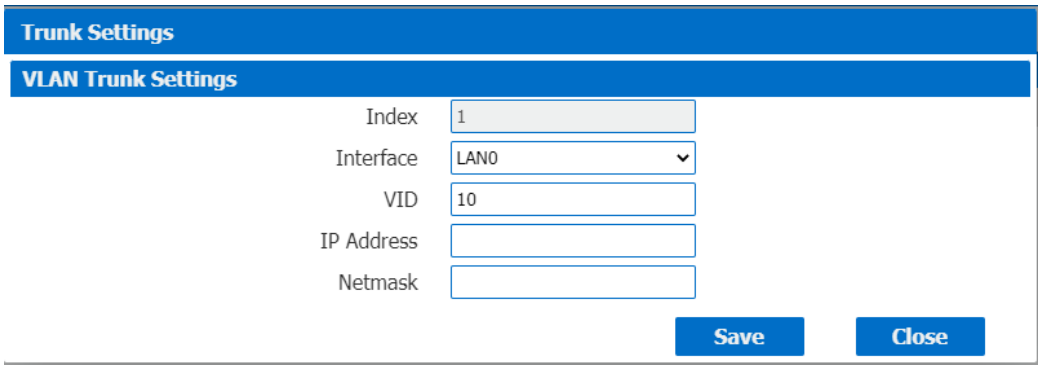
- **Host MAC Address**
  Enter the host MAC address.

- **Host IP Address**
  Enter the host IP address.



Ethernet->LAN->Multiple IP Settings

- **Interface**
  Select the configurate LAN port of this subnet.
- **IP Address**
  Enter multiple IP address for this interface.
- **Netmask**
  Enter subnet mask for this subnet.



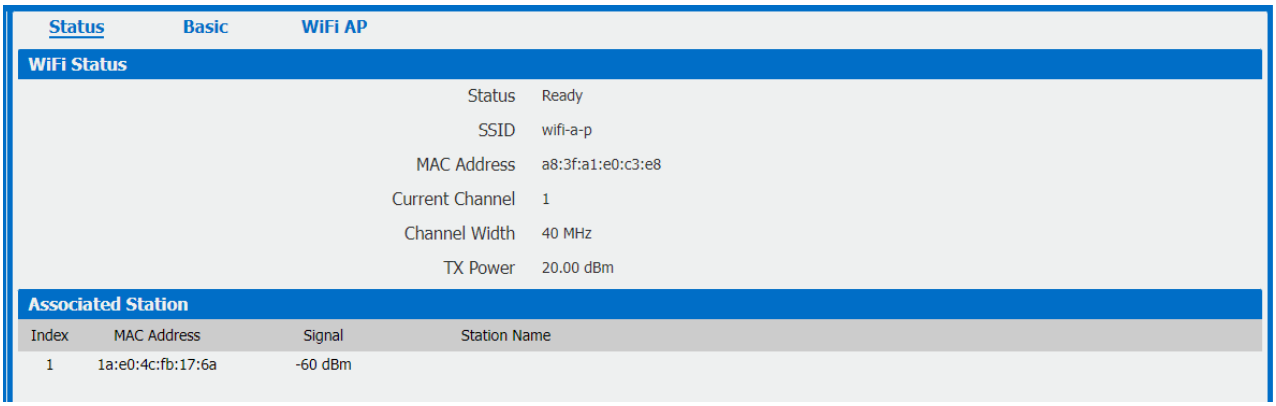
Ethernet->VLAN->VLAN Trunk Settings

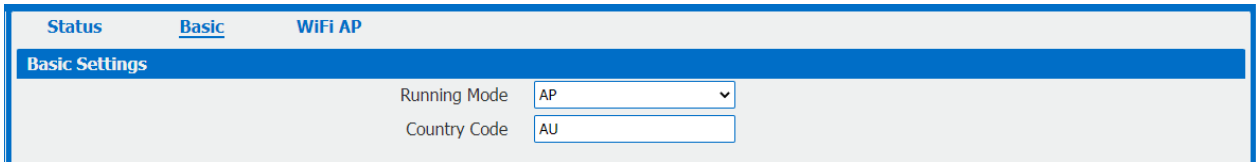
- **Interface**
  Select the LAN port for VLAN trunk.
- **VID**
  Specify the VLAN ID for VLAN trunk.
- **IP Address**
  Enter IP address for this VLAN trunk.
- **Netmask**
  Enter subnet mask for this VLAN trunk.

Wi-Fi (641M-6 only)

641M router could only be set to function as either a Wi-Fi Client or a Wi-Fi Access Point, but not both simultaneously. Select Wi-Fi (Access Point) from the main navigation menu to Wi-Fi (default as Access Point) page, which contains tabs for configuration of the Wi-Fi Access Point interface.

You could review the Wi-Fi connection status as below.

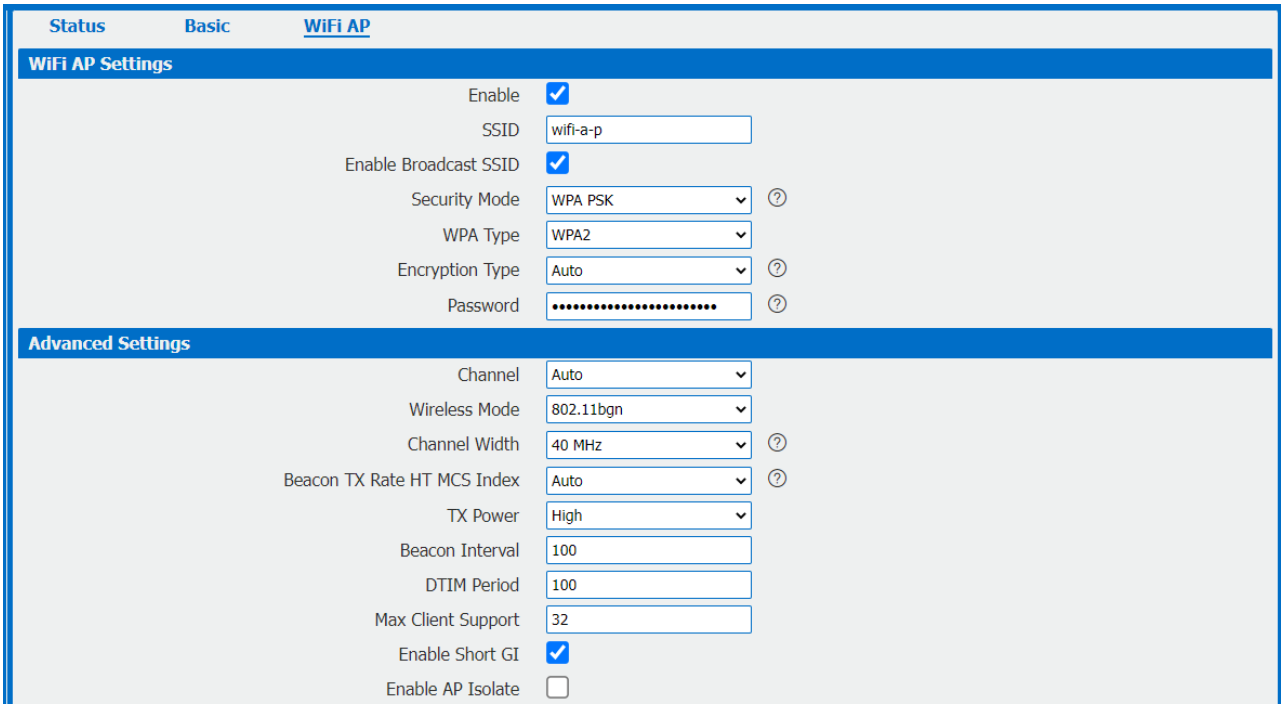




Wi-Fi->Basic

- **Running Mode**
  Select the configurate Wi-Fi mode from AP or Client.
- **Country Code**
  Enter the country where the AP is located. Use 2-digit country code. For example: Australia use AU

Wi-Fi AP settings page as below.



Wi-Fi->Wi-Fi AP

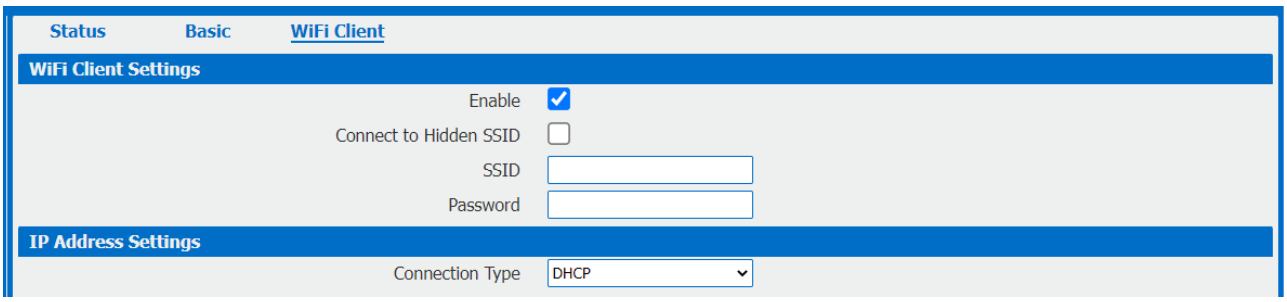
- **Enable**
  Check this box will enable the Wireless interface.
- **SSID**
  The SSID is the name of the wireless local network. Devices connecting to the 641M router WiFi access will identify the Access Point by this SSID.
- **Enable Broadcast SSID**
  When the checkbox is not checked, SSID broadcast is disabled, other wireless devices can't not find the SSID, and users have to enter the SSID manually to access to the wireless network.
- **Security Mode**
  Select security mode from “None”, “WEP” or “WPA PSK”.
- **WPA Type**
  Select WPA Type from “Auto”,“WPA” and “WPA2”.
- **Encryption Type**
  Select the encryption method. Options are “Auto”, “TKIP”, or “CCMP”. Because these options depend on the authentication method selected, some options will not be available.
- **Password**
  Enter the pre-shared key of WEP/WPA encryption.
- **Channel**
  Select the Wi-Fi channel the module will transmit on. If there are other Wi-Fi devices in the area the 641M router should be set to a different channel than the other access points. Channels available for selection depend on the selected Band.
- **Wireless Mode**
  Select the Wi-Fi 802.11 mode: B, G, or N. Available selections depend on selected Band.
- **Channel Width**

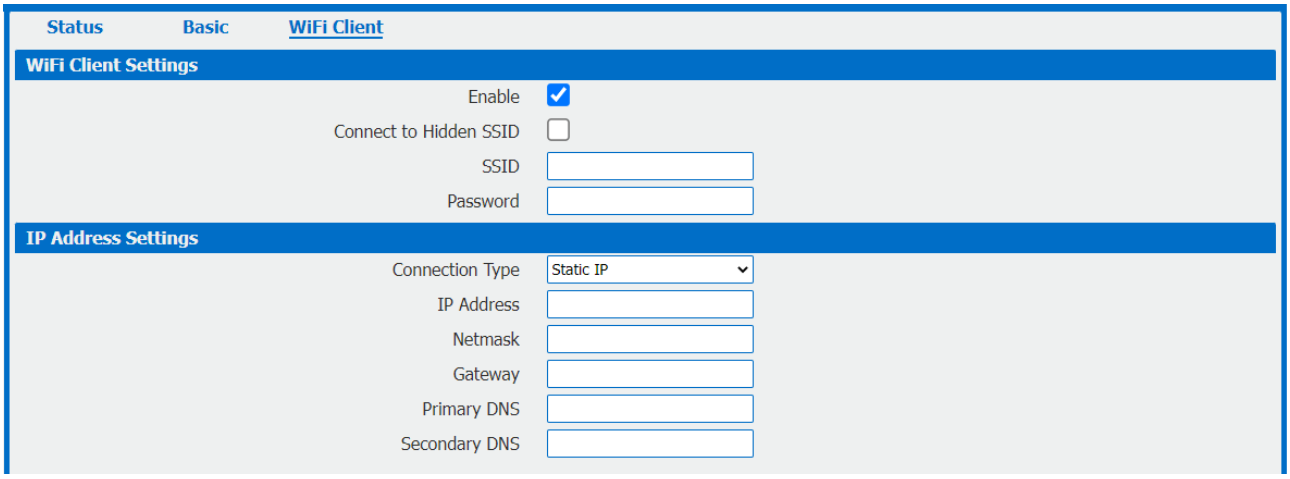
Select the width of the Wi-Fi channel. 20 MHz will limit the channel to 20 MHz wide; 20/40 MHz will enable the use of a 40 MHz wide channel when available.

- **Beacon TX Rate HT MCS Index**
  Modulation and Coding Scheme, The MCS modulation coding table is a representation proposed by 802.11n to characterize the communication rate of the WLAN. The MCS takes the factors affecting the communication rate as the columns of the table and uses the MCS index as a row to form a rate table.
- **TX power**
  Select the transmission power for the AP from “High”, “Medium” and “Low”.
- **Beacon Interval**
  Enter the interval of time in which the router AP broadcasts a beacon which is used for wireless network authentication.
- **DTIM Period**
  Enter the delivery traffic indication message period and the router AP will multicast the data according to this period.
- **Max Client Support**
  Enter the maximum number of clients to access when the router is configured as AP.
- **Enable Short GI**
  Check this box to enable Short GI(guard interval), Short GI is a blank time between two symbols, providing a long buffer time for signal delay.
- **Enable AP Isolate**
  Check this box to enable AP isolate, the route will isolate all connected wireless devices.

Wi-Fi Client

Wi-Fi Client settings page as below.





Wi-Fi->Wi-Fi Client

- **Enable**
  Check this box will enable the Wireless interface.
- **Connect to Hidden SSID**
  Check this box will enable connect to hidden SSID.
- **SSID**
  The SSID of external access point.
- **Password**
  Enter the password of external access point.
- **Connection Type**
  Select from DHCP Client or Static IP address.
- **IP Address**
  Static address for this interface. It must be on the same subnet as the gateway.
- **Netmask**
  Will be assigned by the gateway.
- **Gateway**
  IP address of the Gateway.
- **Primary DNS**
  Enter the primary DNS server will override the automatically obtained DNS.
- **Secondary DNS**

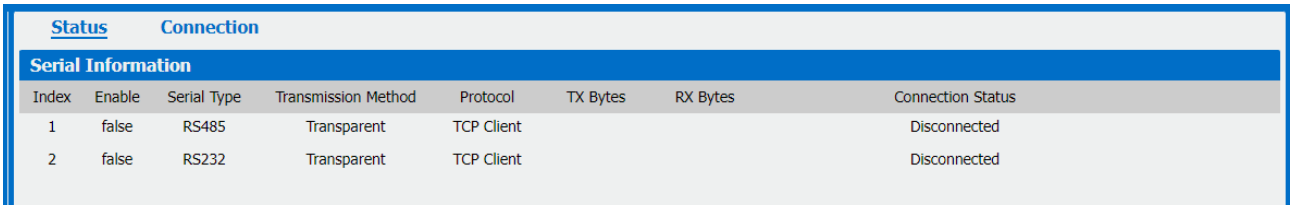
Enter the secondary DNS server will override the automatically obtained DNS.

Industrial Interface

The Industrial page contains tabs for making configuration settings for Serial RS232 and RS485, Digital input and output. Select Serial & Digital IO from the main navigation menu to navigate to this page.

Serial

You could review the status of serial connection.



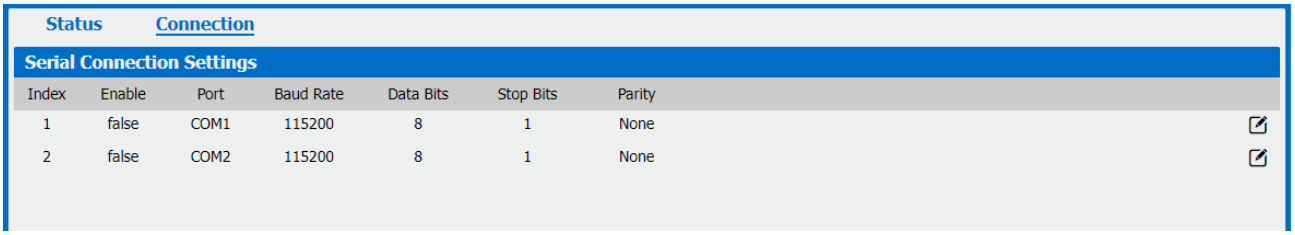
Status Connection

Serial Information

Index	Enable	Serial Type	Transmission Method	Protocol	TX Bytes	RX Bytes	Connection Status
1	false	RS485	Transparent	TCP Client			Disconnected
2	false	RS232	Transparent	TCP Client			Disconnected

Serial->Status

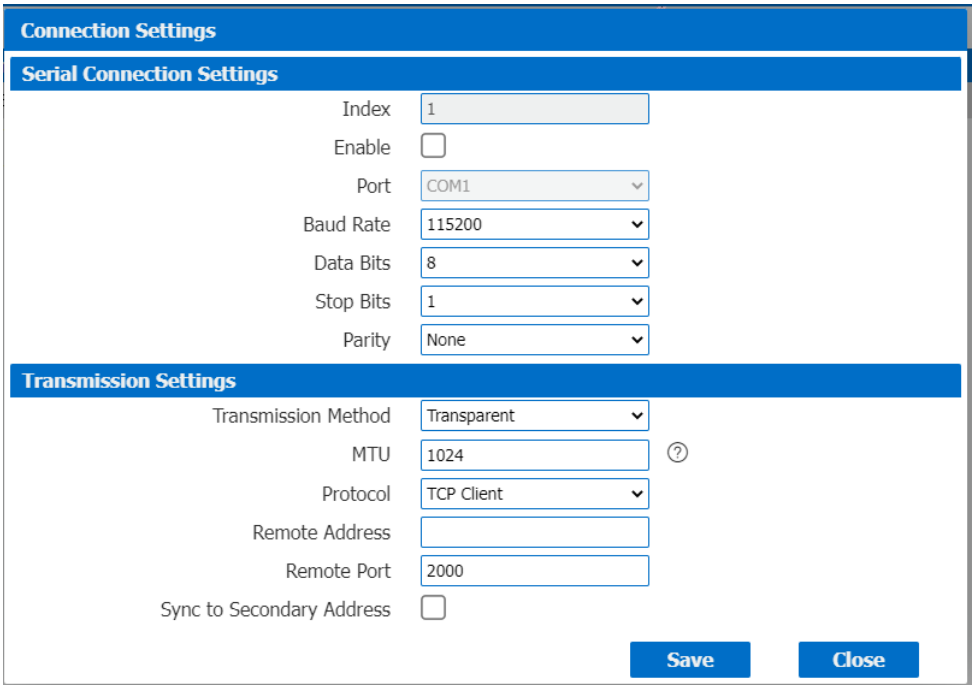
- **Enable**
  Displays status of current serial function.
- **Serial Type**
  Displays the serial type of COM port.
- **Transmission Method**
  Displays the transmission method of this serial port.
- **Protocol**
  Displays the protocol used by this serial port.
- **Connection Status**
  Displays the connection status of this serial port.



Index	Enable	Port	Baud Rate	Data Bits	Stop Bits	Parity
1	false	COM1	115200	8	1	None
2	false	COM2	115200	8	1	None

Serial->Connection

- **Enable**
  Displays status of current serial function.
- **Port**
  Displays the serial type of COM port.
- **Baud Rate**
  Displays the serial port baud rate.
- **Data Bits**
  Displays the serial port Data Bits.
- **Stop Bits**
  Displays the serial port Stop Bits.
- **Parity**
  Displays the serial port parity.



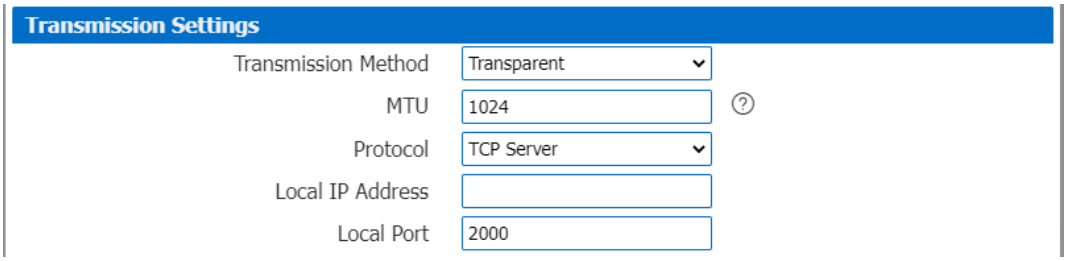
Serial->Connection Settings

- **Baud Rate**
  Select the serial port baud rate. Supported values are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200.
- **Data Bits**
  Select the values from 7 or 8.
- **Stop Bits**

Select the values from 1 or 2.

- **Parity**
  Select values from none, even, odd, mark, space.
- **Transmission Method**
  Select the transmission method for serial port. Optional for “Transparent”, “Modbus RTU Gateway” and “Modbus ASCII Gateway”.
- **MTU**
  Maximum Transmission Unit, maximum packet size allowed to be transmitted. Should be left as default value of 1024 in most cases.
- **Protocol**
  Select the mode for Serial IP communication. Supported modes are UDP, TCP Server, or TCP Client.
- **Remote IP Address**
  Enter the IP address of the remote server.
- **Remote Port**
  Enter the port number of the remote server.
- **Sync to Secondary Address**
  Check this box to enable the data send to secondary remote server for data backup.
- **Remote Secondary Address**
  Enter the remote backup server IP address.
- **Remote Secondary Port**
  Enter the remote backup server port.

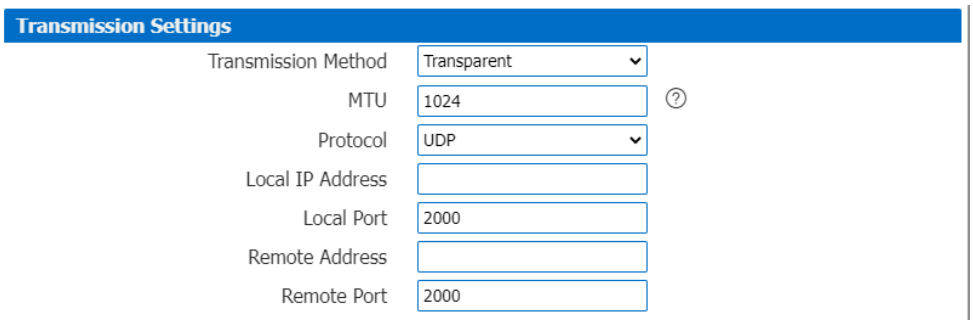
Below window displays different settings when you select **TCP Server** on Protocol.



Serial->Connection Settings

- **Local IP Address**
  Enter the IP Address of the local endpoint.
- **Local Port**
  The port number assigned to the serial IP port on which communications will take place.

Below window displays different settings when you select **UDP** on Protocol.

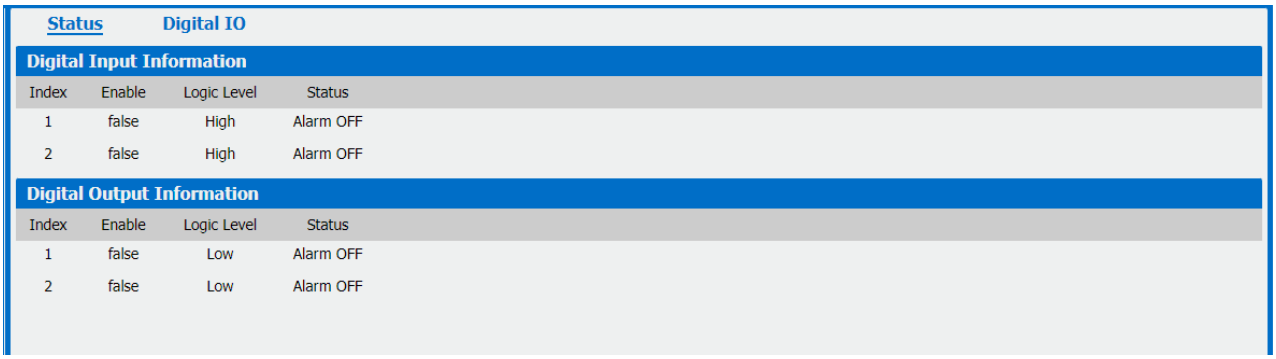


Serial->Connection Settings

- **Local IP Address**
  Enter the IP Address of the local endpoint.
- **Local Port**
  The port number assigned to the serial IP port on which communications will take place.
- **Remote IP Address**
  Enter the IP address of the remote server.
- **Remote Port**
  Enter the port number of the remote server.

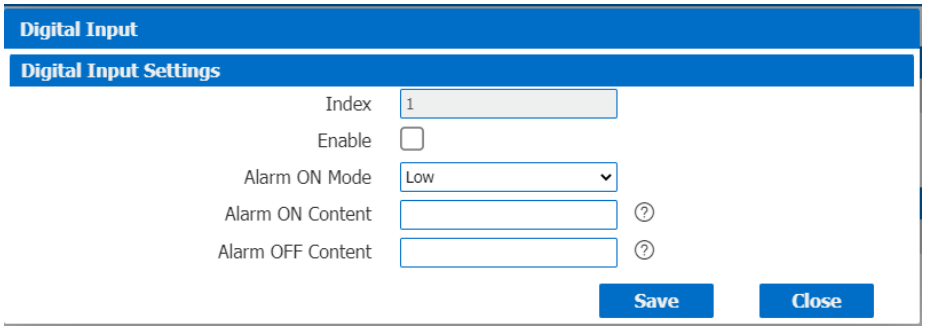
Digital IO

This section allows you to set the Digital IO parameters. The Digital input could be used for triggering alarm, and Digital output could be used for controlling the slave device by digital signal.
You could review the status of Digital IO as below.



Digital IO->Status

- **Enable**
  Displays status of current digital IO function.
- **Logic Level**
  Displays the electrical level of digital IO port.
- **Status**
  Displays the alarm status of digital IO port.



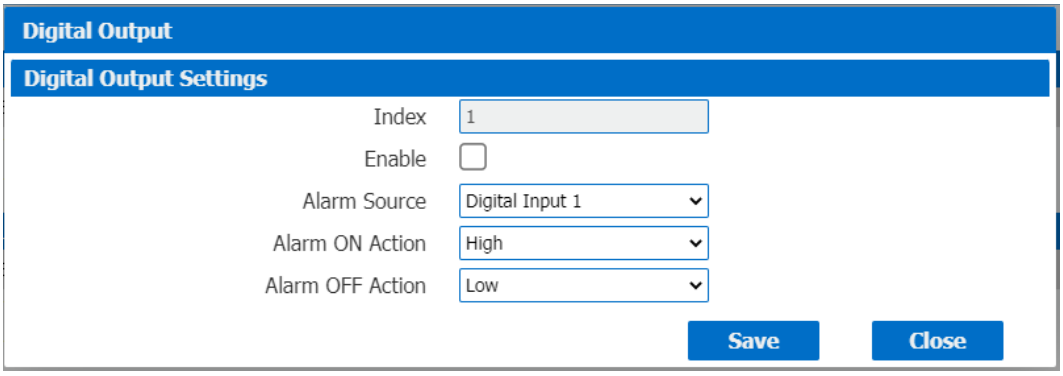
Digital IO->Digital Input

- **Enable**
  Check this box to enable digital Input function.
- **Alarm ON Mode**

Select the electrical level to trigger alarm. Option are “Low” and “High”.

- **Alarm ON Content**
  Specify the alarm on content to be sent out via SMS message.
- **Alarm OFF Content**
  Specify the alarm off content to be sent out via SMS message.

NOTE Alarm Content can also include special parameters: $DI_INDEX, $DATE, $SERIAL_NUMBER, $DEVICE_MODEL, $FIRMWARE_VERSION, $SYSTEM_UPTIME, $LINK_TYPE, $IP_ADDRESS, $MODEM_MODEL, $CSQ, $OPERATOR, $NETWORK_TYPE, $IMEI, $PLMN_ID, $LOCAL_AREA_CODE, $CELL_ID, $IMSI, $MODEM_FIRMWARE



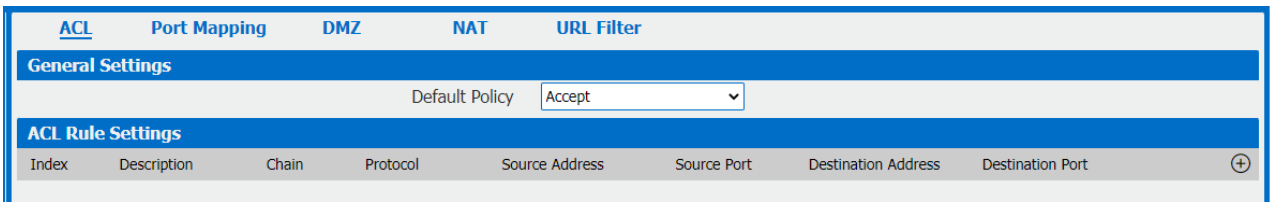
Digital IO->Digital Output

- **Enable**
  Check this box to enable digital output function.
- **Alarm Source**
  Select from “Digital Input1”, “Digital Input2” or “SMS”, Digital output triggers the related action when there is alarm comes from Digital Input or SMS.
- **Alarm ON Action**
  Select from “High”, “Low” or “Pulse”. High means high electrical level output. Low means low electrical level output. Pulse will generate a square wave as specified in the pulse mode parameters when triggered.
- **Alarm OFF Action**
  Initiates when alarm disappeared. Select from “High”, “Low” or “Pulse”. High means high electrical level output. Low means low electrical level output. Pulse will generate a square wave as specified in the pulse mode parameters when triggered.
- **Pulse Width**
  This parameter is available when select “Pulse” as “Alarm ON Action/Alarm OFF Action”. The selected digital output channel will generate a square wave as specified in the pulse mode parameters.

Network

Firewall

Firewall rules are security rule-sets to implement control over users, applications or network objects in an organization. Using the firewall rule, you can create blanket or specialized traffic transit rules based on the requirement.

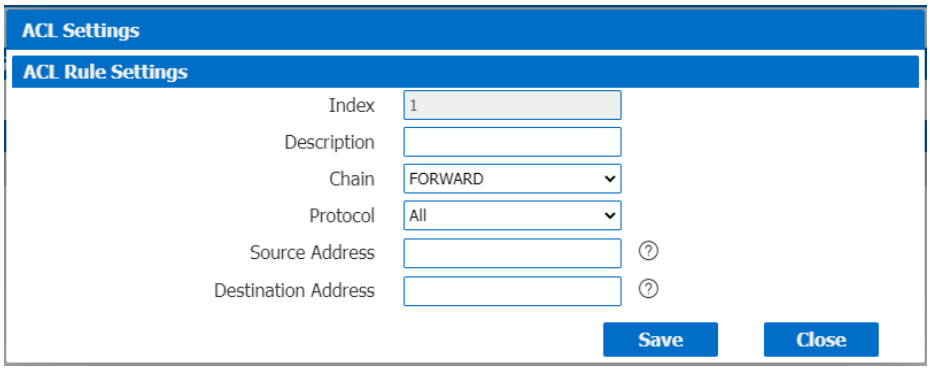


Firewall->ACL

- **Default Policy**

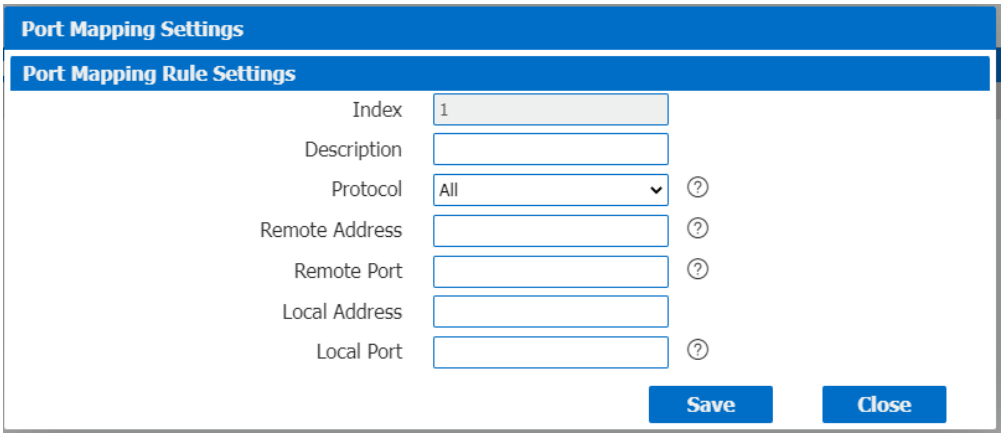
Select the "Accept" or "Drop" from the list, the packets which are not included in the access control list will be processed by the default filter policy.

An access control list (ACL), with respect to a computer file system, is a list of permissions attached to an object. An ACL specifies which users or system processes are granted access to objects, as well as what operations are allowed on given objects.



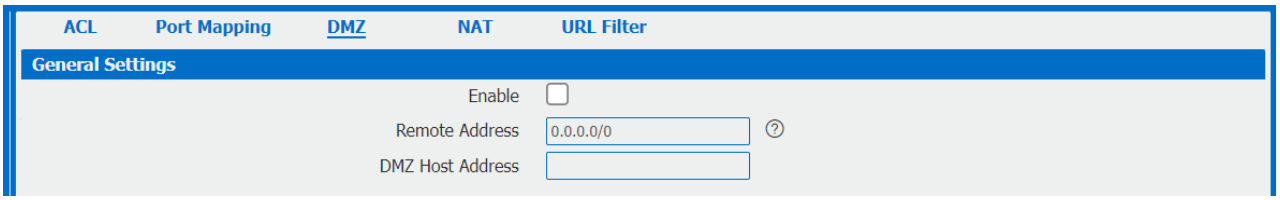
Firewall->ACL

- **Description**
  Add a description for this rule.
- **Chain**
  Specify the forward rule of ACL, choose from "FORWARD" and "INPUT".
- **Protocol**
  All: Any protocol number.
  TCP: The TCP protocol.
  UDP: The UDP protocol.
  TCP & DUP: both TCP and UDP protocol
  ICMP: The ICMP protocol.
- **Source Address**
  A specific host IP address can also be specified, or a range of IP addresses via a bitmask (the box following the /).
- **Destination Address**
  A specific IP address can also be specified, or a range of IP addresses via a bitmask (the box following the /).



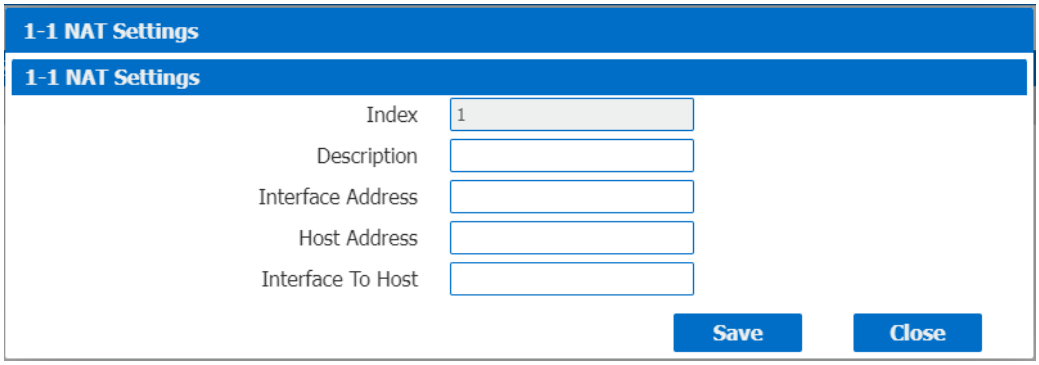
Firewall->Port Mapping

- **Description**
  Add a description for this rule.
- **Protocol**
  All: Any protocol number.
  TCP: The TCP protocol.
  UDP: The UDP protocol.
- **Remote Address**
  Enter a WAN IP address that is allowed to access the unit.
- **Remote Port**
  Enter the external port number range for incoming requests.
- **Local Address**
  Sets the LAN address of a device connected to one of the Fusion's LAN interfaces. Inbound requests will be forwarded to this IP address.
- **Local Port**
  Sets the LAN port number range used when forwarding to the destination IP address.



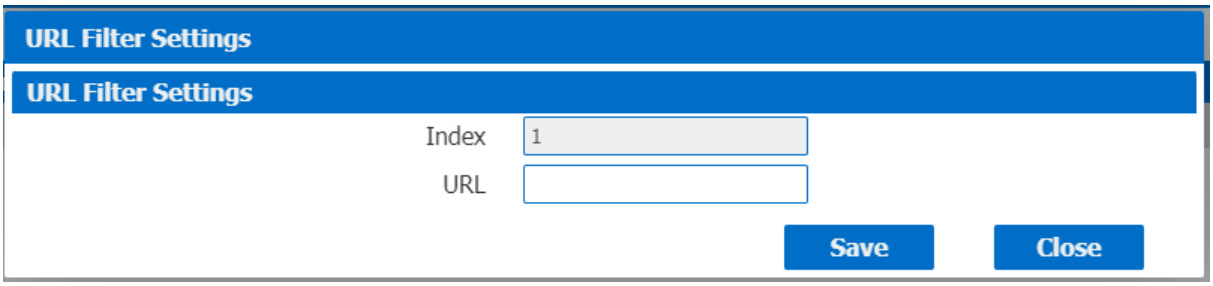
Firewall->DMZ

- **Enable**
  Check this box to enable DMZ function.
- **Remote Address**
  Optionally restricts DMZ access to only the specified WAN IP address.
  NOTE: If set to 0.0.0.0/0, the DMZ is open to all incoming WAN IP addresses.
- **DMZ Host Address**
  The WAN IP address which has all ports exposed except ports defined in the Port Forwarding configuration.



Firewall->NAT

- **Description**
  Enter a description of 1-to-1 NAT setting.
- **Interface Address**
  Specify the interface address that need to be accessed before NAT.
- **Host Address**
  Specify the host address that need to be accessed after NAT.
- **Interface To Address**
  Specify the interface that connected to host, like lan0, lan1, lan2, lan3.



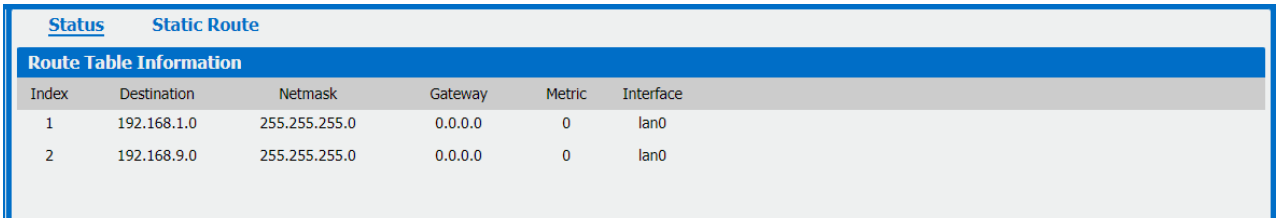
Firewall->URL Filter

- **URL**
  Enter the URL to block the data traffic to go to the website. For example, www.google.com

Route

Static Routing refers to a manual method of setting up routing between networks. Select the Static Routing tab to add static routes to the Static Route Table.

Please refer current route table as below.

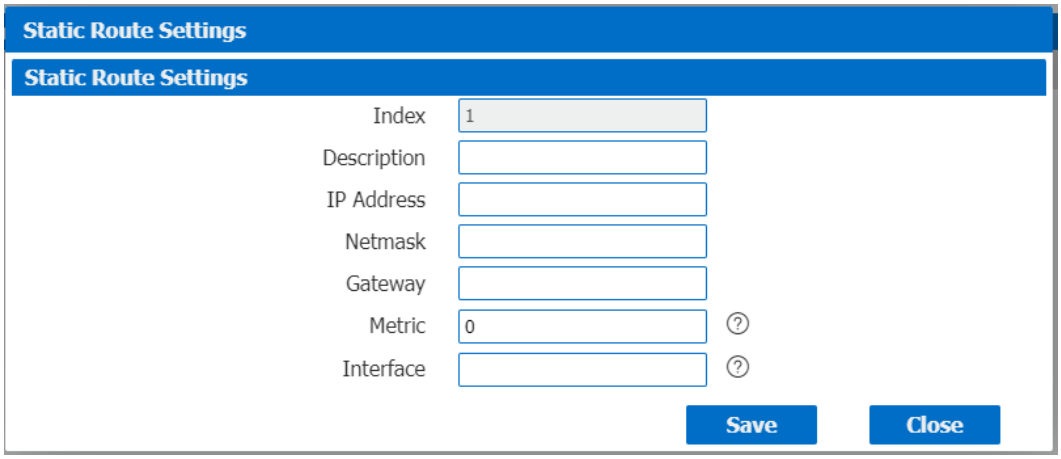


Route->Route Table Information

- **Destination**
  Displays the destination of routing traffic.
- **Netmask**
  Displays the subnet mask of this routing.
- **Gateway**

  Displays the gateway of this interface. This is used for routing packets to remote networks.
- **Metric**

  Displays the metric value of this interface.
- **Interface**
  Displays the outbound interface of this route.

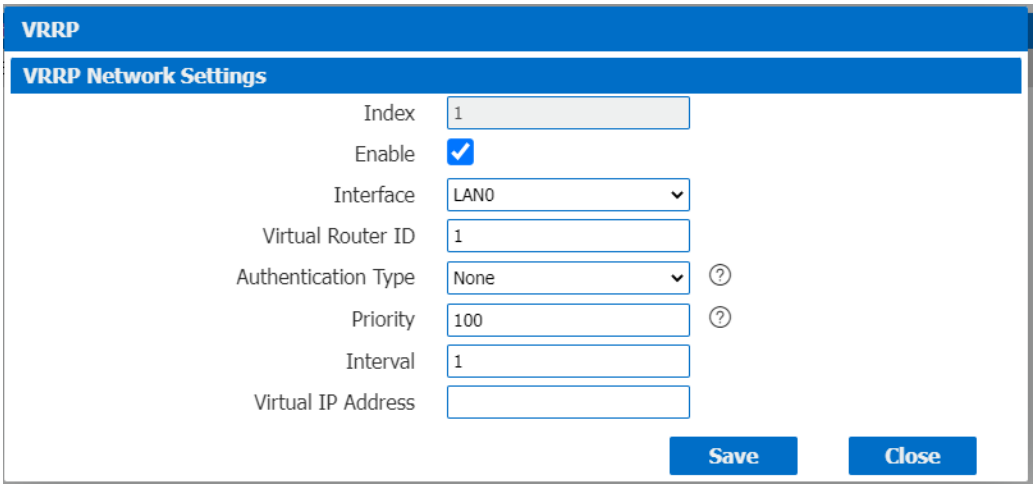


Route->Static Route Settings

- **Description**
  Enter the description of current static route rule.
- **IP Address**
  Enter the IP address of the destination network.
- **Netmask**
  Enter the subnet mask of the destination network.
- **Gateway**
  Enter the IP address of the local gateway.
- **Metric**
  Enter the metric value of current static route rule. The smaller value, the higher priority.
- **Interface**
  Please refer to the Network->Route->Status interface.

VRRP

The Virtual Router Redundancy Protocol (VRRP) is a computer networking protocol that provides automatic assignment of available Internet Protocol (IP) routers for participating hosts. The VRRP router who has the highest number will become the virtual master router. The VRRP router number ranges from 1 to 255 and usually we use 255 for the highest priority and 100 for backup. If the current virtual master router receives an announcement from a group member (Router ID) with a higher priority, then the latter will pre-empt and become the virtual master router.

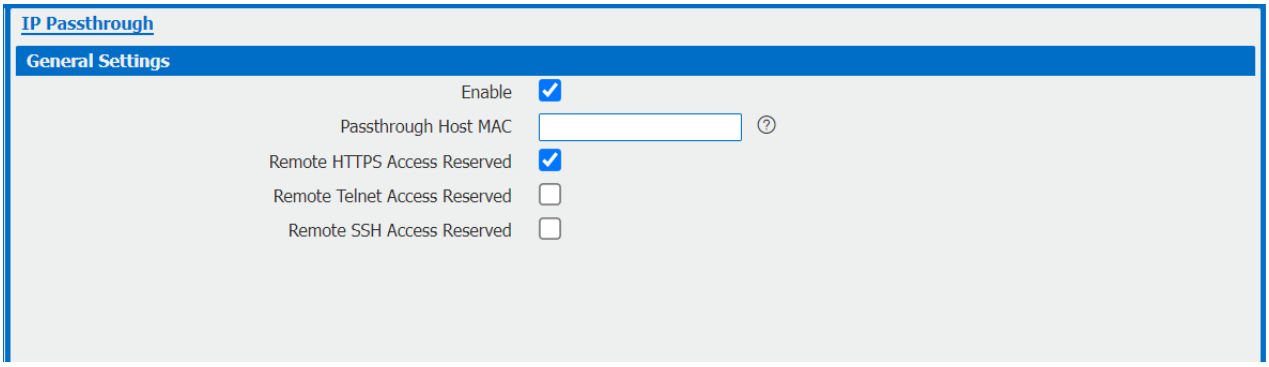


Network->VRRP

- **Enable**
  Check this box will enable VRRP.
- **Interface**
  Select the interface of Virtual Router.
- **Virtual Router ID**
  User-defined Virtual Router ID. Range: 1-255.
- **Authentication Type**
  Select the authentication type for VRRP.
- **Priority**
  Enter the VRRP priority range is 1-254 (a bigger number indicates a higher priority).
- **Interval**
  Heartbeat package transmission time interval between routers in the virtual IP group. Range: 1-255.
- **Virtual IP Address**
  Enter the virtual IP address of virtual gateway.

IP Passthrough

IP Passthrough mode, disables NAT and routing and passes the WAN IP address from the WAN interface to the device connected on the local Interface. It is used instead of Network Address Translation (NAT) in order to make the router "transparent" in the communication process.



Network->IP Passthrough

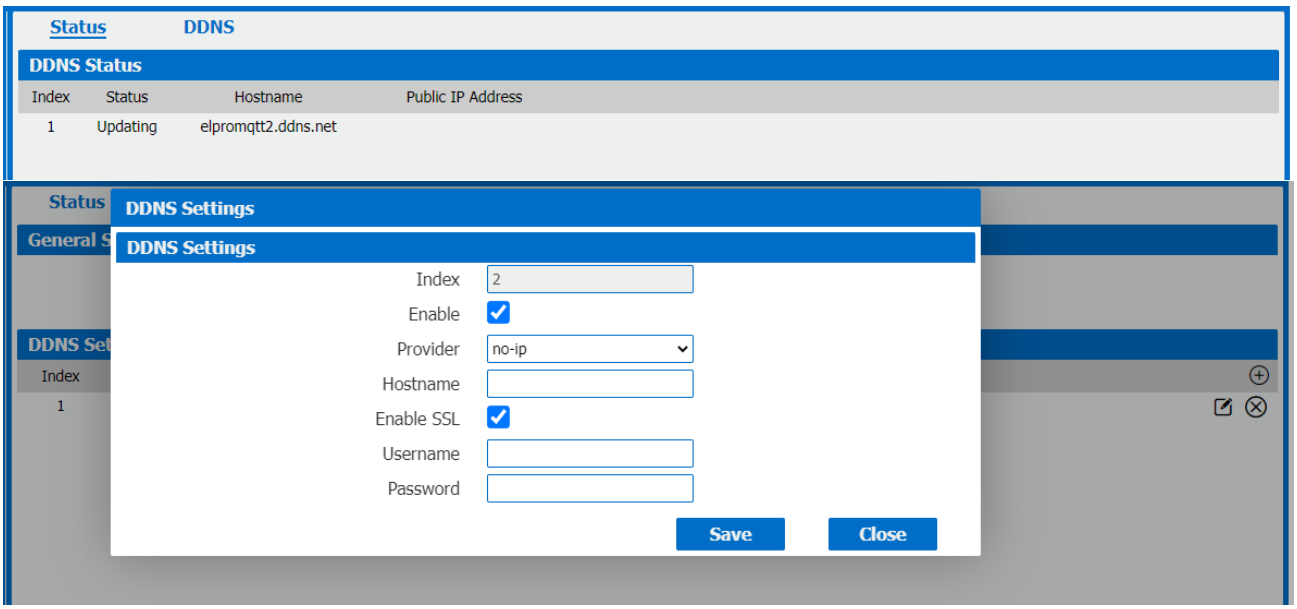
- **Enable**
  Check this box will enable IP Passthrough.
- **Passthrough Host MAC**
  Enter the MAC of passthrough host to receive the WAN IP address.
- **Remote HTTPS Access Reserved**
  Check this box to allow to remote access the router via https while enable IP Passthrough mode.
- **Remote Telnet Access Reserved**
  Check this box to allow to remote telnet to the router while enable IP Passthrough mode.
- **Remote SSH Access Reserved**
  Check this box to allow to remote SSH to the router while enable IP Passthrough mode.

Applications

DDNS

DDNS is a system that allows the domain name data of a computer with a varying (dynamic) IP addresses held in a name server to be updated in real time in order to make it possible to establish connections to that machine without the need to track the actual IP addresses at all times. A number of providers offer Dynamic DNS services (DDNS), free or for a charge.

You could review the status of DDNS as below.

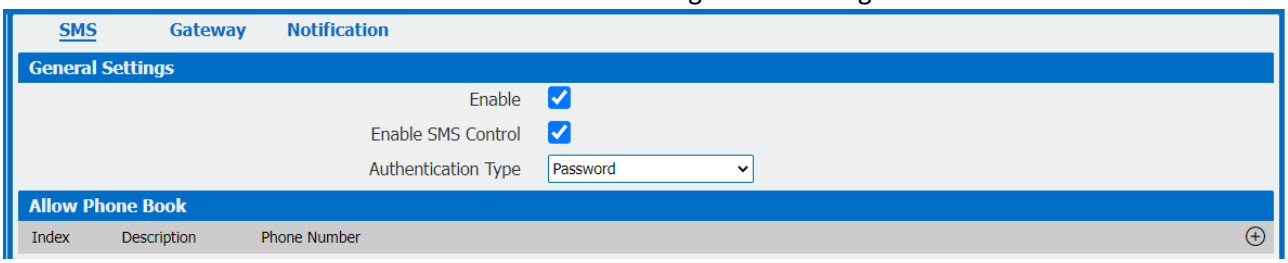


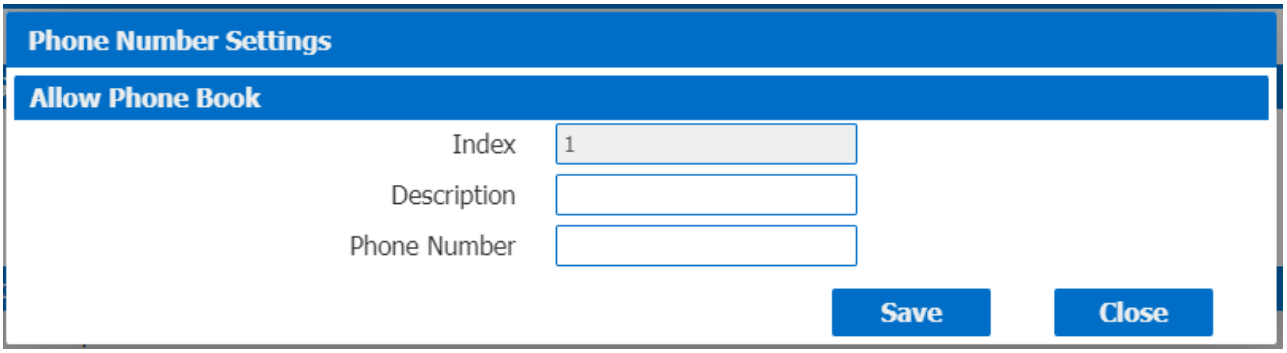
DDNS

- **Status**
  Display the DDNS status.
- **Hostname**
  Display the hostname of DDNS.
- **Public IP Address**
- Display the public IP address.
- **Check IP Interval**
  Enter the interval, the modem will update the Dynamic DNS server of its carrier assigned IP address.
- **Log Level**
  Select the log output level from “none”, “Error”, “Notice”, ”Info” and “Debug”.
- **Enable**
  Check this box to enable the DDNS service.
- **Provider**
  Select the DDNS provider from the list, options from “DynDNS”, “no-ip”,”3322” and custom.
- **DDNS Server**
  The internet address to communicate the Dynamic DNS information to. This option is available after you select **custom** on DDNS Provider.
- **DDNS Path**
  DDNS path for custom type.
- **Check IP Server**
  Check IP Server for custom type
- **Check IP Path**
  Check IP Path for custom type.
- **Enable SSL**
  Enable SSL for connection.
- **Username**
  Enter the username used when setting up the account. Used to login to the Dynamic DNS service.
- **Password**
  Enter the password associated with the account.
- **Hostname**
  Enter the hostname associated with the account.

SMS

SMS allows user to send the SMS to control the router or get the running status of the router.

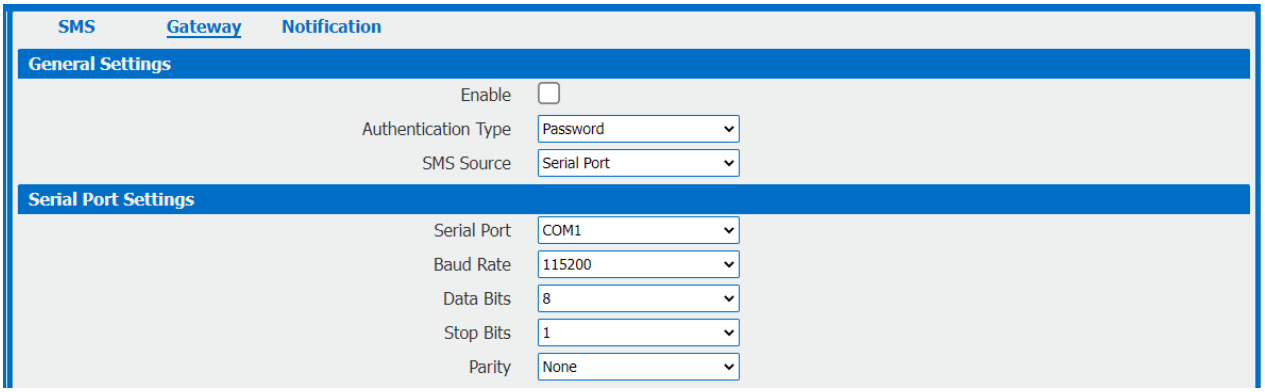




Application->SMS

- **Enable**
  Check this box to enable SMS feature.
- **Enable SMS Control**
  Check this box to enable SMS control feature.
- **Authentication Type**
  Specify the authentication mode for SMS, optional for “None” and “Password”.
- **Description**
  Enter the description of the Phone Book
- **Phone Number**
  Enter the special phone number and only allow this phone number to send SMS to the router

SMS Gateway allow to send SMS messages by using a valid syntax from serial device or ethernet device.



Application->SMS>Gateway

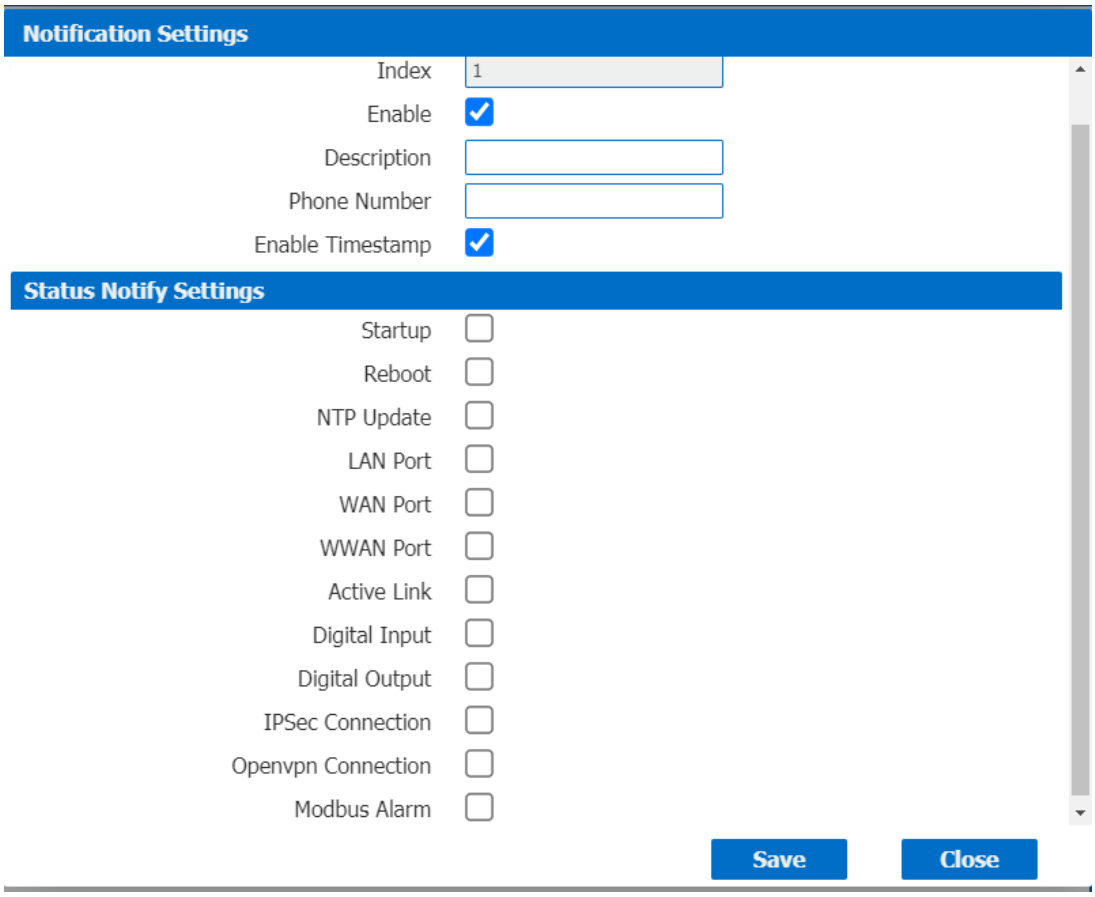
- **Enable**
  Check the box will enable SMS gateway.
- **Authentication Type**
  Specify the authentication mode for SMS, optional for “None” and “Password”.
- **SMS Source**
  Specify SMS source to receive valid syntax, optional for “Serial Port” and “HTTP(S) GET/POST”.
- **SMS Message Format**
  Specify the SMS format between “Text” and “PDU” when reading SMS or reading SMS list via “HTTP(S) GET/POST”
- **Serial Port**
  Select the serial port from COM1 or COM2.

- **Baud Rate**
  Select the serial port baud rate. Supported values are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200.
- **Data Bits**
  Select the values from 7 or 8.
- **Stop Bits**

  Select the values from 1 or 2.

- **Parity**
  Select values from none, even, odd, mark, space.

SMS Notification feature allow to send SMS notification to the pre-setting phone number when some of router status changed.



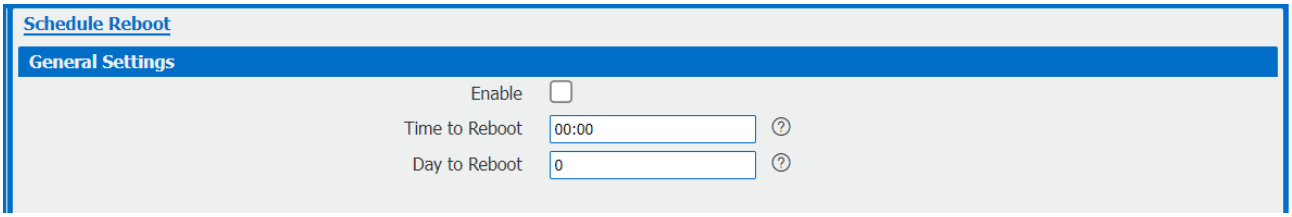
Application->SMS>Notification

- **Index**
  Display the index of the notification channel, maximum is 10.
- **Description**
  Add the description for notification channel.
- **Phone Number**
  Pre-setting phone number to receive the notification
- **Timestamp**
  Check this box to enable timestamp on the SMS notify.

- **Startup**
  Send SMS notification to the pre-setting phone number when system startup.
- **Reboot**
  Send SMS notification to the pre-setting phone number when system reboot.
- **NTP Update**
  Send SMS notification to the pre-setting phone number when NTP update successfully.
- **LAN Port Status**
  Send SMS notification to the pre-setting phone number when LAN port status changed.
- **WAN Port Status**
  Send SMS notification to the pre-setting phone number when WAN port status changed.
- **WWAN Port**
  Send SMS notification to the pre-setting phone number when WWAN port status changed.
- **Active Link**
  Send SMS notification to the pre-setting phone number when active link status changed.
- **Digital Input**
  Send SMS notification to the pre-setting phone number when DI status changed.
- **Digital Output**
  Send SMS notification to the pre-setting phone number when DO status changed.
- **IPSec Connection**
  Send SMS notification to the pre-setting phone number when IPSec connection status changed.
- **OpenVPN Connection**
  Send SMS notification to the pre-setting phone number when OpenVPN Connection Status changed.
- **Modbus Alarm**
  Send SMS notification to pre-setting phone number when trigger modbus alarm.

Schedule Reboot

Schedule reboot allows user to define the time for router reboot itself.

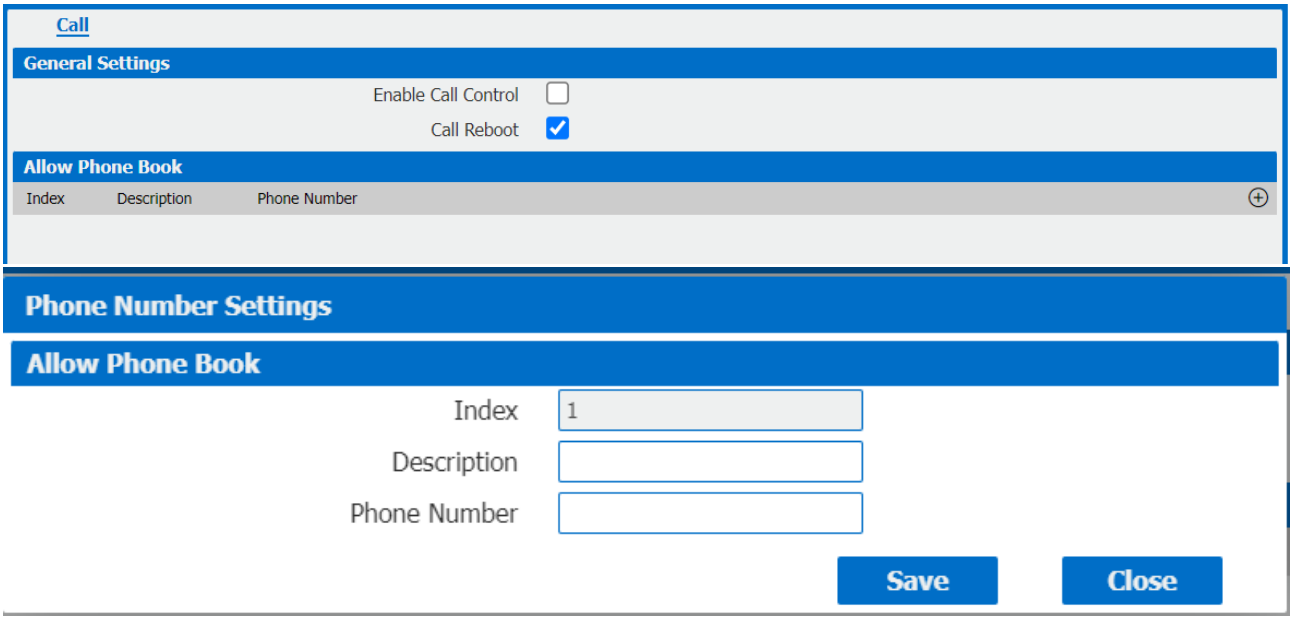


Application->Schedule Reboot

- **Enable**
  Check this box to enable schedule reboot feature.
- **Time to Reboot**
  Enter the time of each day to reboot device. Format: HH(00-23):MM(00-59).
- **Day to Reboot**
  Enter the day of each month to reboot device. 0 means every day.

Call

Call reboot allow the user to make a call to the router to control it restart.

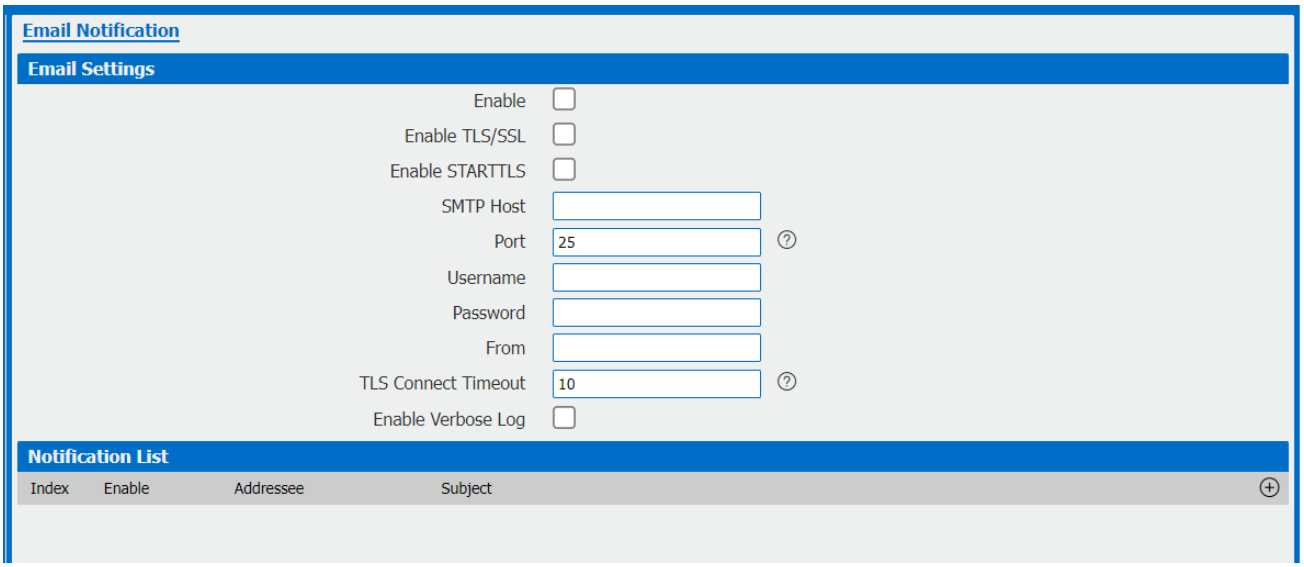


Application->Call

- **Enable Call Control**
  Check this box to enable call control feature.
- **Call Reboot**
  Check this box to enable call reboot feature.
- **Description**
  Define the description of the phone book
- **Phone Number**
  Specify the phone number that allow to make a call to the router.

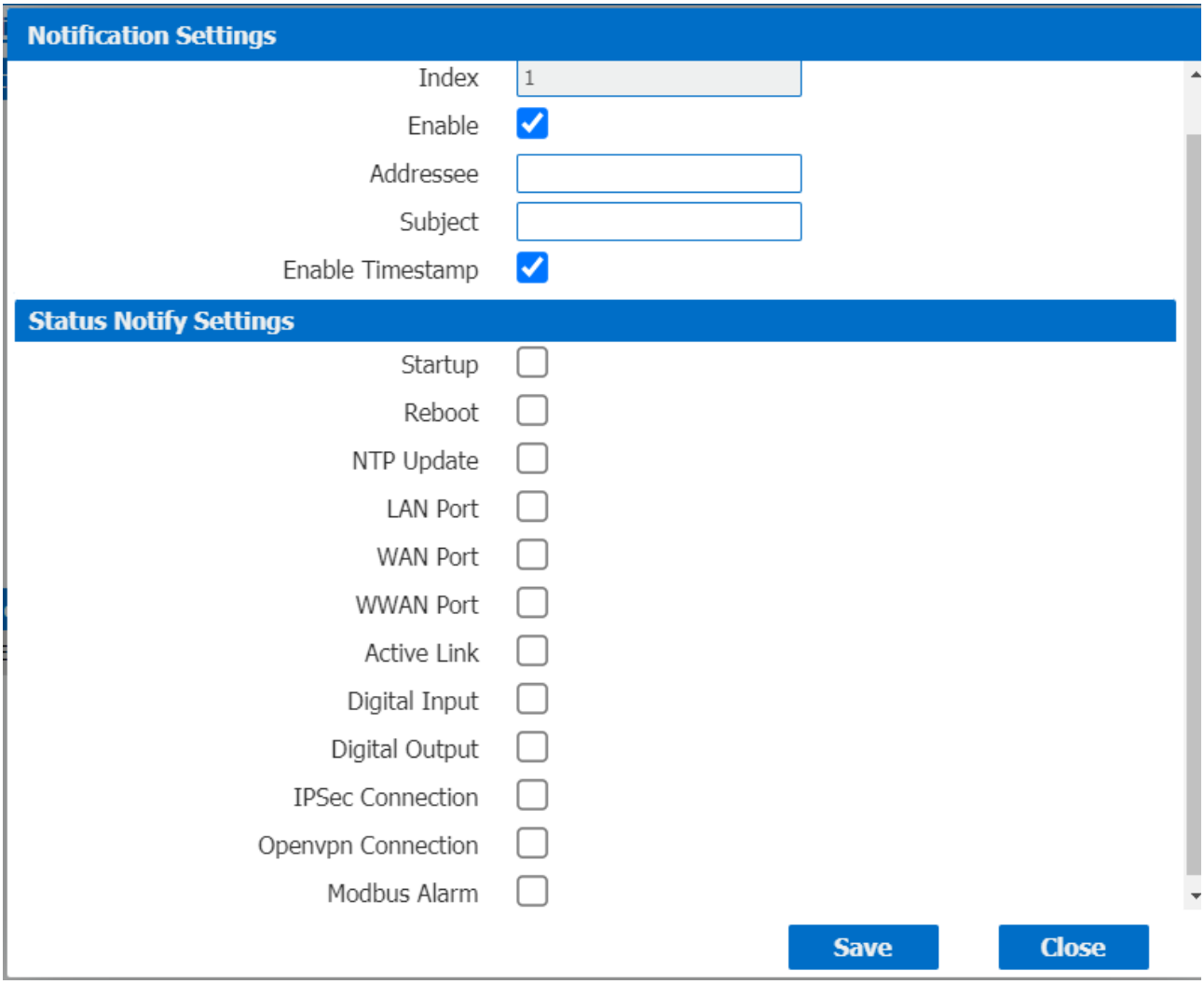
Email Notification

Email notification application allows the 641M to be able to send email based on configured events in the device such as Startup, Reboot, Digital I/O, VPN status or Modbus Alarm.



Application->Email Notification

- **Enable**
  Check this box to enable Email Notification feature.
- **Enable TLS/SSL**
  Check this box to enable TLS/SSL.
- **Enable STARTTLS**
  Check this box to enable STARTLS.
- **SMTP Host**
  Mail server host address to connect for sending email.
- **Port**
  Mail server host port.
- **Username**
  Email exchange server login username
- **Password**
  Email exchange server login password
- **From**
  Sending email address.
- **TLS Connect Timeout**
  Connection timeout configuration for TLS/SSL connections.
- **Enable Verbose Log**
  Checkbox to enable detailed logging in system log.

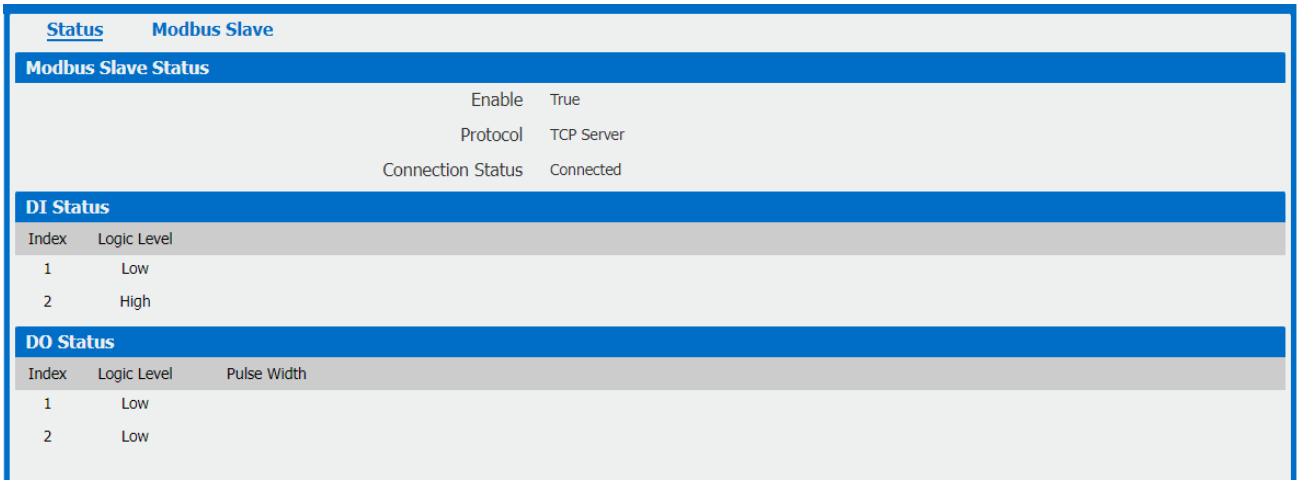


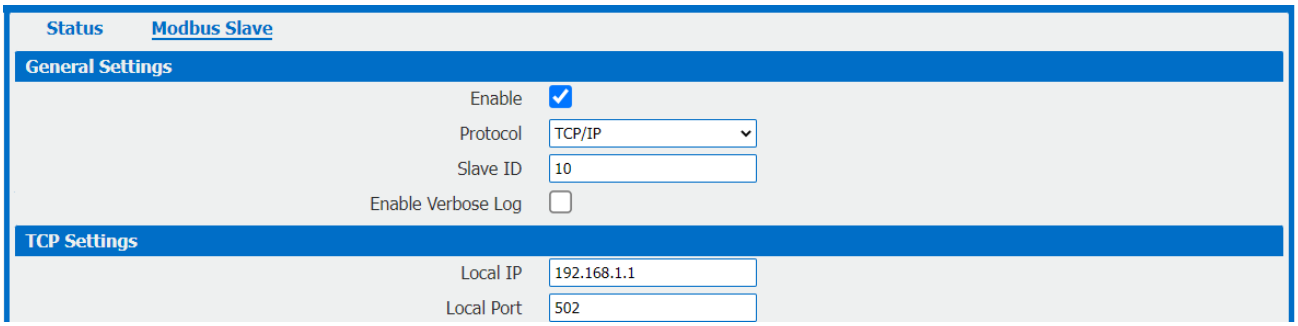
Application->Modbus Slave

- **Enable**
  Check this box to enable Modbus Slave feature.
- **Addressee**
  Email address to send notification.
- **Subject**
  Email message subject line.
- **Timestamp**
  Check to apply timestamp to email message.
- **Status Notify Settings**
  Check any that are required to send notification email.

Modbus Slave

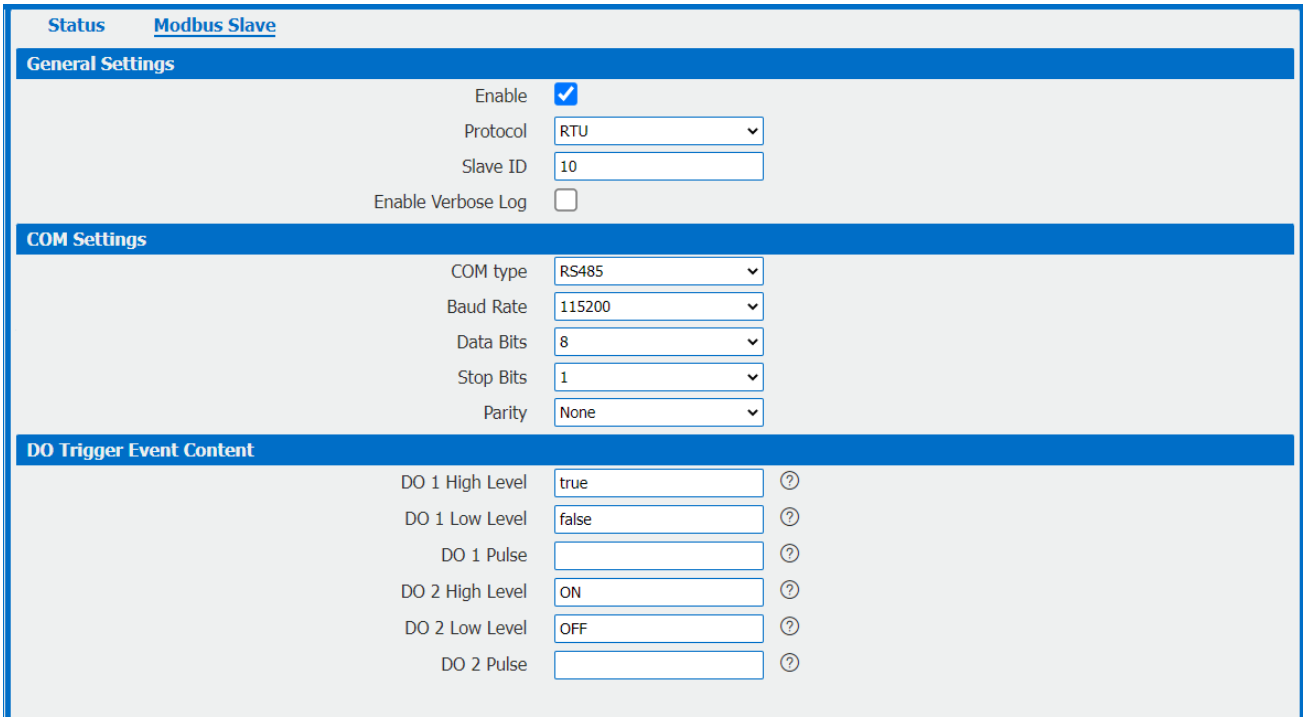
This application allows the 641M to function as a Modbus TCP/IP or RTU slave device. The Modbus slave can be accessed externally from a Ethernet or serial connected master or using the 641M Modbus master software function.





Application->Modbus Slave

- **Enable**
  Check this box to enable Modbus Slave feature.
- **Protocol**
  Select either TCP/IP or RTU protocol.
- **Slave ID**
  Configuration of the Modbus slave ID of the device.
- **Enable Verbose Log**
  Check to enable detailed function logging in system log file.
- **Local IP**
  IP address used for slave device.
- **Local Port**
  IP Port used for slave device.



Modbus RTU Settings

- **COM type**
  Connected to Modbus master through either RS-485 or RS-232 port.
- **Baud Rate**
  Select serial data rate, 300 to 115200 baud.
- **Data Bits**
  Number of data bits to transmit, set to 8 only.
- **Stop Bits**
  Number of stop bits to transmit, set to 1 or 2.
- **Parity**
  Data byte parity, set to None, Odd, Even, Mark, Space
- **DO 1 High Level**
  Value to be used for digital output high level. See note below.
- **DO 1 Low Level**
  Value to be used for digital output low level. See note below.
- **DO 1 Pulse**
  Value to be used for digital output pulse. See note below.
- **DO 1 High Level**
  Value to be used for digital output high level. See note below.
- **DO 1 Low Level**
  Value to be used for digital output low level. See note below.
- **DO 1 Pulse**
  Value to be used for digital output pulse. See note below.

Note:

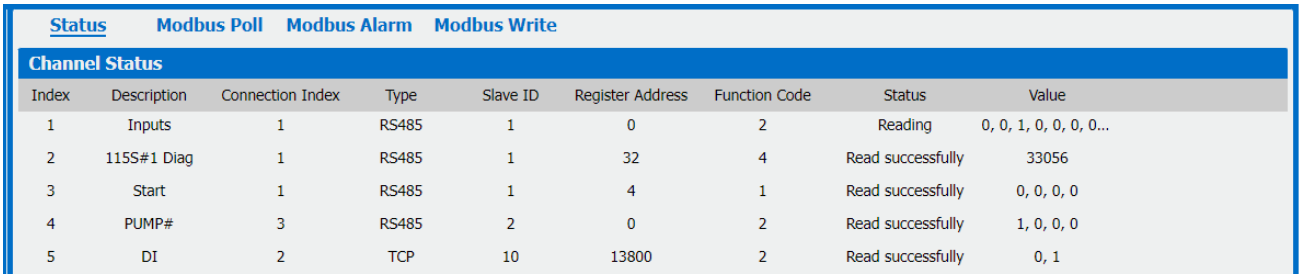
The Trigger Event Content controls the values used for notifications with other applications for each of the configured states of the output. This is a text field that can be used for simple text or expressions. There is several internal field values available to be used to form this text output. Field values can be used singly or combined with other fields or text. These are listed below:

$DI_INDEX, $DATE, $SERIAL_NUMBER, $DEVICE_MODEL, $FIRMWARE_VERSION, $SYSTEM_UPTIME, $LINK_TYPE, $IP_ADDRESS, $MODEM_MODEL, $CSQ, $OPERATOR, $NETWORK_TYPE, $IMEI, $PLMN_ID, $LOCAL_AREA_CODE, $CELL_ID, $IMSI, $MODEM_FIRMWARE

Modbus Master

This application provides a Modbus Master feature to poll internal or external slave devices and collecting register values for applications to use when sending or receiving messages.

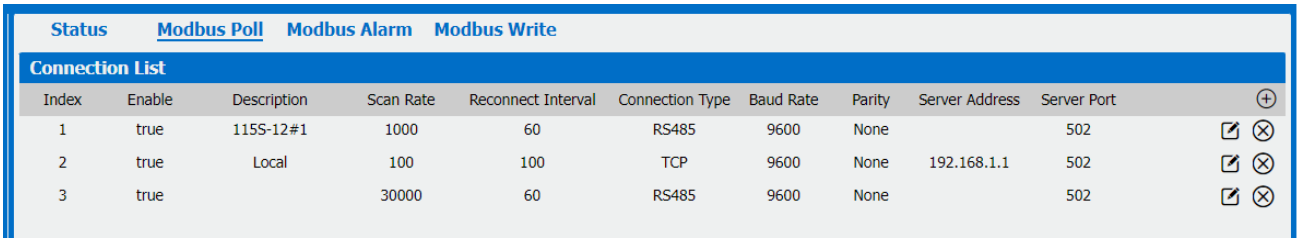
The Modbus master poll configuration is also used by other applications such as MQTT, Sparkplug and DNP3 as the source of register values. In each of these applications the Connection index is used as the reference.



Status Modbus Poll Modbus Alarm Modbus Write

Channel Status

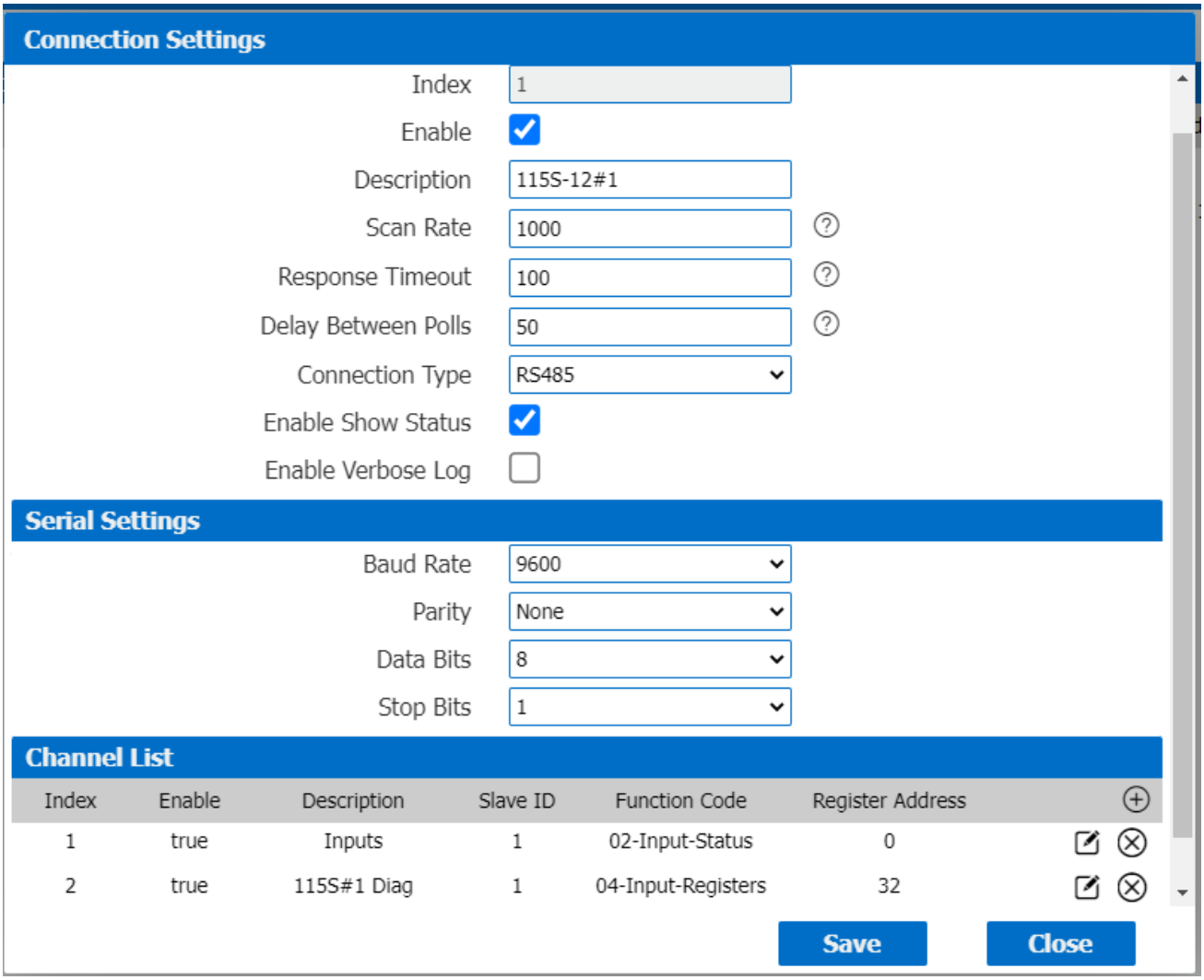
Index	Description	Connection Index	Type	Slave ID	Register Address	Function Code	Status	Value
1	Inputs	1	RS485	1	0	2	Reading	0, 0, 1, 0, 0, 0, 0...
2	115S#1 Diag	1	RS485	1	32	4	Read successfully	33056
3	Start	1	RS485	1	4	1	Read successfully	0, 0, 0, 0
4	PUMP#	3	RS485	2	0	2	Read successfully	1, 0, 0, 0
5	DI	2	TCP	10	13800	2	Read successfully	0, 1



Status Modbus Poll Modbus Alarm Modbus Write

Connection List

Index	Enable	Description	Scan Rate	Reconnect Interval	Connection Type	Baud Rate	Parity	Server Address	Server Port
1	true	115S-12#1	1000	60	RS485	9600	None		502
2	true	Local	100	100	TCP	9600	None	192.168.1.1	502
3	true		30000	60	RS485	9600	None		502



Application->Modbus Slave

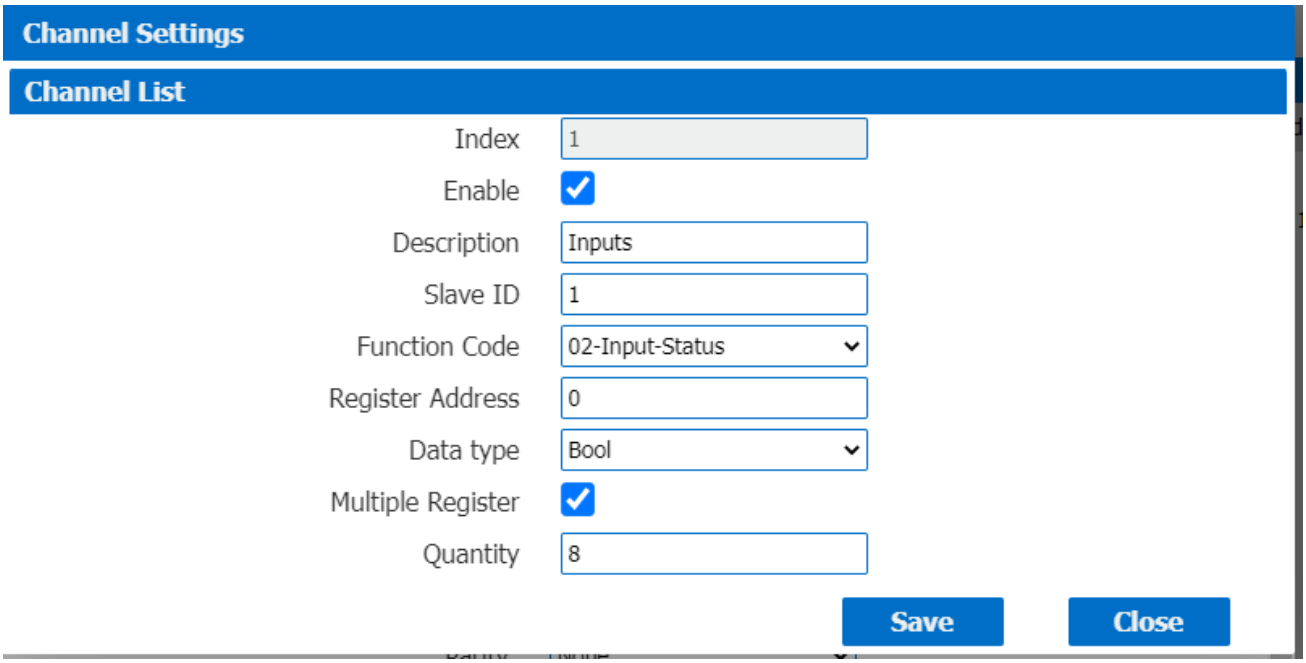
- **Enable**
  Check this box to enable Modbus master poll.
- **Description**
  Descriptive name used as a reference for poll.
- **Scan Rate**
  Rate at with scan or poll occurs in milli-seconds.
- **Response Timeout**
  Timeout used if there is not a response received from the slave in milliseconds.
- **Delay Between Polls**

  Delay time to wait between sending poll messages in milliseconds.
- **Connection Type**

  RS-232, RS485 or TCP.
- **Enable Show Status**

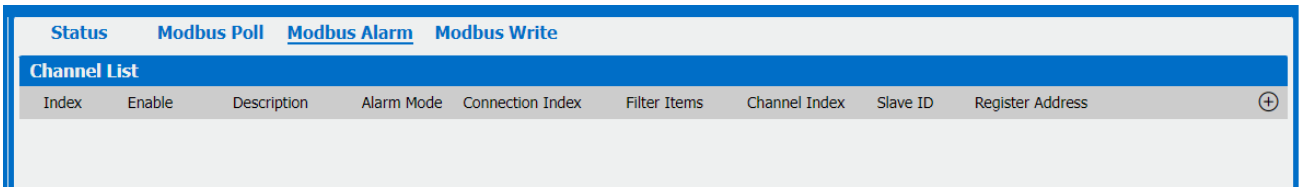
  Show on status page.
- **Enable Verbose Log**
  Check to enable detailed function logging in system log file.

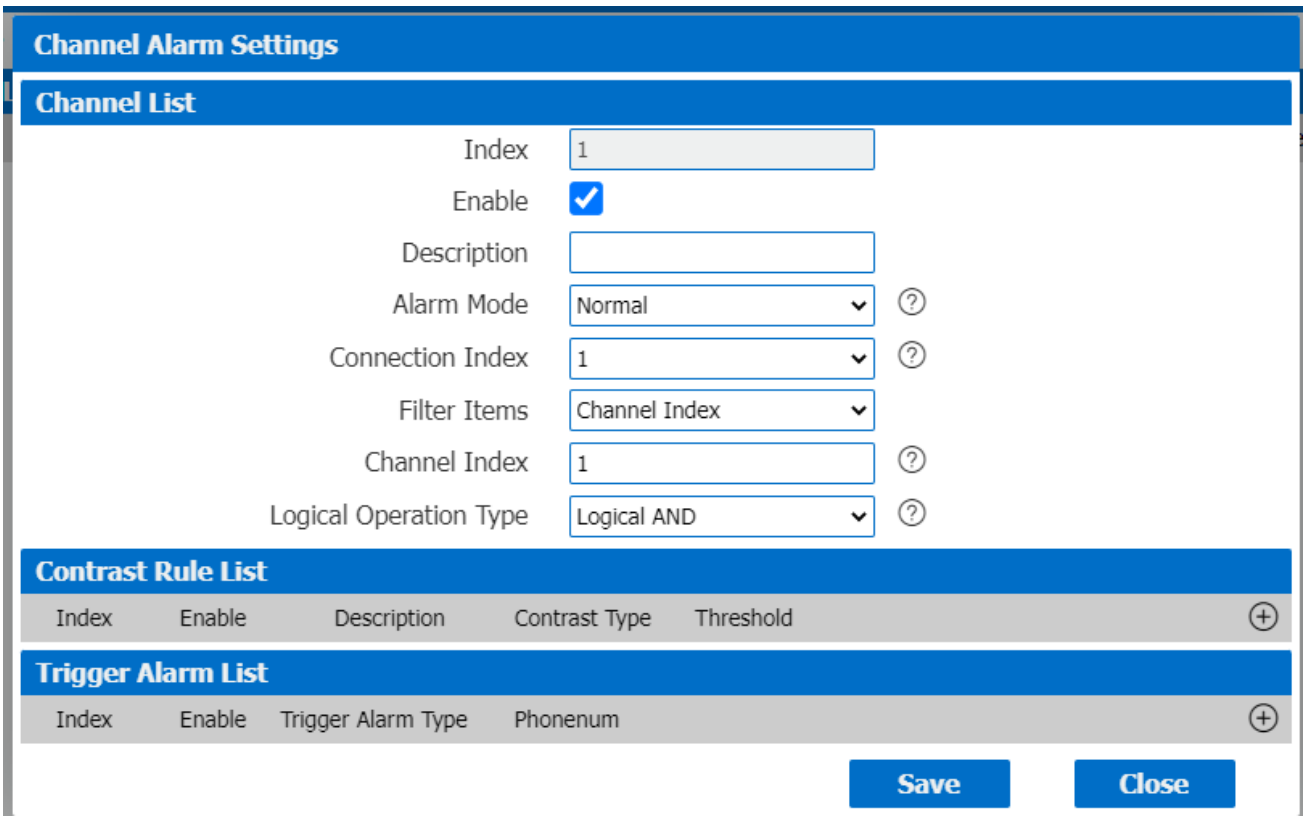
- **Baud Rate**
  Select serial data rate, 300 to 115200 baud.
- **Data Bits**
  Number of data bits to transmit, set to 8 only.
- **Stop Bits**
  Number of stop bits to transmit, set to 1 or 2.
- **Parity**
  Data byte parity, set to None, Odd, Even, Mark, Space.



Application->Modbus Slave

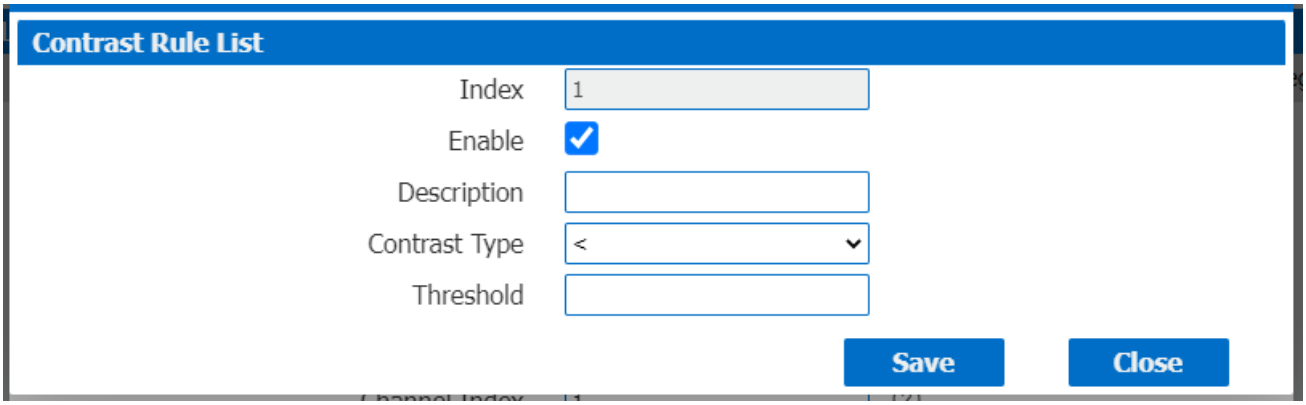
- **Enable**
  Check this box to enable this channel.
- **Description**
  Enter descriptive text for channel.
- **Slave ID**
  Polled slave ID address to be used for poll.
- **Function Code**
  Modbus function code to use to reference register.
- **Register Address**
  Modbus register to use for poll.
- **Data type**
  Data type to use for value. Bool for Coils and Inputs. Uint16, Int16, Uint32, Int32, Float or Double64 other 16 bit and 32 bits register types. Type must match register references to avoid poll error.
- **Multiple Register**
  Check if a block of multiple registers to be polled.
- **Quantity**
  Number of registers to poll.





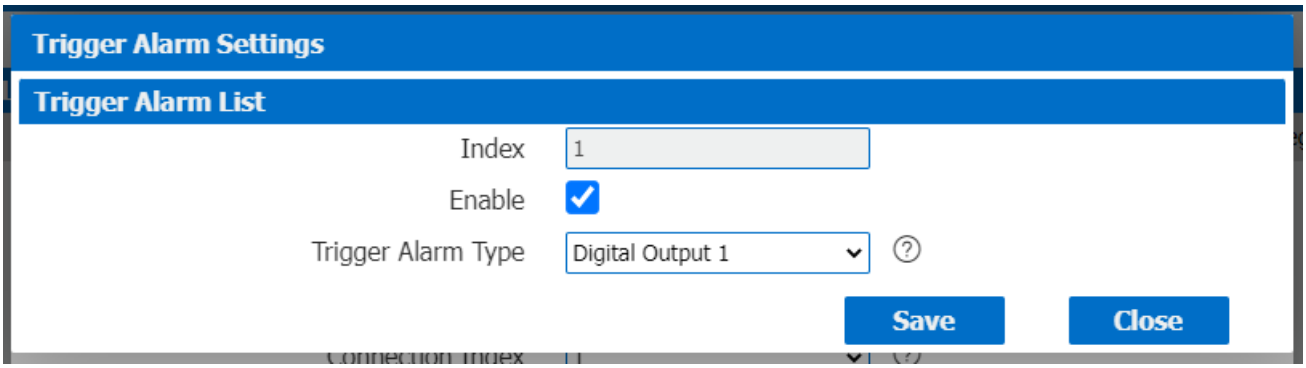
Application->Modbus Master-> Modbus Alarm

- **Enable**
  Check this box to enable.
- **Description**
  Enter descriptive text for channel.
- **Alarm Mode**
  Configure alarm mode for Normal, Continuous or Every operation.
- **Connection Index**
  Connection Index to link Alarm
- **Filter Items**
  Apply filter to alarm using Channel Index, Slave ID or Register Address.
- **Channel Index**
  Channel on configured connection or use or leave empty for all channels.
- **Logical Operation Type**
  Apply a logical AND or OR to the rules.



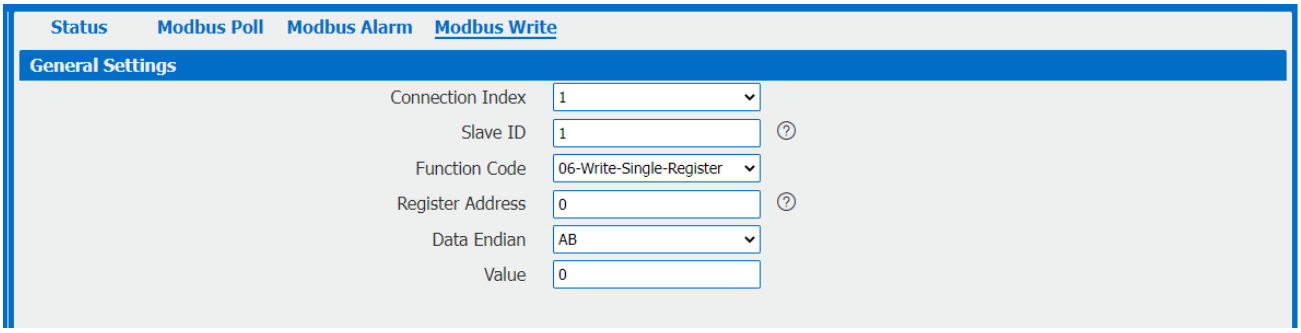
Application->Modbus Slave

- **Enable**
  Check this box to enable Rule.
- **Description**
  Description text for rule.
- **Contrast Type**
  Operand to use for rule: <, >, <=, >=, !=, !, |, &, ^
- **Threshold**
  Value to use.



Application->Modbus Master

- **Enable**
  Check this box to enable.
- **Trigger Alarm Type**
  Select the output type to use for this alarm. Digital Output1, Digital Output2, Event Notification, SMS.



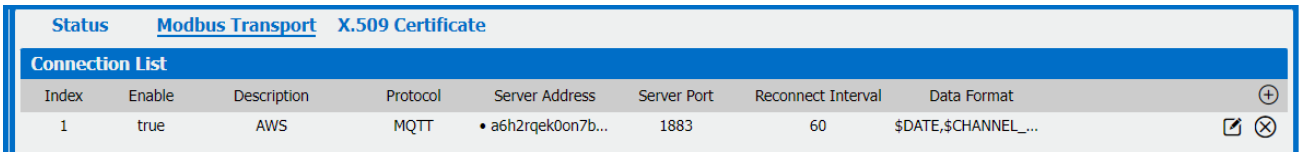
Application->Modbus Master-> Modbus Write

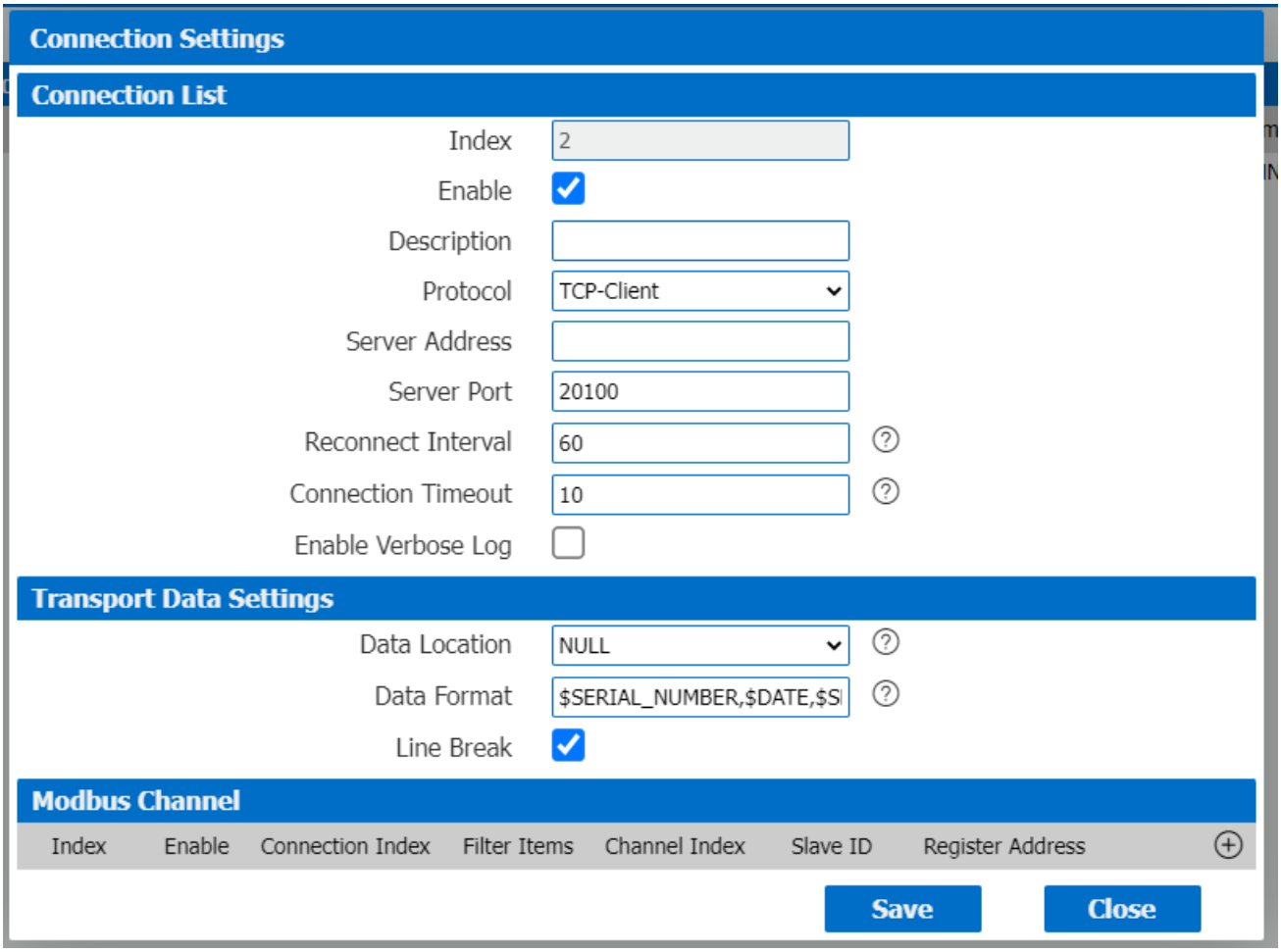
- **Slave ID**
  Slave ID to use for write command.
- **Function Code**
  Modbus Function Code to use for register.
- **Register Address**
  Register Address to use.
- **Data Endian**
  Endian conversion to make byte order correct.

Modbus Transport

Internal Modbus transport that uses connections to the master or slave application applications or protocols. The Modbus Transport application is included when installing the Modbus Master software application.

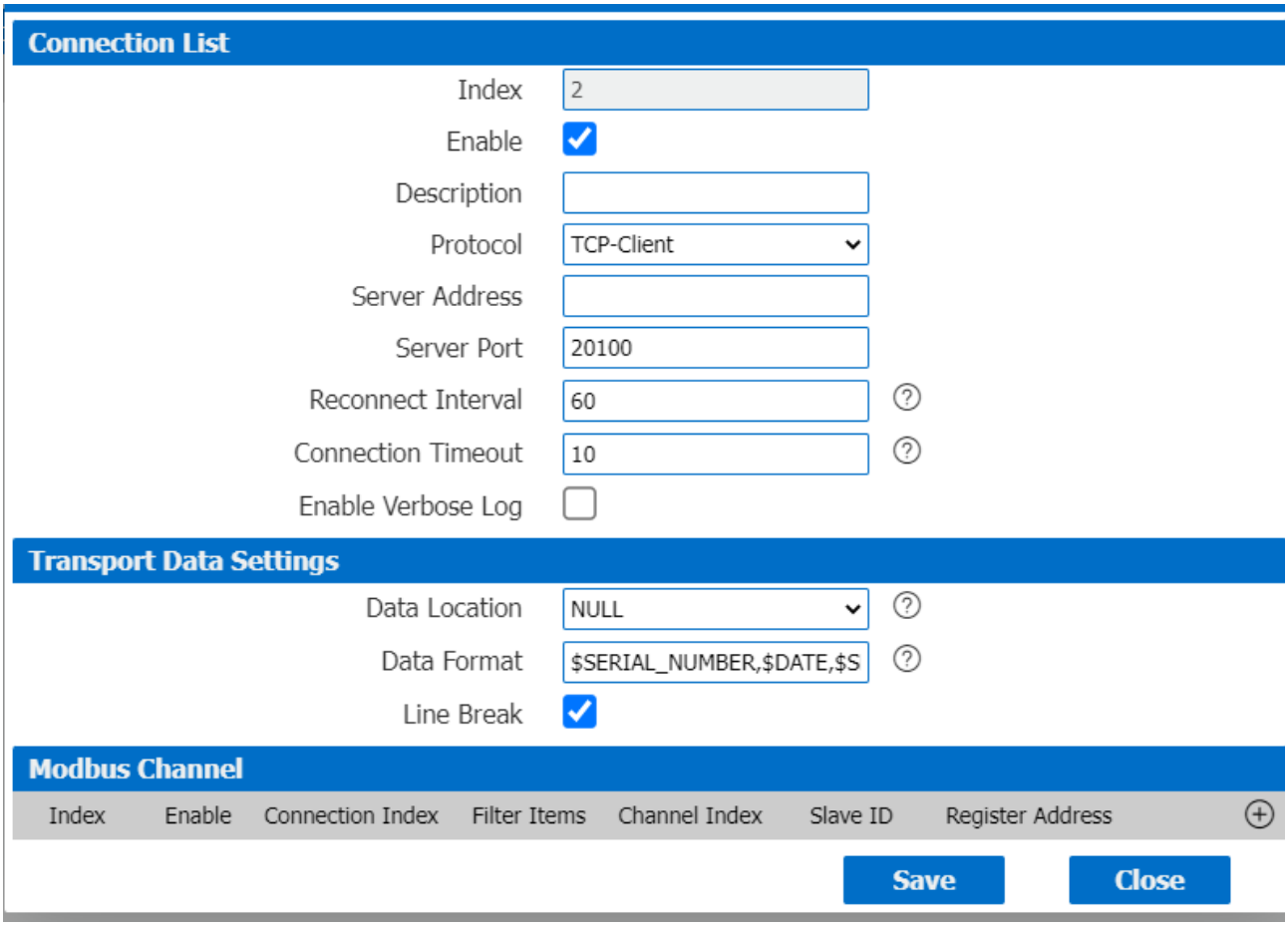
This can be used to collect modbus register values for TCP Client, MQTT, FTP, Google Cloud and SparkplugB.





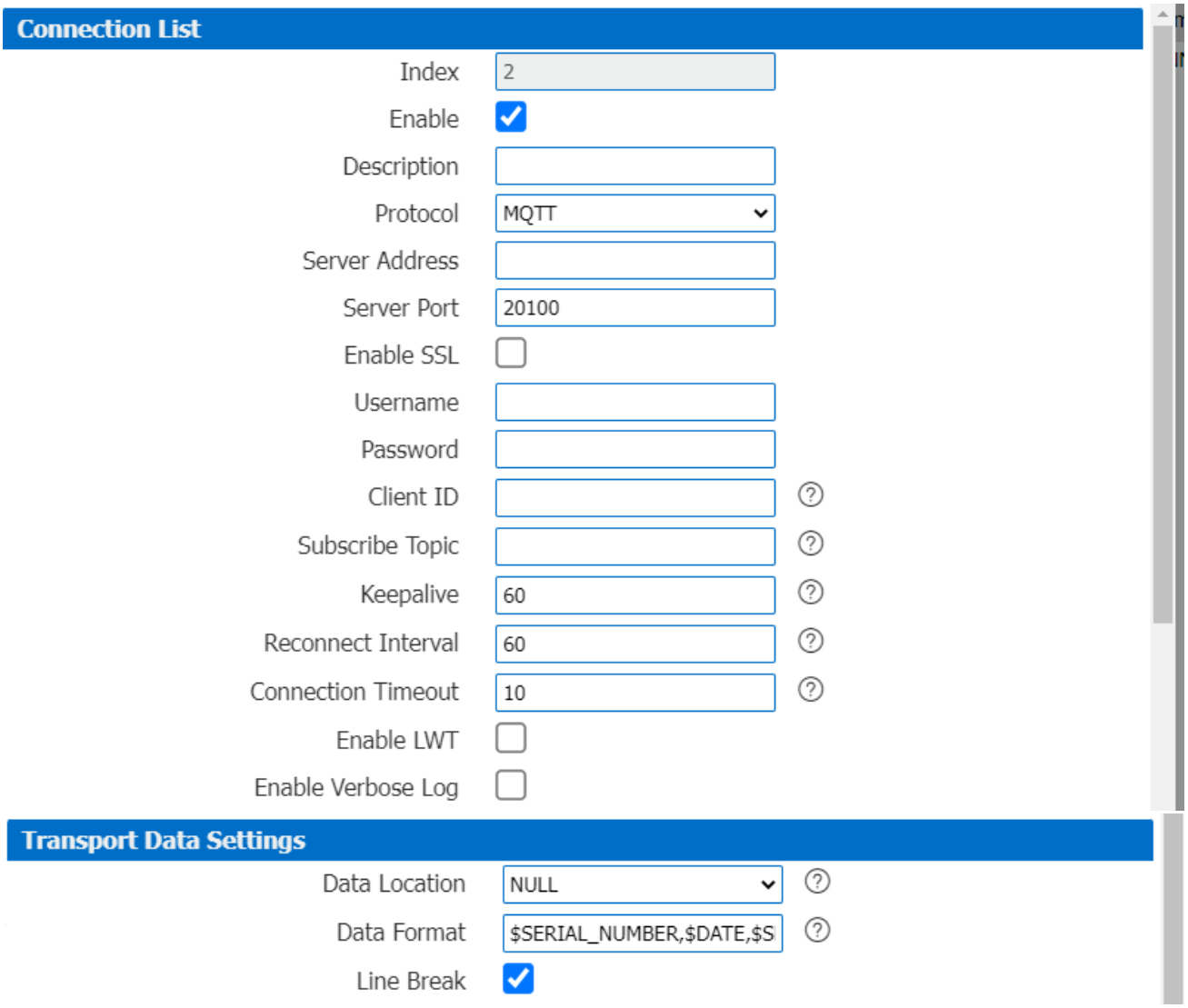
Application->Modbus Transport

- **Enable**
  Check this box to enable Modbus Slave feature.
- **Description**
  Description text for channel.
- ***Protocol***
  Configure for TCP Client, MQTT, FTP or Google Cloud.



Application->Modbus Transport->TCP Client

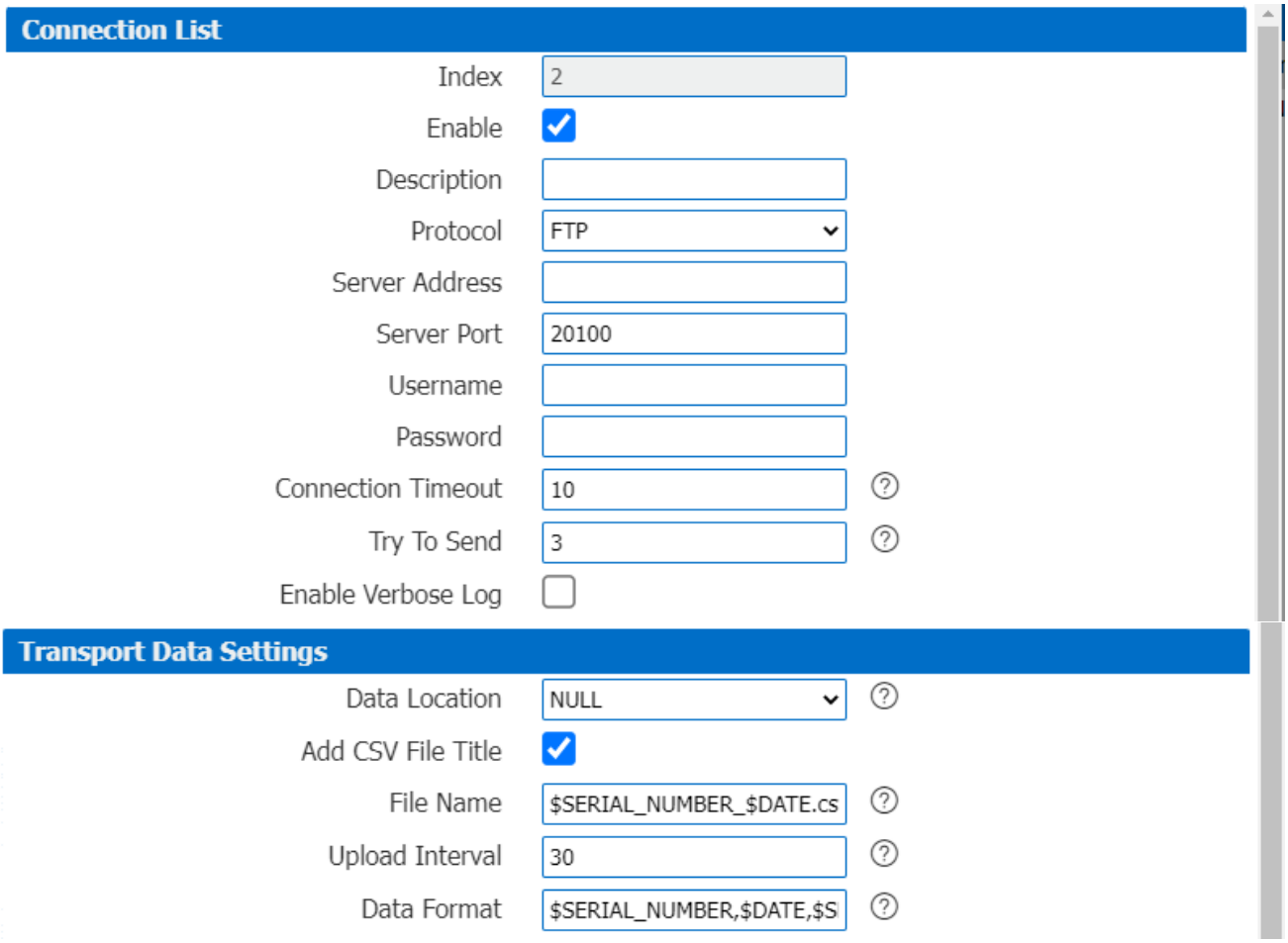
- **Server Address**
  TCP server IP or Domain Name.
- **Server Port**
  TCP server port.
- **Reconnect Interval**
  FTP reconnect interval in seconds.
- **Connection Timeout**
  FTP connection timeout in seconds.
- **Enable Verbose Log**
  Enable detailed logging for system log file.
- **Data Location**
  NULL, RAM or Flash configurable allows short term storage of data if connection is down.
- **Data Format**
  String that configures the data format for transmitted data on this connection.
- **Line Break**
  Check to enable line break to be send after data is transmitted.



Application->Modbus Transport->TCP Client

- **Server Address**
  TCP server IP or Domain Name.
- **Server Port**
  TCP server port.
- **Enable SSL**
  Check to enable SSL with TLS. Note that certificate needs parameters will need to be configured.
- **Username**
  Broker connection username.
- **Password**
  Broker connection password.
- **Client ID**
  Client ID to use for broker connection. May be empty.
- **Subscribe Topic**
  Subscribe topic to use for writing output data.
- **Keepalive**
  TCP or TLS keep alive time for connection to broker.

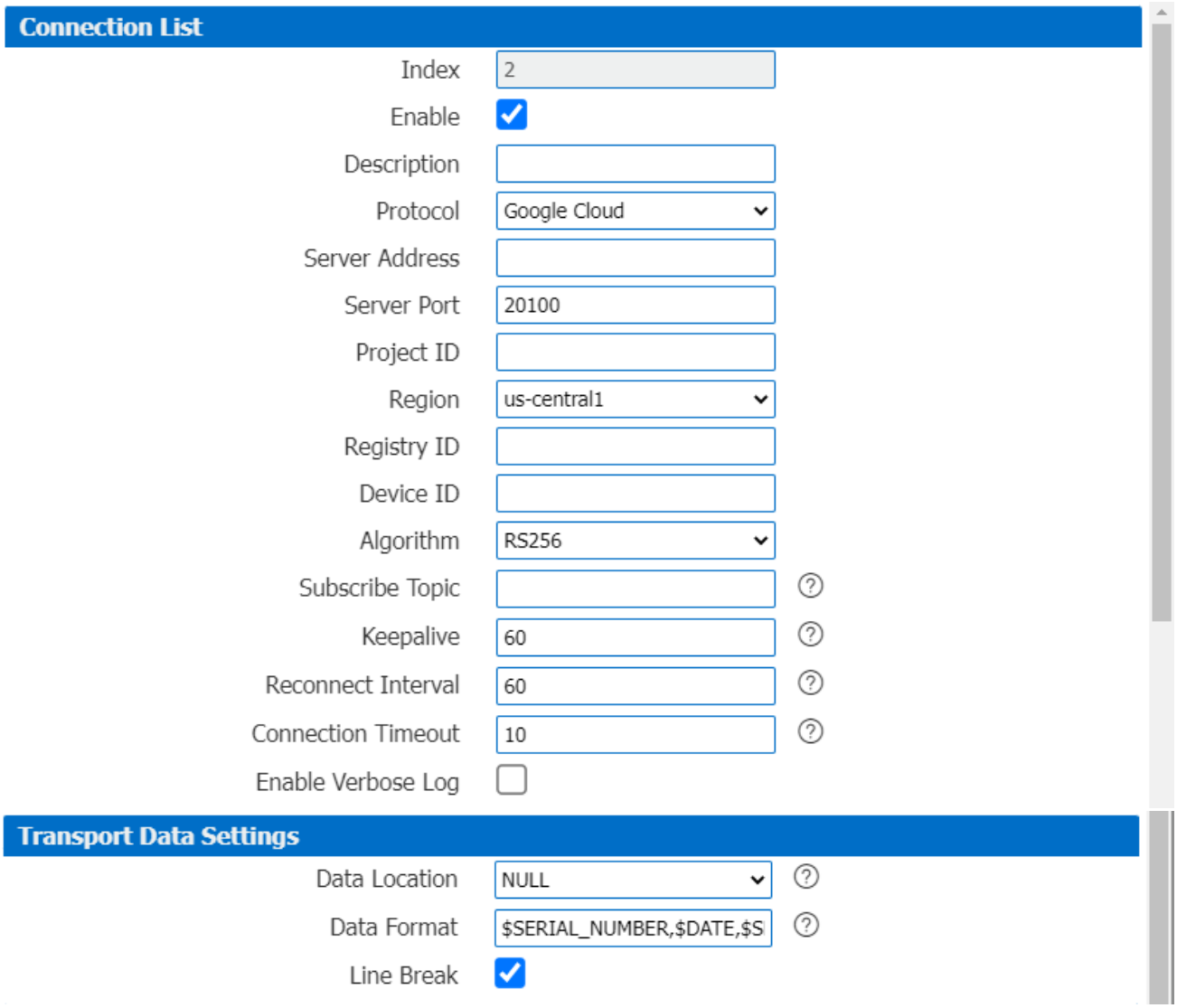
- **Reconnect Interval**
  FTP reconnect interval in seconds.
- **Connection Timeout**
  FTP connection timeout in seconds.
- **Enable LWT**
  Enable Last Will and Testament. If enabled then LWT Topic and Payload can be entered.
- **Enable Verbose Log**
  Enable detailed logging for system log file.
- **Data Location**
  NULL, RAM or Flash configurable allows short term storage of data if connection is down.
- **Data Format**
  String that configures the data format for transmitted data on this connection.
- **Line Break**
  Check to enable line break to be send after data is transmitted.



Application->Modbus Transport->FTP

- **Server Address**
  FTP server IP or Domain Name.

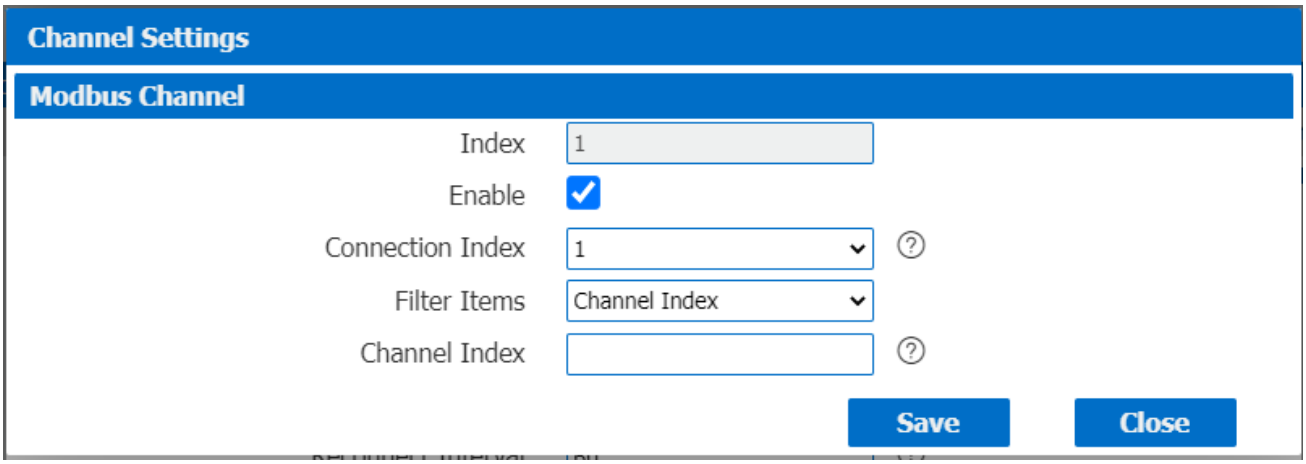
- **Server Port**
  FTP server port.
- **Username**
  Server connection username.
- **Password**
  Server connection password.
- **Connection Timeout**
  FTP connection timeout in seconds.
- **Try to Send**
  Number of times to resend connection request on failure to connect.
- **Enable Verbose Log**
  Enable detailed logging for system log file.
- **Data Location**
  NULL, RAM or Flash configurable allows short term storage of data if connection is down.
- **Add CSV File Title**
  Include title in CSV file
- **File Name**
  String configuration of file number. $ expressions can be used for internal values.
- **Upload Interval**
  Time interval to send the FTP file in seconds. 1- 86400 seconds.
- **Data Format**
  Format of data to send in FTP file. $ expressions can be used for internal values.



Application->Modbus Transport->Google Cloud

- **Server Address**
  FTP server IP or Domain Name.
- **Server Port**
  FTP server port.
- **Project ID**
  Google Cloud project ID to connect.
- **Region**
  Google Cloud server region to connect.
- **Registry ID**
  Device registry ID configuration.
- **Device ID**
  Device ID configuration, must be unique.
- **Algorithm**
  Signature algorithm to use for token, RS256 or HS256.

- **Subscribe Topic**
  Topic to use to send Modbus data.
- **Keepalive**
  Google cloud connection keepalive time in seconds, 1- 86400.
- **Reconnect Interval**
  Connection reconnect time in seconds, 1-600.
- **Connection Timeout**
  Connection timeout in seconds.
- **Try to Send**
  Number of times to resend connection request on failure to connect.
- **Enable Verbose Log**
  Enable detailed logging for system log file.
- **Data Location**
  NULL, RAM or Flash configurable allows short term storage of data if connection is down.
- **Data Format**
  String that configures the data format for transmitted data on this connection.
- **Line Break**
  Check to enable line break to be send after data is transmitted.



Application->Modbus Transport->Channel Settings

- **Enable**
  Check this box to enable channel.
- **Connection Index**
  Modbus channel connection index to use for this link.
- **Filter Items**
  Filter Modbus connection by Channel Index, Slave ID or Register Address.
- **Channel Index**
  Channel index to listen on for Modbus data. If empty then listen on all channels.

Virtual Private Network (VPN)

VPNs provide secure network to network connections or tunnel over public networks. The data transmitted through the VPN is encrypted and can allow networks using different subnets to be connected.
VPN connections are point to point from the remote client to a server.
The 641M provide three VPN types:

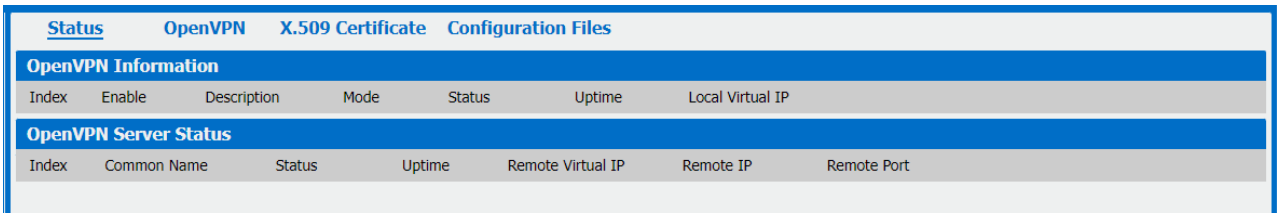
- OpenVPN
- IPSec
- GRE

The following section gives an overview of the configuration items and ELPRO also has several application notes available on the web to provide step by step instructions on setting up a VPN. These are available on the ELPRO web site Knowledgebase.

OpenVPN

OpenVPN is an open source virtual private network (VPN) product that offers a simplified security framework, modular network design, and cross-platform portability.

You could review all OpenVPN connection as below.



VPN->OpenVPN->Status>OpenVPN Information

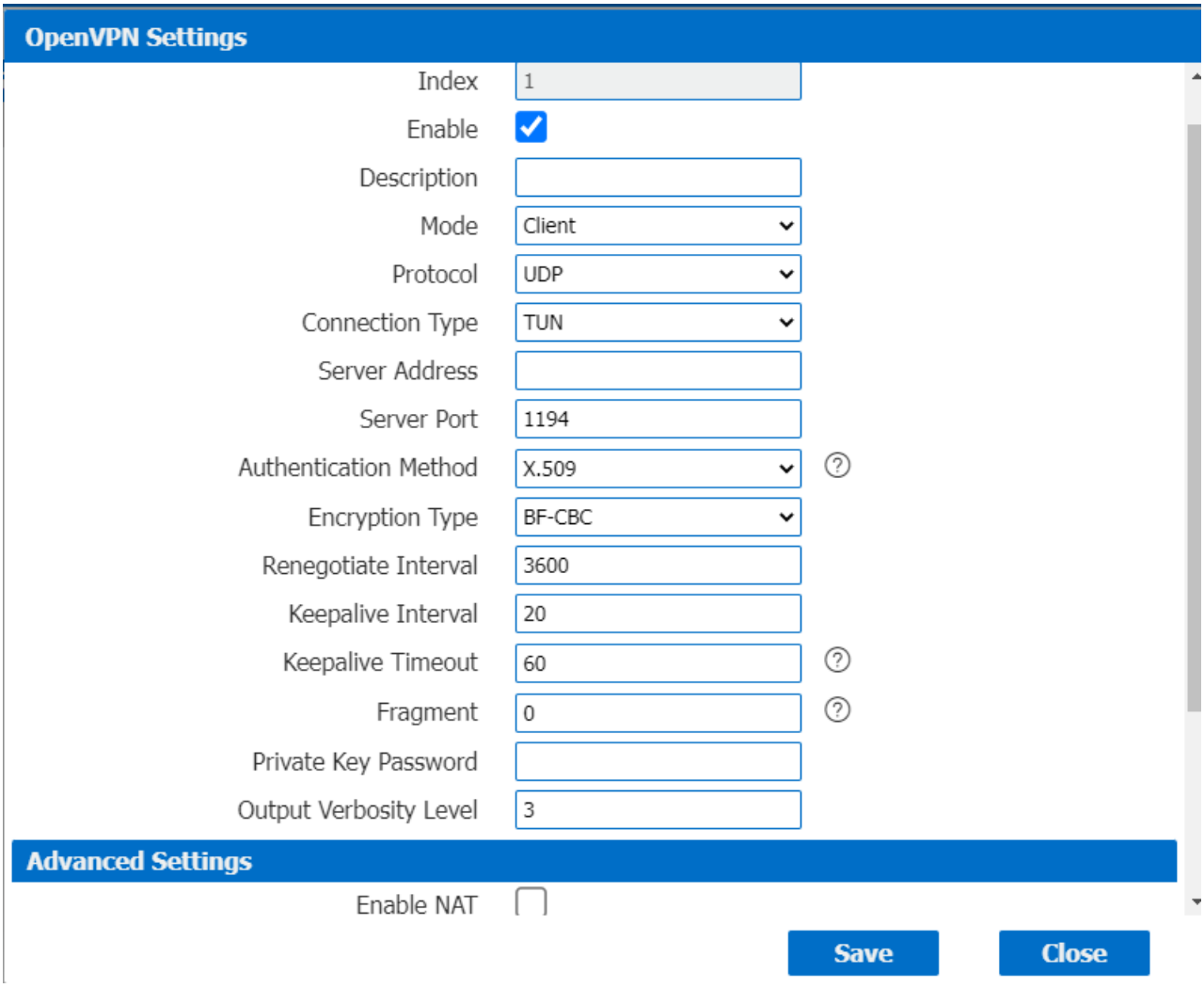
- Enable
  Displays current OpenVPN settings is enable or disable.
- Mode
  Displays current working mode of OpenVPN.
- Status
  Displays the current VPN connection status.
- Uptime
  Displays the connection time since VPN is established.
- Local Virtual IP
  Displays the virtual IP address obtain from remote side.

VPN->OpenVPN->Status>OpenVPN Server Status

- Common Name
  Displays the common name of OpenVPN client.
- Status
  Displays the current VPN connection status.
- Uptime
  Displays the connection time since VPN is established.
- Remote Virtual IP
  Displays the virtual IP address of OpenVPN client.
- Remote IP

Displays the remote IP address of OpenVPN client.

- Remote Port
  Displays the remote port obtain of OpenVPN client.



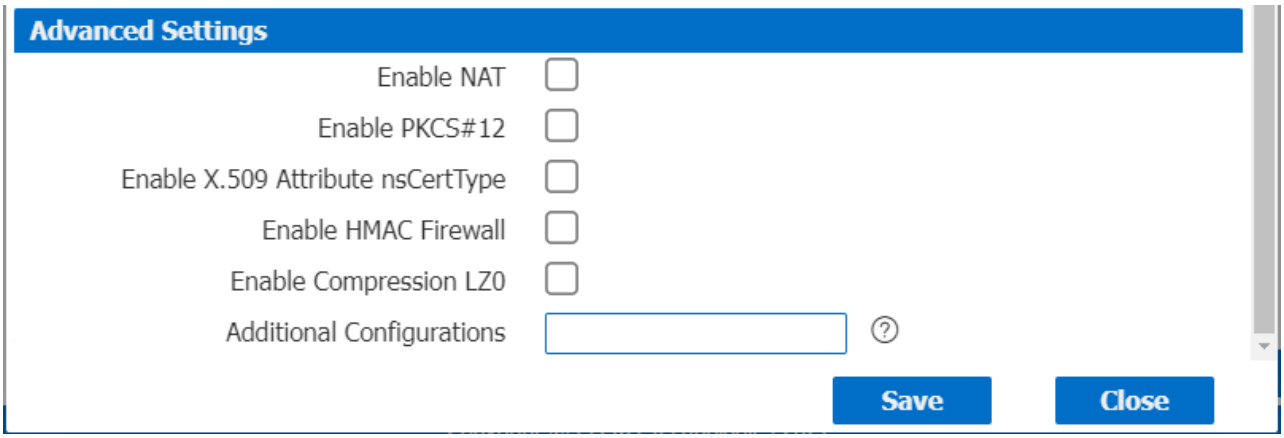
VPN->OpenVPN

- Enable
  Check this box to enable OpenVPN tunnel.
- Description
  Enter a description for this OpenVPN tunnel.
- Mode
  Select from “P2P”, “Client” or “Server”.
- Protocol
  Select from “UDP”, “TCP Client” or “TCP Server”
- Connection Type
  Select from “TUN”, “TAP” which are two different kinds of device interface for OpenVPN. The difference between TUN and TAP device is that a TUN device is a point-to-point virtual device on network while a TAP device is a virtual device on Ethernet.
- Server Address

Enter the IP address or domain of remote server.

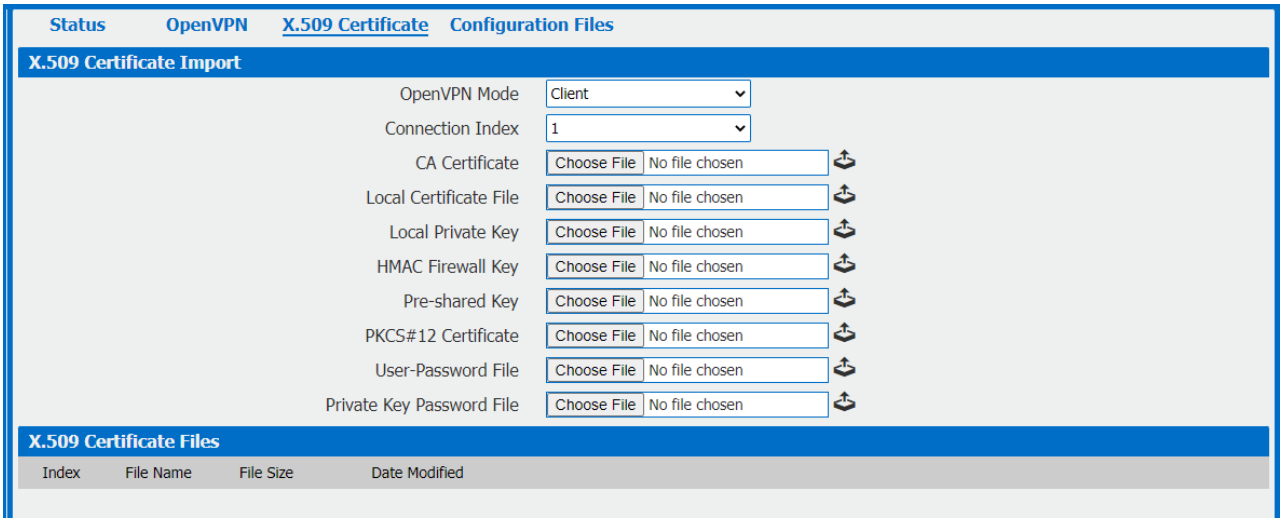
- Server Port
  Enter the negotiate port on OpenVPN server.
- Max Client
  Allow max OpenVPN client connect to OpenVPN server.
- Authentication Method
  Select from "X.509", "Pre-shared", "Password", and "X.509 And Password".
- Encryption Type
  Select from "BF-CBC", "DES-CBC", "DES-EDE-CBC", "DES-EDE3-CBC", "AES-128-CBC", "AES-192-CBC" and "AES-256-CBC".
- Username
  Enter the username for authentication when selection from “Password” or “X.509 And Password”.
- Password
  Enter the password for authentication when selection from “Password” or “X.509 And Password”.
- Local IP Address
  Enter the local virtual IP address when select “P2P” and “OpenVPN Server” mode.
- Remote IP Address
  Enter the remote virtual IP address when select “P2P” mode.
- Local Port
  Specify the OpenVPN Server port, default is 1194.
- Topology
  Select the possible topology from “Subnet” and “Net30”
  Subnet: The recommended topology for modern servers. Note that this is not the current default. Addressing is done by IP & netmask.
  Net30: This is the old topology for support with Windows clients running 2.0.9 or older clients. This is the default as of OpenVPN 2.3, but not recommended for current use. Each client is allocated a virutal /30, taking 4 IPs per client, plus 4 for the server.
- Subnet
  Specify the subnet for the OpenVPN client. Default is 10.8.0.0
- Subnet Netmask
  Specify the subnet netmaks for OpenVPN client. Default is 255.255.255.0
- TAP Bridge
  Select the specified LAN that bridge with OpenVPN tunnel when select “TAP” connection type.
- Renegotiate Interval
  Enter the renegotiate interval if connection is failed.
- Keepalive Interval
  Enter the keepalive interval to check the tunnel is active or not.
- Keepalive Timeout
  Enter the keepalive timeout, once connection is failed it will trigger the OpenVPN reconnect.
- Fragment
  Enter the fragment size, 0 means disable.
- Private Key Password
  Enter the private key password for authentication when selection from “X.509” or “X.509 And Password”.
- Output Verbosity Level

Enter the level of the output log and values.



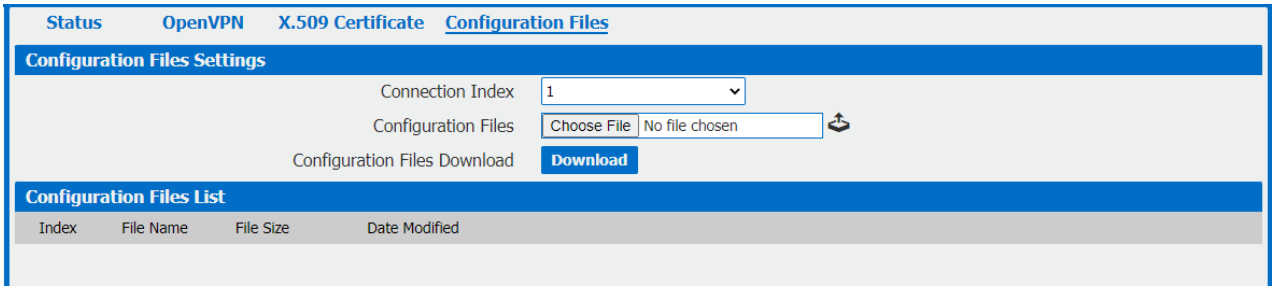
VPN->OpenVPN->Advanced Settings

- Enable NAT
  Check this box to enable NAT, the source IP of host behind router will be disguised before accessing the remote end.
- Enable Default Gateway
  Check this box to enable default gateway, all the data traffic will go through the VPN tunnel.
- Enable PKCS#12
  It is an exchange of digital certificate encryption standard, used to describe personal identity information.
- Enable CRL
  Check this box to enable CRL(Certificate Revocation List).
- Enable Client to Client
  Check this box to allow client to communicate with each other.
- Enable Duplicate CN
  Check this box allow multiple clients connect to the server with the same certificate/key files or common names.
- Enable IP Persist
  Check this box to keep the IP address unchanged.
- Enable X.509 Attribute nsCertType
  Require that peer certificate was signed with an explicit nsCertType designation of “server”.
- Enable HMAC Firewall
  Add additional layer of HMAC authentication on the top of the TLS control channel to protect against DoS attacks.
- Enable Compression LZO
  Compress the data.
- Additional Configurations
  Enter some other options of OpenVPN in this field. Each expression can be separated by a ‘,’.



VPN->OpenVPN->X.509 Certificate

- OpenVPN Mode
  Select OpenVPN working mode between Server and Client.
- Connection Index
  Displays the current connection index for OpenVPN channel.
- CA Certificate
  Import CA certificate file.
- Local Certificate File
  Import Local Certificate file.
- Local Private Key
  Import Local Private Key file.
- DH File
  Import DH file when works as OpenVPN server.
- HMAC Firewall Key
  Import HMAC Firewall Key file.
- Pre-shared Key
  Import the pre-shared key file.
- PKCS#12 Certificate
  Import PKCS#12 Certificate.
- User-Password File
  Import the username and password file when import the OpenVPN client file.
- Private Key Password File
  Import the private key password file when import the OpenVPN client file.
- CRL File
  Import CRL file.

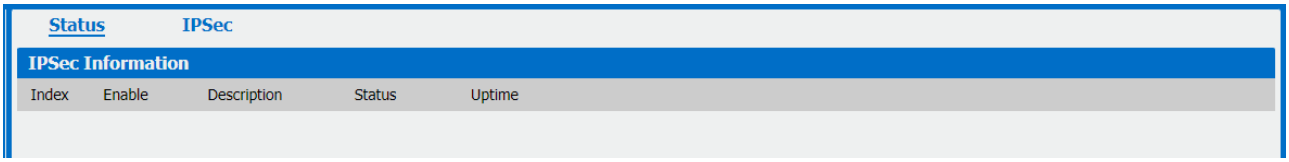


VPN->OpenVPN->Configuration Files

- Connection Index
  Select OpenVPN connection index.
- Configuration Files
  Import the OpenVPN client file.
- Configuration Files Download
  Download the OpenVPN client configuration.
- Configuration Files List
  Display the imported OpenVPN client file.

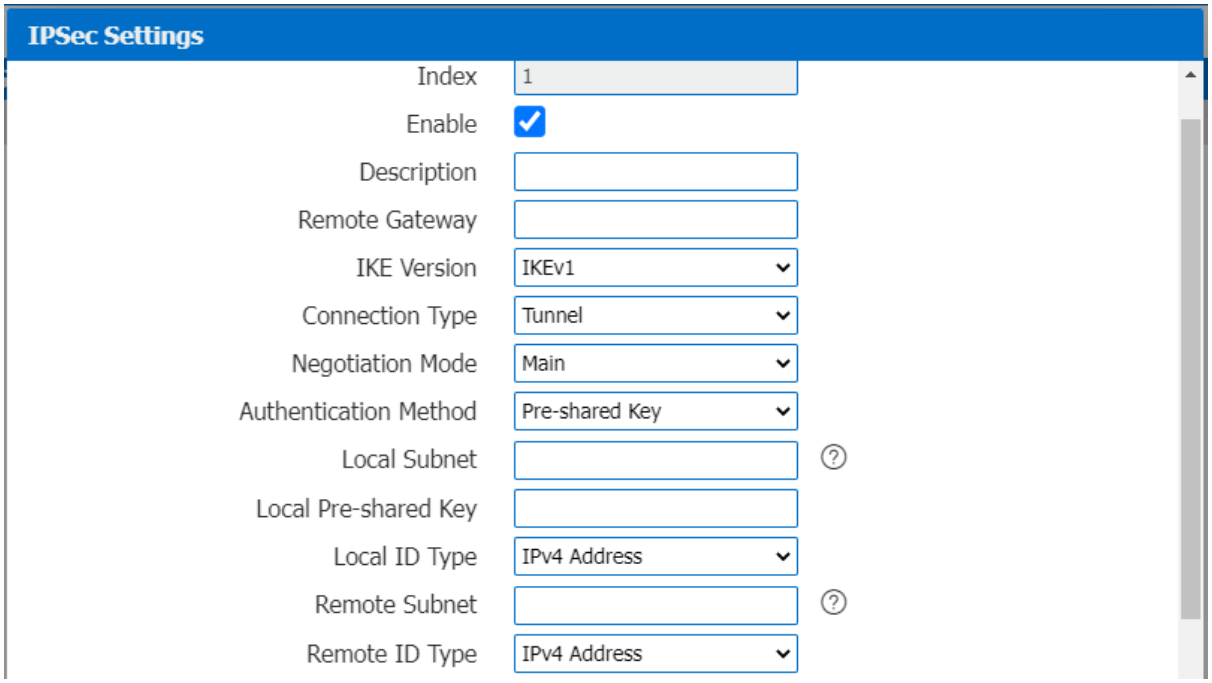
IPSec

IPSec facilitates configuration of secured communication tunnels. The various tunnel configurations will be displayed in the Tunnel Table at the bottom of the page. All tunnels are create using the ESP (Encapsulating Security Payload) protocol.



VPN->IPSec->Status

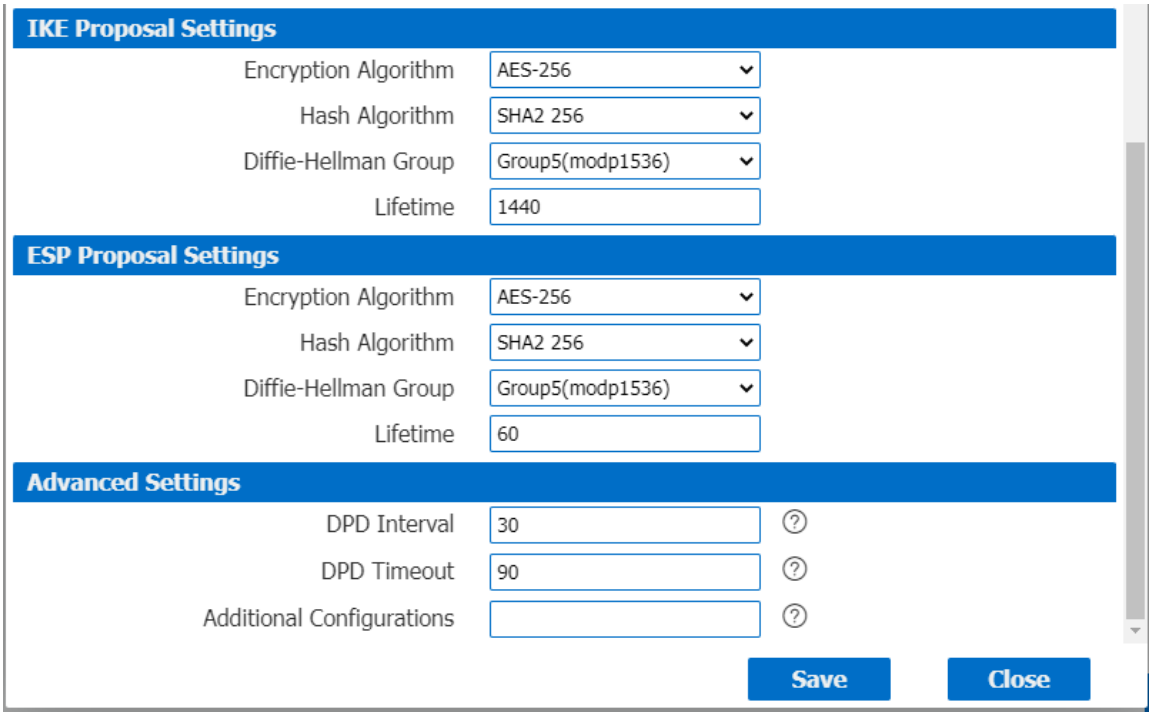
- **Enable**
  Displays current IPSec settings is enable or disable.
- **Description**
  Displays the description of current VPN channel.
- **Status**
  Displays the current VPN connection status.
- **Uptime**
  Displays the connection time since VPN is established.



VPN->IPSec

- **Enable**
  Select Enable will launch the IPSec process.
- **Description**
  Enter a description for this IPSec VPN tunnel.
- **Remote Gateway**
  Enter the IP address of the remote endpoint of the tunnel.
- **IKE Version**
  Internet Key Exchange, select from “IKEv1” or “IKEv2”.
- **Connection Type**
  Select from “Tunnel” or “Transport”.
  Tunnel: In tunnel mode, the entire IP packet is encrypted and authenticated. It is then encapsulated into a new IP packet with a new IP header. Tunnel mode is used to create virtual private networks for network-to-network communications.
  Transport: In transport mode, only the payload of the IP packet is usually encrypted or authenticated. The routing is intact, since the IP header is neither modified nor encrypted.
- **Negotiation Mode**
  Select from “Main” or “Aggressive”.
- **Authentication Method**
  Select from “Pre-shared Key” or “Pre-shared Key and Xauth”.
- **Local Subnet**
  Ener the IP address with mask if a network beyond the local LAN will be sending packets through the tunnel. Multiple subnets separated by commas.
  NOTE: The Remote subnet and Local subnet addresses must not overlap!
- **Local Pre-shared Key**
  Enter the pre-shared key which match the remote endpoint.
- **Local ID Type**
  The local endpoint's identification. The identifier can be a host name or an IP address.

- **Xauth Identity**
  Enter Xauth identity after “Pre-shared Key and Xauth” on authentication Method is enabled.
- **Xauth Password**
  Enter Xauth password “Pre-shared Key and Xauth” on authentication Method is enabled.
- **Remote Subnet**
  Enter an IP address with mask if encrypted packets are also destined for the specified network that is beyond the Remote IP Address. Multiple subnets separated by commas.
  NOTE: The Remote subnet and Local subnet addresses must not overlap!
- **Remote ID Type**
  The authentication address of the remote endpoint.



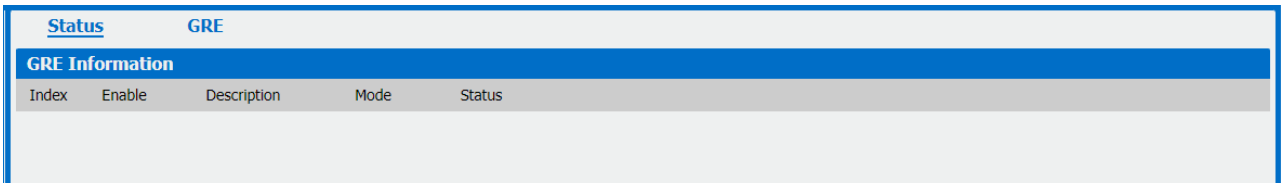
VPN->IPSec

- **Encryption Algorithm (IKE)**
  Select 3DES AES-128, AES-192, or AES-256 encryption.
- **Hash Algorithm (IKE)**
  Select from MD5, SHA1, SHA2 256, SHA2 384 or SHA2 512 hashing.
- **Diffie-Hellman Group (IKE)**
  Negotiate (None) or use 768 (Group 1), 1024 (Group 2), 1536 (Group 5) or 2048 (Group 14) etc.
- **Lifetime (IKE)**
  How long the keying channel of a connection should last before being renegotiated.
- **Encryption Algorithm (ESP)**
  Select 3DES AES-128, AES-192, or AES-256 encryption.
- **Hash Algorithm (ESP)**
  Select from MD5, SHA1, SHA2 256, SHA2 384 or SHA2 512 hashing.
- **Diffie-Hellman Group (ESP)**
  Negotiate (None) or use 768 (Group 1), 1024 (Group 2), 1536 (Group 5) or 2048 (Group 14) etc.

- **Lifetime (ESP)**
  How long a particular instance of a connection should last, from successful negotiation to expiry.
- **DPD Interval**
  Enter the interval after which DPD is triggered if no IPsec protected packets is received from the peer.
- **DPD Timeout**
  Enter the remote peer probe response timer.
- **Additional Configurations**
  Enter some other options of IPSec in this field. Each expression can be separated by a ';'.

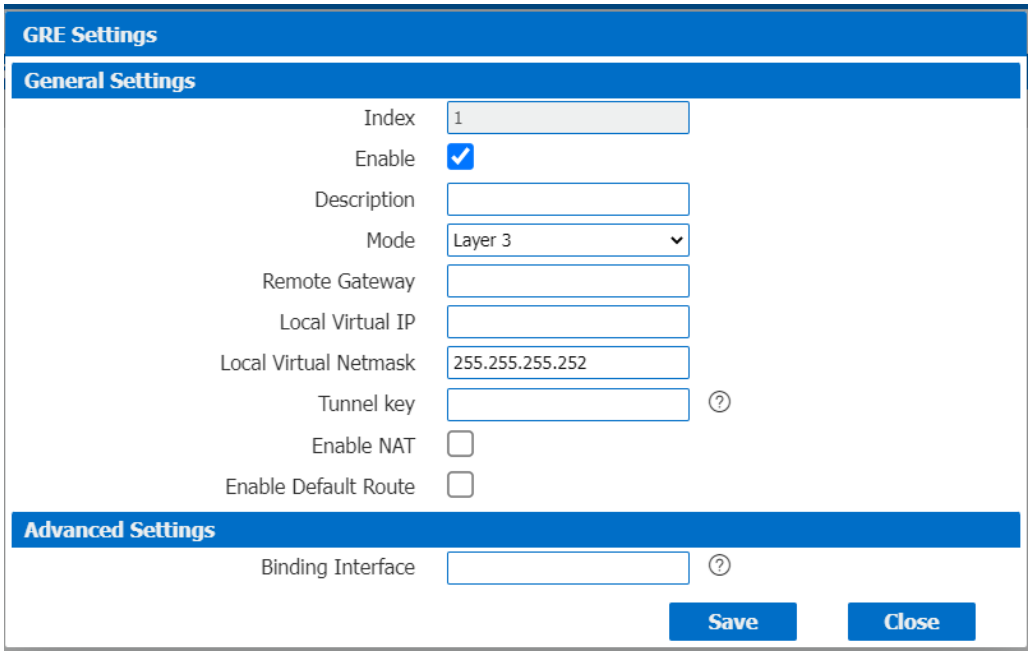
GRE

Generic Routing Encapsulation (GRE) is a protocol that encapsulates packets in order to route other protocols over IP networks. It's a tunneling technology that provides a channel through which encapsulated data message could be transmitted and encapsulation and decapsulation could be realized at both ends.



VPN->GRE->Status

- **Enable**
  Displays current GRE settings is enable or disable.
- **Description**
  Displays the description of current VPN channel.
- **Mode**
  Displays the current VPN mode.
- **Status**
  Displays the current VPN connection status.



VPN->GRE

- **Enable**
  Check this box to enable GRE.
- **Description**
  Enter the description of current VPN channel.
- **Mode**
  Specify the running mode of GRE, optional are “Layer 2” and “Layer 3”.
- **Remote Gateway**
  Enter the remote IP address of peer GRE tunnel.
- **Local Virtual IP**
  Enter the local tunnel IP address of GRE tunnel.
- **Local Virtual Netmask**
  Enter the local virtual netmask of GRE tunnel.
- **Tunnel Key**
  Enter the authentication key of GRE tunnel.
- **Enable NAT**
  Check this box to enable NAT function.
- **Bridge Interface**
  Specify the bridge interface work with Layer 2 mode.
- **Enable Default Route**
  Check this box to make all the traffic go through VPN tunnel.
- **Binding Interface**
  Only specified interface turn into active WAN will start the VPN tunnel.

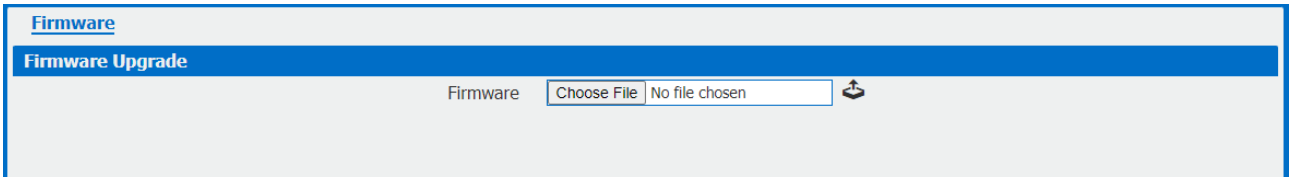
Maintenance

Firmware Upgrade

When newer versions of 641M firmware become available, the user can manually update the unit by uploading a package to the unit.

NOTE: The unit need manually reboots once the upload completes, thus taking the 641M router out of service during approximately 1 minute. Unless otherwise stated, the user is not expected to take any special precautions.

CAUTION: It is important to have a stable power source and ensure that power to the Fusion is not interrupted during a firmware upgrade.



Software

Additional Feature Packages (AFP Package) are available from ELPRO for the 641M router. The user is able to manually install additional feature into the unit by uploading a package file. Or user can uninstall this feature (AFP Package) from router.

NOTE: Up to a maximum of 5 AFP's can be installed at one time.

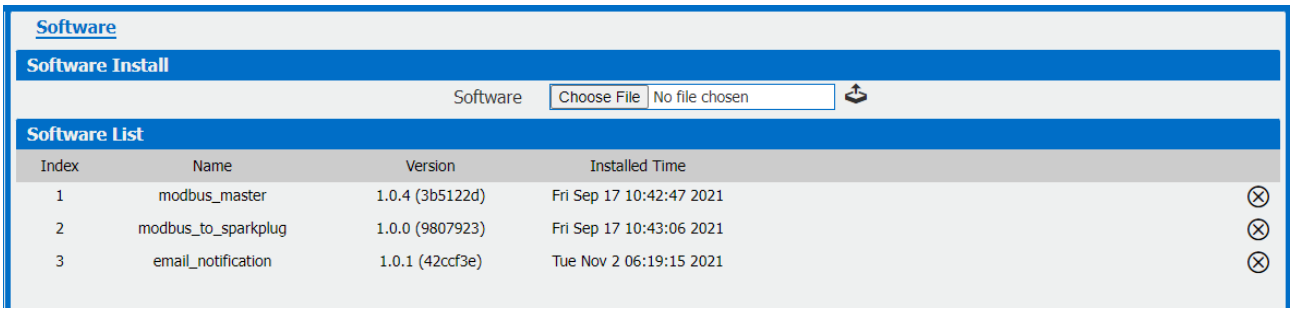
The ELPRO 641M is shipped from the factory with 5 commonly used application pre-installed. If another application is required, then one factory installed application will need to be removed.

The factory installed applications are:

- Modbus Master
- Enhanced Modbus Gateway/MQTT
- Modbus to DNP3
- SNMP
- Email Notification

Check the ELPRO web site for a full list of applications and with support for the AFP files to upload.

NOTE: The unit will need to be rebooted once the upload/uninstall completes, thus taking the 641M router out of service during approximately 1 minute. Unless otherwise stated, the user is not expected to take any special precautions.

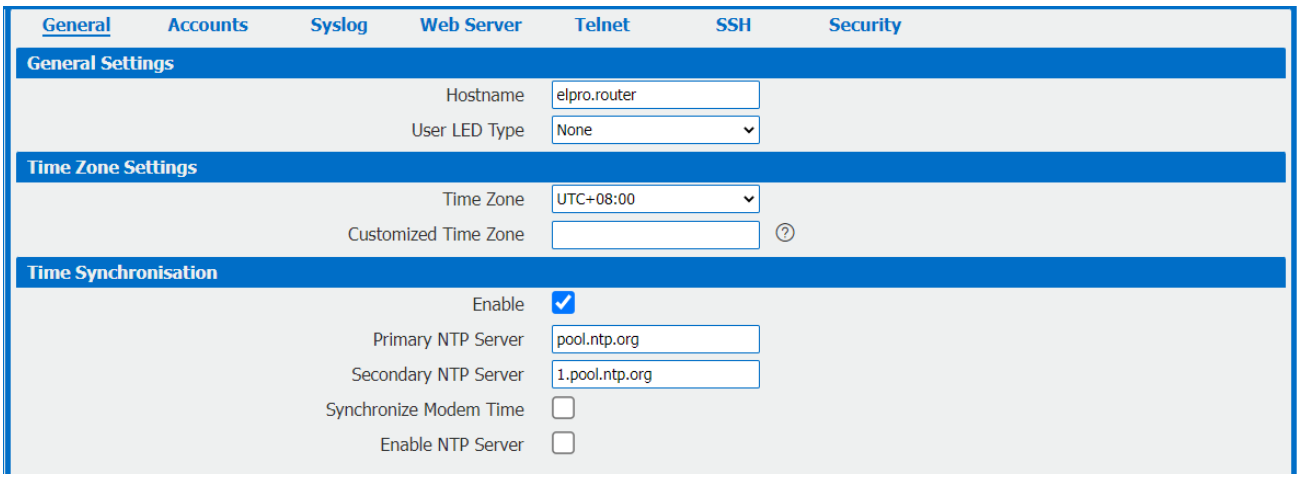


Click  to upload the APP Package.

Click  to delete the APP Package.

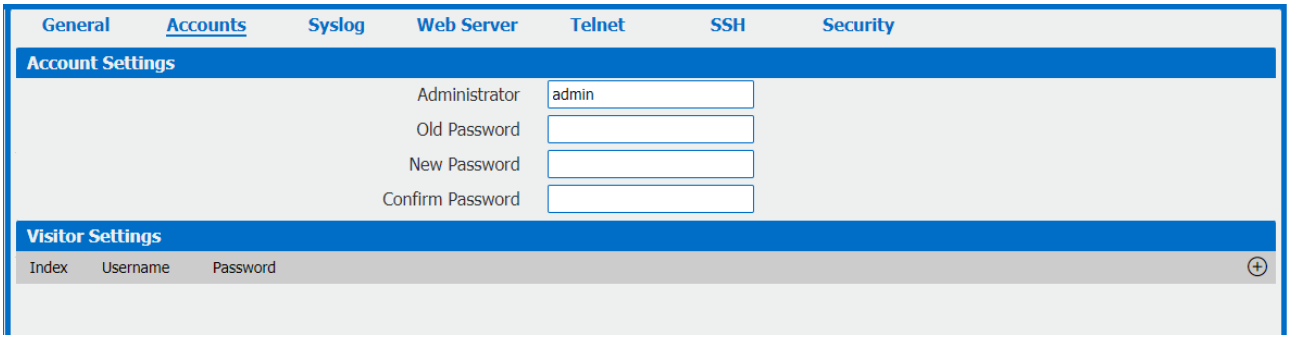
System

This section allows you to review the device system settings.



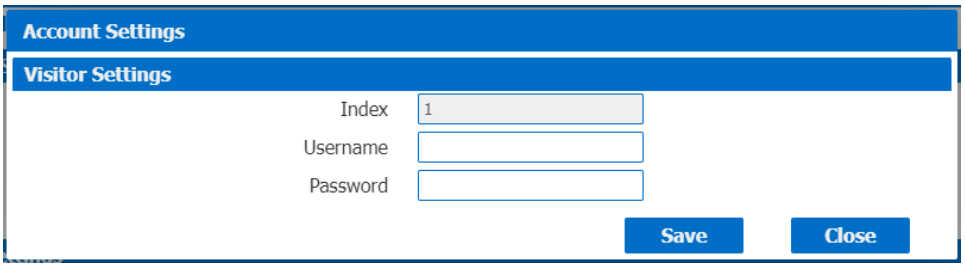
System->General

- **Hostname**
  User-defined router name, which might be use for IPSec local ID identify.
- **User LED Type**
  Defined the User LED behavior.
- **Time Zone**
  Select the zone where the device is in use.
- **Customized Time Zone**
  Customized the zone where the device is in use.
- **Enable (NTP Client)**
  Selected Enabled to utilize the NTP client to synchronize the device clock over the network using a time server (NTP server).
- **Primary NTP Server**
  Enter the IP address (or host name) of the primary time server.
- **Secondary NTP Server**
  Enter the IP address (or host name) of the secondary time server.
- **Synchronize Modem Time**
  Synchronize the time from cellular module.
- **Enable NTP Server**
  Check the box to make the router as a NTP server.



System->Account

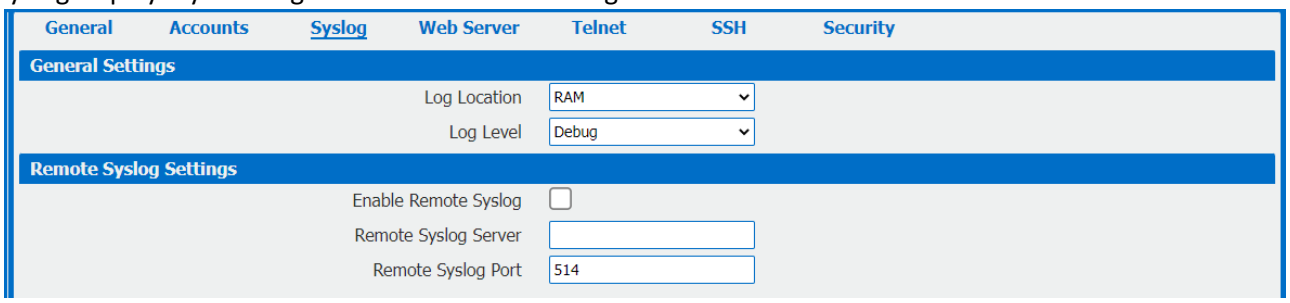
- **Administrator**
  Displays the name of current administrator, default as “admin”.
- **Old Password**
  Enter the old password of administrator.
- **New Password**
  Enter the new password of administrator.
- **Confirm Password**
  Confirm the new password of administrator.



System->Account

- **Username**
  Enter a username of visitor privilege
- **Password**
  Enter the new password of current visitor account.

Syslog displays system logs that are stored in the log buffers.

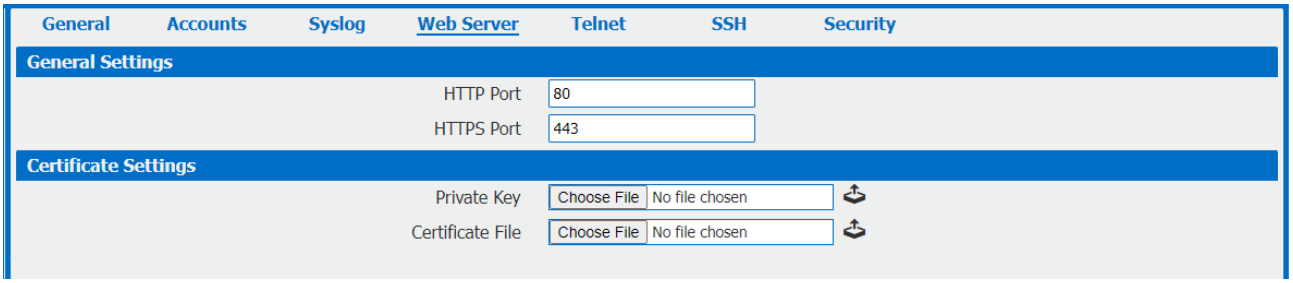


System->Syslog

- **Log Location**

Select the log store location from “RAM” or “Flash”.

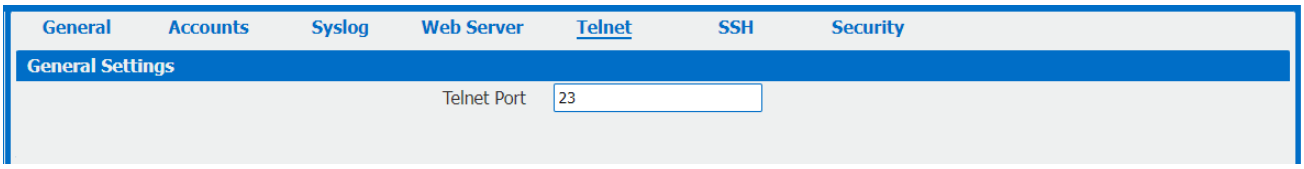
- **Log Level**
  Select the log output level from “Debug”, “Notice”, “Info”, “Warning” or “Error”.
- **Enable Remote Syslog**
  Check this box to enable remote syslog connection.
- **Remote Syslog Server**
  Enter the IP address of remote syslog server.
- **Remote Syslog Port**
  Enter the port for remote syslog server listening.



System->Web Server

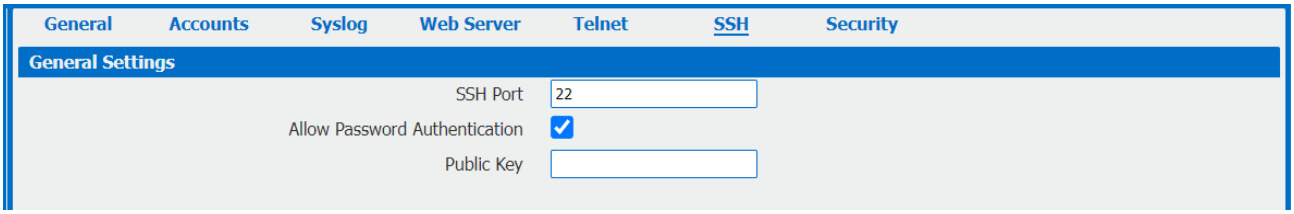
- **HTTP Port**
  Enter the port for Hypertext Transfer Protocol. A well-known port for HTTP is port 80.
- **HTTPS Port**

  Enter the port for HTTPS Protocol. A well-known port for HTTPS is port 443.
- **Private Key**
  Import private Key file for HTTPS connection.
- **Certificate File**
  Import certificate file for HTTPS connection.



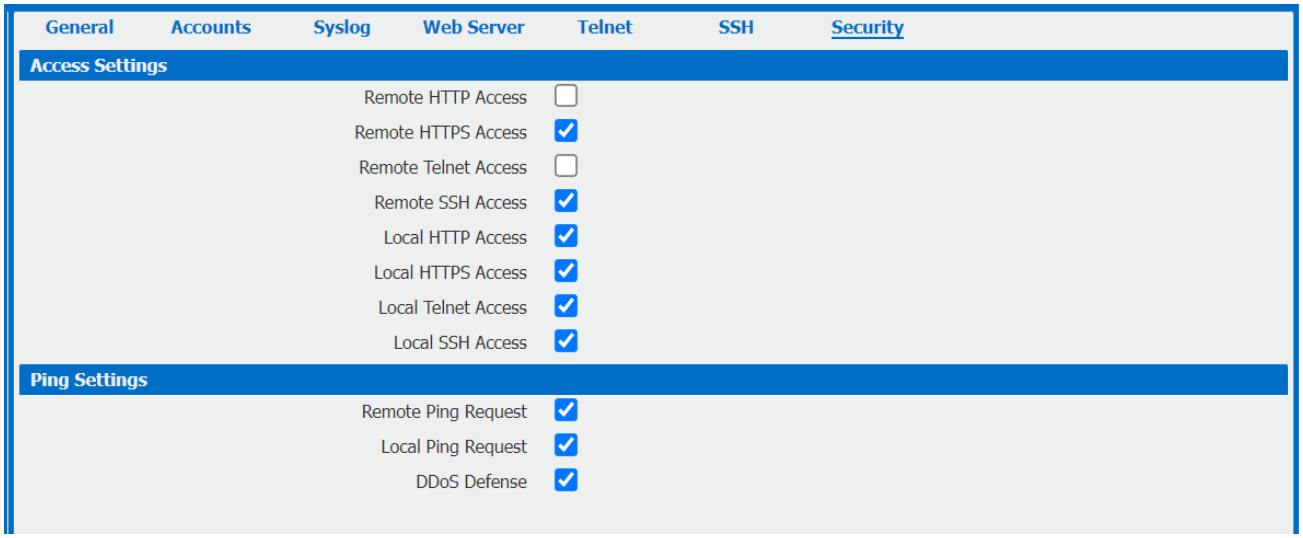
System->Telnet

- **Telnet Port**
  Enter the port for telnet access. A well-known port for HTTP is port 23.



System->SSH

- **SSH Port**
  Enter the port for SSH access. A well-known port for HTTP is port 22.
- **Allow Password Authentication**
  Check this box to enable SSH authentication.
- **Public Key**
  Enter the public Key SSH authentication.



System->Security

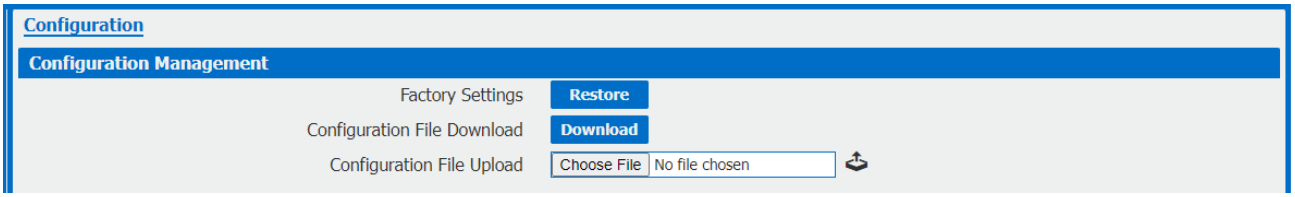
- **Remote HTTP Access**
  Check this box to allow remote HTTP access.
- **Remote HTTPS Access**
  Check this box to allow remote HTTPS access.
- **Remote Telnet Access**

  Check this box to allow remote Telnet access.
- **Remote SSH Access**
  Check this box to allow remote SSH access.
- **Local HTTP Access**
  Check this box to allow local HTTP access.
- **Local HTTPS Access**
  Check this box to allow local HTTPS access.
- **Local Telnet Access**
  Check this box to allow local Telnet access.
- **Local SSH Access**
  Check this box to allow local SSH access.
- **Remote Ping Request**
  Check this box to allow remote ping request.

- **Local Ping Request**
  Check this box to allow local ping request.
- **DDoS Defense**
  Check this box to enable DDoS defense.

Configuration

The Unit Configuration tab allows you to save parameters (settings in the Web interface) to a file. Conversely, if you have saved settings from the 641M router to a file, you can Import these previously-saved configuration settings to the 641M router as well.

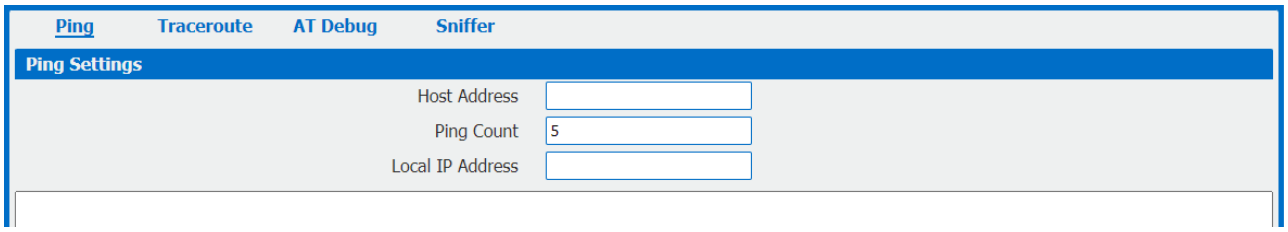


System->Configuration

- **Restore**
  Reset the unit to factory default settings.
- **Download**
  Download the configuration file from 641M router.
- **Configuration File Upload**
  Import previously saved configuration file.

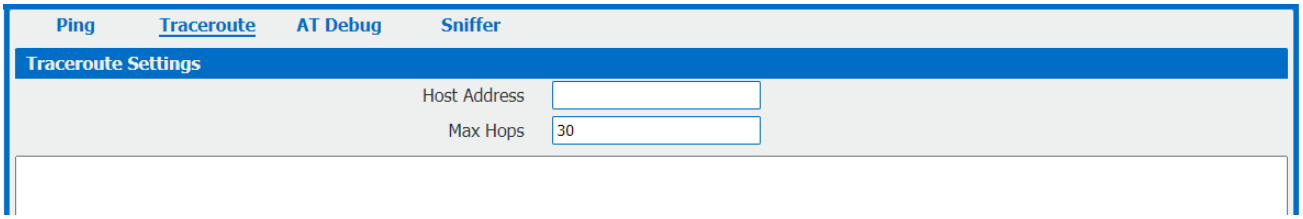
Debug Tools

Provides simple debugging tools to allow diagnostics of IP traffic and networks.



Debug Tools->Ping

- **Host Address**
  Enter a host IP address or domain name for ping.
- **Ping Count**
  Enter the ping times.
- **Local IP Address**
  Enter the ping source IP address or leave it blank.



Debug Tools->Traceroute

- **Host Address**
  Enter a host IP address or domain name for traceroute.
- **Max Hops**
  Enter the max hops for traceroute.

Appendix A – Glossary

APN:	Access Point Name
GPRS:	General Packet Radio Service
HSPA:	High Speed Packet Access
HSDPA:	High-Speed Downlink Packet Access
HSUPA:	High-Speed Uplink Packet Access
LTE:	3GPP Long Term Evolution
IMEI:	International Mobile Equipment Identity
ICCID:	Integrated Circuit Card Identifier
PIN:	Personal Identification Number
PPP:	Point-to-Point Protocol
RSSI:	Received Signal Strength Indication
SIM:	Subscriber Identity Module
SMS:	Short Message Service
DHCP:	Dynamic Host Configuration Protocol
LAN:	Local Area Network
LED:	Light-Emitting Diode
NTP:	Network Time Protocol
SMA:	SubMiniature version A (connector)
SSID:	Service Set Identifier
TCP/IP:	Transmission Control Protocol / Internet Protocol
UDP:	User Datagram Protocol
VPN:	Virtual Private Network
Wi-Fi or WiFi:	Wireless Fidelity
VDC:	Voltage, Direct Current

Appendix B -Q&A

No Signal

Problem

641M Router modem status show no signal.

Possible Reason

- Antenna installation is wrong.
- Modem failure.

Solution

- Check the LTE antenna or replace with new one.
- Check the cellular page confirm modem is detected correctly or not.

Cannot detect SIM card

Problem

641M Router cannot detect SIM card, cellular is not failed to connect to base station.

Possible Reason

- SIM card damage.
- SIM bad contact.

Solution

- Replace SIM card.
- Re-install SIM card.

Poor Signal

Problem

641M Router no signal or poor signal.

Possible Reason

- Antenna installation is wrong.
- Area signal weak.

Solution

- Check the antenna and re-connect it.
- Contact Telecom Operator to confirm signal problem.
- Change to high-gain antenna.

IPSec VPN established, but LAN to LAN cannot communicate

Problem

IPSec VPN established, but LAN to LAN cannot communicate

Possible Reason

- Both subnets are not match the interested traffic.
- IPSec second phase (ESP) settings is not match.

Solution

- Check the both subnet settings.
- Check IPSec second phase (ESP) setting.

Forget Router Password

Problem

Forget router login password.

Possible Reason

User has changed the password.

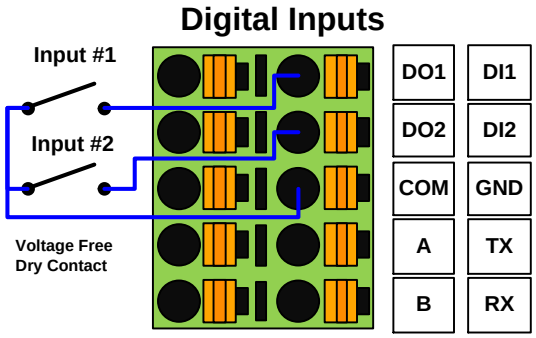
Solution

After router power on, press RESET button between 3 to 10 seconds then release, router need manually reboot and reset to factory default settings (Username/Password is admin/admin).

Appendix C -Digital Input/Output Wiring

Digital Input

Typical Application Diagram

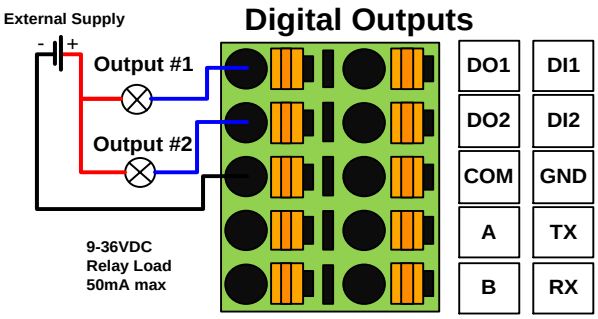


Digital Input Electrical Specifications

- Galvanic Isolation
- Over-voltage protection 36Vdc
- Over-current projection: 100mA per channel @25°C

Digital Output

Typical Application Diagram



Digital Output Electrical Specifications

- Switch ON: close to V-
- Switch OFF: open (high impedence)

Appendix D - CLI

Command-line interface (CLI) is a software interface that provide another configurable way to set parameters on our router. We could use Telnet or SSH connect to our router for CLI input.

NOTE: Example below shows the default login credentials. If these have been changed then use the new log in credentials for login below.

641M CLI Access Example

Connect to CLI using your preferred terminal.

ELPRO.router login: **admin**

Password: **admin**

>

CLI reference commands

```
>?
  config      Change to the configuration mode
 exit         Exit this CLI session
 help         Display an overview of the CLI syntax
 ping         Ping
 reboot       Reboot system
 show         Show running configuration or running status
 telnet       Telnet Client
 traceroute   TraceRoute
 upgrade      Upgrade firmware
 version      Show firmware version
```

e.g.

```
> version
1.0.0 (1017.4)

> show wifi
wifi
{
 "status":"Ready",
 "mac":"a8:3f:a1:e0:ab:81",
 "ssid":"641M-WAN",
 "channel":"6",
 "width":"40 MHz",
 "txpower":"20.00 dBm"
}

> ping www.baidu.com
PING www.baidu.com (14.215.177.38): 56 data bytes
```

```
64 bytes from 14.215.177.38: seq=0 ttl=54 time=10.826 ms
64 bytes from 14.215.177.38: seq=1 ttl=54 time=10.284 ms
64 bytes from 14.215.177.38: seq=2 ttl=54 time=10.073 ms
64 bytes from 14.215.177.38: seq=3 ttl=54 time=10.031 ms
64 bytes from 14.215.177.38: seq=4 ttl=54 time=10.347 ms

--- www.baidu.com ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 10.031/10.312/10.826 ms
>
```

How to Configure the CLI

```
CONTEXT SENSITIVE HELP
[?] - Display context sensitive help. This is either a list of possible
    command completions with summaries, or the full syntax of the
    current command. A subsequent repeat of this key, when a command
    has been resolved, will display a detailed reference.

AUTO-COMPLETION
The following keys both perform auto-completion for the current command line.
If the command prefix is not unique then the bell will ring and a subsequent
repeat of the key will display possible completions.

[enter] - Auto-completes, syntax-checks then executes a command. If there is
      a syntax error then offending part of the command line will be
      highlighted and explained.

[space] - Auto-completes, or if the command is already resolved inserts a space.

MOVEMENT KEYS
[CTRL-A] - Move to the start of the line
[CTRL-E] - Move to the end of the line.
[up]     - Move to the previous command line held in history.
[down]   - Move to the next command line held in history.
[left]   - Move the insertion point left one character.
[right]  - Move the insertion point right one character.

DELETION KEYS
[CTRL-C]    - Delete and abort the current line
[CTRL-D]    - Delete the character to the right on the insertion point.
[CTRL-K]    - Delete all the characters to the right of the insertion point.
[CTRL-U]    - Delete the whole line.
[backspace] - Delete the character to the left of the insertion point.

ESCAPE SEQUENCES
!!  - Subsitute the the last command line.
!N  - Substitute the Nth command line (absolute as per 'history' command)
!-N - Substitute the command line entered N lines before (relative)
```