

APPLICATION NOTE

Modbus TCP server configuration

- Modbus TCP server
- Configuring Modbus TCP server
- Reading and writing Modbus registers
- Specification of registers and their contents

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1) MODBUS TCP SERVER

Etic Telecom provides a Modbus TCP server allowing you to make requests to retrieve various data collected by the product, but also to trigger product features. The complete list of available data is presented in the section “Specification of registers and their contents”.

This application note describes the configuration to be carried out in the products to make this Modbus server functionality available.

2) CONFIGURING MODBUS TCP SERVER

Inside menu “Setup > System > Modbus Server”

The screenshot shows the Etic Telecom web interface. The top header includes the Etic Telecom logo, the product model 'RAS-EC-220-LE', and the word 'Demonstration'. Below the header is a navigation bar with links for 'Documentation', 'EN', 'FR', and 'Log off'. The left sidebar contains a tree menu with categories: Home, Setup, System, GPS, Diagnostics, Maintenance, and About. The 'Setup' category is expanded, showing sub-items like WAN Interfaces, LAN Interface, Remote access, Network, Security, Gateways, Datalogger, and System. The 'System' category is also expanded, showing sub-items like Messaging, SMS/e-mail, Output, Date and time settings, Periodical reboot, Service list, Syslog, SNMP, OPC UA Server, and Modbus Server. The main content area displays the 'Modbus Server' configuration page. It has a breadcrumb trail: '> Home > Setup > System > Modbus Server'. At the top of the configuration area are 'Save' and 'Cancel' buttons, followed by a red warning message: 'Page has unsaved changes'. Below this is a yellow highlighted section with an 'Enable' checkbox (checked) and a 'Port' input field. At the bottom of this section are 'Save' and 'Cancel' buttons.

Check the “Enable” box and enter a free TCP port number for the Modbus server.
If you do not specify a port number, port 502 is used by default.

The machines connected to the product will be able to send Modbus TCP requests to previously specified port and thus retrieve the content of requested registers.

3) READING AND WRITING MODBUS REGISTERS

Some registers are made to be read; they show statuses for the product. Others are made for you to write inside them for specific features. These registers are detailed in chapter “Specification of registers and their contents”.

To read registers, send a Modbus Request “Read Holding Registers” (FC=3).
To write on registers, send a Modbus Request “Write Multiple Registers” (FC=16) or “Write Single Register” (FC=6).

Sending SMS and E-Mail Functionality

Some registers are dedicated to message options:

- Registers 490-539: Message sender
- Registers 540-589: Message destination
- Registers 590-639: Message subject
- Registers 640-763: Message text

Warning: Here, registers numbers follow chapter “Specification of registers and their contents” but numbers used by Modbus client’s requests are 10 registers higher: Here is an example of a Wireshark capture of a Modbus Request to write Message sender:

```
Modbus
.001 0000 = Function Code: Write Multiple Registers (16)
Reference Number: 500
```

Steps:

1. First, write 8-bit ASCII characters starting from the first register of each option.
2. Every option must be filled to send E-Mail, only Destination and Text for SMS
3. The Modbus Server will read registers until it finds a register with value 0x00, the Sender, Destination and Subject registers are therefore limited to 99 characters.

Here is an example of the content of registers for the sender “ETIC Telecom”: each register contains 2 characters; the first letter is on the LSB and the second on the MSB.

Register	490	491	492	493	494	495	496
Register @	40501	40502	40503	40504	40505	40506	40507
8-bit ASCII	TE	CI	T	le	ce	mo	
Hexadecimal	0x5445	0x4349	0x5420	0x6c65	0x6365	0x6d6f	0x0000
Decimal	21573	17225	21536	27749	25445	28015	0

4. Once every needed option is filled, you must write inside Modbus Coils to trigger the sending of the message. To write on these coils, send a Modbus Request “Write Single Coil” (FC=5) or “Force Multiple Coils” (FC=15).
Setting Coil at address 0 to ON state will send a SMS.
Setting Coil at address 1 to ON state will send an e-mail.

Here is an example of a Wireshark capture showing a Modbus Request to trigger an E-Mail:

```
Modbus
.000 0101 = Function Code: Write Single Coil (5)
Reference Number: 1
```

4) SPECIFICATION OF REGISTERS AND THEIR CONTENTS

Register 0 Address: 40011

NodeID: 255

All statuses can be read in one request Read Holding Register (FC=03)

Register MAP:

Register 0-3: GPS Location latitude: TYPE LREAL (-1.79e+308 ... 1.79e+308) - °

- Register 0 - bit 0: LSB (Least Significant Bit)
- Register 3 - bit 15: MSB (Most Significant Bit)

Register 4-7: GPS Location longitude: TYPE LREAL (-1.79e+308 ... 1.79e+308) - °

- Register 4 - bit 0: LSB
- Register 7 - bit 15: MSB

Register 8-9: GPS Location altitude: TYPE REAL (-3.40e+38 - 3.40e+38) – meters

- Register 8 - bit 0: LSB
- Register 9 - bit 15: MSB

Register 10-11: GPS Location speed: TYPE REAL (-3.40e+38 - 3.40e+38) - m/s

- Register 10 - bit 0: LSB
- Register 11 - bit 15: MSB

Register 12: GPS Location precision: TYPE UINT (0 ... 65535) – meters

...

Register 20: Input states Connected: TYPE WORD

- bit 0 – Status of input (0 disabled / 1 enabled)

Register 21: Output states Connected: TYPE WORD

- bit 0 – Status of output (0 disabled / 1 enabled)

Register 22: Power supply 1: TYPE UINT (0 ... 65535) – dV

Register 23: Power supply 2: TYPE UINT (0 ... 65535) – dV

Register 24: Internal temperature: TYPE INT (-32768 ... 32767) - °C

...

Register 30: Main WAN Status: TYPE UINT (0 ... 65535)

- 0: All Down / 1: ADSL / 2: Ethernet / 3: Cellular / 4: Wi-Fi

Register 31: ADSL WAN states: TYPE WORD

- bit 0: ADSL WAN State (0 disabled / 1 enabled)
- bit 1: ADSL WAN Connected (0 disconnected / 1 connected)

Register 32: Ethernet WAN states: TYPE WORD

- bit 0: Ethernet WAN State (0 disabled / 1 enabled)
- bit 1: Ethernet WAN Connected (0 disconnected / 1 connected)

Register 33: Cellular WAN states: TYPE WORD

- bit 0: Cellular WAN State (0 disabled / 1 enabled)
- bit 1: Cellular WAN Connected (0 disconnected / 1 connected)

Register 34: Wi-Fi WAN states: TYPE WORD

- bit 0: Wi-Fi WAN State (0 disabled / 1 enabled)
- bit 1: Wi-Fi WAN Connected (0 disabled / 1 enabled)
- bit 2: Wi-Fi WAN Auto-DNS (0 disabled / 1 enabled)

...

Register 40: ADSL WAN Down Rate: TYPE UINT (0 ... 65535) – kbits/s

Register 41: ADSL WAN Up Rate: TYPE UINT (0 ... 65535) – kbits/s

Register 42-43: ADSL WAN Down SNR Margin: TYPE REAL (-3.40e+38 - 3.40e+38) - dB

Register 44-45: ADSL WAN Up SNR Margin: TYPE REAL (-3.40e+38 - 3.40e+38) - dB

...

Register 60: Cellular WAN Signal level: TYPE INT (-32768 ... 32767) – dBm

Register 61-62: Cellular WAN SNR: TYPE REAL (-3.40e+38 - 3.40e+38) – dBm

- Register 61 - bit 0: LSB
- Register 62 - bit 15: MSB

Register 63: Cellular WAN Bytes Received: TYPE UINT (0 ... 65535) - Megabytes

Register 64: Cellular WAN Bytes Transmitted: TYPE UINT (0 ... 65535) - Megabytes

...

Register 70: Wi-Fi WAN Frequency: TYPE UINT (0 ... 65535) - MHz

Register 71: Wi-Fi WAN Signal level: TYPE INT (-32768 ... 32767) - dBm

...

Register 80: LAN Interfaces states: TYPE WORD

- bit 0...1 - status of Ethernet LAN port 0
 - o 00 disabled
 - o 10 enabled/disconnected
 - o 11 enabled/connected

- bit 2...3 - status of Ethernet LAN port 1
- bit 4...5 - status of Ethernet LAN port 2
- bit 6...7 - status of Ethernet LAN port 3

Register 81: Wi-Fi LAN states: TYPE WORD

- bit 0: Wi-Fi LAN State (0 disabled / 1 enabled)
- bit 1: Wi-Fi LAN 802.11n (0 disabled / 1 enabled)
- bit 2: Wi-Fi LAN on Tor (0 disabled / 1 enabled)

Register 82: M2Me remote access states: TYPE WORD

- bit 0: M2Me Active (0 disabled / 1 enabled)
- bit 1: M2Me Connected (0 disconnected / 1 connected)
- bit 2: M2Me Proxy (0 disabled / 1 enabled)

Register 83: M2Me number of connected remote users: TYPE UINT (0 ... 65535)

...

Register 90-99: Open VPN IN states: TYPE WORD

- bit X: VPN n° X Connected (0 disconnected-not created / 1 connected)

Register 100-109: Open VPN OUT states: TYPE WORD

- bit X: VPN n° X Connected (0 disconnected-not created / 1 connected)

Register 110-119: IPsec VPN states: TYPE WORD

- bit X: VPN n° X Connected (0 disconnected-not created / 1 connected)

...

Register 490-539: Message sender

- 50 registers made to write 99 8-bit ASCII characters (Not used for SMS)

Register 540-589: Message destination

- 50 registers made to write 99 8-bit ASCII characters – Must be a valid phone number or E-mail

Register 590-639: Message subject

- 50 registers made to write 99 8-bit ASCII characters (Not used for SMS)

Register 640-763: Text message to be sent

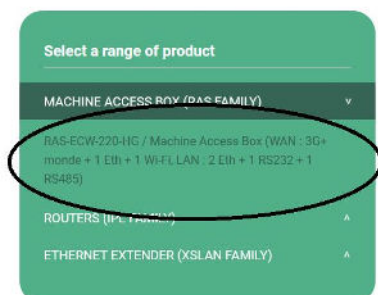
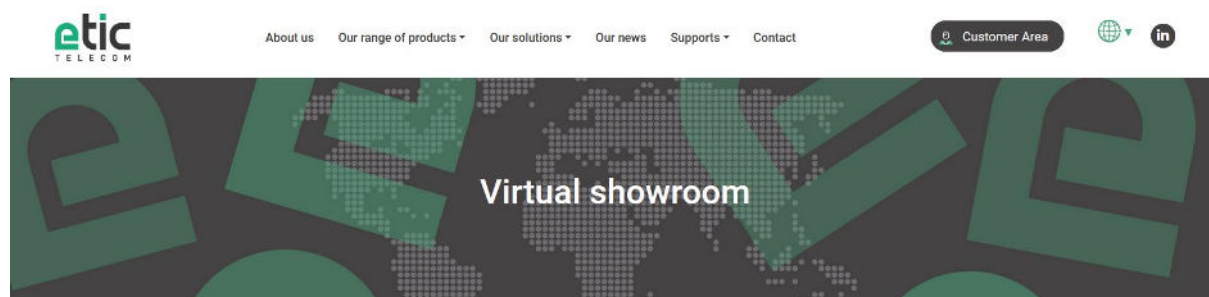
- 123 registers made to write 246 8-bit ASCII characters

5) HOT LINE SUPPORT DURING YOUR TEST

Feel free to contact +33 4 76 04 20 05 or hotline@etictelecom.com

6) VIRTUAL SHOWROOM (AVAILABLE FROM THE HOME PAGE)

By surfing on our WEB site www.etictelecom.com (Support/Virtual Showroom) you can learn how to configure a Machine Access Box (namely a RAS product).



13, chemin du Vieux Chêne
38240 Meylan
Tél. 04 76 04 20 00
Fax. 04 76 04 20 01
www.etictelecom.com