MB54XX-X
Modbus Gateway
User's Manual

v. 1.1

December, 2012

Important Announcement

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Preface

Purpose of the Manual

This manual supports you during the installation and configuring of the MB54XX Modbus Gateway Series only, as well as it explains some technical options available with the mentioned product. As such, it contains some advanced network management knowledge, instructions, examples, guidelines and general theories designed to help users manage this device and its corresponding software; a background in general theory is a must when reading it. Please refer to the Glossary for technical terms and abbreviations (if any).

Who Should Use This User Manual

This manual is to be used by qualified network personnel or support technician who are familiar with network operations; it might be useful for system programmers or network planners as well. This manual also provides helpful and handy information for first time users. For any related problems please contact your local distributor, should they be unable to assist you, please redirect your inquiries to www.atop.com.tw or www.atop-tech.com .

Supported Platform

This manual is designed for the MB54XX Modbus Gateway Series and that series only.

Warranty Period

We provide a 5 year limited warranty for the MB54XX Modbus Gateway Series.

Manufacturers Federal Communication Commission Declaration of Conformity Statement

Model: MB54XX Modbus Gateway Series

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful

interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.

1 Introduction

1.1 Overview

The Modbus Gateway is an interface between Modbus Gateway and computer hosts running Modbus/TCP on Ethernet networks. Fully compliant with Modbus/TCP, the Modbus Gateway offers a convenient solution to connect existing devices or controllers running Modbus serial protocol (Modbus/ASCII or Modbus/RTU) to an Ethernet network. The MB54XX Series are standard Modbus gateways that convert between Modbus TCP and Modbus RTU/ASCII protocols.

The MB54XX Series support 16 simultaneous TCP master and 32 simultaneous requests for each TCP master. Each RS-232/422/485 serial port can be individually configured for Modbus RTU or Modbus ASCII operation or even different baudrate, allowing both types of networks to be fully integrated with Modbus TCP within one package.

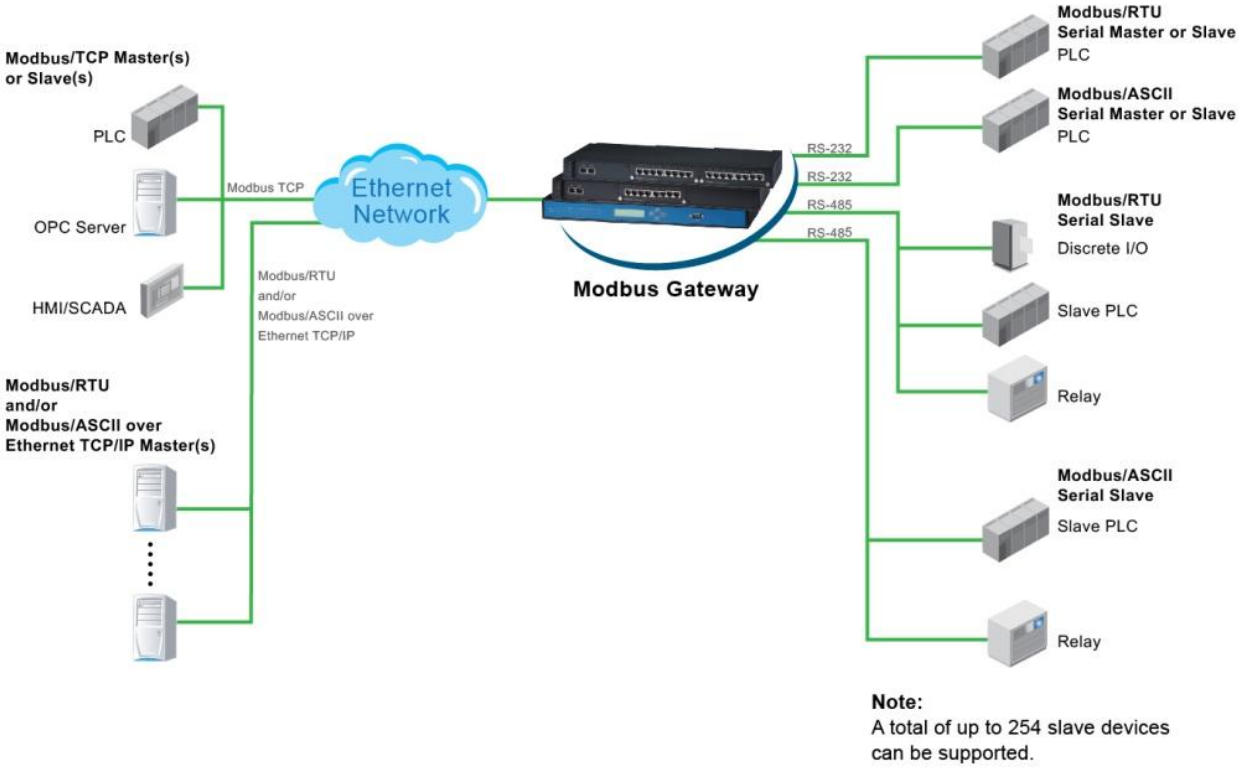


Fig. 1. 1

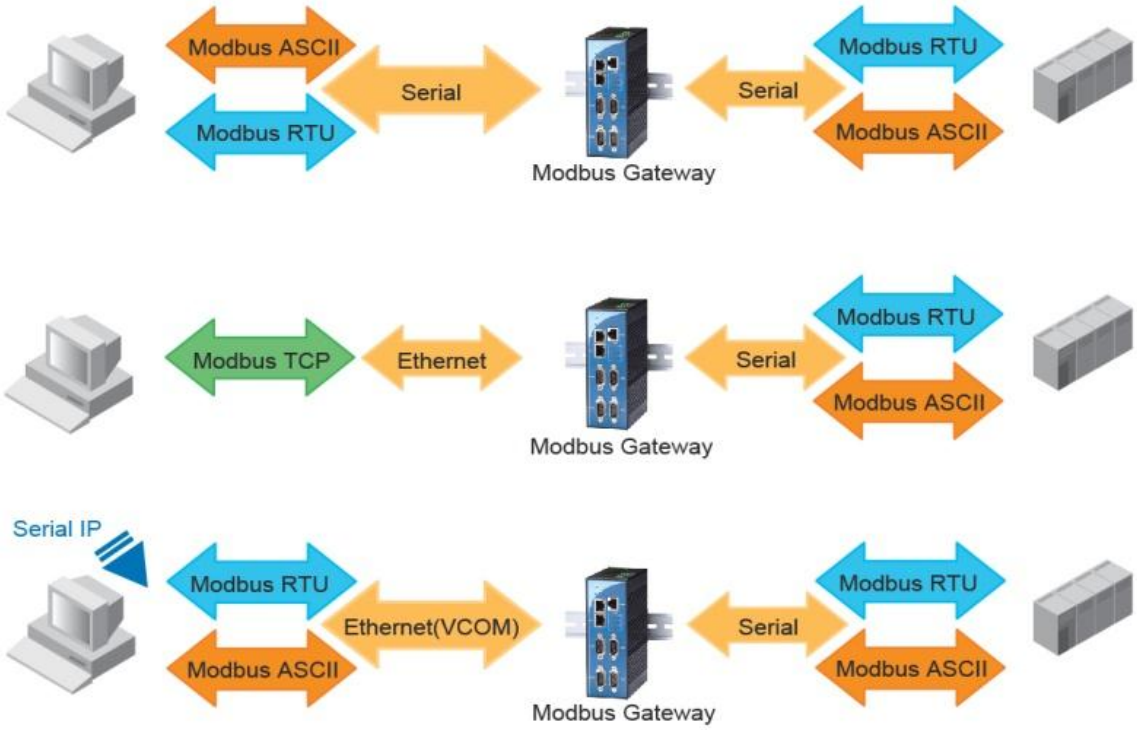

Modbus ASCII
Modbus RTU
Serial
Modbus Gateway
Serial
Modbus RTU
Modbus ASCII
Modbus TCP
Ethernet
Modbus Gateway
Serial
Modbus RTU
Modbus ASCII
Serial IP
Modbus RTU
Modbus ASCII
Ethernet(VCOM)
Modbus Gateway
Serial
Modbus RTU
Modbus ASCII

Fig. 1. 2

1.2 Features

- RISC 32-bit 266 MHz CPU
- Standard 19-inch rack-mount 1U high metal housing
- Software selectable RS-232/RS-485/RS-422 RJ-45 connection
- Dual 10/100 Mbps Ethernet ports for network redundancy
- Configurable via LCM buttons, Serial console, Telnet, Web and Windows-based utility program **Device View©**
- Relay output indicator for network link status
- LCM indication with 4 keypad settings
- Convert between Modbus TCP and Modbus RTU/ASCII
- 2 Ethernet port and 4,8, or 16 RS-232/422/485 ports
- Supports 16 simultaneous TCP masters with up to 32 simultaneous requests per master
- Easy hardware setup and configuration

Caution

Beginning from here there will be extreme caution exercised.

 Never install or work on electrical or cabling during periods of lighting activity. Never connect or disconnect power when hazardous gases are present.

 **WARNING:** Disconnect the power and allow to cool 5 minutes before touching.

2 Getting Started

2.1 Inside the Package

Inside the purchased you will find the following items.

Table 2. 1

Item	Quantity	Description
MB54XX Series	1	Modbus Gateway
Cable	1	RJ-45 to Male DB9 cable
Mounting Kit	1	Rack Mounting Type-L angles (x 2) Screws (x 6)
Foot Rubbers		
Documentation + CD		Inside the CD you will find: ● User's Manual ● Installation Guide ● **Device View©** utility
		Installation Guide + Warranty Card

How to order

Please refer to the following product codes to place an order.

Table 2. 2

Item	Description
MB5404D-X	4-Port Serial-to-Ethernet Intelligent Modbus Gateway, D-Sub(M)
MB5404D-Sis-X	4-Port Serial-to-Ethernet Intelligent Modbus Gateway, Terminal Block, 2 KV Isolation
MB5408-X (US)	8-Port Serial-to-Ethernet Intelligent Modbus Gateway with RJ45 connectors, AC 100-240V, US power plug
MB5408-X (EU)	8-Port Serial-to-Ethernet Intelligent Modbus Gateway with RJ45 connectors, AC 100-240V, EU power plug
MB5416-X (US)	16-Port Serial-to-Ethernet Intelligent Modbus Gateway with RJ45 connectors, AC 100-240V, US power plug
MB5416-X (EU)	16-Port Serial-to-Ethernet Intelligent Modbus Gateway with RJ45 connectors, AC 100-240V, EU power plug

Note: Notify your sales representative immediately if any of the above items is missing or damaged upon delivery.

2.2 Appearance, Front & Rear Panels

The following figures show the device's front and rear panels.

MB5404D-X (Left) / MB5404D-Sis-X (Right) Front Panel

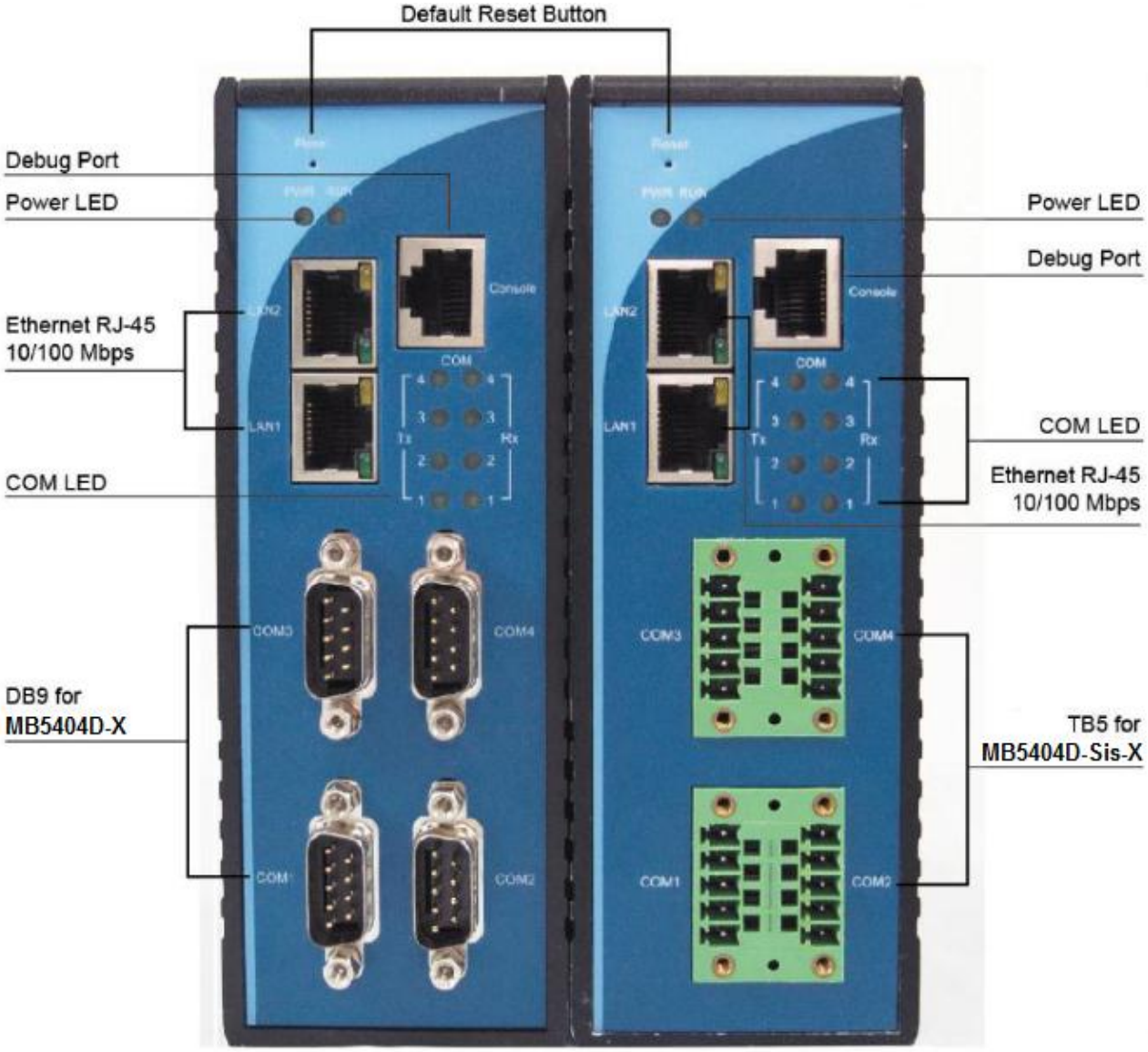


Fig. 2. 1

MB5416-X Front and Rear Panel

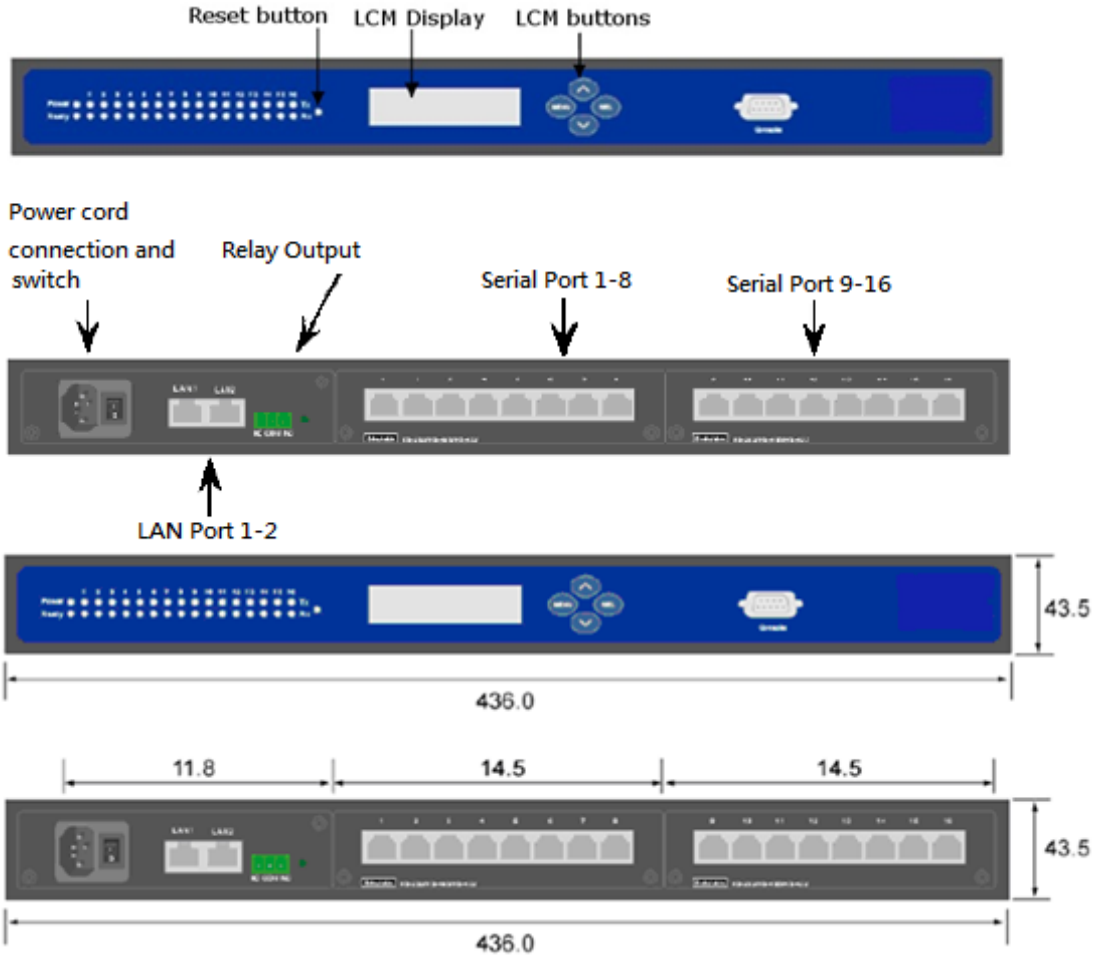


Fig. 2. 2

MB5408-X Front and Rear Panel

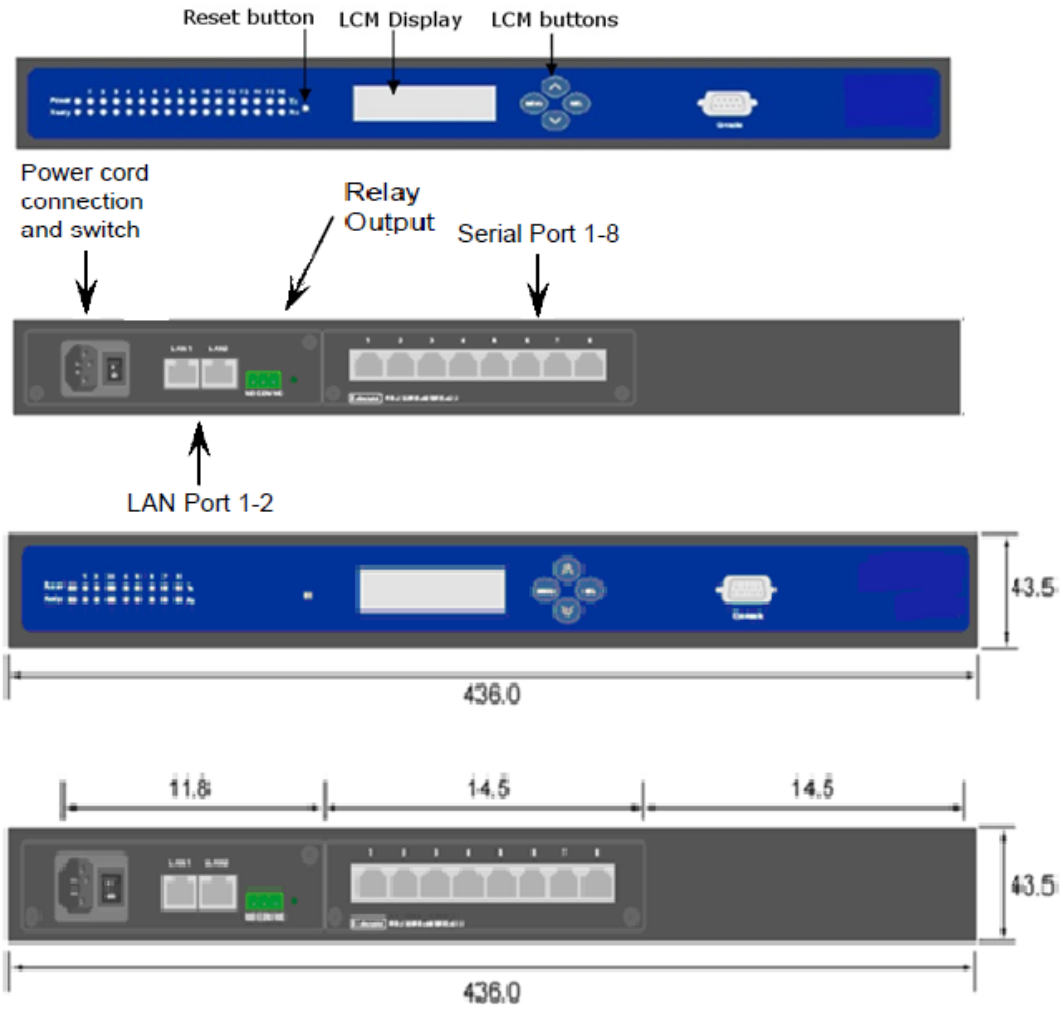


Fig. 2. 3

2.3 First Time Installation

Before installing the device, please adhere to all safety procedures described below, Atop will not be held liable for any damages to property or personal injuries resulting from the installation or overall use of the device. Do not attempt to manipulate the product in any way if unsure of the steps described here, in such cases please contact your dealer immediately.

1. Prepare the necessary cables, DC adapter, power cord, LAN cable, etc.; do not connect the unit yet.
2. Plug in the Power Supply/Adapter (MB5404D-X/MB5404D-Sis-X) or AC power cord (MB5408/5416-X) to a power outlet and turn on the power switch (please make sure the electric outlet has proper grounding so as to not cause damage to the unit, property or yourself); shortly thereafter the unit will beep once and the LCM Display will show a .
3. Within one minute, the buzzer shall beep once, and the LCM Display shall show the model's name.
4. Connect LAN1 to a network switch or to your LAN network with a UTP cable, and connect a host PC to your LAN network with another cable.
5. Connect a serial device to one of the serial ports, and make sure a correct cable is used (Pin assignments for a RS-232 device and for a RS-485 cable are shown in)

For more information on how to install the device, please refer to the Installation Guide available in your package.

2.4 Factory Default Settings

Network Defaults

Note that the Modbus Gateway comes with one IP address for redundant Ethernet interfaces.

Table 2. 3

Interface	Device IP	Subnet mask	Gateway IP
LAN 1	10.0.50.100	255.255.0.0	10.0.0.254

Modbus Default

Table 2. 4

Parameter	Default Values
Modbus Master	
TCP Settings	**TCP Master** ● **Mode:** TCP Master ● **Port:** 502
Modbus Slave	
● MB5416-X:COM1 – COM16 ● MB5408-X:COM1– COM8 ● MB5404D-X: COM1– COM4 ● MB5404D-Sis-X: COM1– COM4	**Mode:** RTU Slave **Serial Configuration:** RS-232, 9600 bps, 8 data bits, None Parity bit, 1 stop bit, None Flow Control, Buffer Disabled,

Other Default Settings are shown in the following table:

Table 2. 5

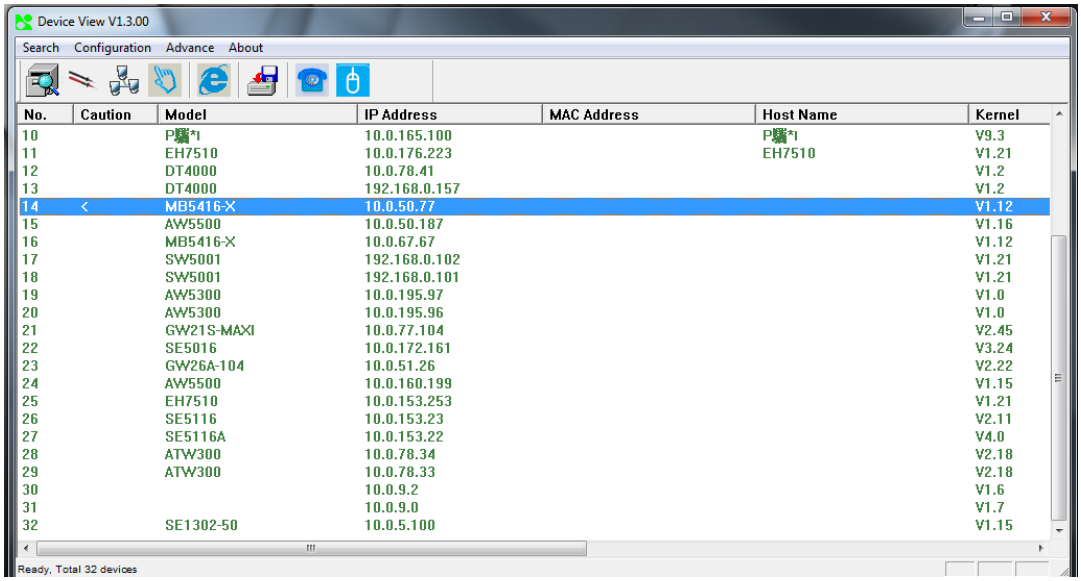
Parameter	Default Values
Security	
User Name	Admin
Password	Null *(blank)*
SNMP	
SysName of SNMP	0060E9-XXXXXX
SysLocation of SNMP	Location
SysContact of SNMP	Contact
SNMP	Enable
Read Community	Public
Write Community	Private
SNMP Trap Server	0.0.0.0

Note: you can press the **"Reset"** button on the front panel for 5 seconds (see Sec. 3.8.8 and 3.9), to restore the server to factory default settings.

3 Configuration and Setup

3.1 Locating and IP configuring using Device View©

First, please install our configuration utility program **Device View©** that comes with the Product CD or download it from our websites (www.atop.com.tw or www.atop-tech.com). For more information on how to install **Device View©,** please refer to the manual that comes in the utility CD. To find the Modbus Gateway device on your network, press **"Scan"**, a list of devices currently connected to the network will be shown in the window.



No.	Caution	Model	IP Address	MAC Address	Host Name	Kernel
10		P[illegible]*I	10.0.165.100		P[illegible]*I	V9.3
11		EH7510	10.0.176.223		EH7510	V1.21
12		DT4000	10.0.78.41			V1.2
13		DT4000	192.168.0.157			V1.2
14	<	MB5416-X	10.0.50.77			V1.12
15		AW5500	10.0.50.187			V1.16
16		MB5416-X	10.0.67.67			V1.12
17		SW5001	192.168.0.102			V1.21
18		SW5001	192.168.0.101			V1.21
19		AW5300	10.0.195.97			V1.0
20		AW5300	10.0.195.96			V1.0
21		GW21S-MAXI	10.0.77.104			V2.45
22		SE5016	10.0.172.161			V3.24
23		GW26A-104	10.0.51.26			V2.22
24		AW5500	10.0.160.199			V1.15
25		EH7510	10.0.153.253			V1.21
26		SE5116	10.0.153.23			V2.11
27		SE5116A	10.0.153.22			V4.0
28		ATW300	10.0.78.34			V2.18
29		ATW300	10.0.78.33			V2.18
30			10.0.9.2			V1.6
31			10.0.9.0			V1.7
32		SE1302-50	10.0.5.100			V1.15

Fig. 3. 1

Note: for illustration purpose only, actual values/settings may vary between devices.

The device might not be in the same subnet as your PC, because of this you will have to use our utility to locate it in your virtual environment. To configure each device, click the selected device (default IP: 10.0.50.100), and login with the default username and password. After successful login, click **"Configuration >Network…"** (Or Ctrl+N), and a pop-up window will appear as follows,

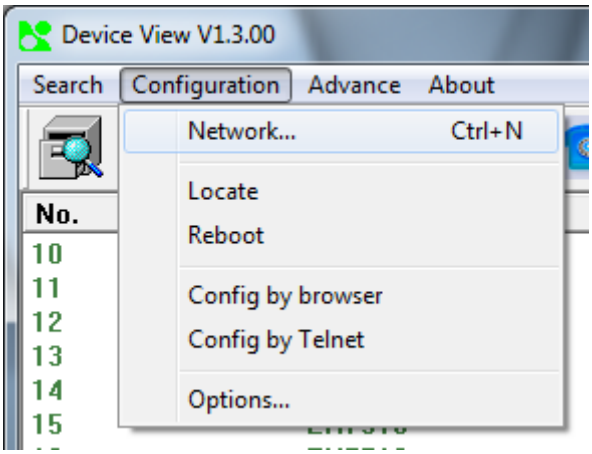


Fig. 3. 2

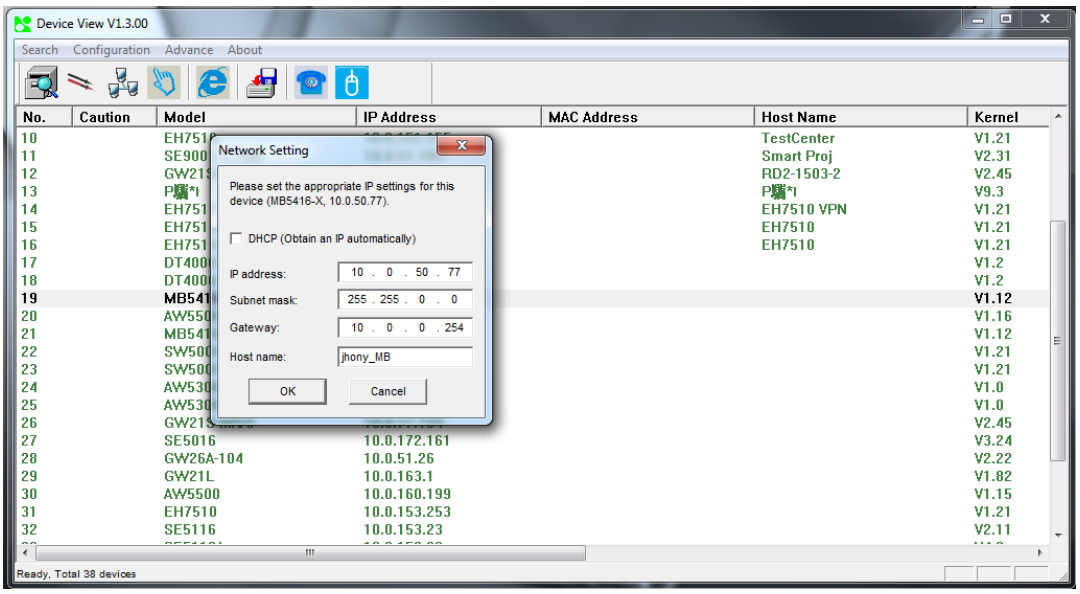


Fig. 3. 3

You may proceed then to change the IP address, to avoid any IP address conflict with other hosts on your LAN network or to connect the device to your existing LAN. The system will prompt you to Authorize whether you can do these changes or not, i.e., it will ask you for the Username and Password, (Fig. 3.4).

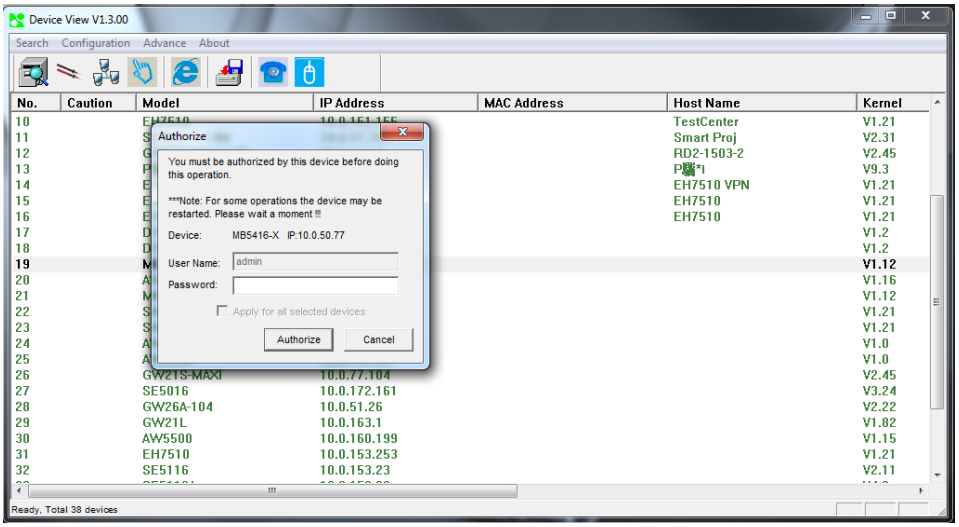


Fig. 3. 4

Please consult your system administrator if you do not know your network subnet mask and gateway address. If your LAN network address begins with **192.168.X.X,** then please use the LAN2 interface for configuration.

3.2 Configuration using Web Interface

Every MB54XX Modbus Gateway device is equipped with a built-in Web server in the firmware. Therefore, it can be accessed by using a browser for configuration by entering the device's IP (see Sec. 2.4 for default value).

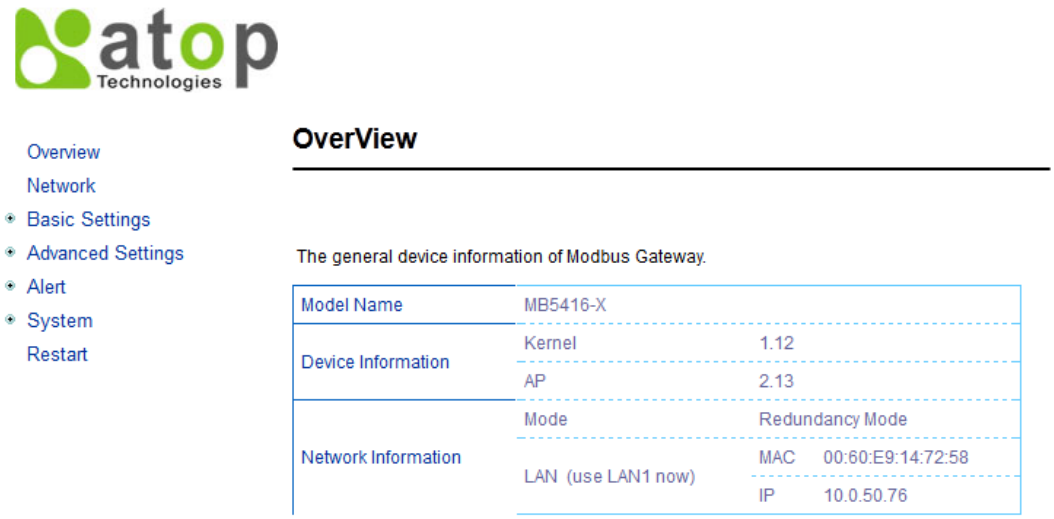


Fig. 3. 5

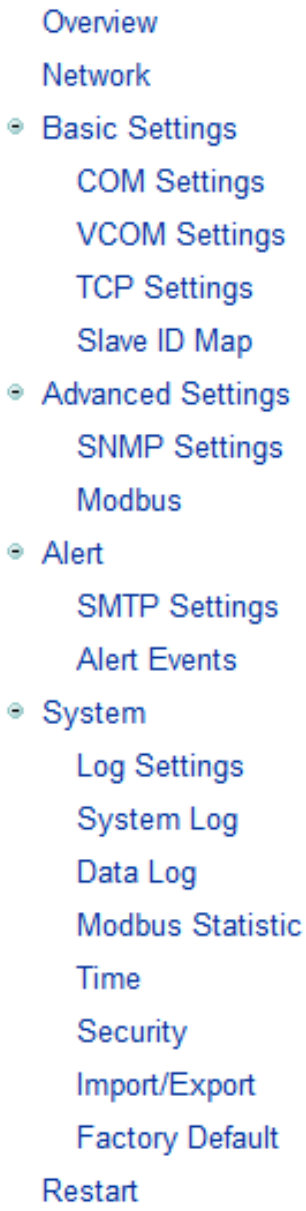


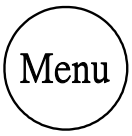
Fig. 3. 6

This type of configuration is the most user-friendly, most recommended and most common method used on your MB54XX Modbus Gateway. Please go to its corresponding section for a detailed explanation.

3.2.1 LCM (Liquid Crystal Matrix) Configuring (MB5408-X/5416-X only)

The device also has the option of manual configuration (without the software), by making use of its interactive console. Using this method is however, very easy and intuitive; buttons and their functions are described next.

Table 3. 1

Buttons		Button Description
	<Menu>	Open Main Menu, or to return to the previous Menu
	<Up>	Scroll up
	<Down>	Scroll down
	<SEL>	Select

Example

To change the device's IP address, follow the approach below.

- Press **<Menu>** to enter **Main Menu**
- Press **<Down>** to scroll down to **2. Network Set**
- Press **<SEL>** to enter Network setting and then **<Up>/<Down>** to scroll up or down to **LAN1**
- Press **<SEL>** to enter **LAN1** and then **<Down>** to scroll down to **1. IP Config**
- Press **<SEL>** to enter **LAN1 IP Config** and then press **<Down>** to scroll down to **1. Static**, finally press **<SEL>** to save the selection.
- Press **<SEL><Down>** to enter **2. IP Address**. Use **<Up>/<Down>** to increase or decrease the **Digital of IP Address**, press **<Menu>** to return to one level higher after completion

- To enter: **3. Net mask Use <Up>/<Down>** to increase or decrease the Digital of subnet mask and then **<Menu>** to return to one level higher after completion
- To enter: **4. Gateway**. Use **<Up>/<Down>** to increase the Digital of default gateway and use **<Menu>** to return to one level higher after completion
- Press **<SEL>** to the end of the menu to return to one level higher and the device shall display System message **"Save & Restart"**. Push **<SEL> to 2. Yes**, and **<SEL>** again after completion. The device shall restart and the new settings will appear.

The LCM command structure is as follows, Table.

Table 3. 2

1st layer	2nd layer	3rd layer	4th layer	5th layer	Descriptions
1.Overview	1. Model name				Display Model name
	2. Kernel ver.				Display kernel version
	3. AP ver.				Display AP version
	4. Lan 1	1.Lan status			Display status of LAN1
		2.MAC			Display MAC address of LAN1
	5. Lan 2	1.Lan status			Display LAN of LAN2
		2.MAC			Display MAC address of LAN2
2.Network set	1.Lan 1	1.IP config	1.Static IP		Display/Change static IP
			2.DHCP		Display dynamic IP or enable DHCP
		2.IP address			Display/Change LAN1 IP
		3.Net mask			Display/ Change Net mask
		4.Gateway			Display/Change the Gateway IP
	2.DNS server1				Display or Change 1st DNS IP address
	3.DNS server2				Display or Change 2nd DNS IP address
3.Serial set	1.Select port				Select COM Port: SE5016: [1]~[16] / SE5008: [1]~[8]

	2.Parameter set	1.Baud Rate	1. 300		Display or Change baud rate
			2. 600		
			3. 1200		
			4. 2400		
			5. 4800		
			6. 9600		
			7. 19200		
			8. 38400		
			9. 57600		
			10. 115200		
			11. 230400		
			12. 460800		
			13. 921600		
		2.Parity	1. None		Display or Change Parity mode
			2. Odd		
			3. Even		
			4. Mark		
			5.Space		
		3.Data bits	1. 5 bits		Display or Change Data bit length
			2. 6 bits		
			3. 7 bits		
			4. 8 bits		
		4.Stop bits	1. 1 bits		Display or Change Stop bit length
			2. 2 bits		
		5.Flow control	1. None		Display or Change Flow control mode
			2. Xon/Xoff		
			3. Hardware		

		6.UART mode	1. 232		Display or Change UART mode for RS-232
			2. 422		Display or Change UART for RS-422
			3. 485		Display or Change UART for RS-485
		7.Apply to all	1.No		
			2.Yes		Apply UART setting to all serial ports
4.Server state	1.Console	1.Web console	1.Disable		Disable Web console
			2.Enable		Enable Web console
		2.Telnet console	1.Disable		Disable Telnet console
			2.Enable		Enable Telnet console
	2.Pwd protection	1.LCM console	1.No		Disable LCM console password protection
			2.Yes		Enable and change the password
		2.Reset button	1.No		Disable the Reset button password protection
			2.Yes		Enable and change the password on Reset button
	3.Ping	1.Lan 1			Use "ping" command to check specific IP address for LAN1
		2.Lan 2			Use "ping" command to check specific IP address for LAN2
5.Restart	1.No				Cancel Restart command
	2.Yes				Restart immediately

3.2.2 Configure Automatic IP Assignment with DHCP

A DHCP server can automatically assign addresses to LAN1 or LAN2, the Subnet Mask, and the Gateway. You can simply check **"DHCP"** box in the Network Setting dialog using our **Device View©** utility and then restart it; once restarted it will be automatically configured.

3.3 Web Overview

In this section, only current information on the device's status and settings will be displayed.

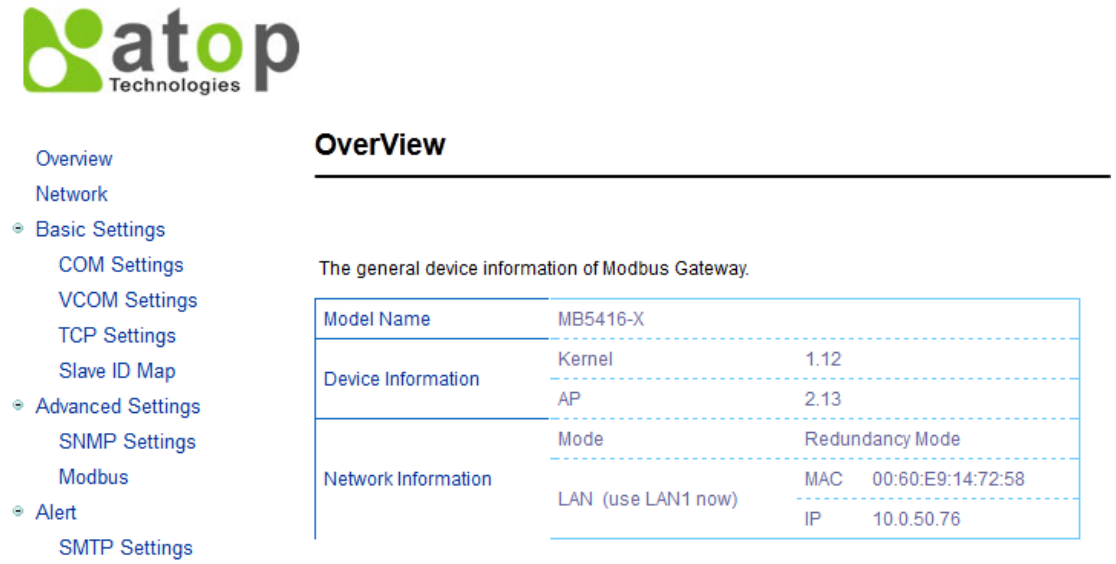


Fig. 3. 7

- **Model Name** as its name implies, shows the device's model.
- **Device Information** displays information on the Kernel version, as well as the AP
- **Network Information** here you may find the Mode in which the device is currently working on (Dual Subnet, Redundancy Mode), and both LANs respective MAC and IP addresses.
  - **Dual Subnet Mode: in which** two Ethernet ports have separate IP addresses and subnets
  - **Redundancy Mode:** the system will just use one port for data transfer, if this port is disconnected, the whole system will change to another port automatically.

3.4 Network Configuration

In this section, IP, Subnet Mask and overall connectivity settings can be accessed. When on **Redundancy Mode** the device will have the two LAN ports connected[1] to the Network, but the signal will flow through one of them. In the case one line is out due to any reason there will still be another route so the signal can keep flowing.

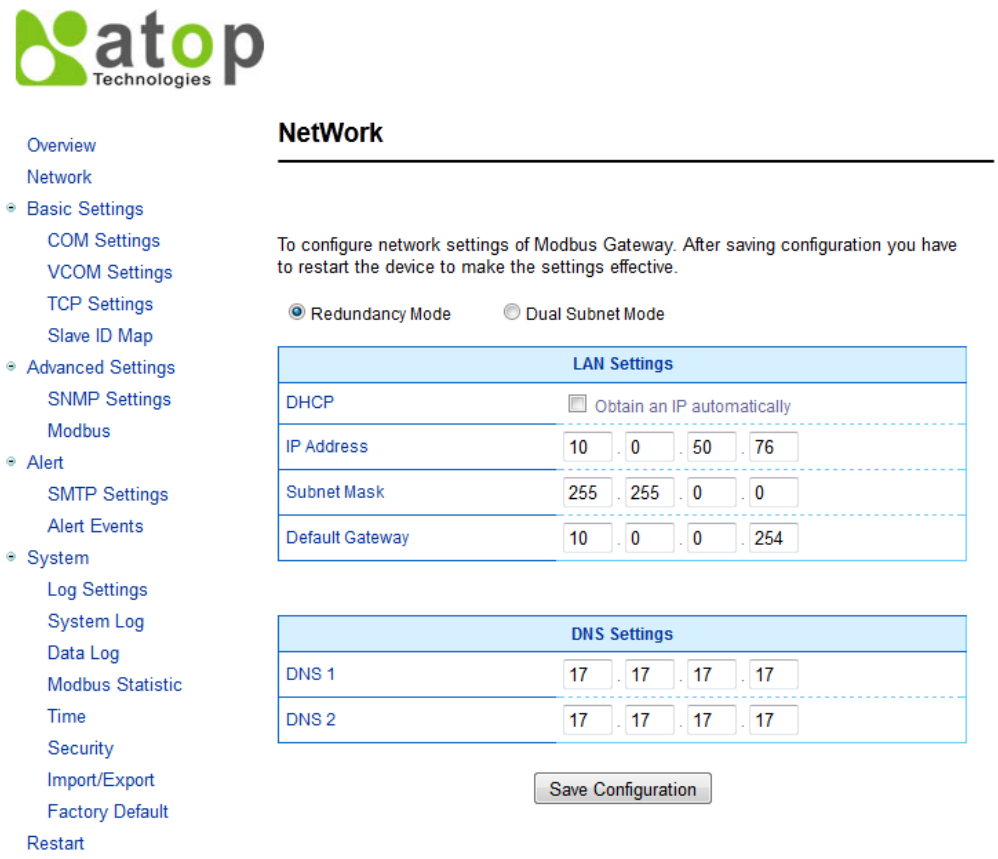


Fig. 3. 8

Note[1]: you can still connect only one LAN port to the device, though you can still change the settings in it, there won't be a **Redundancy** function.

When the device is set on **Dual Subnet Mode,** a set of two IP addresses can be used without having **Redundancy.** This is especially useful when using two different networks.

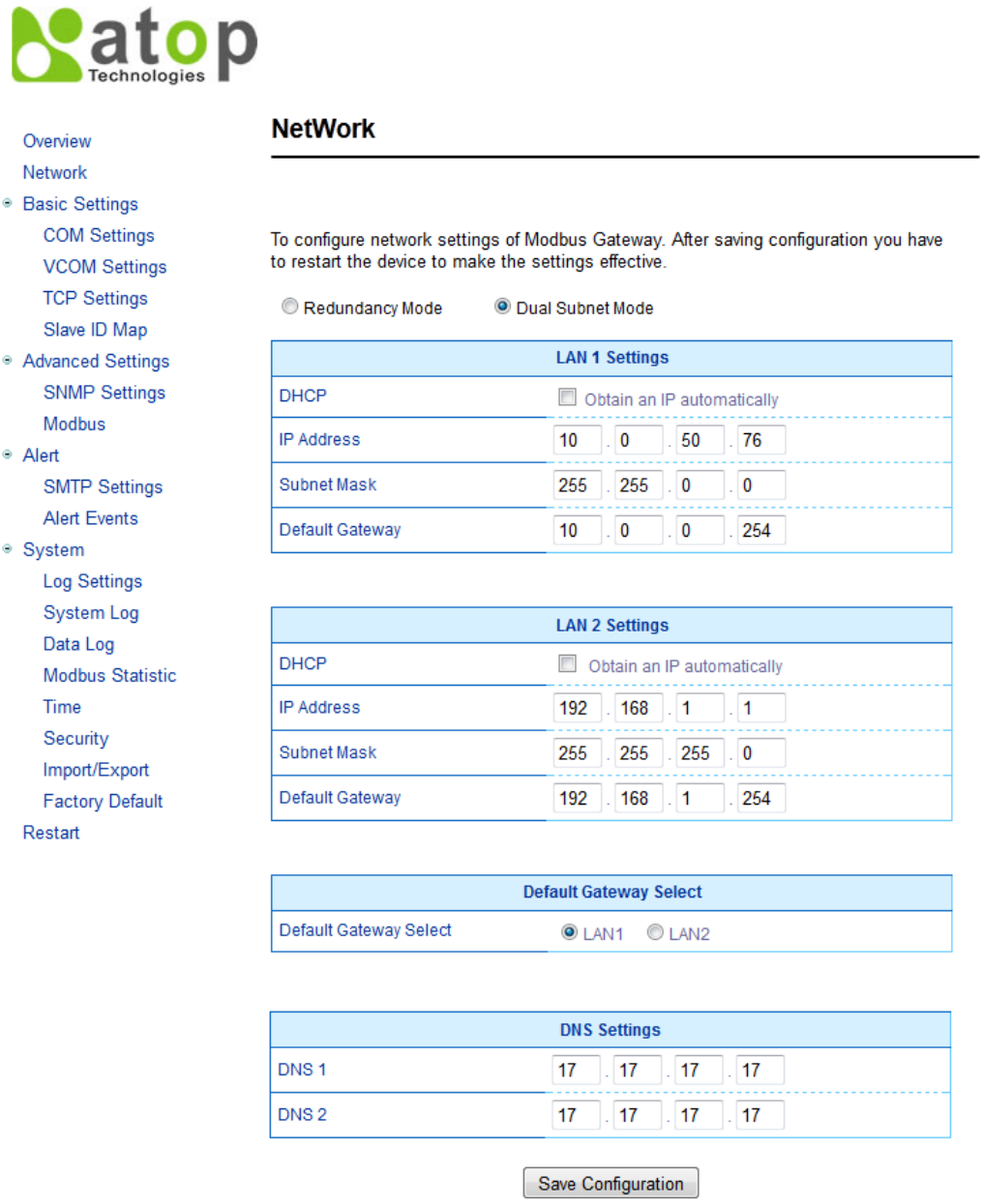


Fig. 3. 9

3.5 Basic Settings

3.5.1 COM Settings

This section is responsible for settings on your physical ports, (may them be COM or serial).

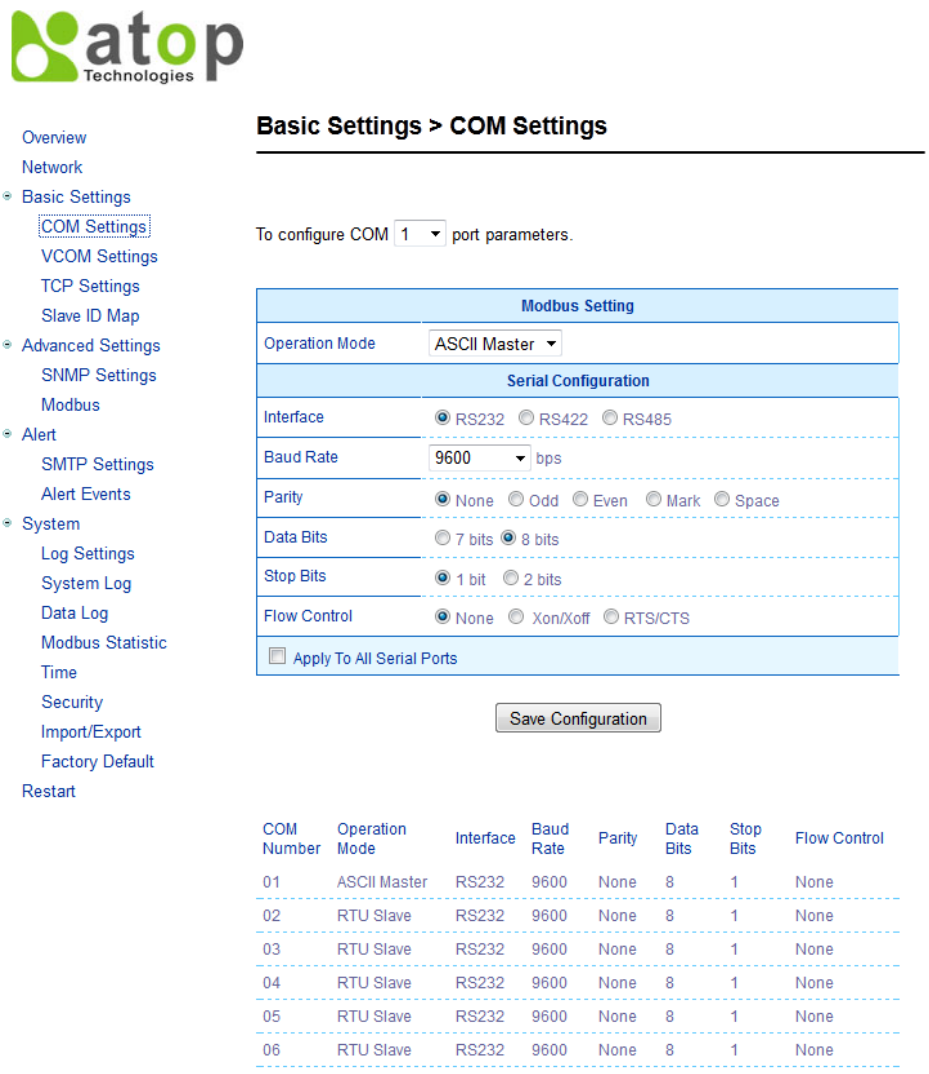


Fig. 3. 10

3.5.2 Operation Mode

- **RTU Slave:** when working as a slave node, the device will wait and accept request from its master; data transfer is done under an RTU format.
- **RTU Master:** when working as a master node, the device will issue commands to the slave node; data transfer is under an RTU format.
- **ASCII Slave:** when working as a slave node, the device will wait and accept request from its own master; data transfer is under an ASCII format.
- **ASCII Master:** when working as a master node, the device will issue commands to the slave node; data transfer is under an ASCII format.

3.5.3 Serial Settings

This section has the following selections:

- RS-232/RS-422/RS-485 Software Selectable (Default: RS-232)
- Baud-rate: 110 bps ~ 921600 bps
- Parity: None, Even, Odd, Mark, or Space
- Data Bits: 5, 6, 7, or 8
- Stop Bits: 1 or 2
- Flow Control: None, Hardware CTS/RTS, Software Xon/Xoff

Apply to all Serial Ports Alternatively, the settings can be chosen to apply to all Serial Ports if needed by checking the last box on the options.

3.5.4 VCOM Settings

Generates a virtual Serial (COM) port within the device by the network connection, it is a **TCP connection** but the encoding is an Atop Technologies' exclusive private protocol. There is the choice to set your device as either a Master or a Slave in your network.

You will need a VCOM setting, proceed to go to **Basic Settings → VCOM Settings** and tick on the VCOM's **"Enable"** box to allow configuration on the port selected.

The options for Master are similar, the only difference being on the device's function.

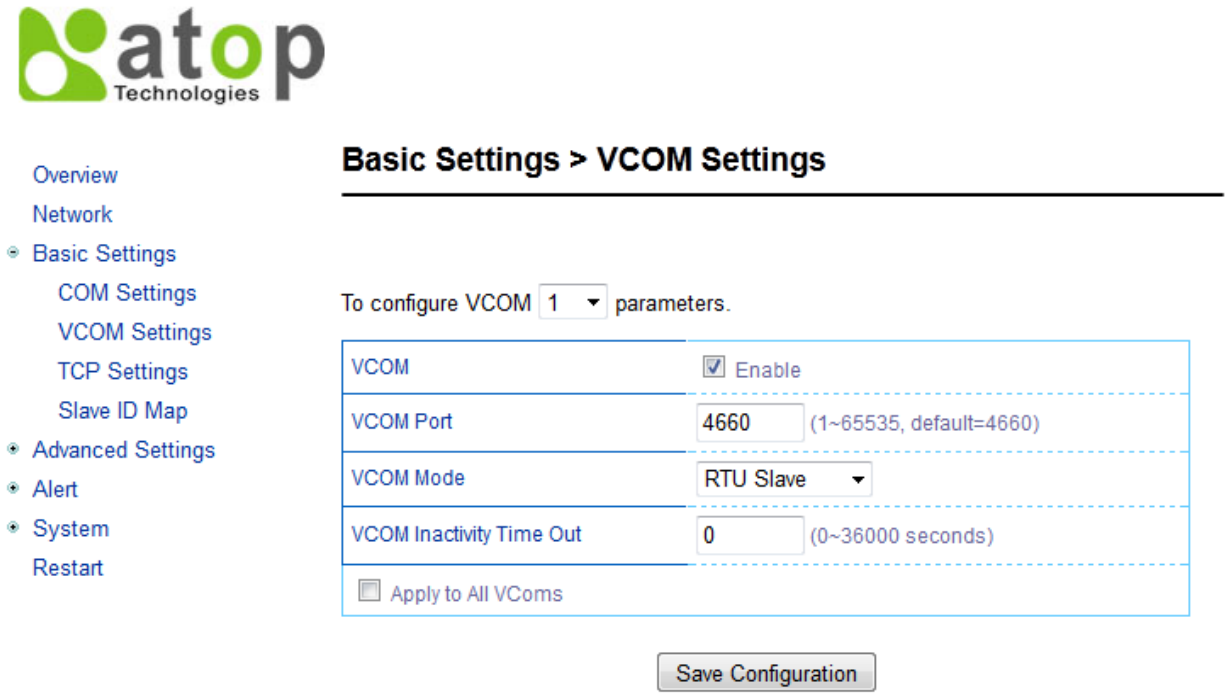


Fig. 3. 11

Choose whether your device conforms as an RTU or ASCII, which is the VCOM Mode.

- **VCOM Port** Using the TCP, the device listens whether there are any clients (VCOM clients), connecting (Serial-IP) to its ports.
- **VCOM Mode** Its definition is analogous to the one in Sec. 3.5.2.

Note: Windows has its own restrictive Serial-IP software installed for use.

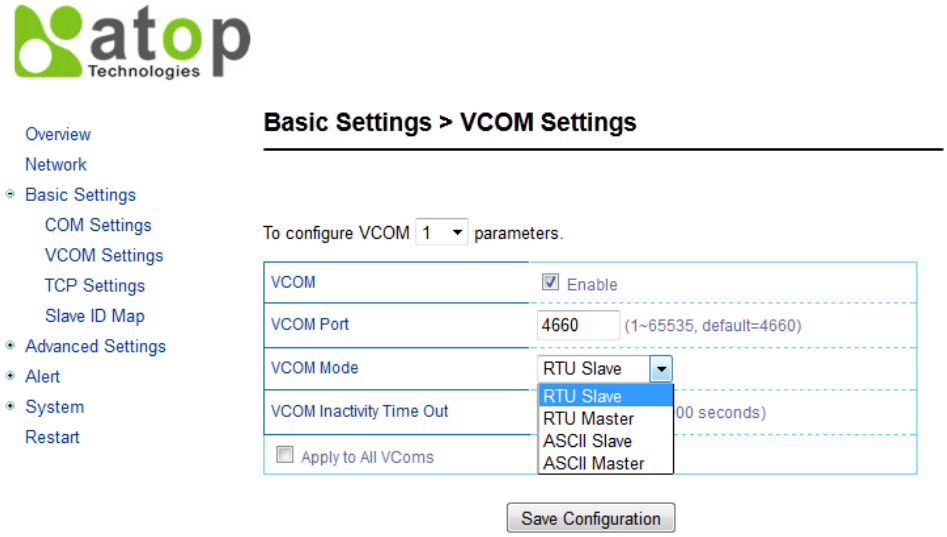


Fig. 3. 12

- **VCOM inactivity's Time Out** can be set as well (which is the period of time allowed between actions), with a maximum of 600 minutes or 10 hours. If no action has been taken after this period, VCOM connection will be automatically interrupted by the system.

It is important to note that alternatively, these settings can be chosen to be applied to All VCOMs if needed by checking the last box on the options.

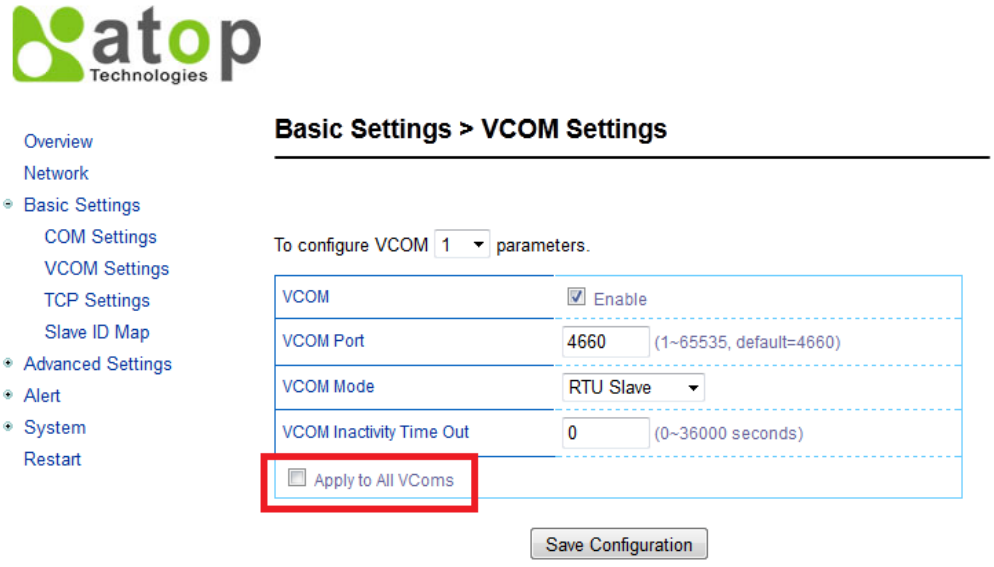


Fig. 3. 13

Click on Save Configuration to keep all changes made.

3.5.5 TCP Settings

Settings for representing a **Modbus TCP connection** using the internet are set here. First go to **Basic Settings ↔ TCP Settings,** then proceed to choose whether to enable **TCP** ticking on the "**Enable"** box.

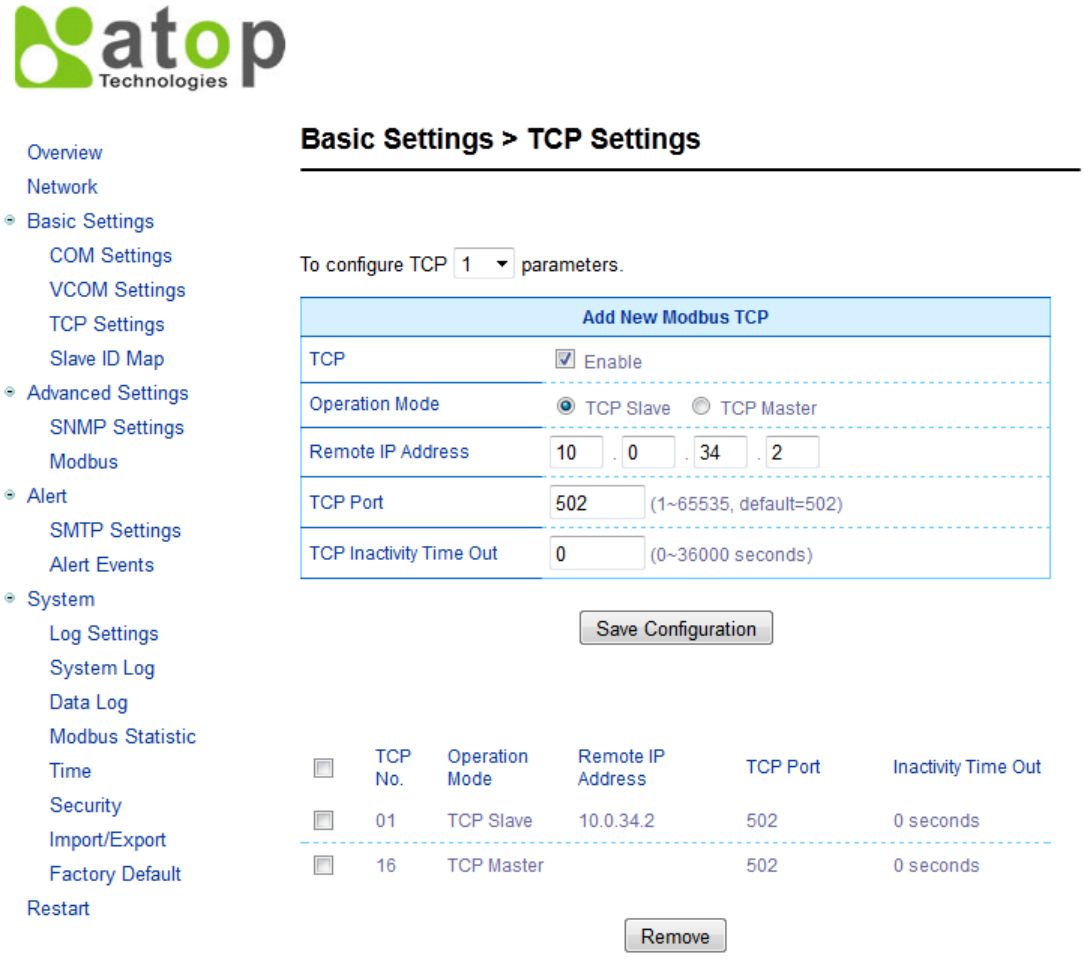


Fig. 3. 14

- **TCP Slave:** When on this mode, the device will run on Slave mode and wait to receive Modbus requests from the Master; data transmission is done under a Modbus TCP format.
- **Remote IP Address** shows the device's slave node IP address.
- **TCP Port** shows the device's slave node TCP port.
- **VCOM inactivity's Time Out** can be set as well (which is the period of time allowed between actions), with a maximum of 600 minutes or 10 hours. If no action has been taken after this period, Modbus TCP connection will be automatically terminated by the system.

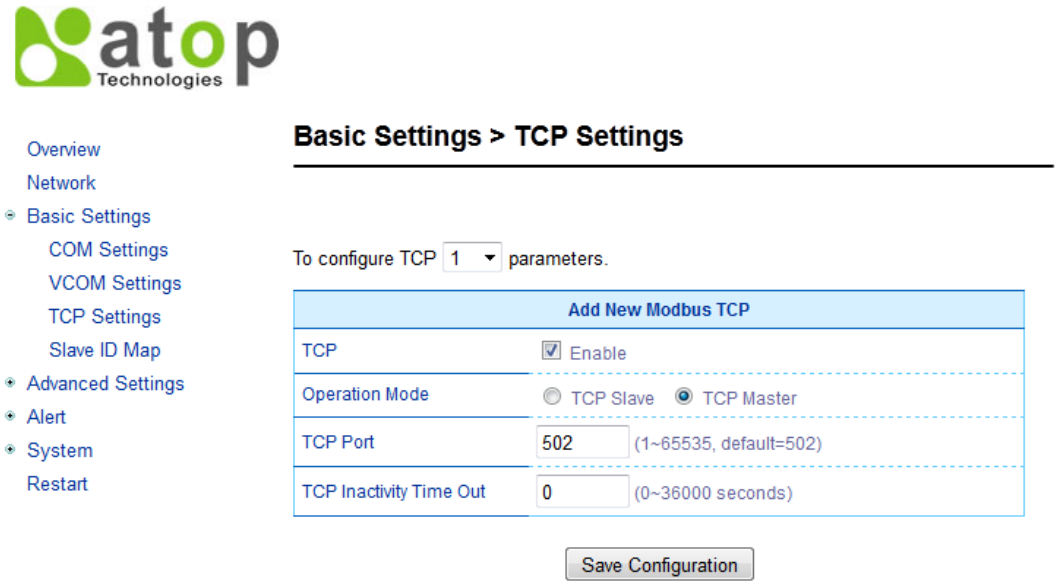


Fig. 3. 15

On Operation Mode choose whether the device is going to be a Slave or a Master. Remote IP Address refers to the IP belonging to the device that is going to be controlled from your MB54XX Series; this option is not available when the device is set as a Master. TCP Port is the port through which the signal is going to be relayed upon. And again, there is a TCP Inactivity Time Out with the same 10 hours maximum value as stated on the last section. Configuration can be saved as well.

3.5.6 Slave ID Map

The system uses the Modbus ID to route Modbus' request commands (from the master node) to the respective slave node; it is paramount to define ID maps for each slave node. For every slave node, there must be a correct Virtual ID (Alias ID) and Real ID defined in the maps.

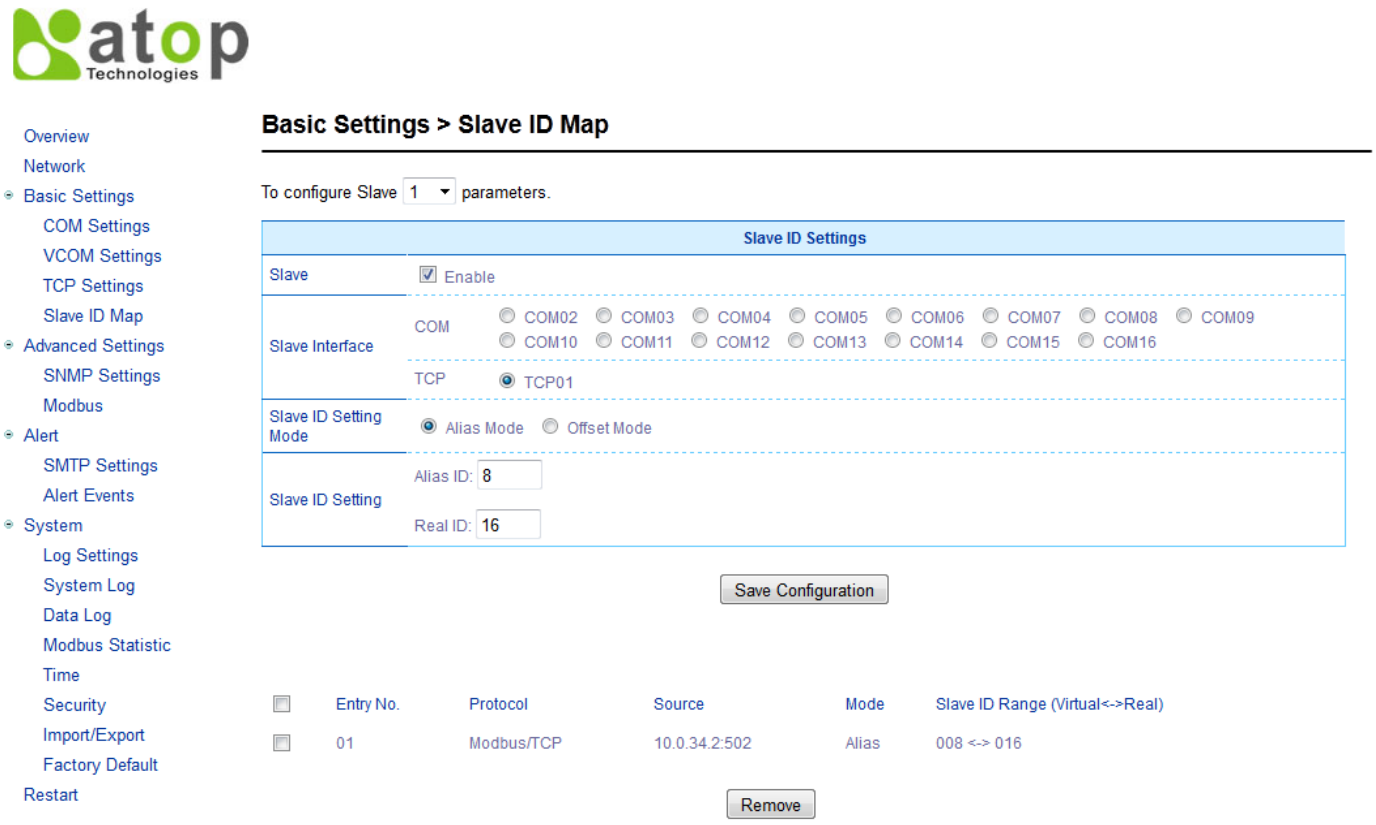


Fig. 3. 16

Slave Interface

When a port is set to slave mode, a Slave interface will be then created for you. Select the **Slave Interface,** which is the **COM/VCOM/TCP port**; then select **Alias Mode** or **Offset Mode** to modify the range and offset as you needed.

- **Alias Mode** maps a virtual ID to a real ID each at the time.
  - **Alias ID** which refers to a Virtual ID for the reading Master node.
  - **Real ID** which is the real ID from the slave node.
- **Offset Mode** which refers to a range of defined ID maps.
  - **Slave ID Start** Virtual ID's start number.
  - **Slave ID End** Virtual ID's end number.
  - **Slave ID Offset** Real ID range, which is from (Slave ID Start -Offset) to (Slave ID End-Offset).

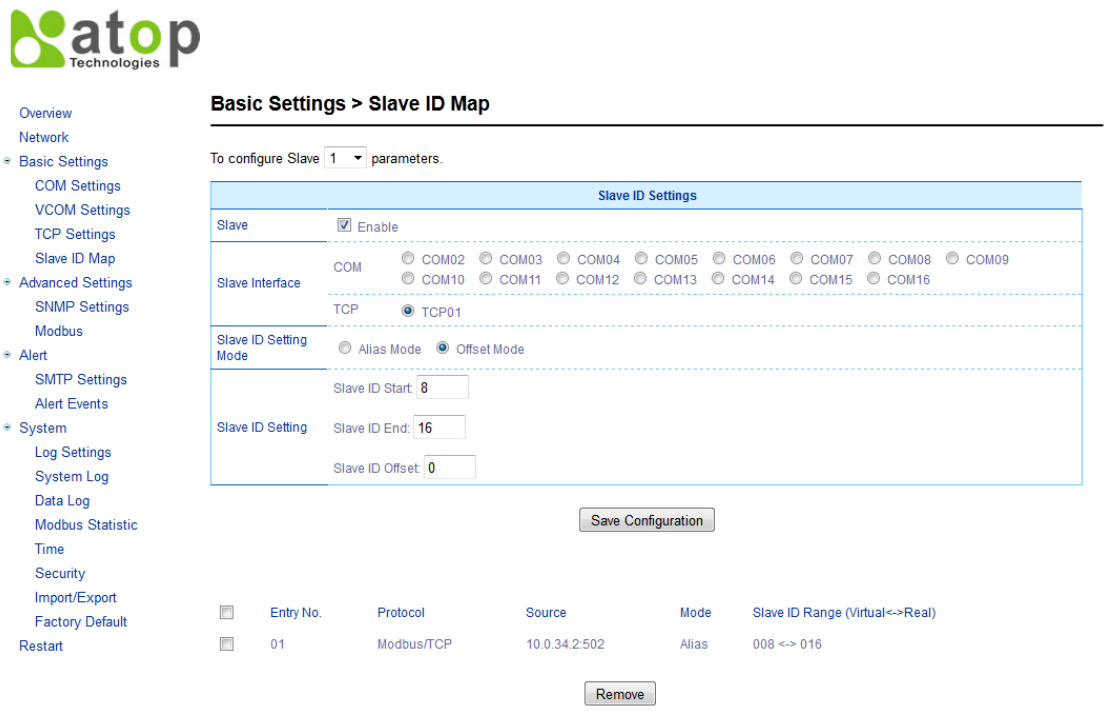


Fig. 3. 17

Note: on VCOM, TCP and COM, Master and Slave IDs can be set, while on COM and VCOM work only with Serial ports.

3.6 Advanced Settings

3.6.1 SNMP Settings

SNMP Settings determines whether your device settings can be viewed with standard SNMP software; by default it is disabled.

- **SysName** which is by default the MAC address
- **SysLocation** refers to the device's physical location.
- **SysContact** is the device administrator's contact information.

If you wish to make the information available for public viewing by a Read Community, simply check the **"Enable SNMP"** box and fill in **"Public_viewers"** in **Read Community** field. If you wish to allow a group of people called **"Power_users"** to change the information, enter **"Power_users"** in **Write Community.** If you allow a trap server to collect device information, please fill in **SNMP Trap Server** with its corresponding IP address (the trap server designed to collect all alarm information). Configuration will take effect after the device is restarted.

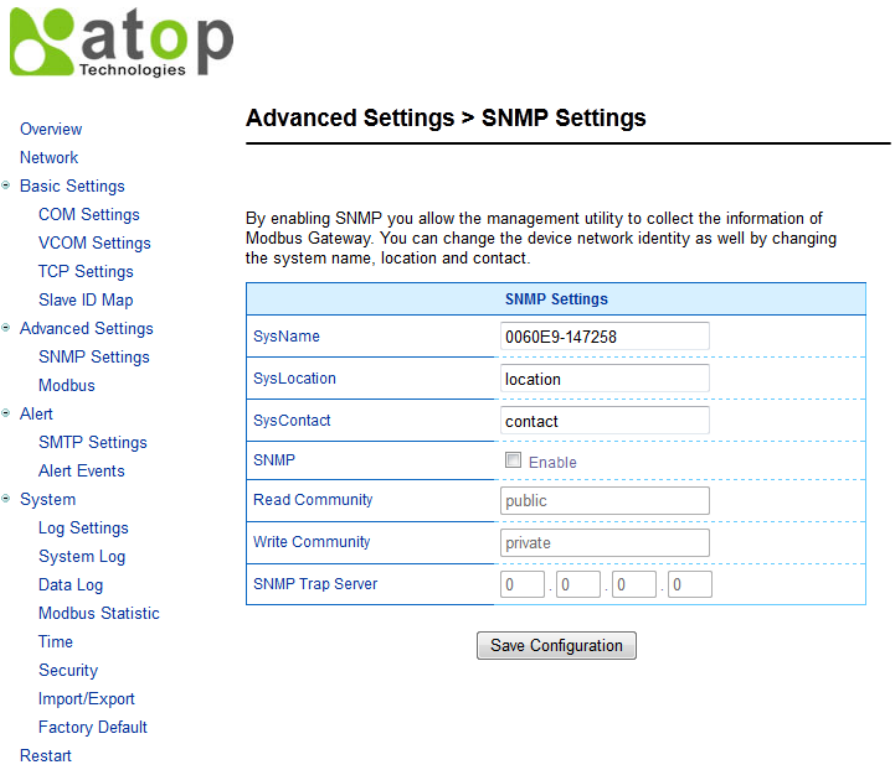


Fig. 3. 18

3.6.2 Modbus

In **Modbus** settings, you could select whether to enable **Modbus Exception** or not. If the Modbus' slave produces no response, timeout occurs, it may then be necessary for the gateway to return an Exception, and setting the Response timeout as follows.

- Configure timeout for each COM port
- Configure timeout for TCP/ VCOM port

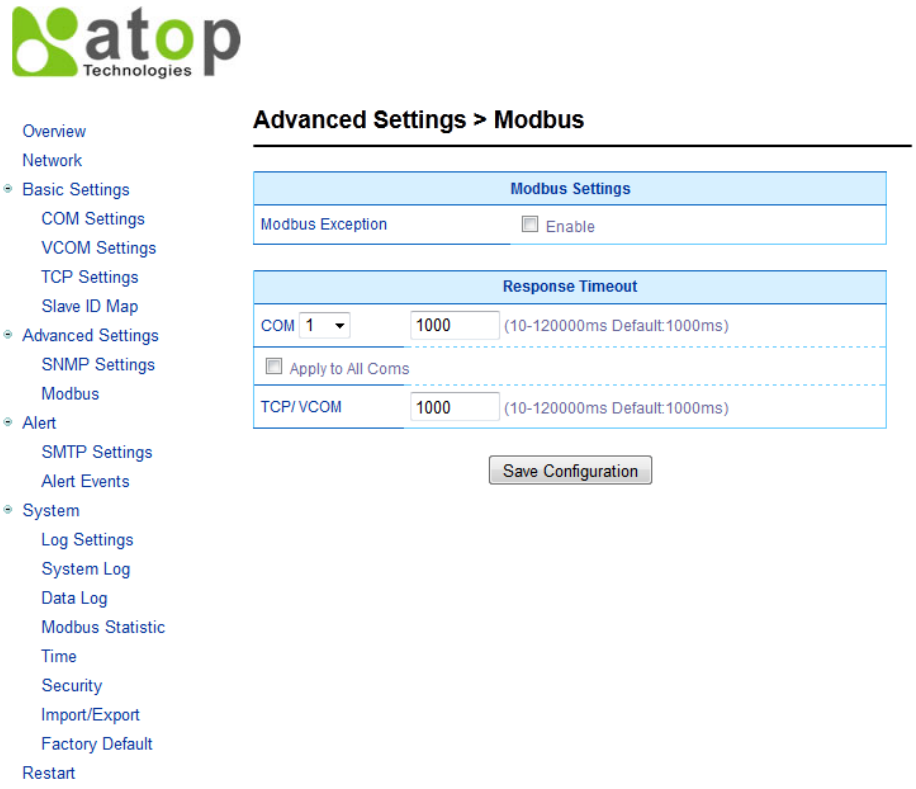


Fig. 3. 19

3.7 Alert Configuration

3.7.1 SMTP and Email Settings

In **Alert Events,** you can configure options to let your Modbus Gateway to send out device information to alert users, administrators, or responsible personnel. There are five anomalies defined in it to trigger alert functions.

- **Cold Start,** power supply is interrupted.
- **Warm Start,** the device Restart function is used, (either by pressing a button or by its interface).
- **Authentication Fail,** incorrect username and password are entered.
- **IP address change,** device's IP address is changed.
- **Password Changed,** authentication password is changed.

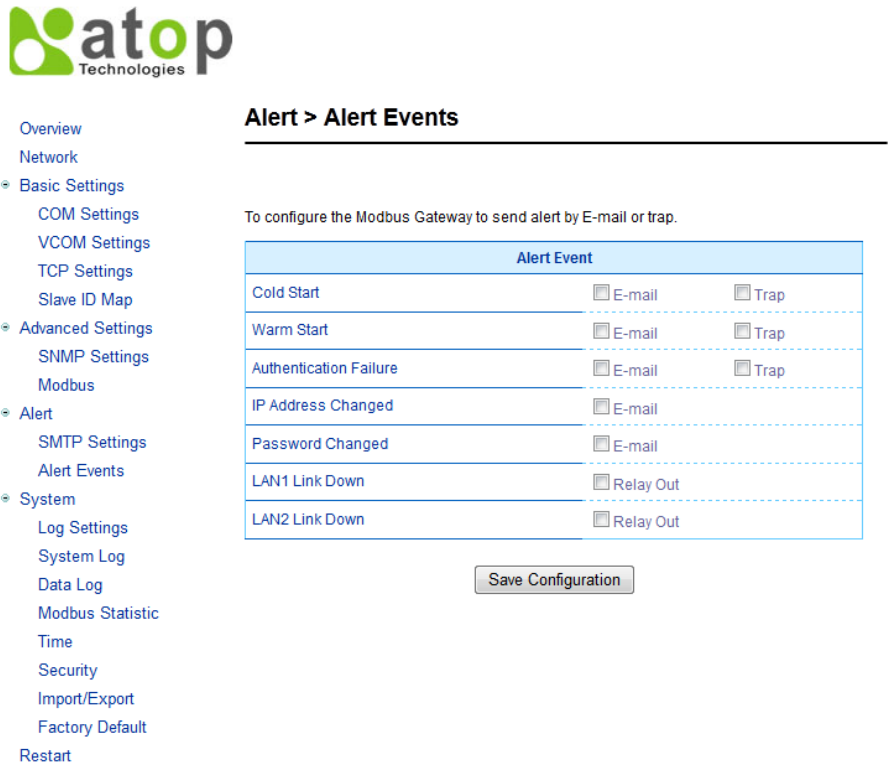


Fig. 3. 20

When enabled, an E-mail alert would be sent to the designated E-mail address in the **E-Mail Settings.** To setup an email alert function, you first need to configure the recipient's email address and the mail server.

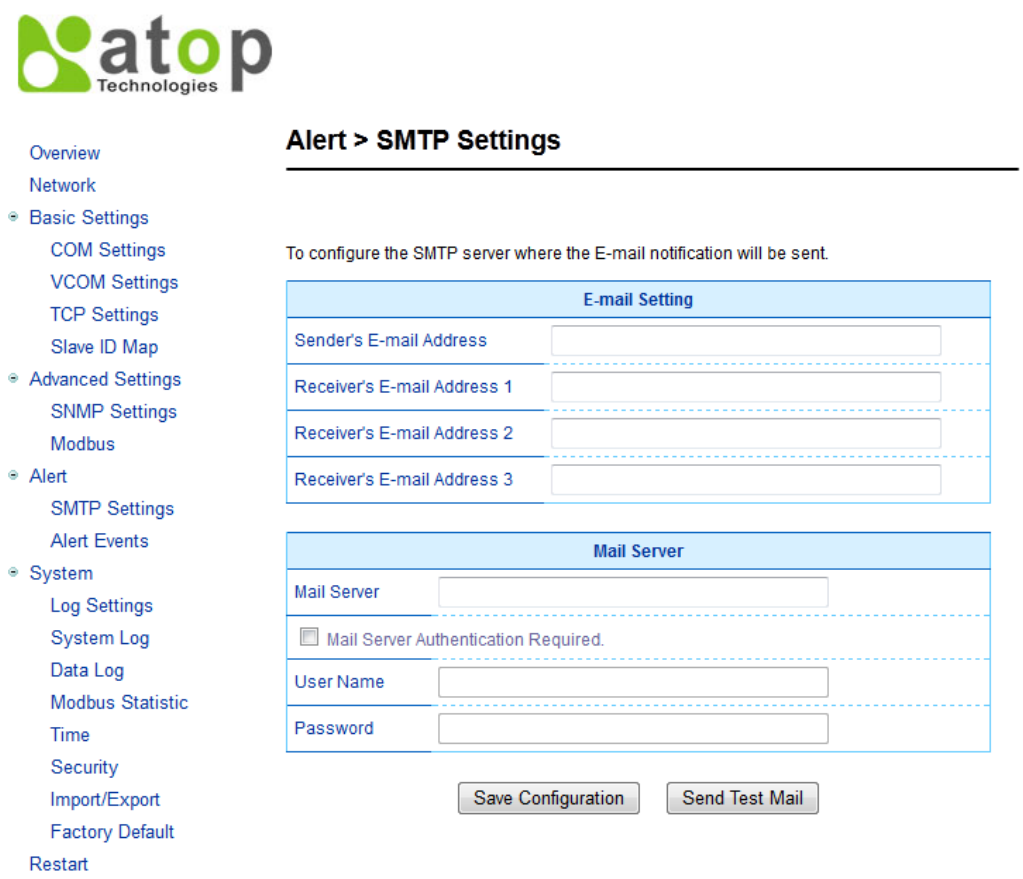


Fig. 3. 21

3.8 System

3.8.1 Log Settings

This section lets you change the way your report will be shown on your Log.

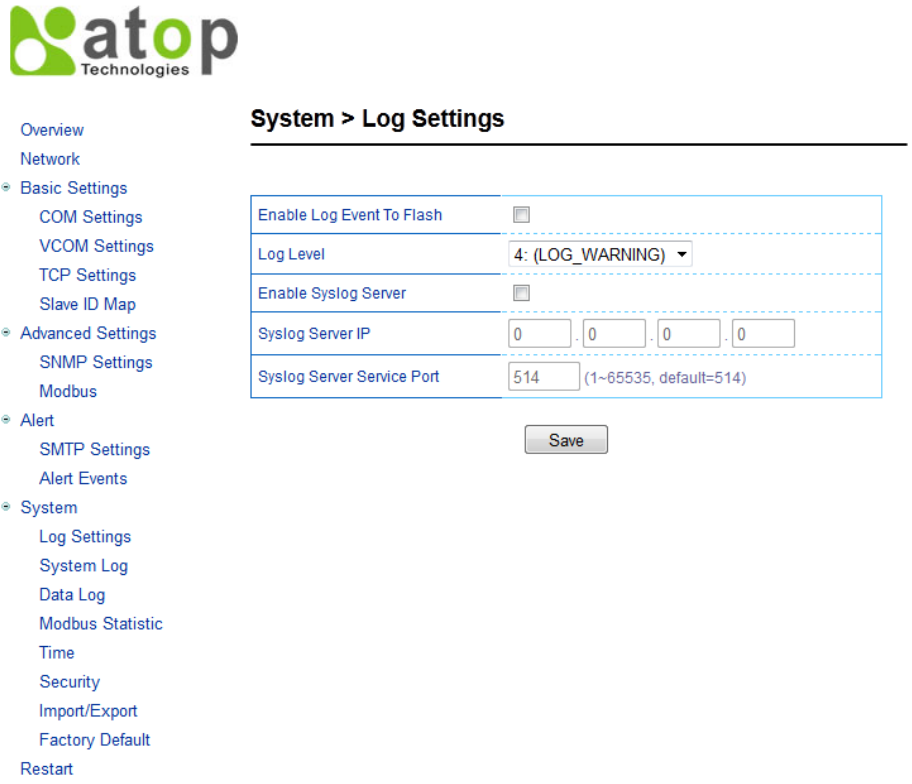


Fig. 3. 22

3.8.2 System Log

This section merely shows a list of system running events currently (with every event's properties displayed), as well as the option to clear them all.

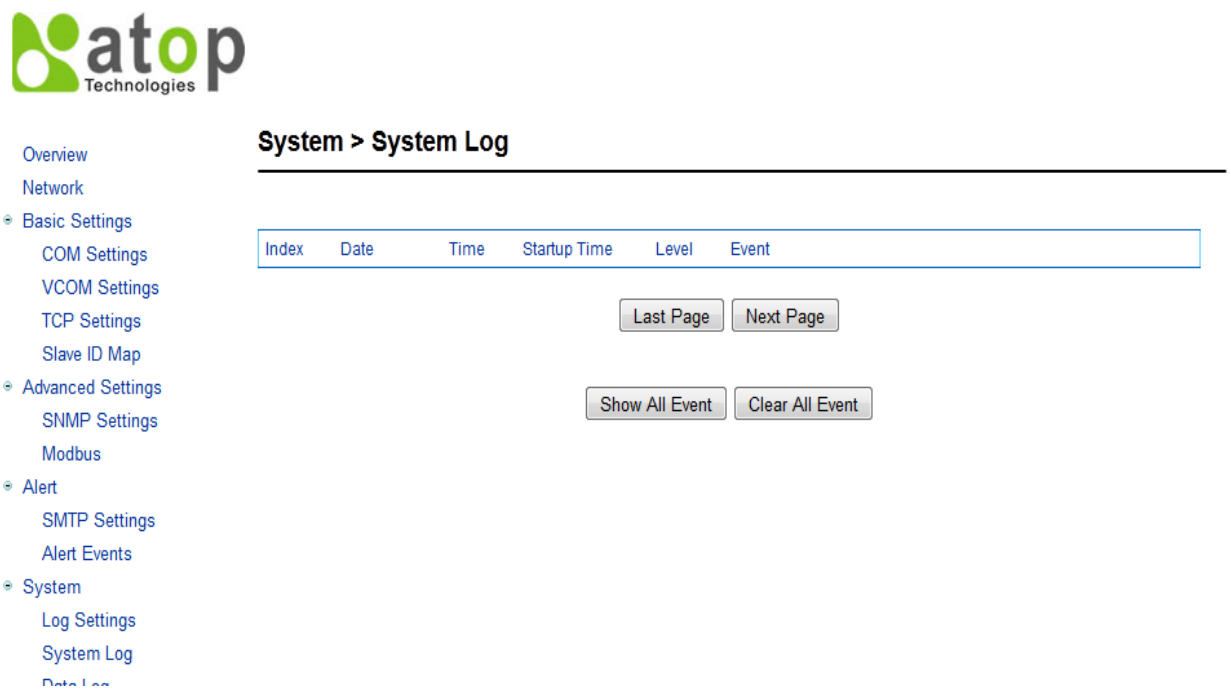
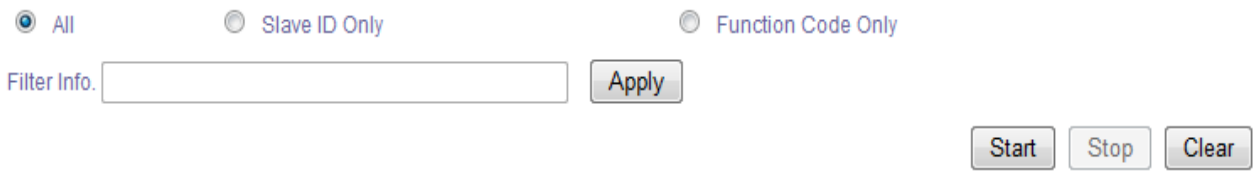


Fig. 3. 23

3.8.3 Data Log

Event filtering is available in this section for analysis; a number of options are available for a customized analysis. Traffic in the system can be done here as well.

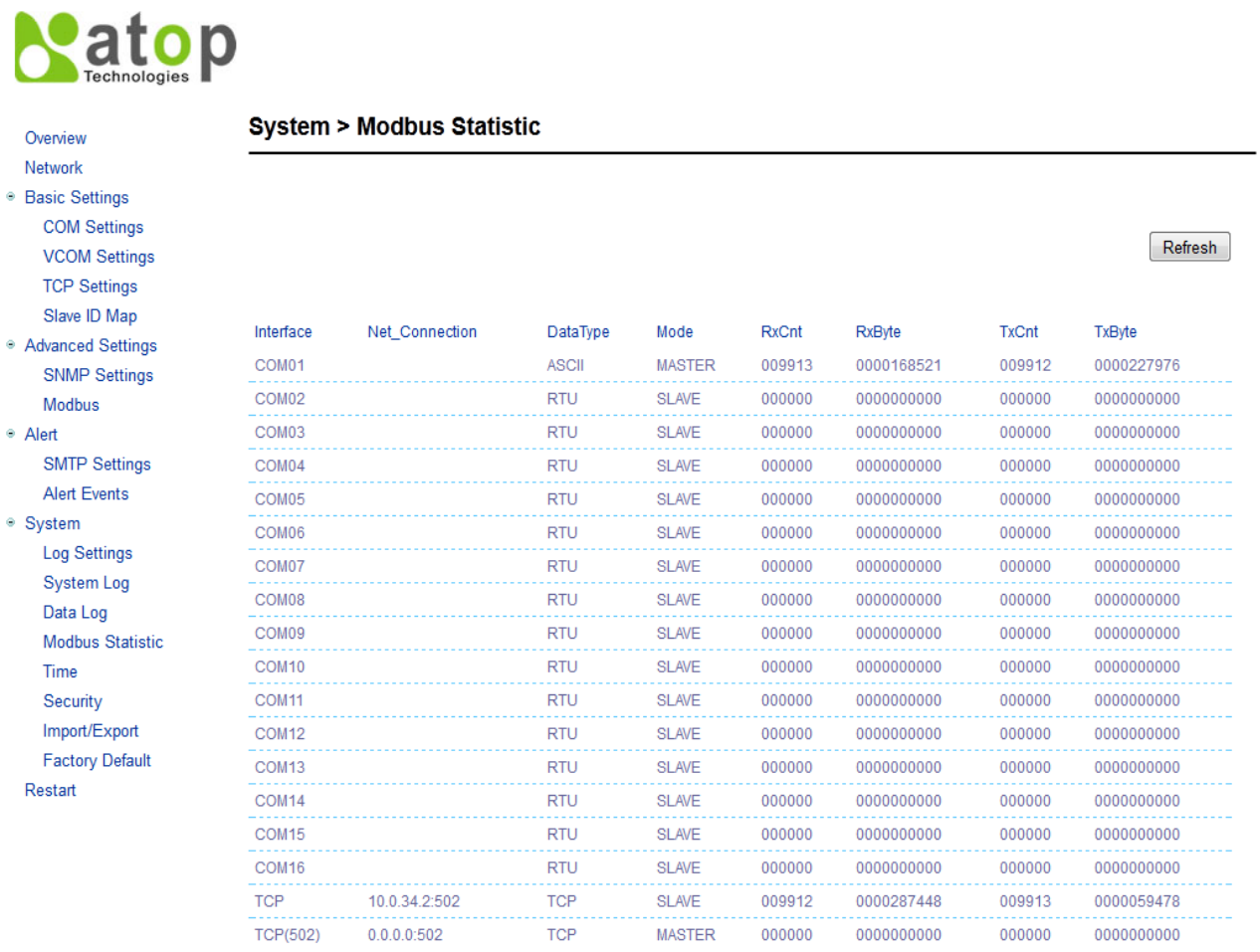


Index	Time	Type	Slave ID	Function Code	Event
1/1531	00:22:29	TCP Resp.	8	0x03	04 38 00 00 00 17 08 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
2/1531	00:22:29	RTU Req.	16	0x03	10 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A3 F7
3/1531	00:22:29	RTU Req.	16	0x03	10 03 14 00 00 00 00 00 00 00 00
4/1531	00:22:28	TCP Resp.	8	0x03	04 37 00 00 00 17 08 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
5/1531	00:22:28	RTU Req.	16	0x03	10 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A3 F7
6/1531	00:22:28	RTU Req.	16	0x03	10 03 14 00
7/1531	00:22:27	TCP Resp.	8	0x03	04 36 00 00 00 17 08 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
8/1531	00:22:27	RTU Req.	16	0x03	10 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A3 F7
9/1531	00:22:27	RTU Req.	16	0x03	10 03 14 00 00 00 00 00
10/1531	00:22:26	TCP Resp.	8	0x03	04 35 00 00 00 17 08 03 14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Fig. 3. 24

3.8.4 Modbus Statistic

All ports' information is available in this section.



Interface	Net_Connection	DataType	Mode	RxCnt	RxByte	TxCnt	TxByte
COM01		ASCII	MASTER	009913	0000168521	009912	0000227976
COM02		RTU	SLAVE	000000	0000000000	000000	0000000000
COM03		RTU	SLAVE	000000	0000000000	000000	0000000000
COM04		RTU	SLAVE	000000	0000000000	000000	0000000000
COM05		RTU	SLAVE	000000	0000000000	000000	0000000000
COM06		RTU	SLAVE	000000	0000000000	000000	0000000000
COM07		RTU	SLAVE	000000	0000000000	000000	0000000000
COM08		RTU	SLAVE	000000	0000000000	000000	0000000000
COM09		RTU	SLAVE	000000	0000000000	000000	0000000000
COM10		RTU	SLAVE	000000	0000000000	000000	0000000000
COM11		RTU	SLAVE	000000	0000000000	000000	0000000000
COM12		RTU	SLAVE	000000	0000000000	000000	0000000000
COM13		RTU	SLAVE	000000	0000000000	000000	0000000000
COM14		RTU	SLAVE	000000	0000000000	000000	0000000000
COM15		RTU	SLAVE	000000	0000000000	000000	0000000000
COM16		RTU	SLAVE	000000	0000000000	000000	0000000000
TCP	10.0.34.2:502	TCP	SLAVE	009912	0000287448	009913	0000059478
TCP(502)	0.0.0.0:502	TCP	MASTER	000000	0000000000	000000	0000000000

Fig. 3. 25

3.8.5 Time

Date and time can be set manually, or using **N**etwork **T**ime **P**rotocol (NTP) to automatically synchronizes with a **Time Server.** For auto-synching check the box below **NTP Server Settings "Obtain date/time automatically"** proceeding then to fill the **IP address** or hostname for it. If a hostname is entered, the **DNS server** must be configured properly; a **Time Zone** can be selected as well, Fig. 3.26.

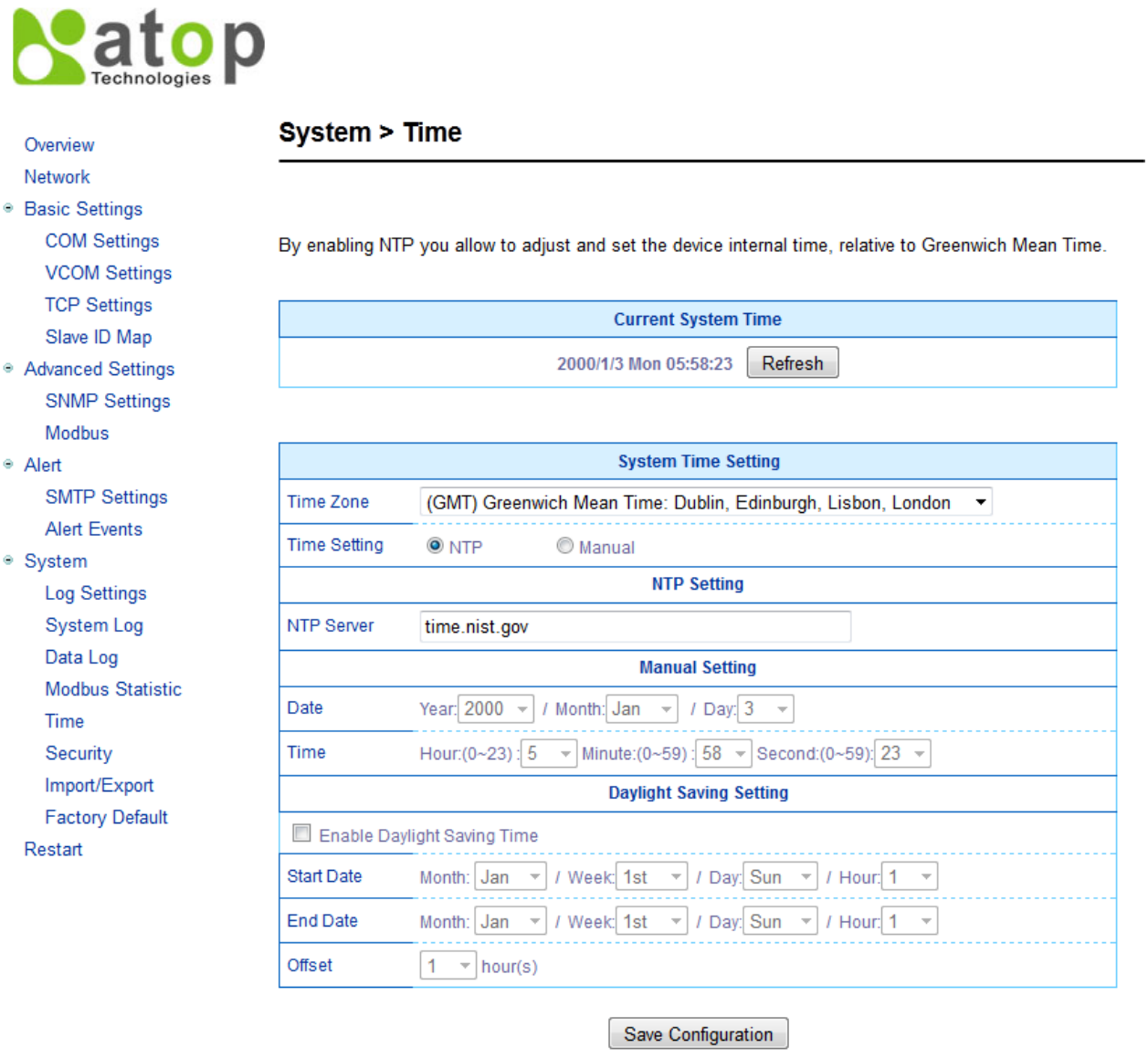


Fig. 3. 26

3.8.6 Security

Password settings are available at this section, as well as device's console configuration settings allowing users to limit the way they are able to configure the device.

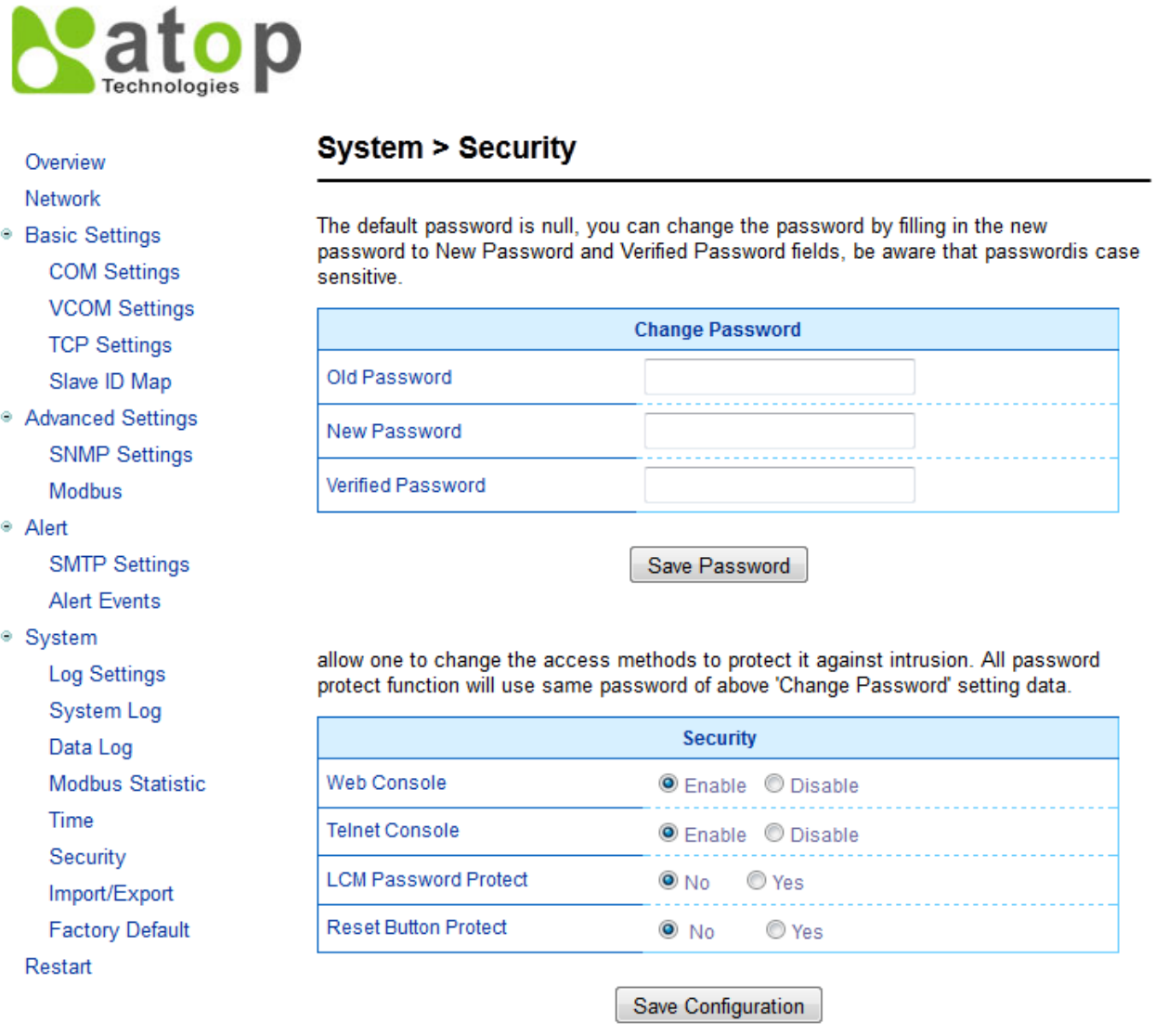


Fig. 3. 27

3.8.7 Import/Export

Once all the configurations are set and the device is working properly, you may want to backup **(Export)** your configuration. Backup can be used when the new firmware is uploaded and it is reset to a factory default settings, it is done to prevent accidental loading of incompatible old settings. The backup file could also be used to efficiently deploy multiple Modbus Gateways of similar settings by restoring the settings to the devices by **Importing** the corresponding file.

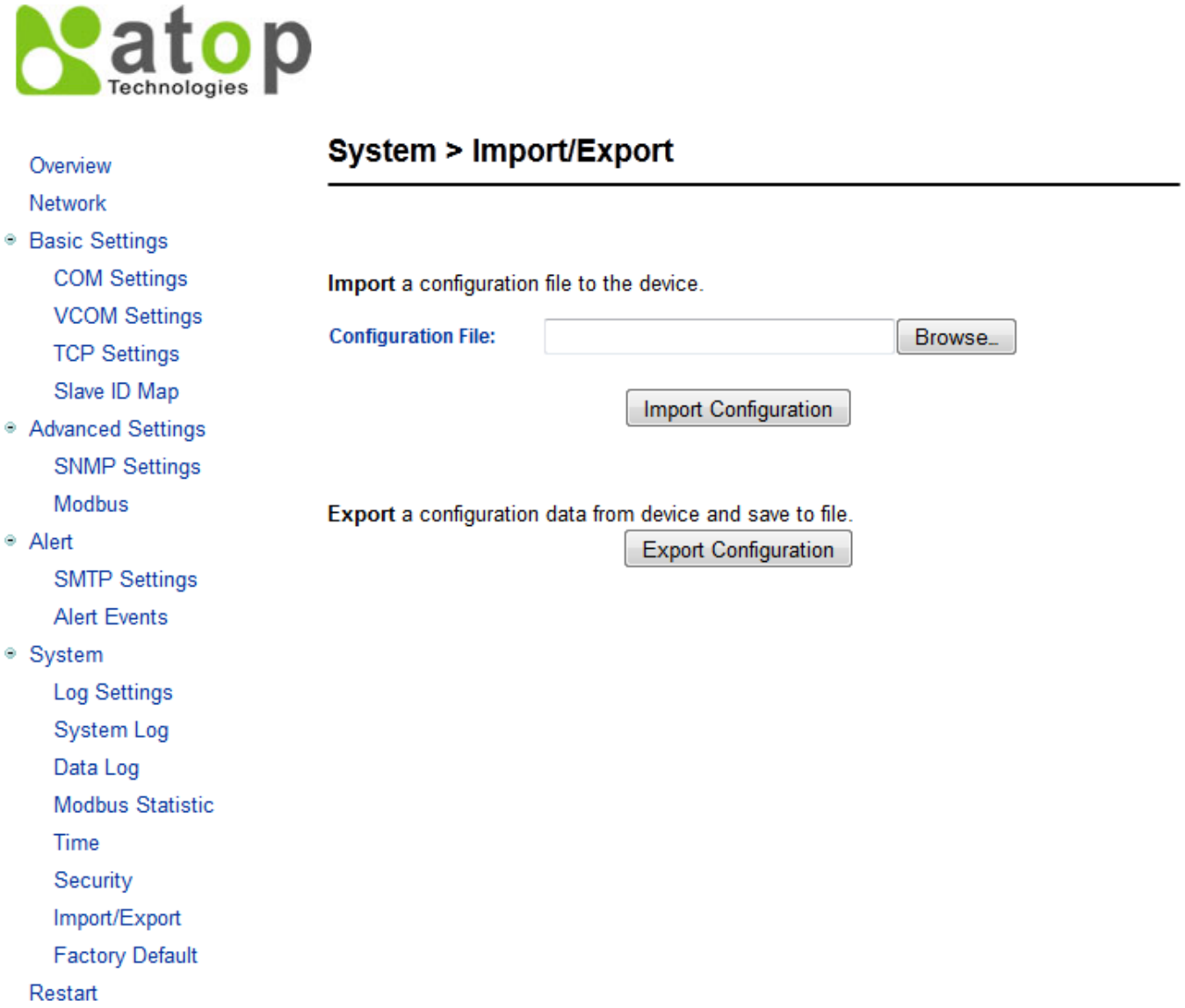


Fig. 3. 28

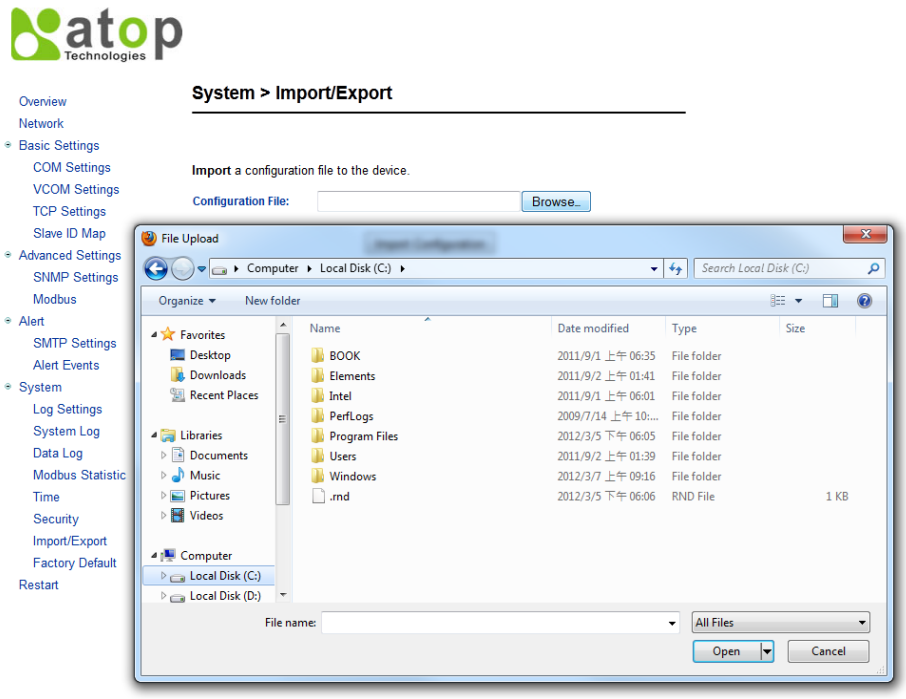


Fig. 3. 29

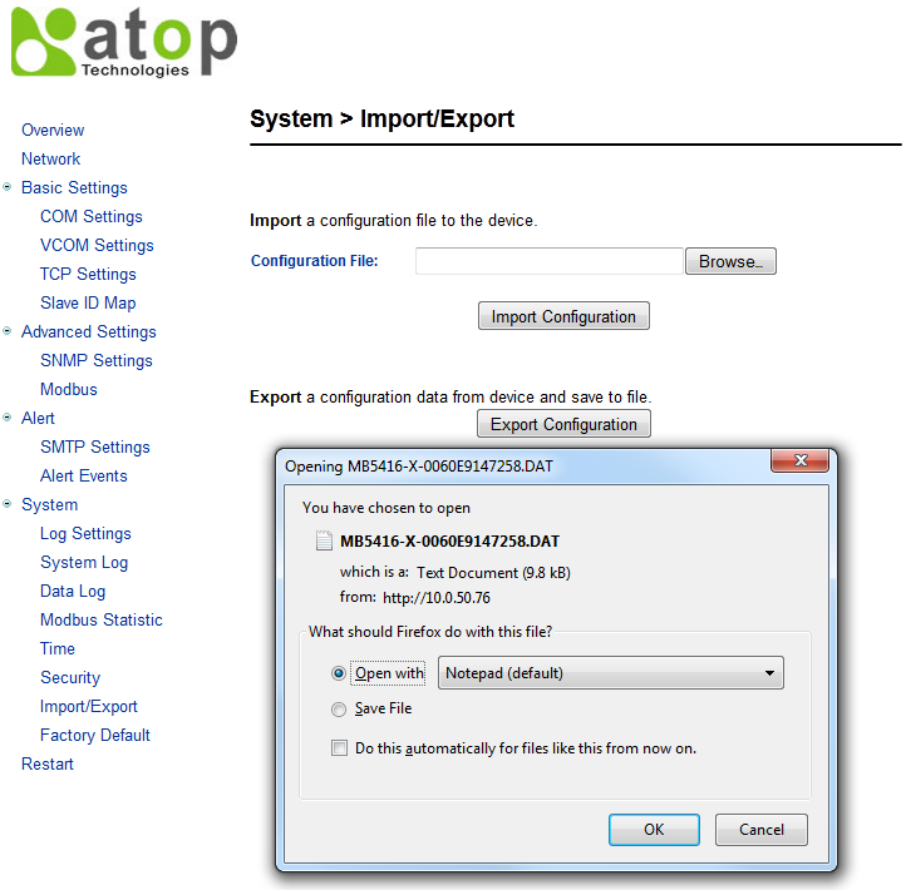


Fig. 3. 30

3.8.8 Factory Default

A simple return to **Factory Default** is available in our MB54XX Series.

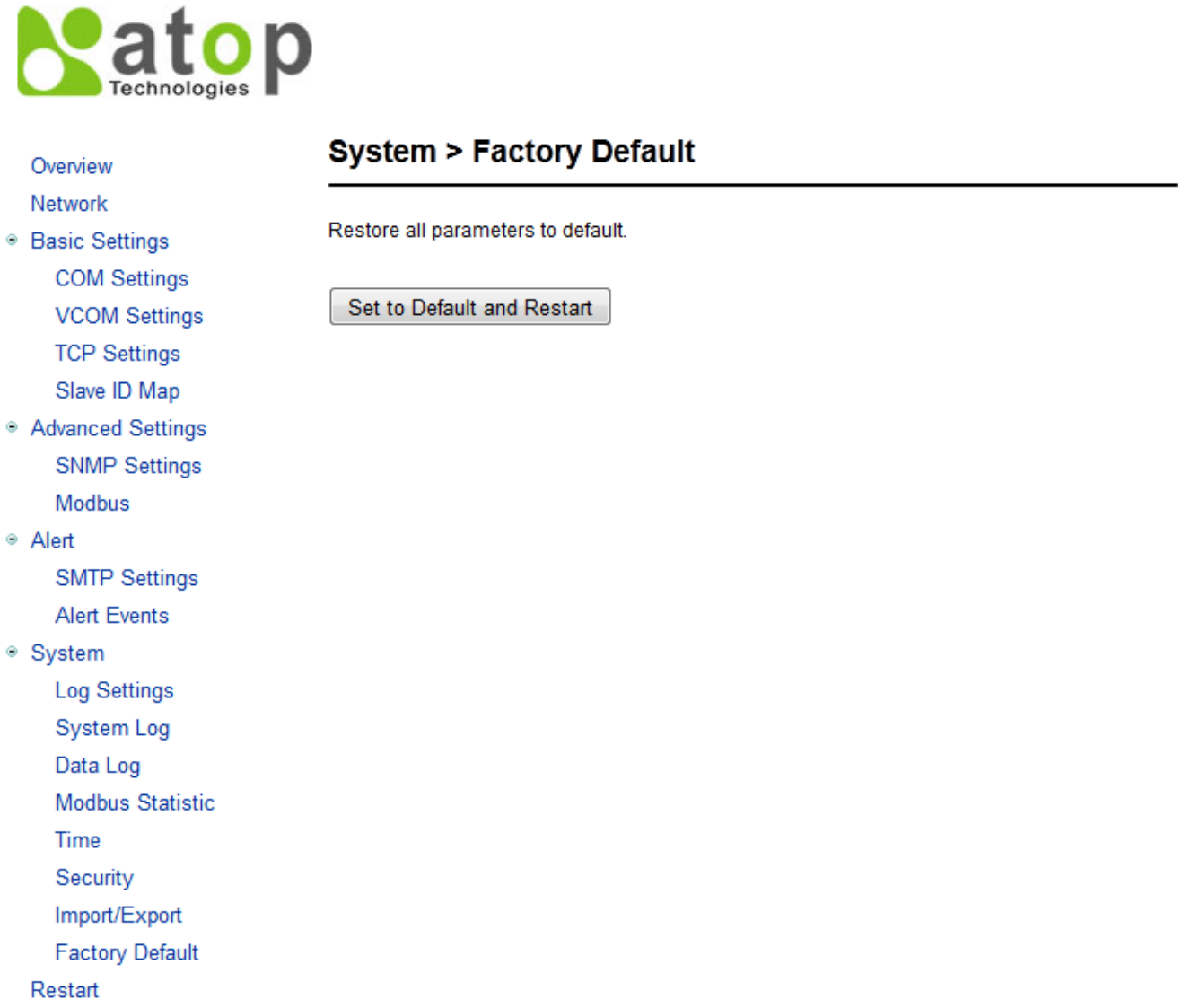


Fig. 3. 31

3.9 Restart

Restart is just a click away in our Modbus Series.

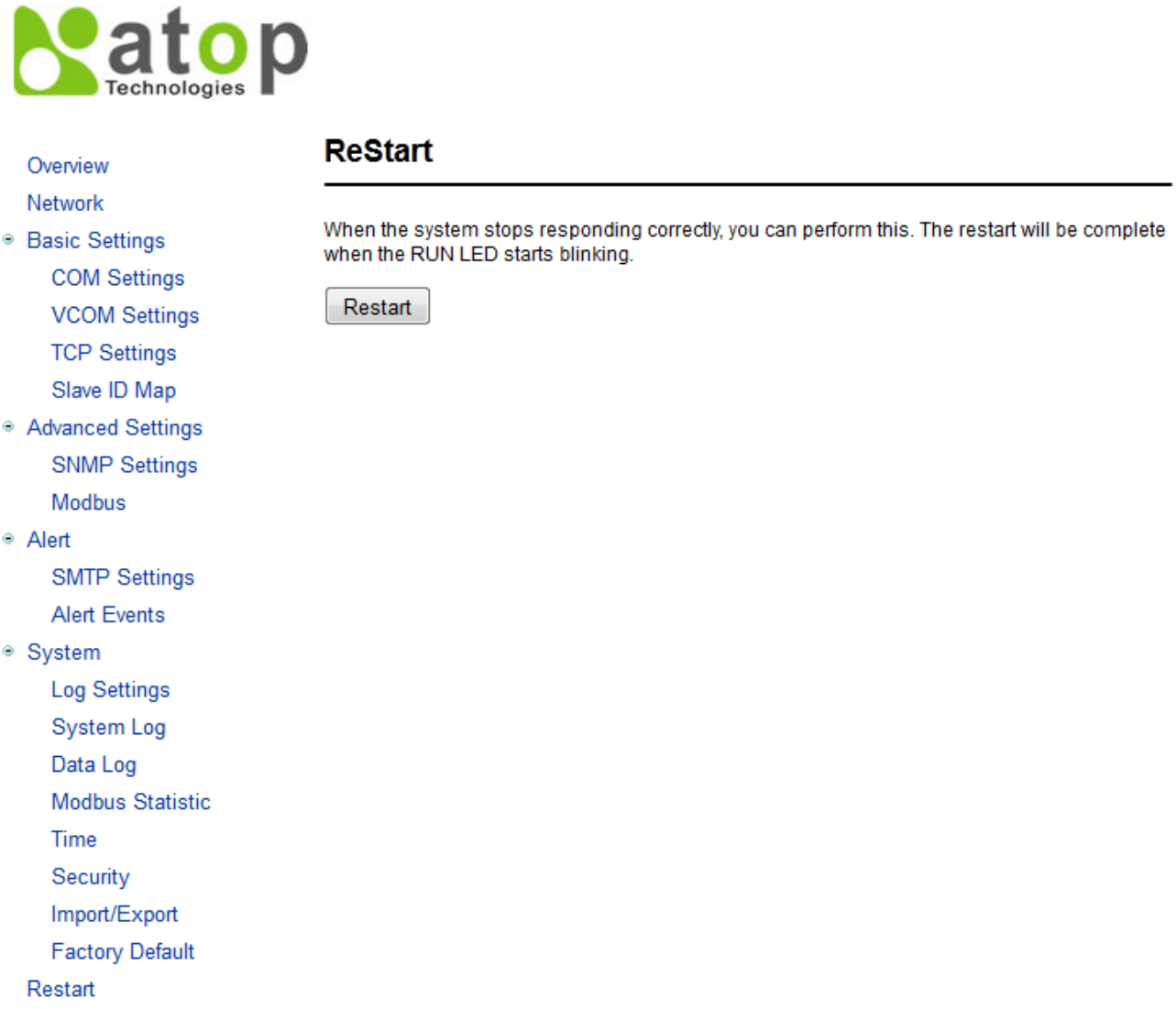


Fig. 3. 32

4 Applications and Examples

On your device two different ID mapping definitions are given by the system, both using Modbus ID to route the requesting command (from the Master) to the Slave node.

4.1 Using ID offset range mapping

If the Slave ID is continuous, it is recommended to use the Offset mode, Fig. 4.1.

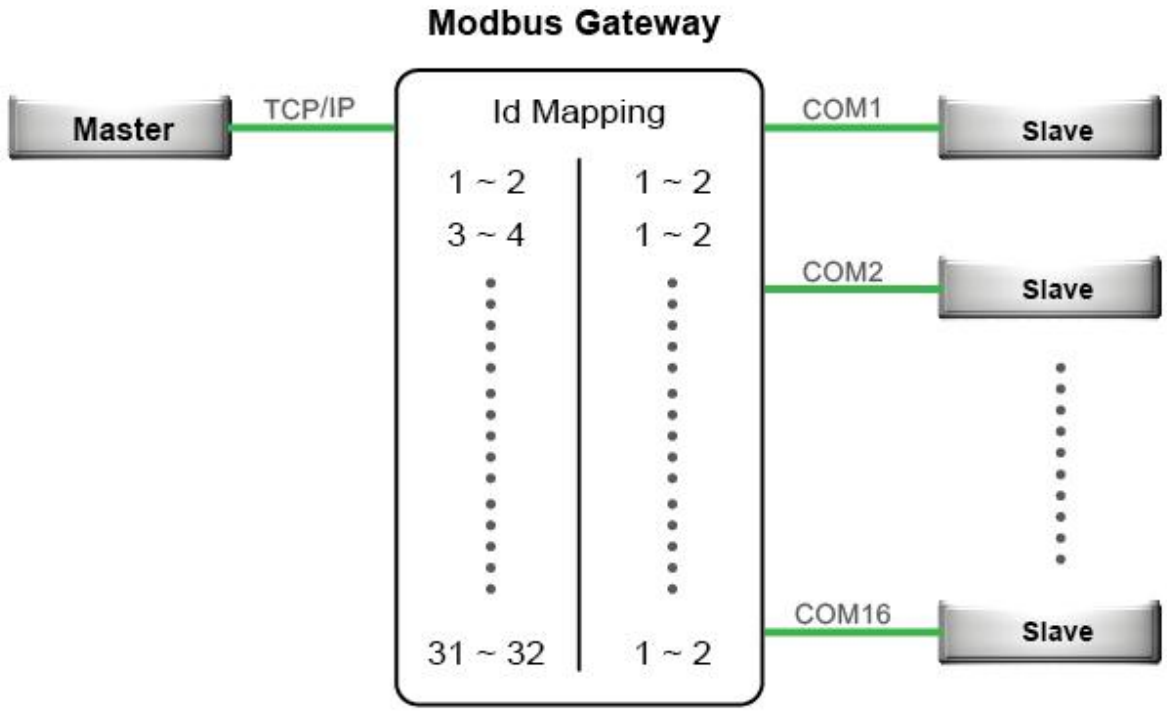


Fig. 4. 1

	Entry No.	Protocol	Source	Mode	Slave ID Range (Virtual<->Real)
☐	01	Modbus/RTU	COM1	Offset	001 - 002 <-> 001 - 002
☐	02	Modbus/RTU	COM2	Offset	003 - 004 <-> 001 - 002
☐	03	Modbus/RTU	COM3	Offset	005 - 006 <-> 001 - 002
☐	04	Modbus/RTU	COM4	Offset	007 - 008 <-> 001 - 002
☐	05	Modbus/RTU	COM5	Offset	009 - 010 <-> 001 - 002
☐	06	Modbus/RTU	COM6	Offset	011 - 012 <-> 001 - 002
☐	07	Modbus/RTU	COM7	Offset	013 - 014 <-> 001 - 002
☐	08	Modbus/RTU	COM8	Offset	015 - 016 <-> 001 - 002
☐	09	Modbus/RTU	COM9	Offset	017 - 018 <-> 001 - 002
☐	10	Modbus/RTU	COM10	Offset	019 - 020 <-> 001 - 002
☐	11	Modbus/RTU	COM11	Offset	021 - 022 <-> 001 - 002
☐	12	Modbus/RTU	COM12	Offset	023 - 024 <-> 001 - 002
☐	13	Modbus/RTU	COM13	Offset	025 - 026 <-> 001 - 002
☐	14	Modbus/RTU	COM14	Offset	027 - 028 <-> 001 - 002
☐	15	Modbus/RTU	COM15	Offset	029 - 030 <-> 001 - 002
☐	16	Modbus/RTU	COM16	Offset	031 - 032 <-> 001 - 002

Fig. 4. 2

4.2 Using Alias ID mapping

This is only recommended if the ID is not continuous, Fig. 4.3.

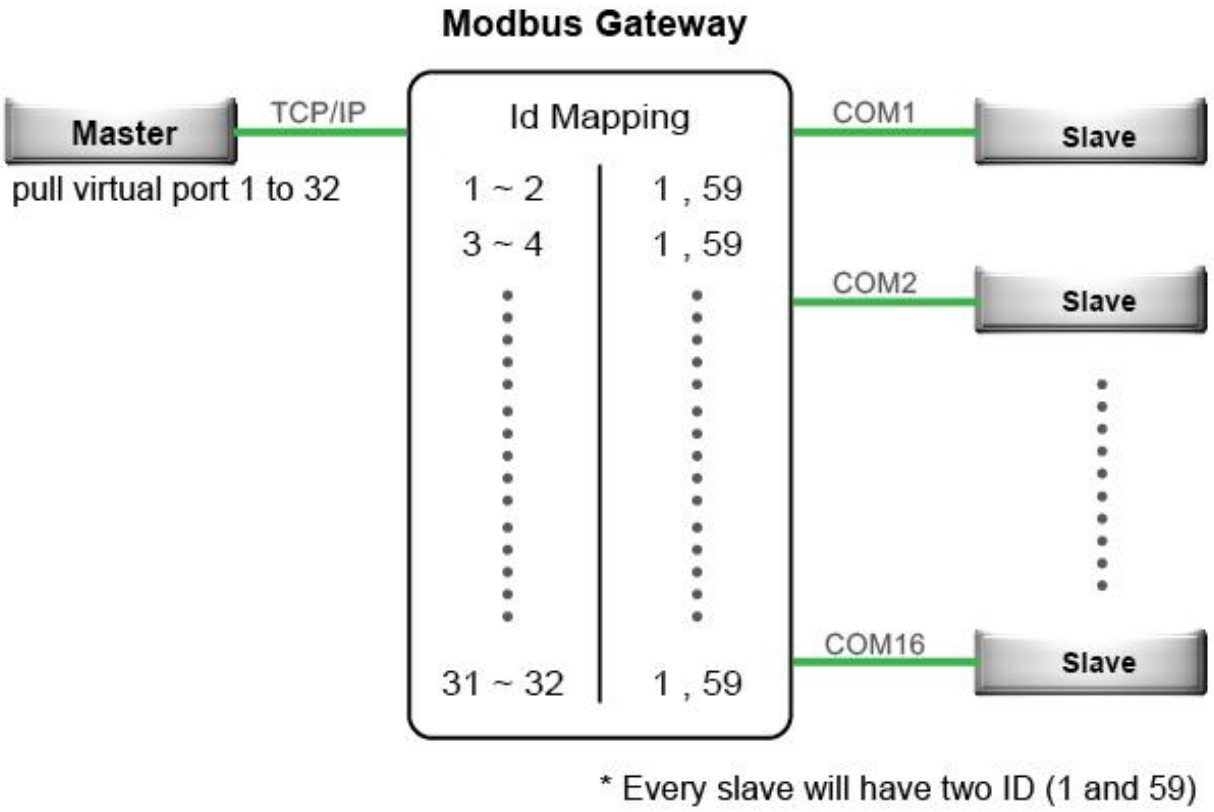


Fig. 4. 3

☐	03	Modbus/RTU	COM2	Alias	003 <-> 001
☐	04	Modbus/RTU	COM2	Alias	004 <-> 059
☐	05	Modbus/RTU	COM3	Alias	005 <-> 001
☐	06	Modbus/RTU	COM3	Alias	006 <-> 059
☐	07	Modbus/RTU	COM4	Alias	007 <-> 001
☐	08	Modbus/RTU	COM4	Alias	008 <-> 059
☐	09	Modbus/RTU	COM5	Alias	009 <-> 001
☐	10	Modbus/RTU	COM5	Alias	010 <-> 059
☐	11	Modbus/RTU	COM6	Alias	011 <-> 001
☐	12	Modbus/RTU	COM6	Alias	012 <-> 059
☐	13	Modbus/RTU	COM7	Alias	013 <-> 001
☐	14	Modbus/RTU	COM7	Alias	014 <-> 059
☐	15	Modbus/RTU	COM8	Alias	015 <-> 001
☐	16	Modbus/RTU	COM8	Alias	016 <-> 059
☐	17	Modbus/RTU	COM9	Alias	017 <-> 001
☐	18	Modbus/RTU	COM9	Alias	018 <-> 059

Fig. 4. 4

5 Specifications

5.1 Hardware

Table 5. 1

System	
CPU	32-bit 266MHz RISC Processor with MMU
Flash Memory	2 + 8 MB (2MB for Bootloader)
RAM	128 MB DDR
EEPROM	8 KB
Reset	Built-in Recessed Key (Restore to Factory Defaults)
Watchdog	Hardware built-in
Network	
Ethernet Interface	■ IEEE 802.3 Compliance ■ Dual Port 10/100Mbps Auto-Detection ■ Connection: RJ-45 ■ Auto MDI/MDI-X: No
Protection	Built-in 1.5 KV Magnetic Isolation
Protocol	■ ICMP ■ TCP/IP ■ UDP ■ HTTP, , ■ SMTP ■ NTP ■ ARP

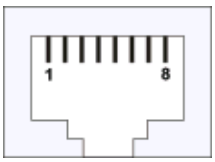
Serial	
Serial Interface	RS-232/RS-422/RS-485 Software Selectable (Default: RS-232)
Serial Connector	RJ45 Connector Type ■ MB5416-X ---16 Serial Ports ■ MB5408-X --- 8 Serial Ports DB9 (9-pin) Connector type ■ MB5404D-X TB5 (5-pin) Connector type ■ MB5404D-Sis-X
Serial Port Communication	■ Baud-rate: 300 bps ~ 921600 bps (MB5404D-X, MB5408-X,MB5416-X) 300 bps ~ 230400 bps (MB5404D-Sis-X) ■ Parity: None, Even, Odd, Mark, or Space ■ Data Bits: 7, or 8 ■ Stop Bits: 1 or 2 ■ Flow Control: None, Hardware CTS/RTS, Software Xon/Xoff
LED Indicator	
LED indication	■ Power x 1 ■ Ready x 1 ■ COM port TX x 16 (MB5416-X); x 8 (MB5408-X); x 4 (MB5404D-X, MB5404D-Sis-X) ■ COM port RX x 16 (MB5416-X);x 8 (MB5408-X) ; x 4 (MB5404D-X, MB5404D-Sis-X)
Power Requirement & EMC	

Input	● 100~240 V (MB5408-X, MB5416-X) ● DC9~48V (MB5404D-X, MB5404D-Sis-X)	
Consumption	● Max. 8.5 W (MB5408-X/MB5416-X) ● 5.58W (MB5404D-X, MB5404D-Sis-X)	
EMC	FCC Class A, CE Class A	
Mechanical		
Dimensions (W x H x D, mm)	MB5408-X, MB5416-X	436 x 43.5 x 200
	MB5404D-X, MB5404D-Sis-X	53.4x145.7x119.9
Casing	SECC sheet metal (1 mm)	
Environmental		
Temperature	Operation	MB5404D-X, MB5404D-Sis-X：-40°C ~ 80°C,
		MB5408-X, MB5416-X：0°C ~ 60°C,
	Storage	-40°C ~ 85°C, 5% ~ 95% RH
Humidity	5% ~ 95% Non-condensing	

Serial and RJ-45 Connectors Pin Assignments

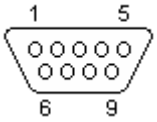
RJ45 to Serial Connectors

Table 5. 2

		Ethernet	RS-232	RS-422	RS-485
	Pin 1	Tx+	RTS	-	-
	Pin 2	Tx-	DTR	TX-	-
	Pin 3	Rx+	TXD	TX+	-
	Pin 4		SG	SG	SG
	Pin 5		SG	SG	SG
	Pin 6	Rx-	RXD	RX+	Data+
	Pin 7		DSR	RX-	Data-
	Pin 8		CTS	-	-

DB9 to RS-232/RS-485/RS-422 connectors (MB5404D-X)

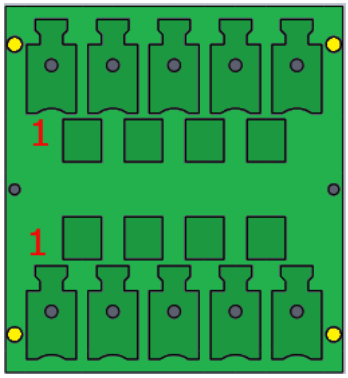
Table 5. 3



Pin#	RS-232 Full Duplex	RS-422/4-Wire RS-485 Full Duplex	2-Wire RS-485 Half Duplex
1	DCD	N/A	N/A
2	RXD	**TXD+**	N/A (reserved)
3	TXD	**RXD**+	**DATA+**
4	DTR	N/A	N/A
5	SG (Signal Ground)	SG (Signal Ground)	SG (Signal Ground)
6	DSR	N/A	N/A
7	RTS	**RXD-**	**DATA-**
8	CTS	**TXD-**	N/A (reserved)
9	RI	N/A	N/A

5pin Terminal Block to RS-485/RS-422 connectors (MB5404D-Sis-X)

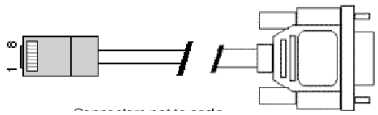
Table 5. 4



Pin#	RS-422/4-Wire RS-485 Full Duplex for SE5404D-TB / SE5404D-Sis	2-Wire RS-485 Half Duplex For SE5404D-TB / SE5404D-Sis
1	T+	NC
2	T-	NC
3	R+	Data+
4	R-	Data-
5	SG (Signal Ground)	SG (Signal Ground)

RJ45 to Male DB9 Connector

Table 5. 5

RJ45			Male DB9	
				
RTS	Pin 1	⇔	Pin 7	RTS
DTR	Pin 2	⇔	Pin 4	DTR
TXD	Pin 3	⇔	Pin 3	TXD
SG	Pin 4	⇔	Pin 5	GND
SG	Pin 5	⇔		
RXD	Pin 6	⇔	Pin 2	RXD
DSR	Pin 7	⇔	Pin 6	DSR
CTS	Pin 8	⇔	Pin 8	CTS

RS-232/RS-422 to RJ-45 Cross over Connection

Table 5. 6

RJ45 A				RJ45 B		
RS-422	RS-232				RS-232	RS-422
	RTS	Pin 1	⇔	Pin 8	CTS	
TX-	DTR	Pin 2	⇔	Pin 7	DSR	RX-
TX+	TXD	Pin 3	⇔	Pin 6	RXD	RX+
	SG	Pin 4	⇔	Pin 5	SG	
	SG	Pin 5	⇔	Pin 4	SG	
RX+	RXD	Pin 6	⇔	Pin 3	TXD	TX+
RX-	DSR	Pin 7	⇔	Pin 2	DTR	TX-
	CTS	Pin 8	⇔	Pin 1	RTS	

RS-485 to RJ-43 Loop back Connection

Table 5. 7

RJ45 A			RJ45 B	
RS-485			RS-485	
	Pin 1	⇔	Pin 1	
	Pin 2	⇔	Pin 2	
	Pin 3	⇔	Pin 3	
	Pin 4	⇔	Pin 4	
	Pin 5	⇔	Pin 5	
Data+	Pin 6	⇔	Pin 6	Data+
Data-	Pin 7	⇔	Pin 7	Data-
	Pin 8	⇔	Pin 8	

LED indicators

Table 5. 8

Name	Color	Message
Power	(Steady Green)	Power ON
Ready	(Steady Green)	Booting up
	(Blinking Green)	In Activity
TX (1-16)	(Blinking Green)	Serial Port Transmission
	(Light Off)	No Data Transmission
RX (1-16)	(Blinking Green)	Serial Port Data Reception
	(Light Off)	No Data Reception
LAN1/LAN2	(Steady Amber)	100Mbps Ethernet connected
	(Light Off)	10Mbps Ethernet Connection or 100 Mbps Disconnected

	 (Blinking Green)	Ethernet Port in Activity

5.2 Software

Table 5. 9

Software	
Utility	"Virtual COM" Driver "Serial-IP" for Windows 98/2000/XP/2003/Vista
Configuration Tool	■ Web-based ■ Telnet ■ LCM ■ **Device View©**

Appendix Configuration using Telnet Interface

The MB54XX Modbus Gateway device also has a built-in Telnet server program such that users can also configure the device using Telnet console software. To start the device configuration using Telnet console, please go to Windows Command software (Start→Run) and use "telnet" command to access the device. In the "Run" window, enter "*telnet device_IP_address*" (For example, telnet 10.0.50.100 if the device is connected to LAN1 port) as shown in Fig. The system will prompt for Username and Password. After the valid username and password are entered, the main menu shall appear as in Apx. 10. It shows all the configurations that can be used on the device.

If Telnet is not yet configured, please follow the steps mentioned below to configure it.

Note:

- The steps described below are for **Windows®** platforms.
- You can always press "ESC" key to return to the upper layer menu.
- If the device does not receive any command within 3 minutes, Telnet connection will be automatically terminated.

For Telnet interface configuring, please go to **Windows® Hyper Terminal** and follow the steps described below.

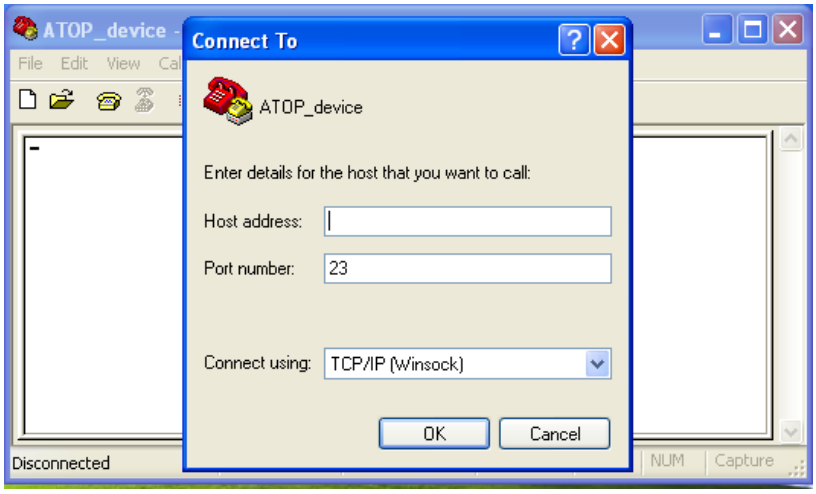
- On your Desktop go to **"Start → All Programs → Accessories → Communications → HyperTerminal".**

Apx. 1

- Fill the Name entry with a name of your choice, and select your favorite icon. The **"Connect to"** window will pop-out.

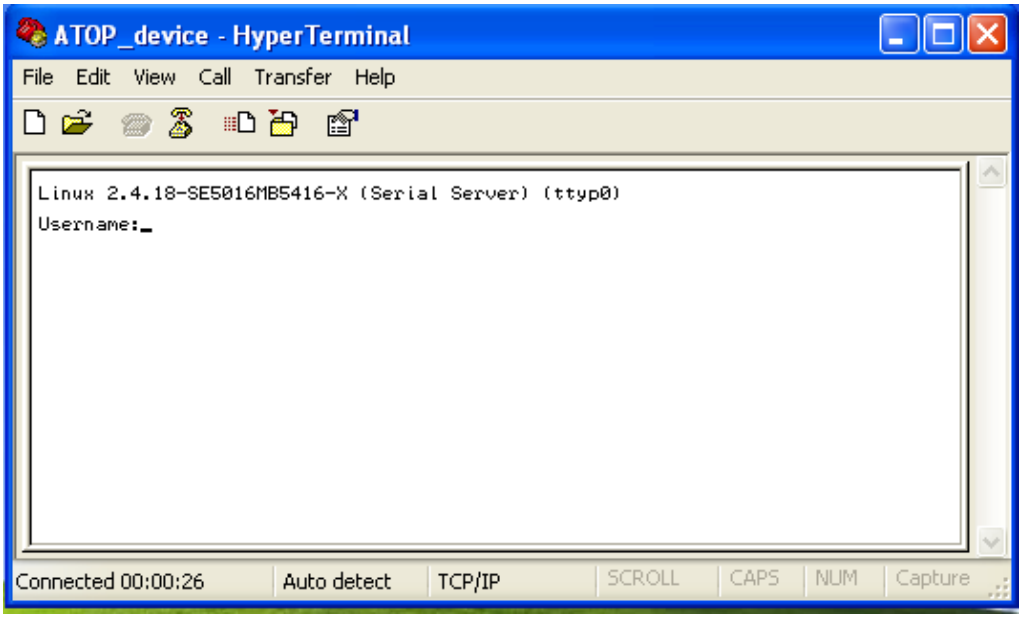
Apx. 2

- Select **"TCP/IP Winsock"** on **"Connect using"**, then check **"OK"**. Here **"Session 1-Hyperterminal"** will appear, and then type **"telnet 10.0.XXX.XXX"** (device's IP), to get into the device's login menu.



Apx. 3

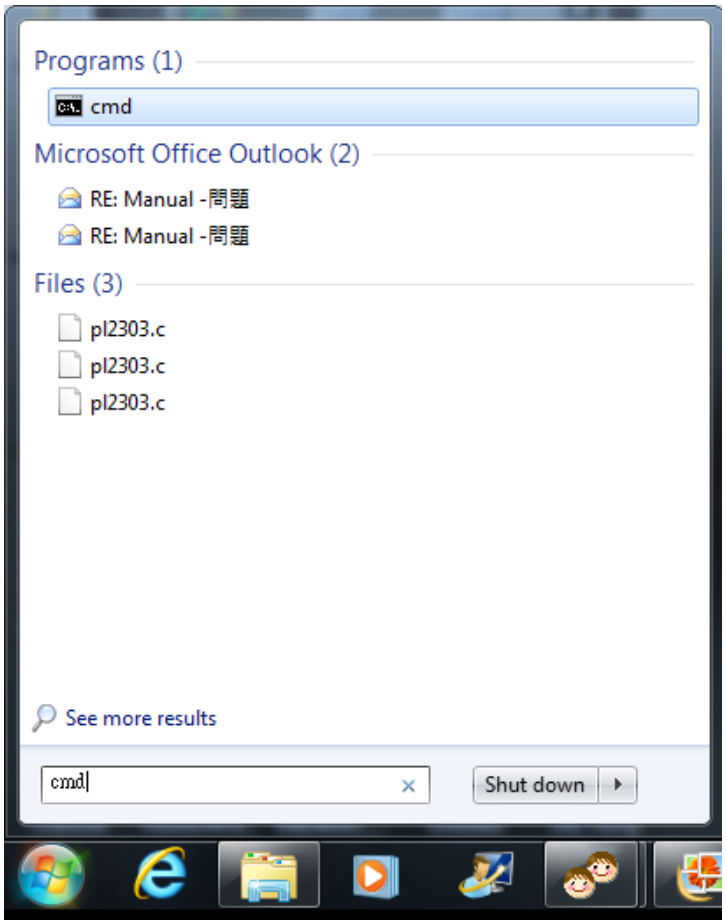
- Once the correct username and password are entered, you will see the configuration menu of the device on the display.



Apx. 4

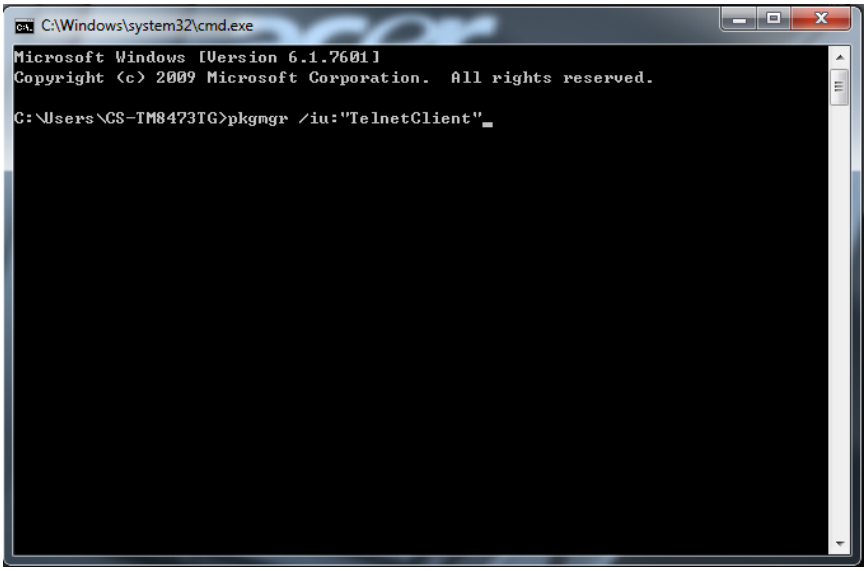
The steps before mentioned are for Win XP, in order to enable telnet in Win 7 follow the steps below.

1. Go to **Start** and on the **"Run"** box type **cmd, Fig.**



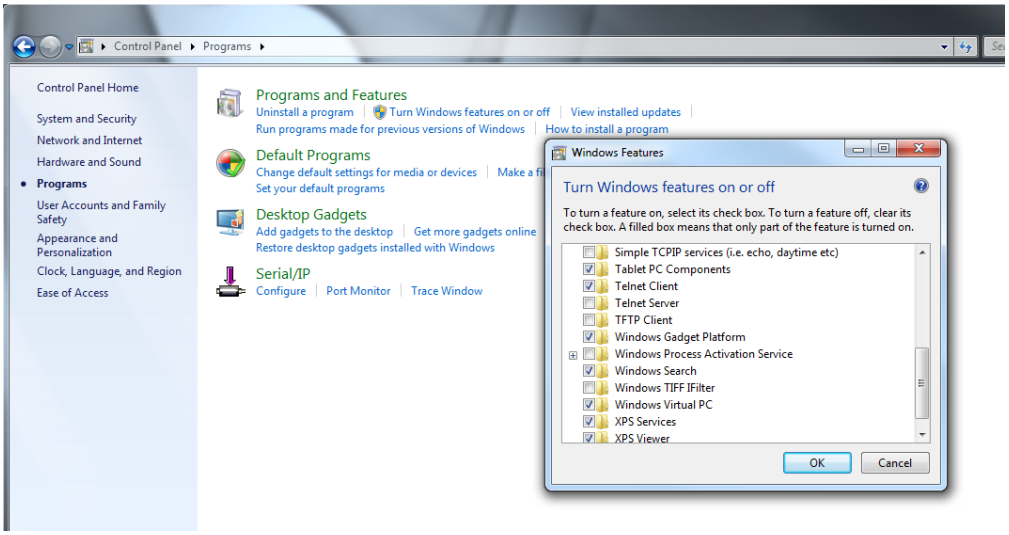
Apx. 5

2. A pop out window will appear as follows, type **" pkmgr /iu:"TelnetClient" "** and press Enter, your Telnet must be configured by now. If you wish to confirm if it is working, follow the next step.



Apx. 6

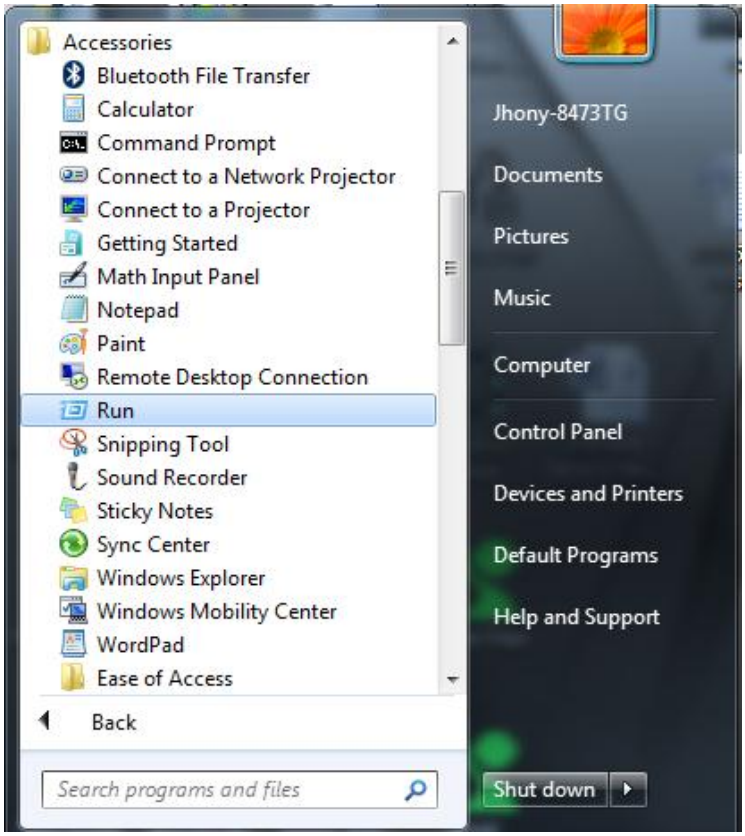
3. Go to **Control Panel** under **Programs and Features** press **Turn Windows features on or off** and click the **Telnet Client** box.



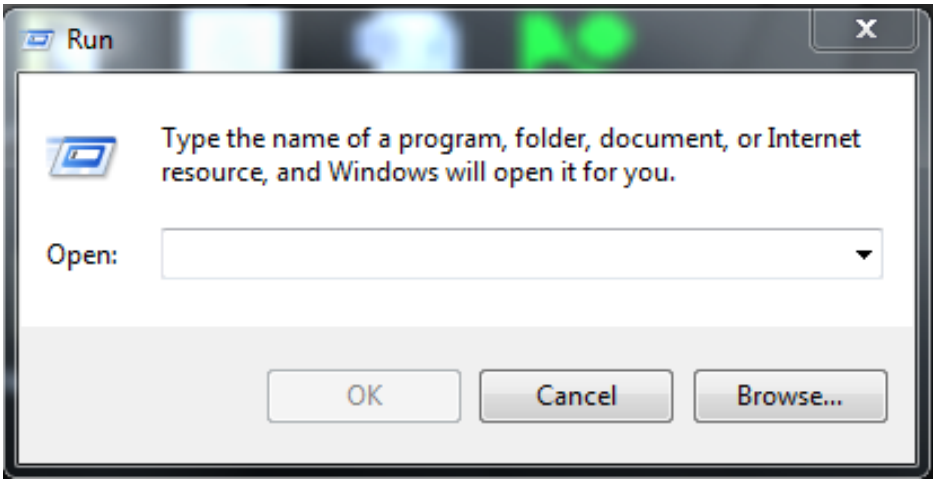
Apx. 7

Note: Default "TCP port numbers" (in this manual, TCP port number, TCP local port number and TCP logical number are synonymous) are 4660 – 4667 for the MB5408-X model, and 4660 – 4675 for the MB5416-X model, each corresponding to COM1 – COM8 and COM1 – COM16, respectively.

After these steps are completed, telnet can be accessed by typing the device's IP using the **"Run**" command window on the Start programs.

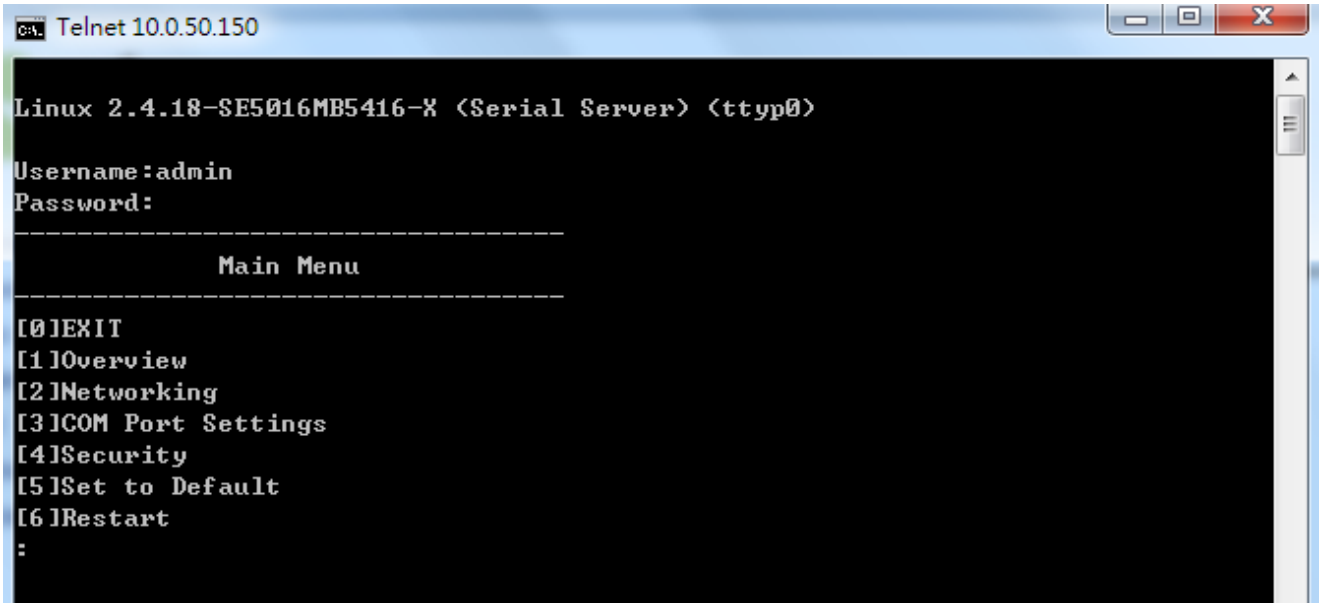


Apx. 8



Apx. 9

Its main menu is a command driven interface; it will look as follows.

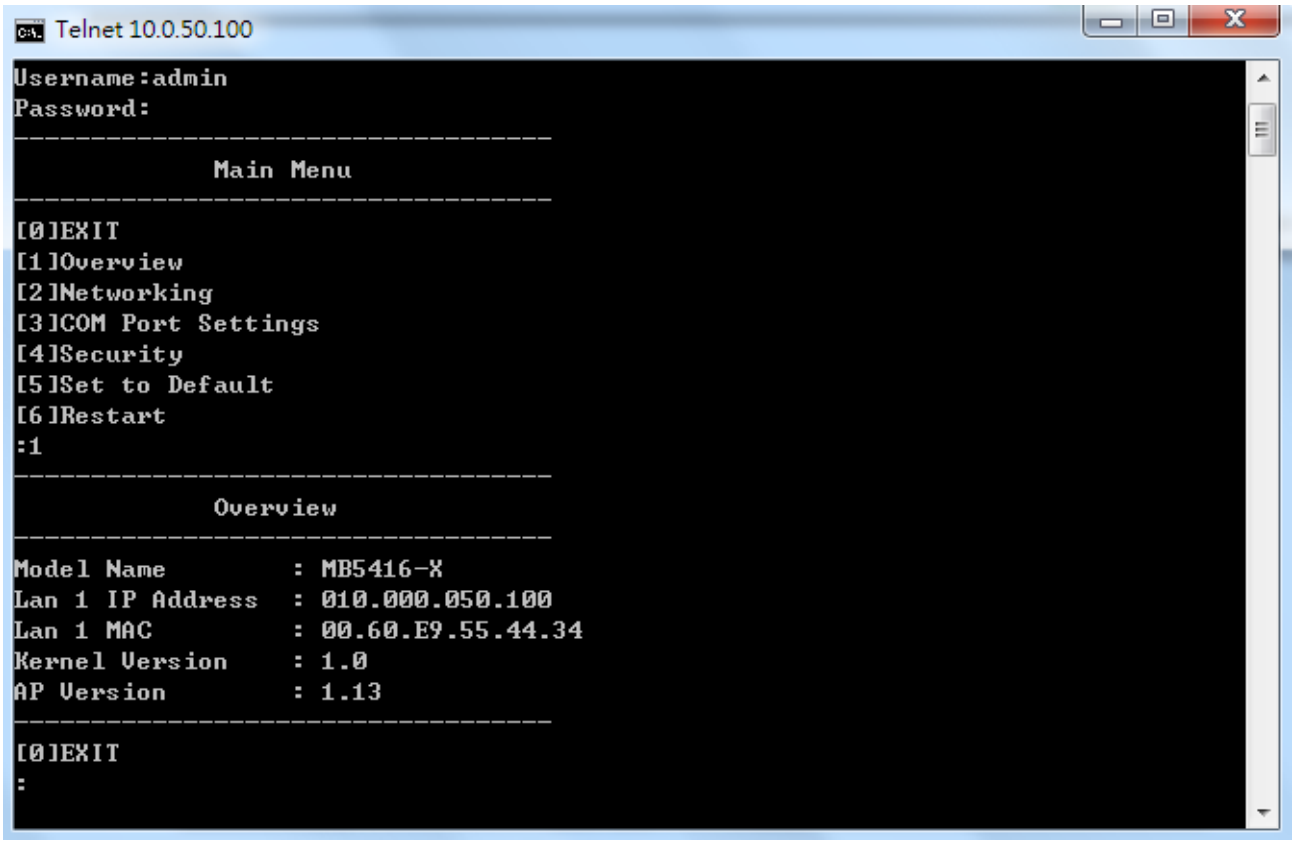


Apx. 10

Most options appear the same as the ones in web browsing mode, the difference being that they have to be accessed by entering the number corresponded to that option.

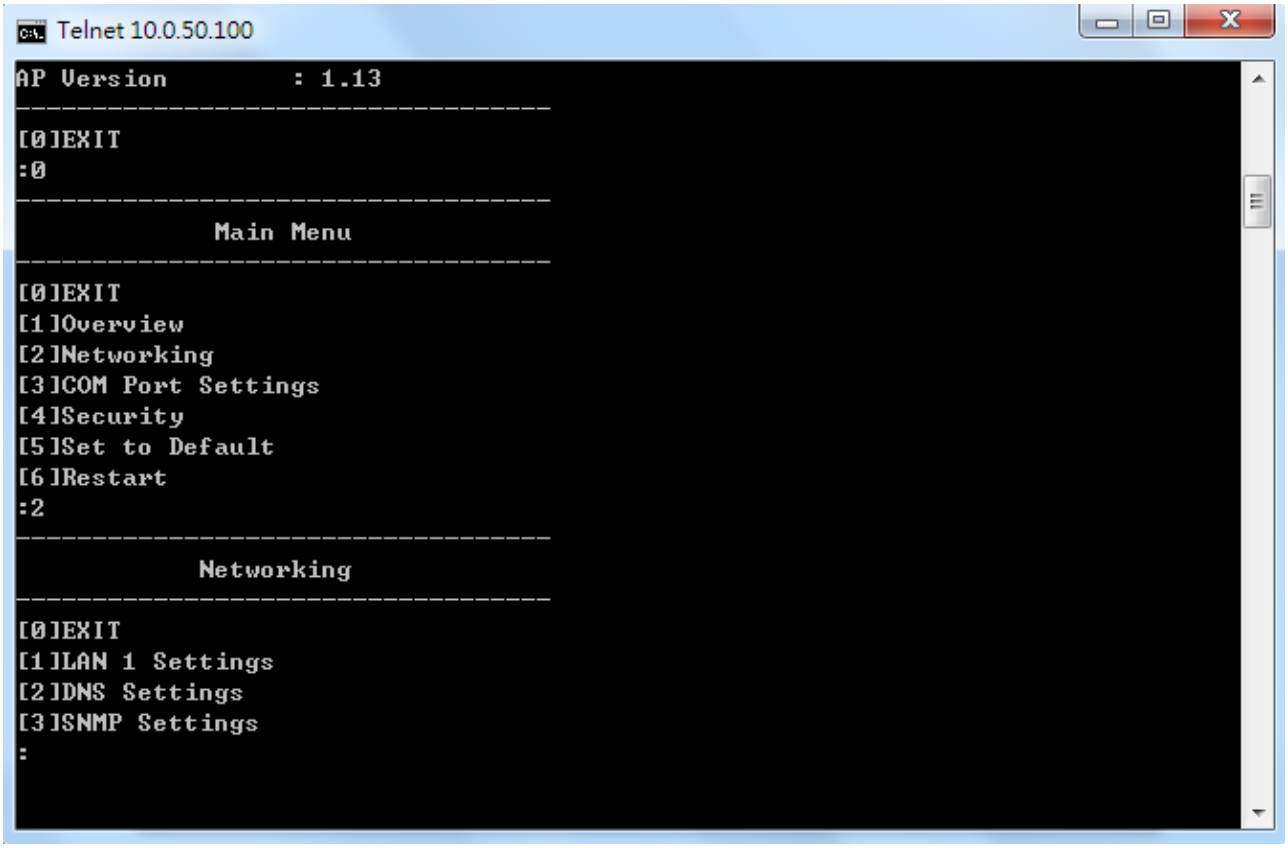
For accessing each function please follow the steps described below.

- On the **Main Screen → [1] Overview,** (a more detailed description of this section is given on Sec. 3.3)



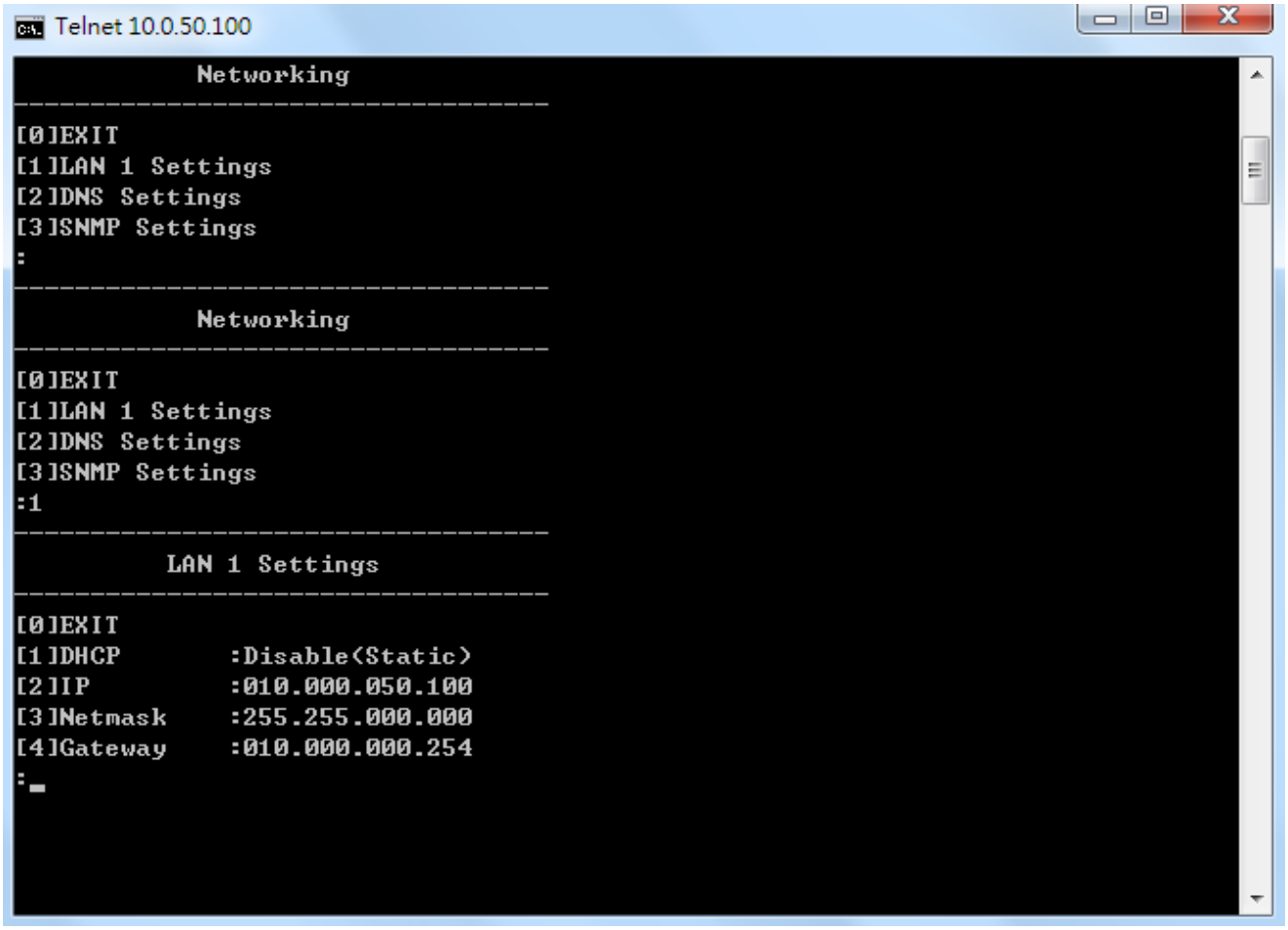
Apx. 11

- **Main Screen → [2] Networking,** (a more detailed description of this section is given on Sec. 3.4)



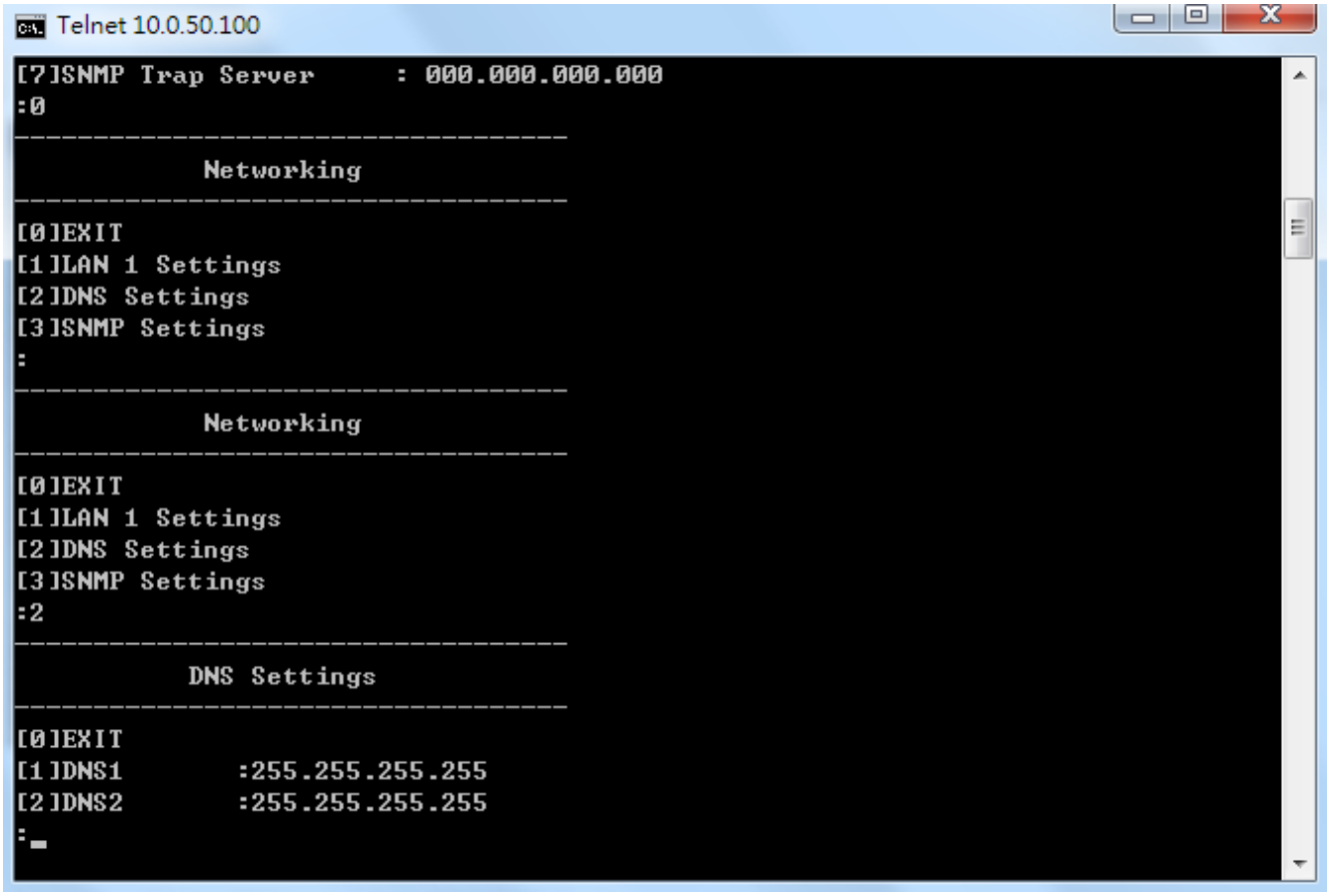
Apx. 12

- **Main Screen → [2] Networking → [1]LAN 1 Settings,** (a more detailed description of this section is given on Sec. 3.4)



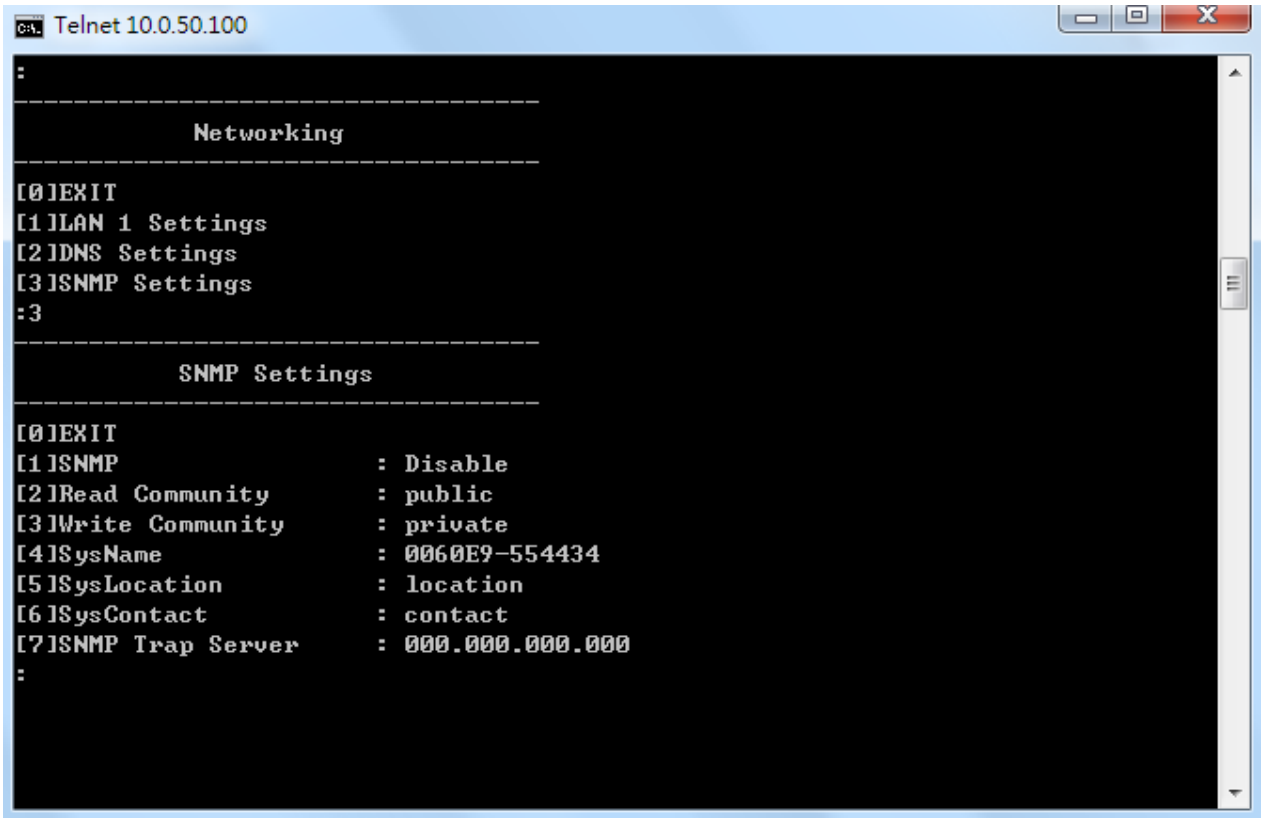
Apx. 13

- **Main Screen → [2] Networking → [2] DNS Settings,** (a more detailed description of this section is given on Sec. 3.4)



Apx. 14

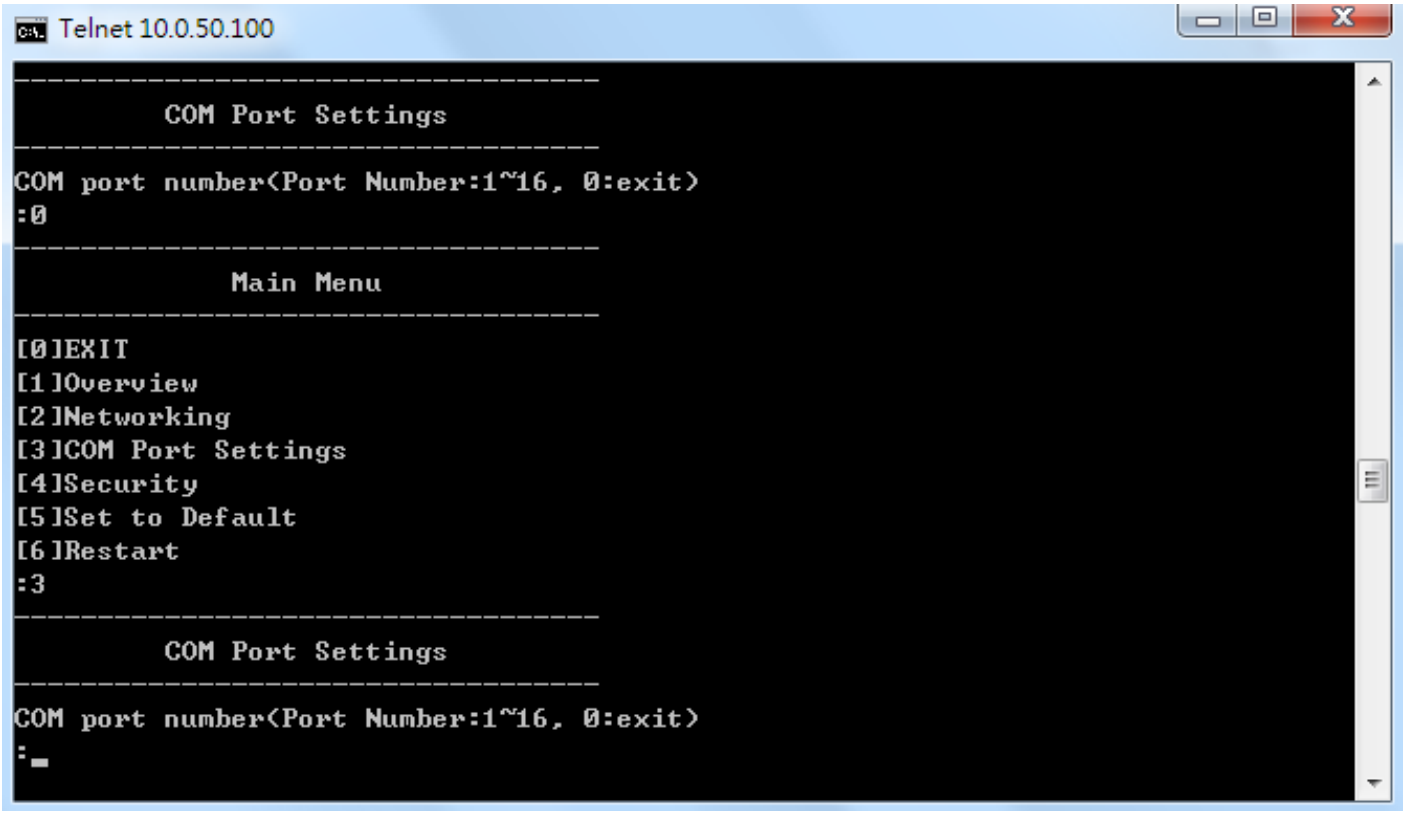
- **Main Screen → [2] Networking → [3] SNMP Settings,** (a more detailed description of this section is given on Sec. 3.6.1)



Apx. 15

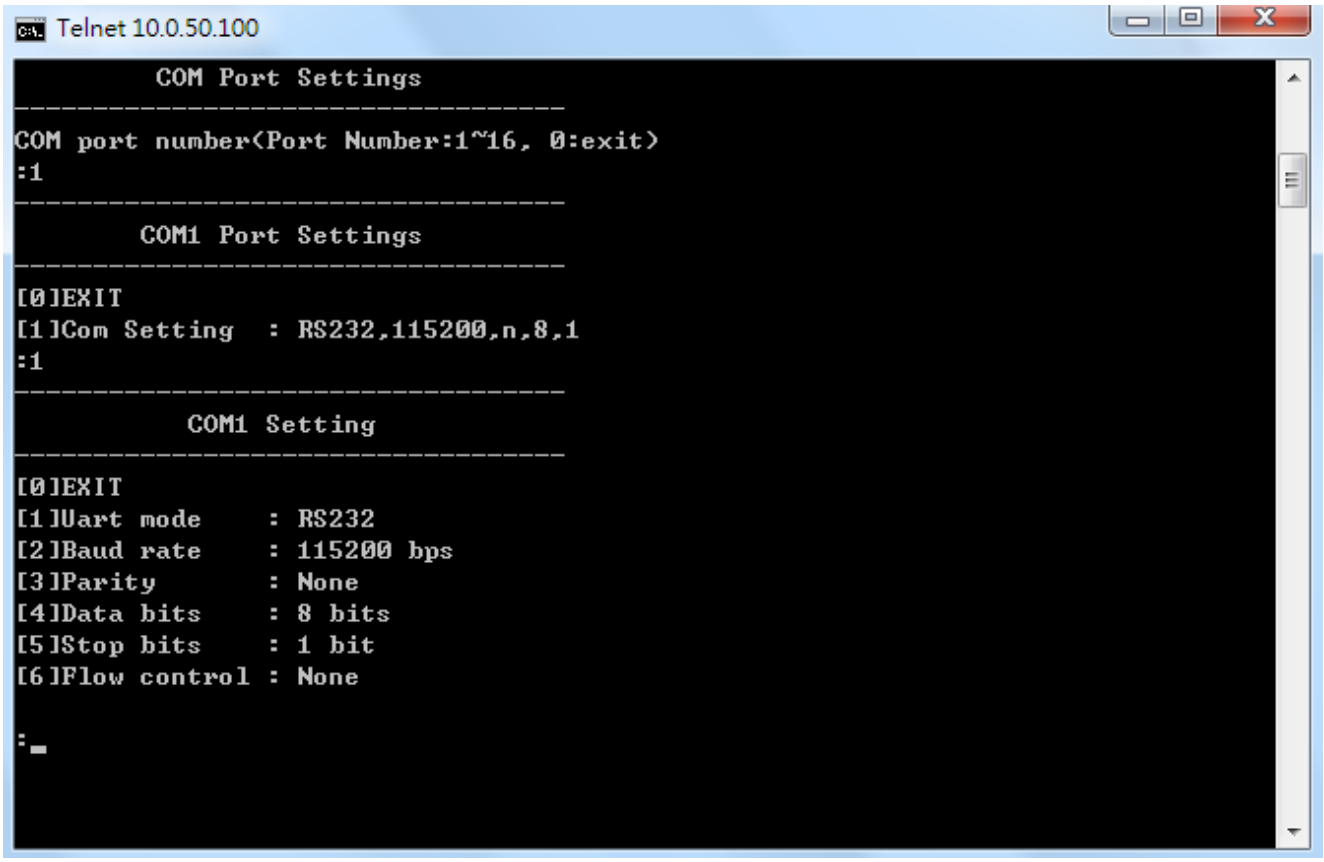
COM Port Configuration: telnet

- **Main Screen → [3] COM Port Setting,** (a more detailed description of this section is given on Sec. 3.5.1)



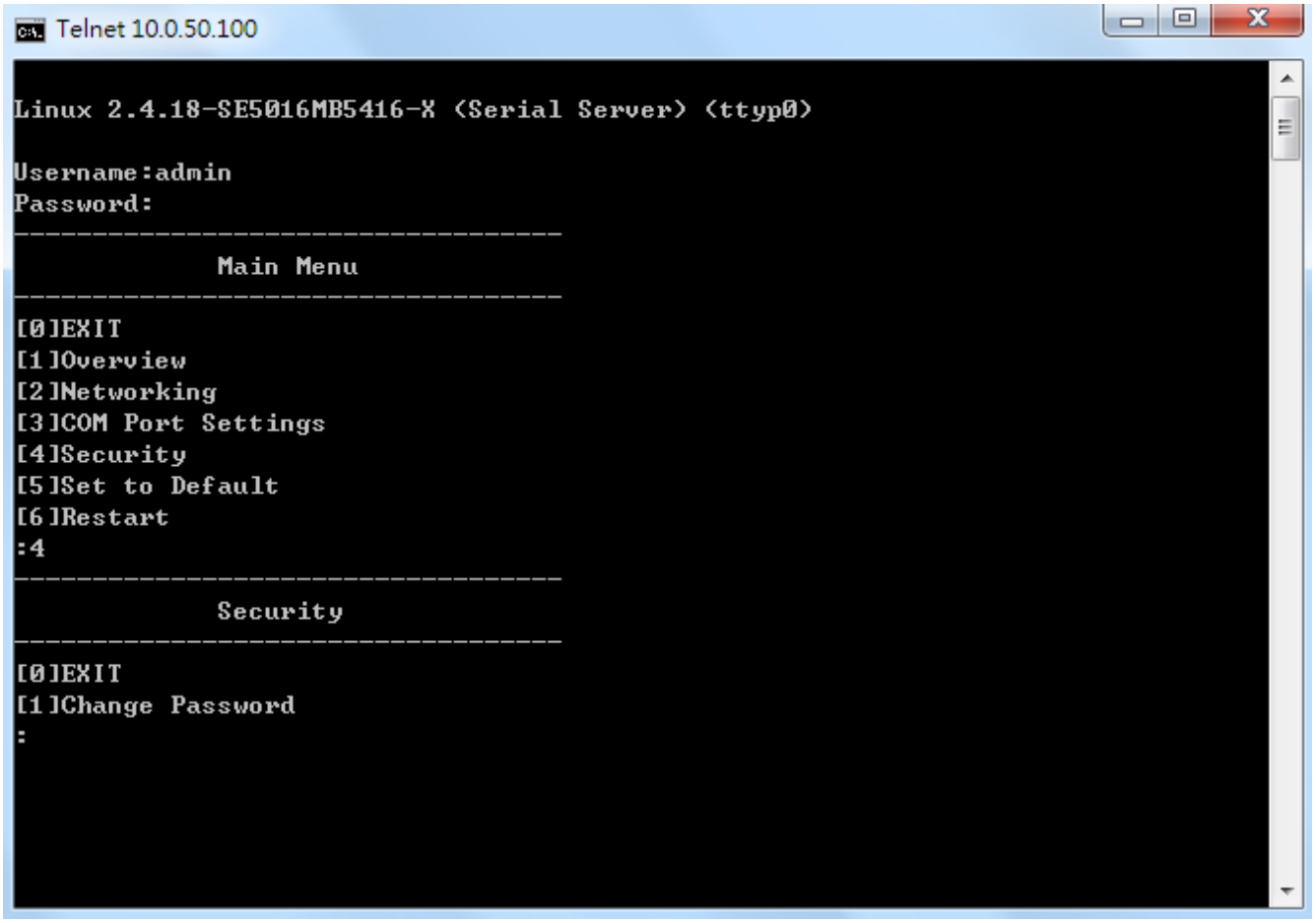
Apx. 16

- **Main Screen → [3] COM Port Setting → [1-16] Select Port → [3] COM Port Settings,** (a more detailed description of this section is given on Sec. 3.5.1)



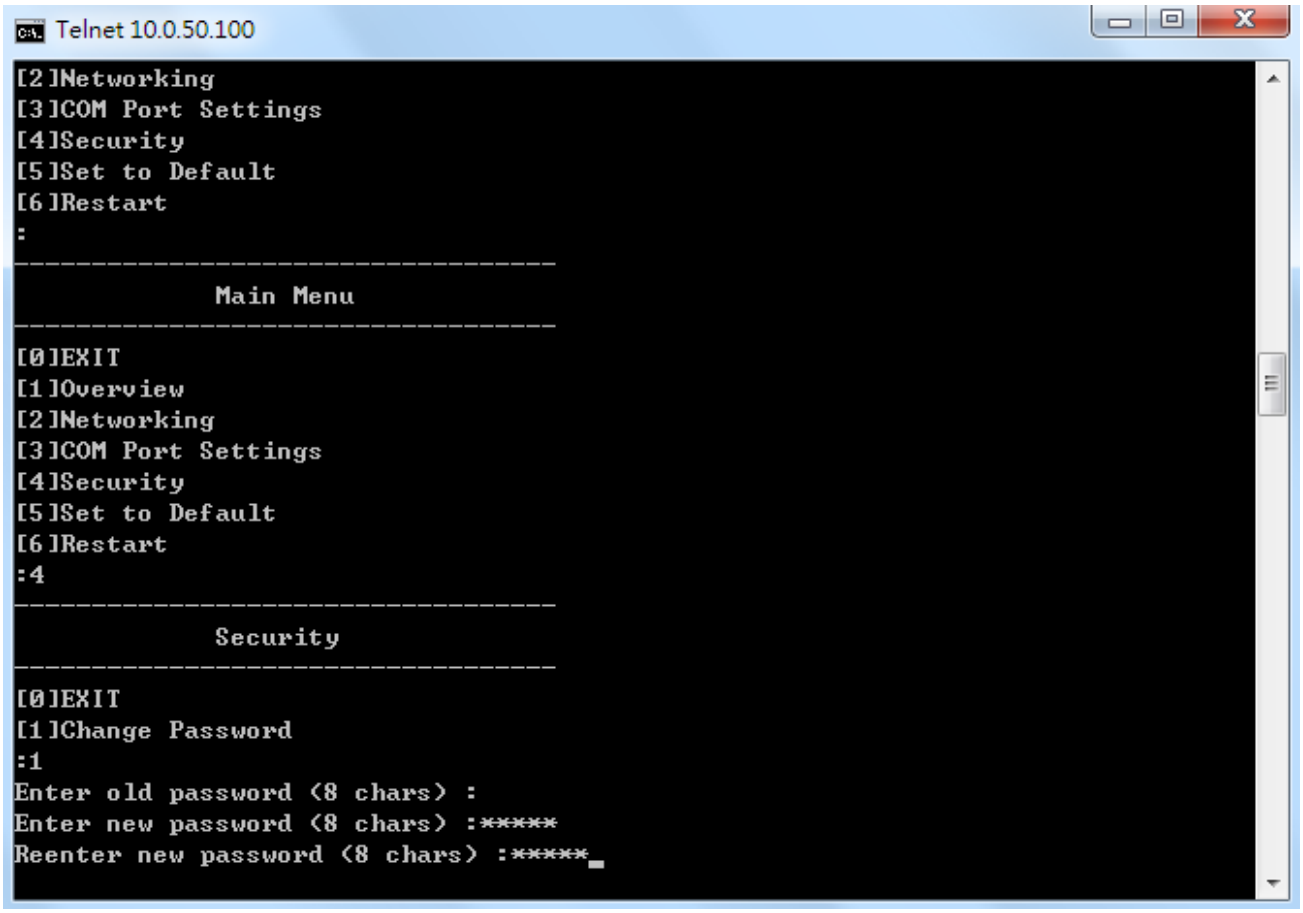
Apx. 17

- **Main Screen → [4] Security,** (a more detailed description of this section is given on Sec. 3.8.6)



Apx. 18

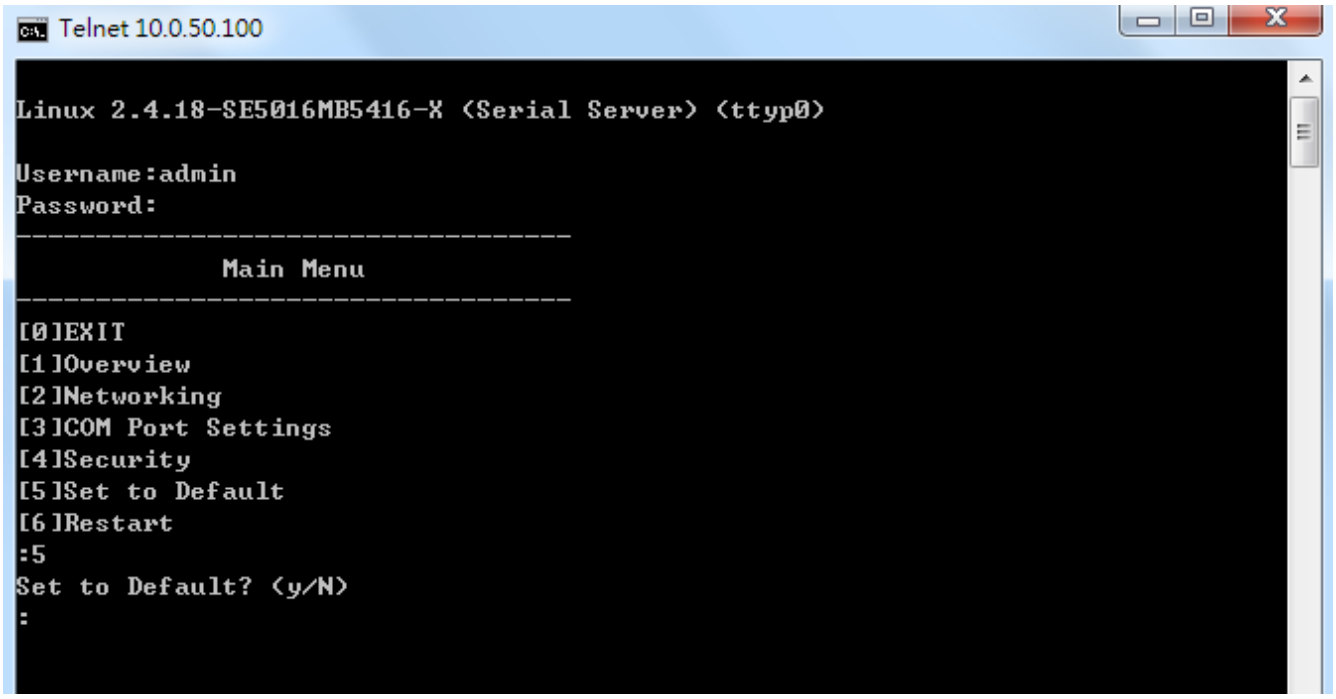
- **Main Screen → [4] Security → [1] Change Password,** (a more detailed description of this section is given on Sec. 3.8.6)



Apx. 19

Reset to Factory Defaults

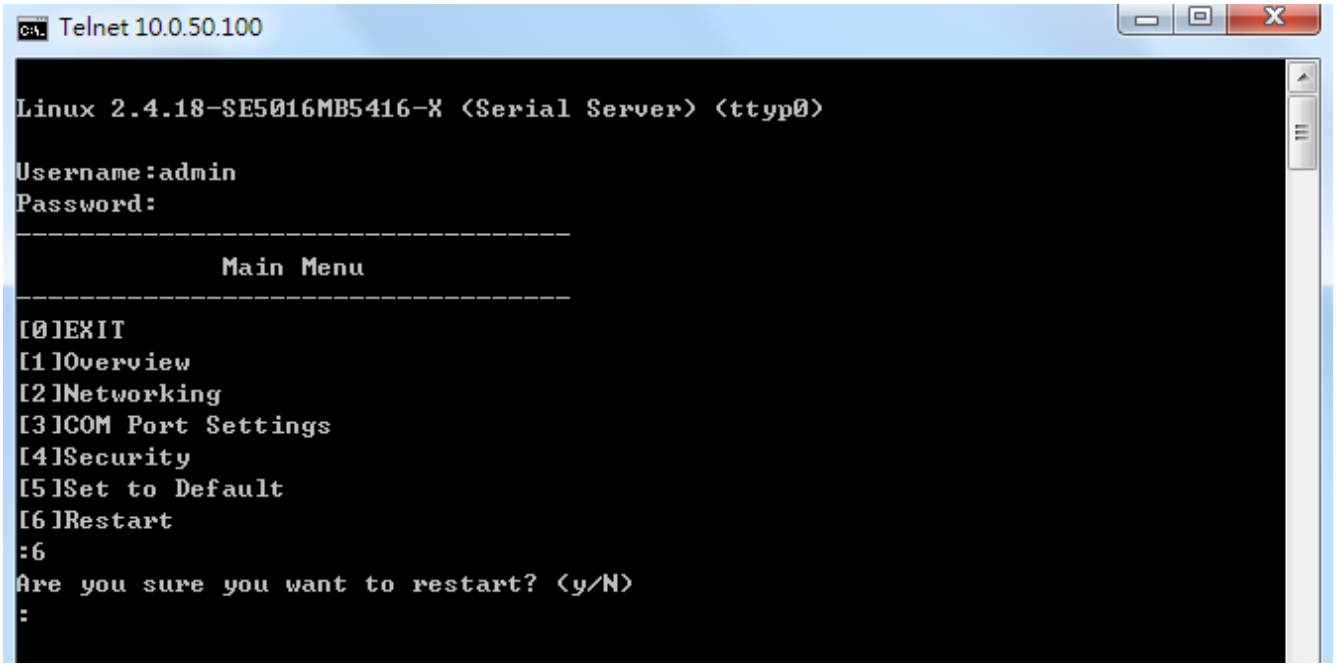
Main Screen → [5] Set to Default, (a more detailed description of this section is given on Sec. 3.8.8)



Apx. 20

Restart

Main Screen → **[6] Restart,** (a more detailed description of this section is given on Sec.3.9)



Apx. 21

Warranty

Limited Warranty Conditions

Products supplied by Atop Technologies Inc., are covered in this warranty for undesired performance or defects resulting from shipping, or any other event deemed to be the result of Atop Technologies Inc., mishandling. The warranty doesn't cover however, equipment which has been damaged due to accident, misuse, abuse, such as:

- Use of incorrect power supply, connectors, or maintenance procedures
- Use of accessories not sanctioned by us
- Improper or insufficient ventilation
- Improper or unauthorized repair
- Replacement with unauthorized parts
- Failure to follow Our operating Instructions
- Fire, flood, "Act of God", or any other contingencies beyond our control.

RMA and Shipping Reimbursement

- Customers must always obtain an authorized **"RMA" number** from us before shipping the goods to be repaired.
- When in normal use, a sold product shall be replaced with a new one within 3 months upon purchase. The shipping cost from the customer to us will be reimbursed.
- After 3 months and still within the warranty period, it is up to us whether to replace the unit with a new one; normally, as long as a product is under warranty, all parts and labor are free of charge to the customers.
- After the warranty period, the customer shall cover the cost for parts and labor.
- Three months after purchase, the shipping cost from you to us will not be reimbursed, but the shipping costs from us to the customer will be paid by us.

Limited Liability

Atop Technologies Inc., shall not be held responsible for any consequential losses from using our products.

Warranty

Atop Technologies Inc., gives a 5 years max for Modbus Gateway products.