Industrial IoT Gateway

EG324

User Manual

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Revision History

Revision	Date	Changes
1.0	2021-02-03	Created
1.1	2022-09-12	Optimized

Contents

1. Product Introduction

1.1 Overview

The Elastel EG324 IoT Gateway provide a high-performance computing platform for embedded data acquisition and communication applications. It comes with 4 x RS485/232 serial ports and dual 10/100 Mbps Ethernet ports, as well as a Mini PCIe socket to support 4G LTE/3G/2G/NB-IoT/Cat M1 cellular modules. These versatile capabilities let users efficiently adapt the EG324 to a variety of complex communications solutions.

1.2 Features

- **Armv7 Quad-core Cortex-A9 1.4 GHz CPU, 512MB RAM + 8GB eMMC Hardware platform**
- **Elastel Optimized Ubuntu 18.04 Firmware flexible configure and program**
- **Dual auto-sensing 10/100 Mbps Ethernet ports**
- **Mini-PCIe slot for 4G LTE, 3G, 2G, NB-IoT cellular modules**
- **Isolated RS485, and RS232 for industrial data acquisition**
- **SD slot for storage expansion**
- **-40°C to +85°C Operating Temperature for harsh environment**

1.3 Specifications

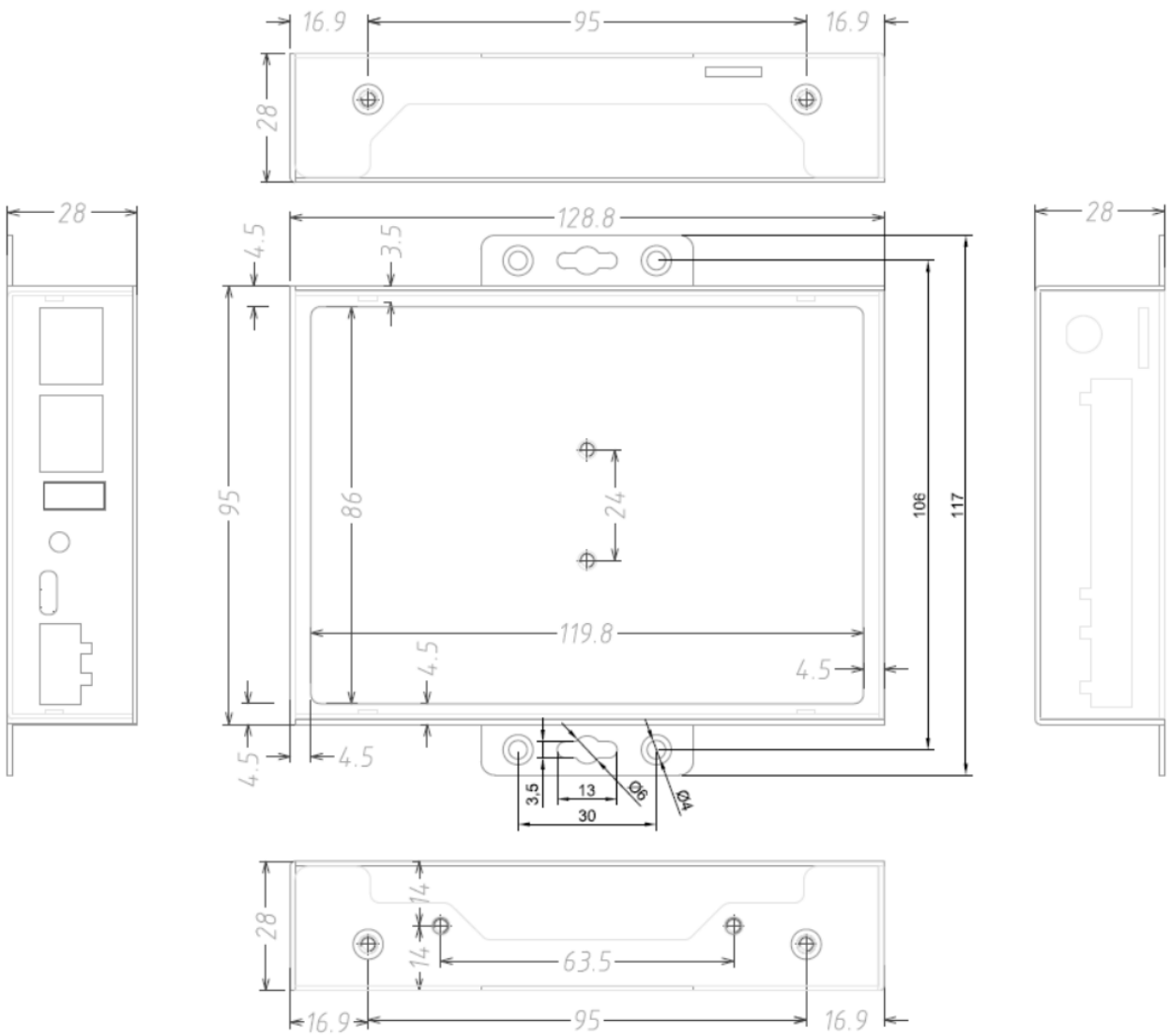
System	
CPU	Armv7 Quad-core Cortex-A9 1.4 GHz
Pre-installed OS	Optimized Ubuntu core 18.04, easy Configurable and Programmable
DRAM	512MB DDR3
Storage Pre-installed	8 GB eMMC
Storage Slot	SD slots x 1
Serial Interface	
Serial Ports	2 x RS485 + 2 x RS-232/485
Baudrate	300 bps to 921.6 kbps

Data Bits	5, 6, 7, 8
Parity	None, Even, Odd, Space, Mark
Stop Bits	1, 1.5, 2
Protection	Surge 4KV ESD ±15kV IEC61000-4-2 Air Discharge ESD ±15kV Human Body Model
Ethernet Interface	
Ethernet Ports	2 x Auto-sensing 10/100 Mbps ports (RJ45 connector) , 1x WAN, 1xLAN or 2xLAN configurable
Protection	Surge 2KV ESD ±15kV IEC61000-4-2 Air Discharge ESD ±15kV Human Body Model
Cellular Interface	
Cellular module Slots	1 x mPCIe slot for Cellular module
Number of SIMs	1
SIM Format	Micro SIM (12mm*15mm)
Cellular Antenna Connector	SMA
Band Options	**US model:** 4G LTE FDD@ B2/B4/B12/B13; 3G WCDMA@ B2/B4/B5; **EU model:** 4G LTE FDD@ B1/B3/B7/B8/B20/B28A; 4G LTE TDD@ B38/B40/B41; 3G WCDMA@ B1/B8; 2G GSM@ B3/B8; **AU model:** 4G LTE FDD@ B1/B2/B3/B4/B5/B7/B8/B28; 4G LTE TDD@ B40; 3G WCDMA@ B1/B2/B5/B8; 2G GSM@ B2/B3/B5/B8; Other options please contact Elastel representative.
USB Host	
USB 2.0	1 x USB 2.0, type-A connector
Power output	5V@500mA
Protection	Output Over Load protection ESD ±8kV IEC61000-4-2 Air Discharge ESD ±6kV Human Body Model
Other Interface	
Console Port	1 x UART type-C connector
Buttons	1x button for Reset and Upgrade
Power Parameters	
Standard Power	DC 12V/1.5A
Input Voltage	9 ~ 48 VDC, 12 ~ 30 VAC

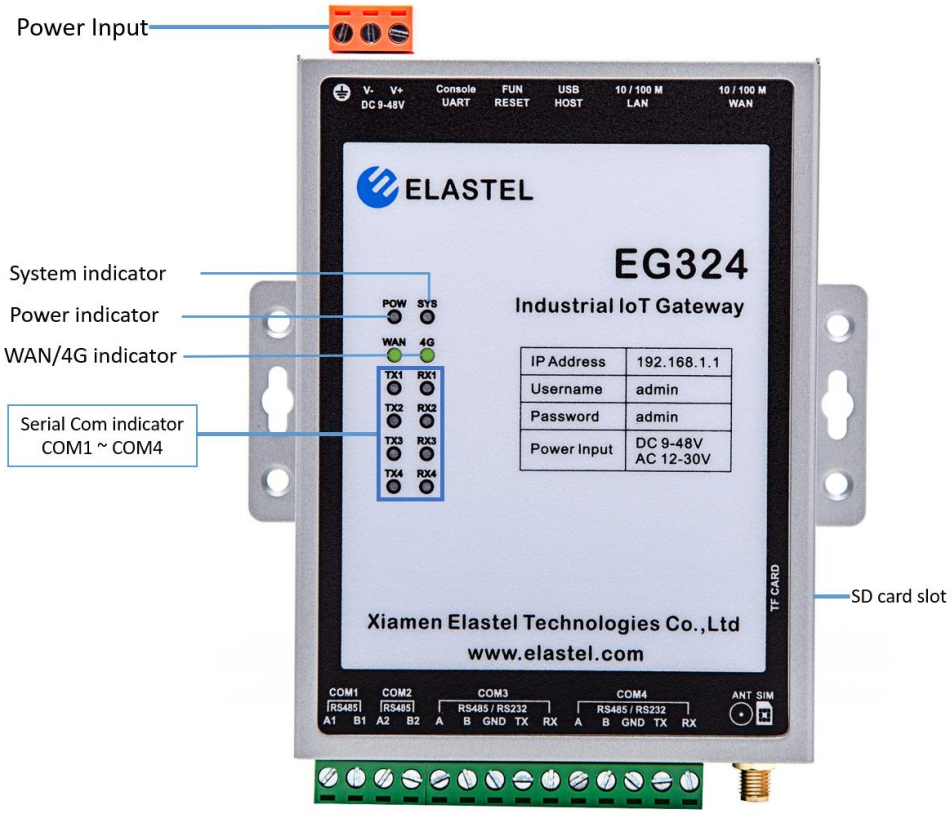
Power Consumption	Working Mode: 6 W Max Consumption: <10 W
Protection	Overvoltage & Reverse polarity protection Surge 4KV ESD ±15kV IEC61000-4-2 Air Discharge ESD ±15kV Human Body Model
Indicators	
LED Indicators	Power x 1, System (programmable) x1, Cellular WAN x1, WAN x1, COM<x> trans x 8 (TX + RX)
Cellular LED status	Searching network: Slow flashing (200ms ON/1800ms OFF) Idle Status: Slow flashing (1800ms ON/200ms OFF) Transmission: Fast flashing (125ms ON/125ms OFF)
Buzzer	Built-in buzzer x 1, for Warning alarm (Programmable)
Reliability	
Alert Tools	External RTC (real-time clock)
Automatic Reboot Trigger	External WDT (watchdog timer)
Physical Characteristics	
Dimensions	128.8mm×117mm×28mm (L×W×H)
Housing	Metal
Installation	DIN-rail mounting Wall mounting
Weight	470 g (1.04 lb)
Environmental Limits	
Ambient Relative Humidity	5 to 95% (non-condensing)
Operating Temperature	-40 to 85°C (-40 to 185°F)
Storage Temperature (package included)	-40 to 85°C (-40 to 185°F)
Package Contents	
Device	1 x EG324 IoT Gateway with Terminal Block preinstalled
Antenna	Mag-mount Cellular Antenna (SMA Male, 1 meter, 12dBi)
Installation Kit	1 x DIN-rail kit
Power Adapter	DC 12V/1.5A (optional)
Warranty	
Warranty Period	1 years

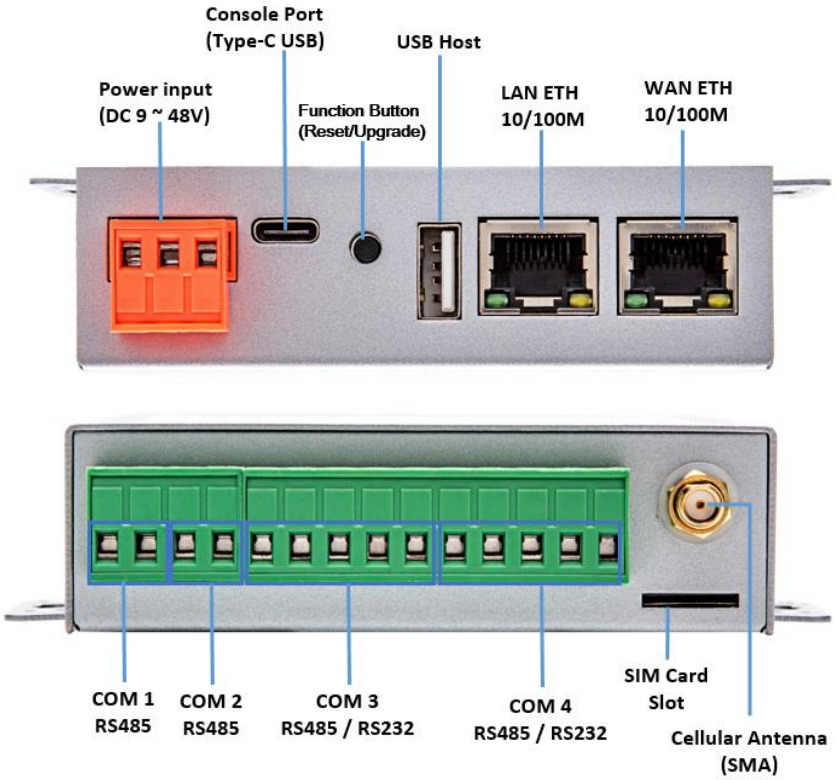
2. Hardware Introduce

2.1 Overview and Dimension



2.2 Interfaces Overview





3.Optimized Ubuntu OS Guide

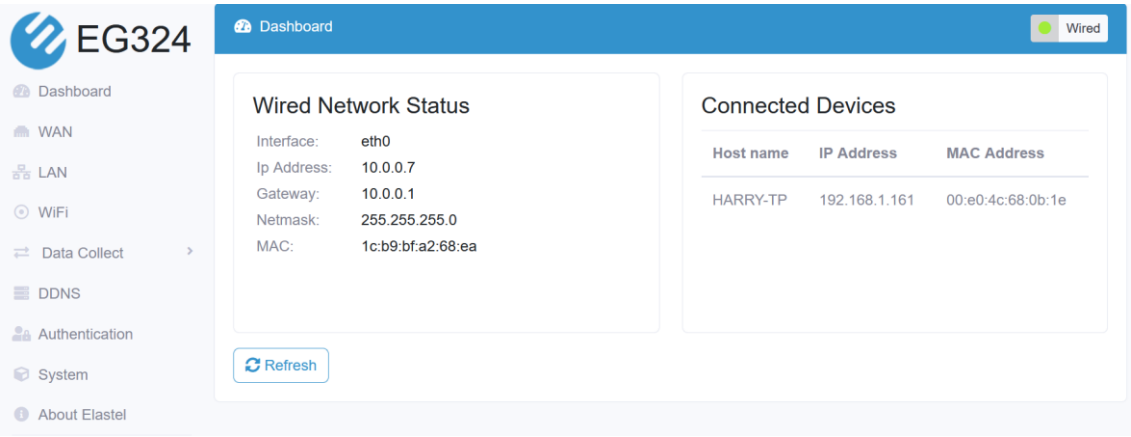
Elastel provide optimized Ubuntu Operating System which optimized from standard Ubuntu 18.04. It provide a webUI easy for basic system management, networks management, serial ports communication operations, and other usages. While also provide CLI for more programms configurable. This section guide you how to use this embeded OS on EG324.

3.0 Access to WebUI

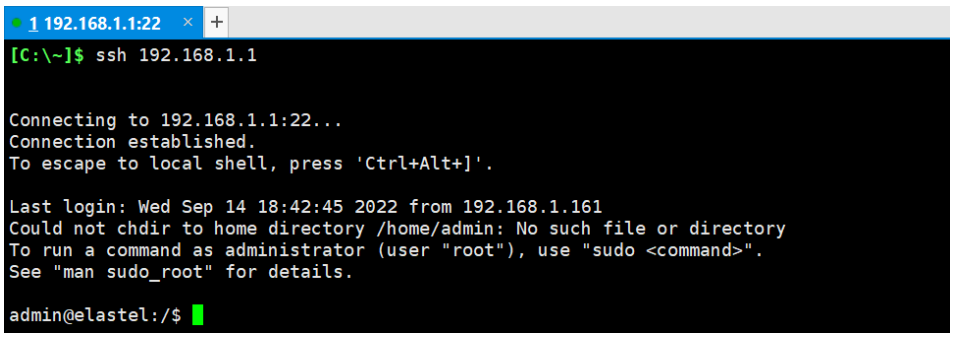
1) Connect your PC to LAN port of EG324 Gateway directly. Normally your PC will obtain an IP address 192.168.1.X from EG324 DHCP automatically. If not, please assign a static IP manually within the same subnet as 192.168.1.1 at 255.255.255.0 mask, while default gateway as 192.168.1.1

2) Open a web browser on your PC and visit 192.168.1.1 gateway address. The webUI of EG324 should appear and request an username and password to login.

3) Enter the default username and password both “admin” to login the webUI of EG324



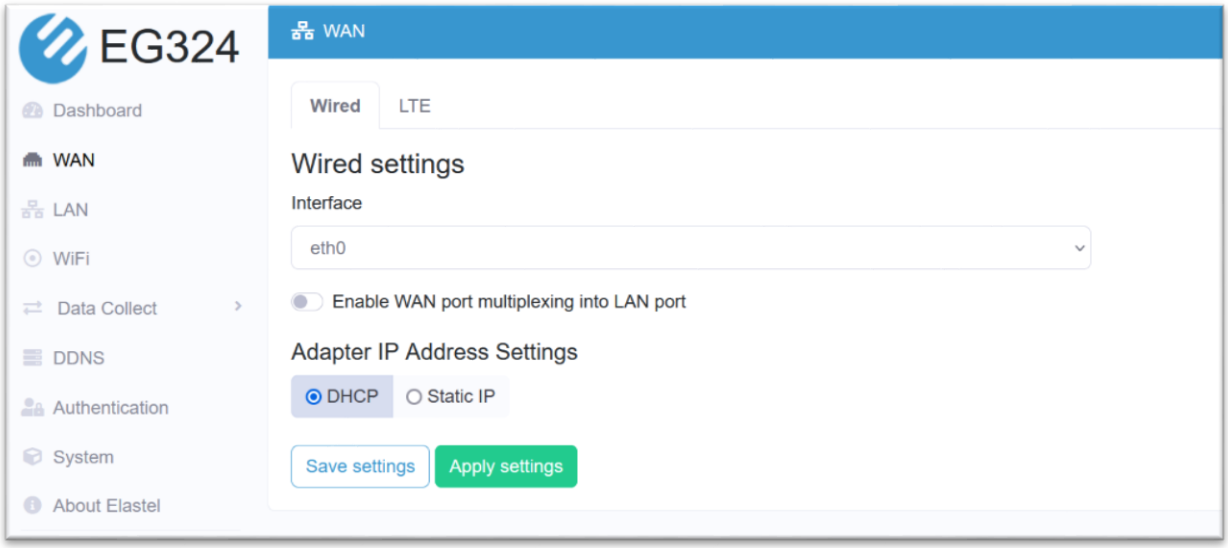
Note, you are also allowed to access to EG324 CLI (Command Line Interface for batch scripting) immediately via SSH or Telnet once connected your PC to EG324 LAN, rely a putty or Xshell tool to ssh 192.168.1.1 with “admin” for both username and password. Check the Section 4 for more details.



3.1 Dashboard

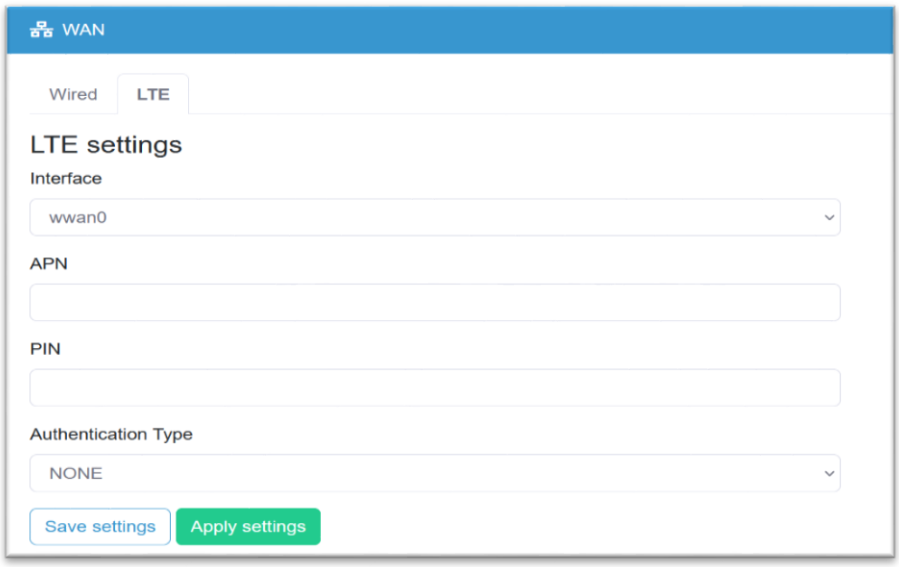
The Dashboard page shows the overview of current network status, it contains the current actived network type (Wired or LTE), network interface, IP address, MAC address and so on. And the current Connected Devices list, indicating host name, IP address, MAC address.

3.2 WAN

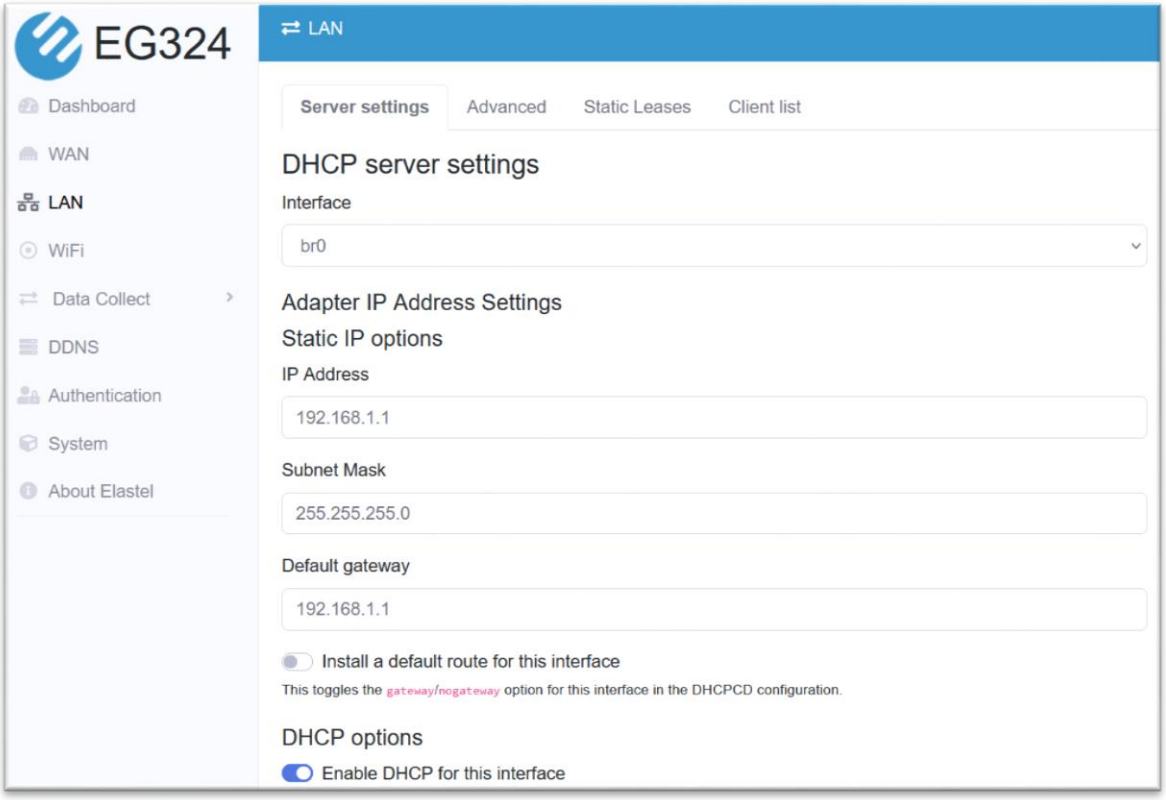


WAN menu provide the network setting for WAN, including Wired and LTE.
At Wired setting, it provide “Enable WAN port multiplexing into LAN port”, and options for adapter IP address from DHCP or Static IP.

LTE setting provide the cellular network related items like APN, PIN, Authentication Type, and so on.

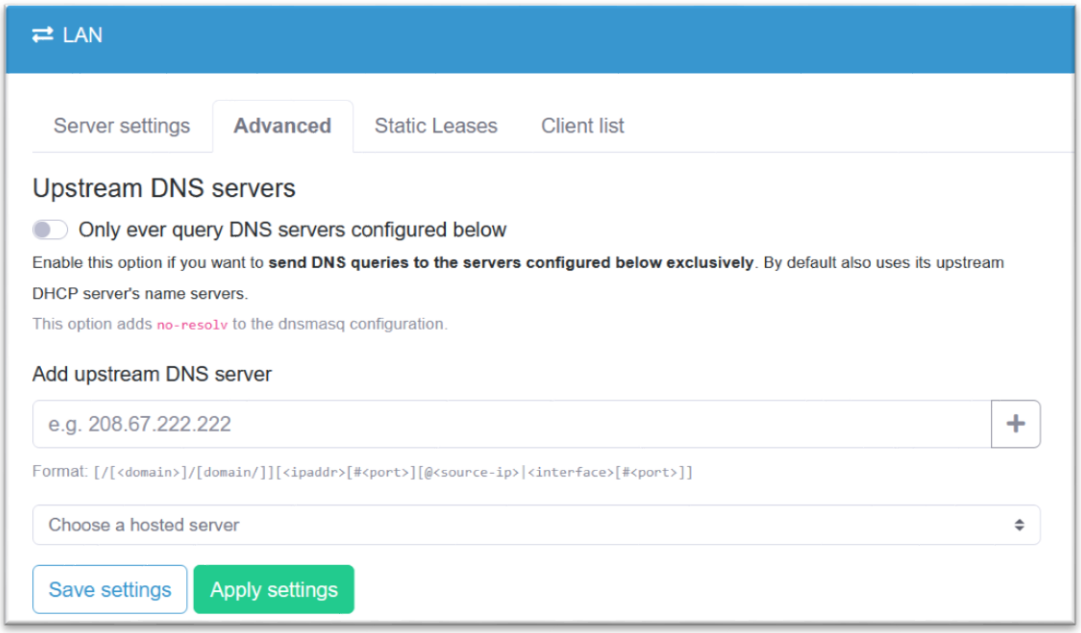


3.3 LAN

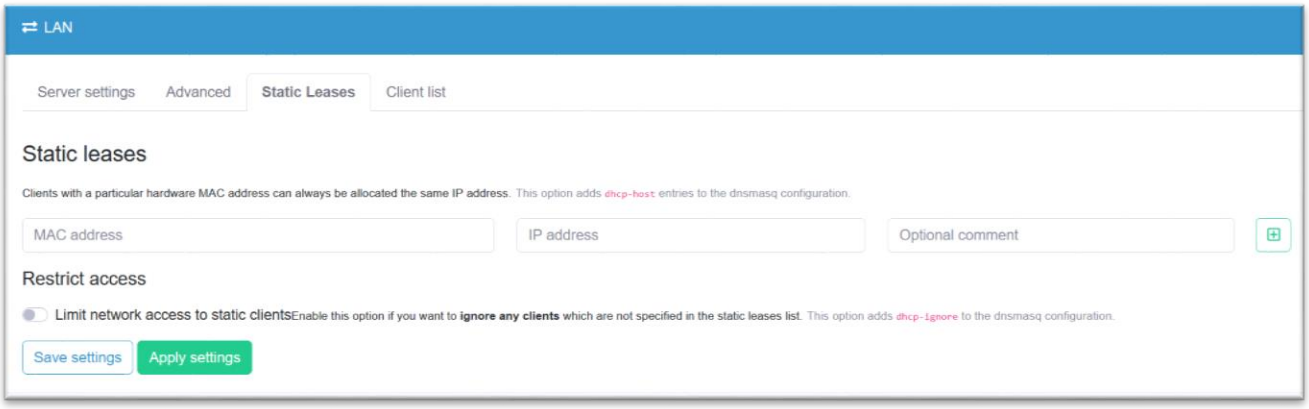


The LAN menu provide settings for EG324 LAN, including DHCP server settings like assigned IP address range, with EG324 gateway IP address which default as 192.168.1.1.

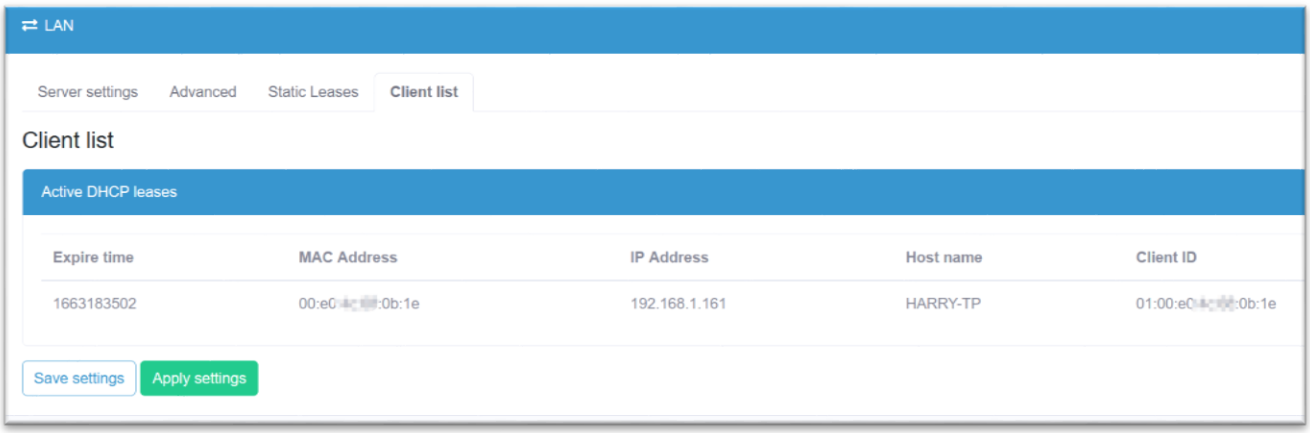
Advanced label provide Upstream DNS server



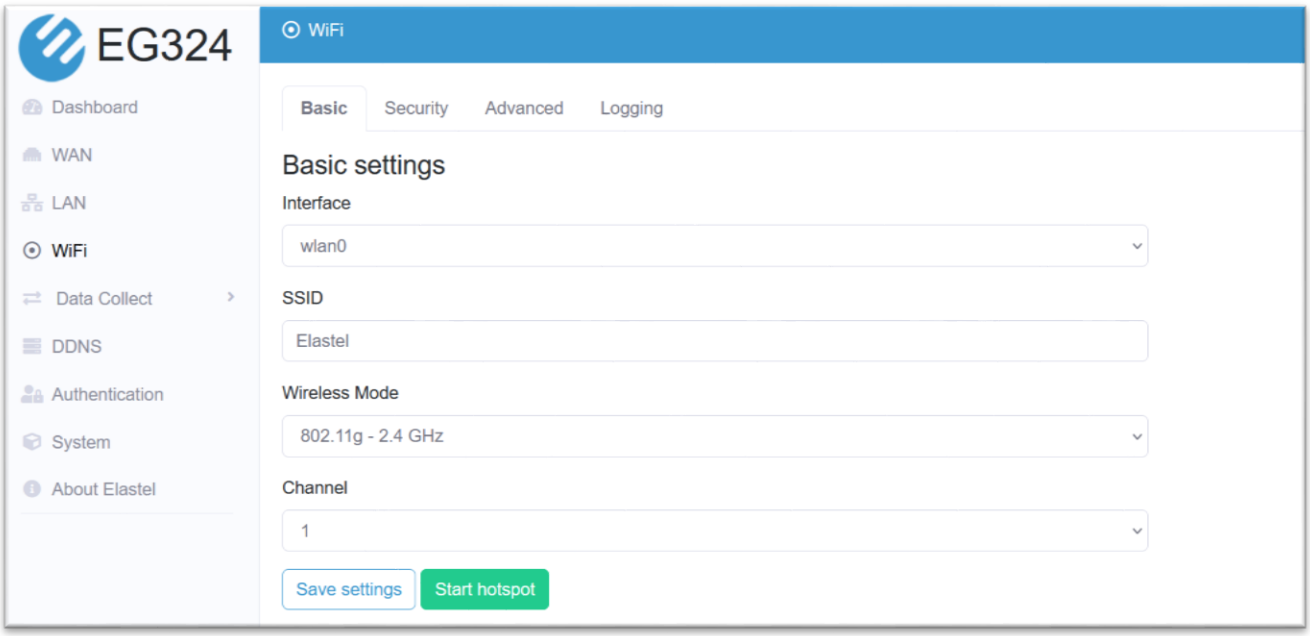
Static Leases provide an option for user allocate LAN IP address with particular hardware MAC address. This is useful for making your slave device use solid LAN IP address connected with EG324 Gateway.



Client List provide the overview of actived clients connected on EG324 gateway currently.



3.4 WiFi



EG324 support WiFi optional by external USB WiFi dongle. The OS preinstalled the drivers of USB WiFi dongle which powered by RTL8188EU, RTL8192EU, MT7601U, RTL8811CU and RTL8812BU chipset.

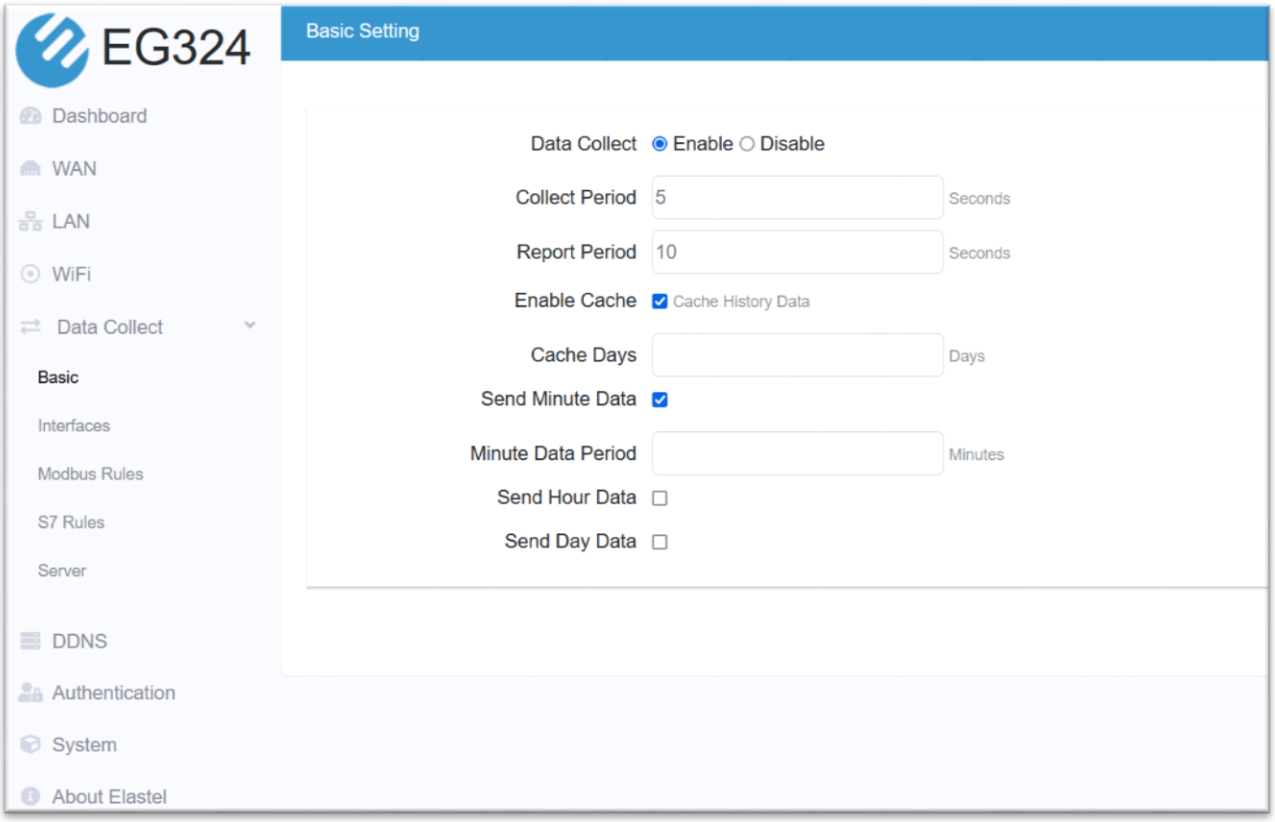
The webUI powered by Hostapd provides the setting items related WiFi like SSID, Wireless Mode (2.4G/5G depends on your WiFi dongle mode), and Security settings for type, encryption, password.

3.5 Data Collect

ElastOS provide data communication management portal for RS485/RS232/Ethernet ports data acquisition and control. Support Modbus protocol, Siemens S7, and other customizable protocols.

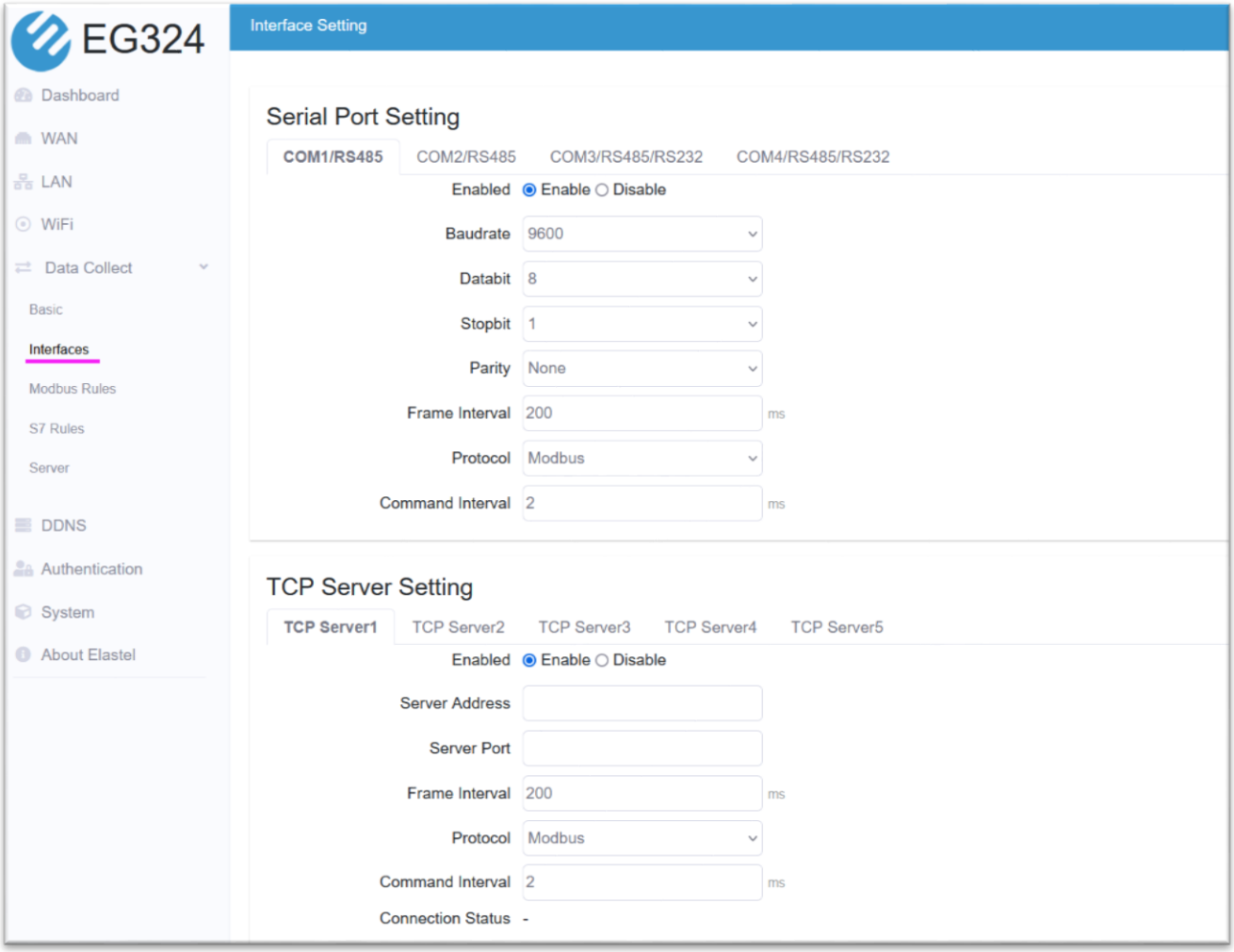
3.5.1 Basic Setting

This page provide settings for enable or disable the data collect feature, set the collect period, and report period in seconds, also enable/disable data cache in fail to upload data to cloud.



1) Data Collect: Enable or Disable data collect feature.
2) Collect Period: Set the period of data acquire from slave devices.
3) Report Period: Set the Period of data report to server/ data center.
4) Enable Cache: Enable or Disable history data cache feature.
5) Related data cache setting if enable the cache feature.

3.5.2 Interface Settings

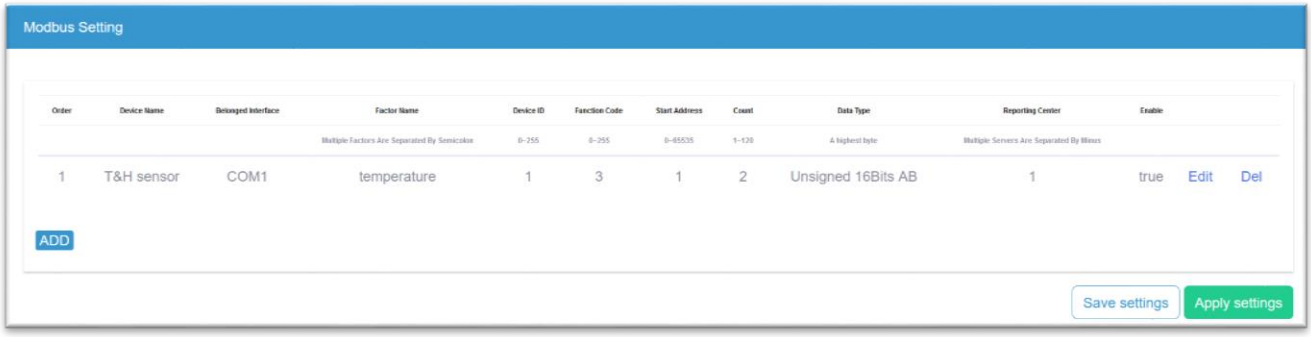


Switch the hardware interfaces for data acquisition from kinds of slave devices. Including Serial ports (COM1 ~ COM4 on EG324 accordingly), Modbus TCP base on Ethernet Ports.

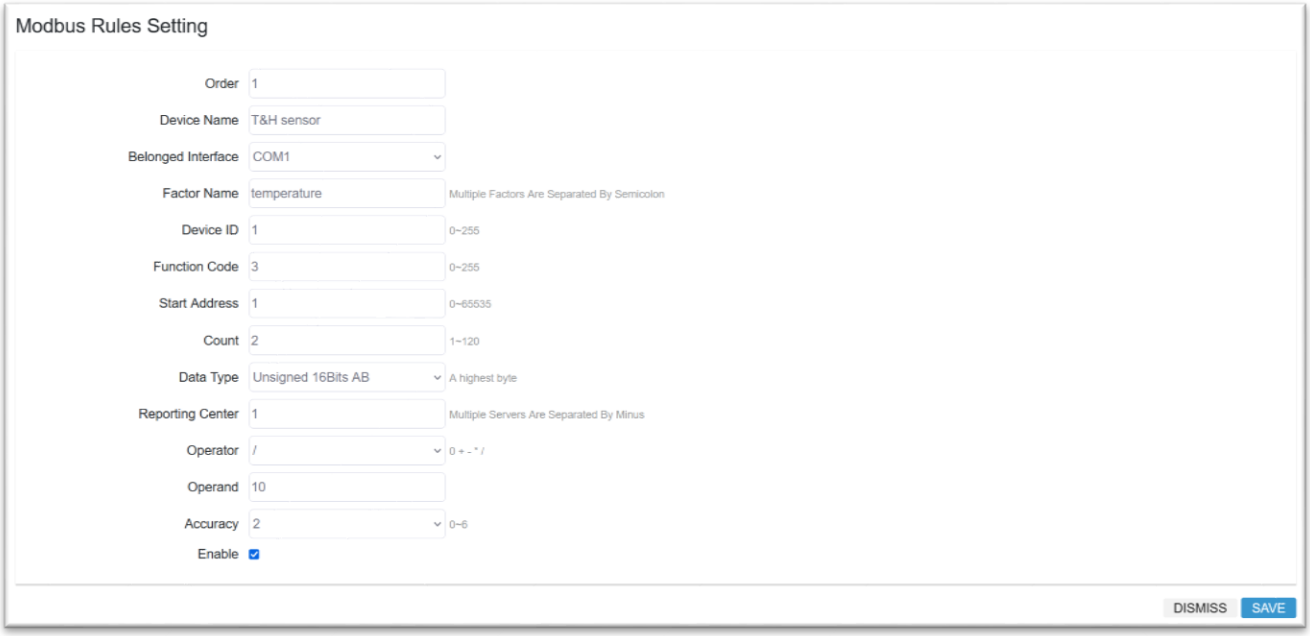
3.5.3 Modbus Rule Setting

Modbus Rules Setting is for EG324 as a Modbus master to acquire data from slave devices based on Modbus protocol. You can configure multiple Modbus rules on it base on different Device ID.

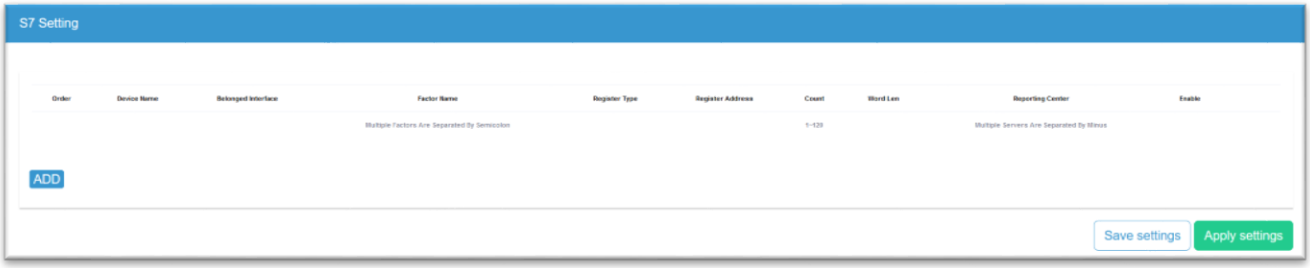
EG324 provide the options of definable factor name, device ID, function code, register address and count register number, please following the slave device datasheet to get these information.



Click ADD or EDIT button to add or edit a modbus rule, it provide visible Modbus related setting items.

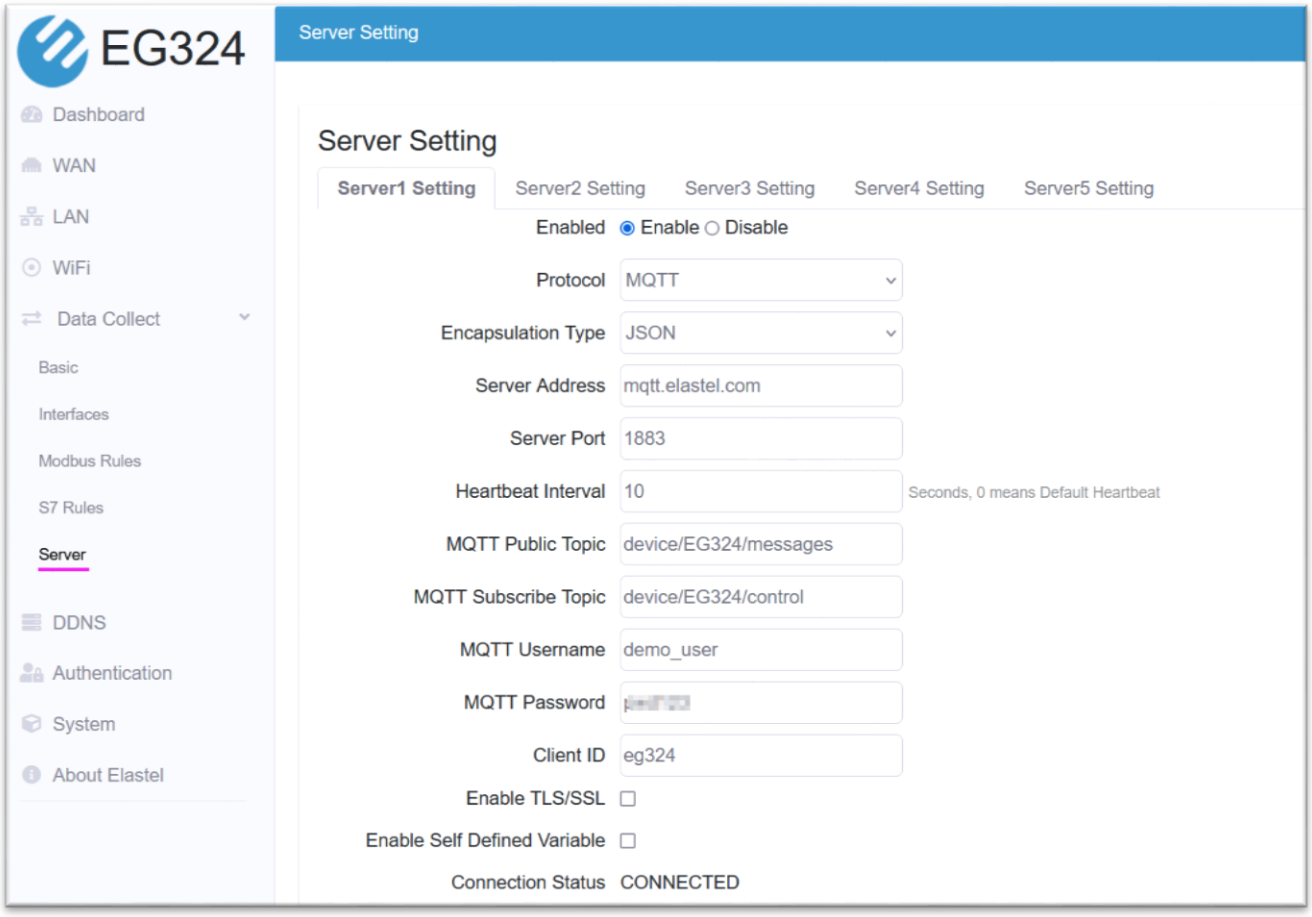


3.5.4 S7 Rules Setting



This menu provide the Siemens S7 protocol settings for your Siemens PLC data acquisiton.

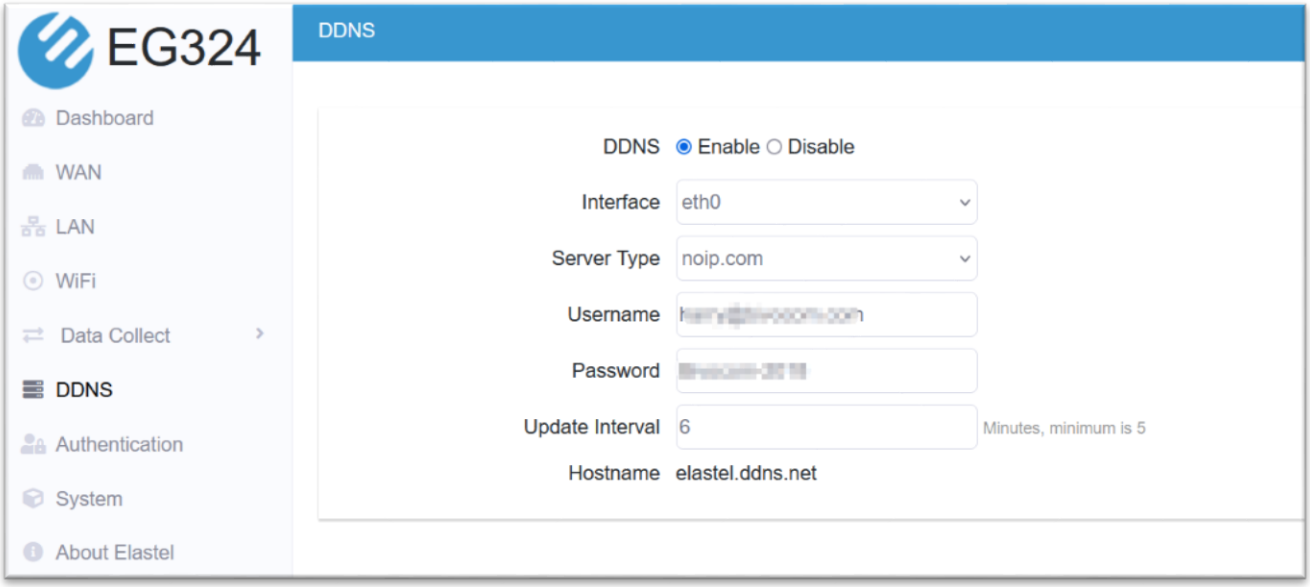
3.5.5 Server Setting



Server setting menu allows user set the data center address up to 5 servers with individual protocols. The EG324 support TCP, TCP Server, UDP, HTTP, MQTT, and Modbus TCP protocols for communication.

For the data format, it supports different encapsulation type, include “Transparent”, “Json”, and “HJ212” (special for some Environment SCADA). Also it support customize specific protocols for your specific data center requirements.

3.6 DDNS

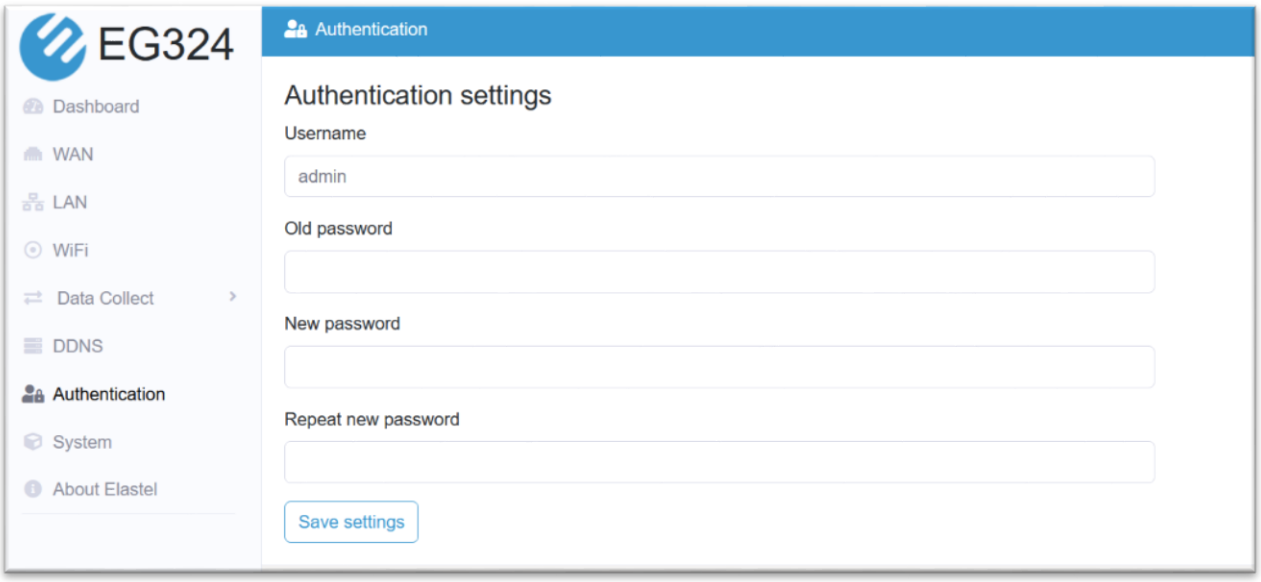


DDNS menu provide the settings for DDNS service, the default DDNS service provide is noip.com, which you can easily login your username and password of noip.com, and set the update interval (the minimum interval is 5 minutes).

Note,

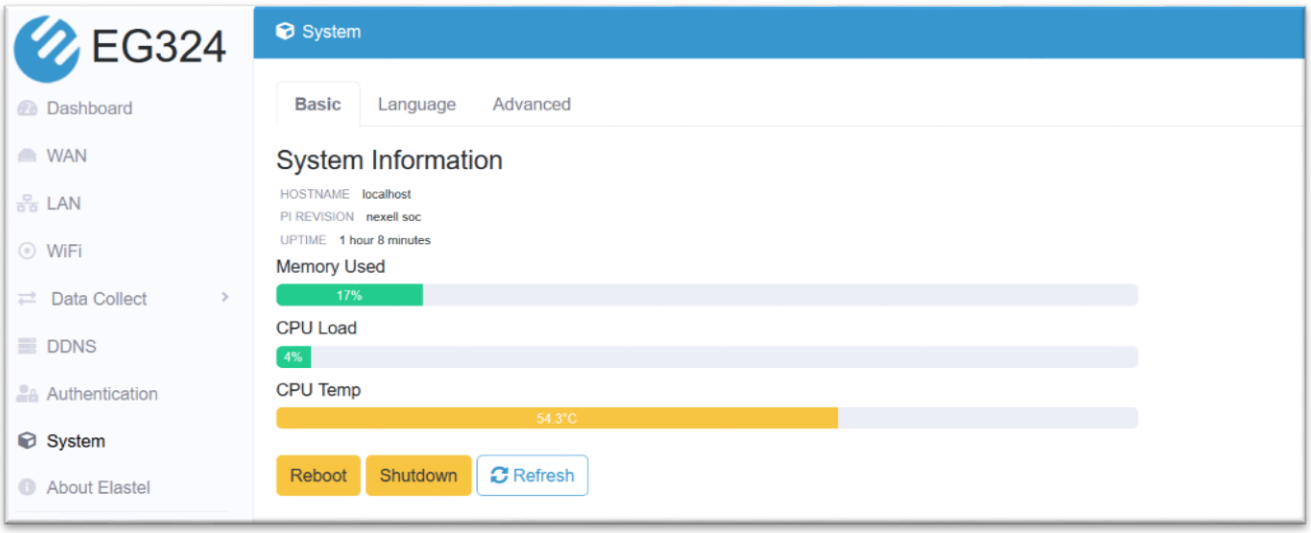
1. You will need configure the hostname domain on noip.com platform cloud.
2. DDNS request you be assigned a public IP address on EG324 from Wired network or cellular LTE network.

3.7 Authentication



Authentication menu provide you set your passowrd of username. The default password of admin username is “admin”.

3.8 System



The system menu provide the system running status overview indicating current Memory Used, CPU Locad, CPU Temperature. Also provide menu “Reboot” and “Shutdowm” operation.

The Language label provide modify the mutiple languages of WebUI. While the Advanced label provide the WebUI server portal and so on.

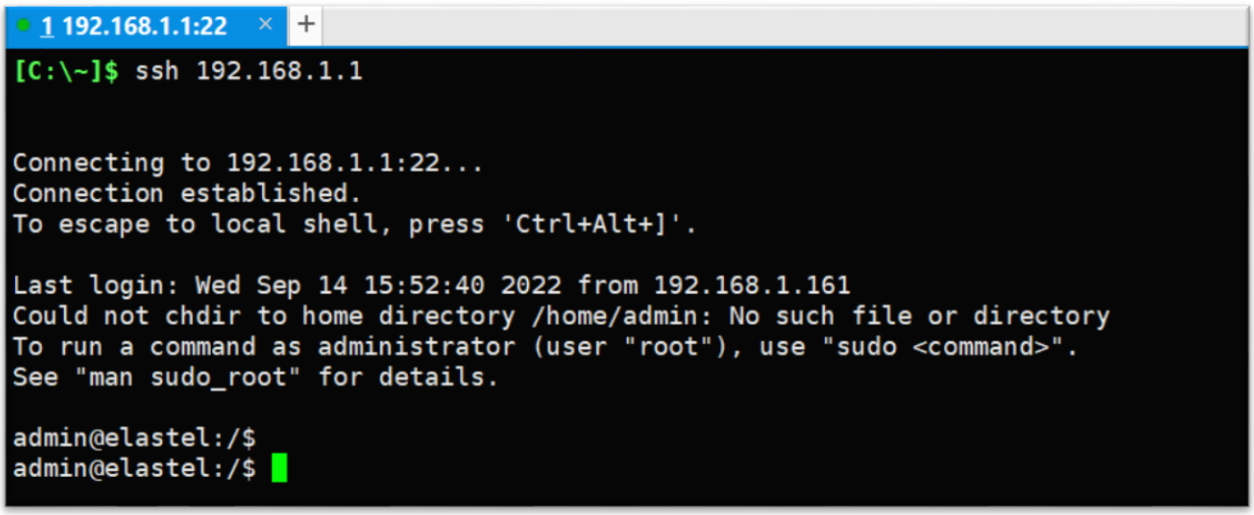
4. Command Line Interface (CLI)

4.1 Console CLI

EG324 integrated an USB to serial chipset convertor in it, which provide ability for USB-C console port to access CLI.
The console port are at the right of power input port on top panel . Connect the EG324 USB-C console port with your PC, open a serial communication tool (like putty). Set the baudrate as 115200, databit 8N1.

Boot up the EG324 and you are able to access the OS CLI via serial console.

4.2 SSH CLI



Connect LAN port of EG324 with your PC (check the “3.0 Access to WebUI” section for more details), the default IP address of EG324 gateway is 192.168.1.1, using this IP address to access CLI via SSH or Telnet, with the default username password both “admin”.

4.3 Userful Commands Examples

4.3.1 Check OS Version

"$ uname -a" or "$ lsb_release -a" to check the Linux OS details.

```
admin@elastel:/$ uname -a
Linux elastel 4.4.83 #131 SMP PREEMPT Tue Dec 21 14:56:31 CST 2021 armv7l armv7l armv7l GNU/Linux
admin@elastel:/$
admin@elastel:/$ lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description:    Ubuntu 18.04 LTS
Release:        18.04
Codename:       bionic
admin@elastel:/$
admin@elastel:/$
```

4.3.2 Check Flash Usage

"$ df –h" to Check Flash usage

```
admin@elastel:/$ df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/mmcblk0p3  3.5G  1.8G  1.6G  53% /
/dev/mmcblk0p4  3.5G   15M  3.3G   1% /home
devtmpfs        111M     0  111M   0% /dev
tmpfs           241M     0  241M   0% /dev/shm
tmpfs           241M  2.4M  239M   1% /run
tmpfs           5.0M     0  5.0M   0% /run/lock
tmpfs           241M     0  241M   0% /sys/fs/cgroup
tmpfs            10M   12K   10M   1% /var/state
admin@elastel:/$
```

4.3.3 Check CPU information

"$ cat /proc/cpuinfo" to check CPU details

```
admin@elastel:/$ cat /proc/cpuinfo
processor       : 0
model name      : ARMv7 Processor rev 0 (v7l)
BogoMIPS        : 10.00
Features        : half thumb fastmult vfp edsp thumbee neon vfpv3 tls vfpd32
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x3
CPU part        : 0xc09
CPU revision    : 0

processor       : 1
model name      : ARMv7 Processor rev 0 (v7l)
BogoMIPS        : 10.00
Features        : half thumb fastmult vfp edsp thumbee neon vfpv3 tls vfpd32
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x3
CPU part        : 0xc09
CPU revision    : 0

processor       : 2
model name      : ARMv7 Processor rev 0 (v7l)
BogoMIPS        : 10.00
Features        : half thumb fastmult vfp edsp thumbee neon vfpv3 tls vfpd32
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x3
CPU part        : 0xc09
CPU revision    : 0

processor       : 3
model name      : ARMv7 Processor rev 0 (v7l)
BogoMIPS        : 10.00
Features        : half thumb fastmult vfp edsp thumbee neon vfpv3 tls vfpd32
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x3
CPU part        : 0xc09
CPU revision    : 0

Hardware        : s5p4418
Revision        : 0000
Serial          : 0000000000000000
admin@elastel:/$
```

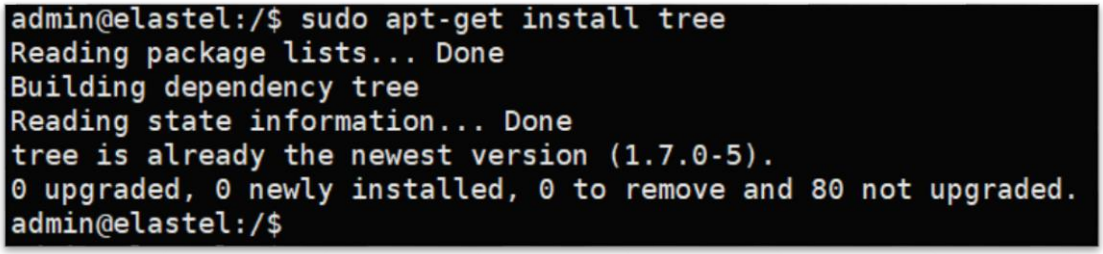
4.3.4 Check Installed program list

"$ dpkg -l |grep docker" to fliter if "Docker" was installed

```
admin@elastel:/$ dpkg -l |grep docker
ii  docker.io                      17.12.1-0ubuntu1                armhf        Linux container runtime
admin@elastel:/$
admin@elastel:/$
```

4.3.4 Install programs

"$ sudo apt-get install <package name>" to install the program as you needs from Ubuntu package manager tool



4.3.4 Peripheral Interfaces Data Block

The data block for peripheral interfaces accordingly which can be invoked by your own programs.

Peripheral Interfaces	Data Block / Name
COM1	/dev/ttyAMA0
COM2	/dev/ttyAMA1
COM3	/dev/ttyAMA2
COM4	/dev/ttyAMA3
USB power control	/dev/usbpwr
Buzzer	/dev/buzzer
Hardware Watchdog	/dev/watchdog
WAN port	eth0
LAN port	eth1

Technical Support

Send Email to Elastel Support center (support@elastel.com) for firmware upgrade, product documents, FAQ, technical support and more.

-END-