Intelligent Gateway
ASDU-LE1
User Manual

Heyuan Intelligence Technology Co., Ltd

IMPORTANT DECLARATIONS

Please read this manual carefully before the product is operated. And once you start operating the product, you'll be considered to have read this manual and accept all our terms. Heyuan shall not be responsible or liable for any damages or injuries caused by improper product installation and/or operation.

Attention: the following symbols in this manual refer to meanings as follows

The product must be installed and operated by one who has experience with high-voltage devices or has qualifications. Please connect the meter to correct voltage before operating the product. Please install and use the meter according to the user manual. Heyuan shall not be responsible or liable for any damages or injuries caused without following the instructions in the user manual.

Contents

Chapter 1 Product Overview

ASDU-LE1 Intelligent Gateway adopts industrial-grade ARM Cortex-A7 processor and loads an embedded Linux real-time multitasking operating system. It supports a variety of communication protocols and can realize the functions of information transmission, synthesis, editing, management and monitoring among various devices, such as automation equipment, smart power meters, intelligent auxiliary equipment of substation and host computer systems. It can be applied in large and demanding integrated automation system, dispatching automation system and distribution automation system etc. It is used for information interaction among intelligent electronic equipment, such as substation microcomputer, and substation host systems to achieve information exchange between remote power stations and host computer.

Supports protocols

	Siemens	Mitsubishi	Schneider	Matsushita	Omron	AB Rockwell	GE	FATEK
PLC	S7-200/200SMART /200(PPI)	FX series (program port)	M218	FP series	HostLink	ControlLogix	GE-SRTP	FBs
	S7-300/400/ 1200/1500	FX serial (TCP)				DF1		
	Profubus_dp	Q serial (TCP)						

MODBUS	Modbus RTU	Modbus TCP	Modbus ASCII	
Power Protocol	EC 60870-5-101/103/104	DLT645-1997/2007	DL/T698.45-2017	IEC61850 (client)
OPC	OPC_DA(Client)	OPC_DA(Client)		
BACNET	BACnet IP			

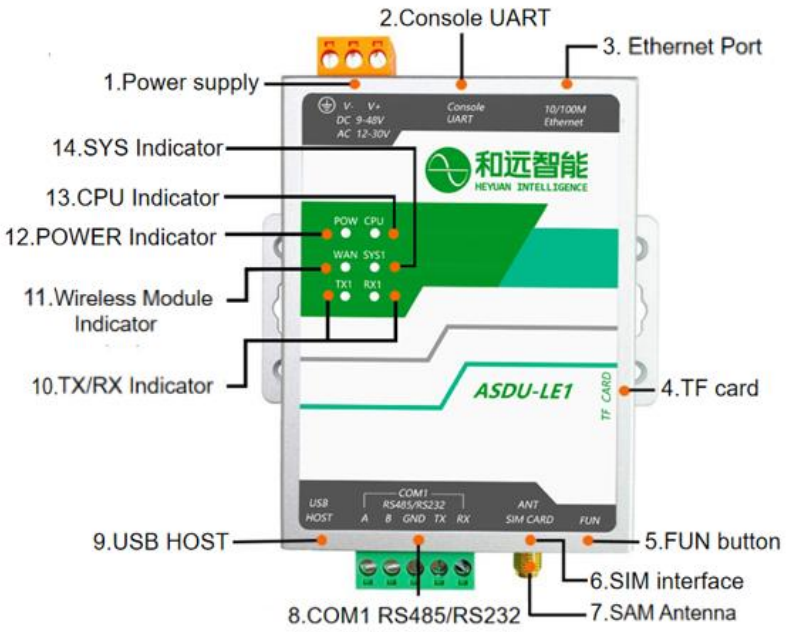
	Siemens	Mitsubishi	Schneider	Matsushita	Omron
Power Protocol	S7-200/200SMART /200(PPI)	FX series (program port)	M218	FP series	HostLink
	S7-300/400/1200/1500	FX serial (TCP)			
	Profubus_dp	Q serial (TCP)			

OEM for PV Power	ISolarSNSL	East	Goodwe	Ginlong	Kostal	SunTree	...
MQTT (OEM)	Alibaba Cloud	Tuya MQTT	Baidu Blink	SANY MQTT	...		

Chapter 2 Technical Parameters

ASDU-LE1-4G Hardware Parameters	
CPU	ARM Cortex-A7 32-bit processor, 1.1 GHz, ARMv7-A instruction set architecture
System Memory	64MB DDR2
Nand Flash	On-board 256 MByte SLC NAND Flash
Ethernet Port	1*100M/10M Ethernet Port (supports AUTO MDI/MDIX with dual-level lightning protection) ◆ Withstands 2 kV differential-mode surges under Level 3 of the 10/700 μs–5/320 μs combination wave test per GB/T 17626.5-2019. ◆ ±15kV Human Body Model ◆ ±15kV IEC61000-4-2 Air Discharge
RS485/RS232 Port	1 * independent isolated RS485 or RS232 interfaces (only one interface can be active at a time) ◆ ±15kV Human Body Model ◆ ±15kV IEC61000-4-2 Air Discharge
Power Supply	9-48VDC
Other Extension	1* TF card for memory expansion; 1* USB HOST; 1* Console UART 1* Micro SIM card 12mm*15mm; 1* SMA Antenna RTC real time clock,
ASDU-LE1-4G 4G Cat4 Quectel EG25 Global Wireless Module Supports Standards/Frequency Bands	
LTE-FDD	B1/2/3/4/5/7/8/12/13/18/19/20/25/26/28/66 LTE-FDD:150Mbps (DL)/50Mbps (UL)
LTE-TDD	B34/38/39/40/41 LTE-TDD:130Mbps (DL)/30Mbps (UL)
ASDU-LE1-4G WiFi (RTL8811CU) wireless module supports standard/frequency band	
Frequency band	2.4～2.4835GHz or 5.15～5.85GHz
WIFI protocol	IEEE802.11a/b/g/n/ac （WiFi5）
Operating environment parameters	
Temperature	Operating:-40～85℃ Storage and transportation :-40～85℃
Relative humidity	Operating:20% to 90% no condensation Storage and transportation :15% to 95% no condensation

Chapter 3 Interfaces Introduction



3.1 Power Supply

Symbol	Description
⏚	Earth
V-	Negative pole of power input
V+	Positive pole of power input

Support DC 9V~48V, support overcurrent, lightning protection and reverse connection protection.

- Resist GB/T 17626.5-2019 standard at the highest level 4 (4KV)1.2/50uS-8/20uS combination wave lightning test
- Anti-reverse connection protection
- Over voltage crowbar
- Anti-pulse cluster protection
- antistatic:

  ±15kV Human Body Model

  ±15kV IEC61000-4-2 Air Discharge

Regarding the usage instructions for Earth (grounding wire), to achieve better lightning protection, static electricity prevention, and interference resistance, Earth must be reliably connected to the ground whenever conditions permit. For users who supply power through DC terminals, a reliable connection to the ground can be achieved by securing screws with a metal casing.

If the Earth cannot be reliably grounded, its interference resistance and lightning protection performance will be affected. For example, if some server rooms have external ground wires that are floating, or if there is strong interference or high voltage on the ground wire, it may cause strong interference signals to enter the machine through the grounding wire, affecting normal operation (in severe cases, it could even damage the machine). In

such situations, if there is no reliable external ground wire available on-site, the grounding wire connected to the machine can be disconnected, allowing the machine's grounding wire and casing to be insulated from the external ground wire. When there is no reliable external ground wire available, using the machine's grounding wire and insulating it from the external ground wire is actually safer and can effectively reduce the occurrence of faults (Note: Users must pay attention to ground wire connection issues during on-site construction).

3.2 USB HOST

The interface type is a vertical USB A-type standard USB socket, and users can expand USB peripherals through this USB port (USB HOST supports automatic file system updates). To ensure that external devices on the USB HOST port can recover on their own in case of abnormalities, the power supply of the USB HOST port can be programmed to turn on and off.
To protect device safety, USB HOST has internal current limiting protection. When the output current exceeds 1A, the protection circuit will be triggered to cut off the+5V power supply provided by USB HOST to the outside world. After the overload is relieved and the machine is restarted, the normal external supply of +5V power can be restored.

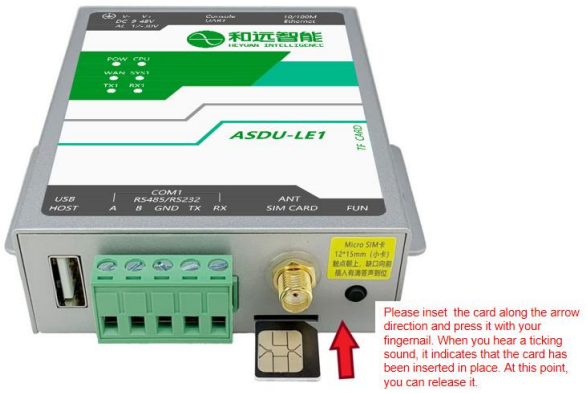
3.3 Console UART (console serial port)

ASDU-LE-4G integrates a USB-to-serial circuit and a CPU debugging serial port connection for user convenience. The external interface is a Type-C port. Users can connect the device's Console UART to the computer's USB port using a standard Type-C cable. After installing the USB-to-serial driver, users can easily debug applications.

3.4 FUN Button

The FUN button is used to enable the device to enter the file system update mode and update the file system on the device. The user copies the file system and configuration files to the U disk or TF card and inserts them into the corresponding port of the device. Holding down the FUN button and connecting the power supply of the device will automatically complete the file system update.
It is used for temporary recovery of the default IP address. The device starts a system service program by default when it leaves the factory. When the user does not know the IP address of the current device, long press the FUN button for 3 seconds after starting and entering the system. At this time, the system will temporarily change the NIC IP to 192.168.1.233 for the user to debug.
The button can also be programmed by the user to achieve personalized function Settings.

3.5 SIM card holder



3.6 WIFI / 4G Global Wireless Module (Quectel EG25 Cat4)

WIFI Wireless Module

WiFi (RTL8811CU) wireless module supports system/frequency band:	
Band support	2.4 ~ 2.4835GHz or 5.15 ~ 5.85GHz
WiFi protocol support	IEEE802.11a/b/g/n/ac

4G Global Wireless Module (Quectel EG25 Cat4)

Band support	LTE-FDD：B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28/B66
	LTE-TDD：B34/B38/B39/B40/B41
	WCDMA：B1/B2/B4/B5/B6/B8/B19
	GSM：GSM850/EGSM900/DCS1800/PCS1900
Transmitting power	GSM850：Class 4 (33 dBm ±2 dB)
	EGSM900：Class 4 (33 dBm ±2 dB)
	DCS1800：Class 1 (30 dBm ±2 dB)
	PCS1900：Class 1 (30 dBm ±2 dB)
	GSM850 8-PSK：Class E2 (27 dBm ±3 dB)
	EGSM900 8-PSK：Class E2 (27 dBm ±3 dB)
	DCS1800 8-PSK：Class E2 (26 dBm ±3 dB)
	PCS1900 8-PSK：Class E2 (26 dBm ±3 dB)
	WCDMA Band: Class 3 (23 dBm ±2 dB)
	LTE band: Class 3 (23 dBm ±2 dB)
LTE Characteristic	Supports non-CA Cat 4 FDD and TDD at most
	Supports 1.4/3/5/10/15/20 MHz RF bandwidth
	Downstream support MIMO
	LTE-FDD: maximum downlink rate 150Mbps, maximum uplink rate 50Mbps
	LTE-TDD: maximum downlink rate of 130Mbps and maximum uplink rate of 30Mbps
UMTS Characteristic	Supports 3GPP Rel-8 DC-HSDPA, HSPA+, HSDPA, HSUPA and WCDMA
	Supports QPSK, 16QAM and 64QAM modulation
	DC-HSDPA: maximum downlink rate 42 Mbps
	HSUPA: Maximum uplink rate 5.76 Mbps
	WCDMA: maximum downlink rate 384 kbps, maximum uplink rate 384 kbps
GSM Characteristic	GPRS：
	Supports GPRS multi-slot level 33 (default is 33)
	Coding mode: CS-1/CS-2/CS-3 and CS-4
	The maximum downlink rate is 107Kbps and the maximum uplink rate is 85.6Kbps
	EDGE：
	Supports EDGE multi-slot level 33 (default is 33)
	Supports different modulation and coding modes of GMSK and 8-PSK
	Downlink coding formats: CS 1-4 and MCS 1-9
	Uplink coding format: CS 1-4 and MCS 1-9
	The maximum downlink rate is 296Kbps and the maximum uplink rate is 236.8Kbps
Network protocol Characteristics	Supports TCP/UDP/PPP/FTP/FTPS/HTTP/HTTPS/NTP/PING/QMI/NITZ/SMTP/ SSL/MQTT/CMUX/SMTPS/FILE/MMS protocols
SMS Service	Supports text and PDU modes
	Supports point-to-point MO and MT
	Support community radio messages
	SMS storage: Default ME
(U)SIM Interface	Supports USIM/SIM card：1.8V and 3.0V

3.7 Indicators

POW power supply

CPU CPU heartbeat

SYS1 System programmable indicator 1(for custom function indication)

WAN wireless 4G/WiFi module working status

WAN Status	Network status description
Slow flashing (200mS on/1800ms off)	Find the internet
Slow flashing (1800mS on/200ms off)	Standby
Fast flashing (125mS on/125ms off)	Data transmission mode
Stays on	During network calls

TX1 COM1 sending data

RX1 COM1 receiving data

3.8 Built-in Buzzer

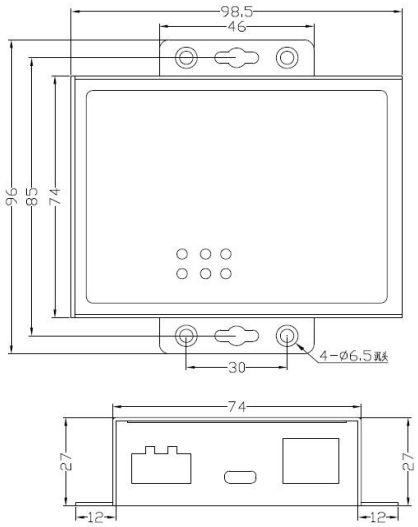
For personalized prompt sound programming

3.9 RTC Real-time clock and backup battery

The ASDU-LE1-4G integrates a standalone high-precision hardware real-time clock internally, providing accurate timing for the system. To ensure that the real-time clock continues to function properly after the machine is powered off, it is equipped with a CR2032 button cell battery. This battery can maintain the RTC clock operation for over three years even when the machine is powered down. However, in harsh conditions (such as high temperature, high humidity, high dust, and low temperature), users need to reassess this value. The RTC current during non-operation is ≤5uA. The internal button cell is designed to be replaceable; if users notice that the RTC battery level is low, they can replace it themselves. The battery specification is a CR2032 3V button cell.

Chapter 4 Installation

4.1 Dimension

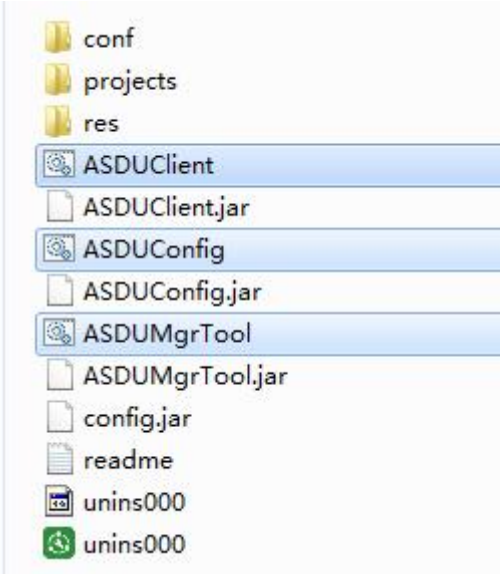


4.2 Installation

Chapter 5 Configuration Tool Installation

5.1 File content

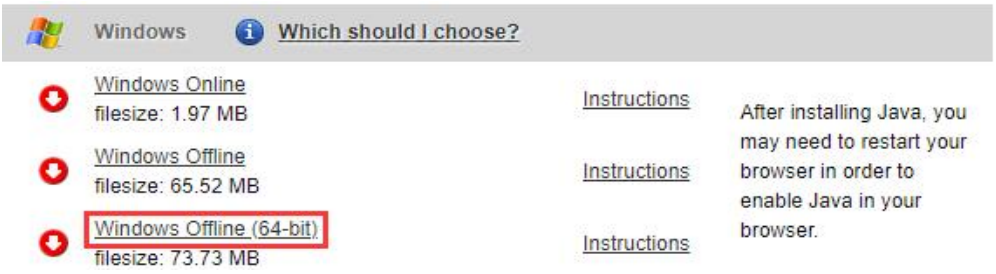
ASDUMgrTool.jar is the gateway management tool;
ASDUConfig.jar is data configuration tool;
ASDUClient.jar is real-time monitoring & debugging tool.
Please don’ t delet the files for keeping the tool work normally.



5.2 Working Environment

System: windows、MAC、Linux etc, 32-bit or 64-bit is ok.
Note: IEC algorithm function only supports Windows 7 systems and above.
Minimum resolution: 1280 * 720
JAVA environment: support JDK(or JRE)1.8 version and above, if it is windows version, the user can directly install the installation package with a running environment, or visit the official website to download the suitable running environment (this software supports 32-bit or 64-bit).
The Java official website: https://java.com/en/download/manual.jsp

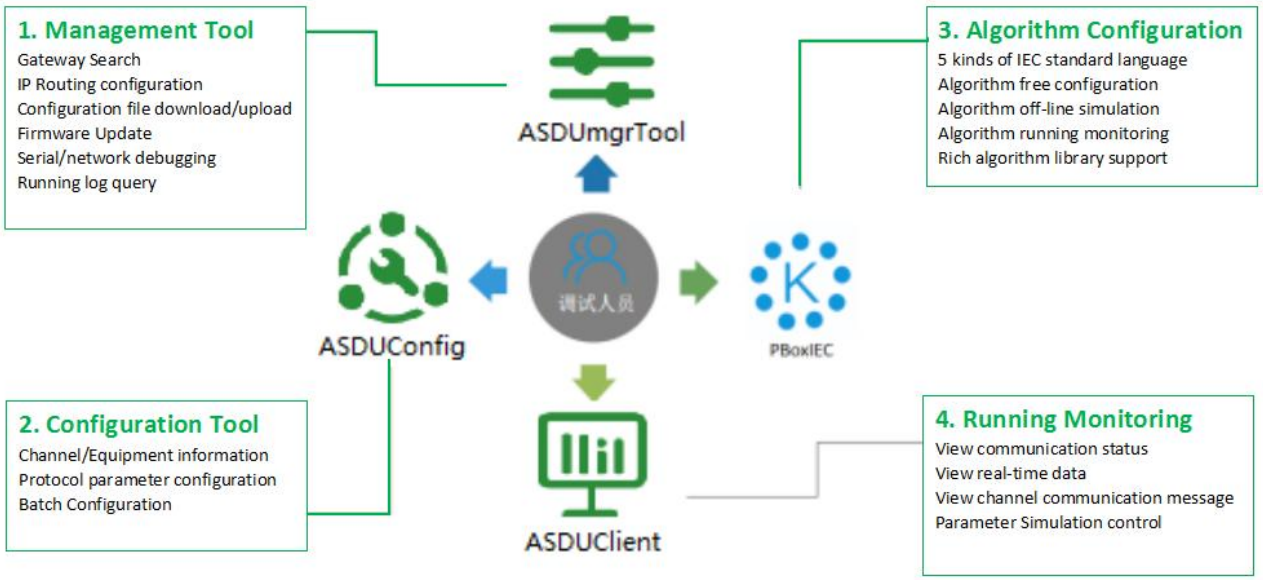
Windows system 64-bit version:



Linux system 64-bit version:

Chapter 6 Configuration Software

6.1 Software Tool Introduction



1.Management Tool: ASDUMgrTool

Search for gateways within the LAN;
IP/routing configuration for the gateway;
Configuration file download/upload;
Serial port/network debugging;
Log query;
Firmware upgrade;
Clock synchronization, etc.

2.Configuration Tool: ASDUConfig

Management of collection, forwarding, and computing points;
Management of channels, devices, test points, and scripts

3.Algorithm Configuration Tool: ASDUIEC

Algorithm configuration programming, building logic for automatic calculation.
After the construction is completed, it can be compiled and simulated to confirm whether the algorithm is correct. The algorithm will not take effect until it is compiled and downloaded to the gateway.

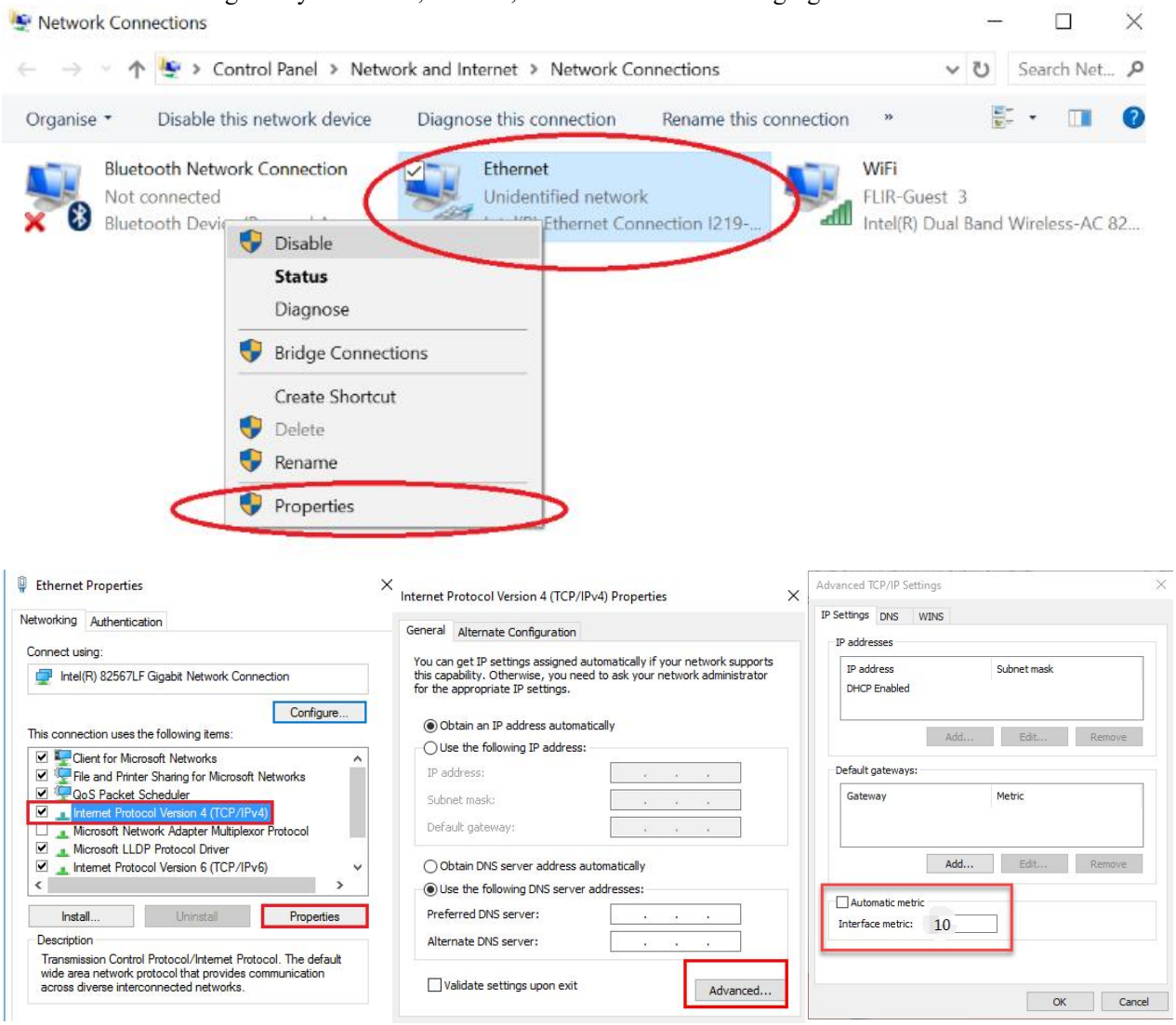
4.Running Monitoring Tool: ASDUClient

View the configured files and download to the gateway. Through this tool, the user can view the real-time data/ channel communication message. The tool is used for visually checking the correctness of data configuration, algorithm calculation, etc.

6.2 Configuration Step

Step 1: IP setting

Use the managemet tool(ASDUMgrTool) to search all equipments within the LAN.
Note: if the gateway cannot be searched, the user can release this process ASDUMgrTool in the computer firewall settings or temporarily close the firewall. If you still cannot find it, you can set the interface metric of the network card connected to the gateway to manual, 10 is ok, as shown in the following figure:



After searching for a gateway, please modify the IP of the user computer to ensure that the computer IP is in the same network segment as the gateway IP, and perform a PING test through the CMD command.
After the PING is enabled, the user can continue other operations on the gateway.

Step 2: Parameter configuration

Use the configuration tool(ASDUConfig) to set parameters:
Select protocols, build measuring points/ transfering points etc.
After all configuration is finished, please save it.

Step 3(optional):

Use the Algorithm Configuration Tool(ASDUIEC) to realize automatic control of algorithms and logic operations, automatically calculate requirements, support graphical algorithm simulation, and verify the correctness of algorithm execution. After the algorithm is built, save and compile it.

Step 4: Restart Gateway

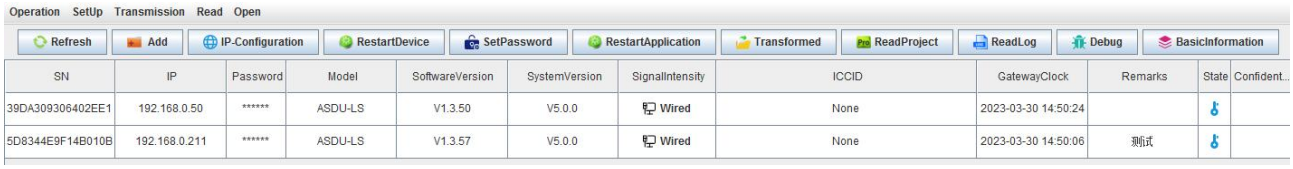
Use the managemet tool(ASDUMgrTool) to download the configured file, then restart the gateway.

Step 5:View &Monitor

Use the Monitoring Tool(ASDUClient), input the gateway IP. After connecting, the gateway will shown the real-time data. The time will automatically refresh.
The user can manually control each controllable point. If the data is wrong, the user can view the communication messages during the collection or forwarding process. For some common errors, such as wrong CRC and connection failure, a prompt will be provided.

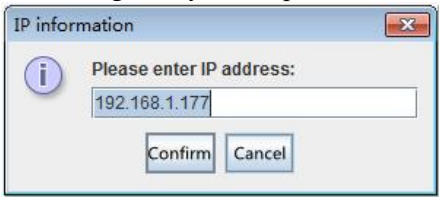
Chapter 7 Management Tool

7.1 Screen Display

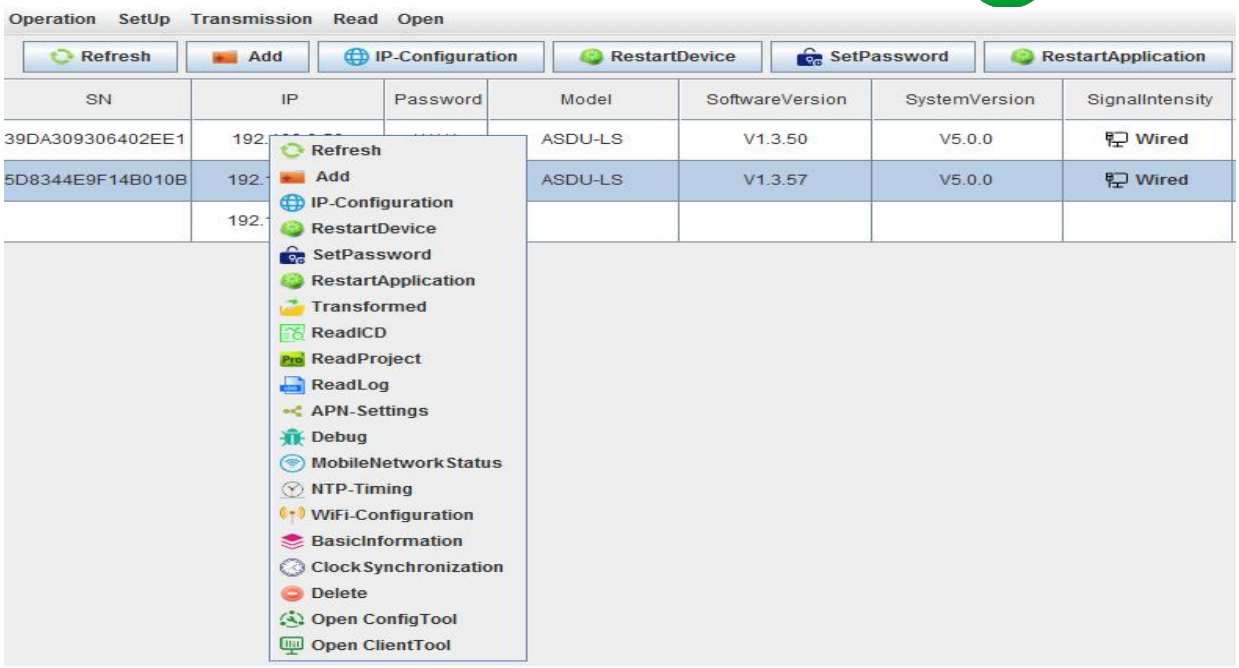


7.2 Refresh and Add

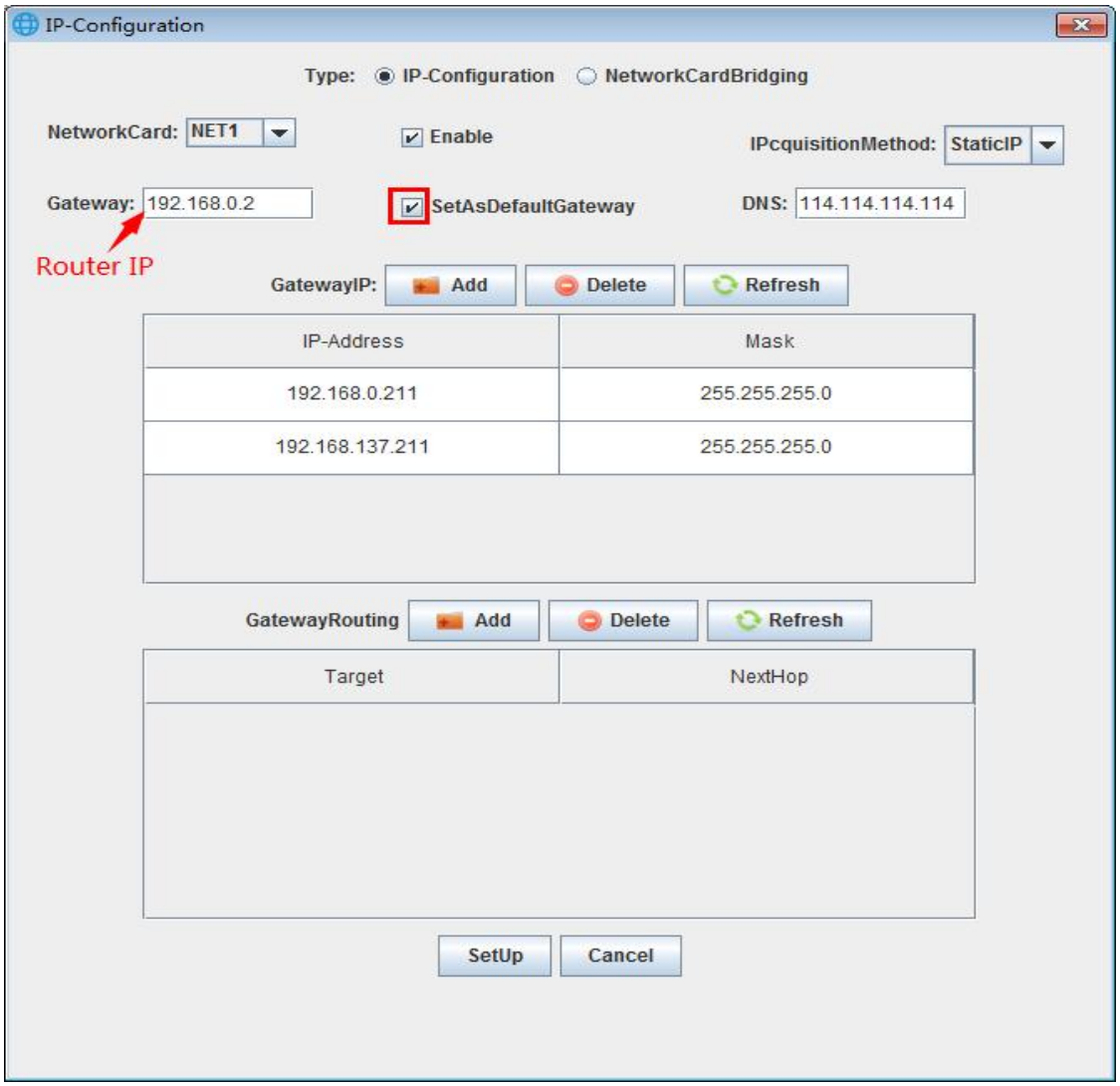
Double click the managemet tool(ASDUMgrTool), it will automatically search for gateways within the LAN.
If there is no any data in the gateway list, please click “refresh” to search gateways manually.
The user can also click “add” to build a new gateway, and input the IP address.



Right click on the selected gateway to view more details.



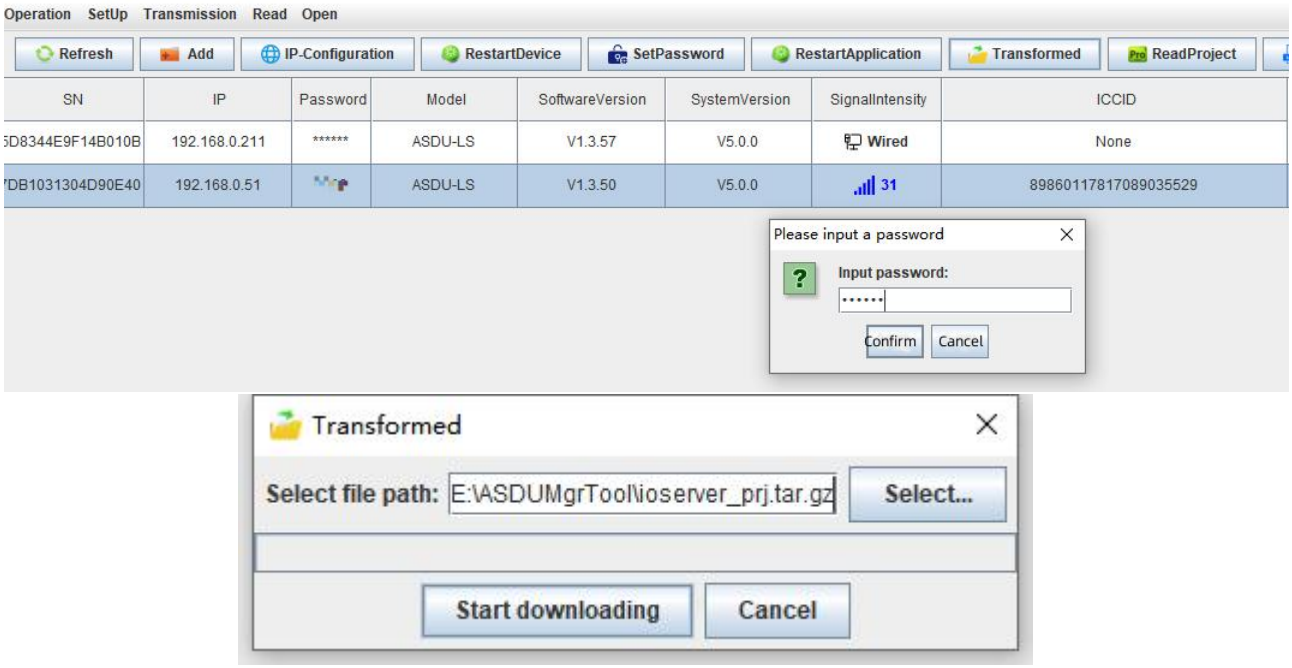
7.3 IP-Configuration



Properties introduction:
Network Card: refers to the Ethernet port settings.
Only one network card can be configured at a time.
IP Acquisition method: please select the “static IP”.
Gateway: here it refers to the router IP address within the LAN, not the device ASDU-LS.
Set as default gateway:
DNS: please keep the default setting.
Gateway IP(ASDU-LS IP): the max IP QTY is 10.
Gateway Routing:the max QTY is 10.

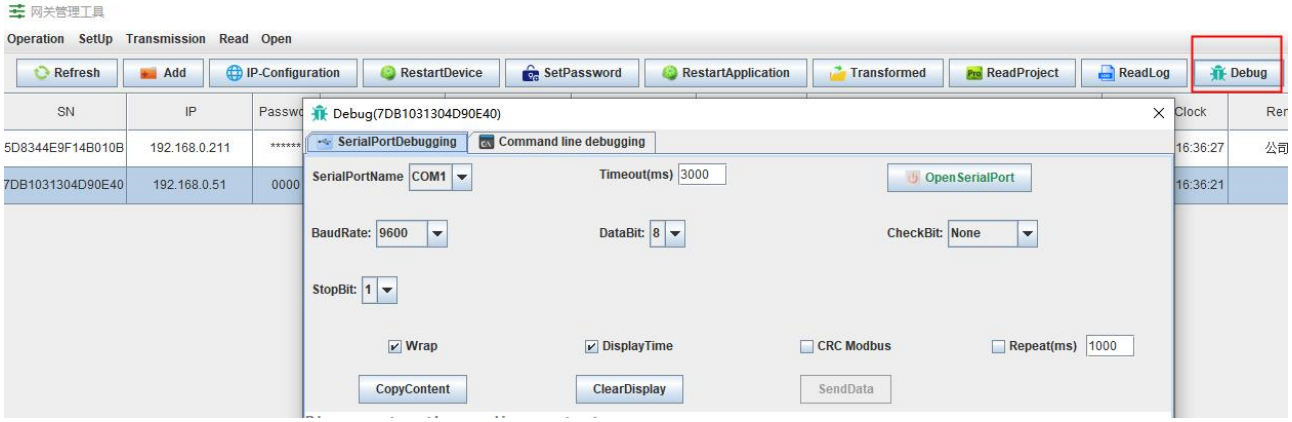
7.4 Restart and Transformed

Click “Transformed”, select the file path, after the downloading, please restart the device.



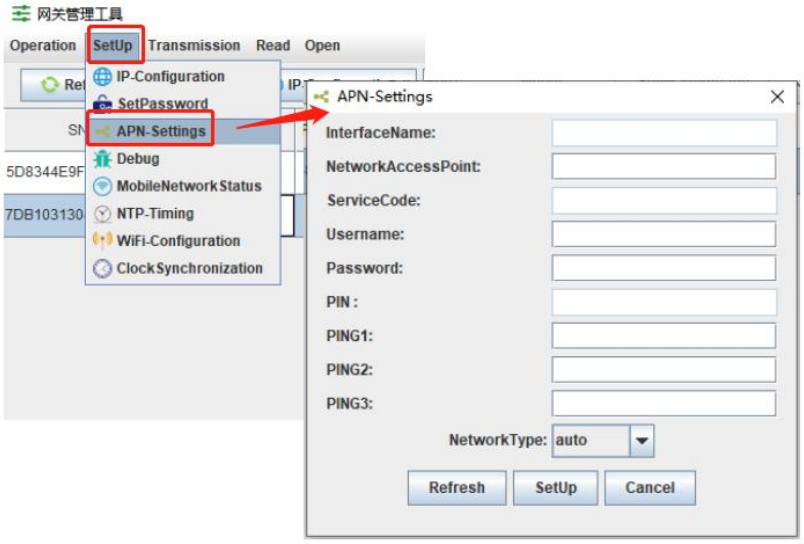
7.5 Debug

Click “Debug” to set parameters

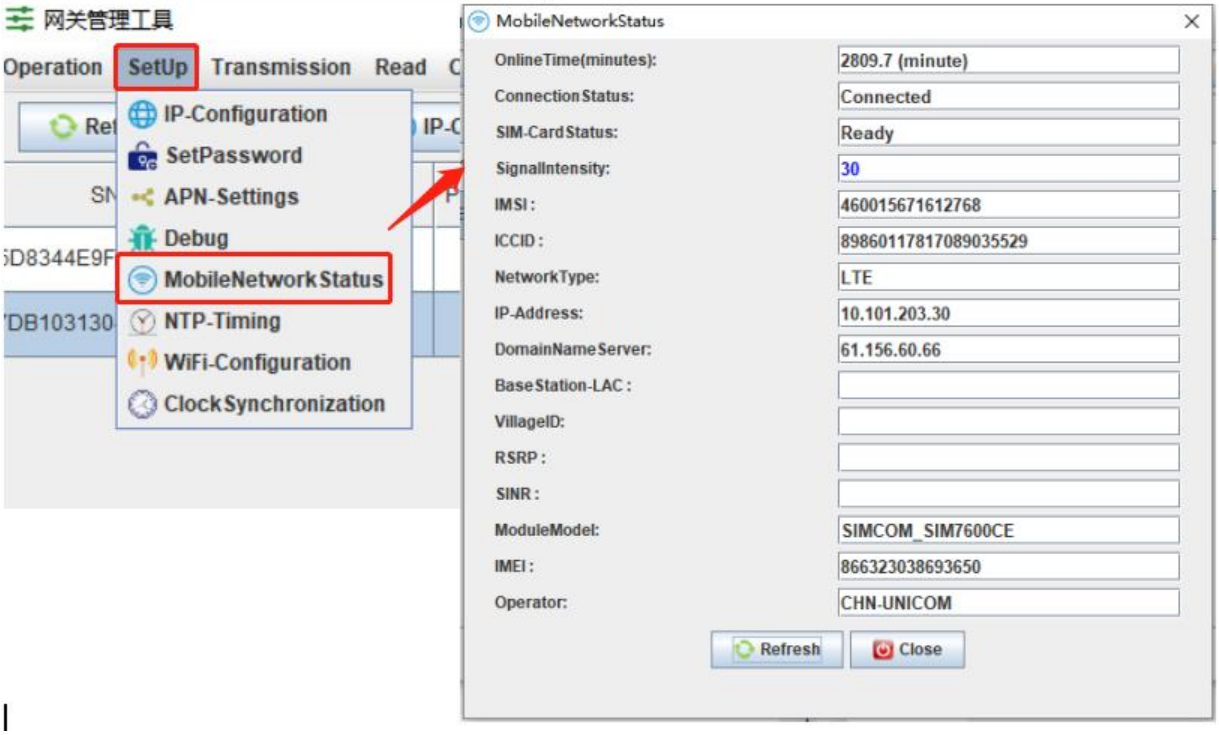


Select command line debugging to perform network testing, view logs, and other operations.

7.6 APN setting&Mobile Network Status

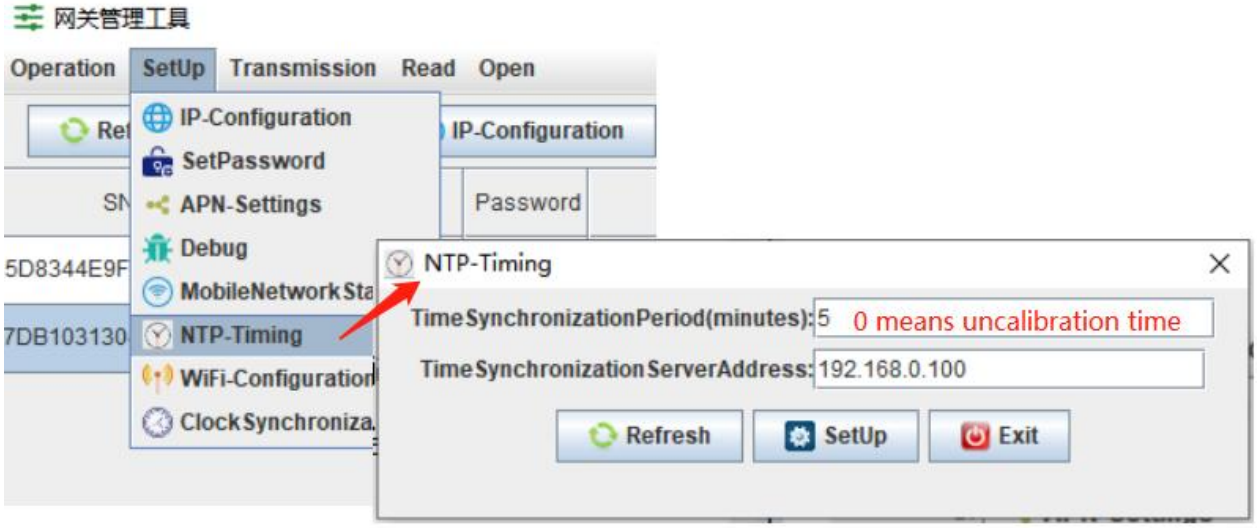


Mobile Network status



7.7 NTP Timing Setting

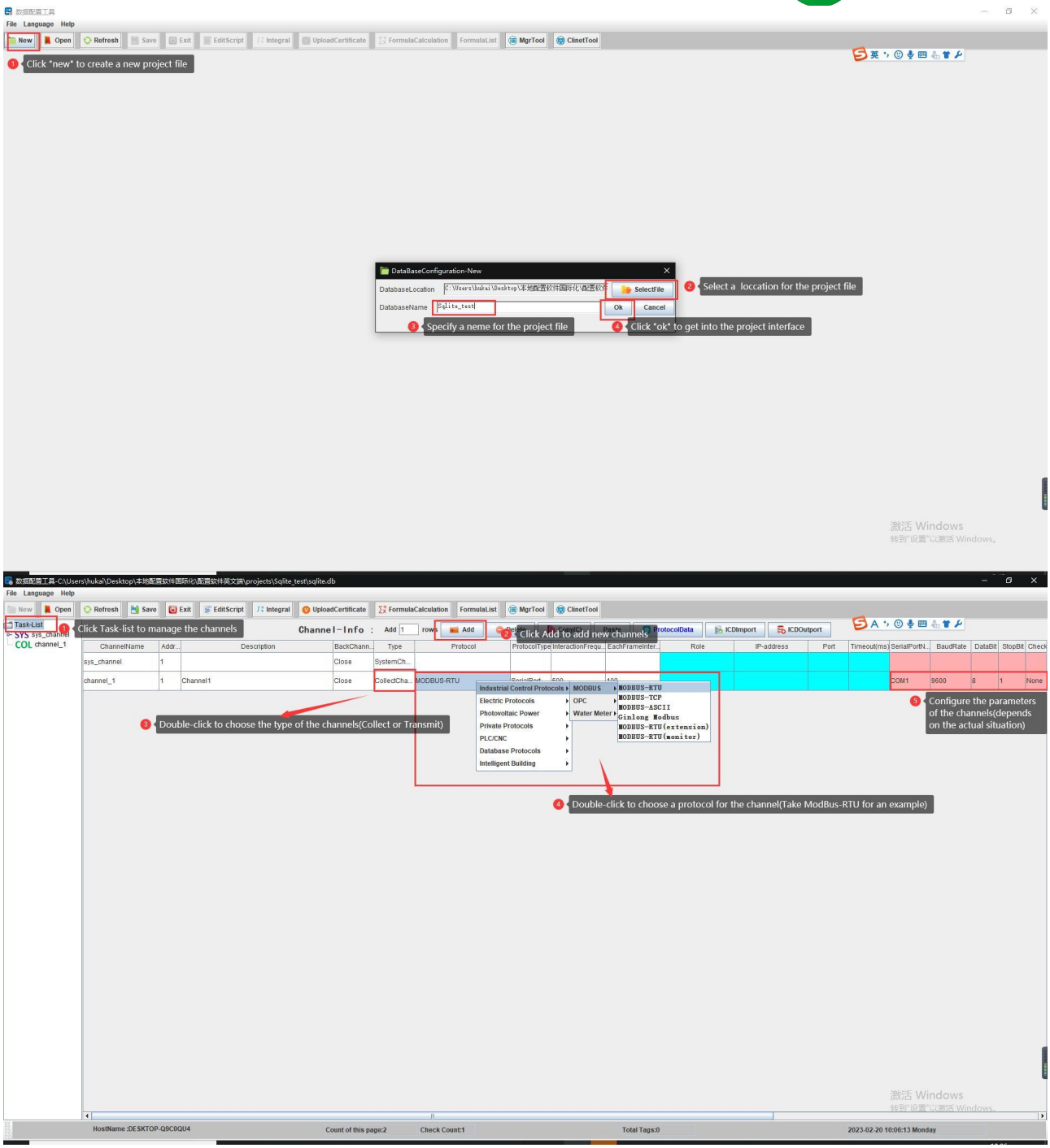
If ASDU-LS is in an intranet environment, the user can set time by the NTP timing button;
If ASDU-LS can access to external network, it can automatically calibrate the time.



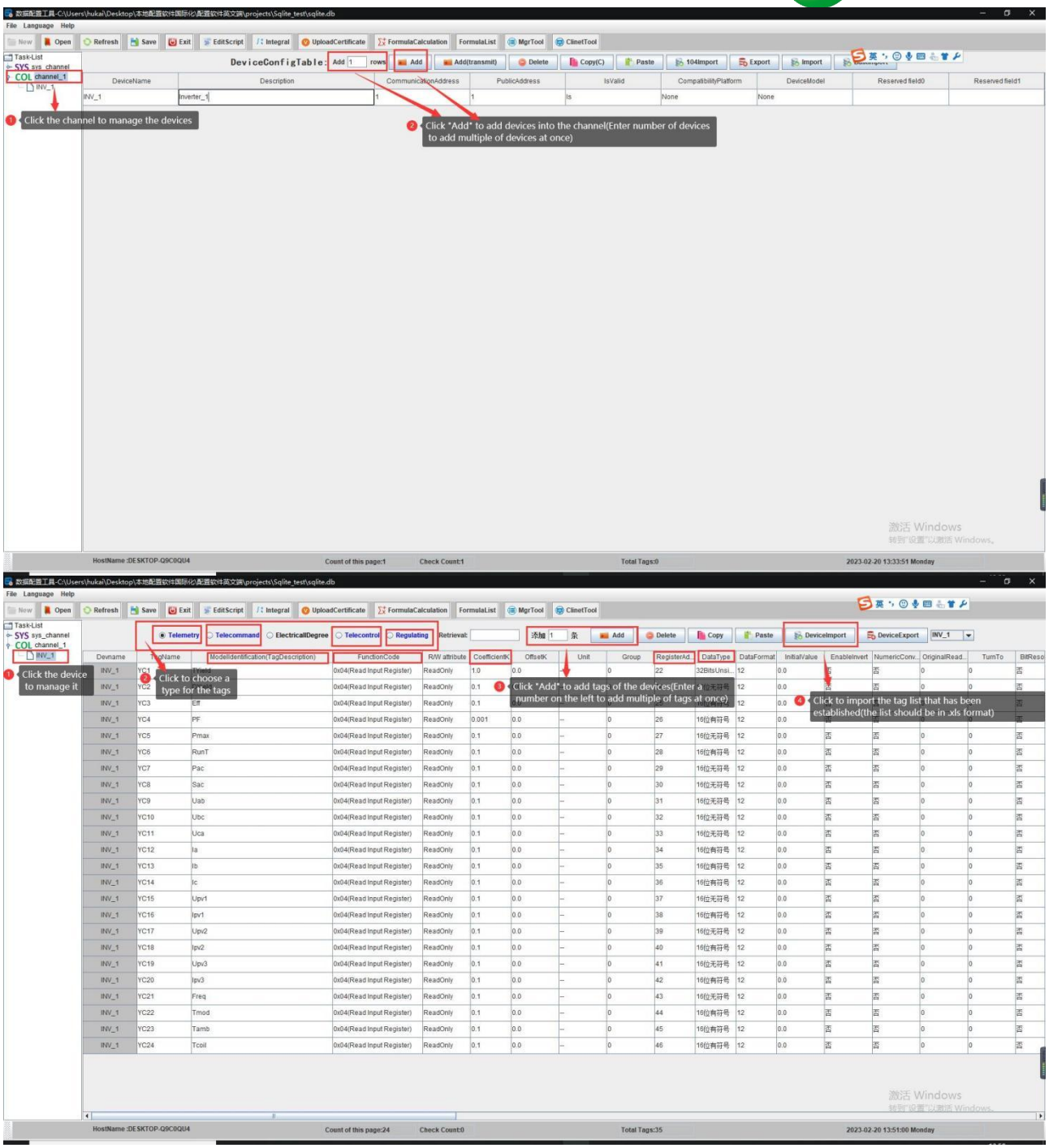
Chapter 8 Configuration Steps

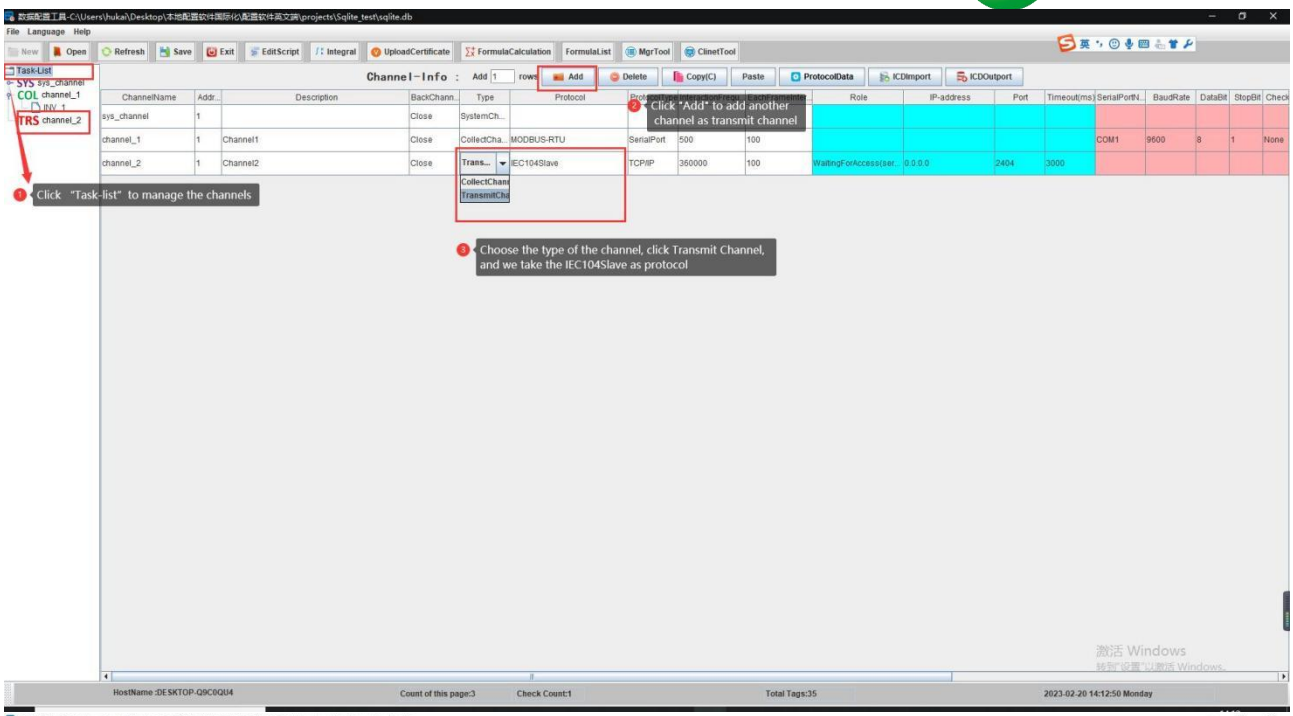
Double click “ ASDUConfig.jar” to open configuration tool

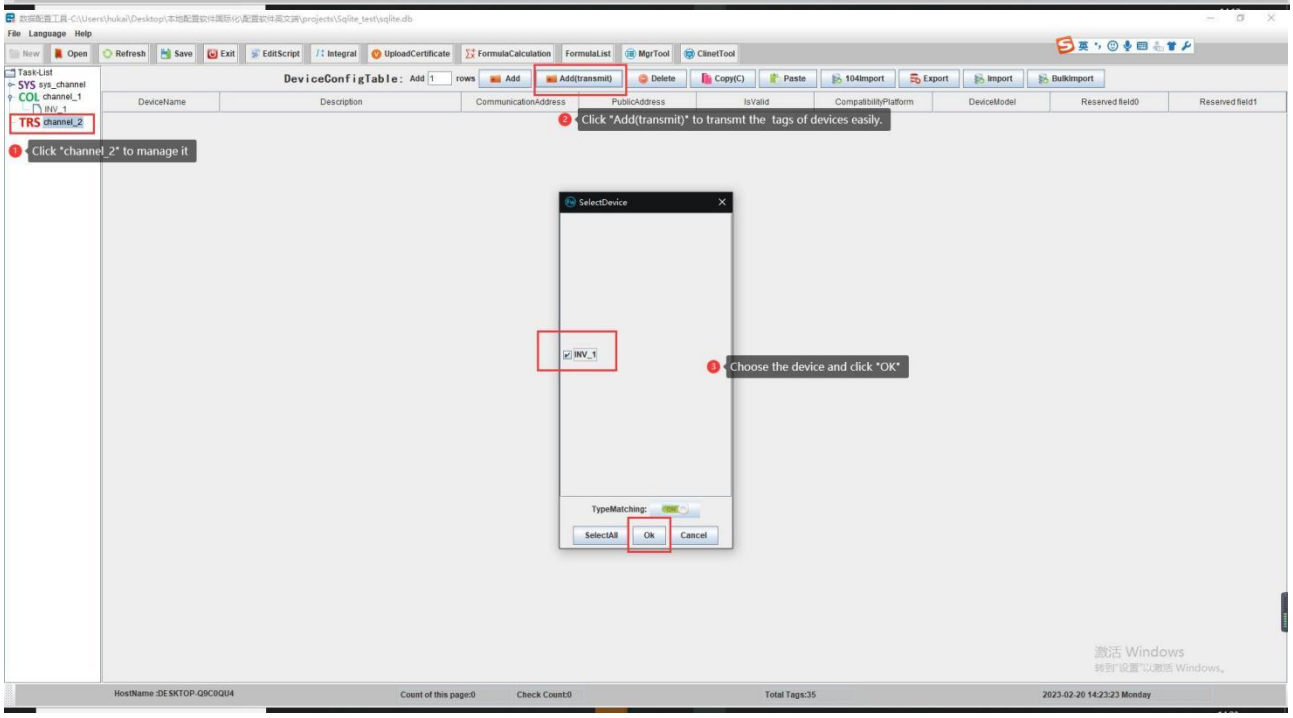
8.1 Create a New Project

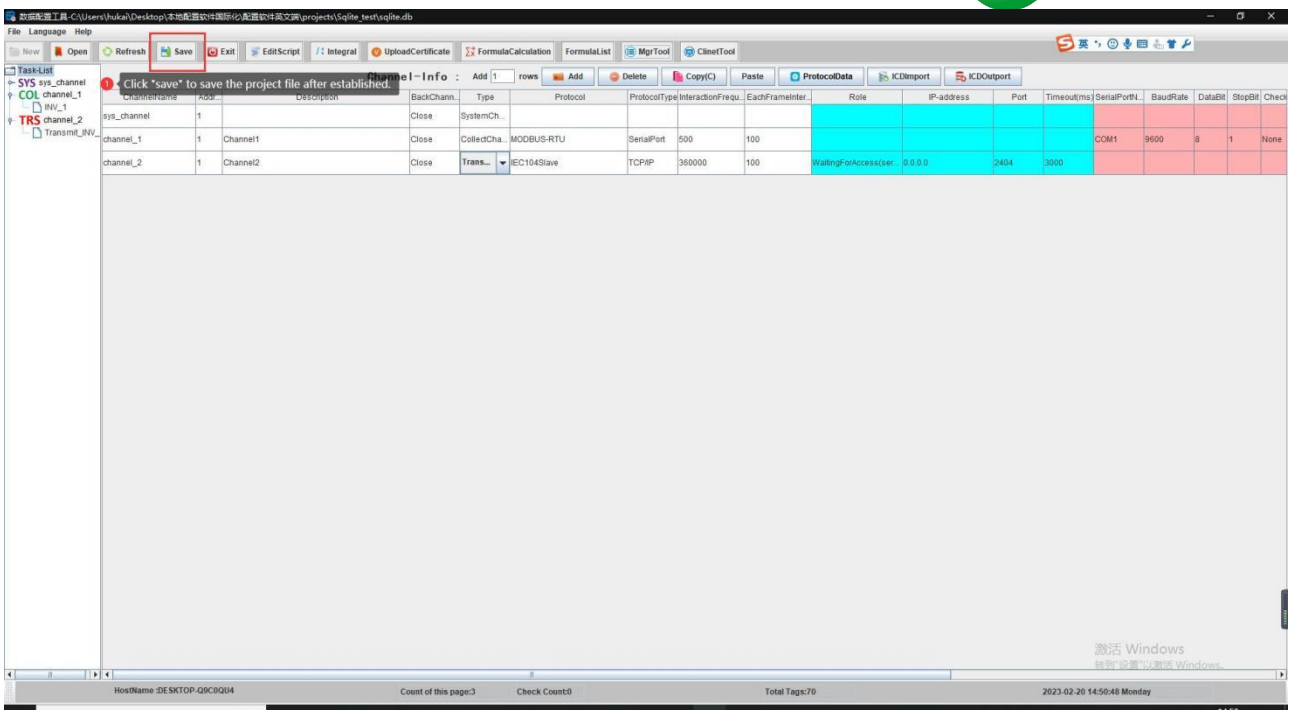

File Language Help
New
Open
Refresh
Save
Exit
EditScript
Integral
UploadCertificate
FormulaCalculation
FormulaList
MgrTool
ClinetTool
1 Click "new" to create a new project file
DataBaseConfiguration-New
DatabaseLocation
SelectFile
2 Select a loccation for the project file
DatabaseName
Sqlite_test
Ok
Cancel
3 Specify a neme for the project file
4 Click "ok" to get into the project interface
激活 Windows
转到"设置"以激活 Windows。

File Language Help
Task-List
1 Click Task-list to manage the channels
Channel-Info :
Add 1 rows
Add
2 Click Add to add new channels
ProtocolData
ICDImport
ICDOutport
ChannelName
Addr...
Description
BackChann...
Type
Protocol
ProtocolType
InteractionFrequ...
EachFrameInter...
Role
IP-address
Port
Timeout(ms)
SerialPortN...
BaudRate
DataBit
StopBit
Check
sys_channel
channel_1
Channel1
Close
SystemCh...
CollectCha...
MODBUS-RTU
COM1
9600
8
1
None
3 Double-click to choose the type of the channels(Collect or Transmit)
5 Configure the parameters of the channels(depends on the actual situation)
Industrial Control Protocols
Electric Protocols
Photovoltaic Power
Private Protocols
PLC/CNC
Database Protocols
Intelligent Building
MODBUS
OPC
Water Meter
MODBUS-RTU
MODBUS-TCP
MODBUS-ASCII
Cinlong Modbus
MODBUS-RTU(extension)
MODBUS-RTU(monitor)
4 Double-click to choose a protocol for the channel(Take ModBus-RTU for an example)
HostName :DESKTOP-Q9C0QU4
Count of this page:2
Check Count:1
Total Tags:0
2023-02-20 10:06:13 Monday
激活 Windows
转到"设置"以激活 Windows。

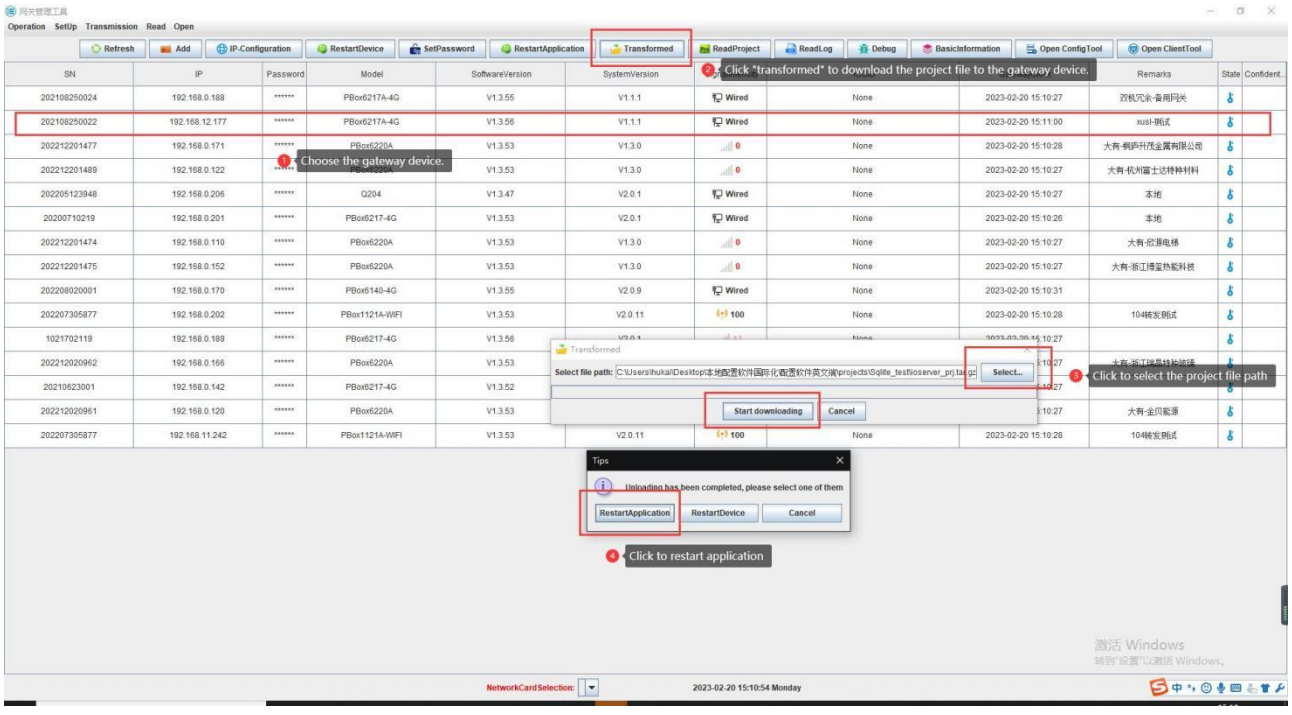

Click the channel to manage the devices
Click "Add" to add devices into the channel(Enter number of devices to add multiple of devices at once)
Click the device to manage it
Click to choose a type for the tags
Click "Add" to add tags of the devices(Enter a number on the left to add multiple of tags at once)
Click to import the tag list that has been established(the list should be in .xls format)


Click "Task-list" to manage the channels
Click "Add" to add another channel as transmit channel
Choose the type of the channel, click Transmit Channel, and we take the IEC104Slave as protocol

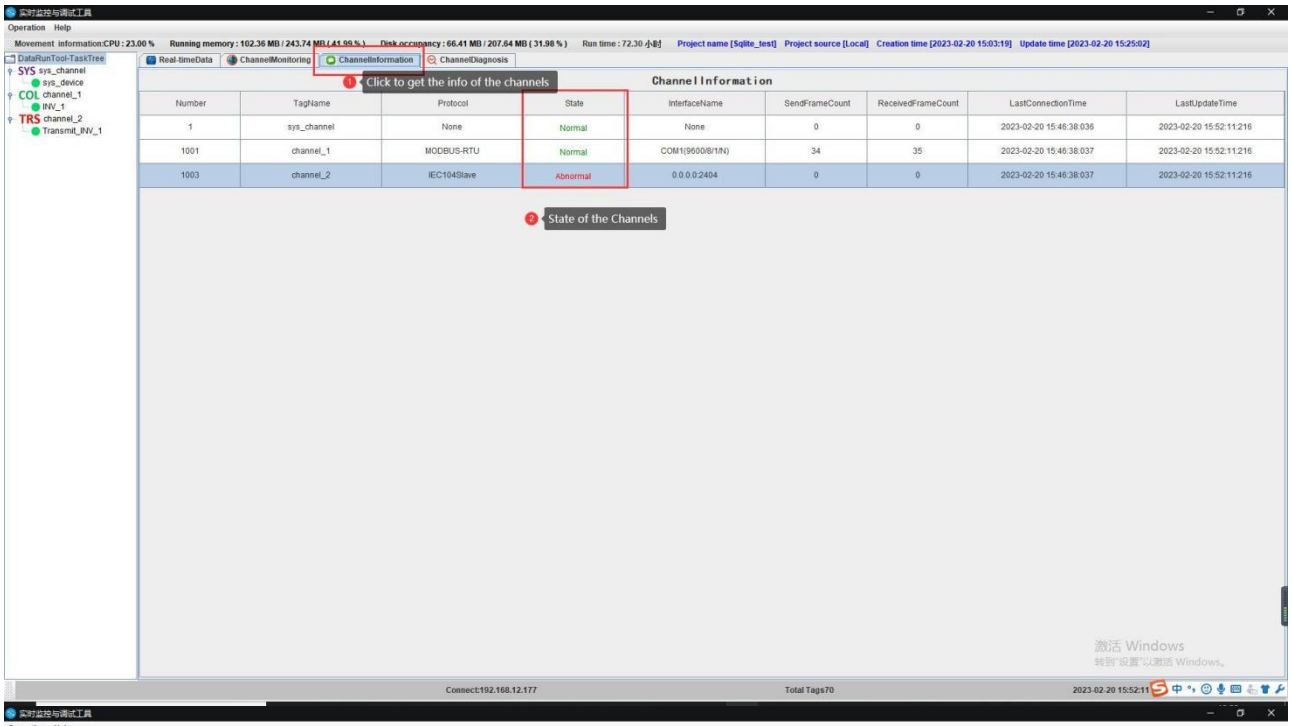

Click "channel_2" to manage it
Click "Add(transmit)" to transmt the tags of devices easily.
Choose the device and click "OK"

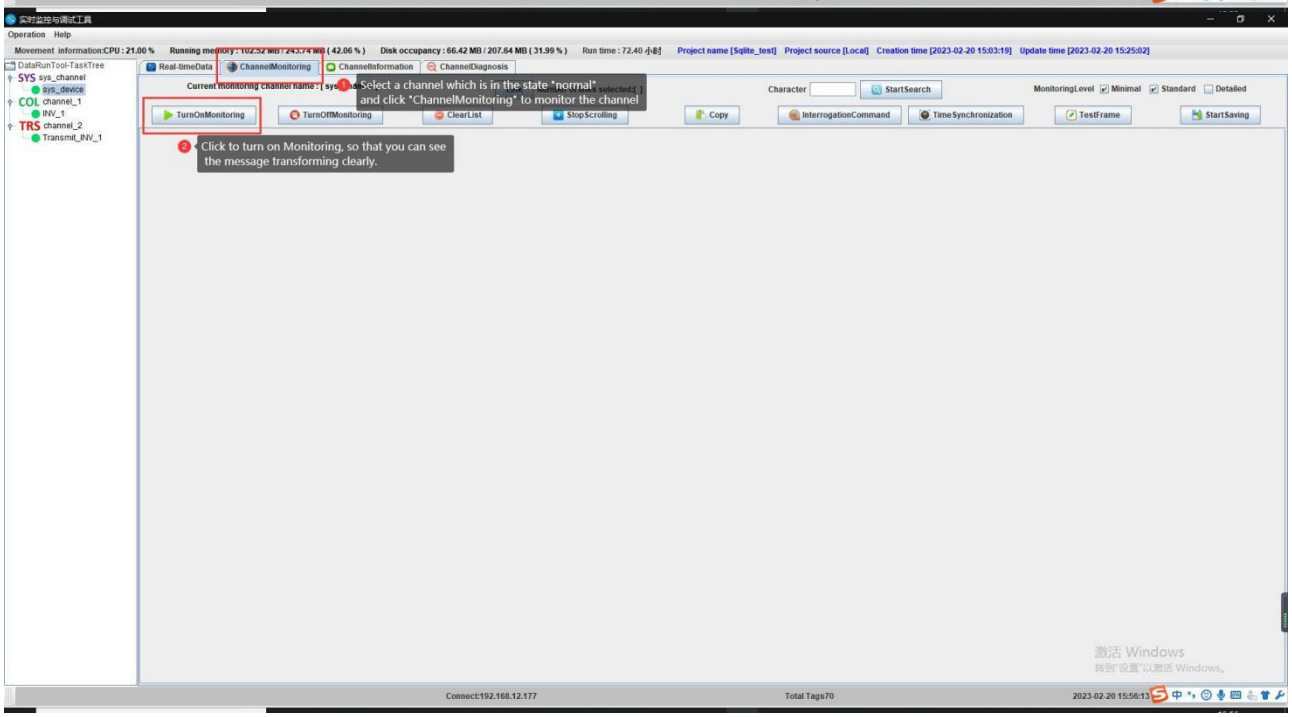


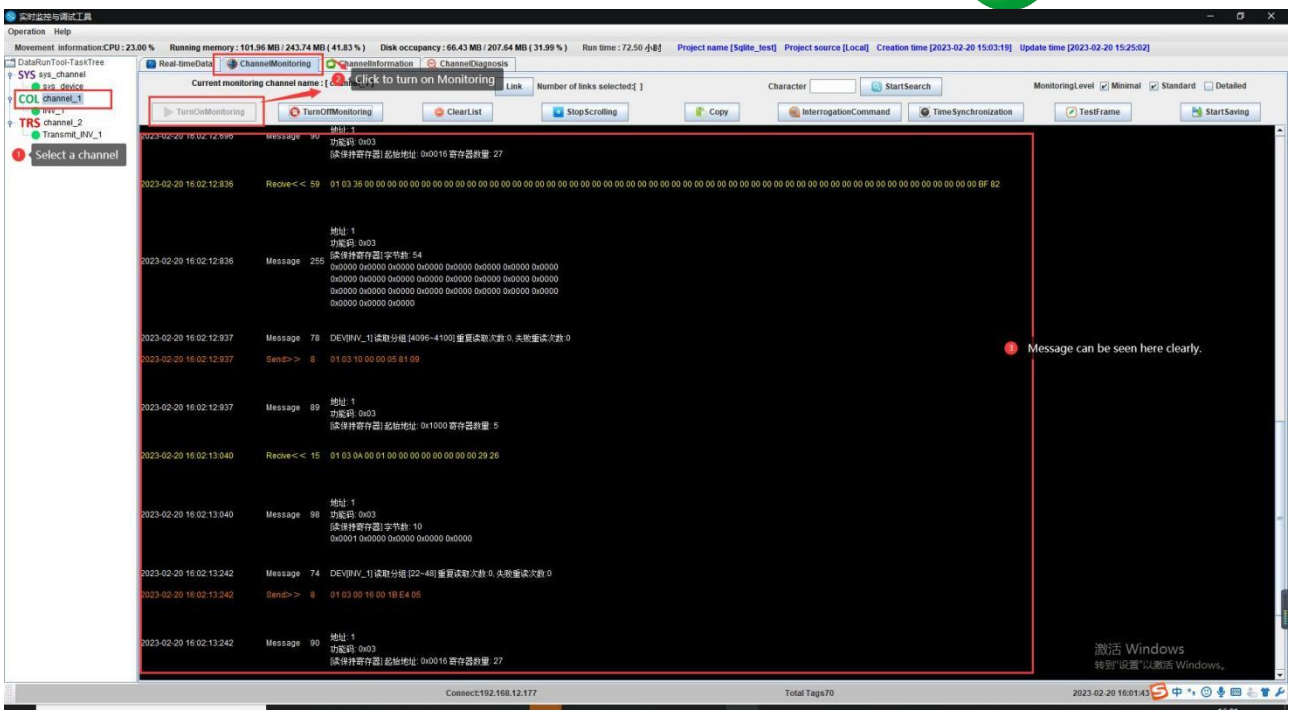
8.2 Download the project to the ASDU-LS gateway



8.3 MonitorTheStatuOfTheChannels







Chapter 9 After-sales Service

Product Warranty

1．The product warranty period is one year.

2．The company is responsible for free maintenance or exchange within one-year warranty period.

3．The cost of the components and freight shall be charged for improper meter installation and/or operation.

4．Over the warranty period, part of the maintenance cost according to actual situation will be charged.

Service Guarantee

1．Product technical consulting and quality complaints will be replied within 12 hours.

2．Solutions for quality complaints will be provided within 24 hours.

3．Except statutory holidays and force majeure.

Chapter 10 Contact Us

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