User manual

IPort-1

Embedded Serial to Ethernet Device

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Key words	IPort-1 Ethernet Serial port Multi-connection
Abstract	IPort-1 Serial to Ethernet Device Specification

Contents

Chapter 1: Features

1.1 Overview

IPort-1 is a multi-functional embedded Serial-to-Ethernet data converter device developed by Guangzhou ZHIYUAN Electronics Co., Ltd.; it integrates the TCP/IP protocol stack, which allows users to apply the network functions to their embedded devices easily without knowing the complex knowledge on network or TCP/IP protocols. It can save the expense on network interface and shorten the development period, further reduce the time to market and make the product more competitive to others.

This device contains a 10/100M self-adaptive Ethernet interface and the maximum Baud rate for serial port can reach up to 230.4Kbps. It provides many operation modes to suit for different communication requirements, including TCP Server, TCP Client, UDP, Real COM driver, and etc. IPort-1 supports maximum 4 connections and domain name access.

1.1.1 Function Features

- 10/100M self-adaptive Ethernet Interface;
- Support ATUO MDI/MDIX, allowing crossover cable connection or straight-through cable connection;
- Selectable Baud rate between 300bps and 230.4Kbps;
- Selectable working modes, such as TCP Server, TCP Client, UDP, Real COM driver; also, in these modes, most of the parameters, such as Multicasting address, working port, destination port, destination IP, and port number are configurable by user;
- Provides general configuration function library to support the application developments in VC, VB, Delphi or C++ Builder;
- Build-in WEB server, allowing users to configure their webpage easily;
- Auto reconnection after a network break, ensure the reliable TCP connection for the whole network;
- Support DNS, can achieve a communication using the domain name;
- Provide flexible framing modes to satisfy different framing requirements by user;
- Compatible to SOCKET working modes (TCP Server, TCP Client, UDP and etc.), the upper layer machine software is written strictly following the SOCKET rules;
- Support virtual serial port working mode, provide virtual serial port driver for windows applications, seamless upgrading the user's serial device to Ethernet communication without the need to change any original serial port software;

- TCP modes supports multi connections, specific data sending after password verifying, allowing up to 4 user to manage a single embedded device at a same time;
- Supports single or multiple communication under UDP mode, allow multiple users to manage a same serial device at a same time;
- Advanced security mechanisms, prevent illegal access from unauthorized visitors, provide IP verifying firewall, and up to 8 configurable IP or IP segment certifications;
- Support the local and remote upgrading of the firmware;
- Provide free Windows configuration software function library, including all API functions for easy usage, very convenient for users to write their own configuration software;
- Support AT Command configuration;
- Support remote configuration;

1.1.2 Product Parameters

- 32 bits ARM7 CPU;
- LAN
  - Ethernet: 10/100Mbps;
  - Protections: build-in 2KV surge protection;
- Serial Interface
  - TTL×1:TXD,RXD,GND;
- Serial Port Parameter
  - Parity: None, Even, Odd, Space, Mark;
  - Data Bit: 5, 6, 7 or 8 bits;
  - Stop Bit: 1, 1.5 or 2 bits;
  - Flow Control: None;
  - Baud Rate: 300bps~230.4Kbps;
- Software
  - Compatible Protocol: Ethernet, ARP, IP, ICMP, UDP, TCP, HTTP, DHCP, DNS;
  - Software Tool: ZNetCom2 Configuration Software, ZNetCManager Virtual serial port server software, TCP/UDP testing tool;
  - Configuration Mode: Web browser configuration tool, windows configuration software ZNetCom, Windows Hyper Terminal, Telnet, Serial port configuration;
- Power Supply
  - Power Input: 3.3V DC;
- Physical Parameters
  - Physical Size (W×D×H): 33×16.8×13.6(mm);
- Working Temperature:
  - Industrial Temperature: -25℃~75℃

- Storage Environment
- Industrial Temperature: -40℃~85℃, 5~95%RH;

1.1.3 Parameters Configuration Mode

IPort-1 supplies various configuration modes for configuration.

- Available of Windows platform configuration software for parameter settings;
- Provide free Windows configuration software function library, including all API functions for easy usage, very convenient for users to write their own configuration software;
- Allow easy configurations by using a WEB browser;
- Allow using the Hyper Terminal Software attached to the Windows system for parameter configurations, provide friendly configuration interface with Chinese and English bi-language;
- Support AT command configuration, allowing convenient parameter settings for user by using embedded device;
- Independent Console serial interface for Hyper Terminal Software and AT Command configurations;
- Independent TCP configuration interface, allowing Hyper Terminal and Telnet configurations.

1.2 Specification of Product

1.2.1 Electrical Parameters

1.2.1.1 Static Parameters: Power Supply

The parameters listed in the table below are for Tamb=25℃, unless otherwise specified.

Symbol	Description	Specifications				Notes
		Min.	Typ.	Max.	Unit	
V_{DP3V3}	Device Voltage	3.15	3.3	3.45	V	
I_{DP3V3}	Device Current	-	-	168	mA	

1.2.1.2 Static Parameters: Digital Pins

Symbol	Description	Parameter	Condition	Specifications				Notes
				Min.	Typ.	Max.	Unit	
V_{IH}	Pins for serial ports and IO signals	High input voltage		2.0	3.3	5	V	
V_{IL}		Low input voltage				0.8	V	
V_{OH}		High output voltage	I=4mA	2.9	3.3		V	
V_{OL}		Low output voltage	I=4mA			0.4	V	

1.2.2 Dimensions

To design a product using the IPort-1 device, user need to know the device's physical size, these are provided in Figure 1-1; also, to produce an IPort-1 main-board, user need the pin location maps and distances, these are provided in Figure 1-1.

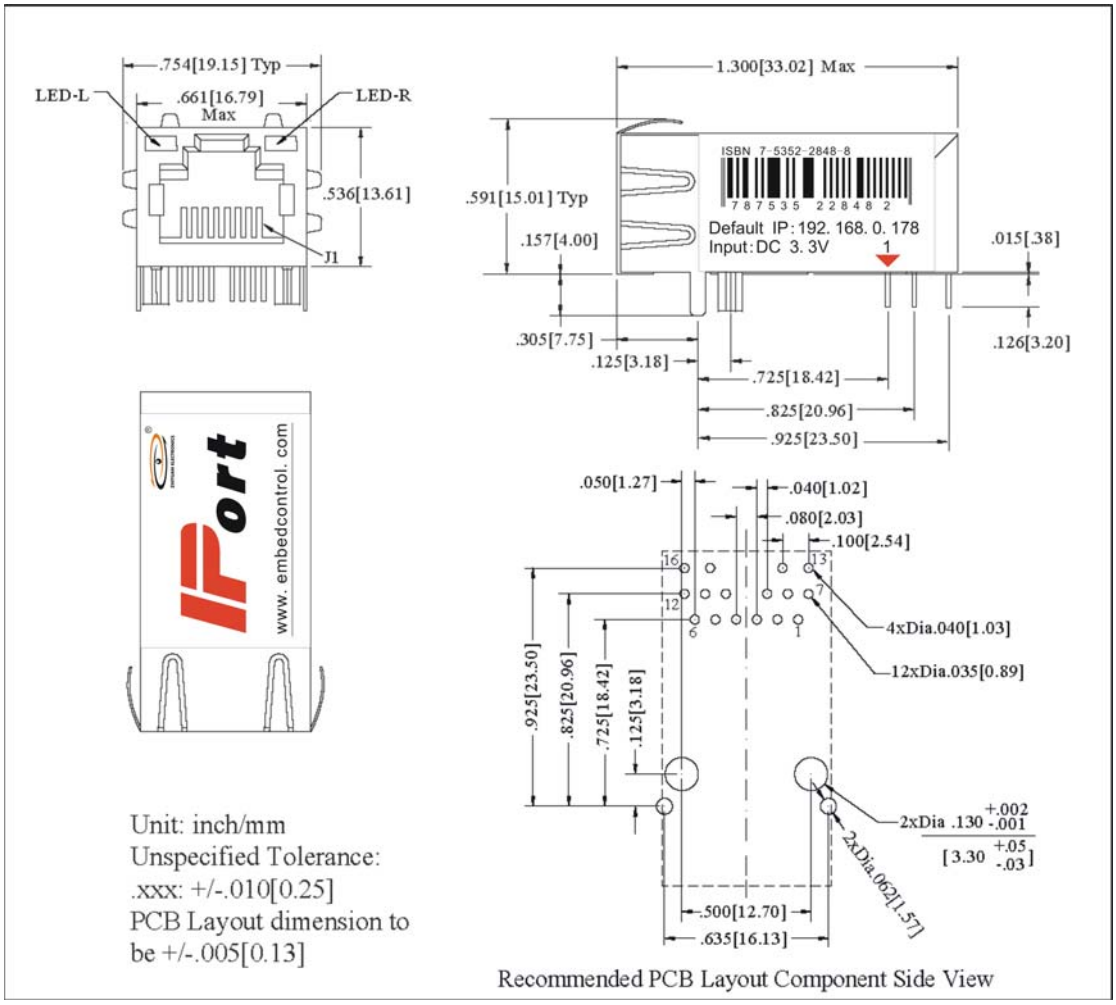


Figure 1-1: The dimensions of IPort-1

1.2.3 Temperature Character

Name	Class	Working Temperature	Storage Temperature
IPort-1	Industrial	-25~75℃	-40~85℃

Chapter 2: Hardware Specification

2.1 The Specification of Hardware Circuit

The pin specification of the IPort-1 device and the usage of the evaluation board will be described in this chapter.

Figure 2-1 shows the device shape. In the top view of the device (Figure 2-2), user can find that IPort-1 device has three lines of pin header, 6 pins (Pin1~Pin6) on the inside line, 6 pins (Pin7~Pin12) on the middle line, and 4 pins (Pin13~Pin17) on the outside line.

Figure 2-1: Aspect of the Device

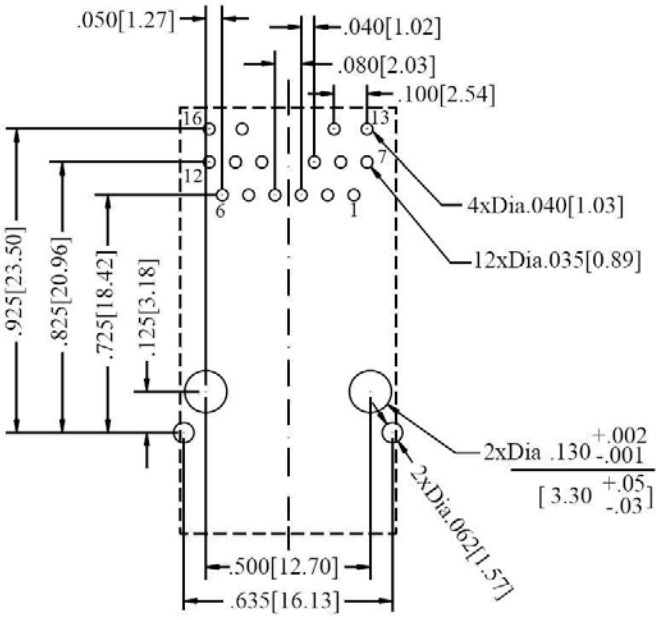


Figure 2-2: Top view of the device

Table 2-1: The pin name of IPort-1

Pin No.	Signal	Direction	Pin No.	Signal	Direction
1	COM_CFG	IN	9	GND	——
2	FUNCTION_IO	I/O	10	TXD	OUT
3	RST	IN	11	RXD	IN
4	NC	Reserved	12	NET_R/T	OUT
5	NC	Reserved	13	R_LED+	——
6	NC	Reserved	14	R_LED-	——
7	NET_LINK	OUT	15	L_LED-	——
8	VCC 3.3	——	16	L_LED+	——

Notes: *Please leave the reserved pins unconnected in the design.*

The pins shown in Table 2-1 are defined as following:

- Pin1: COM_CFG is a serial configuration controller pin, and it is an input pin. When it is high or unconnected, the device will run in the normal working mode; and when it is low the device will run in the serial configuration mode. In normal working mode, serial port will transmit data that converted from the Ethernet or receive data and convert them for Ethernet. In serial configuration mode, the serial port will be used for configuration commands, which can set the working parameter or acquire the working state parameters of the device, and this pin has an internal weak pull-up;
- Pin2: FUNCTION_IO is a function pin of the device, for more detailed information please refer to 6.3.6.26 section in Chapter 6;
- Pin3: RST is an active low signal pin for device reset, a negative pulse that lasted over 20us on this pin can reset the device, since there are built-in power on reset circuit, this pin can be left unconnected;
- Pin4~Pin6: NC is the pin reserved for further use, this pin can be left unconnected;
- Pin7: NET_LINK is an indication signal for Ethernet connection, it outputs “1” (high level) pulses when the network connection is broken, and outputs “0” (low level) pulses when the device connects to the network. User can connect this pin to a LED to indicate the network connection status;
- Pin8: VCC 3.3 is an input power voltage pin, and its input voltage is 3.3V DC;
- Pin9: GND is a power ground pin;
- Pin10: TXD is a serial signal output pin;
- Pin11: RXD is a serial signal input pin;
- Pin12: NET_R/T is Ethernet transmit/receive signal, it outputs “0” (low level) pulses when data are being transmitted on Ethernet (the LED connected to this pin will flicker), otherwise outputs “1” (high level) pulses. User can connect this pin to a LED to indicate the networking connection status;

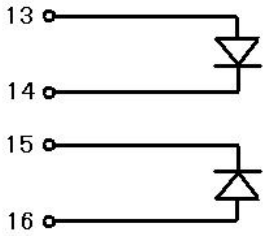


Figure 2-3: Schematic of Pin13~Pin16 of IPort-1

- Pin13~Pin14: R_LED+, R_LED- are pins of the device internal LED, the schematic is shown in Figure 2-3. User can use them to indicate NET_LINK signal or user signal.
- Pin15~Pin16: L_LED-, L_LED+ are pins of the device internal LED, the schematic is also shown in Figure 2-3. User can use them to indicate NET_LINK signal or user signal (Notes: When using R_LED or L_LED, user should pay attention to the polarity of the pins).

The schematic for evaluation board is shown in Figure 2-4.

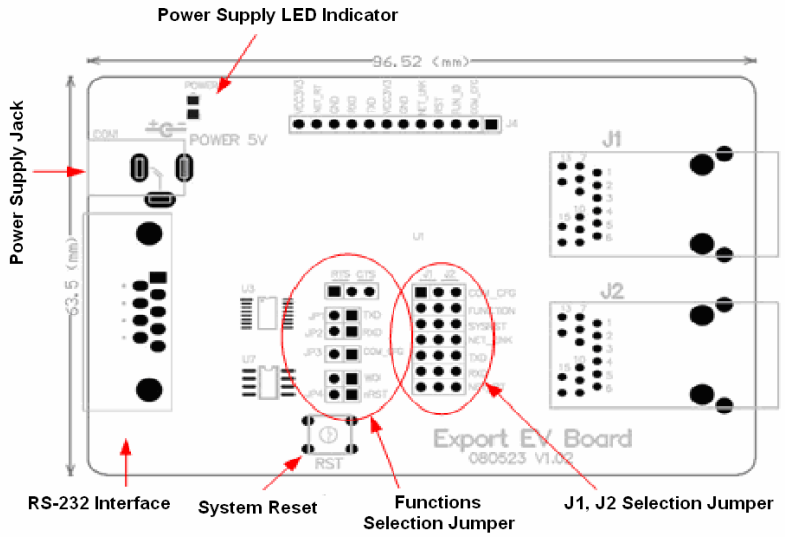


Figure 2-4: Schematic of the IPort Evaluation board

Evaluation board is a demonstration platform that designed for easy test and simple application of the device. It includes 9V DC power supply jack, IPort device socket and RS-232/RS-485 interfaces and other useful devices.

The pin assignment of RJ45 connector is shown in Figure 2-5.

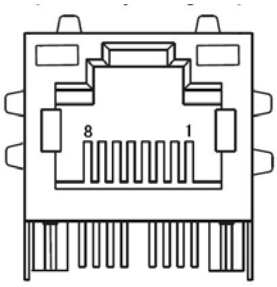


Figure 2-5: Pin assignment of RJ45 connector

Table 2-2: Pin Specifications of RJ45 Connector

PIN	Signal
1	TX+
2	TX+
3	RX+
6	RX+

Only 3 pins are used by the RS-232 interface of our device, they are RXD, TXD and GND respectively; the pin assignment is shown in Figure 2-6.

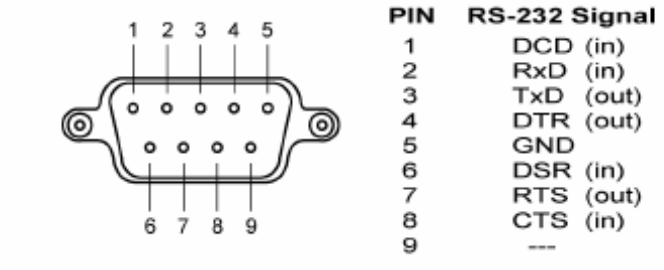


Figure 2-6: The pin assignment of RS232

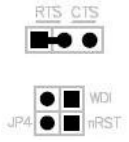
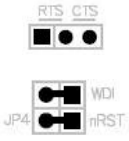
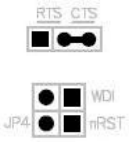
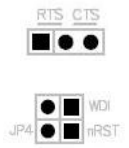
IPort-1 device can not use the RS-485 interface in the evaluation board, since IPort-1 device does not provide RS-485 data transmission control end.

The Power jack on the evaluation board is used to connect with the 9V power adapter, which is provided accompanied with the evaluation board.

The RERST key can be used to reset the device.

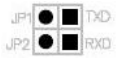
The settings of functions selection jumpers are list in Table 2-3. For more detail specifications, please refer to 6.3.6.26 section in Chapter 6.

Table 2-3: Jumper specification for functions selection

Descriptions	Jumper Settings
Select RTS mode; the signal is outputted to the Pin7 of RS-232 interface.	
Select WDT output mode; the signal is outputted to the Pin6 of CAT706.	
Select CTS mode, user can get the signal at the Pin8 of RS-232 interface.	
Can work at any mode, user can get the signal at the FUN_IO of J4.	

The Jumper specification for serial port is list in Table 2-4

Table 2-4: Jumper specification for serial port

Descriptions	Jumper Settings
The TXD and RXD pins of the device are connected to the RS-232 interface.	
If the TXD and RXD pins of the device are not connected to RS-232 interface, user can get the signals at the TXD and RXD pins of J4.	

The evaluation board will enter into configuration mode after power up or reset if this jumper was shorted, or enter normal operation mode if there is no jumper link on it. Table 2-5 shows the specification of the serial configuration jumper settings.

Table 2-5: Serial configuration jumper settings

Descriptions	Jumper Settings
This setting will make the device enter the configuration mode; the serial port of the device will then work as a port for the configuration of the device parameters.	
This setting will make the device enter the normal operation mode; the serial port of the device will work for data transmission.	

J1 and J2 selection jumpers are used to switch between the J1 module and the module connected on J2 socket. To use the J1 module, which is an ready IPort device soldered on the Evaluation Board, the jumper should be connected to the J1; if user buys an independent IPort device, it can be plug to the J2 socket with the selection jumper set to J2. Then the newly-buy IPort device is ready for the relative testing.

The pin arrangement of the J2 socket of the evaluation board is shown in Figure 2-7. To plug the module, user should find out the pin1 on the module and the pin1 on the socket; then connect the module to the socket in the corresponding position. User should plug the module carefully, and avoid twisting the pins, after this, set the jumper to J2 side to allow the usage of the module.

Notes: *If the power LED does not turn on after the power up, please turn off the device immediately and check whether there is any mistake on connection.*

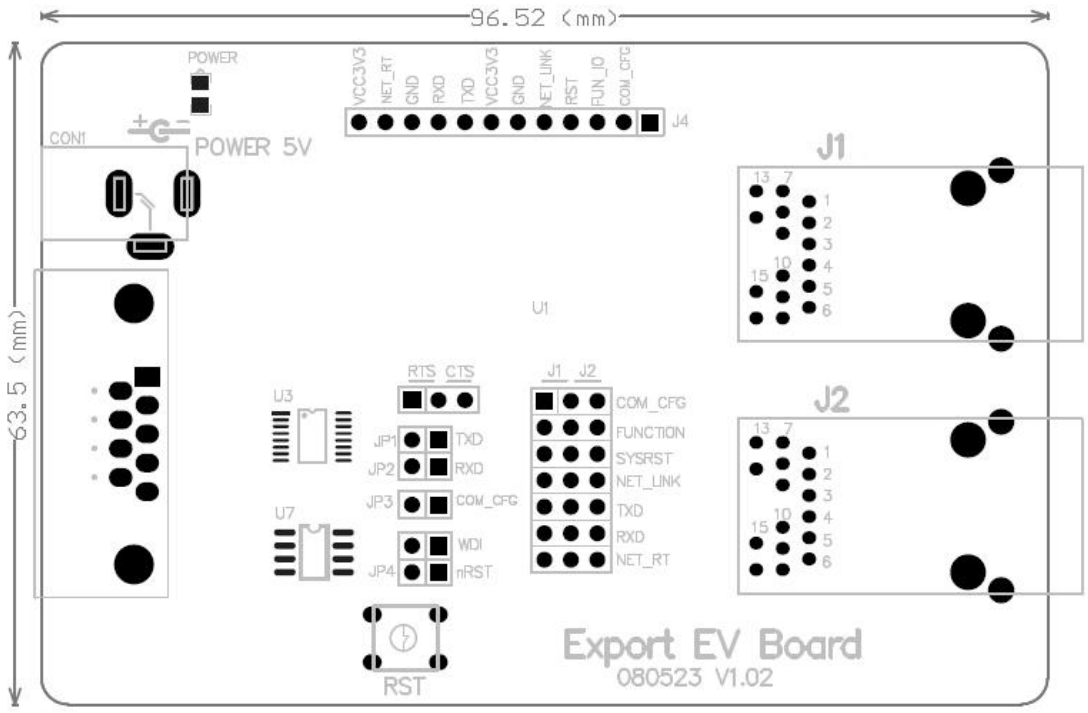


Figure 2-7: The connection between evaluation board and IPort-1

The Schematic of Evaluation board is shown in Figure 2-8. User can take it as a reference to the secondary development.

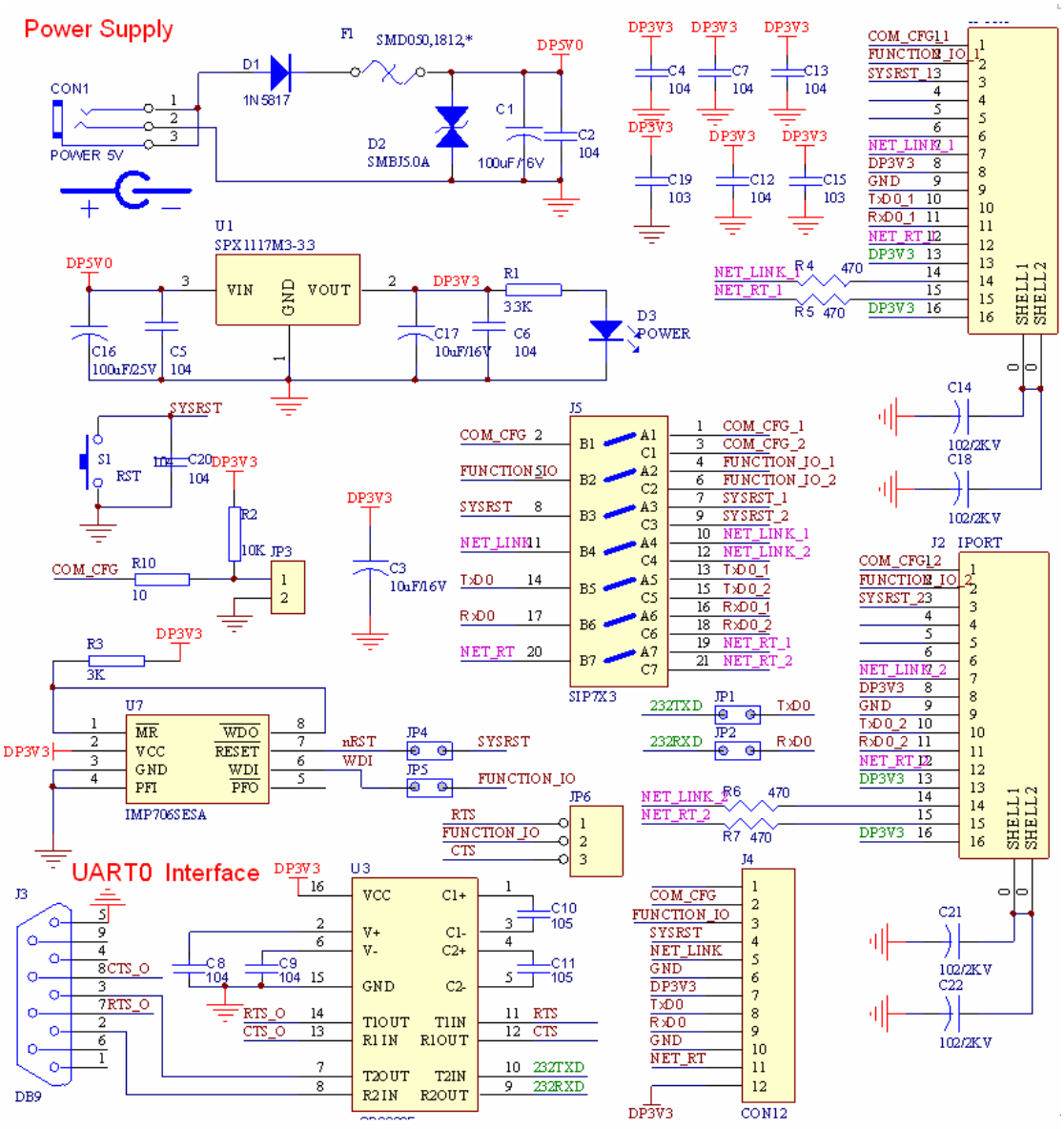


Figure 2-8: The Schematic of ZNE Evaluation board

2.2 The Specification of Hardware Connection

Generally, user can use the IPort device to expand their serial port products to Ethernet after secondary developments. The general application of the Evaluation board and device is to apply them as a bridge between the serial devices and Ethernet; user can connects them to the Ethernet through an Ethernet interface, and then connects them to the serial device through the serial port. In this way, using a PC can control lots of serial peripherals and devices via Ethernet network. An application example of IPort-1 is shown in Figure 2-9.

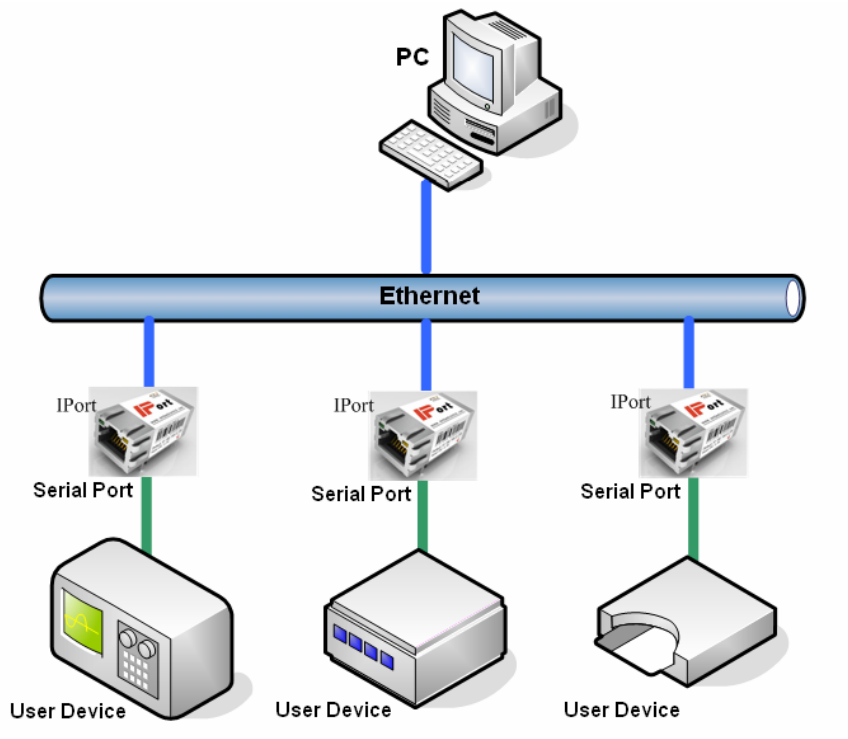


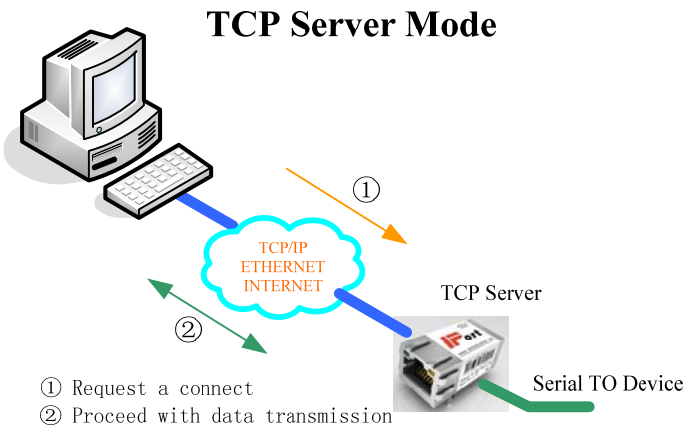
Figure 2-9: The application of IPort-1 device

To test the device and the evaluation board, user can connect a crossover network cable (one is provided in the product) between PC network adaptor interface and the evaluation board Ethernet interface. Then, connect the serial cable (a crossover cable) that provided by the product between PC serial port and the RS232 interface. Then a simple testing network is ready; user may start sending data to the serial port and receive it back for verification. Such kind of testing functions are available in ZNETCOM software, which is included in the CD.

Chapter 3: Operation Modes

IPort-1 module supports 4 different operation modes. Each of them will be described respectively in this chapter.

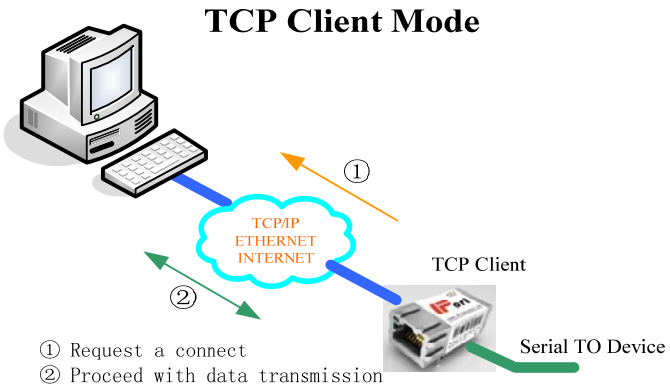
3.1 TCP Server Mode



For TCP Server Mode, IPort-1 always waits for the connection from TCP Client, rather than actively connects to other devices. Once the connection is built up, the bi-direction data transmission can be carried out.

Notes: *Under this mode, TCP Client connects to the IPort-1 device through the working port which is corresponding to the network port.*

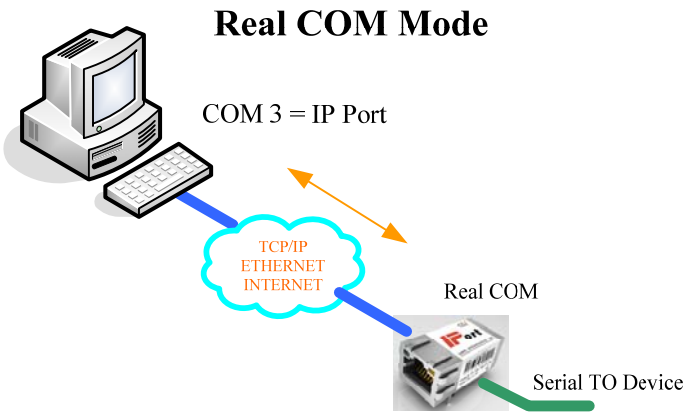
3.2 TCP Client Mode



For TCP Client Mode, IPort-1 will actively connect to the presetting destination TCP server. If it fails, the module will continually try to establish the connection to the TCP server, according to the connection condition of setting. When the connection has been built up, the bi-direction data transmission can then be carried out.

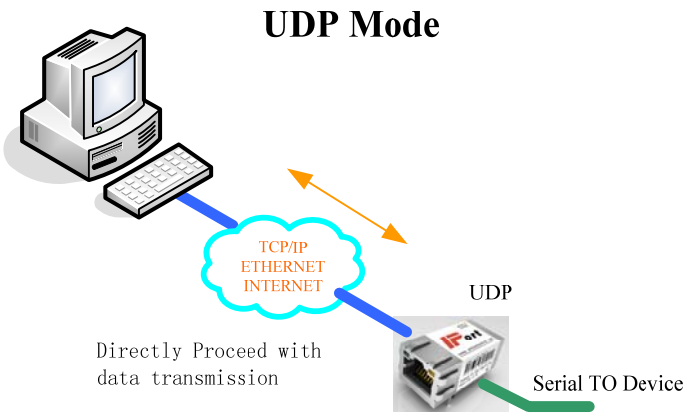
Notes: *Under this mode, the IP address of TCP server is based on the "destination IP" (see 6.3.6.21 section in Chapter 6), and the communication port of TCP server is determined by the "destination port" (see 6.3.6.20 section in Chapter 6). There are 4 "destination port" and "destination IP" options. According to the number of the connections in the setting, IPort-1 will keep polling the TCP servers which are specified by these 4 parameters, until the connection has been established.*

3.3 Real COM Mode



For Real COM Mode, the IPort-1 device is actually working at TCP Server Mode. A background service program on the upper layer machine will actively build up a connection to IPort-1 and add a virtual COM port to the PC device lists; this COM port works virtually as a serial port interface to users. So, in this way, users can seamlessly upgrade their serial device to Ethernet communication without changing their old "PC to Serial Communication" mode on PC.

3.4 UDP Mode



Different from the abovementioned modes, under UDP mode, IPort-1 will use UDP protocol for data communication. UDP is a communication mode which is not base on connection and it does not guarantee the safe arrival of data to the destination, therefore, for the situation with high reliability requirement, an upper layer communication protocol should be used to guarantee the received data is correct; however, because the transmission method of UDP is very simple, it has lower communication overhead than TCP transmissions, so it has a faster communication rate than TCP mode, making it more suitable for the real-time transmission. In fact, for simple network environment and light communication load, UDP communication is hardly to have mistakes. Working under this mode, the role of the devices is equivalent, so there is no server and client.

Notes: *Under this mode, IPort-1 use "working port" (see 6.3.6.2 section in Chapter 6) to receive the UDP data packet from user device; the data received by the serial interface of IPort-1 will be converted and sent to the "destination port" (see 6.3.6.20 section in Chapter 6) of the 4 valid "destination IP" (see 6.3.6.21 section in Chapter 6).*

Chapter 4: IP Address Configuration

User should know the network parameters such as the IP address, before using the IPort-1 device. Static and Dynamic Acquisition are two methods for IPort-1 to acquire IP. The Static Acquisition mode is the factory default setting, of which the IP address, subnet mask and MAC address used for the device are specified directly in the module; Dynamic Acquisition mode means that the module will automatically acquire the information about the IP address, subnet mask and gateway assigned by DHCP server on a network with DHCP protocol.

4.1 Factory Default Setting of IP Address

The default IP address of IPort-1 Serial to Ethernet module is 192.168.0.178.

4.2 How to Acquire the IP Address of Device

If user forgets the IP address, which is set directly in the module or assigned by the DHCP server with the DHCP protocol, using the ZNetCom software can help to find out the current IP of IPort-1 device.

ZNetCom is the configuration software for IPort-1, it runs in Windows system. User can acquired and configured the current IP of IPort-1 by using this software, whatever the IP is. The process for IP acquisition is listed as follows.

1. Connect the hardware
   Power up the device, and connect a crossover cable between the LAN interface of the module and the NIC of PC.
2. Install the ZNetCom software
   Please see the section of configuration software installation in Chapter 5 for more detail information about the installation of ZNetCom software. Please use the latest version of the software; user can download it from the URL below:
   http://www.embedcontrol.com/products/Ethernet_tools/ethernetsoft.asp
3. Click the “ZNetCom2” icon to run the ZNetCom software, an interface will appear as Figure 4-1 shows.

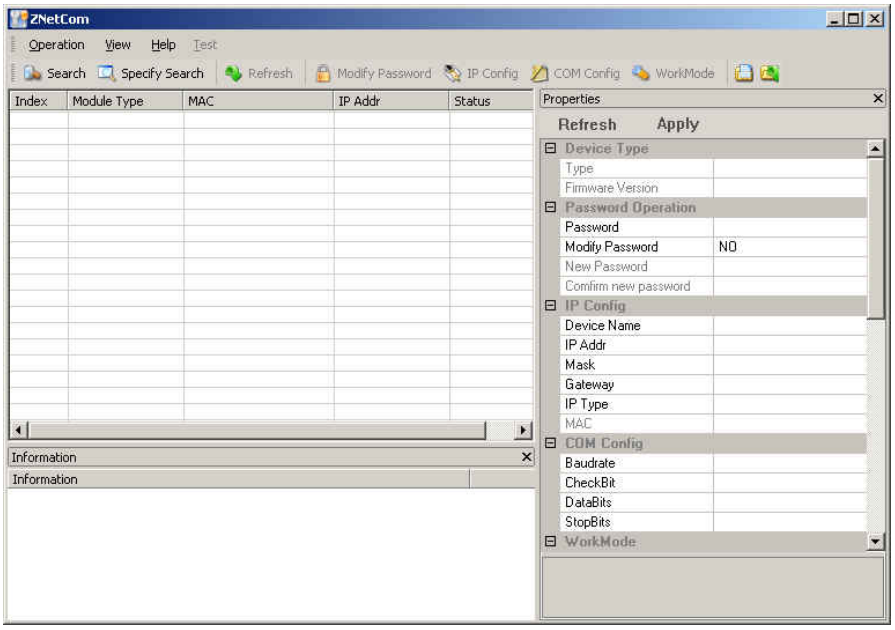


Figure 4-1: The operation interface for ZNetCom software

4. Click Search button to find out the IP address of the module, as Figure 4-2 shows.

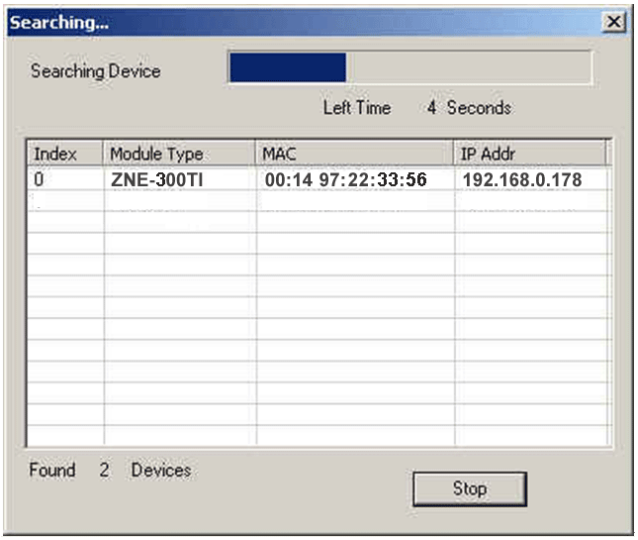


Figure 4-2: Searching the devices in the network

4.3 Checking Network Segments

Before starting the communication, user should make sure that an Ethernet Card has been installed in the PC; and make sure the PC and IPort-1 device are set on the same network segment.

IPort-1 module has factory default setting on IP address (192.168.0.178) and network mask (255.255.255.0). User can check whether the module is on the same network segment as the PC, according to the process as Figure 4-3 shows. If they are the same, then the following section about the configuration of PC network setting can be skipped. If they're different, the following section should be read to configure them to the same segment.

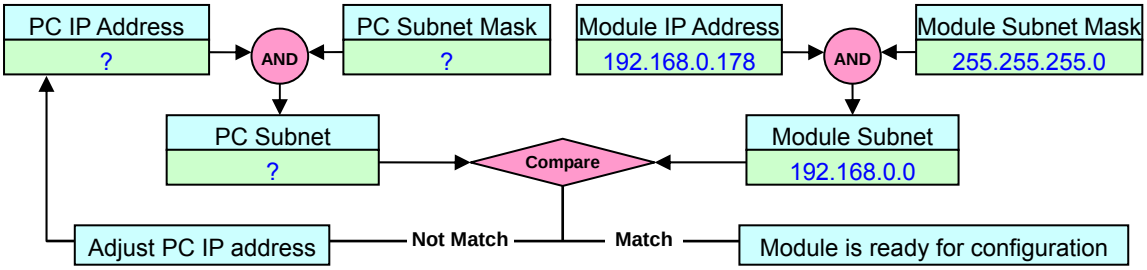


Figure 4-3: Find out whether the module is ready for configuration

The following descriptions are about how to set the PC to a same network segment as the device.

4.3.1 Windows 98/Me Network Configuration

When using Windows 98/ME, enter the system, then click "Start" → "Settings" → "Control Panel", and double click the "Network" icon, a Network dialog box will then appear, as Figure 4-4 shows.

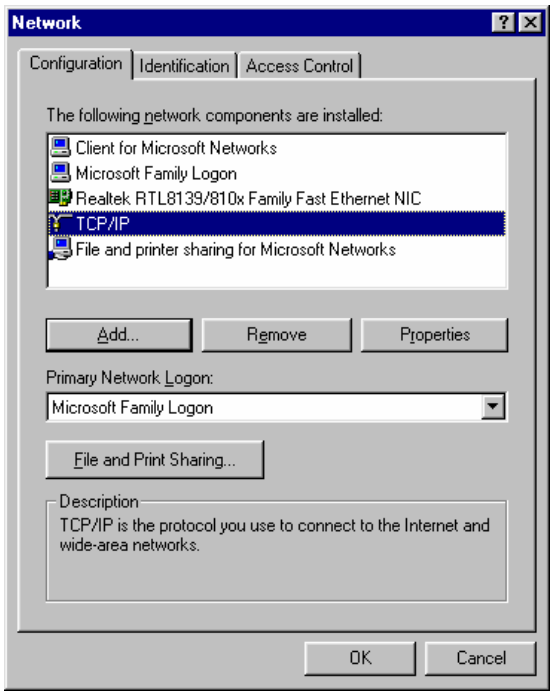


Figure 4-4: The network dialog box

Choose the "TCP/IP protocol of IPort-1" item listed in the Configuration tab; user may find many TCP/IP items, please select the one associated with the IPort-1 module then click the Properties button. This will open the TCP/IP dialog box for IPort-1, as Figure 4-5 shows.

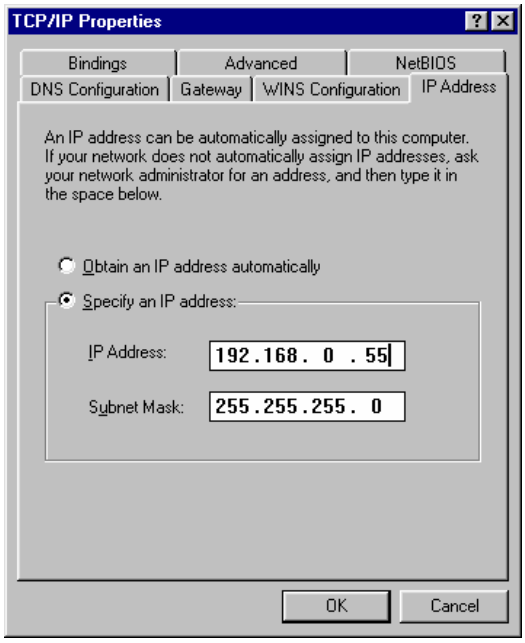


Figure 4-5: TCP/IP Properties

As Figure 4-5 shows, select the “Specify an IP Address” option within the IP Address Tab, then fill in the IP address “192.168.0.55” and the subnet mask “255.255.255.0”. Click the OK button to confirm the settings, and then follow the instructions to restart the PC.

4.3.2 Windows 2000/XP Network Configuration

When using Windows 2000/XP, there are two methods for user to modify the network configurations; During the running of the system, click “Start” → “Setting” → “Control Panel”(or directly click the “Control Panel” in “My Computer”), and then double click the “Network and Dial-up connections” (or “network connection”) icon; select the “Local Area Network Connection” icon for the IPort-1 module network adaptor, then select the property option and choose “internet protocol (TCP/IP)” within the “Routine” Tab to check its “Property”, as Figure 4-6 shows. Choose “Use the IP address below”, and fill in the IP address “192.168.0.55”, network mask “255.255.255.0” and default MAC address “192.168.0.1” (the part of DNS is not allowed to fill). Click the OK button to confirm the setting, and wait for the system to complete the configuration.

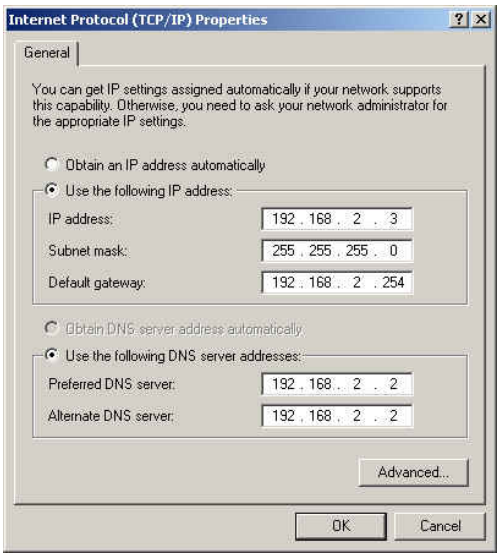


Figure 4-6: TCP/IP Properties

Now, the communication between PC and IPort-1 device is ready.

Chapter 5: Software Configuration Guide

ZNetCom is the dedicated configuration software for IPort-1, and it runs in the WINDOWS system. Through the software, user can acquire the IP of ZNE module, check and change the device configuration parameters, and upgrade the firmware of the device.

5.1 Installing the Configuration Software

Put the product CD into the CD-ROM drive and double-click the "ZnetCom_Setup.exe" file to start the installation.

Figure 5-1: Setup File

A welcome window will then appear, as Figure 5-2 shows; Click the Next > button to continue.

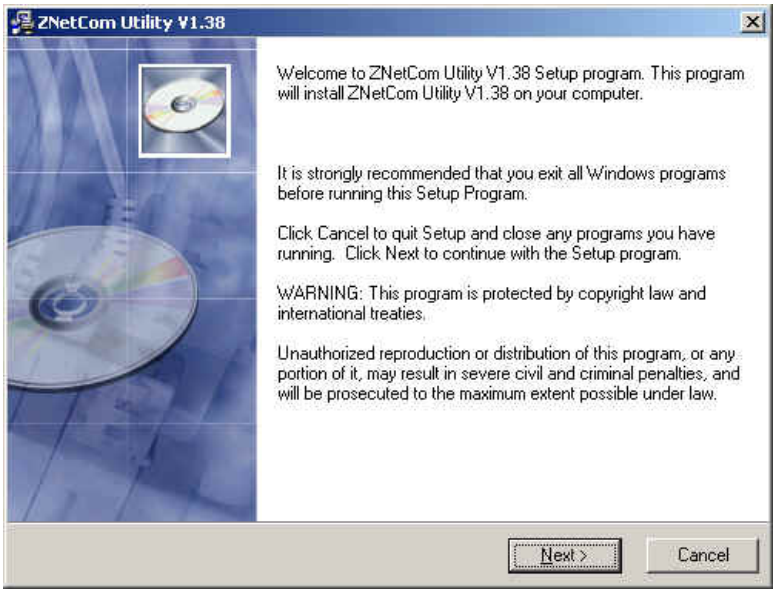


Figure 5-2: the Welcome Dialog Box

The upcoming dialog window will ask user to enter the destination directory for installation. (Default installation directory is *C:\PROGRAM FILE\ZnetCom\directory*), If user wants to change this installation directory, click the "Browse…" button. When all settings are completed, click the "Next >" button to proceed.

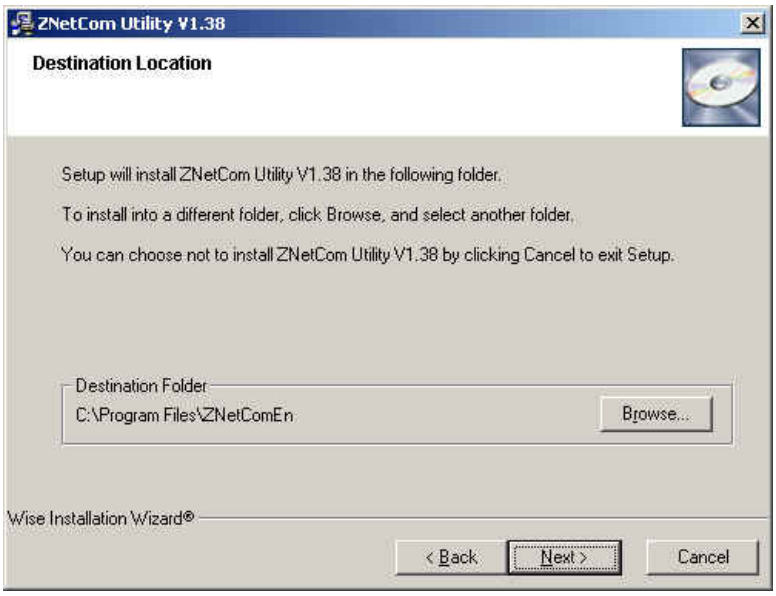


Figure 5-3: Select Installing Directory

Click the "Next >" button to start the file copying. After the installation completed, a successful installation dialog box will appear, as Figure 5-4 shows. User can just click the "Finish" button to finish the installation of ZNetCom software.

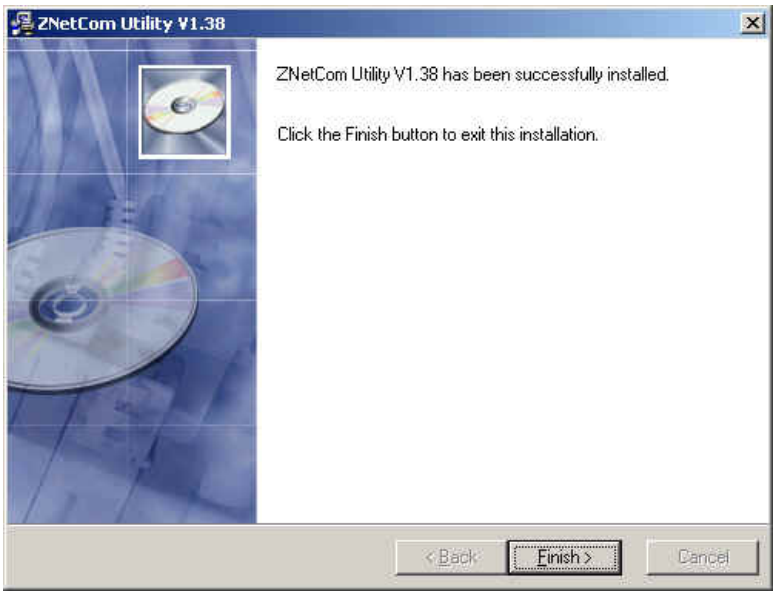


Figure 5-4: Installation Complete Dialog

Then the configuration software has been installed on the system. Before running the module, it is recommended to check the hardware first, such as the connection between the ZNE module and the PC network adaptor.

5.2 Acquire the Configuration Information

Run the ZNetCom.exe file, and then the user interface of the software will appear, as Figure 5-5 shows.

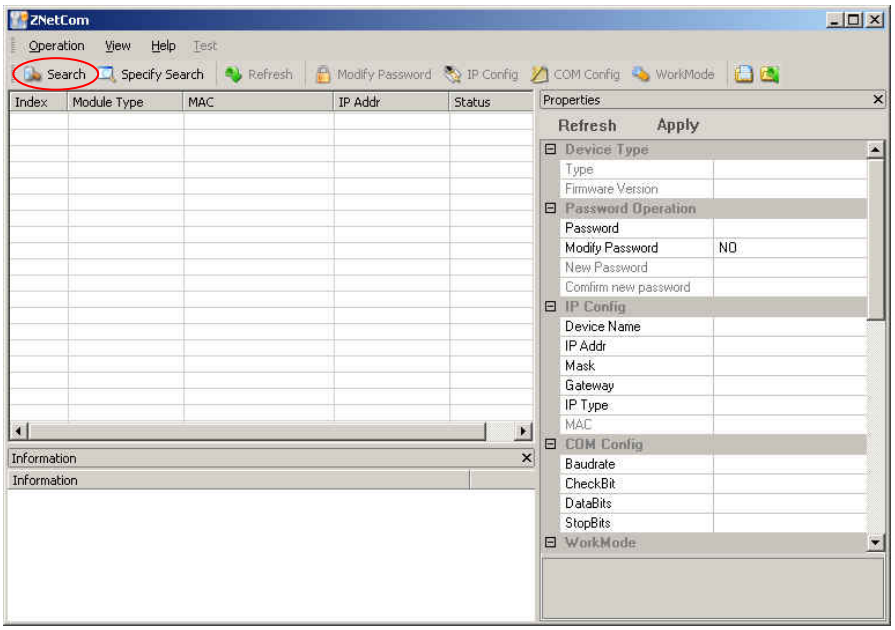


Figure 5-5: ZNetCom configuration software interface

Click the Search button in the toolbar, and then a “Search” dialog box will appear and start to search the ZNE modules connected to the PC, as Figure 5-6 shows. All the ZNE module that have been found will be listed on it with their MAC address and IP address. Then this dialog box will close automatically in 10 sec, user also can click the Stop button to close it directly

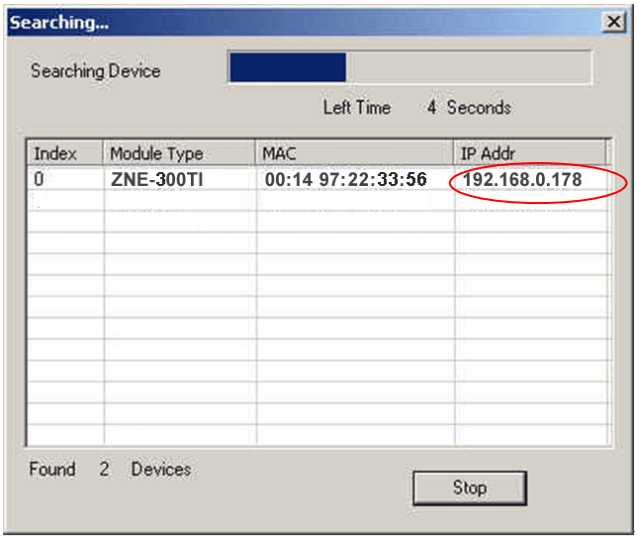


Figure 5-6: Searching the module

Shown as Figure 5-7, the software will then list out all devices found by the search dialog box after closing it.

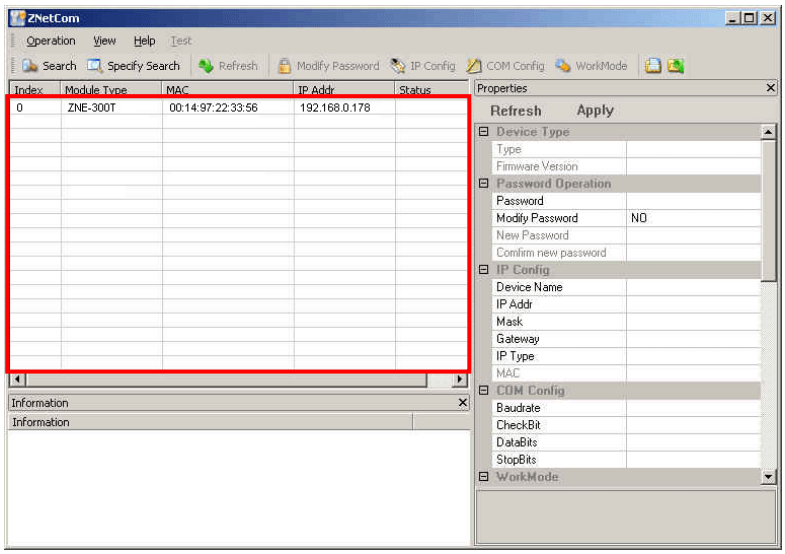


Figure 5-7: List of the found modules

Double click the device item in the list; or select device item, and click the Get Info button in the toolbar or the Refresh button in the property bar. Then a dialog box shown as Figure 5-8 will pop up.

Figure 5-8: Acquiring the device information

After the dialog box disappeared, user can find out the configuration information of IPort-1 from the Properties bar, as Figure 5-9 shows.

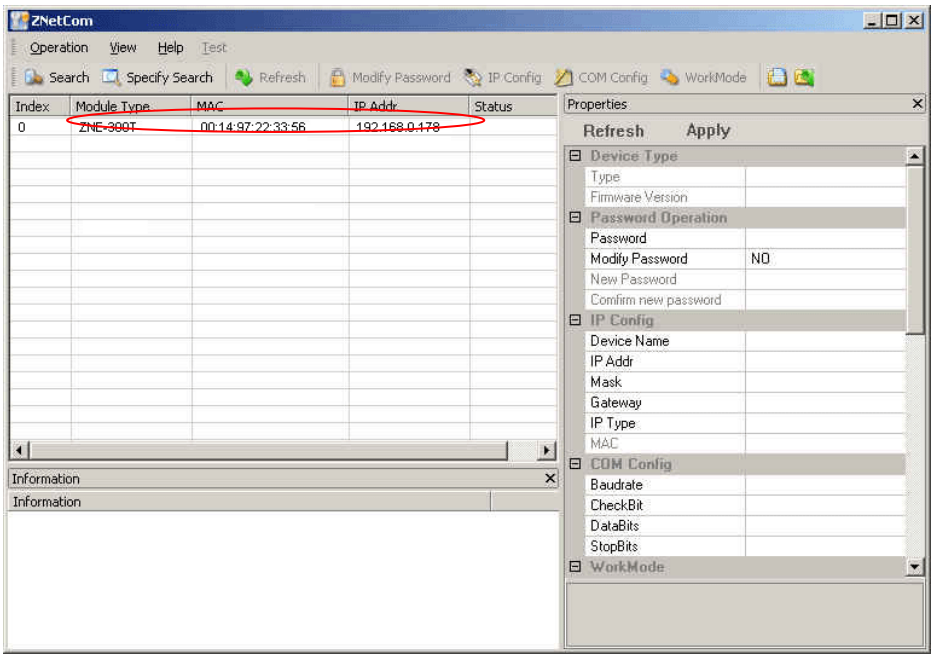


Figure 5-9: The configuration information of IPort-1

5.3 Modify the Device Configuration Information

For any modification to the parameters, the password is required (The default password is “88888”). User should fill in the password after modifying the configuration information in the Properties bar, and click the Apply button to confirm the modification.

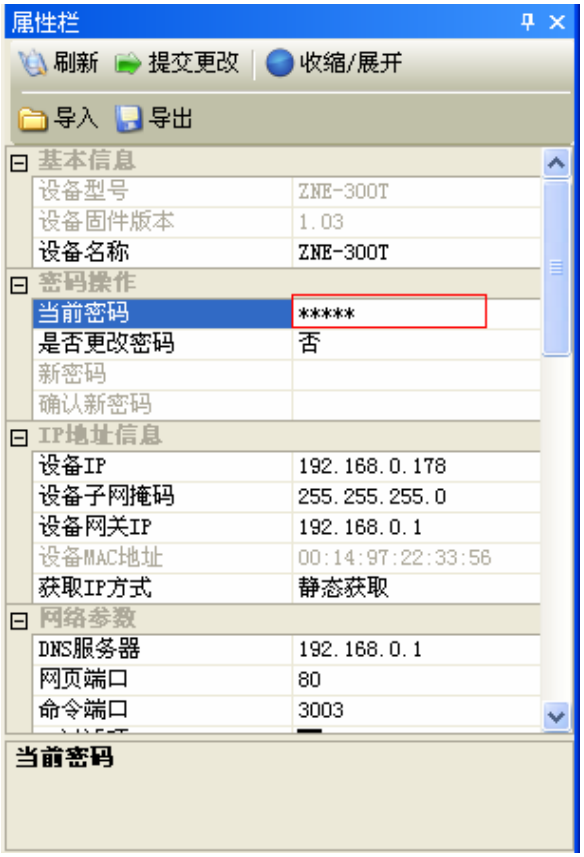


Figure 5-10: Modifying the module configuration

Notes: *Please refer to the 6.3 section in Chapter 6 for the detail meaning of each parameter in the properties bar.*

5.4 Save or Recover the Setting

ZNetCom provides an import/export function for information configuration, so that user can easily modify the IPort-1 configuration information in a huge quantity. The button of this function is located in the Properties bar, as Figure 5-11 shows.

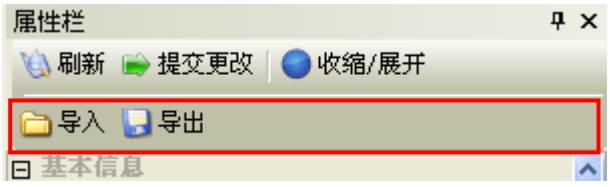


Figure 5-11: Import/export function

5.4.1 Save the Setting

We will demonstrate how to save the settings in this section.

Click the Export button, then a “Save as…” dialog box will pop up; users can select the directory they want for saving, and fill in the name of the file, then click the Save button to store the module configuration information in XML format.

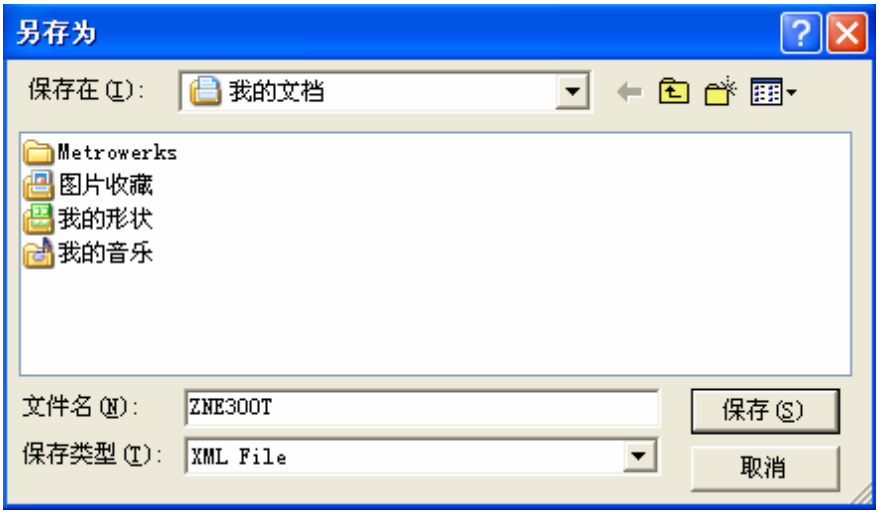


Figure 5-12: Saving configuration information

5.4.2 Recover Setting

We will demonstrate how to recover the factory settings in this section.

Click the Import button, then an “Open” dialog box will pop up; then select the saved configuration information file, and click the Open button, the ZNetCom software will import the settings save in the file.

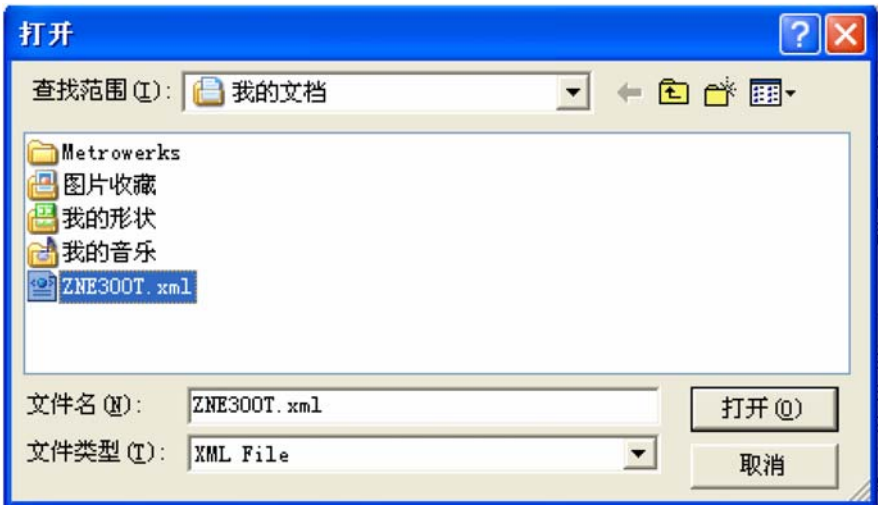


Figure 5-13: Open the configuration information file

5.5 Recover the Factory Setting

If there are some wrong modifications that cause the module unable to work properly, such as a wrong IP address, wrong subnet mask, or just a wrong password; user can recover the module to default factory settings. There are two methods for recovering: one is via software; the other is via hardware. Here we only provide the method of Software Recover.

5.5.1 Software Recover

- Firstly, choose the device need recovered in the device list of the ZNetCom software;
- Then click “Configuration” → “Recover factory setting”, and enter the MAC address of the device to the pop-up window;
- And then click the Recover button in this window, as Figure 5-14 shows.

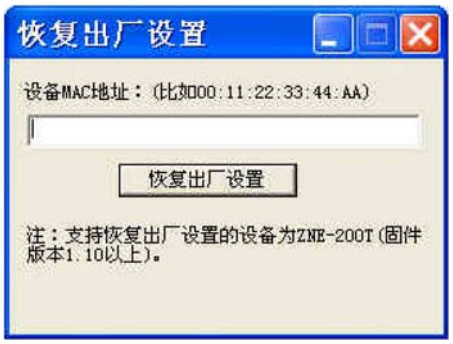


Figure 5-14: Recover the factory settings

5.5.2 Firmware Upgrading

User can also upgrade the firmware via ZNetCom software. For more information, please refer to the file “Firmware Upgrading.pdf” in the product CD or see Chapter 8.

Chapter 6: Hyper Terminal Configuration

6.1 Overview

Users can use a telnet tool to configure the settings of the IPort-1 device; using the telnet tool, user can configure the device through a menu program or AT commands. Actually, the Hyper Terminal program provided by Windows can complete all these configuration tasks well, so users don't need to install additional tools for it. The IPort-1 device provides two types of connection for its configurations: COM port configuration and TCP/IP configuration. And it provides two configuration modes for telnet tool configuration: the more convenient Menu mode, as Figure 6-1 shows; and the more directly AT command line mode, as Figure 6-2 shows.

Figure 6-1: Menu mode

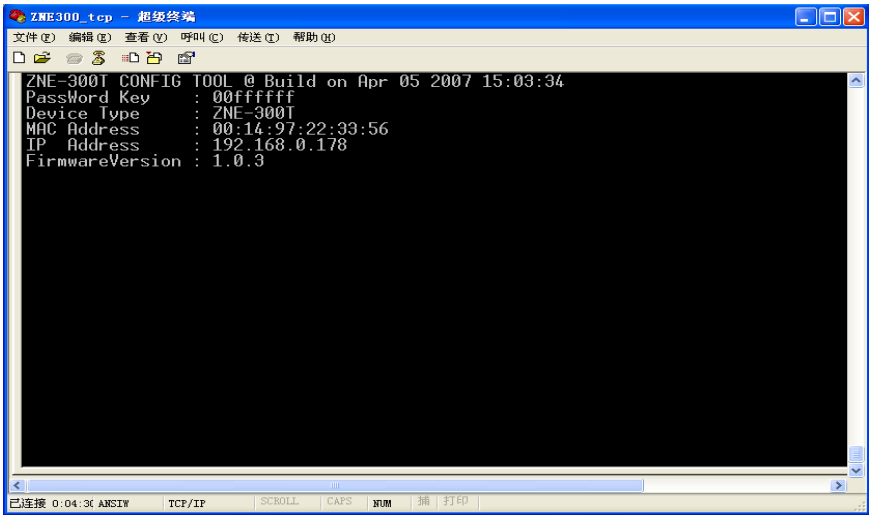


Figure 6-2: AT command line mode

The communication parameters for these two connections are listed as follow:

TCP/IP mode:

- IP: 192.168.0.178;
- PORT: 3003.

Notes: *The values of this "IP" and "PORT" are factory settings. If user has configured these parameters, please use the new values for connection.*

COM port mode:

The connection is established based on the user setting of the serial communication parameters, such as Baud rate, data bit, stop bit, parity bits, and etc. For example, if the default factory setting is used, the value of the parameters will be 19200-8-1-N .To enter COM port configuration mode, user should connect the COM_CFG pin to LOW voltage level.

Notes: *If user forgets the network parameters and cannot use the TCP/IP mode to connect the device for configuration, the COM port connection is a good solution, with it, user don't need to give up the current setting of the device and recover it back to default factory settings.*

Notes: *The COM_CFG pin should be LOW for at least 150ms to allow the device switch to serial port configuration mode, a High voltage on COM_CFG pin for over 150ms will bring it back to normal working mode.*

Figure 6-8 shows the operation interface of Menu mode, in which user can use different shortcut keys to check and modify all the module parameters. AT command mode provides a standard AT command interface for users, and it is mainly used for the configurations that controlled by embedded devices (such as MCU) or user software.

6.2 Menu Mode

Menu mode provides a simple, direct, convenient and easy-to-use configuration mode in the Windows Hyper Terminal software. Its operation interface is shown in Figure 6-8. User can use different shortcut keys to check and modify all the module parameters in this mode. Additionally, it is the default setting after the module is powered up. User can refer the 6.3.4.1 section for the detail information about the switch of the configuration mode (AT+MODE).

6.2.1 Usage of Menu Mode

6.2.1.1 New Connection

Enter Windows system, click the "All Programs" → "Accessories" → "Communication" → "Hyper Terminal", then give a name to the new connection (such as ZNE300_TCP) and select a relative icon, then click the OK button and further to configure the new connection.

Figure 6-3: New Connection

6.2.1.2 Select the Connection Mode

Choose the country code and the area code first; for the TCP/IP connection mode, please select TCP/IP (Winsock); in the serial connection mode, please select the PC serial port connected with the IPort-1 device serial port.

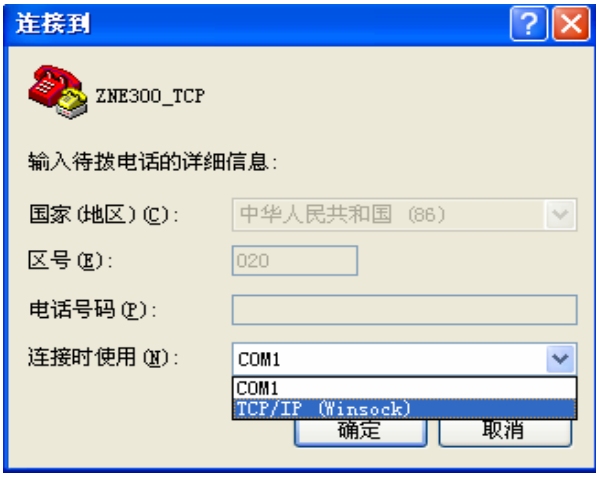


Figure 6-4: Choose connection mode

6.2.1.3 Connection Parameter Configuration

When using the TCP/IP connection mode, the IP address of the Host should be the same with the module IP (the factory setting is 192.168.0.178) and the port number should be the same with the command port number of the module (the factory setting is 3003), as Figure 6-5 shows.

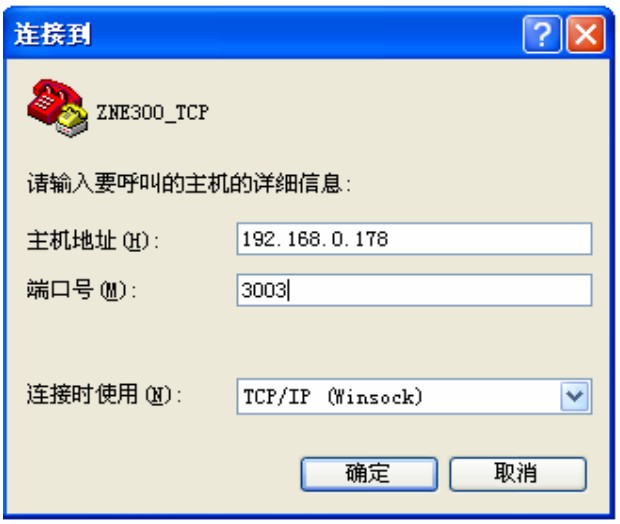


Figure 6-5: Setting of TCP/IP Connection Properties

When using serial port connection mode, the parameters (such as Baud rate, data bit, odd/even parity and so on) should be consistent with the current value of the module, and the data flow control should be set to “None”, as Figure 6-6 shows.

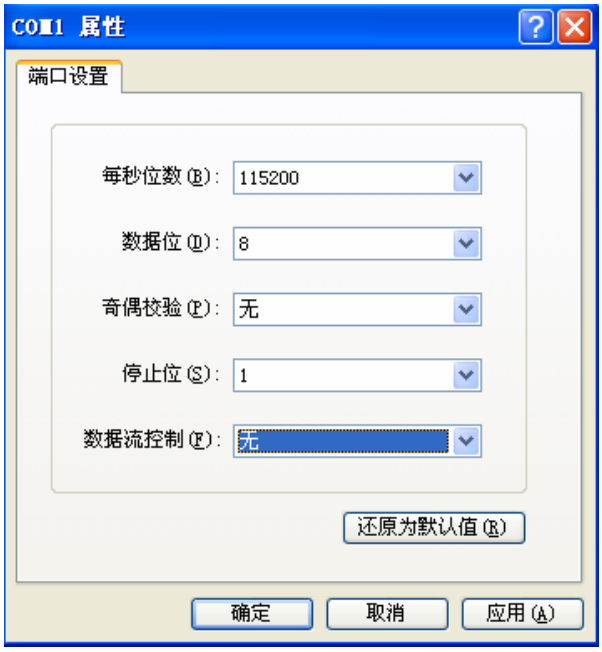


Figure 6-6: Setting of serial port properties

Notes: *Before using the serial connection mode, the COM_CFG pin of the device should be connected with low voltage level, or else the connection can not be successful.*

6.2.1.4 Enter Hyper Terminal Interface

If the correct connection is built up, an interface will appear, as Figure 6-7 shows. User can get the device information from it, such as the PassWordKey①, device type, MAC address, IP, firmware version and etc. After inputting the password (the factory setting is 88888) to the “PassWord” option, user can configure the device via the Menu mode.

Figure 6-7: The login interface of Menu mode

Notes: *PassWord Key①: If user forgets the password, please contact us and provide the value of the PassWord Key option in the login interface to acquire the password.*

6.2.2 Operation Interface

Figure 6-8 shows the operation interface of the Menu mode.

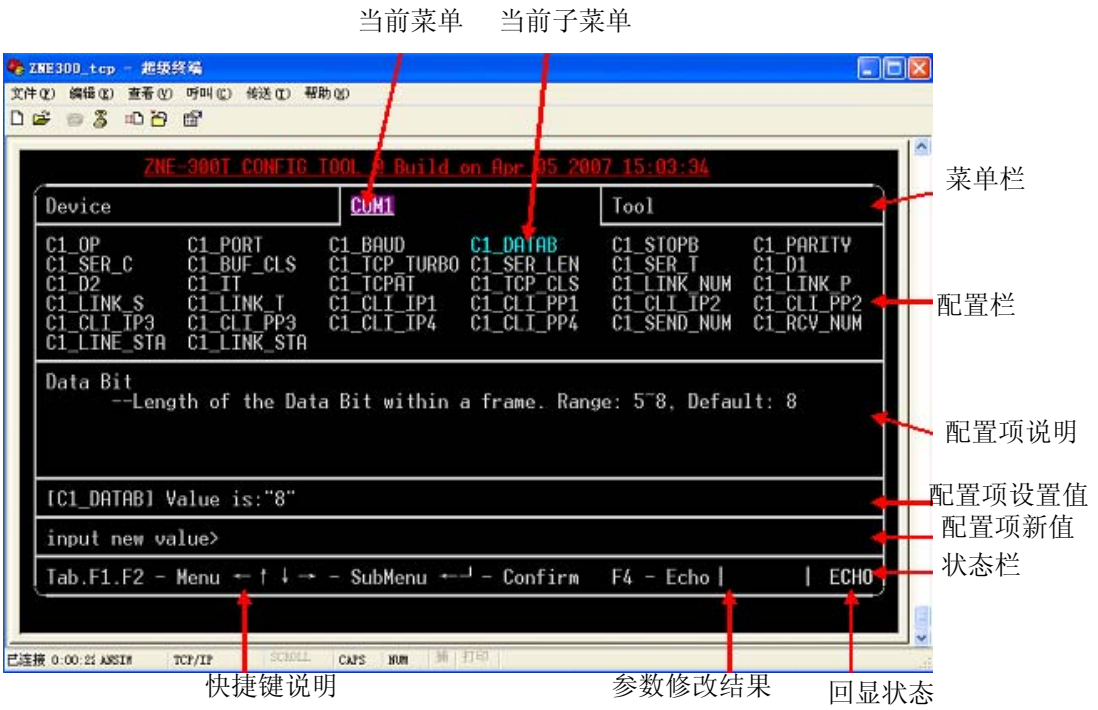


Figure 6-8: Operation interface of the Menu mode

- Menu Bar: contains the settings of the common information, serial port information, and etc.; the reversed color part of it indicates the current selected menu option. As Figure 6-8 shows, the current Menu on the figure is COM1, so all configuration items about COM1 will be listed out on the Configuration item lists.
- Configuration item lists: the configuration all items are corresponding to the

selected menu; the reversed color part of it indicates the current selected configuration item. As Figure 6-8 shows, the current selected item on the figure is "C1_DATAB", which represents the configuration of data bit for serial port 1; the name of the configuration option is corresponding to the AT command; please refer the specification of AT command for more detail information about the range and meaning of the parameters.

- Item specifications: the specification of the selected item.
- Current settings: the current setting value of the selected option.
- New value: new value input box of the selected item; input the value to this box, then press the Enter button, the value of the seleted parameter item is modified.
- Status Bar: contains the "Shortcut key specification", "Parameter modification result" and "Echo status", when the modification to the configuration option is successful, the "parameter modification result" will indicate "OK", or it will show "ERROR"; the current condition of the echo function is shown in "Echo condition" bar, when this function is on, the ECHO label is bright: ECHO, when the function is off, the label is dark: ECHO.

Notes: *Echo function: It indicates that the inputted value returned to the host (software) by the configured device. Because the Hyper Terminal software can not display the user inputted value, user needs to turn on the echo function when using Hyper Terminal software to configure the module. But when using the embedded device (such as MCU) or telnet mode to configure the module, user can turn off this function.*

6.2.3 Shortcut Keys

In Menu mode, the shortcut keys are available for the fast switching between the configuration options. Table 6-1 shows the valid shortcut keys and the relative functions.

Table 6-1: The shortcut Keys

Shortcut Keys	Function
Tab、F1、F2	Switch the menu
←、↑、↓、→	Switch the configuration option
Home	Refresh Screen
F4	Switch the Echo Condition
←┘	OK

6.3 AT Command Mode

AT command mode provides a standard AT command interface for users, and it is mainly used for the configurations that controlled by embedded devices (such as MCU) or user software.

6.3.1 Overview of AT Command

The AT command supported by IPort-1 device is a standard interfacing language. It does not require case match, but all of its commands should begin with "AT" and end with "\r\n". In other word, the format of the commands, return values and the descriptions of the parameters is fixed.

In general, there are 4 types of AT command:

- Command without Argument:
  It is a single command, and its format is "*AT+<command>\r\n*". E.g. the command for exiting the configuration mode is: *AT+EXIT\r\n*.
- Help Command:
  It is used to list out the possible parameters and the specification of a command; its format is "*AT+<command>=?/r/n*". E.g. *AT+NAME=?\r\n*.
- Check Command:
  It can check the current value of the setting, and its format is "*AT+<command>?\r\n*". E.g. *AT+NAME?\r\n*
- Command with Argument:
  This is the frequently used format, which provides more flexibilities. It is mainly used for parameter settings, and its format is "*AT+<command>=<par1>, <par2>, <par3>…\r\n*". E.g. *AT+IP=192.168.0.178\r\n*.
  When this format is used for the return value, there could be various situations. The detail information about all these return values will be given out in the section of AT command specification. No matter what return value, it complies with the format below.

\r\n<character string for acknowledge>\r\n<OK/ERROR>\r\n

"Error Information" and "OK Information" are two types of return value. And there are 6 types of "Error Information"; the detailed specifications are listed in Table 6-2.

Table 6-2: The return value of AT command

TYPE	CONDITION	RETURN VALUE
Error Information	Command does not begin with "AT".	\r\n0_Command Invalid\r\nERROR\r\n
	Not Login	\r\n1_No Login\r\nERROR\r\n
	Password is error, when using the "AT+LOGIN" command to login.	\r\n2_PassWord Error\r\nERROR\r\n
	Command does not exist.	\r\n0_Command Invalid\r\nERROR\r\n
	When setting the parameter, the type of the inputted parameter is wrong (such as a numeric value is required but user inputted a character value instead) or the value of the inputted parameter exceeds the specified range (for example, the value required should be less than 256 but the value inputted is bigger than 255).	\r\n3_Parameter Format Error\r\nERROR\r\n

TYPE	CONDITION	RETURN VALUE
	The number of the parameter inputted is less than expected.	\r\n4_Parameter Number Error\r\nERROR\r\n
	Trying to configure a read only parameter.	\r\n5_Parameter Read Only\r\n
Correct Information	Response to a check command, returns the current value of the parameter.	\r\n[<command>] Value is: "<value>"\r\nOK\r\n
	Reponse to a help command, returns the help information.	\r\n<Help Info>(1)\r\nOK\r\n

Notes: *<Help Info>:Contains the specifications on how to use the commands and the descriptions of the parameters; the value of it is different according to different commands.*

6.3.2 Enter the AT Command Mode

Run the menu configuration program within Hyper Terminal and switch to the "Tool" Menu, as Figure 6-9 shows.

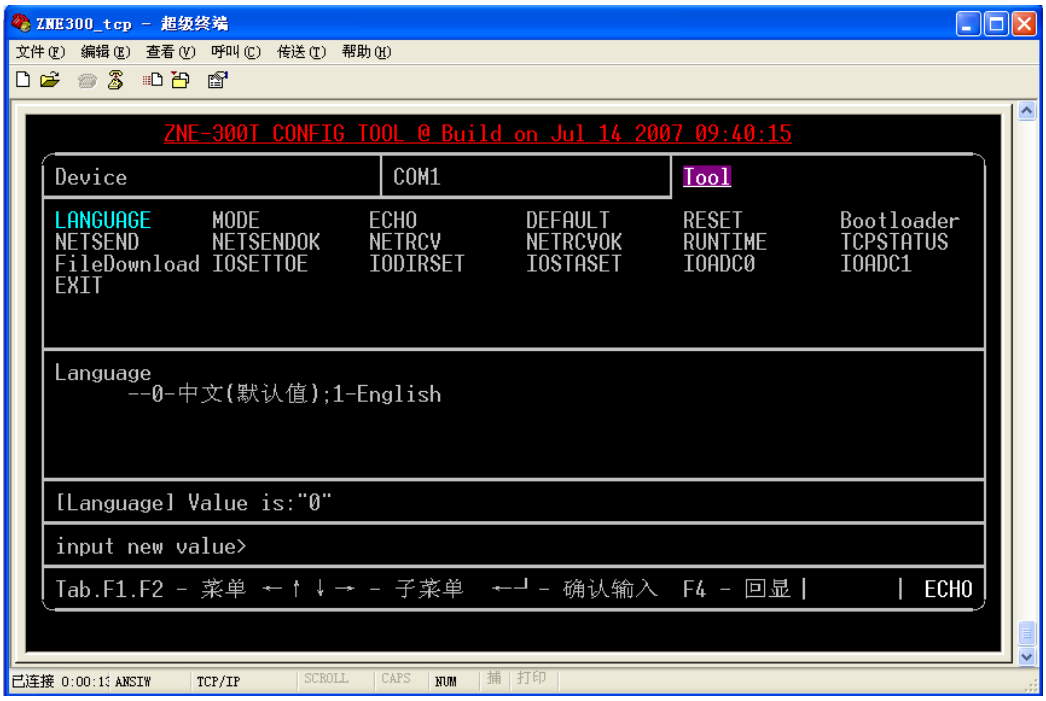


Figure 6-9: The Tool Menu

Then select the "MODE" option in the configuration bar, and input a "0" at the blank of the "input new value"> option; then press the Enter key to confirm the setting, as Figure 6-10 shows.

Figure 6-10: AT Command Mode configuration

Then, the device will enter the AT command mode, as Figure 6-11 shows.

Figure 6-11: AT Command Mode

6.3.3 Specification of AT Command

IPort-1 has 3 types of AT commands. They are control commands, device information configuration commands, and serial port information configuration commands, and the detailed specifications are listed in Table 6-3.

Table 6-3: AT command set

Command type	Function	Command	Read/ Write	Length (Bytes)	Values
Control Command	Configuration mode	MODE	RW	1	0: AT Command mode; 1: Menu mode
	Login	LOGIN	W	15	
	Exit	EXIT	W	0	
	Echo	ECHO	RW	1	0: Turn off; 1: Turn on.
	Language	LANGUAGE	RW	1	0: Chinese; 1: English.
	Command list	LIST	R	0	
	Recover to default values	DEFAULT	W	15	If this parameter is set to the "password", the module will restore the factory setting.
	Reset the device	RESET	W	15	If this parameter is set to the "password", the module will restart.
	Enter Bootloader state	BOOTLOADER	W	15	If this parameter is set to the "password", the module will enter the Bootloader state
	The total number of Ethernet packets to send	NETSEND	R	0	
	The number of packets that successfully sent to Ethernet	NETSENDOK	R	0	
	The total number of Ethernet packets received	NETRCV	R	0	
	The number of packets that successfully received from Ethernet	NETRCVOK	R	0	
	Run time	RUNTIME	R	0	The run time for the device (unit: second)
	TCP state	TCPSTATUS	RW		
	IO mode function reading	IOFUNCTIONRD	R	0	
	IO mode function setting	IOFUNCTIONWR	RW	2	Such as "00" or "01"

Command type	Function	Command	Read/ Write	Length (Bytes)	Values
	IO mode setting	IOSETTOE	R		Invalid
	IO direction	IODIRSET	R		Invalid
	IO level state	IOSTASET	R		Invalid
	ADC state	IOADC0/1	R		Invalid
Device Information Settings	Device type	TYPE	R	15	Such as “EXPORT”.
	Device name	NAME	RW	15	Such as “EXPORT”
	Password	PASS	RW	15	Such as “88888”.
	IP of host	IP	RW	15	Such as “192.168.0.178”.
	Subnet mask	MARK	RW	15	Such as “255.255.255.0”.
	Gateway	GATEWAY	RW	15	Such as “192.168.0.1”.
	DNS server	DNS	RW	15	Such as “192.168.0.1”.
	MAC address	MAC	R	17	Such as “00-14-97-0f-13-30”.
	Mode of IP acquisition	IP_MODE	RW	1	0: use DHCP protocol; 1: static acquisition (default).
	Webpage port	WEB_PORT	RW	5	Such as “80”.
	Command port	CMD_PORT	RW	5	Such as “3003”.
	IP filter option 1	IPF1	RW	31	Such as “192.168.0.1-255.255.255.0”.
	IP filter option 2	IPF2	RW	31	Such as “192.168.0.1-255.255.255.0”.
	IP filter option 3	IPF3	RW	31	Such as “192.168.0.1-255.255.255.0”.
	IP filter option 4	IPF4	RW	31	Such as “192.168.0.1-255.255.255.0”.
	IP filter option 5	IPF5	RW	31	Such as “192.168.0.1-255.255.255.0”.
	IP filter option 6	IPF6	RW	31	Such as “192.168.0.1-255.255.255.0”.
	IP filter option 7	IPF7	RW	31	Such as “192.168.0.1-255.255.255.0”.
	IP filter option 8	IPF8	RW	31	Such as “192.168.0.1-255.255.255.0”.
Serial Port Information Configuration	Working mode	C1_OP	RW	1	0: TCP SERVER (default); 1: TCP CLIENT; 2: REAL COM; 3: UDP; 4: DISABLE.
	Working port	C1_PORT	RW	5	Such as “4001”
	Baud rate	C1_BAUD	RW	6	300~230400
	Data bit	C1_DATAB	RW	1	5~8
	Stop bit	C1_STOPB	RW	1	1~2

Command type	Function	Command	Read/ Write	Length (Bytes)	Values
	Parity bit	C1_PARITY	RW	1	0:NONE (default); 1: EVEN; 2: ODD; 3: FORCE TO 0; 4: FORCE TO 1.
	Serial flow control	C1_SER_C	RW	1	0: NONE (default); 1: RTS/CTS; 2: DTR/DSR; 3: Xon/Xoff.
	Clear COM BUFFER	C1_BUF_CLS	RW	1	0: Data in the serial BUFFER will not be cleared after a connection (default); 1: Data in the serial BUFFER is cleared after a connection.
	TURBO	C1_TCP_TURBO	RW	1	0: Turn off (default); 1: Turn on.
	Length of frame in continuous receiving	C1_SER_LEN	RW	4	0~1478，when it reach 0, this function will be turned off.
	Interval of serial frame	C1_SER_T	RW	4	0,2~9999, (Unit: millisecond)
	Starting byte of a frame (HEX)	C1_D1	RW	4	Hexadecimal number, such as “0x0f:
	Ending byte of a frame (HEX)	C1_D2	RW	4	Hexadecimal number, such as “0x0f.
	Duration for overtime disconnection	C1_IT	RW	5	0~60000, (Unit: 10ms).
	Period for heart beat checking	C1_TCPAT	RW	5	0~60000，(Unit: second).
	TCP disconnection	C1_TCP_CLS	RW	1	0: The TCP connection is remained after the physical connection is broken (default); 1: The TCP connection is broken after disconnecting the physical connection.
	Number of TCP connections	C1_LINK_N	RW	1	1~4
	Password checking	C1_LINK_P	RW	1	0: No password checking after a TCP connection is built up. (default); 1: Check the Password after a TCP connection is built up.

Command type	Function	Command	Read/ Write	Length (Bytes)	Values
	Sending message after connection	C1_LINK_S	RW	1	0: No message sending after a TCP connection is built up (default); 1: Send the name of the device after a connection; 2: Send the IP address of the device after a connection.
	Connection condition	C1_LINK_T	RW	1	0: Build up a connection once power up (default); 1: Build up the connection while data is received; 2: Build up the connection when the state of the DSR pin changes.
	Destination port 1	C1_CLI_PP1	RW	5	Such as “4001”.
	Destination port 2	C1_CLI_PP2	RW	5	Such as “4001”.
	Destination port 3	C1_CLI_PP3	RW	5	Such as “4001”.
	Destination port 4	C1_CLI_PP4	RW	5	Such as “4001”.
	Destination IP 1	C1_CLI_IP1	RW	40	IP address, IP segment or domain name, such as “192.168.0.1” or “192.168.0.1-192.168.0.10” or “www.Embedcontrol.Com”.
	Destination IP 2	C1_CLI_IP2	RW	40	The same as above.
	Destination IP 3	C1_CLI_IP3	RW	40	The same as above.
	Destination IP 4	C1_CLI_IP4	RW	40	The same as above.
	Number of bytes sent to the serial port	C1_SEND_NUM	R	0	Decimal number, 0~ 4294967295.
	Number of bytes received from the serial port	C1_RCV_NUM	R	0	Decimal number, 0~ 4294967295.
	State of serial line	C1_LINE_STA	R	0	Invalid
	Connection state	C1_LINK_STA	R		

Notes: *To make the new settings effective, the IPort-1device must be restarted.*

6.3.4 Control Commands

6.3.4.1 Configuration Mode (AT+MODE)

Command String	Return Value & Parameters Specifications	Function
AT+MODE=<*mode*>		Mode setting
	Parameter specification: <*mode*>: 0 for AT Command configuration mode; 1 for Menu configuration mode.	

In Hyper Terminal Configuration Mode, IPort-1 supports two kinds of configurations: Menu configuration and AT Command configuration.

The command described here is used to set the configuration mode. Before using AT Command mode to configure the IPort-1 device, user should send a command "*AT+MODE=0\r\n*" to switch it to AT Command configuration mode.

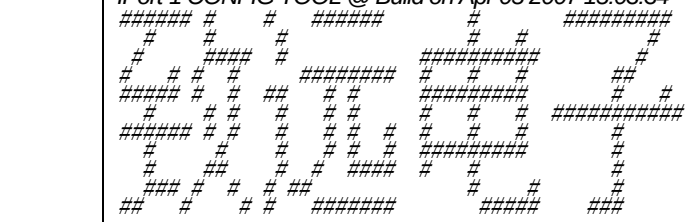
Notes: *This command is usable under any mode of the IPort-1 device; while other commands are only available for AT Command configuration mode.*

6.3.4.2 Check State (AT)

Command String	Return Value & Parameters Specifications	Function
AT	Already login: can configure the parameters *\r\nOK\r\n* Not login: can not configure the parameters *\r\nERROR\r\n*	Check state

This command is used to check whether the configuration of the parameters can be performed. If "*\r\nOK\r\n*" is returned, it indicates that user can configure the parameters; If "*\r\nERROR\r\n*" is returned, it means that user did not login the device, to configure the parameters, user needs to login the device first; if other data is returned, it means that the device has not entered the AT Command mode, user should send a command "*AT+MODE*" command to switch to AT Command mode first (please refer to Section 6.3.4.1).

6.3.4.3 Login (AT+LOGIN)

Command String	Return Value & Parameters Specifications	Function
AT+LOGIN=<*pass*>	If not login, but the password is correct: *IPort-1 CONFIG TOOL @ Build on Apr 05 2007 15:03:34*  *Zhiyuan Electronics CO., LTD.* *Web:www.embedcontrol.com* *Email:Ethernet.support@embedcontrol.com* *Tel:020-22644385* *OK* If not login, or the password is error: *\r\n1_Password Error\r\nERROR\r\n* Login: *\r\nOK\r\n*	Login
	Parameters specification: <*pass*>: ASCII code character string, the maximum length of it is 15 bytes and the part over this length will be ignored.	

In order to prevent accidental modification to the IPort-1 parameters, user is required to send this command to login the device first before doing any configurations.

6.3.4.4 Exit Configuration (AT+EXIT)

Command String	Return Value & Parameters Specifications	Function
AT+EXIT	\r\nOK\r\n	Exit the configuration mode

To finish the configuration, user should use this command to exit the configuration mode; and if the TCP connection is used for the configuraiton, IPort-1 will also disconnect it automatically.

Notes: *Under configuration mode, if user has already logged on the device, but does not input a thing over a duration of 120 seconds, the IPort-1 will log out the device automatically; also, if the device was not logged on, and has been left over 120 seconds without any input, the IPort-1 will quit the configuration mode automatically.*

6.3.4.5 Echo (AT+ECHO)

Command String	Return Value & Parameters Specifications	Function
AT+ECHO?	\r\n[ECHO] Value is: "*1*"\r\nOK\r\n	Read the current value
AT+ECHO=<*echo*>	\r\nOK\r\n or \r\n<*Error Info*>①\r\nERROR\r\n	Set new value
	Parameters specification: <*echo*>:0 for Off;1 for On.	

Echo means that the IPort-1 will return the original inputted value back to the PC for verification. When using the Hyper Terminal software to configure the device, since the software can not display the user inputted value, therefore user need to turn on the echo function. But when using the embedded device (such as MCU) or telnet mode to configure the IPort-1, the Echo function could be a kind of trouble, so, user should turn it off in these situations.

Notes: *<Error Info>①: Different value will be returned according to different types of error, please refer to Table 6-2. The "<Error Info>" in the return value specifications of the following sections have the same meaning with here.*

6.3.4.6 Language (AT+LANGUAGE)

Command String	Return Value & Parameters Specifications	Function
AT+LANGUAGE?	r\n[LANGUAGE] Value is: "*0*" r\nOK\r\n	Read the current value
AT+LANGUAGE=*<lang>*	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specification: *<lang>*: 0 for Chinese; 1 for English.	

This command can get or set the language of the user interface options. IPort-1 supports Chinese and English.

6.3.4.7 Command List (AT+LIST)

Command String	Return Value & Parameters Specifications	Function
AT+LIST?	\r\n<The supported command list, a TAB is used between two commands> \r\nOK\r\n	Read the current value

User can use this command to check all the AT commands supported by the module, as Figure 6-12 shows.

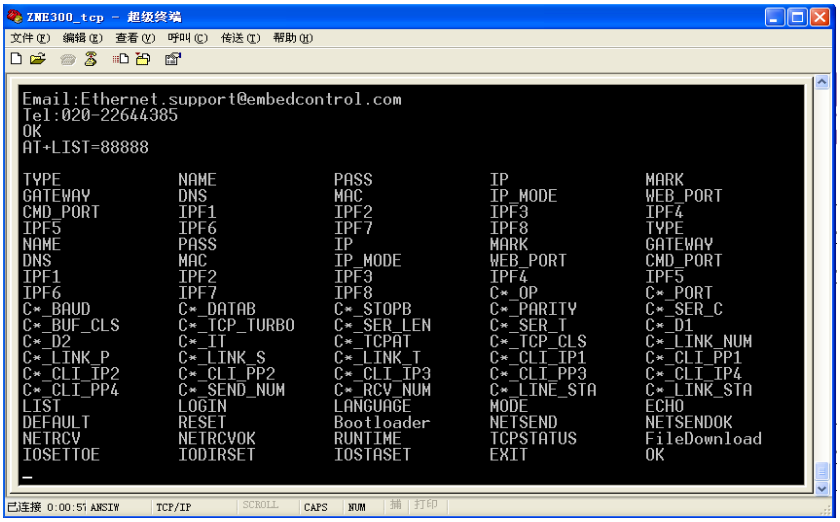


Figure 6-12: Command "AT+LIST"

6.3.4.8 Restore Default Setting (AT+DEFAULT)

Command String	Return Value & Parameters Specifications	Function
AT+DEFAULT =*<pass>*	\r\nOK\r\n or \r\n 2_PassWord Error \r\nERROR\r\n	Restore the factory settings
	Parameters specification: *<pass>*: Password.	

If this command is successfully executed, the IPort-1 device will reset.

6.3.4.9 Reset Device (AT+RESET)

Command String	Return Value & Parameters Specifications	Function
AT+ RESET=*<pass>*	\r\nOK\r\n or \r\n 2_PassWord Error \r\nERROR\r\n	Reset the device
	Parameters specification: *<pass>*: Password.	

6.3.4.10 Enter BootLoader (AT+BOOTLOADER)

Command String	Return Value & Parameters Specifications	Function
AT+BOOTLOADER=*<pass>*	\r\nOK\r\n or \r\n 2_PassWord Error \r\nERROR\r\n	Enter BootLoader
	Parameters specifications: *<pass>*: Password.	

The execution of this command will cause the IPort-1 device reset.

Notes: *After entering the BootLoader mode, other functions of IPort-1 will not be available, so user should not enter this mode if not for firmware upgrading.*

6.3.4.11 Packet Number of Network Sending (AT+NETSEND)

Command String	Return Value & Parameters Specifications	Function
AT+NETSEND?	\r\n[NETSEND] Value is: "*10*"\r\nOK\r\n	Read the current value

This command can get the packet number of network sending. Its range is between 0 and 4294967295.

6.3.4.12 Packet Number of Successful Network Sending (AT+NETSENDOK)

Command String	Return Value & Parameters Specifications	Function
AT+NETSENDOK?	\r\n[NETSENDOK] Value is: "*10*"\r\nOK\r\n	Read the current value

This command can get the packet number of successful network sending. Its range is between 0 and 4294967295.

6.3.4.13 Packet Number of Network Receiving (AT+NETRCV)

Command String	Return Value & Parameters Specifications	Function
AT+NETRCV?	\r\n[NETRCV] Value is: "*10*"\r\nOK\r\n	Read the current value

This command can get the packet number of network receiving. Its range is between 0 and 4294967295.

6.3.4.14 Packet Number of Successful Network Receiving (AT+NETRCVOK)

Command String	Return Value & Parameters Specifications	Function
AT+NETRCVOK?	\r\n[NETRCVOK] Value is: "*10*"\r\nOK\r\n	Read the current value

This command can get the packet number of successful network receiving. Its range is between 0 and 4294967295.

6.3.4.15 Run time (AT+RUNTIME)

Command String	Return Value & Parameters Specifications	Function
AT+RUNTIME?	\r\n[RUNTIME] Value is: "*10*"\r\nOK\r\n	Read the current value

This command can get the run time of the IPort-1 (Unit: second).

6.3.4.16 Connection State of TCP (AT+TCPSTATUS)

Command String	Return Value & Parameters Specifications	Function
AT+TCPSTATUS?	**\r\n[TCPSTATUS] Value is: "LinkNum: 0 Status: LISTEN; LinkNum:1 Status: LISTEN; LinkNum:2 Status: LISTEN; LinkNum:3 Status: LISTEN; LinkNum:4 Status: LISTEN; LinkNum:5 Status :LISTEN; LinkNum:6 Status: LISTEN; "\r\nOK\r\n**	**Check the connection state**
AT+ TCPSTATUS = INFO+*<linknum>*	**\r\n[TCPSTATUS] Value is: "Num: <linknum> Status: LISTEN LocalPort: 4001 RemoteIP: 0.0.0.0 Port: 0"\r\nOK\r\n** **Parameters specifications:** ***<linknum>*: connection number**	**Check the detailed information about the connection**
AT+ TCPSTATUS = CLOSE+*<linknum>*	**<linknum> if it is valid: \r\nOK\r\n** ***<linknum>* if it is invalid: \r\n3_Parameter Format Error\r\nERROR\r\n** **Parameters specifications:** ***<linknum>*: connection number**	**Disconnect**

6.3.5 Information Configuration Commands

This kind of commands is used to set the general parameters of IPort-1.

6.3.5.1 Device Type (AT+TYPE)

Command String	Return Value & Parameters Specifications	Function
AT+TYPE?	\r\n[NAME] Value is: "IPort-1"\r\nOK\r\n	Read the current value

The "TYPE" within the command should be an ASCII code character string, and the effective length of it is 15 bytes (this value is set by the manufacturer, user can not change it).

6.3.5.2 Device Name (AT+NAME)

Command String	Return Value & Parameters Specifications	Function
AT+NAME?	\r\n[NAME] Value is: "IPort-1"\r\nOK\r\n	Read the current value
AT+NAME=<*str*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*str*>: ASCII code character string, the maximum length of data is 15 bytes and the part over this length will be ignored.	

The "NAME" within the command should be an ASCII code character string, and its valid data length is 15 bytes. User can identify a number of devices which are the same type by modifying this parameter.

6.3.5.3 Password (AT+PASS)

Command String	Return Value & Parameters Specifications	Function
AT+PASS?	\r\n[PASS] Value is: "*88888*"\r\nOK\r\n	Read the current value
AT+PASS=<*pass*>	\r\nOK\r\n	Set the new value
	Parameters specifications: <*pass*>: ASCII code character string, the maximum length of data is 15 bytes and the part over this length will be ignored.	

To prevent inadvertent changes of the IPort-1 parameters, before any modification to the property of device, user is required to input the password first (for AT command configuration mode. There are two ways to login the device; first is to use AT+LOGIN command (please refer to the 6.3.4.3 section for more detailed information); the second way is input the password in menu mode, as Figure 6-7 shows. The password should be an ASCII code character string, the valid data length is 15 bytes (default setting is "88888").

6.3.5.4 Device IP (AT+IP)

Command String	Return Value & Parameters Specifications	Function
AT+IP?	\r\n[IP] Value is: "192.168.0.178"\r\nOK\r\n	Read the current value
AT+IP=<*ip*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*ip*>: decimal number separated by dots, such as 192.168.0.178, but xx.xx.xx.0 and xx.xx.xx.255 is reserved (which means that 0 and 255 should not appear at the last segment of the IP).	

6.3.5.5 Subnet Mask (AT+MARK)

Command String	Return Value & Parameters Specifications	Function
AT+MARK?	\r\n[MARK] Value is: "*255.255.255.0*"\r\nOK\r\n	Read the current value
AT+MARK=*<mask>*	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: *<mask>*: decimal number separated by dots, such as 255.255.255.0.	

6.3.5.6 Gateway IP (AT+GATEWAY)

Command String	Return Value & Parameters Specifications	Function
AT+GATEWAY?	\r\n[GATEWAY] Value is: "192.168.0.1"\r\nOK\r\n	Read the current value
AT+GATEWAY=*<gate>*	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: *<gate>*: decimal number separated by dots, such as 192.168.0.178, but xx.xx.xx.0 and xx.xx.xx.255 is reserved (which means that 0 and 255 should not appear at the last segment of the IP).	

6.3.5.7 DNS Server IP (AT+DNS)

Command String	Return Value & Parameters Specifications	Function
AT+DNS?	\r\n[DNS] Value is: "*192.168.0.1*"\r\nOK\r\n	Read the current value
AT+DNS=*<ip>*	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: *<ip>*: decimal number separated by dots, such as 192.168.0.1, but xx.xx.xx.0 and xx.xx.xx.255 is reserved (which means that 0 and 255 should not appear at the last segment of the IP).	

6.3.5.8 MAC Address (AT+MAC)

Command String	Return Value & Parameters Specifications	Function
AT+MAC?	\r\n[MAC] Value is: "*00.14.97.0f.13.30*"\r\nOK\r\n	Read the current value

This is the physical address of IPort-1 device, so user can not change it.

6.3.5.9 IP Acquisition Mode (AT+IP_MODE)

Command String	Return Value & Parameters Specifications	Function
AT+IP_MODE?	\r\n[IP_MODE] Value is: "*1*"\r\nOK\r\n	Read the current value
AT+IP_MODE=*<mode>*	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: *<mode>*: 0 for Dynamic Acquisition; 1 for Static Acquisition (default setting).	

This command can find out or specify which mode is used to acquire the IP address of the module. Two options are available for IP acquisition: Static mode or Dynamic mode.

Static Acquisition mode means that user should specify the "IP Addr", "Mask", and "Gateway" parameters for the IPort-1 device.

Dynamic acquisition mode means that IPort-1 device will automatically acquire the information about the IP address, subnet mask and gateway that assigned by DHCP server on a network through DHCP protocol.

Notes: *Only when a DHCP server exists on the network, can user use the dynamic acquisition mode to get the parameters automatically.*

6.3.5.10 Webpage Configuration Port (AT+WEB_PORT)

Command String	Return Value & Parameters Specifications	Function
AT+WEB_PORT?	\r\n[WEB_PORT] Value is: "*80*"\r\nOK\r\n	Read the current value
AT+WEB_PORT=*<port>*	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: *<port>*:1~65534, except the port numbers which are occupied by other network protocols. For more details, please refer to the appendix.	

This is the connection port for the device parameters configuration when using IE browser; and the default setting is "80".

6.3.5.11 Command Configuration Port (AT+CMD_PORT)

Command String	Return Value & Parameters Specifications	Function
AT+CMD_PORT?	\r\n[CMD_PORT] Value is: "*3003*"\r\nOK\r\n	Read the current value
AT+CMD_PORT=*<port>*	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: *<port>*:1~65534, except the port numbers that occupied by other network protocols. For more details, please refer to the appendix.	

When Hyper Terminal or Telnet tool is using the TCP/IP connection mode to configure the IPort-1 device, this command can specify or check the port number that adopted to establish the connection with device, and its default value is "3003" .

Notes: *The new settings will not be valid until user resets the IPort-1 device.*

6.3.5.12 IP Filter Option (AT+IPFn)

Command String	Return Value & Parameters Specifications	Function
AT+IPFn?	If it is valid: \r\n[IPFn] Value is: "*192.168.0.0-255.255.255.0*"\r\nOK\r\n If it is invalid: \r\n[IPFn] Value is: "*invalid*"\r\nOK\r\n	Read the current value
AT+IPFn=<*ipf*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*ipf*>:1) fill in decimal number separated by dots, such as 192.168.0.0`~255.255.255.0, the former part of which is IP address and the later part are Mask codes; 2) fill in a 0 only, it indicates that turn off this option.	

The IP Filter Option is used to limit the IP addresses which can be used for the communication of the module. 8 items are used to describe a single IP filter option, the former 4 items are the 4 segments of IP address; and the later 4 items are the 4 segments of Mask code. When the IP Filter Option is valid and the Destination IP & Mask code == Network address, the data transmission is allowed to be executed; but if the IP Filter Option is invalid, all the IP addresses are free for communication without being filtered.

There are 8 IP filter options in total (the "n" within the command string within the description of the command represents the IP filter number, it should be replace by numbers from "1" to "8"). The IP address which matches any one of the filler options is allowed to communicate with the IPort-1 device. The example of IP filter options setting is listed in Table 6-4.

Table 6-4: Example of IP filter options setting

The Allowed IP Address	Setting Value
All the IP are allowed	0
192.168.1.127	192.168.1.127-255.255.255.255
192.168.1.1~192.168.1.254	192.168.1.0-255.255.255.0
192.168.0.1~192.168.255.254	192.168.0.0-255.255.0.0

Notes: *If user wants to allow all the IP addresses to communicate with IPort-1, user should disable (set it to an invalid value or 0) all the IP filter options (IPF1~IPF8).*

6.3.6 Serial Configuration Commands

This kind of commands is used to check or configure the operation parameters of each serial port. For example, "*AT+CI_OP=0\r\n*" indicates the operation mode of the serial port 1 is set to "0" (TCP Server mode).

6.3.6.1 Operation Mode (AT+ C1_OP)

Command String	Return Value & Parameters Specifications	Function
AT+C1_OP?	\r\n[C1_OP] Value is: "*0*"\r\nOK\r\n	Read the current value
AT+ C1_OP=<*op*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*op*>: 0 for TCP Server; 1 for TCP CLIENT; 2 for REAL COM; 3 for UDP; 4 for DISABLE.	

This command can check or set the operation mode. IPort-1 device supports 4 different operation modes (see Chapter 3 for more detailed information).

6.3.6.2 Working Port (AT+ C1_PORT)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_PORT?	\r\n[C1_PORT] Value is: "*4001*"\r\nOK\r\n	Read the current value
AT+ C1_PORT=<*port*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*port*>:1~65534, except the port numbers occupied by other network protocols. For more details, please refer to the appendix.	

This command can check or set the working port number. In TCP Server mode or UDP mode, user device can communication with IPort-1 device via the working port.

6.3.6.3 Baud Rate (AT+ C1_BAUD)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_BAUD?	\r\n[C1_BAUD] Value is: "*19200*"\r\nOK\r\n	Read the current value
AT+ C1_BAUD=<*Baud*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*Baud*>:300~230400, the standard Baud rate values should be used here, as Table 6-5 shows.	

The serial Baud Rate is controlled by this command. User should use the standard Baud Rate in here. The standard Baud rate is listed in Table 6-5.

Table 6-5: The standard Baud Rate supported by IPort-1

Baud Rate (bps)										
300	600	1200	2400	4800	9600	19200	38400	57600	115200	230400

6.3.6.4 Data Bit (AT+ C1_DATAB)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_DATAB?	\r\n[C1_DATAB] Value is: "*8*"\r\nOK\r\n	Read the current value
AT+C1_DATAB=<*datab*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*datab*>:5~8.	

The valid length of the serial data bit is selectable from 5 to 8 bits.

6.3.6.5 Stop Bit (AT+ C1_STOPB)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_STOPB?	\r\n[C1_STOPB] Value is: "1"\r\nOK\r\n	Read the current value
AT+ C1_STOPB=<*stopb*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*stopb*>:1~2.	

The valid length of the serial stop bit is selectable between 1 and 2 bits.

6.3.6.6 Parity Bit (AT+ C1_PARITY)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_PARITY?	\r\n[C1_PARITY] Value is: "*0*"\r\nOK\r\n	Read the current value
AT+C1_PARITY=<*parity*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*parity*>: 0 for NONE (default); 1 for even parity (EVEN); 2 for odd parity (ODD); 3 for Force to 0. (SPACE); 4 for Force to 1. (MARK).	

This command can set the serial parity mode. There are 5 modes selectable: ODD, EVEN, Force to 0, Force to 1 and NONE (default).

6.3.6.7 Clear COM BUFFER (AT+ C1_BUF_CLS)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_BUF_CLS?	\r\n[C1_BUF_CLS] Value is: "0"\r\nOK\r\n	Read the current value
AT+ C1_BUF_CLS=<*cls*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*cls*>: 1 for clear the buffer after establishing the connection; 0 for not clear the buffer after building up the connection.	

When using TCP protocol for communication, user should build up the connection before communicating with IPort-1. However, in some case, IPort-1 may still have some data in its buffer before the connection is established. This command is used to determine whether to clear the data in serial BUFFER after a connection.

6.3.6.8 TCP TURBO (AT+ C1_TCP_TURBO)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_TCP_TURBO?	\r\n[C1_BUF_CLS] Value is: "*0*"\r\nOK\r\n	Read the current value
AT+C1_TCP_TURBO=<*turbo*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*turbo*>: 0 for Off (default); 1 for On.	

This command is used to achieve the high speed transmission from Serial to Ethernet in TCP mode.

With the "TCP Turbo" function enabled, the data from Serial port to Ethernet will be handled in higher priority. Also, the module can deal with the delay (several hundreds of milliseconds usually) on TCP packet sending that caused by Windows in a skillful way; so that the high speed serial to Ethernet transmission can still be achieved even without the data transmission from Ethernet to Serial.

6.3.6.9 Length of Packet (AT+ C1_SER_LEN)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_SER_LEN?	\r\n[C1_SER_LEN] Value is: "*500*"\r\nOK\r\n	Read the current value
AT+ C1_SER_LEN=<*len*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*len*>: 0~2000; "0" means disable this function.	

The length of packet is one of the serial frame packet divding conditions. When the serial port continually receives data, once the length of the received data reaches the values specified by "length of packet", the data will be packed to one data packet and sent to Ethernet. Please refer to ***The Framing Rule of Serial Data*** for more detailed information.

6.3.6.10 Time Interval between Serial Data Frames (AT+ C1_SER_T)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_SER_T?	\r\n[C1_SER_T] Value is: "*50*"\r\nOK\r\n	Read the current value
AT+ C1_SER_T=<*len*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*len*>: 0~5000 (unit: ms), "0" means disable this function.	

The "time interval between serial data frames" is one of the serial frame packet dividing conditions. If there is no new data received after a duration of time, which is specified by this parameter, all previous received data will be sent in one data packet. Please refer to ***The Framing Rule of Serial Data*** for more detailed information.

6.3.6.11 Frame Start Byte (AT+ C1_D1)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_D1?	If it is valid: \r\n[C1_D1] Value is: "*0x05*"\r\nOK\r\n If it is invalid: \r\n[C1_D1] Value is: "invalid"\r\nOK\r\n	Read the current value
AT+ C1_D1=<*char*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*char*>: 1) Fill in a string that represents HEX values: 0x00~0xFF, this string specifies the valid start byte; 2) Fill in a string: "invalid", which means that the start byte is not used.	

The frame start byte is one of the serial frame packet dividing conditions. Please refer to ***The Framing Rule of Serial Data*** for more detailed information.

6.3.6.12 Frame Stop Byte (AT+ C1_D2)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_D2?	If is it valid: \r\n[C1_D2] Value is: "*0x05*"\r\nOK\r\n If it is invalid: \r\n[C1_D2] Value is: "*invalid*"\r\nOK\r\n	Read the current value
AT+ C1_D2=<*char*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*char*>: 1) Fill in a string that represents HEX values: 0x00~0xFF, this string specifies the valid stop byte; 2) Fill in a string: "invalid", which means that the stop byte is not used.	

The frame stop byte is one of the serial frame packet dividing conditions. Please refer to ***The Framing Rule of Serial Data*** for more detailed information.

The Framing Rule of Serial Data

If both Frame Start Byte and Frame Stop Byte are not specified, the packets are divided based on the "Time Interval between Serial Data Frames" and the "Length of Frame". In this case, when the serial port has not received any data in two successive frame intervals, or the length of the received data has reached the "Length of Frame", IPort-1 device will pack all the previous received data into one data packet and send it to Ethernet.

If only one condition is specified, Start Byte or Stop Byte, then the device will divide the received data based on the specified condition and the time interval between serial frames.

If both conditions are specified, packets are divided based on Start byte and Stop byte conditions only, data between start byte and stop byte will be put into a packet, but data before the Start byte and data after the Stop byte will be discard.

Let's take the Serial Data Flow shown in Figure 6-13 as an example to illustrate the packing strategy in details:

Figure 6-13: Serial Data Flow

1. **Both Frame Start Byte and Frame Stop Byte are invalid**

   As Figure 6-14 shows, the serial data flow is divided to 2 TCP/IP packets (TCP packets for TCP Server and Client mode, UDP packets for UDP mode) under this condition.

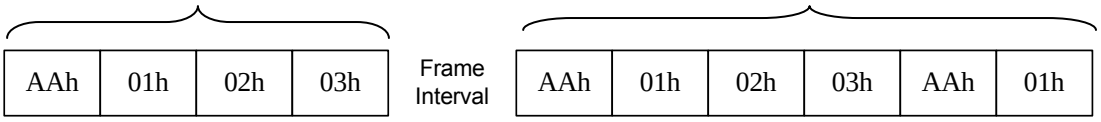


Figure 6-14: Packet dividing when both conditions are not specified

2. **Only one condition is specified, Start byte or Stop byte**

   Packets are divided based on the valid byte, Start byte or Stop byte, and time intervals between serial data frames. Assume that the Frame Start Byte is "01h", and Stop Byte is invalid; then the serial data flow will be divided to 5 TCP/IP packets under this condition.

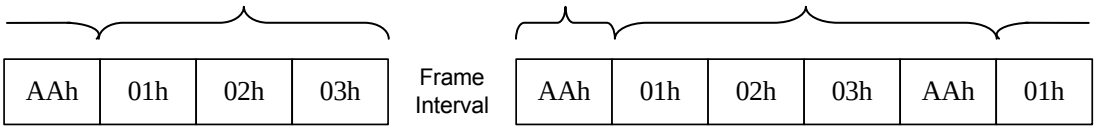


Figure 6-15: Packet dividing with only a Start Byte "01h"

Then assume that the Frame Stop Byte is "01h", and Start Byte is invalid; then the serial data flow will be divided to 4 TCP/IP packets under this condition.

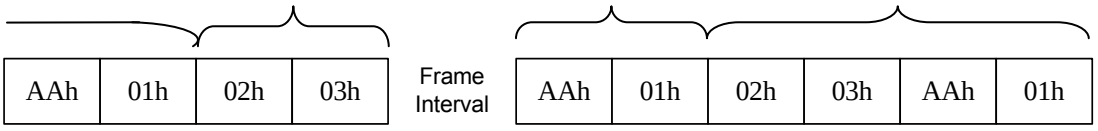


Figure 6-16: Packet dividing with only a Stop Byte "01h"

3. **Both Start Byte and Stop Byte are specified**

   Packets are divided based on Start byte and Stop byte conditions only, data between start byte and stop byte will be put into a packet, but data before the Start byte and data after the Stop byte will be discard. Assume that the Frame Start Byte is "01h", and Stop byte is "AAh"; then the serial data flow will be divided to 2 TCP/IP packets under this condition.

Since the last byte of the data flow is 01h, which is a Start byte, but no Stop byte (AAh) follows, so it will not be count in as a packet.

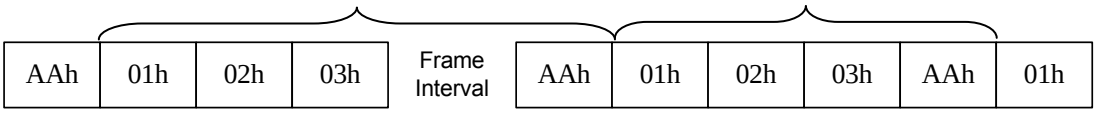


Figure 6-17: Packet dividing with both Start Byte "01h" and Stop Byte "AAh"

Assume that the Frame Start Byte is "01h", and Stop byte is "03h"; then the serial data flow will be divided to 2 TCP/IP packets under this condition. Data between 01h and 03h creates a packet, but all other data is discarded.

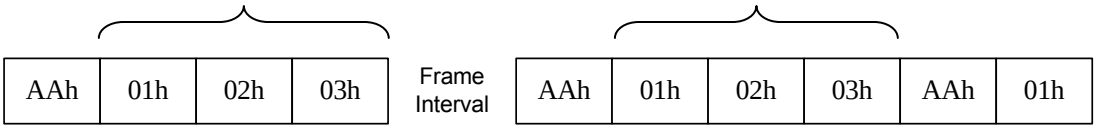


Figure 6-18: Packet dividing with both Start Byte "01h" and Stop Byte ("03h")

Notes: *The rule for serial packet is invalid in RealCOM mode.*

6.3.6.13 Duration for Overtime Disconnect (AT+C1_IT)

Command String	Return Value & Parameters Specifications	Function
AT+C1_IT?	\r\n[C1_IT] Value is: "*0*"\r\nOK\r\n	Read the current value
AT+ C1_IT=<*time*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*time*>:0~60000 (unit:10ms), of which "0" means turn off this function.	

In the applications that dealing with complex networks, it is recommended to adopt the TCP mode for data transmission, since UDP mode is more vulnerable to packet loss.

When a device is working in the TCP mode, no matter what role it acts, Server or Client, it may face the chance of accidental disconnection (disconnected by force or network fault), but in most situations, the device itself are still remain in a fake connection state since it didn't know the disconnection. In this case, any transmission requests will have no response or directly fail.

To solve this problem, ZNE series devices provide a "Duration for Overtime Disconnect" function. When this function is activated, the device will disconnect automatically when its idle time is out of the specified limit in TCP communication. That means if the serial port or Ethernet interface had not received any data over a specified duration of time, the connection will be broken automatically. Setting the "Druation for Timeout Disconnect" parameter to "0" can disable this function..

If the IPort-1 device is working in the Client Mode, it will break the connection after the specified duration of idle time and request for a reconnection to Server. In this way, it can avoid the fake connection caused by accidental disconnection at Server side, further ensures the reliability of the communication.

If the IPort-1 device is working in the Server Mode, it will send a request to the Client for disconnection and then enter the wait-for-connection state. This is an useful way to prevent the situation that the Client can not reconnect to the Server after an accidental disconnection at Client side, since the Server had not been notified about the disconnection and still in the fake connection state.

6.3.6.14 Period of Heart Beat Checking (AT+ C1_TCPAT)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_TCPAT?	\r\n[C1_TCPAT] Value is: *"20"* \r\nOK\r\n	Read the current value
AT+C1_TCPAT=<*time*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*time*>: 0~60000 (unit :second), of which "0" indicates turn off this function.	

When using TCP protocol for communication, the "Heart Beat Checking" is used to test whether the connection is valid by sending the "Heart Beat Packet" periodically. If there is no response after the "heart beat packet" is sent, the module will automatically break the connection.

6.3.6.15 Hardware Disconnection (AT+C*_TCP_CLS)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_TCP_CLS?	\r\n[C1_TCP_CLS] Value is: "*0*"\r\nOK\r\n	Read the current value
AT+C1_TCP_CLS=<*tcp_cls*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*tcp_cls*>: 0 for remain the TCP connection when the physical connection is broken; 1 for break the TCP connection when the physical connection is broken.	

Some network devices may have a function to check the physical connection state. When the physical connection is broken (such as removing the cable), the TCP connection of the network device is also disconnected. However, the IPort-1 device at the other side can not get this news till a data transmission is failed or the idle time exceeds the preset "Duration for Overtime Disconnection"; so, before this, it will not break the connection to initiate a new one (Client Mode) or break the connection to allow a new one to be established (Server Mode), Therefore, it may affect the real-time data transmission of serial port, causing data packet loss.

To solve this problem, the IPort-1 provides a "physical connection breaking" option. This option is used to tell the module whether to break the existing TCP connection when the physical connection is broken.

6.3.6.16 Number of TCP Connection (AT+ C1_LINK_NUM)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_LINK_NUM?	\r\n[C1_LINK_NUM] Value is: "0"\r\nOK\r\n	Read the current value
AT+C1_LINK_NUM=<num>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <num>:1~4.	

This command can get or set the total number of the TCP connection that can be established for a single serial port. When using TCP protocol for data transmission, IPort-1 device allows multiple TCP connections corresponding to one serial port①; in this case, the data received by the serial port will be sent to all the existing connections; and data received by these connections will be sent to the corresponding serial port as well.

Notes: *① IPort-1 device allows multiple connections corresponding to one serial port, so that user can use one of the connections for data transmission and the others for supervising of the data received by the serial port of IPort-1.*

6.3.6.17 Check Connection Password (AT+ C1_LINK_P)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_LINK_P?	\r\n[C1_LINK_P] Value is: "0"\r\nOK\r\n	Read the current value
AT+C1_LINK_P=*<link_p>*	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: *<link_p>*: 1 for check password after connection; 0 for not check password after connection.	

To improve the security of the data transmission, IPort-1 provides a "Check Connection Password" option. In TCP communication, if user turns on the this option, the module will check the first received bytes at the beginning of the first packet after the connection is established, determining whether it is same with the "Password"; if they are the same, the module will start the communication; if not, the module will break the connection.

Notes: *If user turn on the "Check Connection Password" option, the actual data transmission is begun at the second data packet since the first packet is just used for password checking, and IPort-1 will not send this packet out.*

6.3.6.18 Send Message after a Connection (AT+ C1_LINK_S)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_LINK_S?	\r\n[C1_LINK_S] Value is: "0"\r\nOK\r\n	Read the current value
AT+C1_LINK_S=<*link_s*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*link_s*>:0 for not sending any message; 1 for send device name; 2 for send device IP.	

When using TCP protocol for communication (TCP Server mode or TCP Client mode), this option is used to configure the information to be sent immediately after the establishment of a connection; there are three selectable options for it: "device name", "device IP" and "not sending message" (default).

6.3.6.19 Connection Condition (AT+ C1_LINK_T)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_LINK_T?	\r\n[C1_LINK_S] Value is: "*0*"\r\nOK\r\n	Read the current value
AT+C1_LINK_T=<*link_t*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*link_t*>: 0 for connect at power up (default); 1 for connect when there are data received by serial port; 2 for connect when DSR On/DSR Off.	

In TCP Client mode, IPort-1 will actively establish a connection. This option is used to determine when the module should establish the connection to TCP Server.

Notes: *If user selects the connection condition 1, which means that the connection will be established after data receiving on serial port, the first received packet will not be sent immediately; the module will send it together with the second packet. In this case, if user also selects the "Clear serial buffer" option (see section 6.3.6.7), the first received packet will be abandoned, which means that the data transmission actually begins at the second packet.*

6.3.6.20 Destination Port (AT+ C1_CLI_PPn)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_CLI_PPn?	\r\n[C1_CLI_PPn] Value is: "*4001*"\r\nOK\r\n	Read the current value
AT+ C1_CLI_PPn=<*port*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*port*>: 1~65534, except the port numbers which have been occupied by other network protocols. For more details, please refer to the appendix.	

6.3.6.21 Destination IP (AT+ C1_CLI_IPn)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_CLI_IPn?	If it is valid: \r\n[C1_CLI_IPn] Value is: "*192.168.0.1*" \r\nOK\r\n or \r\n[C1_CLI_IPn] Value is: "*192.168.0.1-192.168.0.7*" \r\nOK\r\ or \r\n[C1_CLI_IPn] Value is: "*www.embedcontrol.com*" \r\nOK\r\n If it is invalid: \r\n[C1_CLI_IPn] Value is: "*invalid*" \r\nOK\r\n	Read the current value
AT+ C1_CLI_IPn=<*ip*>	\r\nOK\r\n or \r\n<Error Info>\r\nERROR\r\n	Set the new value
	Parameters specifications: <*ip*>: 1) Fill in IP address, such as 192.168.0.1; or a range of IP addresses, such as 192.168.0.1-192.168.0.7; or domain name, such as www.embedcontrol.com. 2) fill in "0" only, it indicates the option is invalid.	

"Destination port" and "Destination IP" options are used to set the SOCKET parameters of the user device which communicates with IPort-1 device. And both of them are only valid for "TCP Client mode" and "UDP mode". In "TCP Client mode", IPort-1 will actively establish a connection to "Destination IP" and use "Destination port" for communication,; In "UDP mode", the module will send the received serial data to the "Destination port" of the "Destination IP".

There are 4 "Destination IP" and "Destination port" options (the "n" within the command string within the description of the command represents the IP option number, it should be replace by a numeric value from "1" to "8"), and the relationship between the IP options and the port options is one-to-one correspondence. User can set the "Destination IP" to a single IP address, a range of IP addresses (only valid for UDP mode), domain name or "invalid" (not used). In "TCP Client mode", IPort-1 will build up the connection to the "Destination port" of the valid "Destination IP" one by one according to the setting of "number of TCP connection", as Figure 6-14 shows. In "UDP mode", IPort-1 will send the received serial data to the "Destination ports" corresponding to all the valid "Destination IP" options.

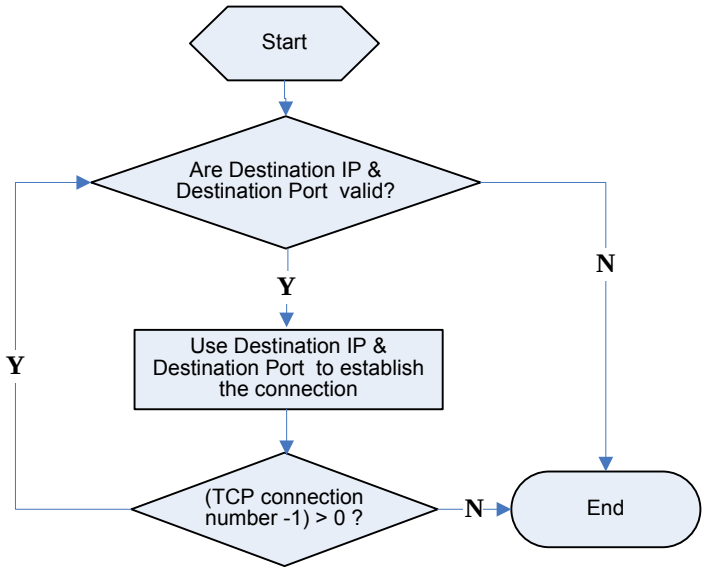


Figure 6-19: Connection flow for TCP Client mode

Notes: *When the "destination IP" is set to "domain name", user should make sure the setting of DNS is valid in the device information configuration.*

Notes: *When user has set the IP filter options (see 6.3.5.12 section), if IPort-1 is working in the TCP Client mode or UDP mode, user should not set the destination IP to any value except the IP filter options.*

6.3.6.22 Number of Serial Send Data Byte (AT+ C1_SEND_NUM)

Command String	Return Value & Parameters Specifications	Function
AT+C1_SEND_NUM?	\r\n[C1_SEND_NUM] Value is: "*10*"\r\nOK\r\n	Read the current value

This command can acquire the number of the serial data bytes sent and its range is between 0 and 4294967295.

6.3.6.23 Number Of Serial Received Data Byte (AT+ C1_RCV_NUM)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_RCV_NUM?	\r\n[C1_RCV_NUM] Value is: "*10*"\r\nOK\r\n	Read the current value

This command can acquire the number of the received serial data byte, and its range is between 0 and 4294967295.

6.3.6.24 Serial Line State (AT+ C1_LINE_STA)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_LINE_STA?	\r\n[C1_LINE_STA] Value is: "*0x00*"\r\nOK\r\n	Read the current value

This command can acquire the state of the serial communication line. Its range is: 0x00~0xFF. The detailed meaning of each bit is listed in Table 6-6.

Table 6-6: Serial line state bit

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
CD	RI	DSR	CTS	-	-	RTS	DTR

6.3.6.25 Serial Connection State (AT+ C1_LINK_STA)

Command String	Return Value & Parameters Specifications	Function
AT+ C1_LINK_STA?	In UDP mode or TCP mode, when the connection has not been established: \r\n[C1_LINK_STA] Value is: "Total Links:0"\r\nOK\r\n In TCP mode, when the connection has been established: [C1_LINK_STA] Value is: "Total Links:2"\r\n Num: 1 Status: ESTABLISHED LocalPort:4001 RemoteIP: 192.168.0.6 Port:3224\r\n Num: 0 Status: ESTABLISHED LocalPort:4001 RemoteIP:192.168.0.6 Port:3223"\r\nOK\r\n	Read the current value
AT+ C1_LINK_STA= CLOSE+*<linknum>*	*<linknum>* if it is valid: \r\nOK\r\n *<linknum>* if it is invalid: \r\n3_Parameter Format Error\r\nERROR\r\n	disconnect
	Parameters specifications: *<linknum>* connection number	

6.3.6.26 Function IO Mode Reading (AT+ IOFUNCTIONRD)

Command String	Return Value & Parameters Specifications	Function
AT+ IOFUNCTIONRD?	\r\n[IOFUNCTIONRD] Value is："*00*"\r\nOK\r\n	Read the current value

This command can acquire the current operation mode of the function IO pin, its range is: 0~4.

The function IO pin is the Pin2 FUNCTION_IO of the device, which has 5 operation modes in all.

Function IO Mode	Setting Value	Descriptions
TCP connection state	0 (default)	Output, working in TCP operation mode, such as TCP Server and TCP Client; when a TCP connection is established, FUNCTION_IO outputs "0" (low); when a TCP connection is broken, FUNCTION_IO outputs "1" (high).
TCP connection control	1	Input, for TCP Server mode， if the input of the FUNCTION_IO is "1" (high), the device will break the connection; For TCP Client mode, if the input of the FUNCTION_IO is "0" (low), the device will accept a connection, and if the input of the FUNCTION_IO is "1" (high), the TCP connection will be broken.

Function IO Mode	Setting Value	Descriptions
Feed dog signal output	2	Output, FUNCTION_IO outputs pulse signal periodically, indicating that the device is working normally. User can connect this pin to the input of an external watch-dog chip or to an external processor to find out whether the device is working normally.
BUSY or RTS	3	Output, when the serial port of the device is busy, FUNCTION_IO outputs "0" (low) to tell user not to send data to the serial port any more, or it will cause data loss; when the serial port of the device is idle, FUNCTION_IO outputs "1" (high) to tell user that it is ready to handle data sent to the serial port.
CTS	4	Input, when input of the FUNCTION_IO is "0" (low), the serial port of the device stops sending out data (STOP); when input of the FUNCTION_IO is "1" (high), the serial port of the device is allowed to send out data (RUN); besides, staying at the STOP state for a long time may cause data loss.

6.3.6.27 Function IO Mode Setting（AT+ IOFUNCTIONWR）

Command String	Return Value & Parameters Specifications	Function
AT+ IOFUNCTIONWR?	**\r\n[IOFUNCTIONWR] Value is：*"00"*\r\nOK\r\n**	**Read out current value**
AT+ IOFUNCTIONWR =*<value>*	***<value>* if it is valid, the return value will be:** **\r\nOK\r\n** ***<value>* if it is invalid, the return value will be:** **\r\n3_Parameter Format Error\r\nERROR\r\n**	**Set a new value**
	Parameters specifications: ***<value> The setting of function IO operation mode.***	

This command can get the setting of the function IO operation mode, range is: 0~4.

The function IO pin is the Pin2 FUNCTION_IO of the device, which has 5 operation modes in all. For more detail information, please refer to 6.3.6.26 section.

Notes: *Both of the IOFUNCTIONRD and IOFUNCTIONWR commands can be used to read the current value of the device. But the functions of them are different. What IOFOUCTIONRD reads is the current operation mode of the device function IO; while IOFUNCTIONWR reads out the setting value stored in the EEPROM. For example, assume that the function IO of the device is working at the default operation mode "00"; if use a IOFUNCTIONWD command to change the current value to "01", user will still get the value "00" when read by IOFUNCTIONRD command, but "01" when read by IOFUNCTINOWR command, since the device will not switch to "01" mode until it is reset.*

6.4 Example AT Command Configuration

When using embedded device (such as MCU) to configure the IPort-1 device, user can adopt the TCP connection mode for module configuration, as Figure 6-20 shows.

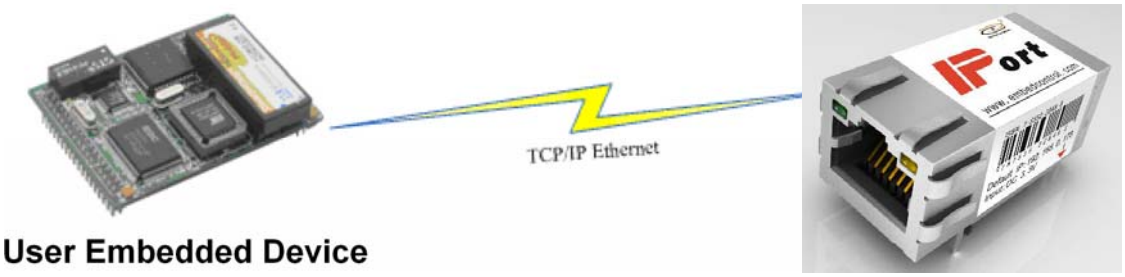


Figure 6-20: User device configure IPort-1

After the connection is established, user can use AT command to configure the IPort-1 device. The configure flow is shown in Figure 6-21.

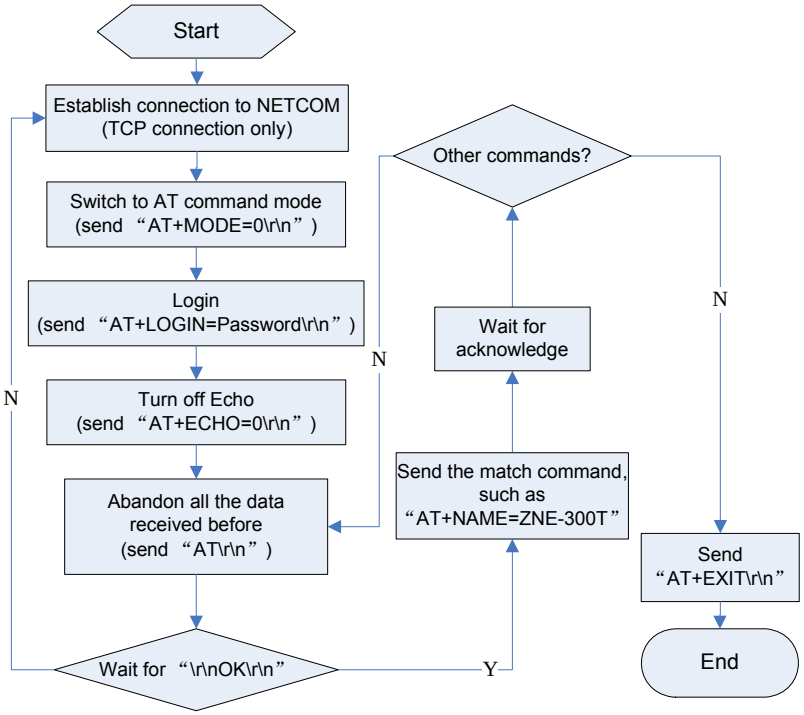


Figure 6-21: AT command configuration flow

Chapter 7: WebPages Configuration Guide

IPort-1 also provides a convenient way for parameter settings through web browser. And the detailed specification will be described in this chapter.

7.1 Internet Explorer (IE) configuration

Before using webpage to configure the module, user should make sure that the PC and the IPort-1 device that need to be configured are both in a same network. For more details about this, refer to the beginning sections of the Chapter 5: Software Configuration Guide.

After connecting the PC and the module to a same network, user still needs to configure the IE settings to open the Webpage correctly. Open a IE window, click Tools→Internet Options, then within the upcoming window, select the "Connection" tab, check "Never Dial a connection" option, then click the Properties button within the "Local Area Network (LAN) settings" field to bring up the LAN setting window, then modify the LAN settings, let it be the same, as Figure 7-1 shows.

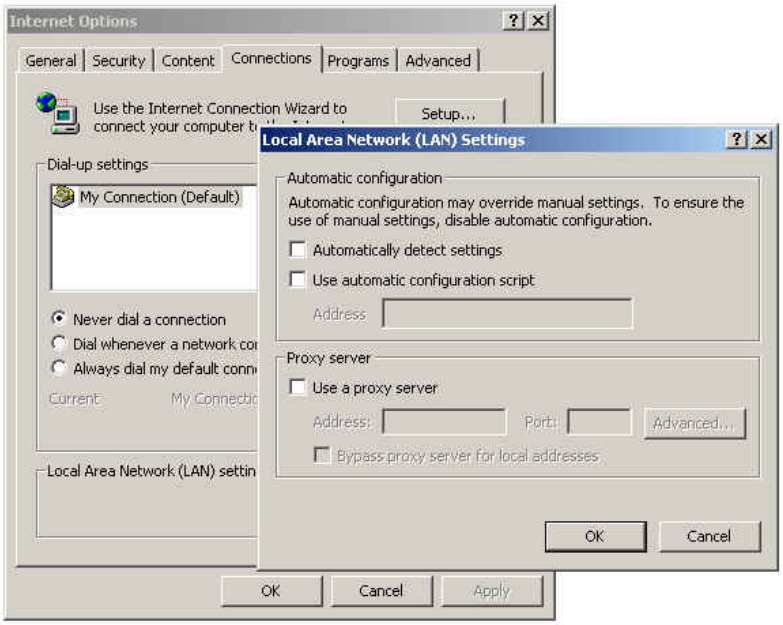


Figure 7-1: IE settings before using webpage configuration

Then press the OK buttons to confirm the settings and exit. After these steps, now it is ready to use the configuration webpage for the modules.

Notes: *If user has installed firewall or Anti-virus software on PC such as Kaspersky, the problem of unsuccessful webpage login may be occurred. Therefore, before using webpage configuration, it is recommended to turn off the firewall and Anti-virus software or make a setting to them to allow multiple webpage open automatically.*

7.2 Enter the Webpage Configuration System

Open the Internet Explorer and enter the IP address① of IPort-1 device to the address bar, as Figure 7-2 shows.

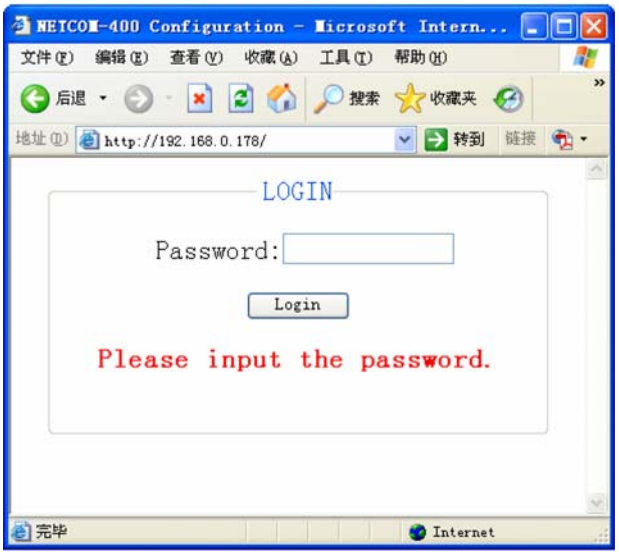


Figure 7-2: Enter the Module Default Address to the Address Bar of IE

Notes: *① The format of URL inputted to IE is [http://ip:port]. The "ip" within it is the "IP address" of IPort-1 device (the factory setting is 192.168.0.178); and the "port" is the "communication port used by the webpage" (the factory setting is 80), if the value of the "port" is 80, user can directly input [http://ip] to the address bar.*

Notes: *If a customized configuration webpage had been downloaded to the device, but user still wants to access the original configuration webpage with the module, in this case, please enter "http://ip:port/default.htm" to the address bar of internet explorer, such as "http://192.168.0.178/default.htm".*

After entering the password to the "Password" field (the factory setting is "8888"), click the Login button, a welcome interface will appear in the IE, as Figure 7-3 shows.

Figure 7-3: IPort webpage configuration login interface

Notes: *To avoid inadvertent modification to the IPort-1 parameters, IPort-1device will exit the login state if there is no operation in 2 minutes (did not apply the change or open any new configuration webpage over time) after entered the configuration webpage. When this happen, a "Found no webpage" will appear when user is trying to access the configuration webpage. To solve this problem, user needs to enter the IP address of the module to the address bar and redo the login procedure again.*

7.3 System Parameters Configuration

The system parameters configuration is used for setting the system parameters of IPort-1, such as the network parameters, device name, IP filter and etc.

Click the "system info" option, then the system parameters configuration interface will appear in the webpage, as Figure 7-4 shows.

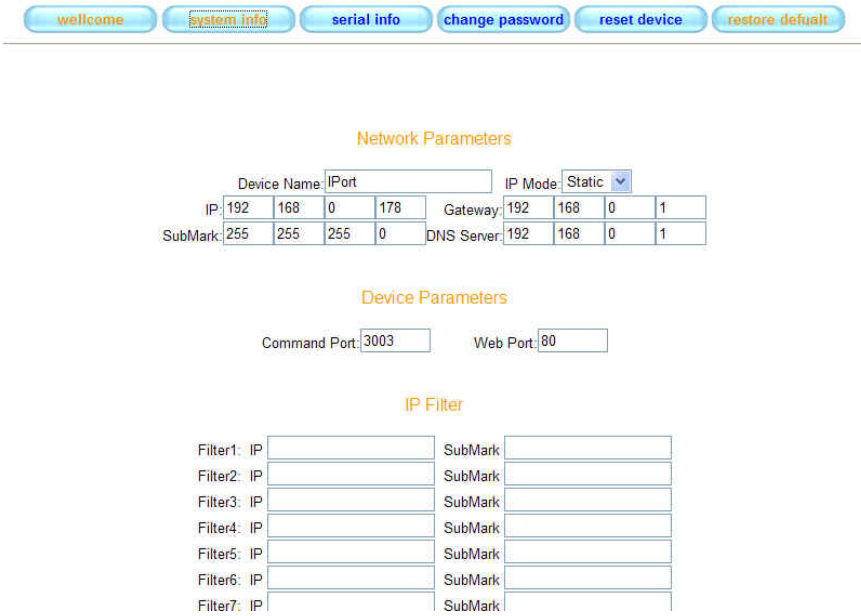


Figure 7-4: The configuration of system properties

After inputting the relative parameters to the webpage, press the Apply button on the bottom of the webpage to confirm the modification.

Notes: *Please refer to the 6.3 section in the Chapter 6 for the detail meaning of each parameter in the properties bar.*

7.4 Parameters Configuration of Serial Port

Click “serial info” option to open the webpage of serial port parameters configuration, as Figure 7-5 shows.

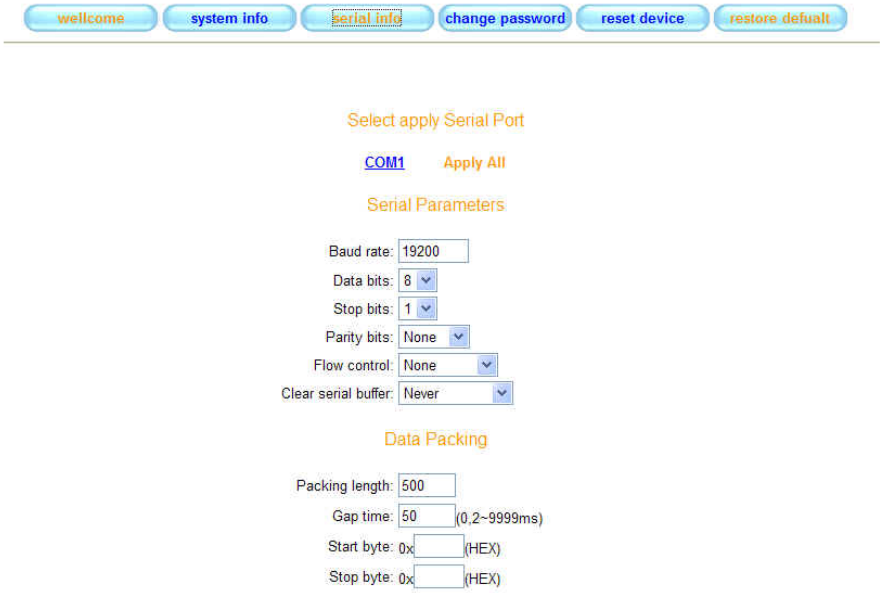


Figure 7-5: The configuration of serial port properties

7.5 Change Password

Click the “change password” option, and then a corresponding webpage will appear, as Figure 7-6 shows.

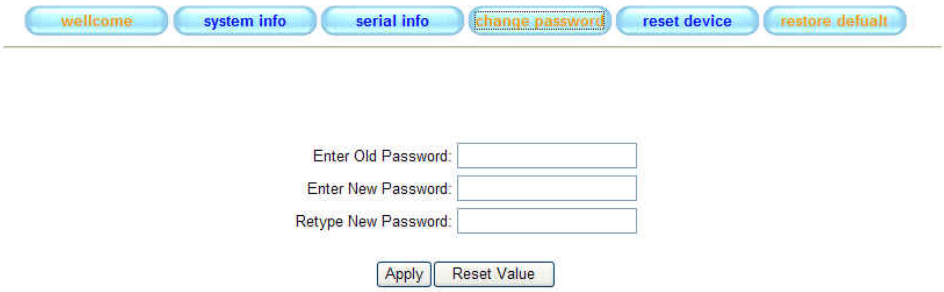


Figure 7-6: Change password

Enter the original password to the [Enter Old Password] option, then enter the new password to the [Enter New Password] and [Retype New Password] options, and then press the Apply button to apply the new settings to the module.

7.6 Reset the Device

Click “reset device” the option to reset the device, and a corresponding interface will appear, as Figure 7-7 shows. Click the IP address with the underline in the webpage to enter the login interface, as Figure 7-2 shows.

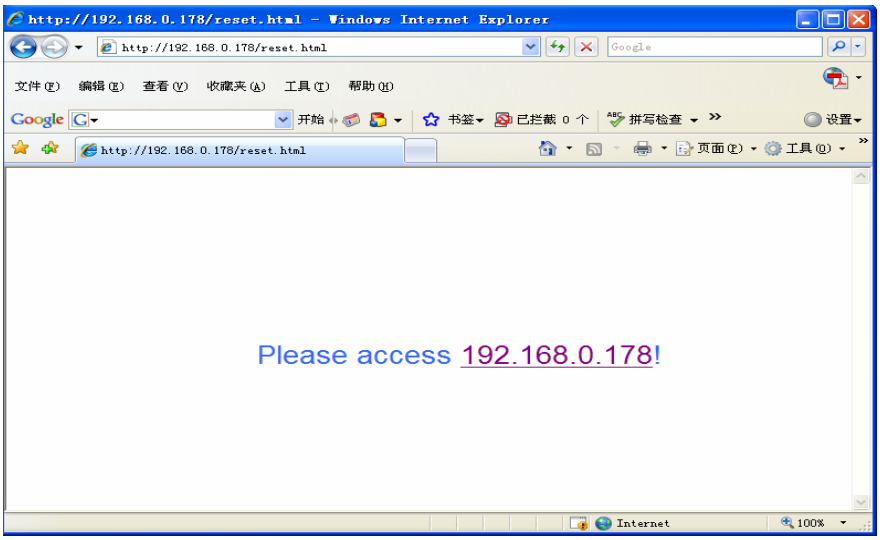


Figure 7-7: Reset the device

7.7 Recover the Factory Setting

Click the restore default option, and then a corresponding interface will appear, as Figure 7-8 shows. User can click the IP address with the underline to recover the factory settings.

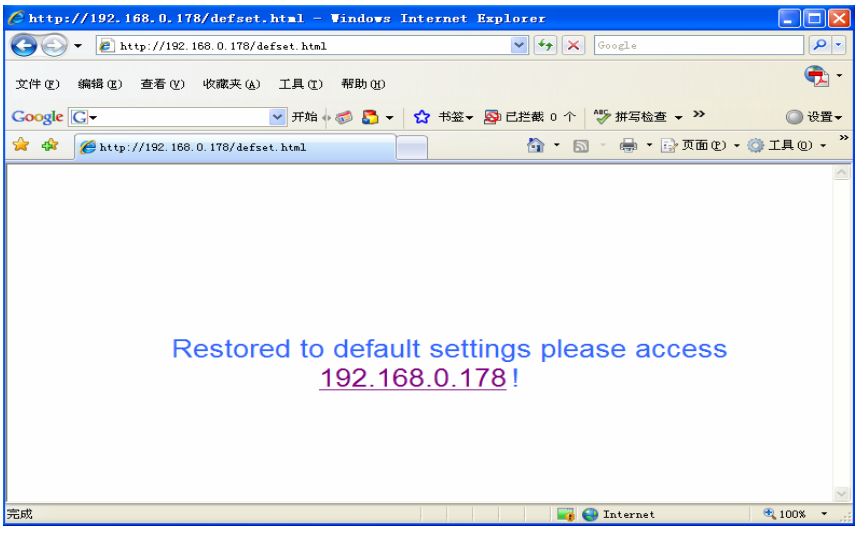


Figure 7-8: Recover the factory setting

Chapter 8: Firmware Upgrade

IPort-1 supports local firmware upgrade and remote firmware upgrade.

Before upgrading the firmware, user should set the IP acquisition mode of IPort-1 device to the Static Acquisition Mode.

The first method is the local firmware upgrade:

Double click the “ZNetCom” icon on the desk top, an interface will appear, as Figure 8-1 shows.

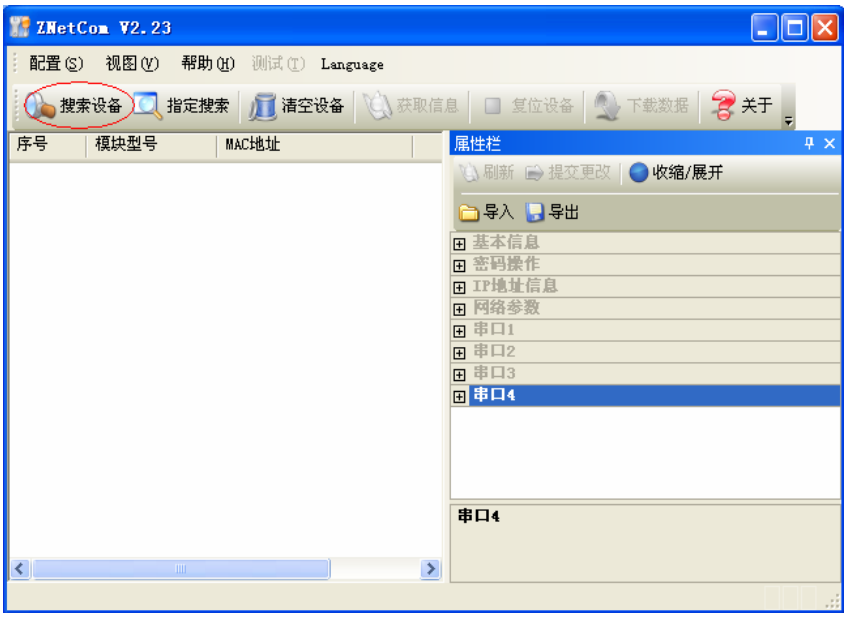


Figure 8-1: Operation interface of ZNetCom

Click the “Search” button within the “Tools” bar, ZNetCom software will start to search all ZNE devices which is connected to PC, as Figure 8-2 shows.

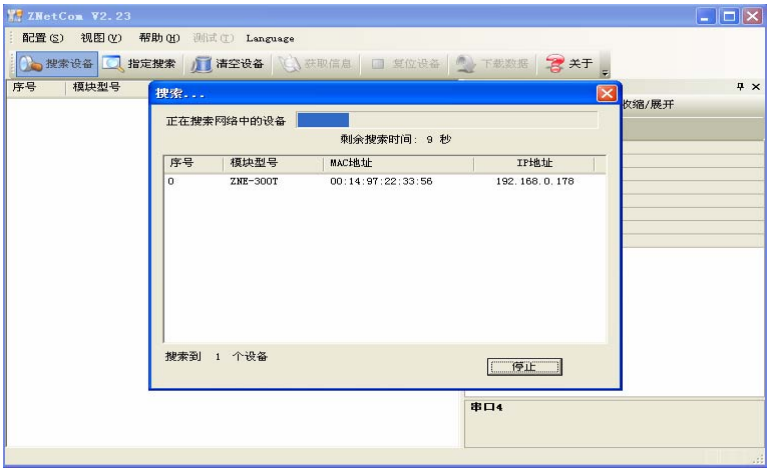


Figure 8-2: Search device

The software will then list out all devices found by the search dialog box after finishing the search, as Figure 8-3 shows.

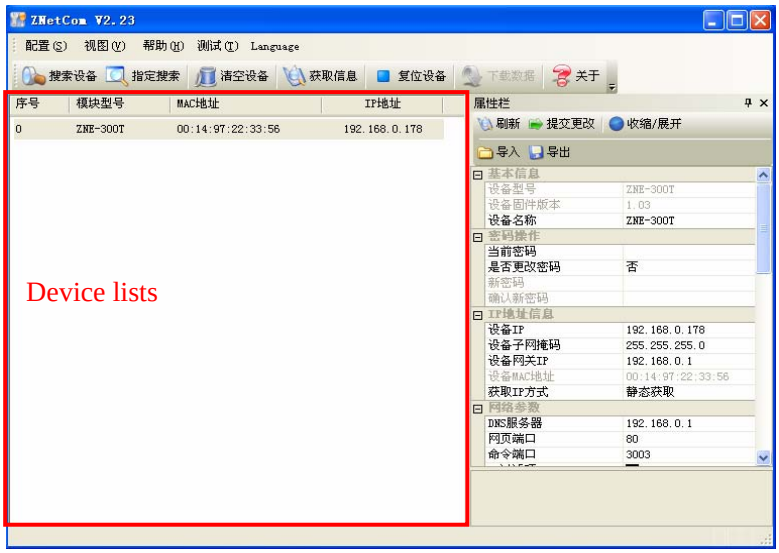


Figure 8-3: List device configuration properties

Double click the device listed in the table, or click the Get Info button in the “Tools” bar or the Refresh button in the “Properties” bar, then a dialog box will appear, as Figure 8-4 shows.

Figure 8-4: Acquire configuration data

After searching, all the information about the device will be listed on the device properties field, as Figure 8-5shows.

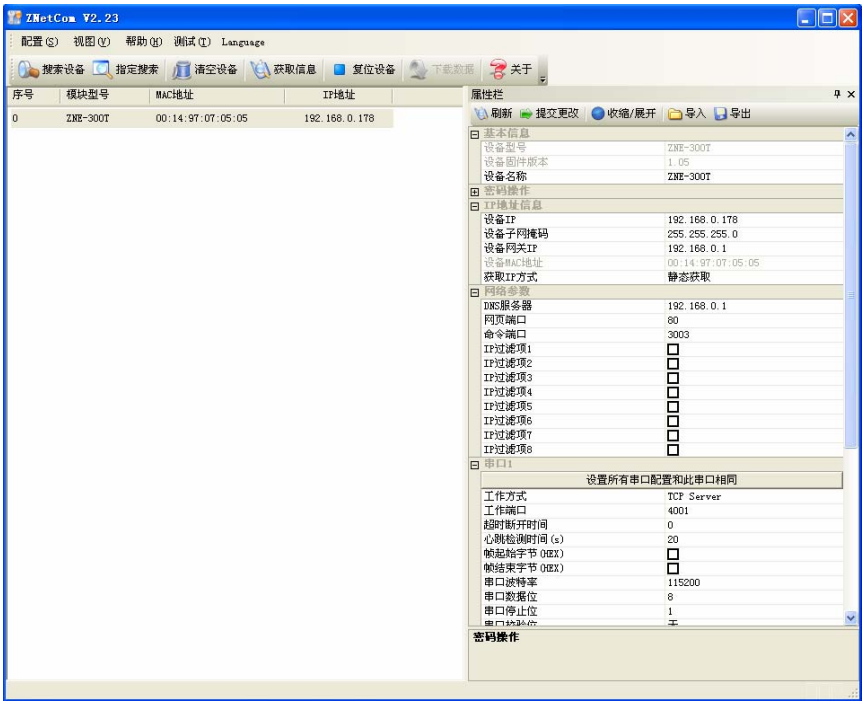


Figure 8-5: IPort-1 configuration information

Then, select the “Upgrade firmware” option within the “Settings” item on the menu bar, a dialog box will appear, as Figure 8-6 shows.

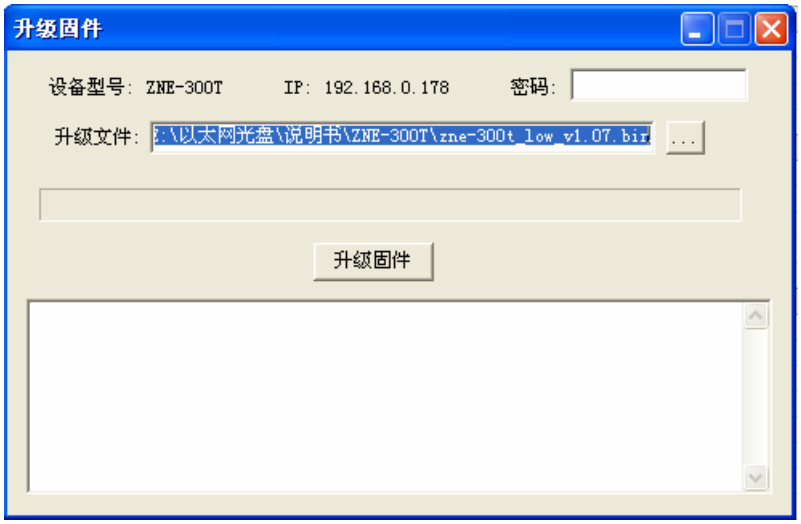


Figure 8-6: Upgrade firmware

Then select the required upgrade file, and fill in the password (default setting is “88888), then click the Upgrade button to start the upgrading of the firmware, as Figure 8-7 shows.

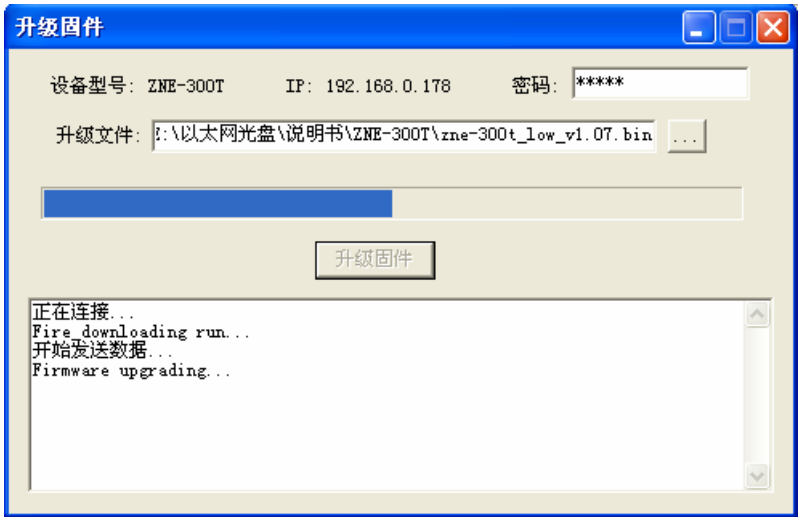


Figure 8-7: upgrading the firmware

Wait a while till the process is complete. If the upgrading is successful, a dialog box will pop up, as Figure 8-8 shows. Then user can click the OK button to finish the upgrading of the firmware.

Figure 8-8: Successful upgrade

If the local firmware upgrade fails, users can try the remote firmware upgrade.

The method of remote firmware upgrade is listed as below:

First, run the telnet tool and use the menu configuration or AT command configuration mode to put the device to Bootloader state; please refer to section 6.2.2 and section 6.3.4.10 in Chapter 6 for more detail information (if user had tried to upgrade the device using the local firmware upgrade method but failed at the end, the step described above can be skipped, since the local firmware upgrade will put IPort-1 to the BootLoader state).

Run the TCP&UDP testing tool, and select the TCP connection, then set the destination IP to the device IP (factory setting is 192.168.0.178), and set the destination port to “6854”, as Figure 8-9 shows.

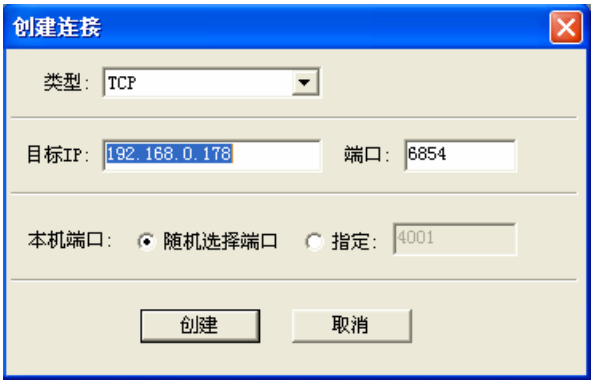


Figure 8-9: Parameter setting

Click the Establish button, an interface will appear as Figure 8-10 shows.

Figure 8-10: Testing tool

Next, check the “Send file” option, then a file selection dialogue will appear, user can specify the required upgrade file in it, as Figure 8-11 shows.

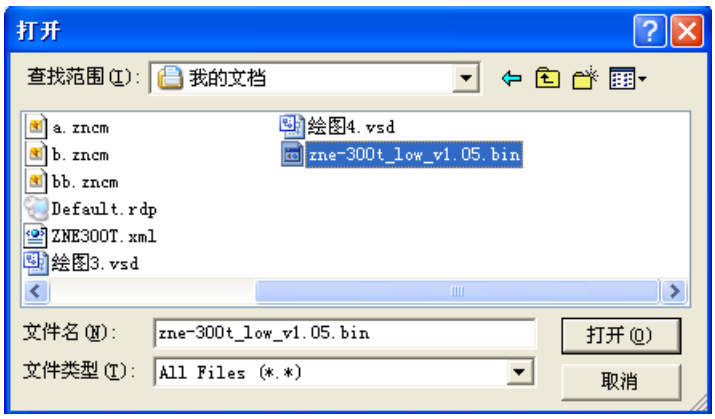


Figure 8-11: Open the file

Select the required upgrade file, then click the Open button, as Figure 8-12 shows.

Figure 8-12: Firmware upgrading interface

Click the Connection button, and then click the Send button, the software will automatically download the selected files to the IPort-1, as Figure 8-13 shows. Now, the firmware upgrading is finish.

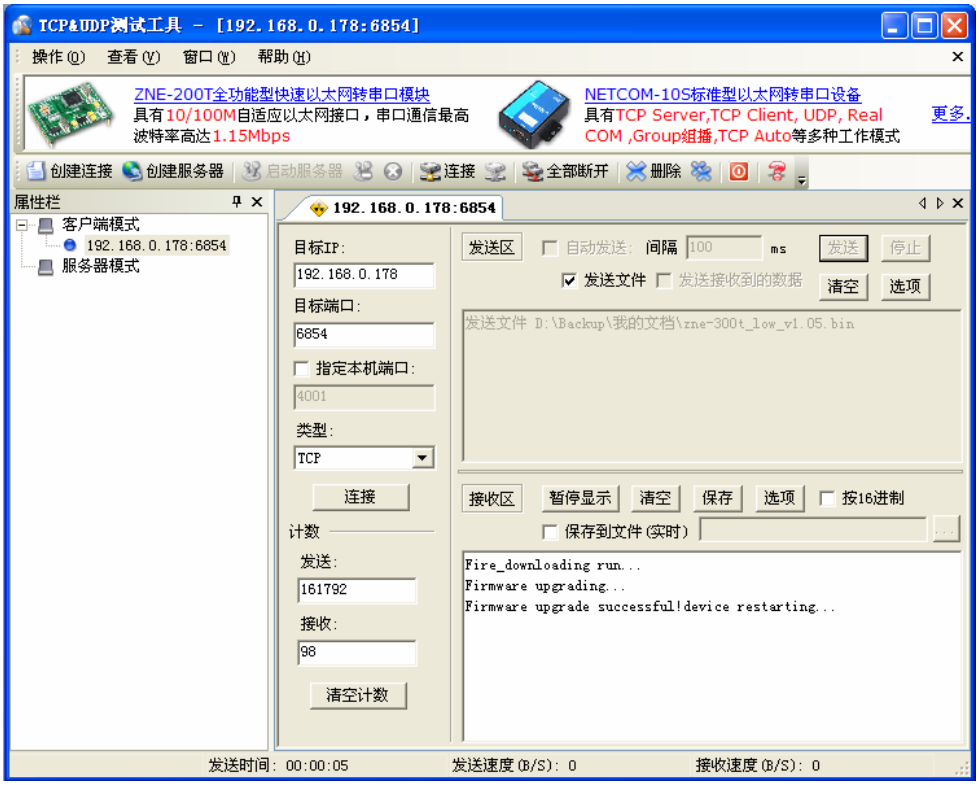
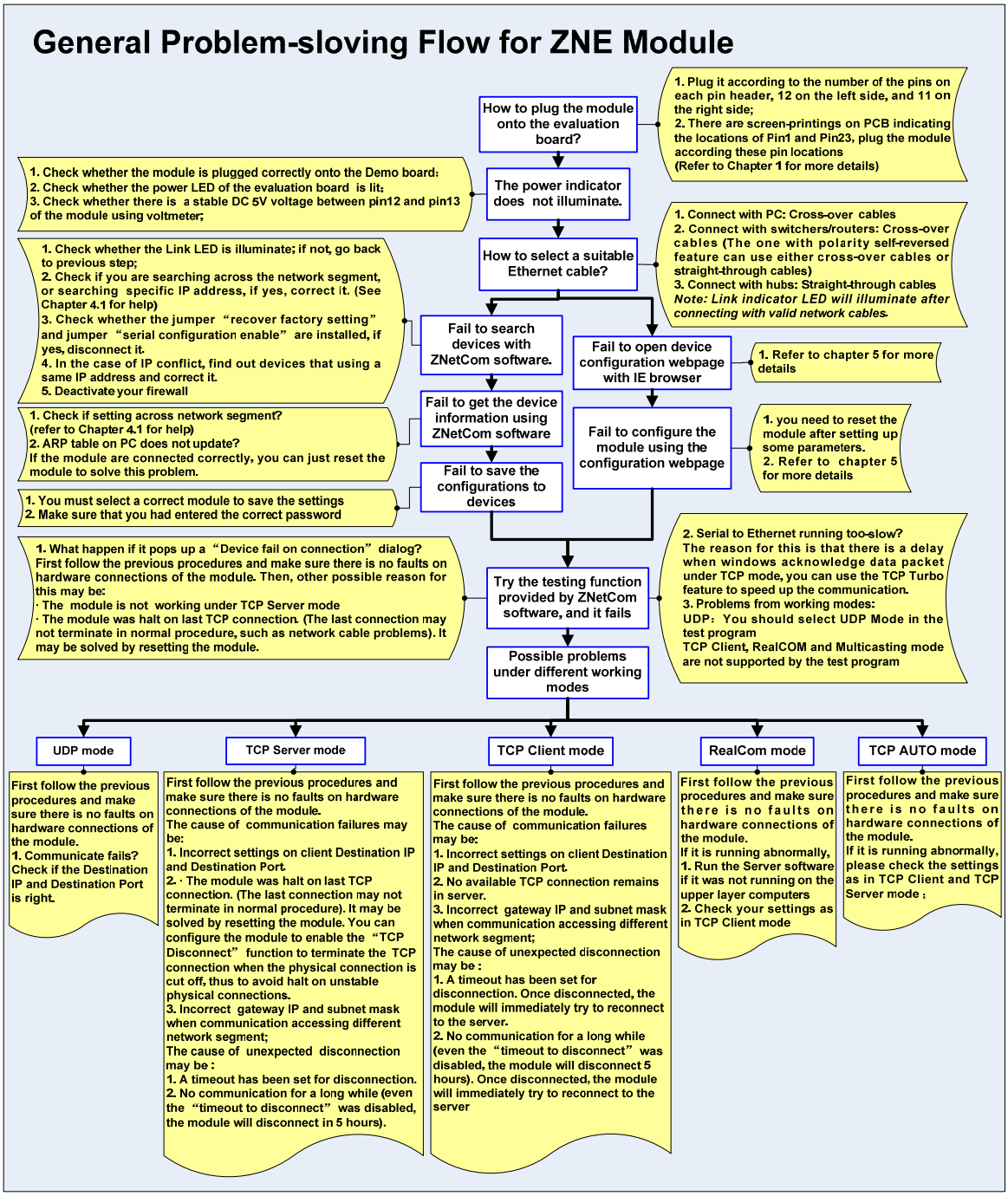


Figure 8-13: Firmware upgrading is complete

Appendix A: Problem Solving



Appendix B: Default Ports under TCP/UDP

Protocol	Port
Reserved	0
TCP Port Service Multiplexer	1
reserved	2
ECHO	7
reserved	9
reserved	11
reserved	13
Network state	15
FTP	20
FTP	21
TELNET	23
SMTP	25
Printer	35
Time Server	37
Names server	42
reserved	43
Login Host Protocol	49
DNS	53
DHCP	67
DHCP	68
TETP	69
Gopler	70
Finger	79
HTTP	80
TELNET	107
SUN	111
NNTP	119
NTP	123
SNMP	161
SNMP	162
IPX	213
reserved	160-223

Problem Report List

User Name:	
Company Name:	
Telephone:	**FAX. No.:**
Email:	**Distributor Name:**
Product Name:	**S/N**

Please describe your problem here in detail:

Repair & Rework Procedures

1. Provide with your purchase certifications
2. Acquire rework permissions from distributor and sub-companies
3. Fill in the Problem Report List of the product and describe the problems in detail to shorten the rework time.
4. Pack it carefully and deliver it to our repair and service department along with the Problem Report List.

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The defects or bugs of the IPort-1 will be collected to an errata list once they are found by any one. This may cause version difference between products. Latest errata list can be acquire from us if customer requires.

Please contact our sales office for the update to the product specs. The documents mentioned in the previous chapters or other ZHIYUAN's documents can also be found on our website: http://www.embedcontrol.com/ or call +86-20-22644249 for inquiry

Rights & Notifications

Application Information

The examples and the diagrams of the applications demonstrated in this document are assumptions cases, which are just used to make user understand the product features and usage more easily. Therefore, user should make some modifications and have verifications to them according to the product features, before applies the device.

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