BF-450(M)/BF-430/431

RS232 / RS485 to TCP / IP Converter Module

User's Guide

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1. Getting to Know your BF-450(M)/BF-430/431

1.1 Introduction

The BF-450(M)/BF-430/431 is a RS232/RS485 to TCP/IP converter integrated with a robust system and network management features designed for industrial equipment to be accessed and controlled via Intranet or Internet. By integrating RTOS (Real Time Operating System) and complete TCP/IP protocol stack capability, CHIYU's BF-450(M)/BF-430/431 provides not only a robust and high performance system to make your device connecting to Network, but also ease installation and Internet access.
The BF-450(M)/BF-430/431 Web Configurator is a breeze to operate and totally independent of the operating system platform you use.

1.2 Main features

The following are the main features of BF-450(M)/BF-430/431

► TCP/UDP server/client support
The BF-450(M)/BF-430/431 support four types of connection: TCP server, UDP server, TCP client and UDP client, user can select one of types to meet application requirement.

► DHCP Client
DHCP (Dynamic Host Configuration Protocol) client obtains the TCP/IP configuration at start-up from a centralized DHCP server, which means it can get IP address, an IP default gateway and DNS server.

► PPPoE Over Ethernet
PPPoE is a protocol for connecting remote hosts to the Internet over DSL connection by simulating dial-up connection.

► Dynamic DNS
With dynamic DNS support, you can have a static hostname alias for a dynamic IP address, allowing the host to be more easily accessible from various locations on the Internet.

► Auto-negotiating 10/100Mbps Ethernet
The Ethernet interface automatically detects if it is on a 10 or a 100 Mbps Ethernet.

► Full Network Management via Web
This feature allows you to access or manage device through IE or Netscape on any platform. The firmware also can be upgraded via Web browser.

► Backup and Restore configuration
This feature allows you to backup system configuration to a file and restores it, for the security issue, the file which backup from system is an encryption format.

► IO Controller(BF-450 Ony)
The BF-450 supports 3 DI/3 DO totally; 3 DI with any combination rule can trigger each DO. By providing a smart and easily setup way via Web, user doesn't need to have any programmer background. Besides,

► Alarm Generation(BF-450 Only)
With SMTP client support, you can set system to trigger alarm message via e-mail or SMS (Short Message System) to your mobile phone.

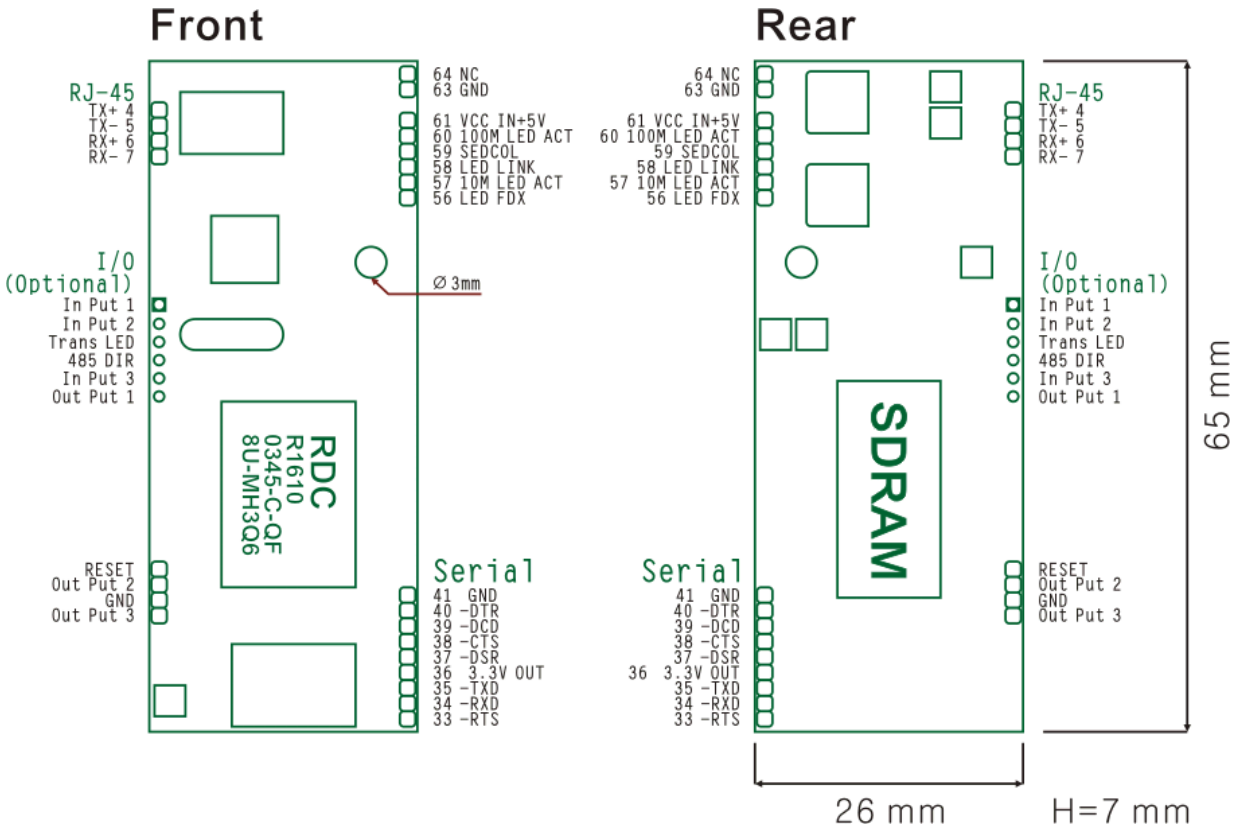
1.3 Applications for BF-450(M)/BF-430/431

Figure 1 Standalone BF-450/BF-430/431's application through Internet

Figure 2 Socket-Type BF-450M's application through Internet

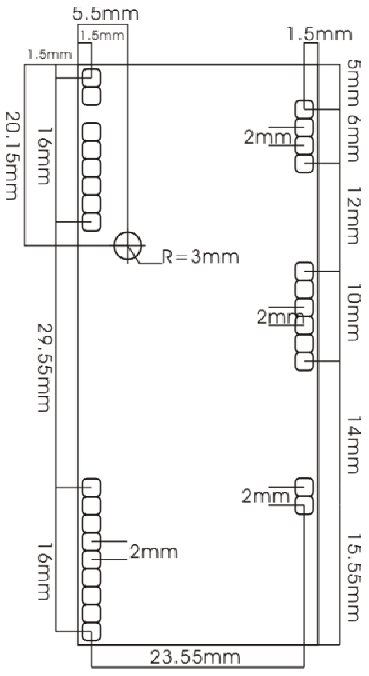
2. Hardware Installation & Initial Setup

2.1 Hardware Installation



RS232 Pin Form		
Pin	**Acronym**	**Sense**
Pin 1	CD	Carrier Detect
Pin 2	RXD	Receive
Pin 3	TXD	Transmit
Pin 4	DTR	Data Terminal Ready
Pin 5	GND	Ground
Pin 6	DSR	Data Set Ready
Pin 7	RTS	Request to Send
Pin 8	CTS	Clear to Send
Pin 9	RI	Ring Indicator

Mechanical Dimensions (mm)：



2.2 LED status

LED	Color(s)	Activity	Desc.
POWER	Red	Off	Power OFF
		On	Device Ready
LINK	Red	Off	No Ethernet Link
		On	Ethernet Link established
100M	Red	Off	10 Mbps
		On	100 Mbps
TRANS	Green	Off	No TCP/IP session link
		On	TCP/IP session link established
		Blinking	Booting/System Self-Test Data Sending/Receiving between Serial and Ethernet

2.3 Initial Setup

Use this section to set up your computer to assign it a static IP address in the 192.168.168.1 to 192.168.168.254 range with a subnet mask of 255.255.255.0. This is necessary to ensure that your computer can communicate with your BF-450(M)/BF-430/431.
Your computer must have an Ethernet card and TCP/IP installed. TCP/IP should already be installed on computer using Windows 98/2000/XP and later operating systems.

Note: Connect a computer to BF-450(M)/BF-430/431 Ethernet port directly should be with crossover Ethernet cable, if both connect to hub/switch should be with straight-through Ethernet cable.

2.3.1 Installing the TCP/IP Protocol

Details refer to BF-450(M)/BF-430/431 Quick Start.

2.3.2 Fixed IP Addresses Configuration

Details refer to BF-450(M)/BF-430/431 Quick Start.

2.3.3 Configure your BF-450(M)/BF-430/431

Details refer to BF-450(M)/BF-430/431 Quick Start.

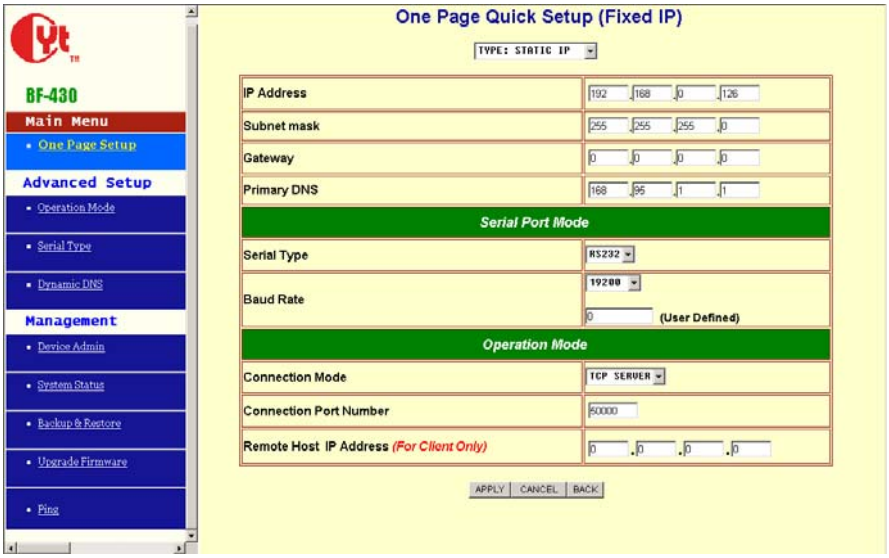
3. BF-450(M)/BF-430/431 Basically Configuration Setup

This chapter will show the basic configuration of BF-450(M)/BF-430/431 by One Page Setup to connect your device through Intranet or Internet.

The BF-450(M)/BF-430/431 support three IP connection types: Static IP, DHCP and PPPoE. These types are listed in the drop-down menu for the IP Configuration setting. Each setup screen and available features will differ depending on what kind of IP connection types you select. Default is Static IP

3.1 One Page Quick Setup with Fixed IP

Static (or Fixed) IP



IP Mode
IP Address: default **192.168.168.125**
Subnet mask: default **255.255.255.0**
Gateway: default **192.168.168.254**
Primary DNS: default **168.95.1.1**

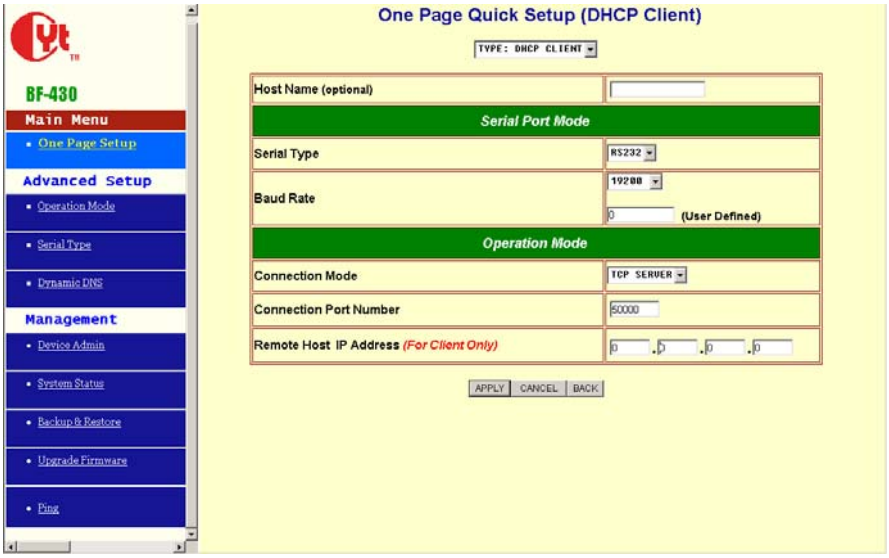
Serial Port Mode
Serial Type: RS232
Baud Rate: 19200
If no suitable Baud Rate in the drop-down menu, chose Others, input the value you want.

Operation Mode
Connection Mode: TCP Server
Connection Port Number: 50000
Remote Host IP Address: Only useful in TCP Client

If you are connecting through a static or fixed IP from your network environment, perform these steps：
Step 1: Enter IP address
Step 2: Enter Subnet mask
Step 3: Enter Gateway IP address
Step 4: Enter Primary DNS IP address
Step 5: Select correct setting of Serial Port Mode and Operation Mode
Step 6: click Apply button

3.2 One Page Quick Setup with DHCP Client

DHCP



IP Mode
Host Name (Optional): default **BF430**, maximum length **15** characters

Serial Port Mode
Serial Type: RS232
Baud Rate: 19200
If no suitable Baud Rate in the drop-down menu, chose Others, input the value you want.

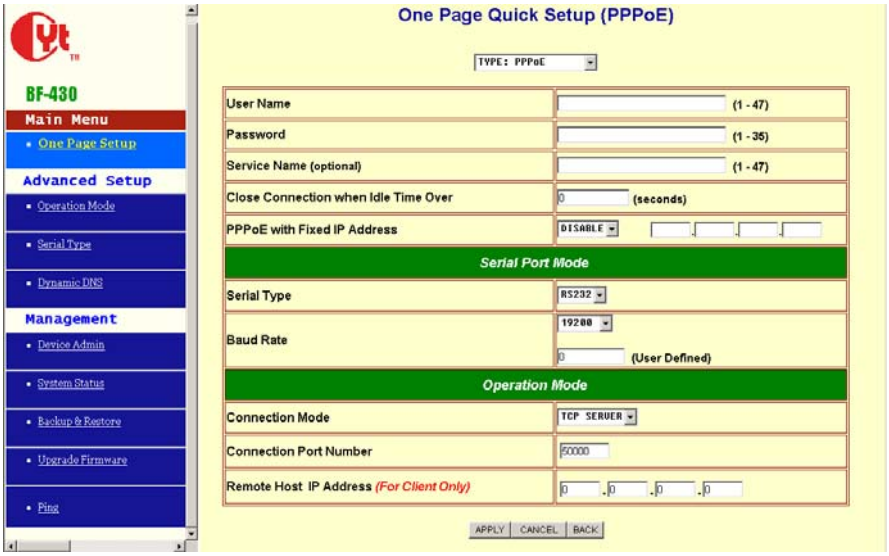
Operation Mode
Connection Mode: TCP Server
Connection Port Number: 50000
Remote Host IP Address: Only useful in TCP Client

If there is a DHCP Server existing in your network environment or you subscribe a CABLE service from your ISP, you can set IP configuration to DHCP to get a dynamic IP address. The **Host Name** is an *optional* item, depending on your DHCP Server setting.

Note 1: to gain CABLE service, you also need to change the MAC address of BF-450(M)/BF-430/431 to the MAC address of register in ISP. Please refer to Chapter 4 Device Admin/Mac Address Change

3.3 One Page Quick Setup with PPPoE

PPPoE



IP Mode
User Name: no default, maximum length **47** characters
Password: no default, maximum length **35** characters
Service Name (optional): no default, maximum length **47** characters
Close Connection when Idle Time Over (second): default **0**, range **0** to **4294967295**
PPPoE with Fixed IP Address: default **DISABLE**

Serial Port Mode
Serial Type: RS232
Baud Rate: 19200
If no suitable Baud Rate in the drop-down menu, chose Others, input the value you want.

Operation Mode
Connection Mode: TCP Server
Connection Port Number: 50000
Remote Host IP Address: Only useful in TCP Client

If you subscribe a DSL service with PPPoE connection from ISP, you can set IP configuration to PPPoE to get a dynamic IP address. Your ISP will provide you the **User Name** and **Password**, some ISP will also need the **Service Name** to authenticate. But this item is optional and depending on your ISP.

If you want to keep the connection always on between BF-450(M)/BF-430/431 and your ISP, then set the value of item **Close Connection When Idle Time Over** to 0, otherwise, when the idle time of no any traffic on line is over the setting value, BF-450(M)/BF-430/431 will terminate this PPPoE connection.

If your ISP can provide you fixed IP address when PPPoE connection established each time, you can select **PPPoE with Fixed IP Address** as ENABLE and enter the IP address given from ISP.

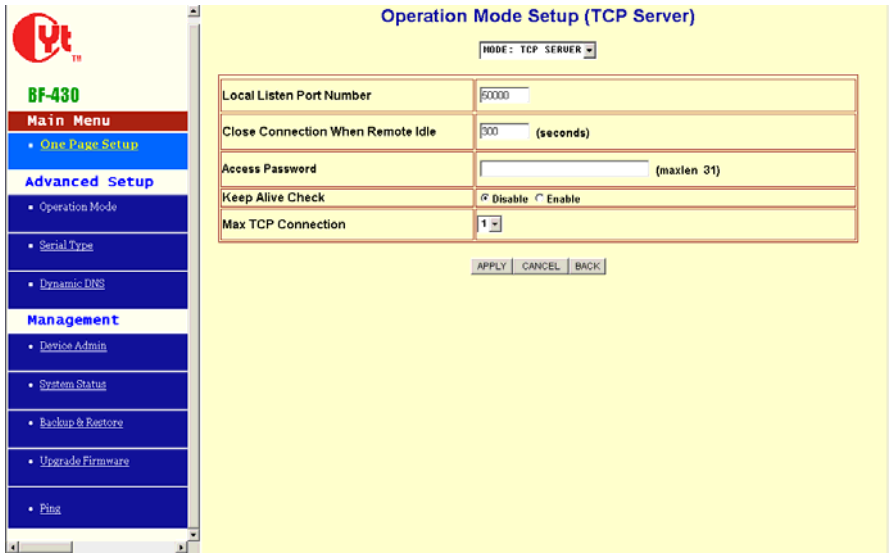
4. BF-450(M)/BF-430/431 Advanced Configuration Setup

This chapter will show you how to configure BF-450(M)/BF-430/431 to function in your network and gain access to your device through Intranet or Internet.

4.1 Operation mode

The BF-450(M)/BF-430/431 support four operation mode: TCP Server, TCP Client, UDP Server and UDP Client. These modes are listed in the drop-down menu for the Operation Mode setting. Each setup screen and available features will differ depending on what kind of operation mode you select. Default is TCP Server.

TCP Server



Listen Port Number: default **50000**, range **0** to **65535**
If your device is acted as passive to accept commands from remote and the data be guaranteed to be received by peer is your concern, then you can set BF-450(M)/BF-430/431 as TCP Server. Be sure the value of item **Listen Port Number** is same as your remote control application using.

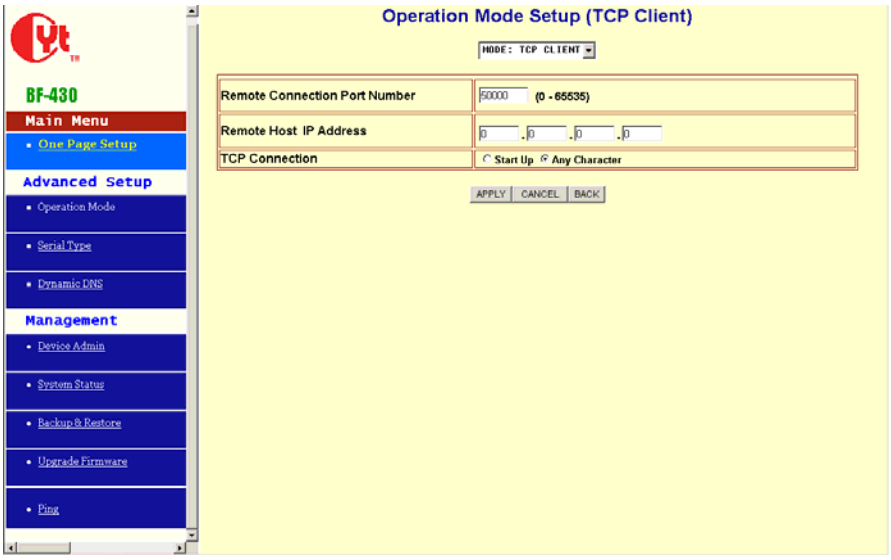
Close Connection When Remote Idle (second): default **300**, range **0** to **32768**
If you want to keep the connection between BF-450(M)/BF-430/431 and your remote control application always on, then set the value of item **Close Connection When Remote Idle** to 0, otherwise, when the idle time of no any traffic on line reach the setting value, BF-450(M)/BF-430/431 will terminate this connection.

For security concern, you can input **Access Password** to protect your device, BF-450(M)/BF-430/431 will authenticate whether this TCP connection is valid by this password.

Keep Alive Check: default **Disable**
Disable: Disable the check of TCP connection is still alive or not.
Enable: BF-450(M)/430/431 automatically send a Ping request to peer per each 30 seconds, the TCP connection will be terminated if no response of Ping reply from peer.

Max TCP Connection: default 1, range from 1 to 4
The allowed TCP connections accept by BF-450(M)/430/431 simultaneously. It is usually used when user needs to receive data from different hosts simultaneously. When multiple hosts establish TCP connection to BF-450(M)/430/431 at the same time, it will duplicate serial data and transmit to all hosts. When data comes from Ethernet port, it is sent on first-in-first-out basis to serial port.

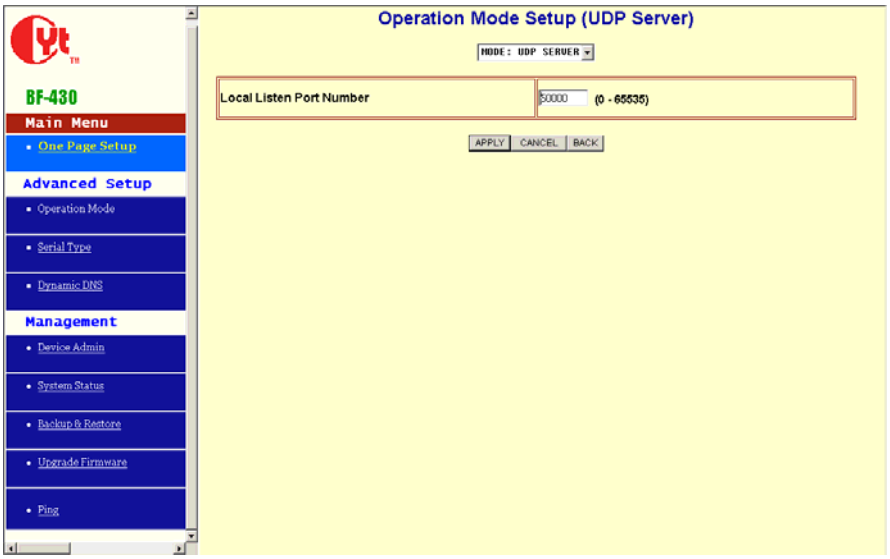
TCP Client



Remote Connection Port Number: default **50000**, range **0** to **65535**
Remote Host IP Address: default **0.0.0.0**
If your device is acted as active to report real-time status to remote and the data be guaranteed to be received by peer is your concern, then you can set BF-450(M)/BF-430/431 as TCP Client. Be sure the value of item **Remote Connection Port Number** is same as your remote control application using and set the correct value of **Remote Host IP Address**.

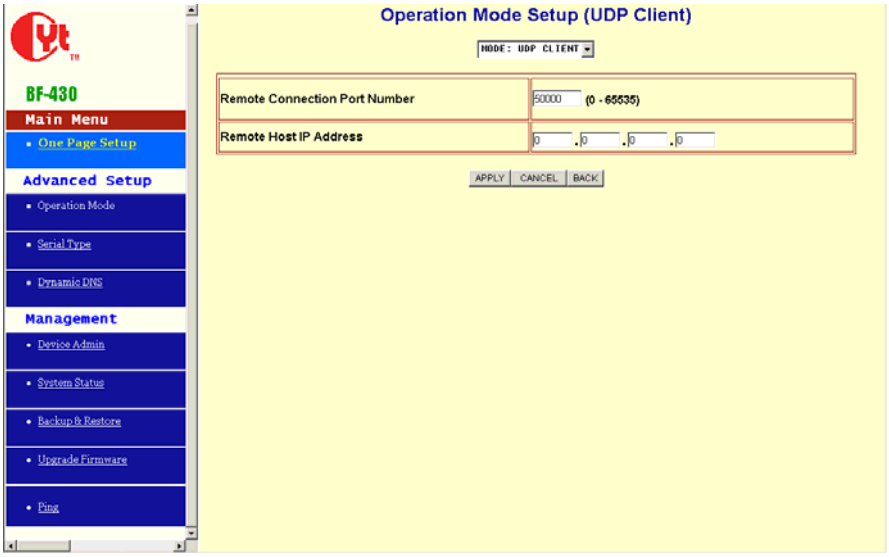
TCP Connection: default **Any Character**
Start Up means BF-450(M)/430/431 attempts to establish a TCP connection as soon as powered on.
Any Character means BF-450(M)/430/431 attempts to establish a TCP connection as soon as starts receiving data from serial port.

UDP Server



Listen Port Number: default **50000**, range **0** to **65535**
If your device is acted as passive to accept commands from remote and the data be guaranteed to be received by peer is *not* your concern, then you can set BF-450(M)/BF-430/431 as UDP Server. Be sure the value of item **Listen Port Number** is same as your remote control application using.

UDP Client

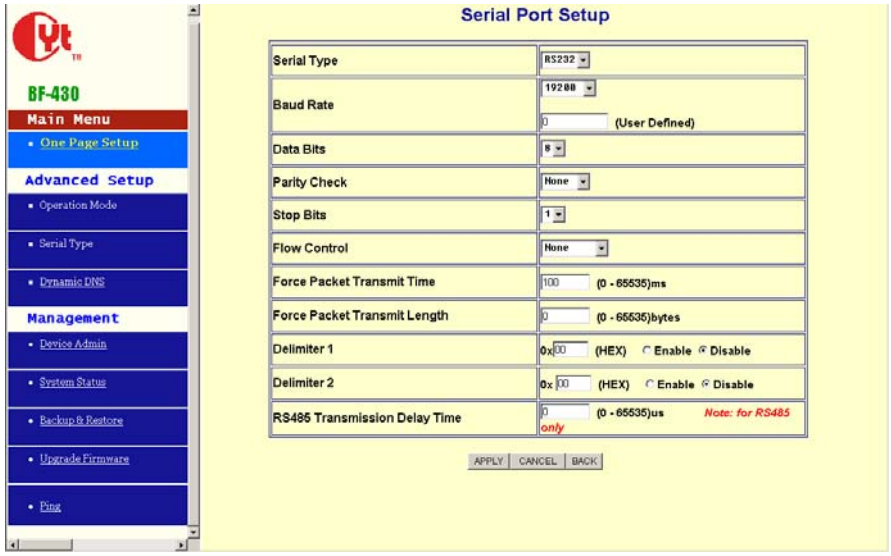


Remote Connection Port Number: default **50000**, range **0** to **65535**
Remote Host IP Address: default **0.0.0.0**
If your device is acted as active to report real-time status to remote and the data be guaranteed to be received by peer is *not* your concern, then you can set BF-450(M)/BF-430/431 as TCP Client. Be sure the value of item **Remote Connection Port Number** is same as your remote control application using and set the correct value of **Remote Host IP Address**.

4.2 Serial Type

The BF-450(M)/BF-430/431 support three serial types: RS232, RS422(optional) and RS485, These types are listed in the drop-down menu for the Serial Type setting. Each setup screen and available features will differ depending on what kind of Serial Types you select and BF-450(M)/BF-430/431 product model you buy. Default is RS232

RS232/RS485: BF-450(M)/BF-430/431
RS422: BF-431 Only



Baud Rate: default **19200**, range 1200bps to 230.4Kbps, Others
If no suitable Baud Rate in the drop-down menu, chose Others, input the value you want.

Data Bits: 5, 6, 7, **8** (default)

Parity Check: **None** (default), even, odd, mark, space

Stop Bits: **1** (default), 2

Flow Control: **None** (default), CTS/RTS (or Hardware), XON/XOFF (or Software)

Force Packet Transmit Time (ms): default **20**, range **0** to **65535**
The timing of transmitting an Ethernet packet, in order to get the whole data in on packet, you can tune this setting value to fit the data length of your device per transmission. The more small value be set will get more less data in one packet.

Delimiter 1(00 to FF): default 0x00
Delimiter 2(00 to FF): default 0x00
Once receive delimiter 1 or both delimiters through its serial port, BF-450(M)/430/431 immediately packs all data currently in buffer and send it to Ethernet port.

Force Packet Transmit Length (bytes): default **0**, range **0** to **65535**
The length of transmitting an Ethernet packet, in order to get a fix length data in on packet, you can tune this setting value to fit the data length of your device per transmission.

RS485 Only

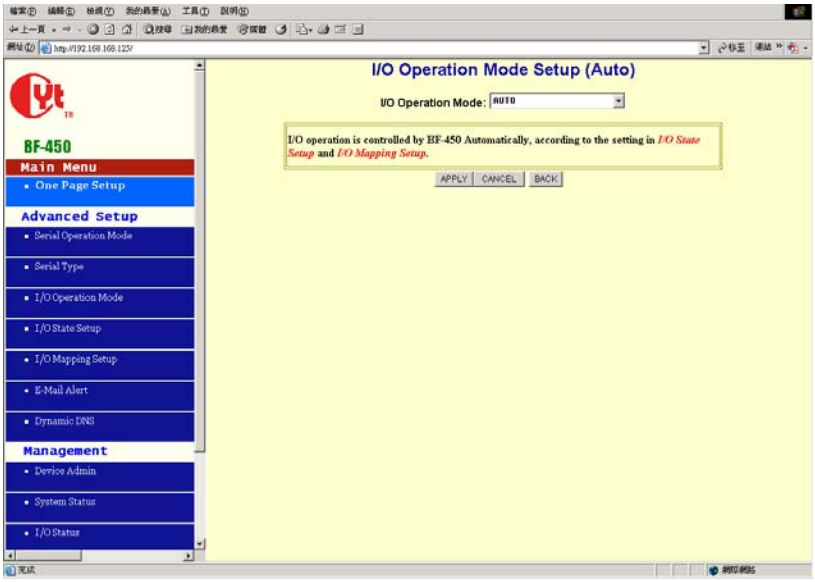
RS485 Transmission Delay Time (ms): default **0**, range **0** to **65535**
Due to different device has different capability in handling data received from serial port. So you can tune this setting value to slow down the speed of BF-450(M)/BF-430/431 to fit the speed of your device handling.

4.3 I/O Operation Mode (BF-450 Only)

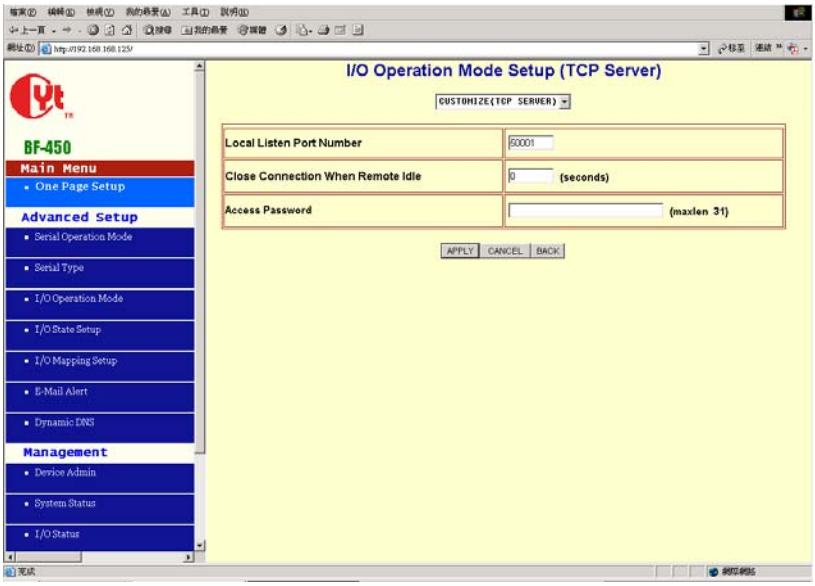
The BF-450 support 6 digital I/Os, including 3 output and 3 input with fixed setting. There are five operation modes: Auto, TCP Server, TCP Client, UDP Server, UDP Client. These modes are listed in the drop-down menu for the I/O Operation Mode setting. Each setup screen and available features will differ depending on what kind of operation mode you select. Default is Auto. It means BF-450 will monitor the state of change for all Input point automatically and trigger Output point by the setting of combination rule. Besides, BF-450 also supplies several DIO command protocols to let your remote software application fully controlling all I/O through TCP/UDP connection. Please refer to Appendix A. DIO Command Protocol for detail

Auto

Please refer to 4.4 and 4.5.



TCP Server

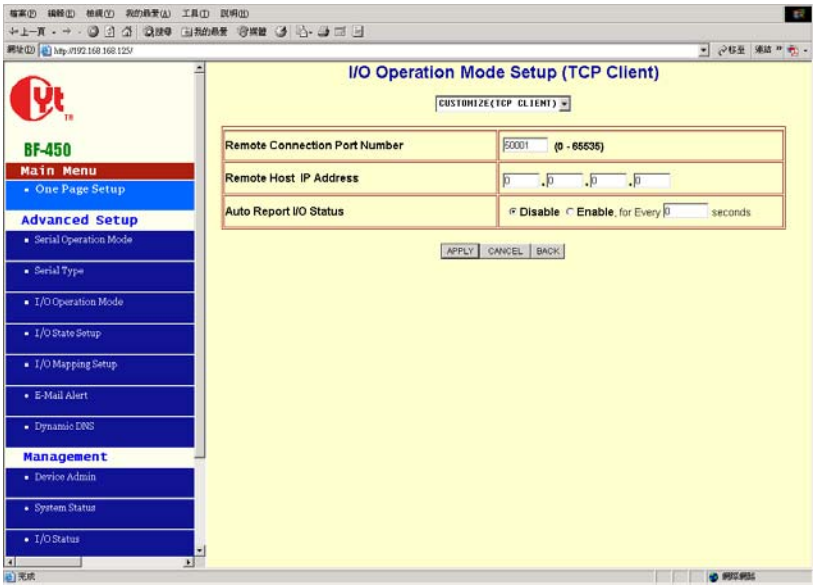


Listen Port Number: default **50001**, range **0** to **65535**
BF-450 is acted as passive to accept commands from remote and report current I/O state to peer then you can set BF-450 as TCP Server. Be sure the value of item **Listen Port Number** is same as your remote control application using.

Close Connection When Remote Idle (second): default **300**, range **0** to **32768**
If you want to keep the connection between BF-450 and your remote control application always on, then set the value of item **Close Connection When Remote Idle** to 0, otherwise, when the idle time of no any traffic on line reach the setting value, BF-450 will terminate this connection.

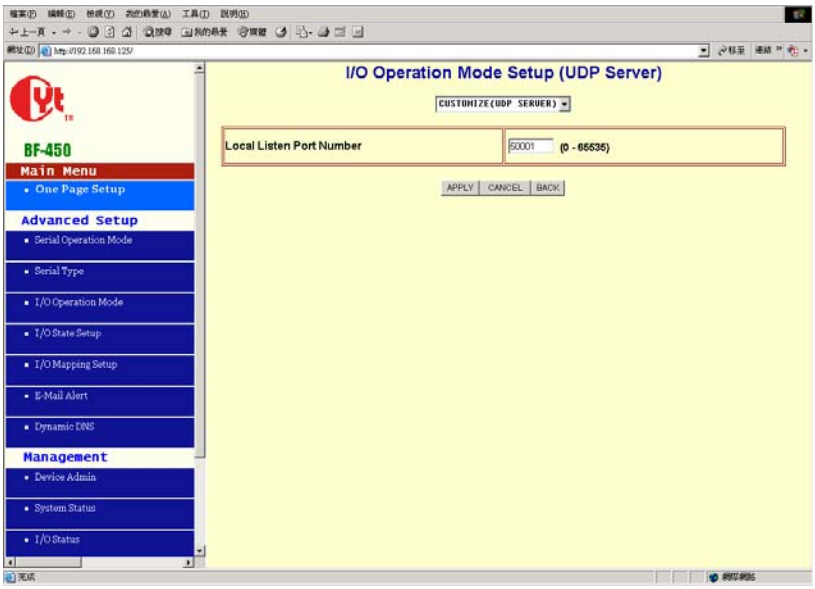
For security concern, you can input **Access Password** to protect your device, BF-450 will authenticate whether this TCP connection is valid by this password.

TCP Client



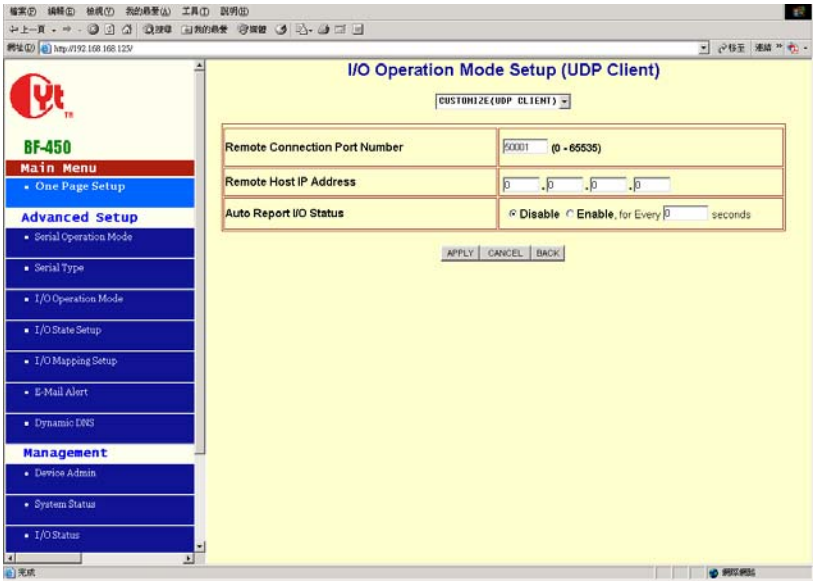
Remote Connection Port Number: default **50001**, range **0** to **65535**
Remote Host IP Address: default **0.0.0.0**
BF-450 is acted as active to report current I/O state to remote or accept commands from remote and report current I/O state to peer then you can set BF-450 as TCP Client. Be sure the value of item **Remote Connection Port Number** is same as your remote control application using and set the correct value of **Remote Host IP Address**.

UDP Server



Listen Port Number: default **50001**, range **0** to **65535**
BF-450 is acted as passive to accept commands from remote and report current I/O state to peer then you can set BF-450 as UDP Server. Be sure the value of item **Listen Port Number** is same as your remote control application using.

UDP Client

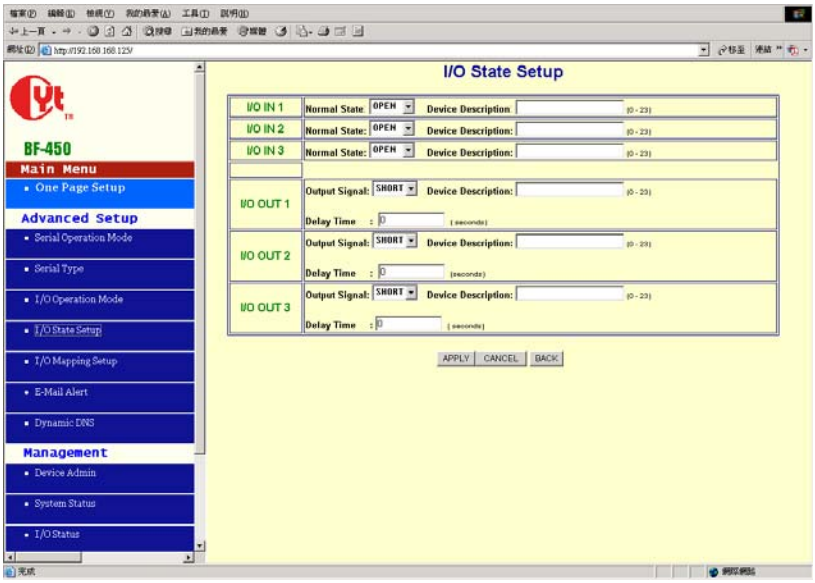


Remote Connection Port Number: default **50001**, range **0** to **65535**
Remote Host IP Address: default **0.0.0.0**
BF-450 is acted as active to report current I/O state to remote or accept commands from remote and report current I/O state to peer then you can set BF-450 as UDP Client. Be sure the value of item **Remote Connection Port Number** is same as your remote control application using and set the correct value of **Remote Host IP Address**.

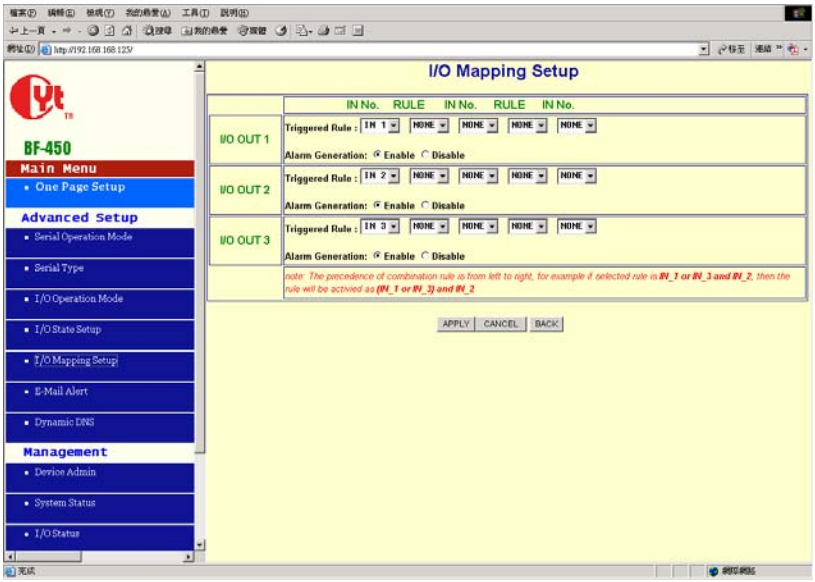
4.4 I/O State Setup (BF-450 Only)

This configuration is workable only in Auto I/O operation mode.
The **Normal State** should be configured in advance to specify the state changing between normal and abnormal when connecting with your device. The **Device Description** is for administrator to naming the device for management purpose.

The **Output Signal** is defined to the signal state output by BF-450 to inform or trigger another device. In the meantime, you can configure the **Delay Time** in second unit to last the signal for a period time. If it is set to zero, BF-450 will latch the signal until Input state back to normal. As to the trigger conditions (rules) are defined in next section.



4.5 I/O Mapping Setup (BF-450 Only)



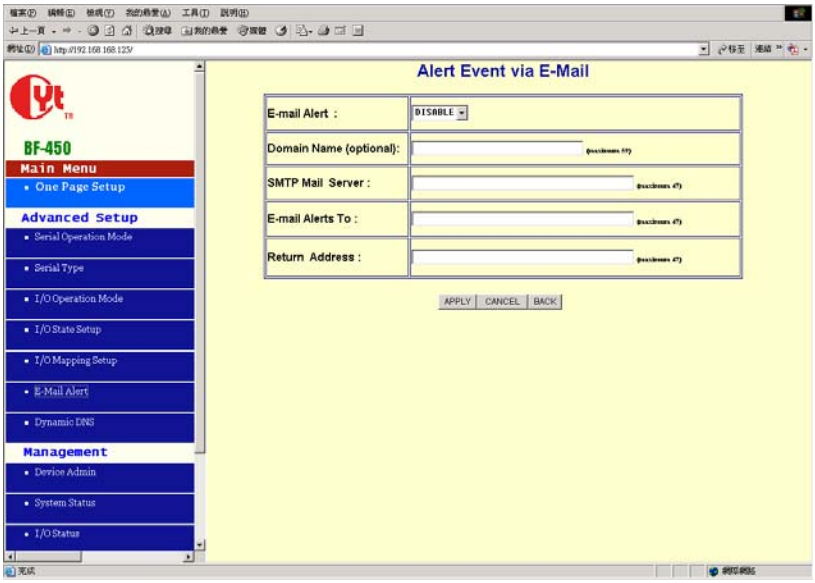
The BF-450 offers a very smart and easy method to operate I/O function. You do not need to own any programming background. All you need to do is just making the relationship rules with each I/O. For example, if two devices (dev1, dev2) connected to **IN1** and **IN2**, another device (dev3) connected to **OUT1**, the trigger condition is the status change happened in both dev1 and dev2, in this case, you can select the **OUT1**'s rule as **IN1** AND **IN2**. By using BF-450's logical rule to combine all condition you want.

Note: the priority of logical combination rule is from left to right, suppose the rule you select is IN1 or IN3 and IN2, the BF-450 will treat this rule as (IN1 or IN3) and IN2.

The **Alarm Generation** allows you to set enable or disable alarm generation function (detail see the 4.6 E-mail Alert).

4.6 E-Mail Alert (BF-450 Only)

The BF-450 allows you send E-Mail to alert the event of I/O state changing. This service default is disabled.



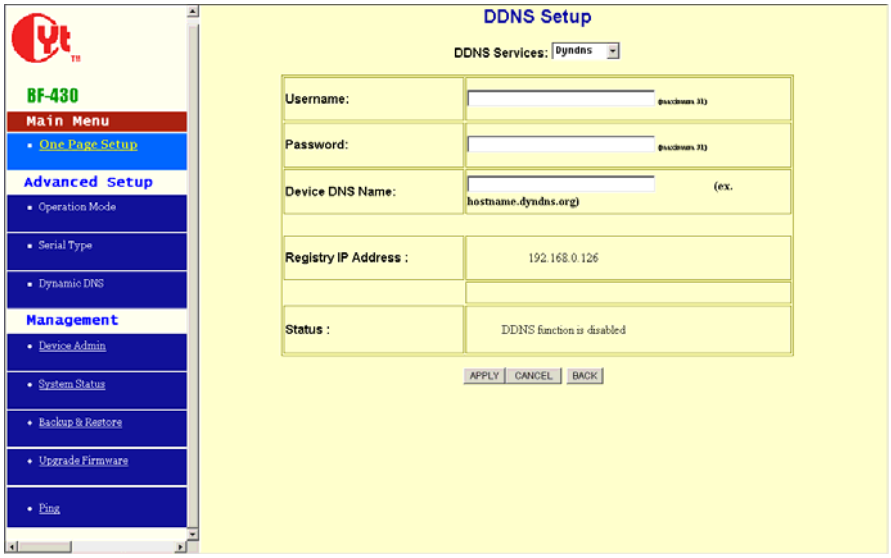
E-mail Alert: default **DISABLE**
Domain Name (optional): no default, maximum length **59** characters
SMTP Mail Server: no default, maximum length **27** characters
E-mail Alerts To: no default, maximum length **27** characters
Return Address: no default, maximum length **27** characters

Select ENABLE in **E-mail Alert**
Enter the **Domain Name** in this field if needed. **(this is optional)**
Enter the **SMTP Mail Server** in the field.
Enter the e-mail account you want to reach or notice in the field of **E-mail Alerts To**.
Enter the e-mail account you want to return in the field of **Return Address**.

4.7 Dynamic DNS

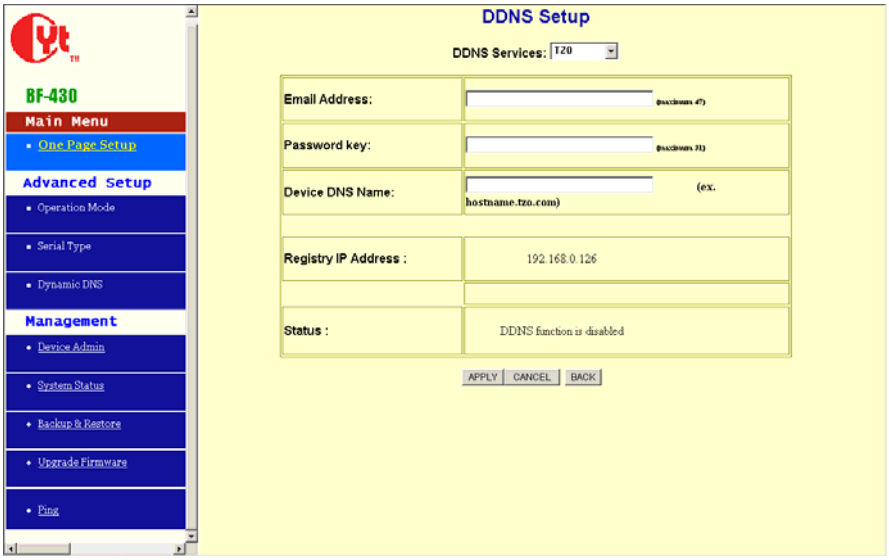
The BF-450(M)/BF-430/431 offers a Dynamic Domain Name System (DDNS) feature. DDNS lets you assign a fixed host and domain name to a dynamic Internet IP address. It is useful when you want to access your device through Internet without static IP address. Before you can use this feature, you need to sign up for DDNS service at *www.dyndns.org* or *www.tzo.com* , two DDNS service provider. This service default is disabled.
If your DDNS service is provided by DynDNS.org, then select **DynDNS** in the drop-down menu. If your DDNS service is provided by TZO, then select **TZO**. The features available on the DDNS screen will vary, depending on which DDNS service provider you use. (Detail sees Appendix B)

Dyndns.org



User Name: no default, maximum length **31** characters
Password: no default, maximum length **31** characters
Device DNS Name: no default, maximum **47** characters
Enter the **User Name, Password, and Device DNS Name** of the account you set up with DynDNS.org.
Registry IP Address. The BF-450(M)/BF-430/431's current Internet IP Address is displayed here. Because it is dynamic, it will change.
Status. The status of the DDNS service connection is displayed here.

Tzo.com

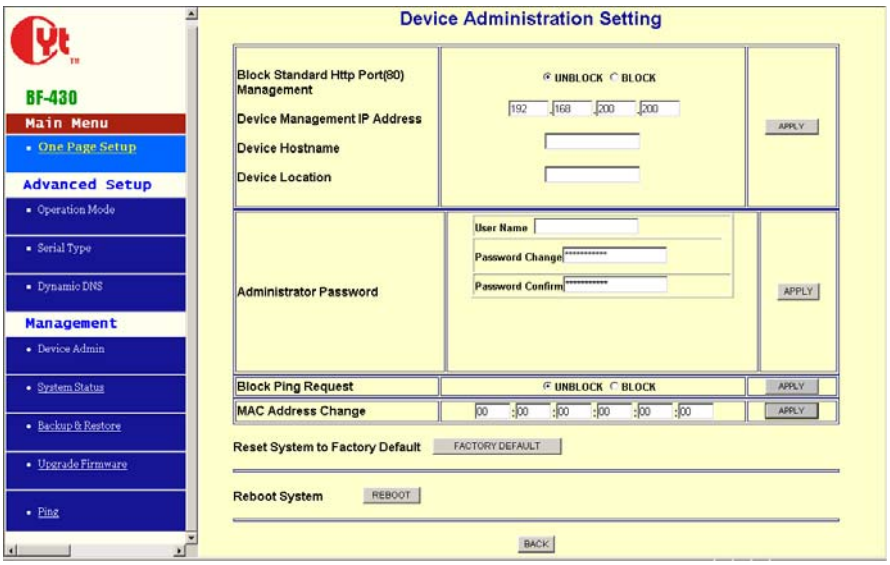


Email Address: no default, maximum length **47** characters
Password key: no default, maximum length **31** characters
Device DNS Name: no default, maximum **47** characters
Enter the **Email Address, Password Key,** and **Device DNS Name** of the service you set up with TZO.
Registry IP Address. The BF-450(M)/BF-430/431's current Internet IP Address is displayed here. Because it is dynamic, this will change.
Status. The status of the DDNS service connection is displayed here.

5. BF-450(M)/BF-430/431 Management Setup

This chapter will show you how to manage BF-450(M)/BF-430/431's access setting as well as configure E-mail alert and firmware upgrade.

5.1 Device Admin



Block Standard HTTP Port(80) Management: default **UNBLOCK**
If for some reason, the HTTP (80) service is blocked in your network environment and result to fail to configure or manage BF-450(M)/BF-430/431, then you select **BLOCK** this function with using port **8080**, instead of standard port 80. So you should enter: http://192.168.168.125:8080 in your browser.

Device Management IP Address: default **192.168.200.200**
In case, you forgot the BF-450(M)/BF-430/431's IP address you ever set, this management IP can be used to connect to BF-450(M)/BF-430/431 to figure out what's the current IP address be used.

In case, you set BF-450(M)/BF-430/431's IP Configuration as DHCP or PPPoE which will assign dynamic IP address to BF-450(M)/BF-430/431, you also can use this management IP address to find what the current working IP address in Intranet is.

Note: If you forgot the IP address setting even management IP address, please use the broadcast utility we offer in CD to search it.

Device Hostname: default **BF430**, maximum length **15** characters
To describe the name of BF-450(M)/BF-430/431 for manage purpose.

Device Location: no default, maximum length **15** characters
To describe the location of BF-450(M)/BF-430/431 for manage purpose.
Administrator Password
User Name: default **admin**
Password: default **admin**
To ensure the BF-450(M)/BF-430/431's security, you will be asked for your password when you access the BF-450(M)/BF-430/431's Web-based Utility.
User Name: Enter the user name to one of your choice.
Password: It is recommended that you change the default password to one of your choice.
Password Confirm: Re-enter theBF-450(M)/BF-430/431's new Password to confirm it.

Block Ping Request: default **UNBLOCK**
To prevent hacker intruding your network, check the **BLOCK** option to enable this function to reject the PING requests from Internet.

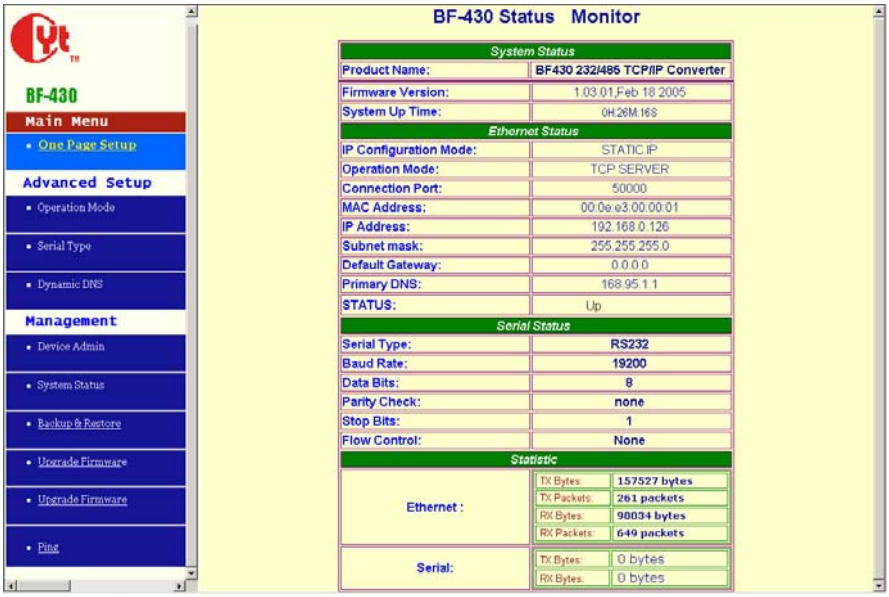
MAC Address Change
The BF-450(M)/BF-430/431's MAC address can be changed from the original values if necessary. Some ISPs require users to change the MAC address to a registered one when users change their access equipment. (Detail sees Appendix D)

Reset System to Factory Default
Click **"Apply",** if you want to return all the BF-450(M)/BF-430/431's current settings to its factory default. *Note: do not restore the factory defaults unless it is absolutely necessary.*

Reboot System
Click **"Apply",** if you want to clear a connection, reboot, and re-initialize the unit without affecting any of your configuration setting.

5.2 Device Status

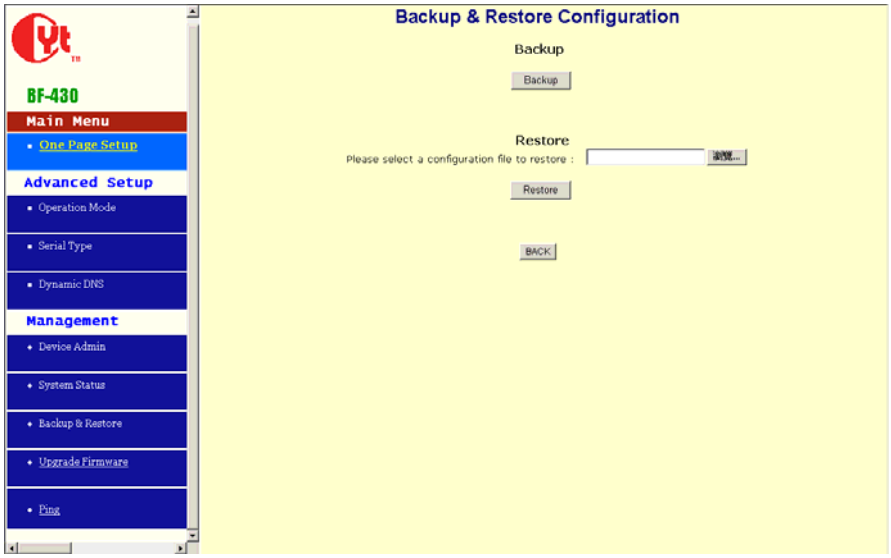
This screen shows the BF-450(M)/BF-430/431's current status. All of the information provided is read-only.



Product Name: the product model name of this BF-450(M)/BF-430/431.
Firmware Version: the installed version of the firmware.
System up Time: the time of system from start up to current.
Management IP Address: the current setting of management IP.
Ethernet Status: the BF-450(M)/BF-430/431's IP Configuration, MAC address, IP address, subnet mask, default gateway IP address, primary DNS IP address and current connection status.
Serial Status: the BF-450(M)/BF-430/431's setting in serial type
Statistic: the transmission and receive bytes and packets count in Ethernet and Serial port separately.

5.3 Backup and Restore

This function allows you to save BF-450(M)/BF-430/431's configuration as backup, or retrieve the configuration file you saved before to turn the setting back.

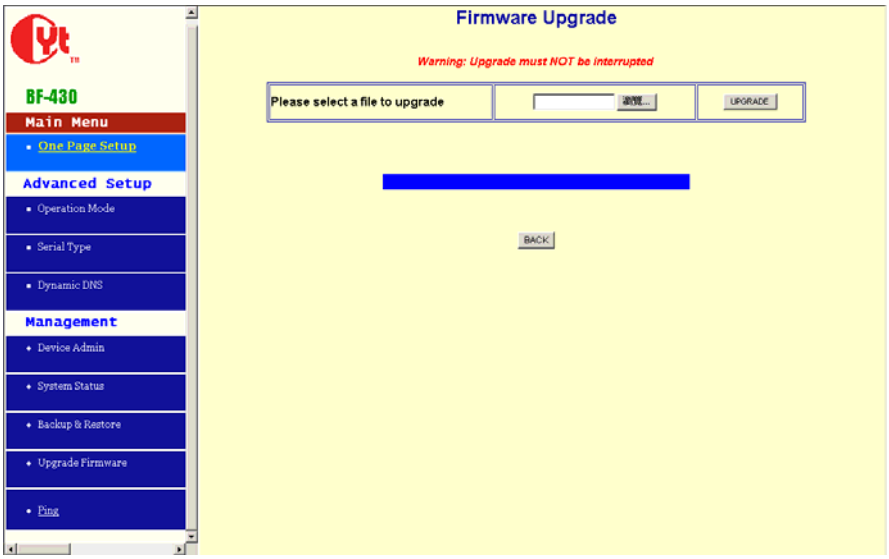


Backup: Click "Backup" button save the current configuration as a backup file in your hard disk.
Restore: Enter path of the configuration file you saved on the PC. You can click "Browse" to view the folders and select the file. Click "Restore" to retrieve it.

Note: the sub-name of file you retrieve must be ".cfg"

5.4 Upgrade Firmware

This function allows you to upgrade the latest version firmware to keep your BF-450(M)/BF-430/431 up-to-date. Before you upgrade the firmware, you have to get the latest firmware and save it on the PC you use to configure the BF-450(M)/BF-430/431.



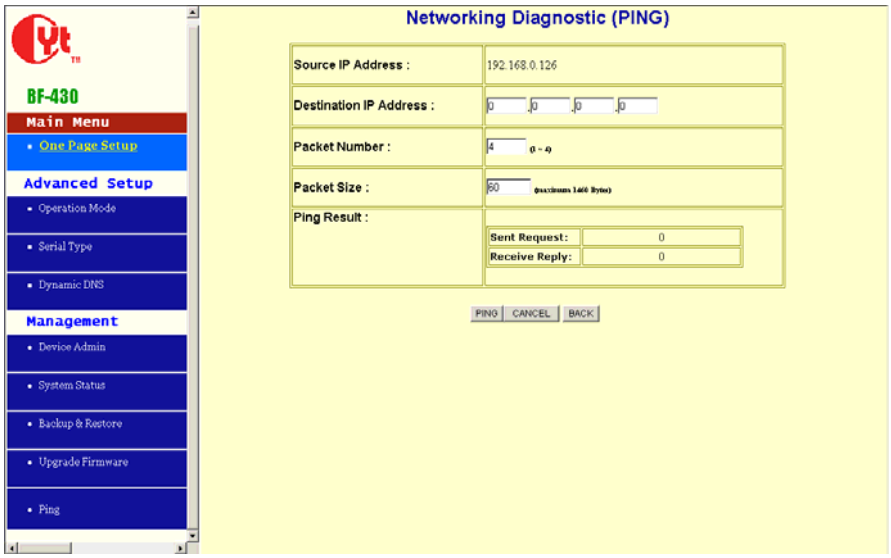
Browse: To select a file to upgrade, you have to enter path of the latest firmware you saved on the PC. You can choose "**Browse**" to view the folders and select the firmware.

Upgrade: After you enter or select the path, click "**Upgrade**" to start the firmware upgrade process**.**

Note: don't power off the router during the firmware upgrading, otherwise the incompletion of firmware upgrading will cause serious damage to the integrity of the BF-450(M)/BF-430/431's firmware that will lead to fail to boot the BF-450(M)/BF-430/431 again.

5.5 Ping

This function allows you to test the connection between BF-450(M)/BF-430/431 and LAN or between BF-450(M)/BF-430/431 and Internet.



Source IP Address: the current BF-450(M)/BF-430/431's IP address (Read Only).
Destination IP Address: the IP Address of destination device you want to ping.
Packet Number: the packet numbers you wish to use to ping the destination device. The maximum numbers are **4**.
Packet Size: the numbers of packet size you wish to use to ping the destination device. The maximum packet sizes are **60**.
Ping Result: The result will show the numbers of sending packet, numbers of packet receiving (Read Only).

6. Troubleshooting

PROBLEM	CORRECTIVE ACTION
None of the LEDs turn on when you turn on the BF-450(M)/BF-430/431	Make sure that you have correct power connected to BF-450(M)/BF-430/431 and plugged in to an appropriate power source. Check all cables connections. If the LEDs still do not turn on, you may have a hardware problem. In this case, you should contact your local vendor.
Can not access BF-450(M)/BF-430/431 from Ethernet	Check cable connection between BF-450(M)/BF-430/431 and computer or hub. Ping BF-450(M)/BF-430/431 from computer. Make sure your computer Ethernet card is installed and functioning properly.
Can not ping any computer on the LAN	If the 10/100M LED are off, check the cable connection between BF-450(M)/BF-430/431 and your computer. Verify that the IP address and subnet mask of the B-450(M)/BF-430 and computer are in the same IP address range.
Can not access BF-450(M)/BF-430/431 from Serial	Check the Serial cable connection between BF-450(M)/BF-430/431 and your device. Verify that the BF-450(M)/BF-430/431 setting of Serial type is same as your device and make sure the hardware jumper is in the correction position.

Appendix A: Product Specifications

Hardware	
processor	80186
Memory	512 KB
Interface	
LAN	Auto-detection 100 Base-T(10/100 Mbps)
Serial	RS-232、RS-485
No. of serial interface	1
Signals	RS-232：TxD, Rxd, RTS, CTS, DTR, DSR, DCD, GND RS-485：data+, data-
Performance	
Speed	50 bps ~ 230 Kbps
Configuration	
Parity	None, even, odd, Mark, Space
Data bits	5, 6, 7, 8
Stop bits	1, 2(with parity setting of None)
OS Support	Windows 98/2000/XP
Protocol	TCP, IP, UDP, Telnet,RTelnet,DHCP, ICMP
Management	Serial console, Telnet console
Windows Utility	IP-Search program, Firmware Upgrade by web
Power and Environment	
Power requirements	DC 9V, 300 mA max DC 12V, 230 mA max DC 24V, 160 mA max
Operting temp.	0 ~ 55℃
Dimensions	BF-450M：26X65X7 mm BF-450：81X103X30 mm BF-430：67X93X22 mm
Regulatory approval	FCC, CE

Appendix B: DIO Command Protocol

In this appendix the DIO command protocol is described here to let customer's remote management software to access Digital I/O state through Ethernet network by a specific TCP/UDP port(default is 50001).

Command Packet Format:

Length(Bytes)	2	2	32	32	2	1
Format	Start Flag	Command	Data1	Data2	End Flag	CRC

Send command to BF-450 by one of four ways (TCP Server/TCP Client/UDP Server/UDP Client)

Return Packet Format:

Length(Bytes)	2	2	32	32	2	1
Format	Start Flag	Command Status	Data1	Data2	End Flag	CRC

The BF-450 returns by Return packet. You can get command status to know the result after sending command packet and from Data1 and Data2 to know current I/O state.

Note:
Start Flag: 0xF0F0
End Flag: 0xF0F0
Command Status: the definition of command code is as following
0x0002 – ACK of Read Digital I/O state
0x0004 – ACK of Trigger Digital I/O
0x0006 – ACK of E-mail Alarm Trigger
0x0010 – Report current Digital I/O state (If I/O Operation Mode of BF-450 is set as TCP Client or UDP Client and Auto Report I/O Status is enabled, you will receive this report packet from BF-450)
0xFFFC – Flag error, incorrect Start Flag or End Flag received in command packet
0xFFFD – Length error, the length of command packet is invalid
0xFFFE – CRC error, incorrect CRC value
0xFFFF – Command error, no such command
CRC value = 0 – total sum from field of 'Start Flag" to "End Flag"

The format of each command code is as following:

1. Read Digital I/O state

Length(Bytes)	2	2	32	32	2	1
	0xF0F0	0x0001	Xxx (don't care)	Xxx (don't care)	0xF0F0	CRC

Return Successful Packet

Length(Bytes)	2	2	32	32	2	1
	0xF0F0	0x0002	Data1	Data2	0xF0F0	CRC

Data1

Data[0]	Data[1]	Data[2]	Data[3]					Data[30]	Data[31]
IN-1	IN-2	IN-3	reserved					reserved	reserved

IN-1: state of IN1, 0 for SHORT, 1 for OPEN
IN-2: state of IN2, 0 for SHORT, 1 for OPEN
IN-3: state of IN3, 0 for SHORT, 1 for OPEN

Data2

Data[0]	Data[1]	Data[2]	Data[3]					Data[30]	Data[31]
OUT-1	OUT-2	OUT-3	reserved					reserved	reserved

OUT-1: state of OUT1, 0 for SHORT, 1 for OPEN
OUT-2: state of OUT2, 0 for SHORT, 1 for OPEN
OUT-3: state of OUT3, 0 for SHORT, 1 for OPEN

2. Trigger Digital I/O

Length(Bytes)	**2**	**2**	**32**	**32**	**2**	**1**
	0xF0F0	**0x0003**	**Data1**	**Xxx (don't care)**	**0xF0F0**	**CRC**

Data1

Data[0]	Data[1]	Data[2]	Data[3]					Data[30]	Data[31]
OUT-1	OUT-2	OUT-3	reserved					reserved	reserved

OUT-1: the value you want to write into OUT1, 0 for SHORT, 1 for OPEN
OUT-2: the value you want to write into OUT2, 0 for SHORT, 1 for OPEN
OUT-3: the value you want to write into OUT3, 0 for SHORT, 1 for OPEN

Return Successful Packet

Length(Bytes)	**2**	**2**	**32**	**32**	**2**	**1**
	0xF0F0	**0x0004**	**Xxx (don't care)**	**Xxx (don't care)**	**0xF0F0**	**CRC**

3. E-mail Alarm Trigger

Length(Bytes)	**2**	**2**	**32**	**32**	**2**	**1**
	0xF0F0	**0x0005**	**Alarm Message Description**		**0xF0F0**	**CRC**

Alarm Message Description: string of alarm message by customer attach and BF-450 send this content by e-mail

Return Successful Packet

Length(Bytes)	**2**	**2**	**32**	**32**	**2**	**1**
	0xF0F0	**0x0006**	**Xxx (don't care)**	**Xxx (don't care)**	**0xF0F0**	**CRC**

4. Report Current I/O State Packet(sending from BF-450)

Length(Bytes)	**2**	**2**	**32**	**32**	**2**	**1**
	0xF0F0	**0x0010**	**Data1**	**Data2**	**0xF0F0**	**CRC**

Data1

Data[0]	Data[1]	Data[2]	Data[3]					Data[30]	Data[31]
IN-1	IN-2	IN-3	reserved					reserved	reserved

IN-1: state of IN1, 0 for SHORT, 1 for OPEN
IN-2: state of IN2, 0 for SHORT, 1 for OPEN
IN-3: state of IN3, 0 for SHORT, 1 for OPEN

Data2

Data[0]	Data[1]	Data[2]	Data[3]					Data[30]	Data[31]
OUT-1	OUT-2	OUT-3	reserved					reserved	reserved

OUT-1: state of OUT1, 0 for SHORT, 1 for OPEN
OUT-2: state of OUT2, 0 for SHORT, 1 for OPEN
OUT-3: state of OUT3, 0 for SHORT, 1 for OPEN

Appendix C: DDNS

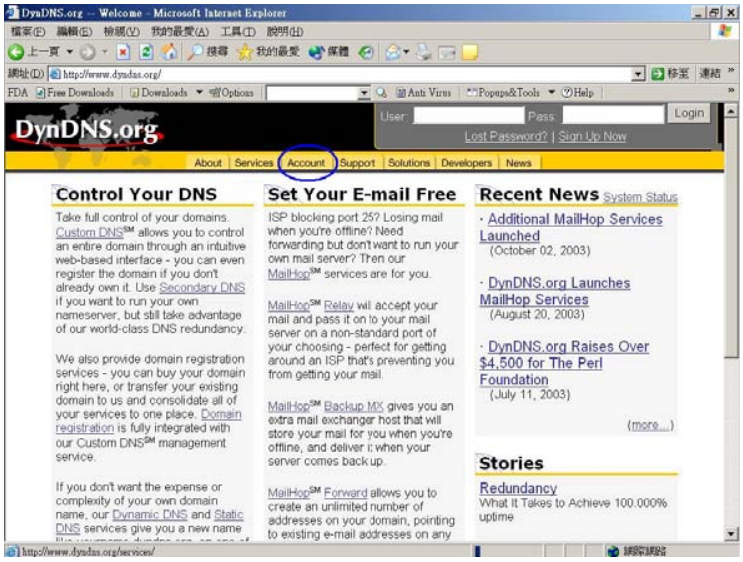
Internet actually runs on IP Addresses which are numerical order, for example “63.208.196.100”. These IP Address identify the location of each device connected to Internet. However, the human brain does not easily remember this numbering system, so a system that allocate domain name such as “www.dyndns.org” provides an easier method. If you type “63.208.196.100” or “www.dyndns.org” in the web browser’s address bar, the browser will show the same web page. This is because both methods relate to the same web server. The **“Domain Name Servers”** used to manage the Internet will translate “www.dyndns.org” into the IP Address “63.208.196.100” in order to allow your browser to find the web server and display the correct web page in your browser.

If your “IP Configuration”, as shown in 3.2 section, is “PPPoE”, or “DHCP” with dynamic IP address assigned by ISP, your IP address may change each time you initiate the connection to your ISP. The DDNS function will help to map your IP address to your domain name when your ISP assigns a new dynamic IP Address.

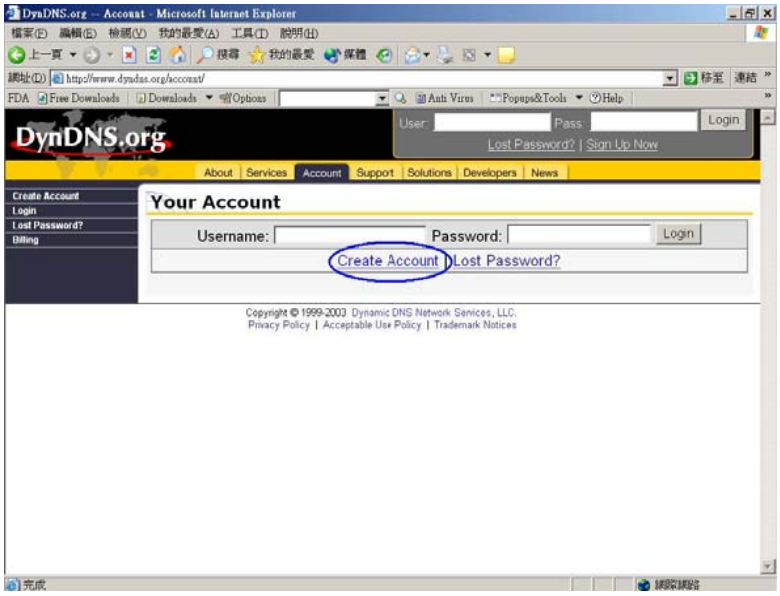
Note that this DDNS function acts as the client appliance of DDNS service and is only able to be use in conjunction with the service provided by DynDNS.org and TZO.com. Before you begin using this function, you will need to apply to DynDNS.org or TZO.com to be able to use the service. Please visit www.dyndns.org or www.tzo.com for further information.

How to register from Dyndns.org

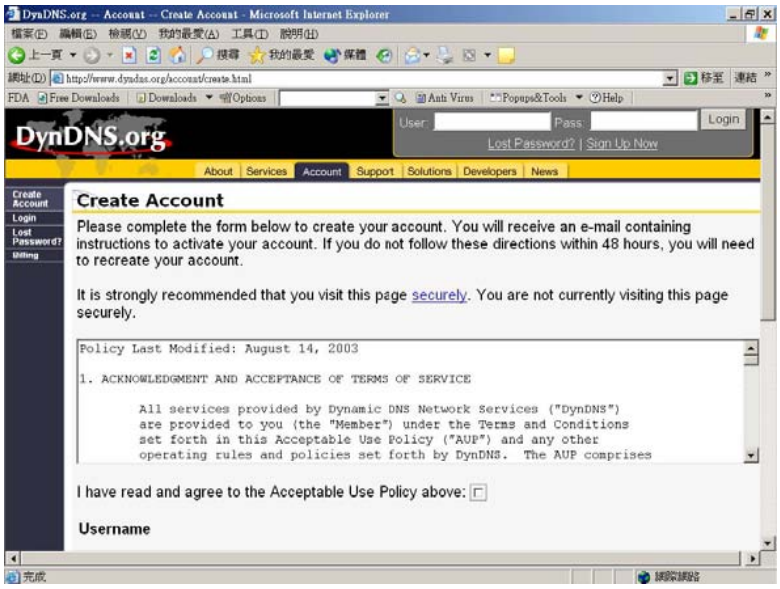
Step 1: Enter the web side www.dyndns.org in Browser, click the tab of **Account**.



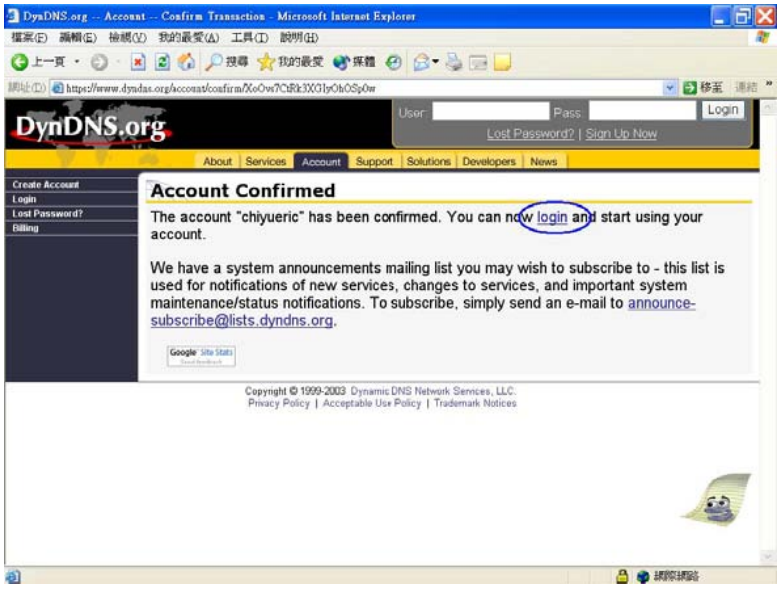
Step 2: click **Create Account**.



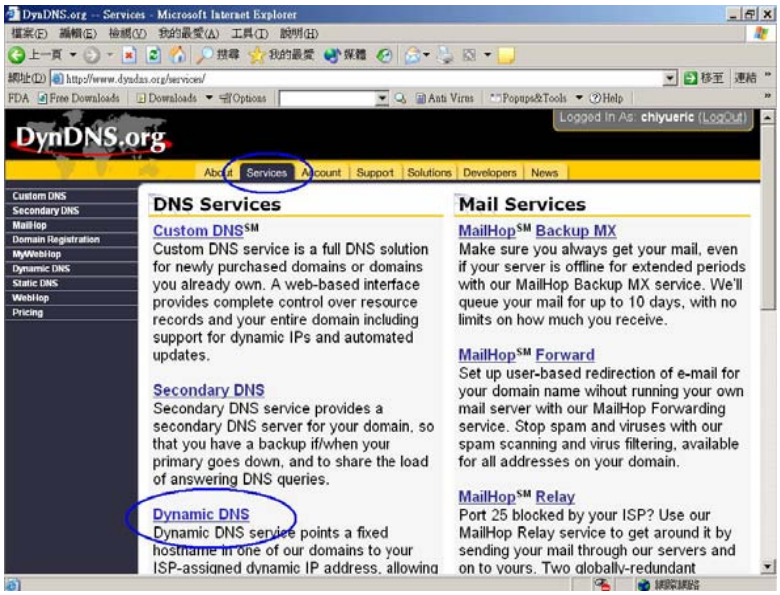
Step 3: Fill the field of Username , E-mail and Password. You will receive an e-mail containing instructions to activate your account.



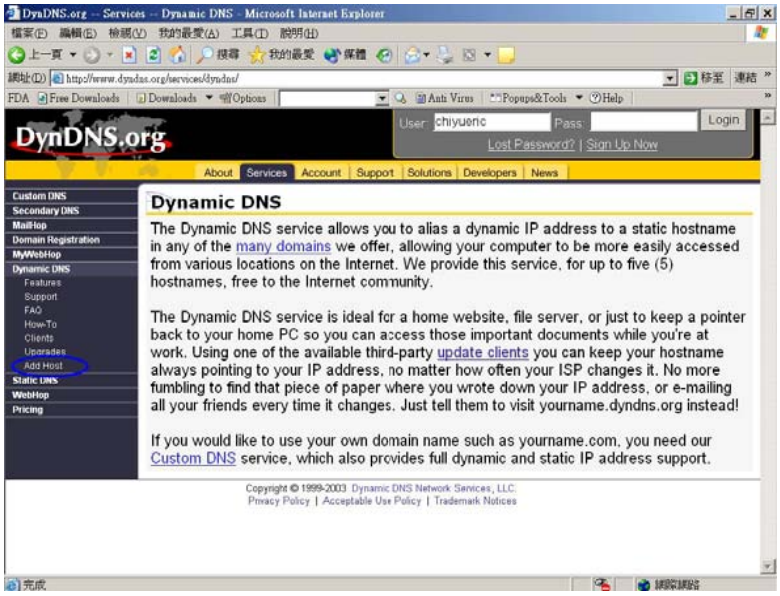
Step 4: Once you receive the confirmed e-mail, **login** with your Username and Password.



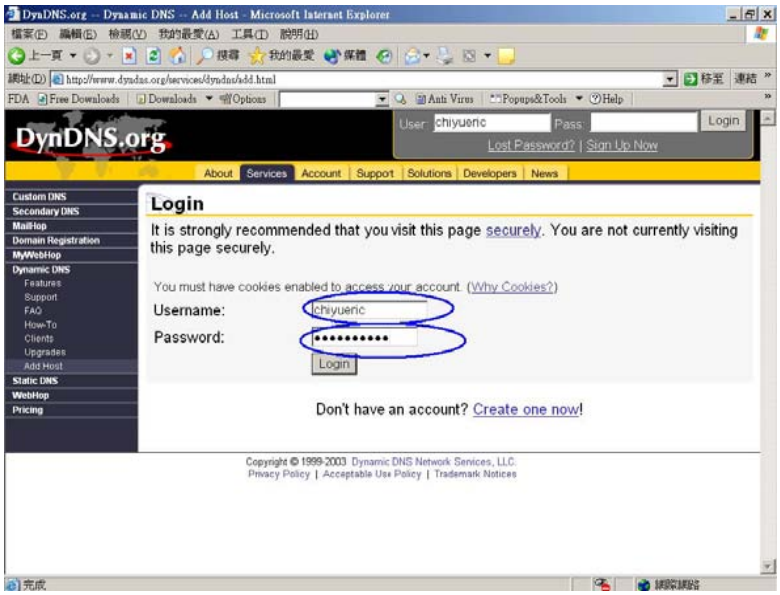
Step 5: Click the tab of **Services**, then click **Dynamic DNS**.



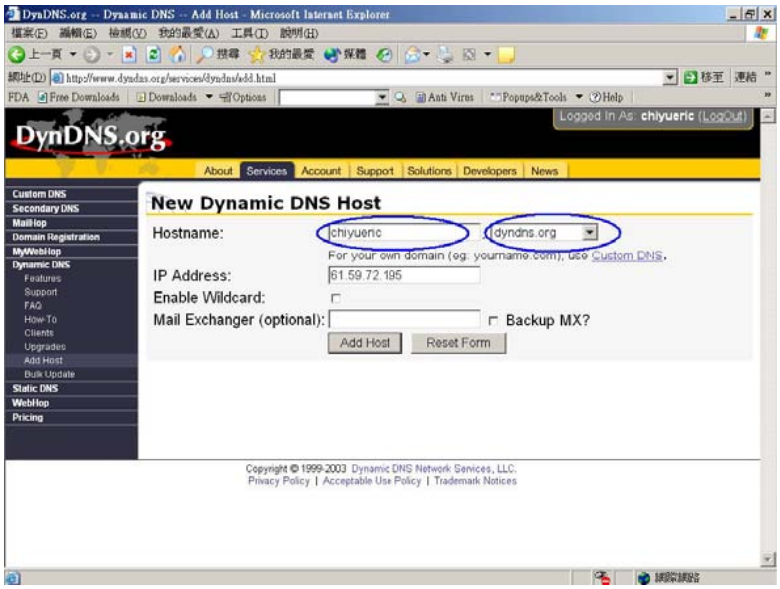
Step 6: select **Add Host** in the left side of screen.



Step 7: Login again with your **Username** and **Password**.



Step 8: Enter the **Hostname** you want to use and select **dyndns.org** from the drop-down menu, click the button of **Add Host** to finish register.

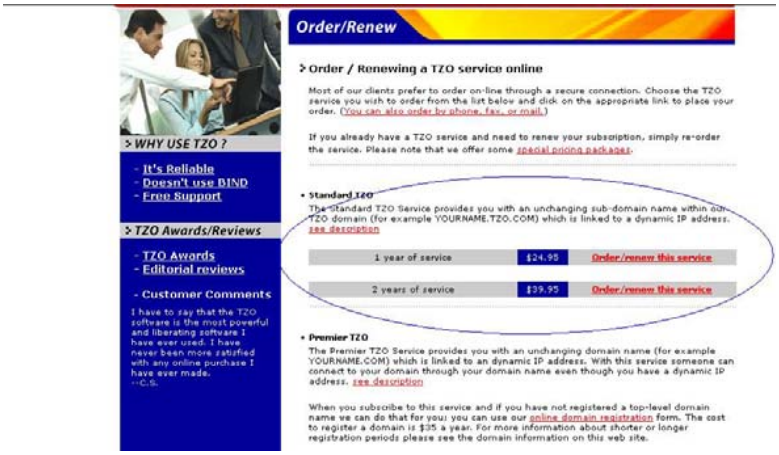


Step 9: now you should enter the Username, Password and Hostname (named Device DNS Name in BF-450(M)/BF-430/431) into BF-450(M)/BF-430/431 to enable this function.

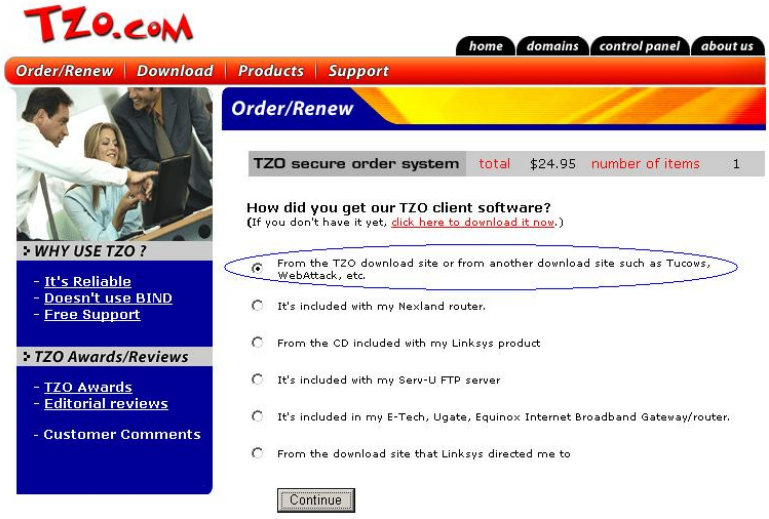
How to register from TZO.com

Step 1: Enter the web side www.tzo.com in Browser, select the **Order/Renew** from top screen.

Step 2: You can choice what's kind of service you need, here we suggest the **Standard TZO** with 1 year of service

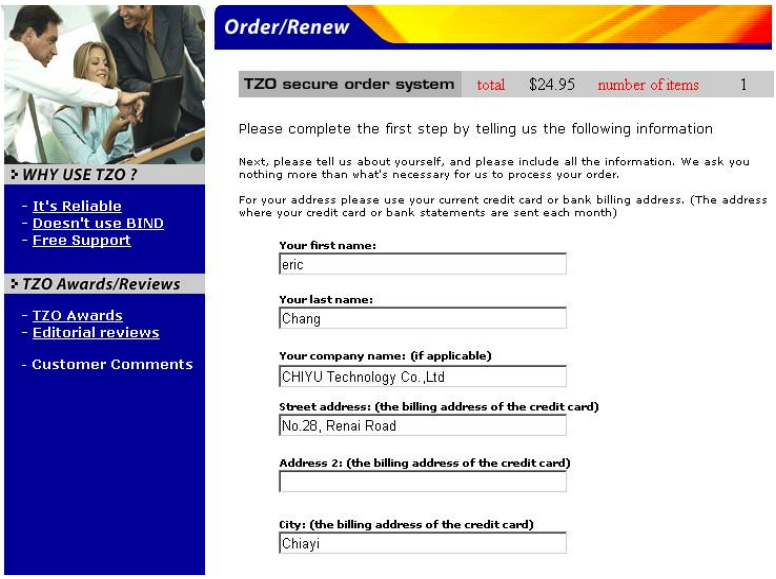


Step 3: Select the first radio button, click **Continue** button.



Step 4: Enter the TZO name you want to register, such as chiyu.tzo.com, and your E-mail address which can reach you. If you don't have a TZO name yet, please check the box under the field of E-mail address, click **Continue with order**

Step 5: complete the form with your information TZO want.



Step 6: TZO will send an e-mail letter to inform your TZO key, please enter these information including E-mail address, TZO key and TZO name (named Device DNS Name in BF-450M) into BF-450M to enable this service.

Appendix D: Glossary

10BaseT - An Ethernet standard that uses twisted wire pairs.

100BaseTX - IEEE physical layer specification for 100 Mbps over two pairs of Category 5 UTP or STP wire.

Adapter - Printed circuit board that plugs into a PC to add to capabilities or connectivity to a PC. In a networked environment, a network interface card (NIC) is the typical adapter that allows the PC or server to connect to the intranet and/or Internet.

Auto-MDI/MDIX - On a network hub or switch, an auto-MDI/MDIX port automatically senses if it needs to act as a MDI or MDIX port. The auto-MDI/MDIX capability eliminates the need for crossover cables.

Auto-negotiate - To automatically determine the correct settings. The term is often used with communications and networking. For example, Ethernet 10/100 cards, hubs, and switches can determine the highest speed of the node they are connected to and adjust their transmission rate accordingly.

Browser - A browser is an application program that provides a way to look at and interact with all the information on the World Wide Web or PC. The word “browser” seems to have originated prior to the Web as a generic term for user interfaces that let you browse text files online.

Cable Modem - A device that connects a computer to the cable television network, which in turn connects to the Internet. Once connected, cable modem users have a continuous connection to the Internet. Cable modems feature asymmetric transfer rates: around 36 Mbps downstream (from the Internet to the computer), and from 200 Kbps to 2 Mbps upstream (from the computer to
the Internet).

CAT 5 - ANSI/EIA (American National Standards Institute/Electronic Industries Association) Standard 568 is one of several standards that specify “categories” (the singular is commonly referred to as “CAT”) of twisted pair cabling systems (wires, junctions, and connectors) in terms of the data rates that they can sustain. CAT 5 cable has a maximum throughput of 100 Mbps and is usually utilized for 100BaseTX networks.

CTS (**C**lear **T**o **S**end) - An RS-232 signal sent from the receiving station to the transmitting station that indicates it is ready to accept data.

Data Packet - One frame in a packet-switched message. Most data communications is based on dividing the transmitted message into packets. For example, an Ethernet packet can be from 64 to 1518 bytes in length.

Default Gateway - The routing device used to forward all traffic that is not addressed to a station within the local subnet.

Download - To receive a file transmitted over a network. In a communications session, download means receive, and upload means transmit.

Dynamic IP Address - An IP address that is automatically assigned to a client station in a TCP/IP network, typically by a DHCP server. Network devices that serve multiple users, such as servers and printers, are usually assigned static IP addresses.

Ethernet - IEEE standard network protocol that specifies how data is placed on and retrieved from a common transmission medium. Has a transfer rate of 10 Mbps. Forms the underlying transport vehicle used by several upper-level protocols, including TCP/IP and XNS.

DDNS (**D**ynamic **D**omain **N**ame **S**ystem) - Allows a network device with a dynamic Internet IP address to have a fixed host and domain name, such as *myhostname.mydomainname.com*. It is useful when you are hosting your own website, FTP server, or other server behind a router, so people can find your site no matter how often the Internet IP address changes. Using DDNS requires registering with a DDNS service provider on the Internet.

DHCP (**D**ynamic **H**ost **C**onfiguration **P**rotocol) - A protocol that lets network administrators centrally manage and automate the assignment of Internet Protocol (IP) addresses in an organization's network. Using the Internet's set of protocol (TCP/IP), each machine that can connect to the Internet needs a unique IP address. When an organization sets up its computer users with a connection to the Internet, an IP address must be assigned to each machine. Without DHCP, the IP address must be entered manually at each computer and, if computers move to another location in another part of the network, a new IP address must be entered. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network. DHCP uses the concept of a "lease" or amount of time that a given IP address will be valid for a computer. The lease time can vary depending on how long a user is likely to require the Internet connection at a particular location. It's especially useful in education and other environments where users change frequently. Using very short leases, DHCP can dynamically reconfigure networks in which there are more computers than there are available IP addresses. DHCP supports static addresses for computers containing Web servers that need a permanent IP address.

DNS - The Domain Name System (DNS) is the way that Internet domain names are located and translated into Internet Protocol (IP) addresses. A domain name is a meaningful and easy-to-remember "handle" for an Internet address.

Domain - A sub network comprised of a group of clients and servers under the control of one security database. Dividing LANs into domains improves performance and security.

Firmware - Code that is written onto read-only memory (ROM) or programmable read-only memory (PROM). Once firmware has been written onto the ROM or PROM, it is retained even when the device is turned off.

Full Duplex - The ability of a device or line to transmit data simultaneously in both directions.

Gateway – A device that interconnects networks with different, incompatible communications protocols.

Half Duplex - Data transmission that can occur in two directions over a single line, but only one direction at a time.

Hardware - Hardware is the physical aspect of computers, telecommunications, and other information technology devices. The term arose as a way to distinguish the "box" and the electronic circuitry and components of a computer from the program you put in it to make it do things. The program came to be known as the software.

Hub - The device that serves as the central location for attaching wires from workstations. Can be passive, where there is no amplification of the signals; or active, where the hubs are used like repeaters to provide an extension of the cable that connects to a workstation.

HTTP (**H**yper**T**ext **T**ransport **P**rotocol) - The communications protocol used to connect to servers on the World Wide Web. Its primary function is to establish a connection with a Web server and transmit HTML pages to the client browser.

MAC Address - The MAC (Media Access Control) address is a unique number assigned by the manufacturer to any Ethernet networking device, such as a network adapter, that allows the network to identify it at the hardware level.

Mbps (**M**ega**B**its **P**er **S**econd) - One million bits per second; unit of measurement for data transmission.

IP Address - In the most widely installed level of the Internet Protocol (IP) today, an IP address is a 32-binary digit number that identifies each sender or receiver of information that is sent in packets across the Internet. When you request an HTML page or send e-mail, the Internet Protocol part of TCP/IP includes your IP address in the message (actually, in each of the packets if more than one is required) and sends it to the IP address that is obtained by looking up the domain name in the Uniform Resource Locator you requested or in the e-mail address you're sending a note to. At the other end, the recipient can see the IP address of the Web page requestor or the e-mail sender and can respond by sending another message using the IP address it received.

IPCONFIG - A utility that provides for querying, defining and managing IP addresses within a network. A commonly used utility, under Windows NT and 2000, for configuring networks with static IP addresses.

ISP - An ISP (Internet service provider) is a company that provides individuals and companies access to the Internet and other related services such as website building and virtual hosting.

Packet - A unit of data routed between an origin and a destination in a network.

Network Mask - Also known as the “Subnet Mask.”

NIC (**N**etwork **I**nterface **C**ard) - A board installed in a computer system, usually a PC, to provide network communication capabilities to and from that computer system. Also called an adapter.

RJ-45 - A connector similar to a telephone connector that holds up to eight wires, used for connecting Ethernet devices.

Server - Any computer whose function in a network is to provide user access to files, printing, communications, and other services.

SMTP (**S**imple **M**ail **T**ransfer **P**rotocol) - The standard e-mail protocol on the Internet. It is a TCP/IP protocol that defines the message format and the message transfer agent (MTA), which stores and forwards the mail.

Ping (**P**acket **IN**ternet **G**roper) - An Internet utility used to determine whether a particular IP address is online. It is used to test and debug a network by sending out a packet and waiting for a response.

Port - A pathway into and out of the computer or a network device such as a switch or router. For example, the serial and parallel ports on a personal computer are external sockets for plugging in communications lines, modems, and printers.

PPPoE (**P**oint to **P**oint **P**rotocol **o**ver **E**thernet) - PPPoE is a method for the encapsulation of PPP packets over Ethernet frames from the user to the ISP over the Internet. One reason PPPoE is preferred by ISPs is because it provides authentication (username and password) in addition to data transport. A PPPoE session can be initiated by either a client application residing on a PC, or by client firmware residing on a modem or router.

Subnet Mask - The method used for splitting IP networks into a series of subgroups, or subnets. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets.

TCP (**T**ransmission **C**ontrol **P**rotocol) - A method (protocol) used along with the IP (Internet Protocol) to send data in the form of message units (datagram) between network devices over a LAN or WAN. While IP takes care of handling the actual delivery of the data (routing), TCP takes care of keeping track of the individual units of data (called packets) that a message is divided into for efficient delivery over the network. TCP is known as a “connection oriented” protocol due to requiring the receiver of a packet to return an acknowledgment of receipt to the sender of the packet resulting in transmission control.

TCP/IP (**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol) - The basic communication language or set of protocols for communications over a network (developed specifically for the Internet). TCP/IP defines a suite or group of protocols and not only TCP and IP.

Telnet - A terminal emulation protocol commonly used on the Internet and TCP/IP-based networks. It allows a user at a terminal or computer to log onto a remote device and run a program.

TFTP (**T**rivial **F**ile **T**ransfer **P**rotocol) - A version of the TCP/IP FTP protocol that has no directory or password capability.

Static IP Address - A permanent IP address that is assigned to a node in a TCP/IP network.

Appendix E: Finding the MAC Address and IP Address for Your Ethernet Adapter

This section describes how to find the MAC address for your computer's Ethernet adapter so you can use the MAC address change feature of the BF-450(M)/BF-430/431. You can also find the IP address of your computer's Ethernet adapter. This IP address is used for the BF-450(M)/BF-430/431's configuration. Follow the steps in this appendix to find the adapter's MAC or IP address in Windows 98, Me, 2000, or XP.

1. Click **Start** and **Run**. In the *Open* field, enter **cmd**. Press the **Enter** key or click the **OK** button.
2. At the command prompt, enter **ipconfig /all**. Then press the **Enter** key.
3. Write down the Physical Address as shown on your computer screen (Figure D-1); it is the MAC address for your Ethernet adapter. This appears as a series of numbers and letters.
The MAC address/Physical Address is what you will use for MAC address changing.

The example in Figure D-1 shows the Ethernet adapter's IP address as 192.168.168.100. Your computer may show something different.

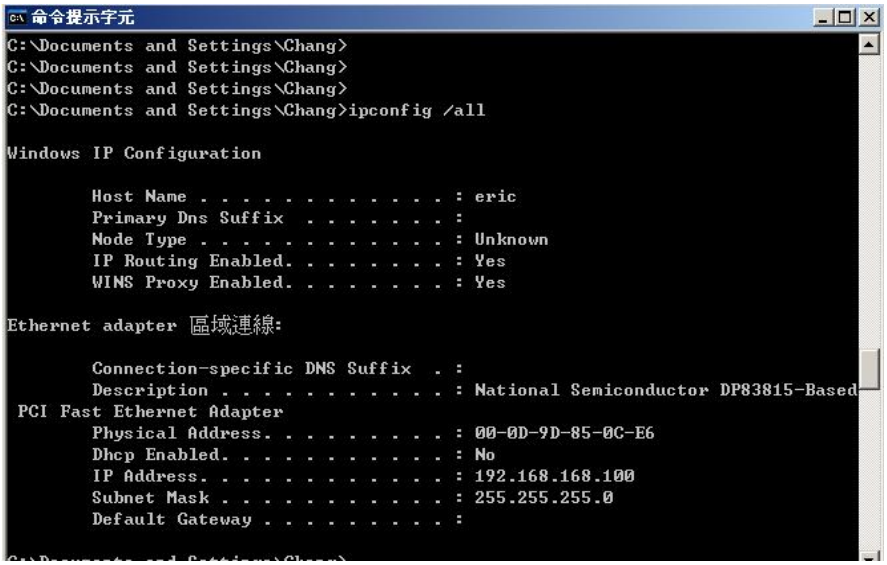
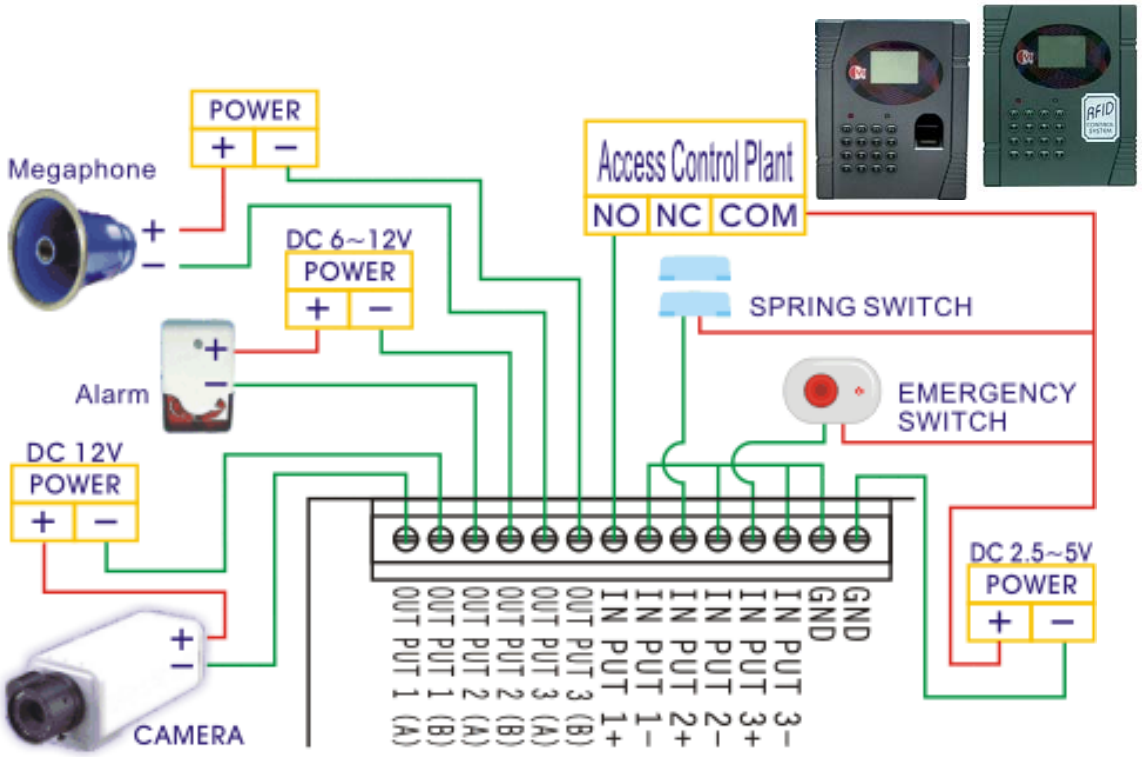


Figure E-1 MAC Address/Physical Address

Appendix F: Example I/O Application