

Serial Device Server

CSW-H80 User's Manual

Version 1.5

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Sollae Systems Co., Ltd.

<http://www.sollae.co.kr>



To all residents of the European Union

Important environmental information about this product

This symbol on this unit or the package indicates that disposal of this unit after its lifecycle could harm the environment. Do not dispose of the unit as unsorted municipal waste; it should be brought to a specialized company for recycling. It is your responsibility to return this unit to your local recycling service. Respect your local environmental regulation. If in doubt, contact your local waste disposal authorities

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1 Overview

1.1 Overview

Along with the development of the Internet, the demand for data communication functions has increased recently. Data communication over the Internet requires using TCP/IP, the Internet communication protocol. That is to say, in order to connect a system to the Internet, TCP/IP protocol must be implemented. It is possible to implement TCP/IP by directly implementing the protocol, porting public TCP/IP, or using Operating System (OS). However, all these methods impose burdens on the developer in time, cost, and technology.

ezTCP series, a Serial ↔ TCP/IP protocol converter product group of Sollae Systems, enables you to use TCP/IP communication (the Internet communication) function simply by "connecting the cable to a serial port". ezTCP sends data from the serial port to the Internet network after TCP/IP processing, and vice versa.

CSW-H80 in ezTCP product group is a product that provides TCP/IP communication through wireless LAN (IEEE802.11b/g). In other words, like other ezTCP products, CSW-H80 sends data from the serial port to the wireless LAN after TCP/IP processing and vice versa.

As CSW-H80 has an SMA antenna port and it is a compact size product, it is easy CSW-H80 to attach to user systems.

It provides DHCP and PPPoE functions, so that it can be applied to the cable network and the xDSL network. And it has DDNS (Dynamic DNS) function, so it can be used more easily in the internet.

It also provides debugging function, so user can solve the problem with ours.

1.2 Components

- CSW-H80 Body
- Omni-directional dipole antenna
- CD including utilities and documents (Option)
- 5V Power Adapter (Option)
- RS232 cable for PC connection (Option)



1.3 Specification

Power	Input Voltage	5V ($\pm 10\%$)
	Current	300mA typical
Dimension	93mm x 57mm x 24mm (without antenna)	
Weight	about 66g (without antenna)	
Interface	Serial	9 pin Dsub male
	Network	IEEE802.11b/g
Serial Port	1 x RS232 (300bps ~ 230400bps, RTS/CTS Flow control)	
Network	IEEE802.11b/g with SMA female jack Supplied with a 2dBi Omni-directional dipole antenna	
Protocols	TCP, UDP, IP, ICMP, ARP, DHCP, PPPoE, DNS lookup, DDNS(Dynamic DNS) Telnet COM Port Control Option(RFC2217) WEP, WPA PSK(TKIP), WPA2 PSK(AES)	
Diagnostic	Online Debugging Function	
RoHS	RoHS Compliant	
Approvals	MIC: SLS-CSW-H80 (A)	
Communication Mode	T2S	TCP Server Mode
	COD	TCP Client Mode
	ATC	TCP Server / Client (AT command emulation)
	U2S	UDP
Utilities	ezManager	Configuration utility via LAN
	ezPairing	ezPairing utility
	Ezterm	Socket test utility
	wflash	Firmware download utility via serial port
	ezVSP	Serial-TCP/IP virtual driver for Windows

 You can download the firmware from our website (<http://www.eztcp.com>).

1.4 Layout

1.4.1 Layout

There are an RS232 port, an SMA female jack for antenna connection, and a Power jack on the top side. And there is a Function button on the right side. And 5 LED indicators are in the CSW-H80.

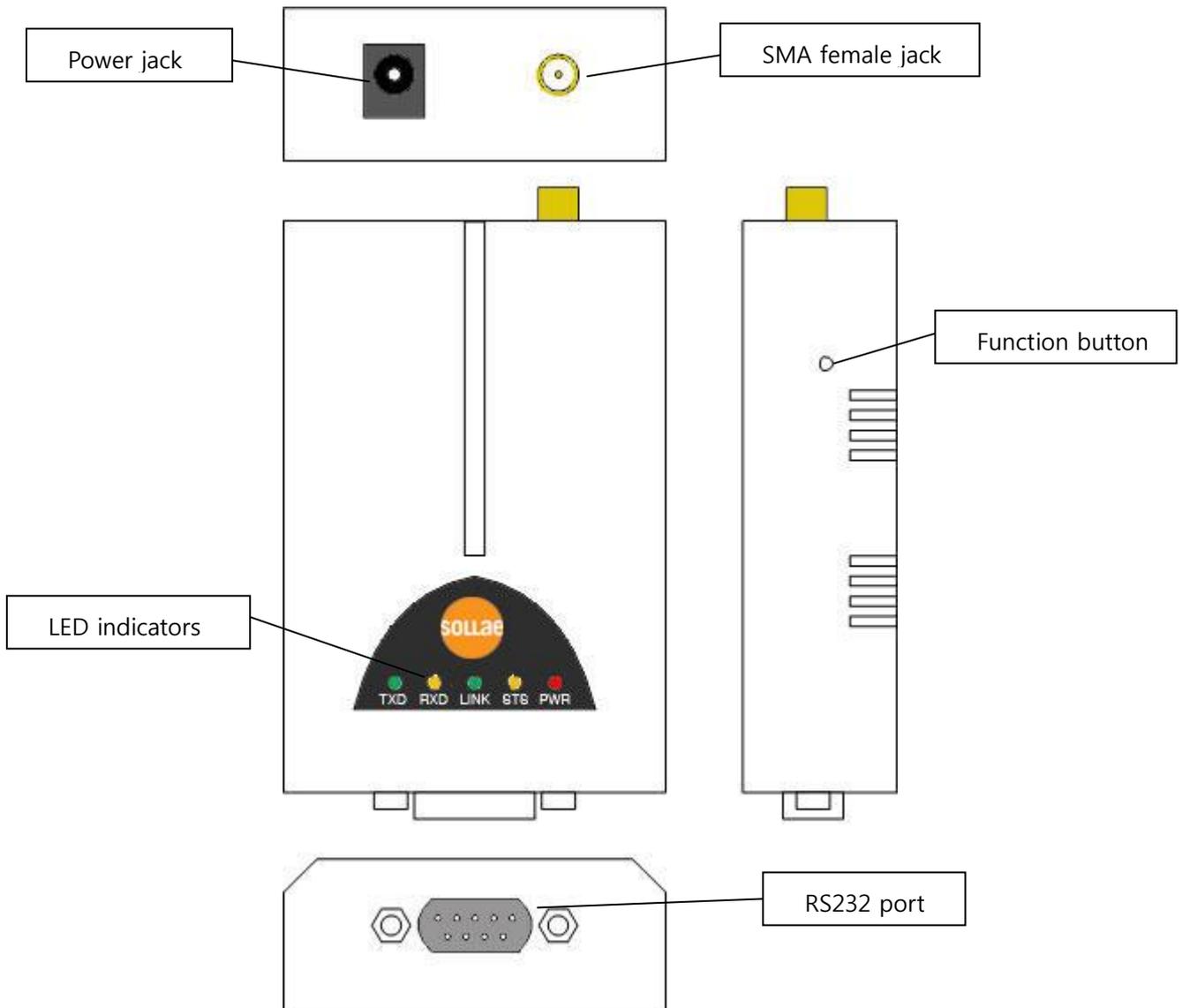


Figure 1-1 CSW-H80 layout

1.4.2 LED indicators

There are 5 LED indicators on the CSW-H80. The followings are the operations of each LED indicators.

Mode	LED	LED Status		Description
Common	PWR	Red	On	Power is on.
	RXD	Yellow	Blink	Data are received from the wireless LAN
	TXD	Green	Blink	Data are transmitted to the wireless LAN
Normal Mode	STS	Yellow	Blink every 1 second	IP address is assigned.
			Blink 4 times every 1 second	IP address is not assigned in DHCP or PPPoE modes.
			On	TCP is connected
	LINK	Green	On	CSW-H80 is connected to wireless LAN
ISP Mode	Others (Except for PWR)	-	Off	CSW-H80 is in the ISP mode
Serial Configuration Mode	Others (Except for PWR)	-	Blink every second simultaneously	CSW-H80 is in the Serial Configuration Mode

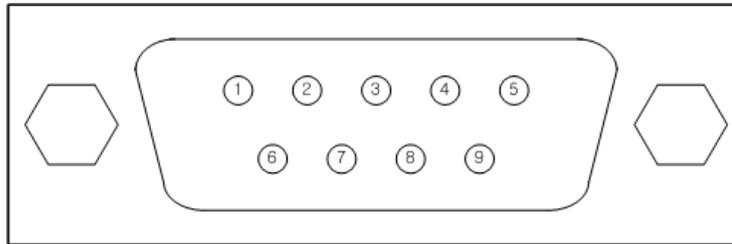
1.4.3 Function button

There is a Function button on the side. If this button is pushed 20ms~1s, it operates as Serial Configuration Mode. If it is push over 1 second, CSW-H80 operates as ISP mode. User can do firmware download to the CSW-H80 in the ISP mode. Please refer to the [4.2 Upgrading new firmware] for more information on firmware download.

1.5 Interface

1.5.1 RS232 Port (DB9M)

There are two RS232 ports. The ports are interfaced with 9 pin D-sub male connectors.



- RS232 ports

Number	Name	Description	level	Dir.	Etc.
1	DCD	Not connected to CPU	-	-	NC
2	RXD	Receive Data	RS232	Input	mandatory
3	TXD	Transmit Data	RS232	Output	mandatory
4	DTR	Data Terminal Ready (Always active signal)	RS232	Output	optional
5	GND	Ground	Ground	-	mandatory
6	DSR	Not connected to CPU	-	-	NC
7	RTS	Request To Send	RS232	Output	optional
8	CTS	Clear To Send	RS232	Input	optional
9	RI	Not connected to CPU	-	-	NC

- Data bits, Parity, Stop bit

Items	Parameters
Data bit	8, 7, 6, 5
Parity	None, Even, Odd, Mark, Space
Stop bit	1, 1.5, 2

- Flow Control

CSW-H80 has RTS/CTS flow-control function.

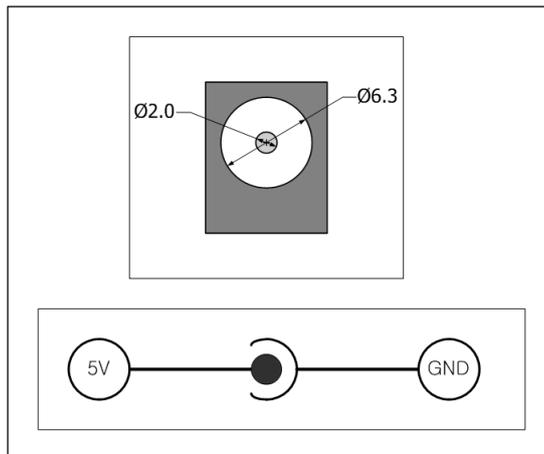
- Telnet COM Port Control Option
 CSW-H80 has a Telnet COM Port Control function that is defined in the RFC2217. If this option is set, CSW-H80 transmits serial input signals (CTS) to the peer host and set the values (RTS, baud rate, data bits, parity, stop bit) onto its serial ports from the peer host.
- TX Interval
 CSW-H80 has a function that delays its serial data for the user's slow device. User can set the interval between byte and byte which are outputting from CSW-H80's serial ports. Its unit is byte.

1.5.2 Wireless LAN Interface

CSW-H80 embeds IEEE802.11b/g function which is interfaced an SMA female jack. An Omni-directional 2dBi antenna is also included in the package.

1.5.3 Power

DC5V is used for CSW-H80 and the specification is below:



2 Getting Start

2.1 Installation Method

You can install CSW-H80 in the following steps.

Title	Item	Sub-item
1. Checking the communication environment	Check items	IP address environment
		Serial port parameters
		Application program to be used
2. Configuring the environmental parameters	Configuration method	Set by ezManager, a utility program for configuration through the serial and network.
		Set by AT commands in ATC mode
	Configuration items	IP address related items
		Wireless LAN related items
		Serial port related items
3. Connecting to the network	Checking method	Communication mode (depending on application program)
		Checking the LINK LED indicator
3. Application to the field		

2.1.1 Checking the Communication Environment

Before installing CSW-H80, check the network environment where CSW-H80 is to be installed, including the followings matters:

- IP address environment (local IP, subnet mask, gateway, DHCP/PPPoE etc.)
- Wireless LAN related parameters (Infrastructure/ad-hoc, SSID, secure protocols)
- Serial port type of the equipment to which CSW-H80 is going to be connected (RS232)
- Serial port items of the equipment to which CSW-H80 is going to be connected (baud rate, data bit, parity, stop bit, flow control)
- Application program protocol to be used (TCP/UDP, server/client, etc.)

2.1.2 Configuring the Environmental Variables

After connecting a serial cable between the serial port of the CSW-H80 and PC's COM port, press the function button from 20 ms to 1 s to enter into the serial configuration mode. And user

has to set the IP address related items, wireless LAN related items, serial port related items, and so on.

2.1.3 Connecting to the network

If you power the CSW-H80 on, it will try to connect to the pre-configured network. After completing the connection, the LINK LED indicator will be on.

2.2 Test Run

You can perform test run according to the following orders. The test run described here is based on the assumption that the IP address of the CSW-H80 is set to 10.1.0.1 and the PC is set to 10.1.0.2.

2.2.1 Installing wireless LAN

Connect an AP (Access Point) to PC with a LAN cable and check the SSID and secure information of the AP according to the direction of the vendor.

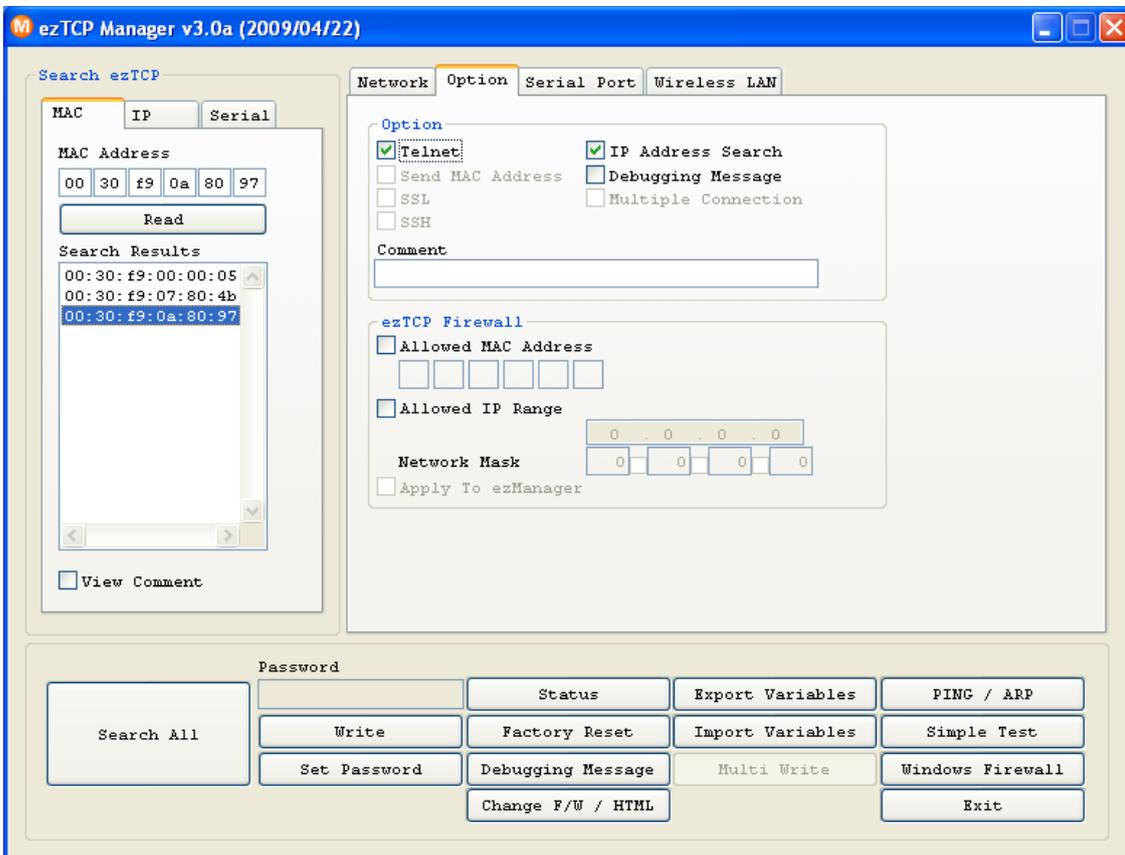
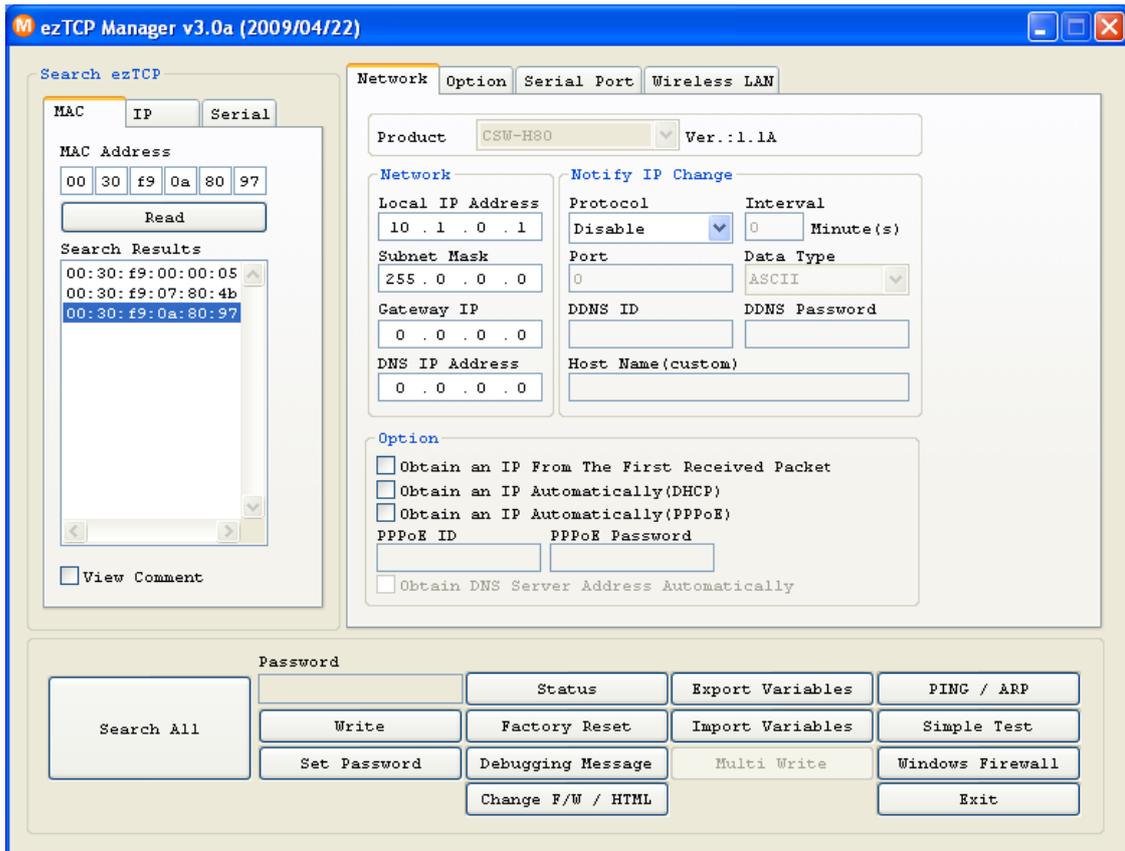
2.2.2 Changing PC IP Address

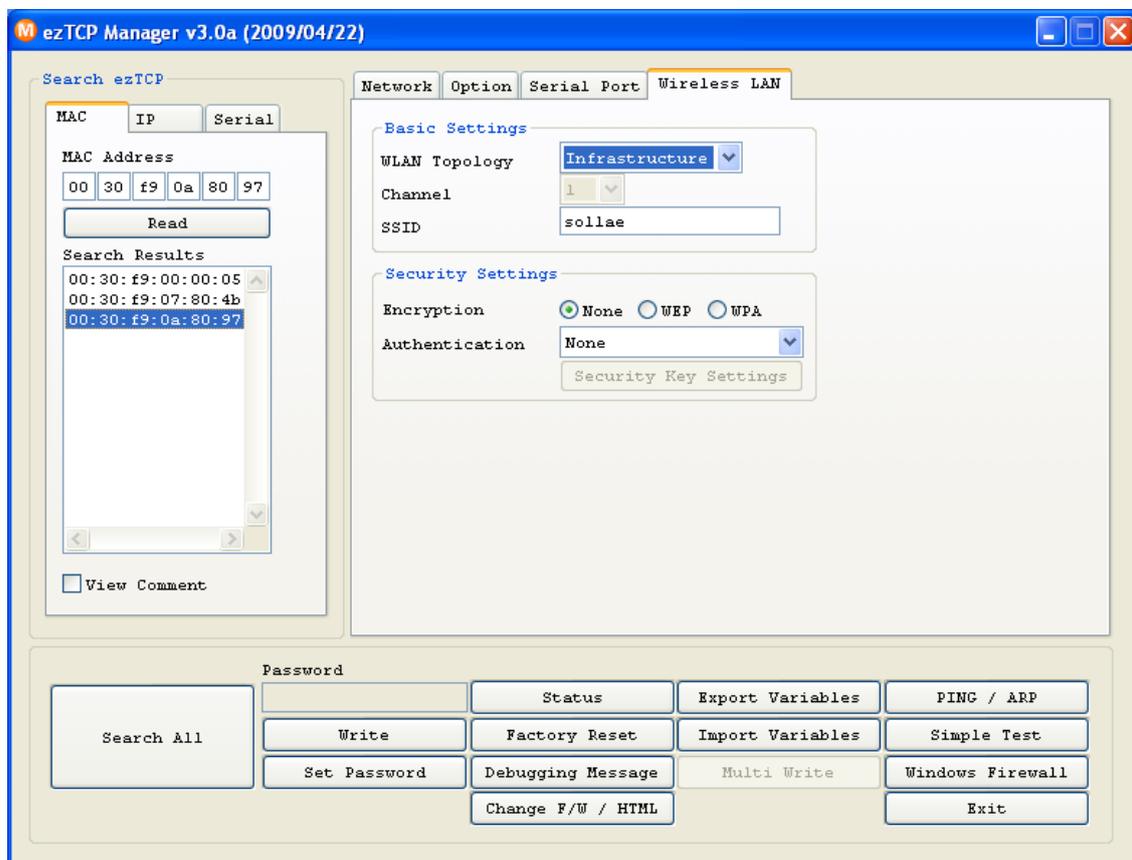
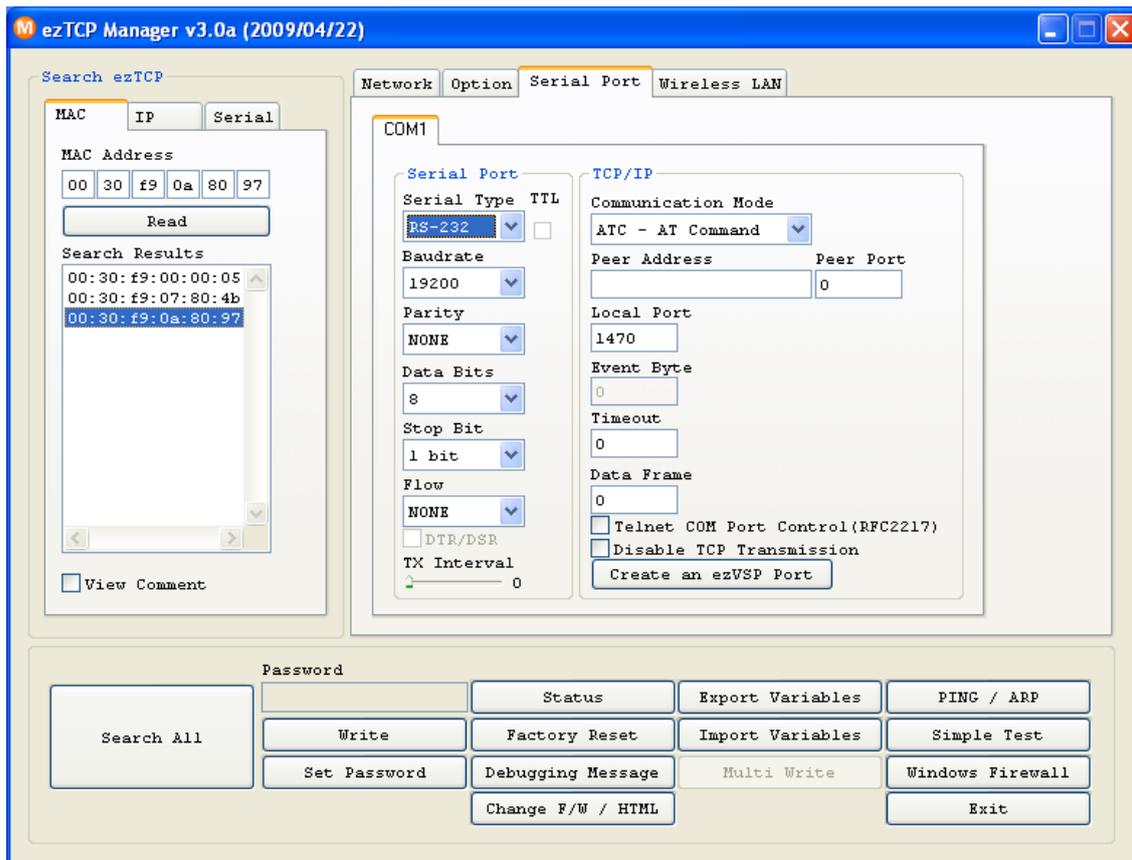
You can change the IP address of your PC as follows:

IP Address	10.1.0.2
Subnet Mask	255.0.0.0
Gateway IP Address	-

2.2.3 Configuring CSW-H80

After connecting a serial cable between CSW-H80's serial port and PC's serial port, run the CSW-H80 as the serial configuration mode. Then, configure CSW-H80 setting using ezManager, the ezTCP configuration program, as follows.



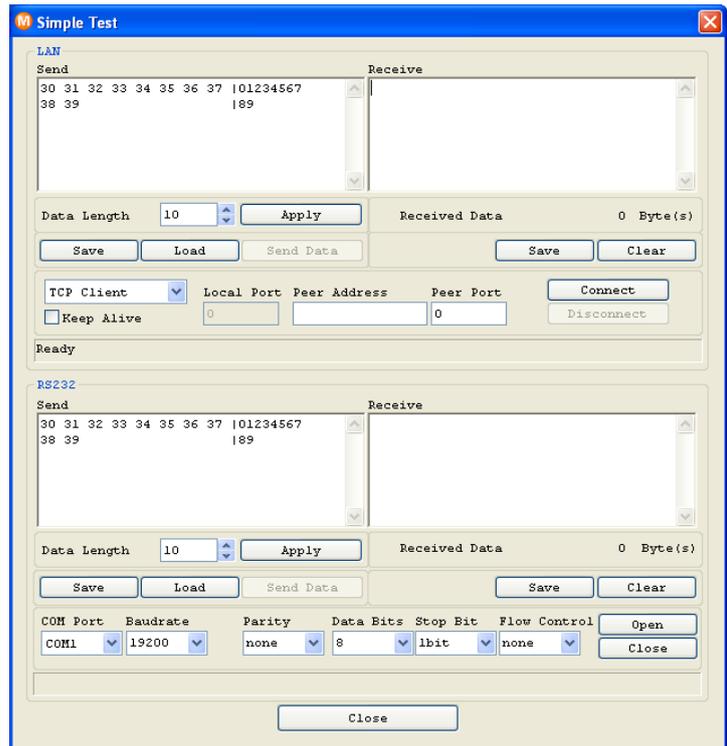


tab	items	values
NETWORK	Local IP Address	10.1.0.1
	Subnet Mask	255.0.0.0
	Gateway IP	0.0.0.0
SERIAL PORT (Serial Port)	Baud rate	19,200
	Parity	NONE
	Data Bits	8
	Stop Bit	1
	Flow Control	NONE
SERIAL PORT (TCP/IP)	EzTCP Mode	T2S(0) – TCP Server
	Local Port	1470
	Timeout	0
	Event Byte	0
WLAN	WLAN Mode	Infrastructure
	SSID	As same as AP's SSID
	Security Configuration	As same as AP's settings (Refer to the 3.3.5 Setting WEP key.)

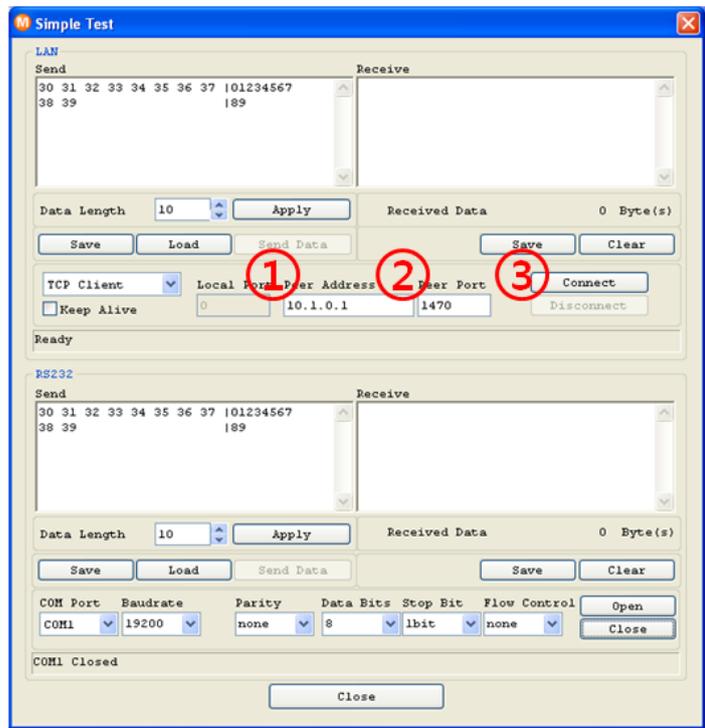
2.2.4 Communication Test

Power the CSW-H80 off and on, then it tries to connect to the wireless LAN. After completing the wireless LAN connection, the LINK indicator will be on.

- 1) A program for testing starts if you press the [Simple Test] button of the ezManager.

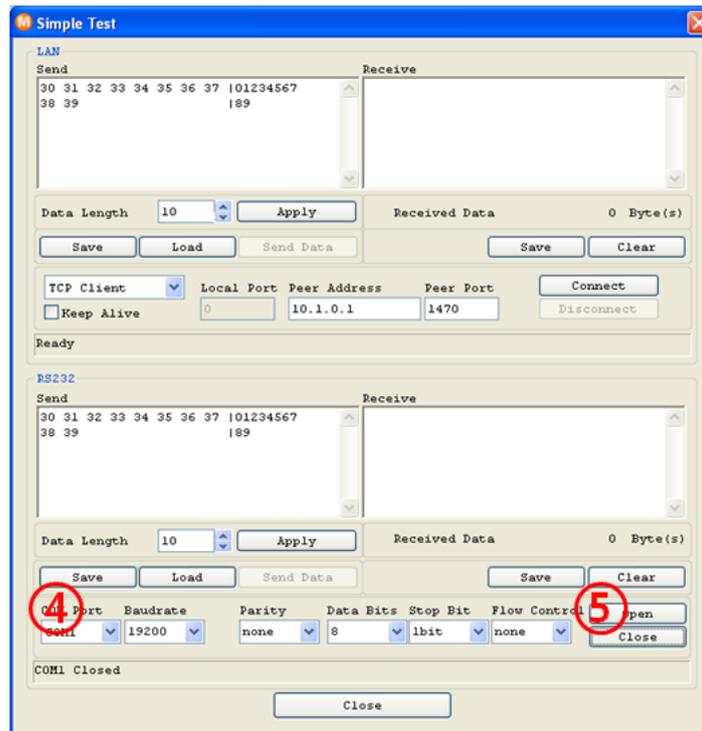


- 2) Press the [Connect] button after inputting 10.1.0.1 and 1470 in the IP and Port. If the TCP connection is established there will be "Connected [10.1.0.1 : 1470]. And the STS indicator will be on.

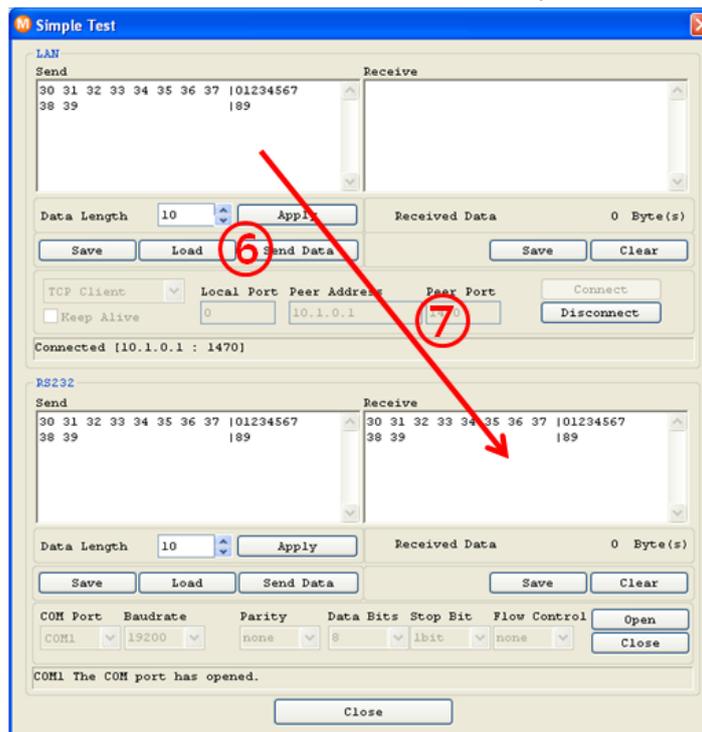


- 3) Press the [Open] button after selecting serial port that is connected to the CSW-H80. If the

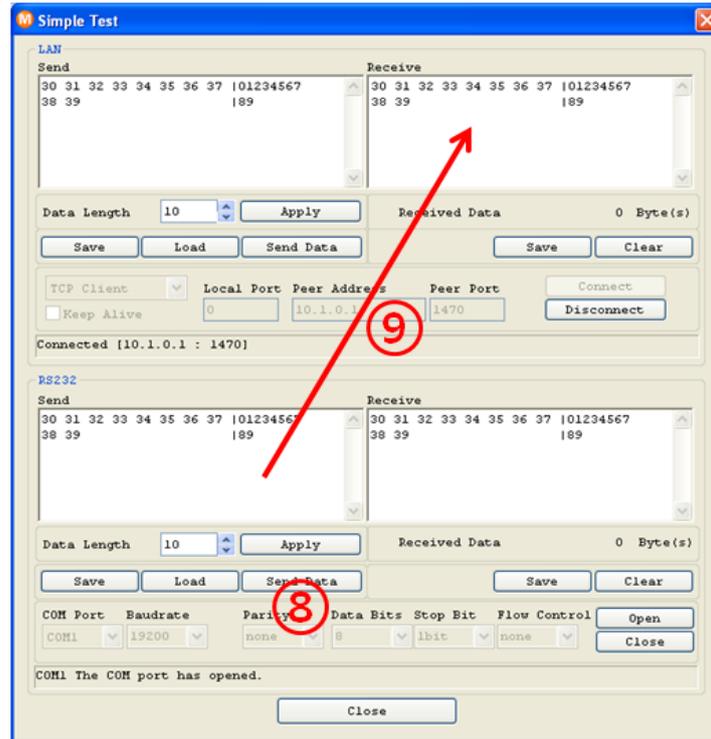
serial port is open, the "COM1 the COM port has opened" message will be shown.



- 4) If you press the [Send Data] button on the LAN part (Top), the data shown in the [Send] box will be transmitted to the [Receive] box on the RS232 part (Bottom).



- 5) If you press the [Send Data] button on the RS232 part (Bottom), the data shown in the [Send] box will be transmitted to the [Receive] box on the LAN part.



6) If the transmitting and receiving data are same, the communication test is successful.

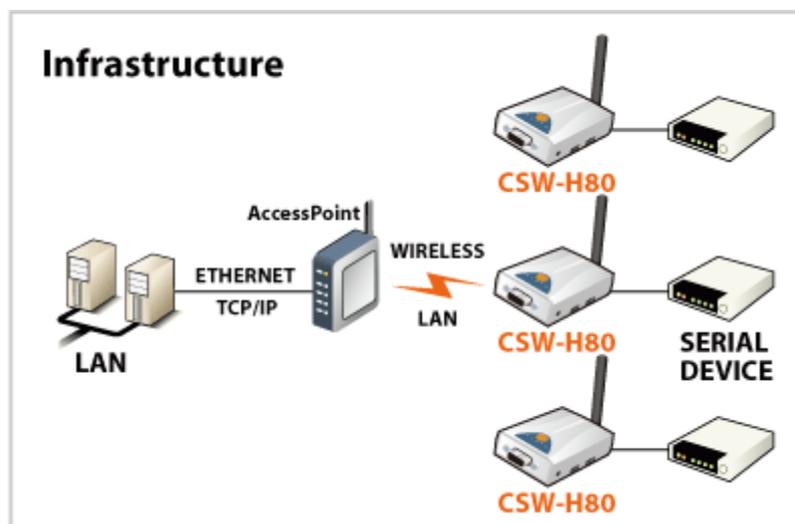
3 Configuration

3.1 Fundamentals of wireless LAN

CSW-H80 supports IEEE802.11b/g. The IEEE802.11b and IEEE802.11g support 11Mbps and 54Mbps transmission rate respectively. There are two types of wireless LAN networks – infrastructure and ad-hoc.

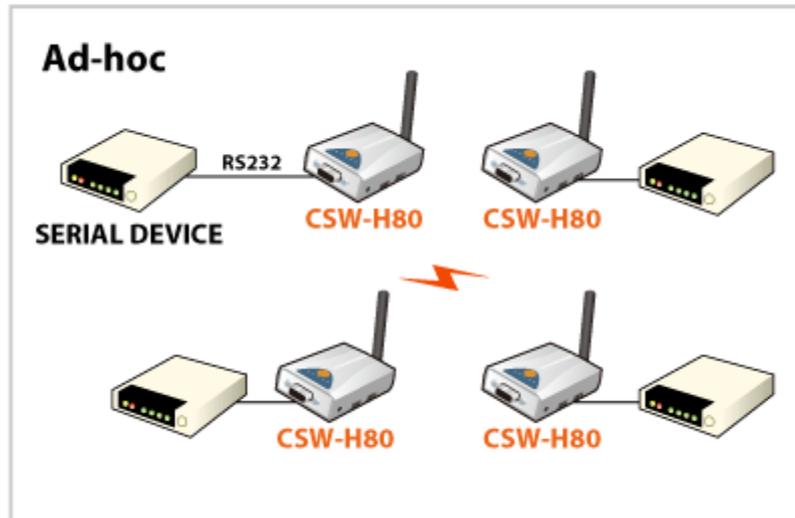
3.1.1 Infrastructure Mode

The wireless LAN stations communicate through AP. So, at least one AP is needed to make the infrastructure network. The wireless LAN station can talk to wired network hosts because AP relays between wireless LAN stations as well as between wireless LAN station and wired LAN (Ethernet) host.



3.1.2 Ad-hoc Mode

Wireless stations communicate each other without any AP. So user can make a system more simply. It is proper if there's no wired LAN requirement and it is a small network. Some people call it peer-to-peer mode.



3.1.3 SSID

It is an identifier to identify the particular wireless LAN. So the same SSID should be configured to all stations to communicate in the same wireless network. In case of infrastructure mode, user has to set his station's SSID as same as AP's.

3.1.4 Channel

IEEE802.11b/g wireless LAN stations communicate through the ISM(Industrial, Scientific, and Medical) band whose frequency is about 2.4GHz. IEEE802.11 specification divides this band into 14 channels every 5MHz.

If user installs more than one wireless LAN networks in the same area, the channels should be apart more than 4 channels to avoid interferences.

3.1.5 Authentication

A wireless LAN station should get authentication from the AP in the infrastructure mode. There are the Open system and the Shared key for the authentication methods.

3.1.6 WEP (Wired Equivalent Privacy)

The WEP is a secure protocol for wireless LAN. There are two kinds of WEP method – 64 bits and 128 bits key.

3.1.7 WPA (Wi-Fi Protected Access)

WPA is a security standard for users of device equipped with Wi-Fi wireless connection. It is an improvement on and is expected to replace the original Wi-Fi security standard, Wired Equivalent Privacy (WEP). There are two modes about the user authentication in WPA security. The one is Enterprise which has authentication server and the other one is PSK (Pre-Shared Key) which doesn't have any server. CSW-H80 supports WPA-PSK (TKIP). If you want to know how to configure it, refer to the "3.3.6 Setting WAP Key"

3.1.8 WPA 2

To final security of Wireless LAN, IEEE 802.11i, a standard about Wireless LAN, has suggested the Counter Mode with Cipher Block Changing Message Authentication Code Protocol (CCMP) for replacing the TKIP. CCMP uses Advanced Encryption Standard (AES), it is the WPA 2 that adopts the using the method. WPA 2 has also both Enterprise and PSK mode. CSW-H80 supports WPA 2-PSK (AES). If you want to know how to configure it, refer to the "3.3.6 Setting WAP Key"

☞ *Only 1.1A or subsequent versions of F/W support WPA and WPA2.*

3.2 IP Address and Environmental Variables

For TCP/IP communication, you must set IP address related items. In addition, you have to set wireless LAN related items and serial port related items (serial port type, communication speed, data bit length, parity bit, flow control, etc) to CSW-H80.

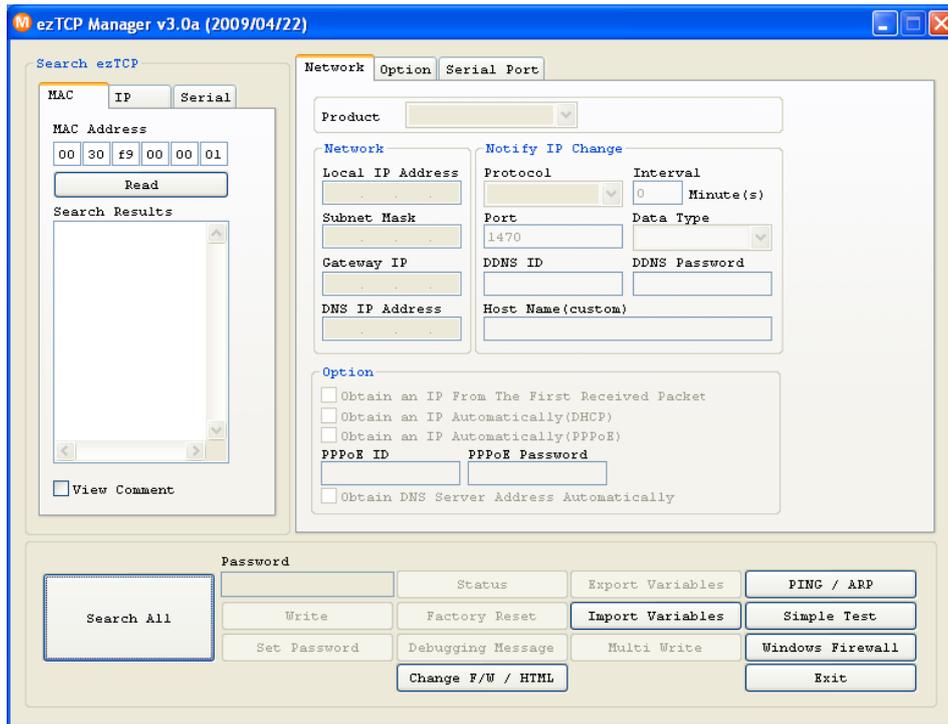
You can set the IP address and the serial port related items by using ezManager, the supplied configuration utility which allows you to configure your CSW-H80 over the serial and the network, or by using AT commands in ATC mode

3.3 Configuring with ezManager

3.3.1 ezManager

The basic environmental variables (wireless LAN related items, IP address related items, serial port items, and etc.) can be set by ezManager which is an integrated management tool for Windows.

The ezManager is operated in Microsoft Windows (Windows 98, 98 SE, 2000 Pro, ME, XP Pro/Home, Vista). Following is the screen shot of ezManager which is just launched.



3.3.2 Configuration methods with ezManager

There are [MAC], [IP], and [SERIAL] tabs in according to the configuration method. Refer to the following table.

	MAC	IP	SERIAL
Connection method	Wireless LAN	Wireless LAN	Serial
protocol	UDP broadcast	UDP unicast	Serial
Identification	MAC Address	IP Address	COM Port
Property	UDP Port 50005	UDP Port 50005	115200/N/8/1

3.3.3 Buttons of the ezManager

Search All	Searches all CSW-H80 on user local network. The result is displayed on the [Search List] box. Each value represents each MAC address of ezTCP. And parameters of the selected ezTCP are displayed in the right window. (The MAC address of CSW-H80 is on the bottom of its case.)
Read	If user inputs the MAC address of the CSW-H80 into the MAC address input box in the [MAC] tab or inputs the IP address of the CSW-H80 into the [IP] tab and presses [Read] button, then user can read only the CSW-H80's parameters. If there are a lot of ezTCP in the network so it is hard to find the ezTCP, it is very useful. User can read the parameters through the serial port if user presses

	the [Read] button in the [SERIAL] tab.
Write	Saving the modified parameters to the CSW-H80 by pressing the [Write] button. The CSW-H80 resets automatically if the [Write] button is pressed.
Set Password	This button is for setting or modifying the password of CSW-H80. If a password of the CSW-H80, user has to input the password in the text box of the ezManager when user sets parameters of the CSW-H80.
Status	User can read the current status of the CSW-H80 by pressing this button. If user presses this button, a new window is appeared and some information will be shown. (up time, IP addresses, the amount of receiving and transmitting from/to the serial ports.)
Debugging Message	User can debug CSW-H80 if the [Debugging Message] option of the [OPTION] tab is set and user presses this button. When the debugging function is running, CSW-H80 broadcasts debugging data to the wireless LAN with UDP 50006 and those can be received after pressing [Debug Message] button. After debugging, user has to unset [Debugging Message] option of the [OPTION] tab to prevent heavy network traffic.
Windows Firewall	The ezManager would not work if any firewall functions are working. This button is a shortcut to the [Windows Firewall].
Simple Test	You can simply test ezTCP's function in terms of both serial and network ports with this button.
Export Variables	You can save the environmental variables in the screen to a file with this button.
Import Variables	You can load the environmental variable from the file that you have saved.
Multi Write	You can save same environmental variables to multiple ezTCP's with this button.
PING/ARP	User can do ping-tests with this button. And user can check or delete the ARP cache table of the PC.
Factory Reset	User can initialize the CSW-H80 with this button.
Change F/W / HTML	User can download F/W or HTML files with this button.
Exit	Terminating ezManager.

3.3.4 ezManager Configuration Items

Wireless LAN	
Basic Configuration	
WLAN Topology	Network type to connect Infrastructure / Ad-hoc
SSID	SSID to connect (Maximum 32 bytes) Default value: sollae
Channel	Channel number for ad-hoc (The channel number will be random in some case.)
Security Settings	
Encryption	Security method None – security function is disabled WEP – WEP is used for security function WPA – WPA is used for security function
Authentication	Wireless LAN authentication method Open system / Shared key / Both enabled

NETWORK	
Network	
Local IP Address	CSW-H80's IP address
Subnet Mask	Subnet Mast
Gateway IP Address	Gateway's IP address
Option	
DNS IP Address	Name Server's IP address
DHCP	Decide whether to receive CSW-H80 IP address via DHCP
PPPoE	Decide whether to receive CSW-H80 IP address via PPPoE
PPPoE ID & Password	ID and Password for PPPoE
ARP	ARP Function activation status (Conditionally required for DHCP) (Obtain an IP From The First Received Packet)
Obtain DNS server address automatically	If CSW-H80's IP address is set as a dynamic IP (DHCP or PPPoE), it will automatically receive DNS server address. If this check box is not activated, the IP address designated in the [DNS IP Address] will be used as the DNS server address.



Notify IP Change	
Protocol	Notify IP Change(IP Change Trap) Method DDNS – using the DynDNS.com DDNS function TCP – sending IP Trap information to a host by TCP UDP – sending IP Trap information to a host by UDP
Interval	The interval to send IP information (unit: minute)
DDNS ID	The user account which was registered to the service provider (If DDNS is selected)
DDNS Password	The password of user account which was registered to the service provider (If DDNS is selected)
Port	TCP or UDP Port number to send (If TCP or UDP is selected)
Data Type	TCP or UDP IP address to send (If TCP or UDP is selected)
Host Name (custom)	When DDNS is selected for the Protocol of the Notify IP Change - The host name of the CSW-H80 (example: eztcp.dyndns.com) When TCP or UDP is selected for the Protocol of the Notify IP Change - The host name to send the Notify IP Change information

SERIAL PORT	
Serial Type	Fixed to RS232
Baud rate	Baud rate of the serial port(1,200 ~ 230,400bps)
Data bits	The length of the serial port(5, 6, 7, 8 bits)
Parity	Parity (NONE, EVEN, ODD, MARK, SPACE)
Stop bit	Stop bit (1, 1.5, 2 bits)
Flow Control	Flow control (NONE, RTS/CTS)
TX Interval	The interval between byte and byte which is outputting from the CSW-H80s serial port. (Unit: 1 byte)
Communication Mode	Communication Mode (Refer to the 5 Communication Mode.)
Local Port	Port number for waiting to be connected in T2S mode Port number for UDP data in U2S mode
Peer Address	IP address or host name to connect in TCP Client mode IP address or host name to send in U2S mode
Peer Port	Port number to connect in Client mode
Event Byte	Minimum number of bytes attempting to connect/transmit Data amount before the TCP connection

Timeout	<p>Time out</p> <p>TCP: if there's no data during the timeout(second), it disconnect the TCP session.</p> <p>UDP: if there's no data during the timeout(second), it sends the data in the serial receiving buffer to the specified host in UDP.</p>
Data Frame	<p>When CSW-H80 sends data from its serial port to the, the [Data Frame] is a unit between two packets.</p> <p>If there is no data from its serial port during the specified [Data Frame], CSW-H80 sends data to wireless LAN.</p> <p>Set also [TCP No Delay] when you set this field.</p>
Telnet COM port control option	<p>If the Telnet COM Port Control Option is enabled, CSW-H80 sends the CTS, DSR control signal to the communication counterpart, and CSW-H80 sets its serial port items(RTS, DTR, Baud rate, data bits, parity, stop bit) after getting information from the communication counterpart.</p>
TCP No Delay	<p>Turn off TCP nagle timer.</p> <p>Transmitting TCP data to the network without delay.</p>

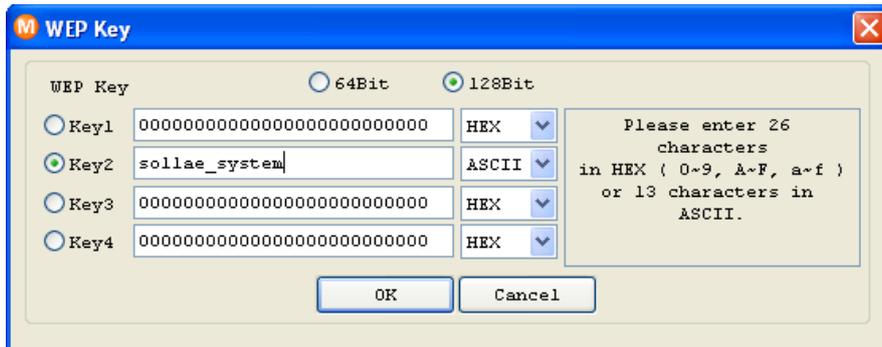
OPTION	
Remote Search	Enable/disable [IP] tab of ezManager
Telnet	Enable/disable telnet
Debugging Message	<p>Enable/disable the remote debugging function of CSW-H80</p> <p>After debugging, user has to disable this function to reduce network load.</p>
Comment	User specific information
Allowed MAC Address	The only host that has specified Ethernet address(MAC address) can access the CSW-H80
Allowed IP Range	The only host that has specified IP address range can access the CSW-H80
Apply to ezManager	If this parameter is set, CSW-H80 replies to the only host that has parameters that is defined in the [Allowed Ethernet Address] or [Allowed IP].

3.3.5 Setting WEP key

- Check the settings of AP to connect to (authenticate method – open, shared key; key length – 64 bits, 128 bits and key index). Refer to the AP's manual for more information.

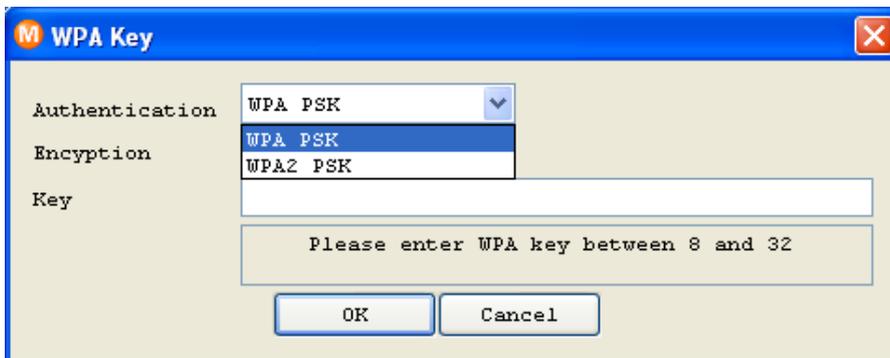


- Click the [WEP] option in the [Security Settings] section.
- Select an Authentication method – [Open System] / [Shared Key]
- Select a WEP key length – [64 Bits] / [128K Bits]
- Select a key index to use – [Key1] / [Key2] / [Key3] / [Key4]
- Select key format to input – [HEX] / [ASCII]
- Input the key.
- The following is an example.



3.3.6 Setting WPA key

- Click the [WPA] option in the [Security Settings] section.



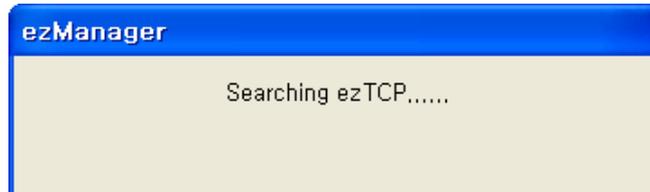
- Select an Authentication type. WPA PSK and WPA2 PSK are available. WPA PSK uses TKIP as its encryption method. In case of WPA2 PSK, AES is used.

3.3.7 ezManager Operation example

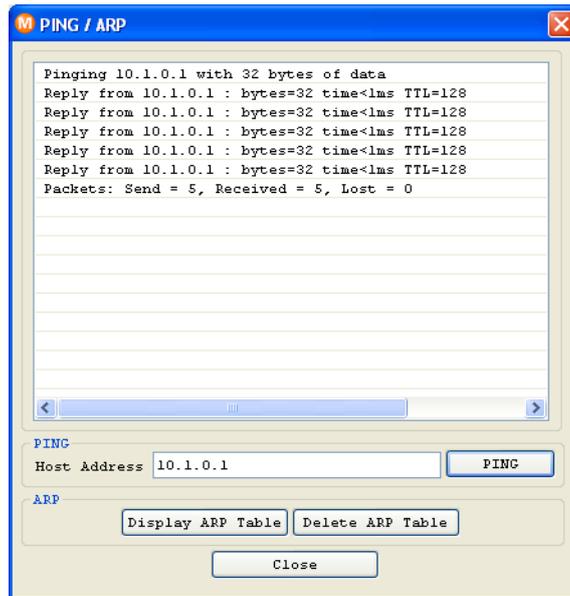
ezManager can be used to change wireless LAN related items, the IP address related items, the serial port setup value, and the serial port operation mode. This section describes these functions briefly. For more information, see the following sections.

The following example shows how to read and change ezTCP's basic functions. Try changing ezTCP setup value according to the following sequence:

- When the ezTCP power is turned on and the wireless LAN is connected correctly, pressing [Search All] or [Read] button will display the following window:



- If a network-attached ezTCP is detected, the searched products will be listed on the [Search Results] box. If a message pops up indicating that there is no response from ezTCP, check that the power is turned on and the cable is connected correctly or make sure the firewall function on your PC, then try pressing [Search] or [Read] button. (The protocol that ezManager uses is UDP and its port is 50005. And its debugging port is 50006.)
- If more than one ezTCP are detected, ezTCP's MAC ADDRESS will be displayed in the [Search List] box on ezManager. Check if the MAC ADDRESS displayed in the [Search List] window corresponds to that printed on ezTCP main body.
- Set [Communication Mode], [Local IP Address], [Local Port], and serial port related items. After setting press [Write] button.
- Pressing the [PING / ARP] button of the ezManager, a [PING / ARP] window will be shown. You can ping test in this window. The following is a screenshot that the ping test is OK.



3.4 AT command

In ATC mode, the user can set environment variables through the serial port using AT command.

☞ For more information, See 6 ATC Mode.

3.5 Setting DHCP

Under environment with a network operating a DHCP server, DHCP protocol allows the user to automatically set the IP address, subnet mask, gateway, and name server of ezTCP. Using DHCP automatic setup function requires the user to check [Obtain an IP Automatically (DHCP)] item on ezManager. Note that the user may have to check [ARP] item according to the type of DHCP servers.

3.6 Setting PPPoE

PPPoE is used in most ADSL and VDSL. To use PPPoE function, [Obtain an IP Automatically (PPPoE)] option should be enabled and PPPoE ID and PPPoE password should be configured. The local IP address of CSW-H80 is assigned automatically in PPPoE environment.

✓ Some ADSL or VDSL modem use DHCP. Please contact your ISP (Internet Service Provider).

4 System Management

4.1 Operation Mode

CSW-H80 can operate in one of three modes (normal, Serial Configuration Mode, and ISP modes). The Normal mode is ordinary data communication mode; and the Serial configuration Mode is to configure the CSW-H80 through the serial port; and ISP mode is used to download CSW-H80 firmware through the serial port.

4.1.1 Normal mode

The Normal mode is an operation mode that CSW-H80's works for normal purposes. If CSW-H80 boots up without any other treatment, it works in the normal mode.

☞ Please refer to the [5 Communication Mode.]

4.1.2 Serial Configuration Mode

If you press the function button on the side of the body in the normal mode for 20ms ~ 1s, it works in the Serial Configuration Mode. You can set the environmental variables through the serial port in this mode.

User can re-configure the CSW-H80 in the Serial configuration Mode even though user can't access the CSW-H80 because of the password or the [ezTCP Firewall] function.

4.1.3 ISP Mode

If you press the function button on the side of the body in the normal mode over 1 second, it works in the ISP mode.

You can download new firmware to CSW-H80 with the wflash program that download a firmware through the serial port.

4.1.4 Comparison between two modes

The following is a comparison between the normal mode and the ISP mode.

Mode	How to initiate	Description	Baud rate
normal	Power on CSW-H80 without pressing the ISP button	Normal data communication mode T2S, ATC, COD, U2S	the value that user set
Serial Configuration	Pressing the ISP button for 20ms~1s.	Configuring CSW-H80 through the serial port	115200bps/ N/8/1
ISP	Pressing the ISP button over 1 second	Firmware download mode	115200bps/ N/8/1

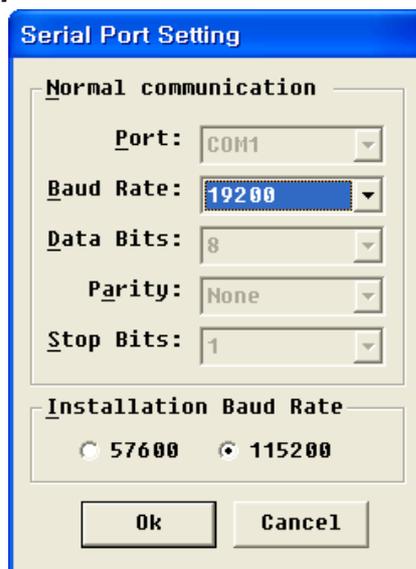
4.2 Upgrading new firmware

User can download CSW-H80's firmware with the wflash program.

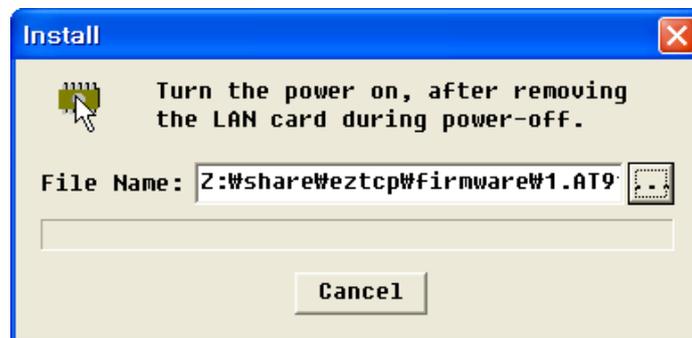
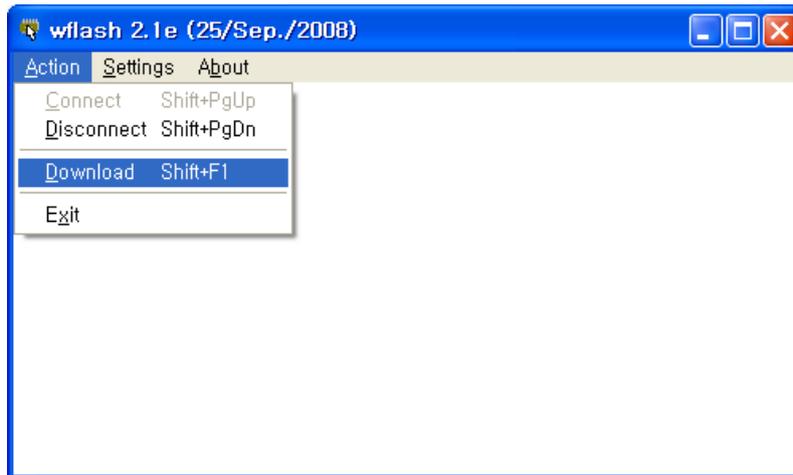
- Connect a serial cable between the PC and the CSW-H80. And run the wflash program



- Check if the COM port that is connected to the CSW-H80 is opened. You can check it with the [Settings] and [Action] menu.



- Brows the firmware with the [Action] -> the [Download] menus.



- If you power the CSW-H80 on, the wflash program downloads the firmware automatically.

4.3 Checking current status

4.3.1 Telnet login

You can log in the CSW-H80 if you enable the [Telnet option] in the [OPTION] tab of the ezManager. Then you can check the network and serial status after logging in the CSW-H80. If you press "telnet [CSW-H80's IP address]" on the command prompt of Windows, you can log in CSW-H80

4.3.2 Commands for checking the status

- Network Status

If you type "st net", you can check the network status of CSW-H80.



- Network status

If you type "st net", you can check the network status of the CSW-H80.

```

c:\ Telnet 10.1.0.1
lsh>st net
-----
proto      local address          peer address          sendq      state
-----
TCP        10.1.0.1< 23>         10.1.0.2< 1055>      192        ESTABLISHED
TCP        10.1.0.1< 1470>       0.0.0.0< 0>          0          CLOSED
lsh>_
    
```

- Serial ports' status
 If you type "st sio", you can check the serial ports' status of the CSW-H80 The tx_count and rx_count is the total bytes since the CSW-H80 has booted up.

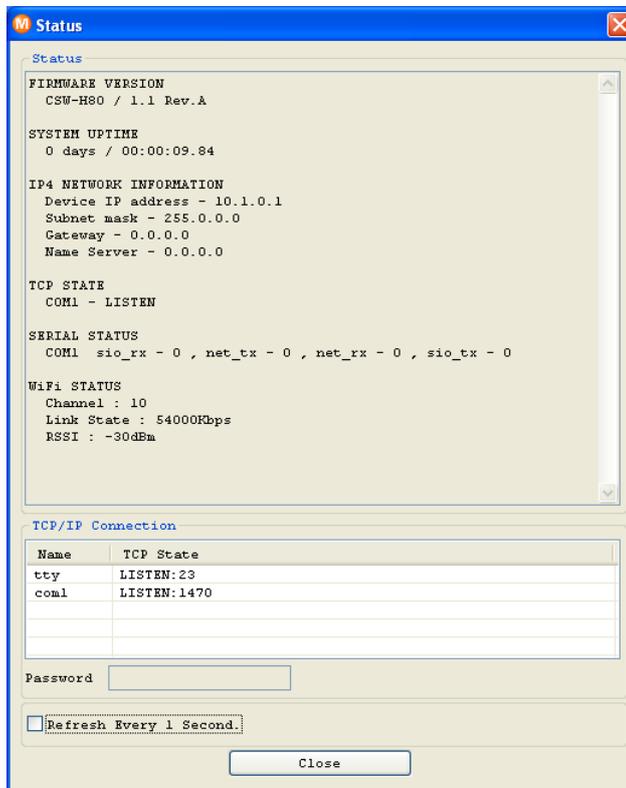
```

c:\ Telnet 10.1.0.1
CSW-H80 Management Console v1.1A Sollae Systems
lsh>st sio
-----
port fmax r bmax rxbuf txbuf  rx_count  tx_count
-----
com1  0      0      0      0      0          0          14
lsh>
    
```

4.3.3 Check Status in the ezManager

If you press the [STATUS] in the ezManager, you can monitor the current status of CSW-H80. If you set the [Status Request] button, the information will be updated every pre-specified time

And user can close the TCP connection in the TCP/IP Connection window with mouse-right button.



4.4 Notify IP Change (IP Change Trap)

CSW-H80 has a function to send its IP address. So user can solve the problem that IP address is changed automatically in the dynamic IP address environment. CSW-H80 supports 3 kinds of transmitting methods – DDNS with DynDNS, TCP and UDP.

4.4.1 DDNS – www.dyndns.com

DDNS (Dynamic DNS) is a system that communicates by the hostname that is registered to a DNS server after registering the IP address in the dynamic IP address environment. The DDNS function that is supplied by CSW-H80 is that CSW-H80 registers its IP address to the DynDNS Inc. (www.dyndns.com)'s DNS server. So you have to register user name and hostname to the website of the DynDNS to use the DDNS function.

4.4.2 TCP/UDP

CSW-H80 sends its IP information to the pre-defined a TCP or UDP server periodically. So user has to set the server's IP address and port number to use this function in advance. CSW-H80 supports both ASCII and BINARY mode.

ASCII message format is followed:

Each byte of the Ethernet address is divided by colons, so the total bytes of the Ethernet address is 17bytes. The IP address is the CSW-H80's IP address that is assigned to the CSW-H80. The product information is composed by 2 bytes-product ID and 6 bytes-firmware version. For example, "11010106" means that product ID is 0x11 and the firmware version is 1.1G. The comments is the [Comments] field in the [OPTION] tab in the ezManager. Each message of the ASCII data is divided by 0x0d0a.

1	2	3	4	5	6	7	8
Ethernet Address							
	0x0d	0x0a					
IP Address							
		0x0d	0x0a	Product Information			
				0x0d	0x0a		
Comment							
0x0d	0x0a						

[ASCII Message Format]

The BINARY message format ends with 0x00. The message format of BINARY is followed:

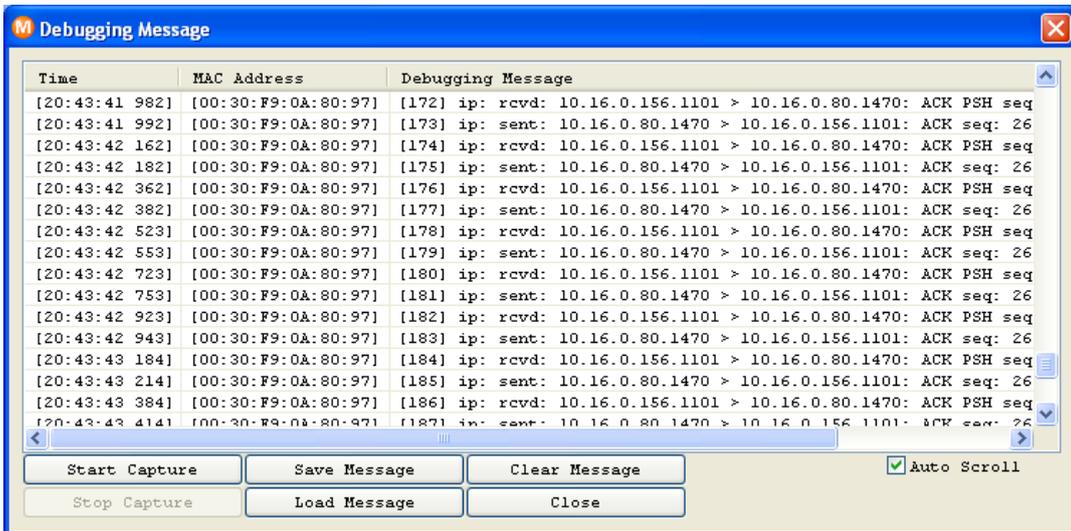
1	2	3	4	5	6	7	8
len	cm_len	Ethernet address					
IP address				p_id	major	minor	Rev
Comment							
0x00							

[Binary Message Format]

- len : total length
- cm_len : comment length
- p_id : product ID
- major / minor / Rev : firmware version

4.5 Debugging Message

If the [Debugging Message] field in the [OPTION] tab of the ezManager, CSW-H80 transmits debugging messages with UDP port 50006. Then user can get the messages with new window if user presses [Debugging Message] button as followed:



This function is very useful when there are any problems when user installs the CSW-H80 in the user site.

5 Communication Mode

5.1 Introduction

Normal communication mode is suitable for the purpose of using CSW-H80.

Normal communication mode can be classified into four modes – T2S, ATC, COD, and U2S – each of which is described in the following table.

Communication Mode	Protocol	Connection	Need for user Equipment Software Modification	Configuring environmental variable via serial port	Topology
T2S	TCP	Passive	Not needed	Impossible	1:1
ATC	TCP	Active Passive	Needed	Possible	1:1
COD	TCP	Active	Not needed	Impossible	1:1
U2S	UDP	No Connection	Not needed	Impossible	N:M

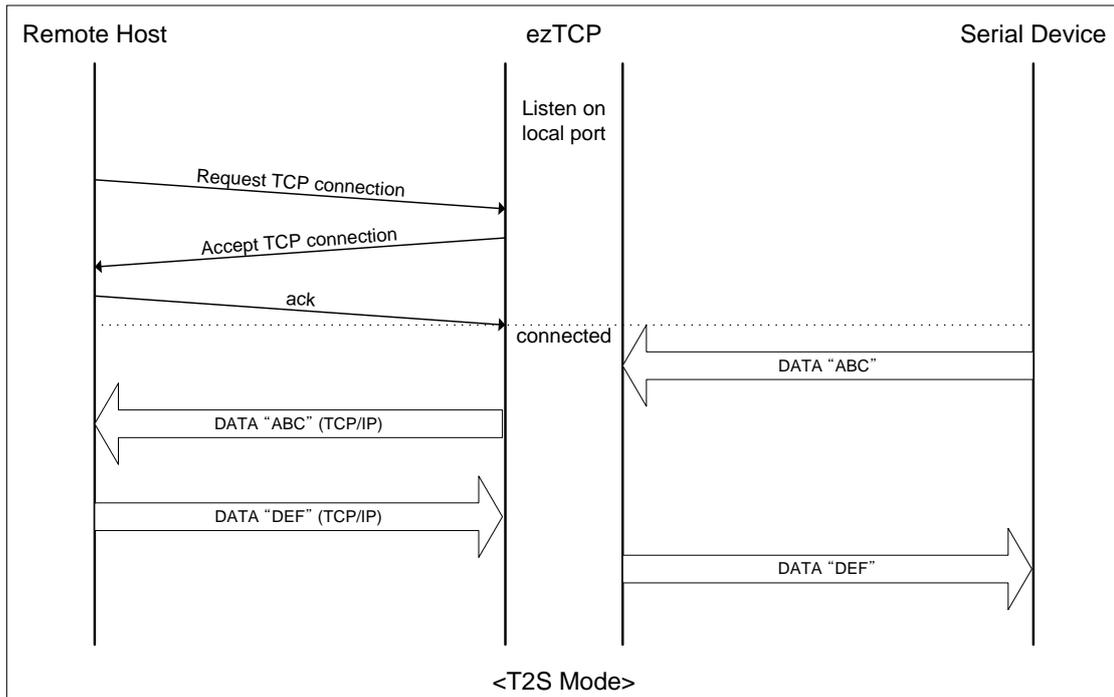
TCP protocol requires connection process. The connection is always established as 1:1 connection. At this time, the host waiting for connection (passive connection) is called a server and the one attempting to connect (active connection) is called a client.

On the other hand, UDP communicates by block unit without connection process. As UDP does not require connection, numbers of hosts can communicate at the same time.

5.2 T2S

In T2S mode, the CSW-H80 functions as a server.

When a host connects to predefined local port, the CSW-H80 accepts a TCP connection. When the ezTCP accepts TCP connection, then the TCP connection is established. After connection is established, TCP/IP processing is performed on the data coming to the serial port, which is then transmitted to the remote host. And the TCP/IP data coming from the remote host is TCP/IP-processed and transmitted to the serial port to establish data communication.



5.2.1 TCP Connection

If a host connects to the pre-defined [Local Port] of CSW-H80, the host can communicate bi-directionally.

5.2.2 Connection Limitation

CSW-H80 has two connection limitation functions. Those can be set by the [Option] tab of the ezManager.

- Allowed Ethernet Address

If user sets the [Allowed Ethernet Address], the only specified host can access the CSW-H80.

- Allowed IP

When the [Allowed IP] is set, the only hosts that are specified by [Allowed IP] and [Net Mask] can connect to the CSW-H80

Allowed IP	Net Mask	The hosts which can connect
10.1.0.1	255.0.0.0	10.1.0.1 ~ 10.255.255.254
10.1.0.1	255.255.255.0	10.1.0.1 ~ 10.1.0.254
192.168.1.4	255.255.255.255	192.168.1.4

User can re-configure the CSW-H80 even though user can't access the CSW-H80 in the normal mode because of the [ezTCP Firewall] function.

5.2.3 Serial Data Before the TCP Connection

If the [Event Byte] is 0, all data from the CSW-H80's serial port before the TCP connection are ignored. If the [Event Byte] is over 0, CSW-H80 stores serial data to its memory and it transmits these data when CSW-H80 is connected.

5.2.4 Data Transmission

Once TCP connection is established, hosts can communicates with the CSW-H80 bi-directionally. And CSW-H80 gathers data from its serial ports. It transmits data when there's no data during the specified in the [Data Frame]. If the [Data Frame] is 0, it transmits as soon as it receives data from the serial port.

The unit of the [Data Frame] is 10ms. And minimum time is 40ms so minimum guard time is 4(except 0).

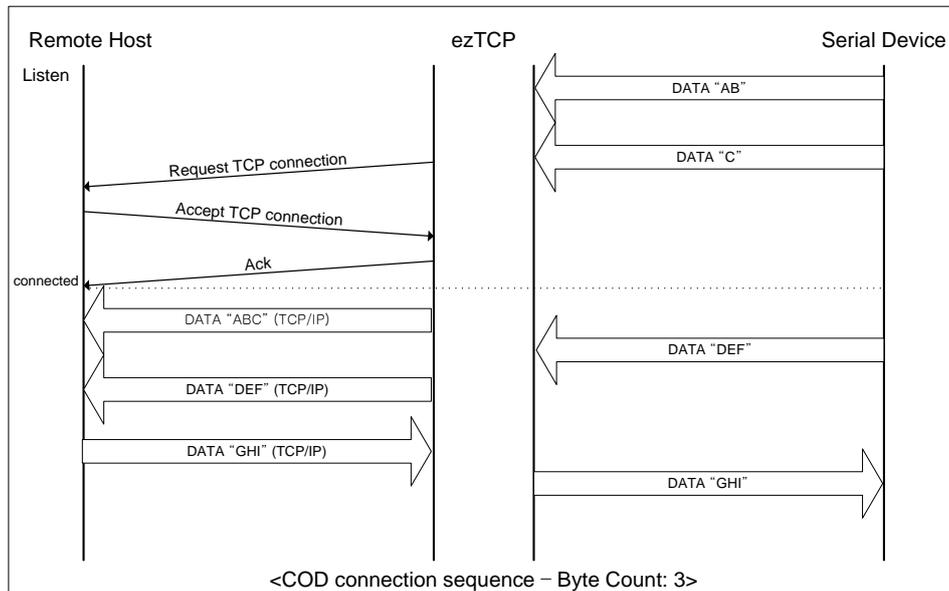
5.2.5 Disconnection

CSW-H80 disconnects the TCP connection if there is no data transmission during the [Timeout]. The unit of the [Timeout] is a second.

5.3 COD

In COD mode, the ezTCP functions as a client.

When data of the pre-specified size [Event Byte] comes to the serial port, the ezTCP attempts a TCP connection to the TCP port [Peer Port] of the preset host IP [Peer IP Address]. If the remote host accepts the TCP connection, TCP connection will be established. Data coming to the serial port after connection establishment is TCP/IP-processed and transmitted to the remote host. And, data coming from the remote host is TCP/IP-processed and transmitted to the serial port for data communication.



5.3.1 Serial Data Before the TCP Connection

If the [Event Byte] is 0, all data from the CSW-H80's serial port before the TCP connection are ignored. If the [Event Byte] is over 0, CSW-H80 stores serial data to its memory and it transmits these data when CSW-H80 is connected.

5.3.2 Data Transmission

Once TCP connection is established, hosts can communicate with the CSW-H80 bidirectionally. And CSW-H80 gathers data from its serial ports. It transmits data when there's no data during the specified in the [Data Frame]. If the [Data Frame] is 0, it transmits as soon as it receives data from the serial port.

The unit of the [Data Frame] is 10ms. And minimum time is 40ms so minimum guard time is 4(except 0).

5.3.3 Disconnection

CSW-H80 disconnects the TCP connection if there is no data transmission during the [Timeout]. The unit of the [Timeout] is a second.

5.3.4 DNS

If numeric IP address is set to the [Peer Address], CSW-H80 tries to connect to the specified IP address. If the alphabetic hostname is set to the [Peer Address], CSW-H80 queries to the DNS server. After CSW-H80 gets the IP address from the DNS server, it tries to connect the IP address.

When CSW-H80 is in DHCP or PPPoE mode and the [Obtain DNS server address automatically] is set, CSW-H80 use the DNS server that it gets DNS server IP address during the DHCP or PPPoE connection.



5.4 ATC

In ATC mode, the user can control the CSW-H80 in a similar way to controlling the modem using AT command. In ATC mode, only a TCP connection is possible and both the server and the client can be configured. In ATC mode, the AT command allows the user to set environment variables including the IP address and control TCP connection and disconnection.

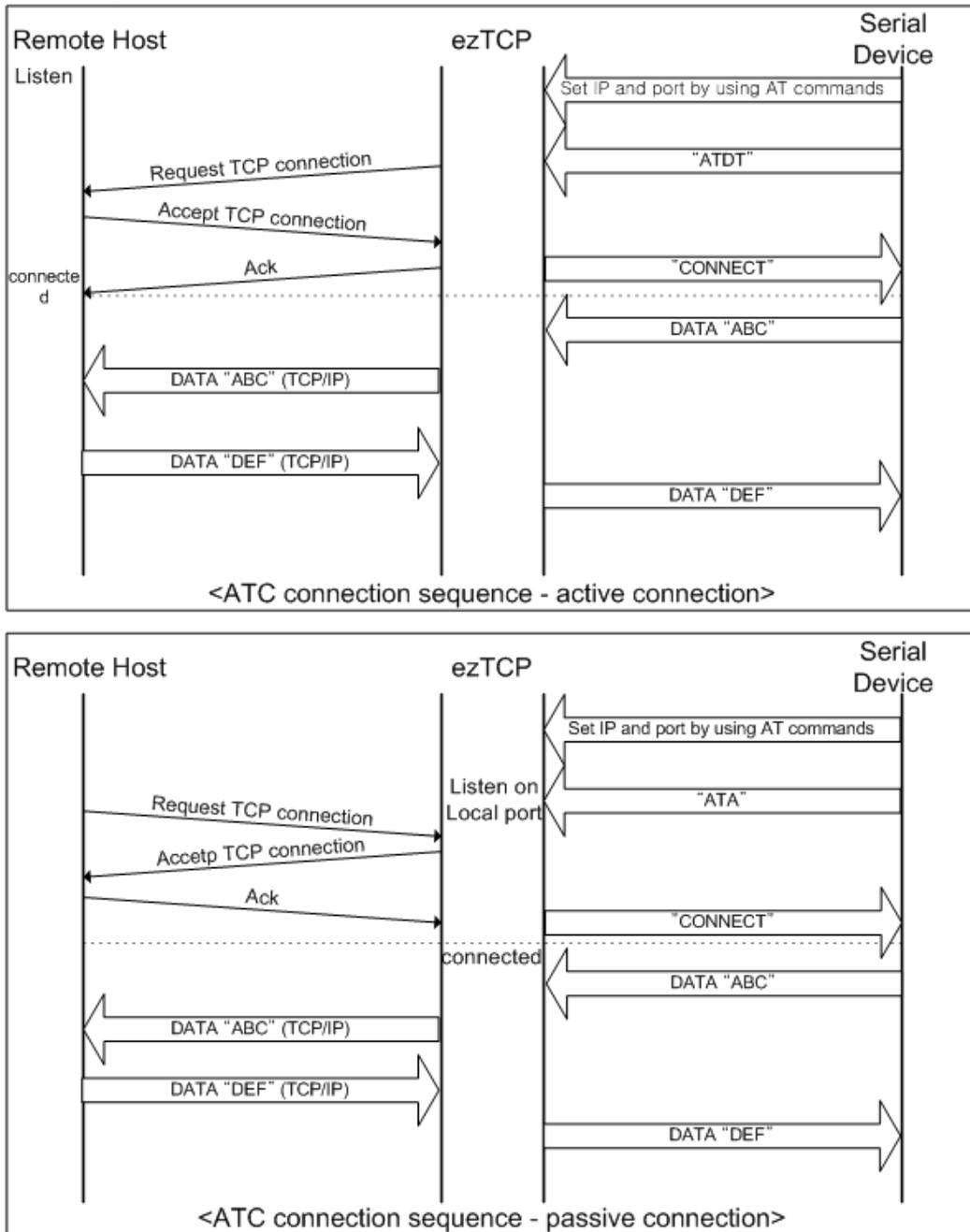


Figure 5-1 ATC Mode

☞ Refer to the [6 ATC Mode.]

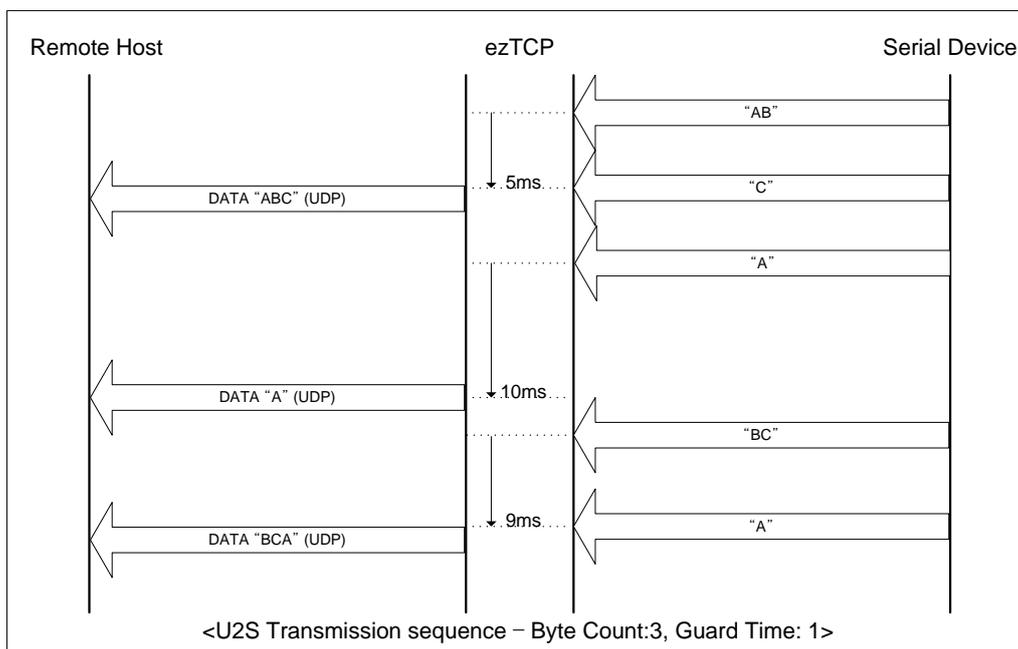
5.5 U2S

U2S mode allows for UDP communication.

In UDP mode, data are transmitted in blocks, which requires dividing data coming to the serial port into blocks before transmitting data. A procedure for dividing data into blocks is as follows:

If data of pre-specified bytes [Event Byte] come to the serial port of the ezTCP or if there is no data during the specified period of time [Timeout], all data received for the same period are recognized as one block which is then transmitted to the UDP. The [Timeout] unit is 10ms.

Since UDP communication does not require a connection procedure, the user can establish N-to-M communication via multicast and broadcast.



In addition, if you set the peer IP address and peer port to 0, CSW-H80 automatically use the source IP address and port information in the latest received UDP packet as the peer IP and port. This function is available on 1.1A or subsequently released firmware version.

6 ATC Mode

6.1 Overview

CSW-H80 can be controlled by AT commands in ATC mode. For example, the peer host IP address can be set by AT+PRIP command and connect to the host by ATD command.

Therefore, CSW-H80 communicates several hosts alternatively.

And also, it provides passive connection function by ATA command.

6.1.1 AT command format

AT commands start with AT, and end <CR>. AT command format is followed.

AT	Command	<CR>(0x0d)
----	---------	------------

The response code to AT command is followed.

<CR>(0x0d)	<LF>(0x0a)	Response message	<CR>(0x0d)	<LF>(0x0a)
------------	------------	------------------	------------	------------

Response Message

When ATV1 (initial setting)	When ATV0	Description
OK	0	command OK
CONNECT	1	TCP connected
NO CARRIER	3	TCP disconnected
ERROR	4	Command error
Set value	Set value	When query set value (example: AT+PRIIP?)

6.2 Basic AT Command Set (Example: ATA, ATD etc.)

Command	Function	Description
A	passive connection	Listen connection (host → CSW-H80 connection)
D	active connection	Connecting to host form CSW-H80
E	echo	Echo (E0 – no echo, E1-echo)
H	off-hook	disconnection
I	Info	Output CSW-H80 related-information AT+I3: the firmware version

		ATI7: MAC address
O	Online	To online mode
V	enable result code	Result code (numeric-V0, alphabetic-V1)
Z	reset	Reset

6.3 Extended AT Commands (Example: AT+PLIP etc.)

Command	Function	Description
+PLIP	local IP address	Needed AT+PWP after setting this parameter
+PSM	subnet mask	
+PGIP	default router	
+PLP	listening TCP port	
+PTO	timeout	
+PRIP	Remote machine IP address	
+PAN	Auto name server IP	Getting the DNS IP address automatically from the DHCP or PPPoE server Auto: 1, manual: 0
+PNIP	Name Server IP Address	Setting Name server IP
+PRHN	Remote Host Name	Setting the peer host name to connect with double quotation. (at+prhn="www.sollae.co.kr") After setting this parameter, CSW-H80 queries the IP address according to the name, and set the IP address to the +PRIP parameter.
+PRP	Remote machine TCP port	
+PWP	Write configuration	Saving and Reset
+PARP	ARP setting function enable/disable	ON: 1, OFF: 0
+PDC	DHCP enable/disable	ON: 1, OFF: 0

6.4 Online State and AT Command State

It is AT command mode during disconnected. AT commands can be used in AT command mode. After TCP connection, AT commands cannot be used. To use AT commands during the connection, change state to AT command state.

AT Command State	During TCP disconnected, AT commands can be used To use AT commands during the connection, required escape sequence
Online State	During TCP connected, all serial data to CSW-H80 convert TCP and send to network

6.4.1 Changing Online State to AT Command State

To change online state to AT command state during the connection, +++ string should be transmitted to CSW-H80 as following time interval.

When transmitting +++ string to CSW-H80, +++ string will be sent to peer host.

The time from final data the first '+' data of '+++' string	No data over 500ms(guard time)
time intervals between '+'s	0~500ms
Time interval after receiving last '+'	No data over 500ms (guard time)

6.4.2 Changing AT Command State to Online State

If CSW-H80's state is in AT command state during TCP connection, CSW-H80's state can be changed into online state by an ATO command.

6.5 Example of Configuration with AT Command

	Serial Port		Description
	AT+PLIP=192.168.1.200<CR>	▶	Setting LOCAL IP address
◀	<CR><LF>OK<CR><LF>		Command OK
	AT+PGIP=192.168.1.254<CR>	▶	Setting GATEWAY IP address
◀	<CR><LF>OK<CR><LF>		Command OK
	AT+PSM=255.255.255.0<CR>	▶	Setting SUBNET MASK
◀	<CR><LF>OK<CR><LF>		Command OK
	AT+PLP=1470<CR>	▶	Setting LOCAL PORT
◀	<CR><LF>OK<CR><LF>		Command OK
	AT+PTO=10<CR>	▶	Setting TIME OUT

◀	<CR><LF>OK<CR><LF>		Command OK
	AT+PWP<CR>	▶	Saving setting value to EEPROM Reset automatically
◀	<CR><LF>OK<CR><LF>		Command OK
◀	<CR><LF>NO CARRIER<CR><LF>		System Reset

6.6 Example of TCP Connection

6.6.1 Example of Active Connection

Serial Port	Description
AT+PRIP=192.168.1.201<CR>	▶ Setting remote IP address to connect
◀ <CR><LF>OK<CR><LF>	Command OK
AT+PRP=1470<CR>	▶ Setting remote port number to connect
◀ <CR><LF>OK<CR><LF>	Command OK
ATDT<CR>	▶ Connecting to the host
Attempting to connect to the host	
◀ <CR><LF>CONNECT<CR><LF>	TCP connection success
Data Communication	

☞ When ezTCP try active connection with "ATDT" command in ATC mode, its Local Port will be changed automatically.

6.6.2 Example of Active Connection with a host name

Serial Port	Description
AT+PNIP=168.126.63.1<CR>	▶ Setting name server S IP address
◀ <CR><LF>OK<CR><LF>	Command OK
AT+PRHN="www.sollae.co.kr"<CR>	▶ Setting a hostname to connect After setting CSW-H80 query an IP address to the specified name server. After getting the IP address, it set to the +PRIP field.
◀ <CR><LF>OK<CR><LF>	Command OK
AT+PRP=1470<CR>	▶ Setting remote port number to connect
◀ <CR><LF>OK<CR><LF>	Command OK

	ATDT<CR>	▶	Connecting to the host
Attempting to connect to the host			
◀	<CR><LF>CONNECT<CR><LF>		TCP connection success
Data Communication			

6.6.3 Example of passive Connection

	Serial Port		Description
	AT+PLP=1470<CR>	▶	Set LOCAL PORT to listen
◀	<CR><LF>OK<CR><LF>		Command OK
	ATA<CR>	▶	Passive connection command
Listen on local port from a host			
A host connects to CSW-H80			
◀	<CR><LF>CONNECT<CR><LF>		TCP connection OK
Data Communication			

6.7 Example of TCP Disconnection

6.7.1 Example of active disconnection

CSW-H80 disconnects the connection.

	Serial Port		Description
Data Communication(during TCP connection)			
	[Data Frame]+++[Data Frame]	▶	Changing online state to AT command state
◀	<CR><LF>OK<CR><LF>		Changed to AT command state
	ATH<CR>	▶	TCP disconnection command
◀	<CR><LF>OK<CR><LF>		Command OK

6.7.2 Example of passive disconnection

The remote host disconnects the connection.

	Serial Port		Description
Data Communication(during TCP connection)			
The remote host disconnect the connection			
◀	<CR><LF>NO CARRIER<CR><LF>		TCP disconnected

7 Technical Support, Warranty, and Notes on Operation

7.1 Technical Support

If you have any question regarding operation of the product, visit Customer Support FAQ corner and the message board on Sollae Systems' web site or send us an email at the following address: support@eztcp.com

Website Address for Customer Support:

<http://www.eztcp.com/en/Support/support.php>

7.2 Warranty

7.2.1 Refund

Upon the customer's request to refund the product within two weeks after purchase, Sollae Systems will refund the product.

7.2.2 Free Repair Services

For product failures occurring within one year after purchase, Sollae Systems provides free repair services or exchange the product. However, if the product failure is due to user's fault, repair service fees will be charged or the product will be replaced at user's expense.

7.2.3 Charged Repair Services

For product failures occurring after the warranty period (one year) or resulting from user's fault, repair service fees will be charged and the product will be replaced at user's expense.

7.2.4 Notes on Operation

- Sollae Systems is not responsible for product failures occurring due to user's alternation of the product.
- Specifications of the product are subject to change without prior notice for performance improvement.
- Sollae Systems does not guarantee successful operation of the product if the product was used under conditions deviating from the product specifications.
- Reverse engineering of firmware and applications provided by Sollae Systems is prohibited.



- Use of firmware and applications provided by Sollae Systems for purposes other than those for which they were designed is prohibited.
- Do not use the product in an extremely cold or hot place or in a place where vibration is severe.
- Do not use the product in an environment in which humidity is high or a lot of oil exists.
- Do not use the product where there is caustic or combustible gas.
- Sollae Systems does not guarantee normal operation of the product under the conditions a lot of noise exists.
- Do not use the product for a purpose that requires exceptional quality and reliability relating to user's injuries or accidents – aerospace, aviation, health care, nuclear power, transportation, and safety purposes.
- Sollae Systems is not responsible for any accident or damage occurring while using the product..



8 Revision History

Date	Version	Comments
Dec. 9. 2008	1.0	Initial Release
Jan.08.2009	1.2	Add re-configuring the security function in the Serial Configuration Mode
Mar.31.2009	1.3	Modify 7.1 Technical Support Modify the table of 6.7.1
May.13.2009	1.4	Modify the table of 1.3 Specification Modify the table of 1.4.2 LED Indicators Add 3.1.7. WPA, 3.1.8 WPA 2 Modify all the figures related ezManager Add a description of changing Local Ports in ATC Add a description of US2 Echo function Correct some expressions
May.14.2009	1.5	Add a comment about F/W which support WPA and WPA2

