Serial Device Server

CSE-H21 User's Manual

Version 1.2

2008-12-04

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

Contents

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.

CSE-H21 in ezTCP product group is a product that provides TCP/IP communication through Ethernet. In other words, like other ezTCP products, CSE-H21 sends data from the serial port to the LAN after TCP/IP processing and vice versa.

As CSE-H21 has 2 RS232 ports, it can be connected to two RS232 devices in the same time. And it is easy CSE-H21 to attach to user systems because of its compact size.

Because it has SSL and SSH function, user can communicate more safely. And 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 can be operated wide range temperature condition and its serial ports are isolated electrically and there is surge protection function on the Ethernet port, so it is very suitable for noisy industrial environment.

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

1.2 Components

- CSE-H21 Body
- CD including utilities and documents (Option)
- 5V Power Adapter (Option)
- RS232 cable for PC connection (Option)

1.3 Specification

Power	Input Voltage	5V (±10%)
	Current	200mA typical
Dimension	158mm x 90mm x 24mm	
Weight	about 340g	
Interface	Serial	9 pin Dsub male
	Network	10/100 Base T (RJ45)
Serial Port	2 x RS232 (300bps ~ 230400bps, RTS/CTS Flowcontrol)	
Network	Ethernet 10/100 M bit auto-sense Auto MDI/MDIX	
Protocols	TCP, UDP, IP, ICMP, ARP, DHCP, PPPoE, DNS lookup, DDNS(Dynamic DNS) Telnet COM Port Control Option(RFC2217) SSL3.0/TLS1.0, SSH	
Diagnostic	Online Debugging Function	
RoHS	RoHS Compliant	
Approvals	MIC: SLS-CSE-H21 (A) CE: F690501/SP-EMY000088 FCC: F690501/RF-EMY002716	
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
	Ezterm	Socket test utility
	Hotflash	Firmware download utility via TFTP
	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 Ethernet port, two RS232 ports, and a Power socket on the top side. And there is an ISP switch on the right side. And 15 LED indicators are in the CSE-H21.

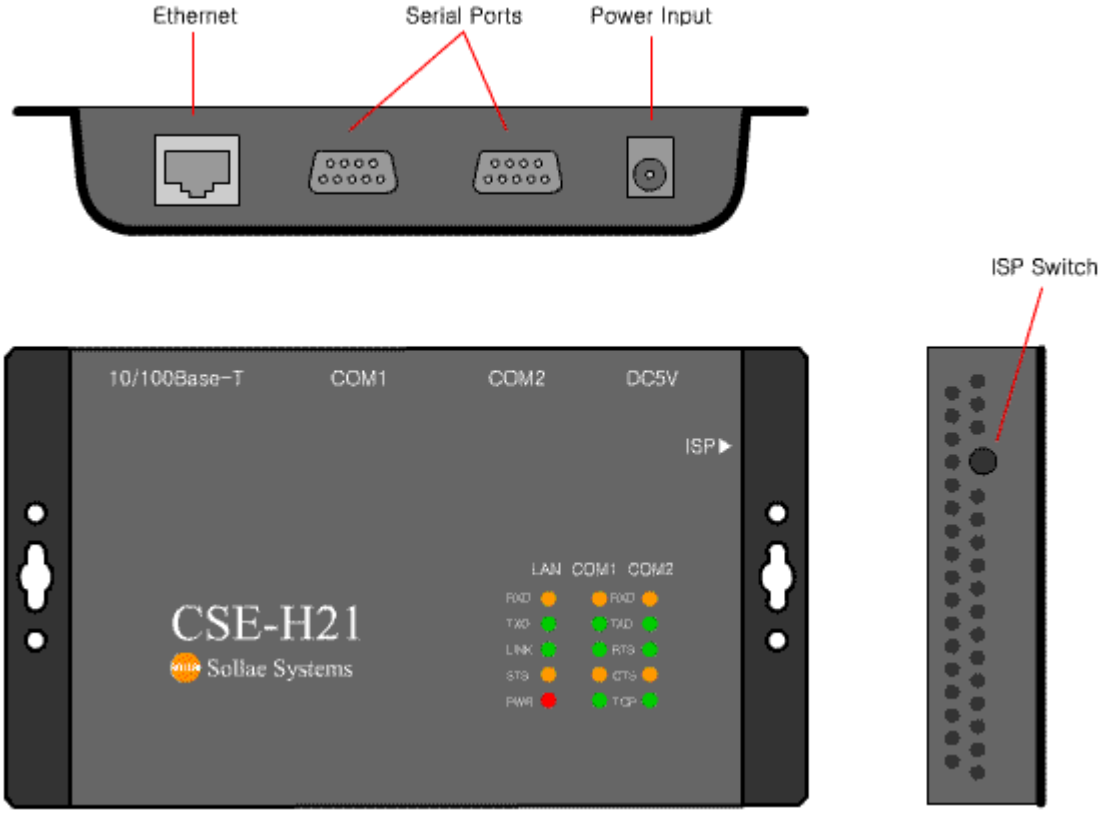

Figure 1-1 CSE-H21 Layout

1.4.2 LED indicators

There are 15 LED indicators on the CSE-H21. The left 5 are for LAN status, and the middle and right 5 are for COM1 and COM2 respectively. The followings are the operations of each LED indicators.

Table 1-1 LED indicators

Name		Color	LED Status	Description
PWR		Red	On	Power is on.
LAN	STS	Yellow	Blink every 1 second	IP address is assigned.
			Blink 4 times every 1 second	IP address is net assigned in DHCP or PPPoE modes.
			Off	ISP Mode
	LINK	Green	On	CSE-H21 is connected to the Ethernet.
	RXD	Yellow	Blink	Ethernet packet is received
	TXD	Green	Blink	Ethernet packet is transmitted
COM	TCP	Green	On	TCP is connected
	RXD	Yellow	Blink	serial data are received
	TXD	Green	Blink	serial data are transmitted
	RTS	Green	On	There are enough rooms to receive serial data.
	CTS	Yellow	On	CTS signal from the counter-part serial device

1.4.3 ISP Switch

There is an ISP switch on the side. If this switch is push 20ms~1s, it operates as Serial Configuration Mode. If this switch is push over 1 second, CSE-H21 operates as ISP mode. User can do firmware download to the CSE-H21 in the ISP mode. Please refer to 4.2 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. The serial ports are isolated electrically.

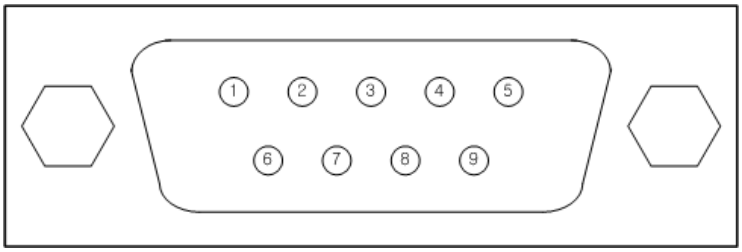

Figure 1-2 9 pin D-sub male connector

- RS232 ports

Table 1-2 RS232 Port Specification

Number	Name	Description	level	Dir.	Etc.
1	DCD	Data Carrier Detect	RS232	Input	optional
2	RXD	Receive Data	RS232	Input	mandatory
3	TXD	Transmit Data	RS232	Output	mandatory
4	DTR	Data Terminal Ready	RS232	Output	optional
5	GND	Ground	Ground	-	mandatory
6	DSR	Data Set Ready	RS232	Input	optional
7	RTS	Request To Send	RS232	Output	optional
8	CTS	Clear To Send	RS232	Input	optional
9	RI	Ring Indicator	RS232	Input	optional

- Data bits, Parity, Stop bit

Table 1-3 RS232 Parameters

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

- Flow Control

  CSE-H21 has RTS/CTS flow-control function.

- Telnet COM Port Control Option

  CSE-H21 has a Telnet COM Port Control function that is defined in the RFC2217. If this option is set, CSE-H21 transmits serial input signals (CTS, DSR) to the peer host and set the values(RTS, DTR, baud rate, data bits, parity, stop bit) onto its serial ports from the peer host.

- TX Delay

  CSE-H21 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 CSE-H21's serial ports. Its unit is byte.

1.5.2 Ethernet Interface

Network part of CSE-H21 is configured with Ethernet. So, what you have to do is only to connect UTP cable. The Ethernet part detects 10Mbit or 100Mbit Ethernet automatically, to connect the corresponding cable. It also provides auto MDI/MDIX function to detect 1:1 cable or cross-over cable automatically. Each piece of Ethernet equipment has unique hardware addresses, and CSE-H21also has factory-set hardware address (which is called MAC address)

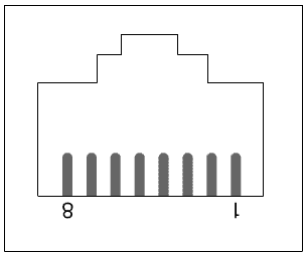

Figure 1-3 RJ45 Ethernet connector

Table 1-4 Ethernet port pin description

Number	Name	Direction
1	Tx+	Output
2	Tx-	Output
3	Rx+	Input
4	-	-
5	-	-
6	Rx-	Input
7	-	-
8	-	-

1.5.3 Power

DC5V is used for CSE-H21 and the specification is below:

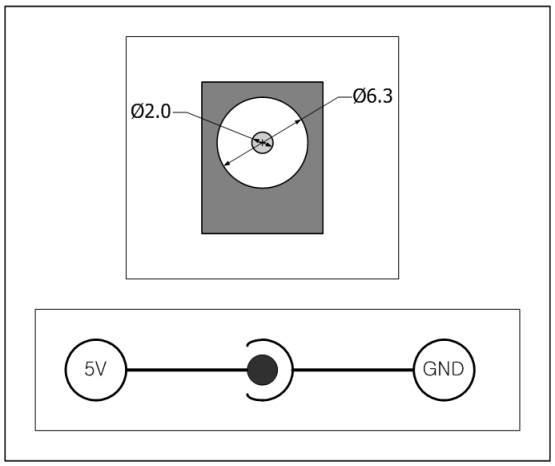

Figure 1-4 DC 5V Power Jack

2 Getting Start

2.1 Installation Method

You can install CSE-H21 in the following steps.

Table 2-1 CSE-H21 Installation steps

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

2.1.1 Checking the Communication Environment

Before installing CSE-H21, check the network environment where CSE-H21 is to be installed, including the followings matters:

- IP address environment (local IP, subnet mask, gateway, DHCP/PPPoE etc.)
- Serial port type of the equipment to which CSE-H21 is going to be connected (RS232)
- Serial port items of the equipment to which CSE-H21 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.)
- Security Function (SSL, SSH)

2.1.2 Connecting to the Network

Connect power to CSE-H21, and connect CSE-H21 either directly to the Ethernet port of the PC where test is to be performed or to the network (hub) to which the PC is connected.

2.1.1 Configuring the Environmental Variables

When network connection is completed, configure the environmental variables such as IP address related items, serial port related items, and communication mode related items through the LAN using "ezManager" the environmental variable configuration program.

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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 PC is set to 10.1.0.2.

2.2.1 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	-

2.2.2 Installing CSE-H21

Connect the supplied RS232 cable between your PC and CSE-H21, the LAN cable to the hub to which the PC is connected or directly to the PC, and the supplied CSE-H21 power adapter to CSE-H21 for power supply. If the LAN cable has been correctly connected when power is supplied, LINK LED turns on.

2.2.3 Configuring CSE-H21

Configure CSE-H21 setting using ezManager, the ezTCP configuration program, as follows.

Run ezManager, and click [Search ezTCP] button in the ezManager window. And, ezManager program will search all CSE-H21s on the local network.

When ezTCP is searched, MAC address of the ezTCP is displayed on the [Search List] window (The MAC address is indicated at the bottom of the product case). Select the corresponding MAC address, and set the same as shown in the following figure and click [Write] button to save the settings. When no ezTCP is found, check the Windows firewall. If you press [Firewall] button in the ezManager, you can see the Windows Firewall menu more easily

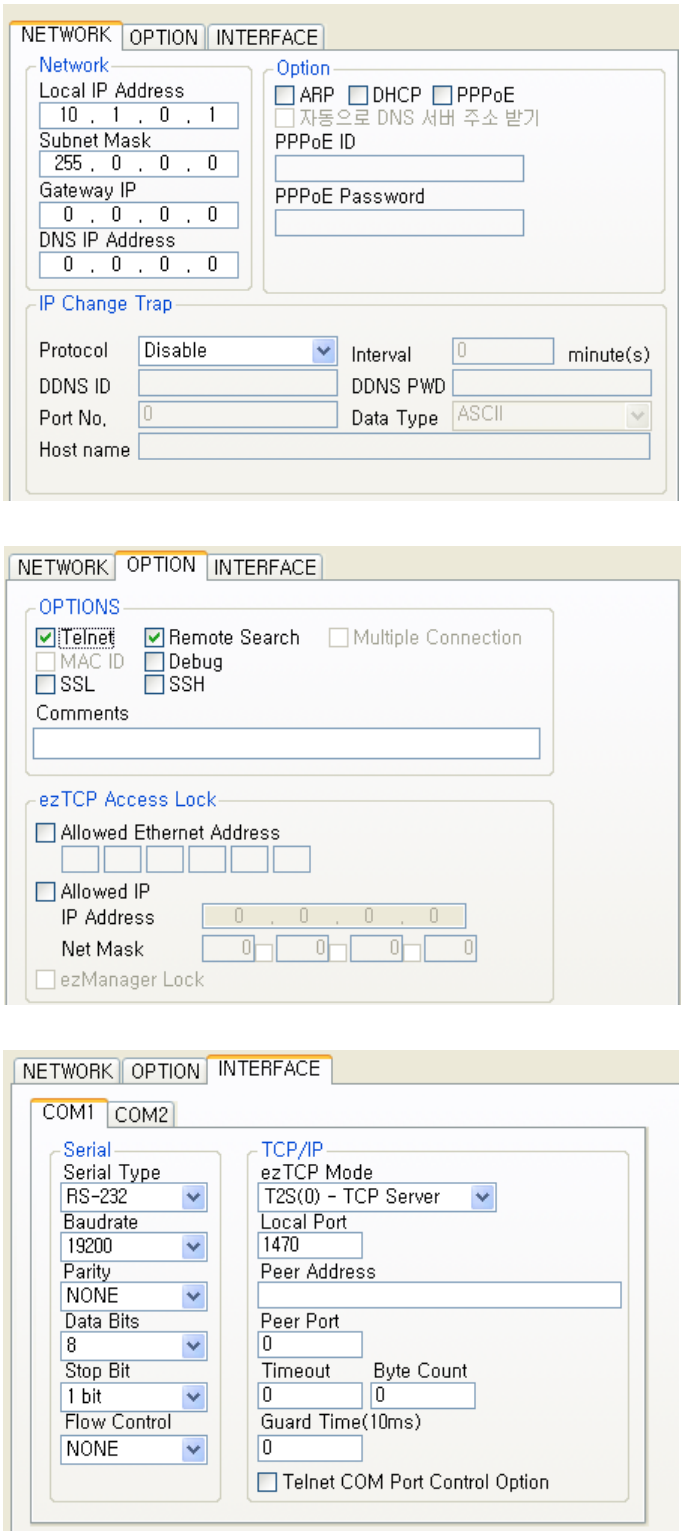


Figure 2-1 Initial settings

2.2.4 Communication Test

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

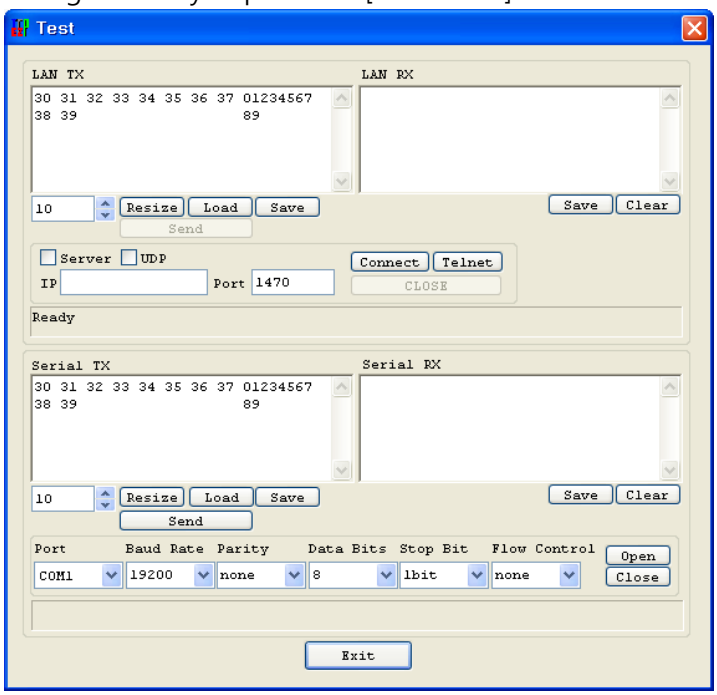


Figure 2-2 The window of the Test Program

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 [REMOTE HOST 10.1.0.1 : 1470]. And the STS of COM1 will be on.

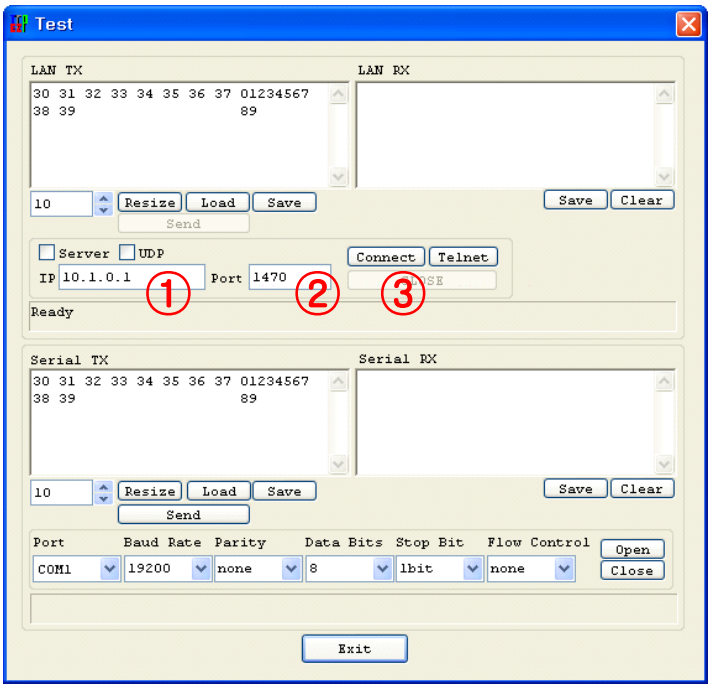


Figure 2-3 A window to test

3) Press the [Open] button after selecting serial port that is connected to the CSE-H21. If the serial port is open, the "COM1 Port is opened" message will be shown.

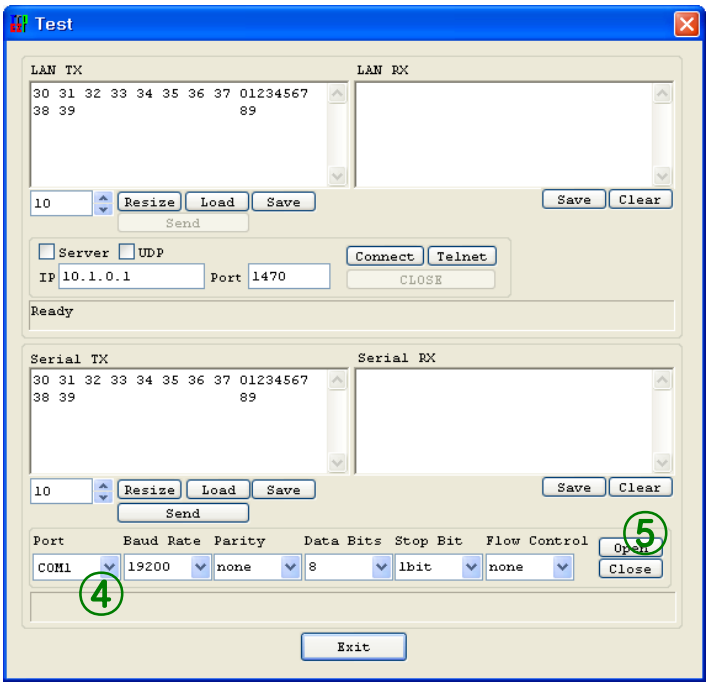


Figure 2-4 the screenshot of test program

4) If you press the [Send] button below of the [LAN TX] window, the data in the [LAN TX] window will be transmitted to the [Serial RX].

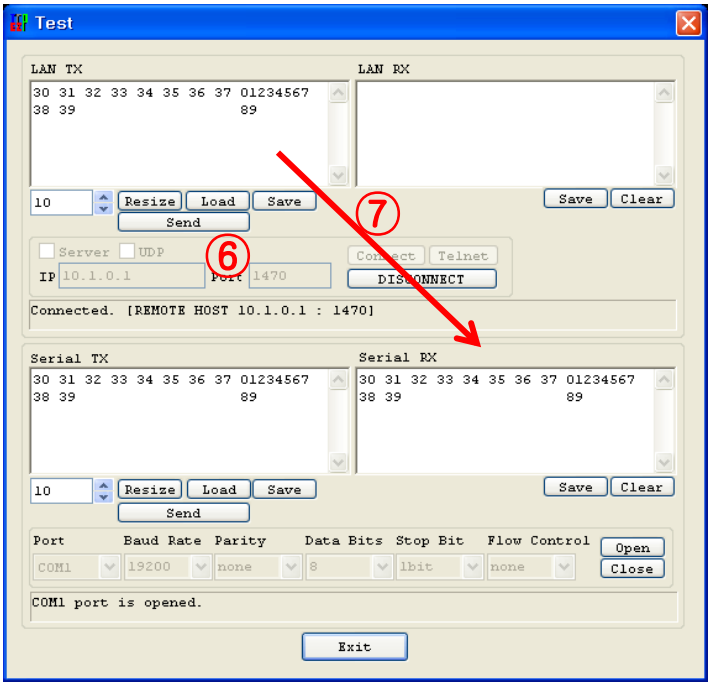


Figure 2-5 The data are transmitted to the [Serial RX] window

5) If you press the [Send] button below the [Serial TX] window, the data will be transmitted from the [Serial TX] window to the [LAN RX] Window.

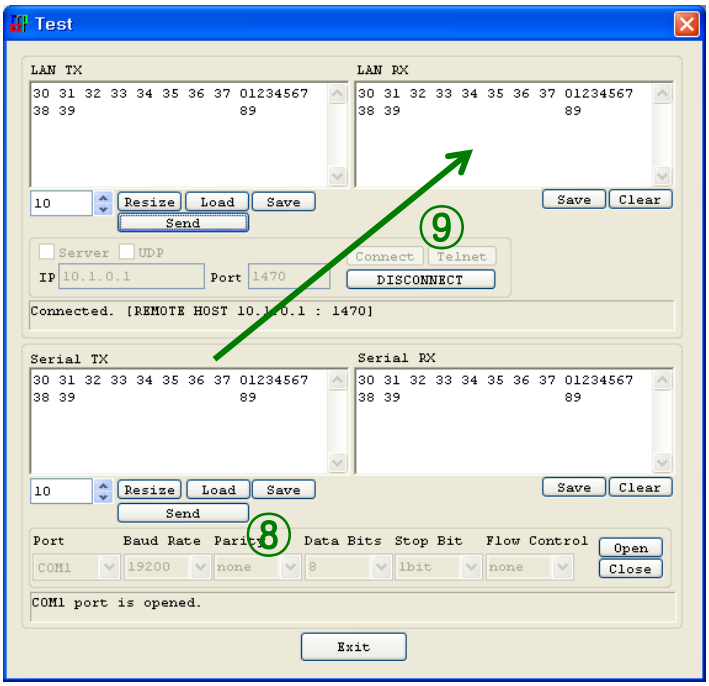


Figure 2-6 The data are transmitted to the [LAN RX] window

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

3 Configuration

3.1 IP Address and Environmental Variables

For TCP/IP communication, you must set IP address related items. In addition, you have to set serial port related items (serial port type, communication speed, data bit length, parity bit, flow control, etc) to CSE-H21.

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 CSE-H21 over the network, or by using AT commands in ATC mode

3.2 Configuring with ezManager

3.2.1 ezManager

The basic environmental variables (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.

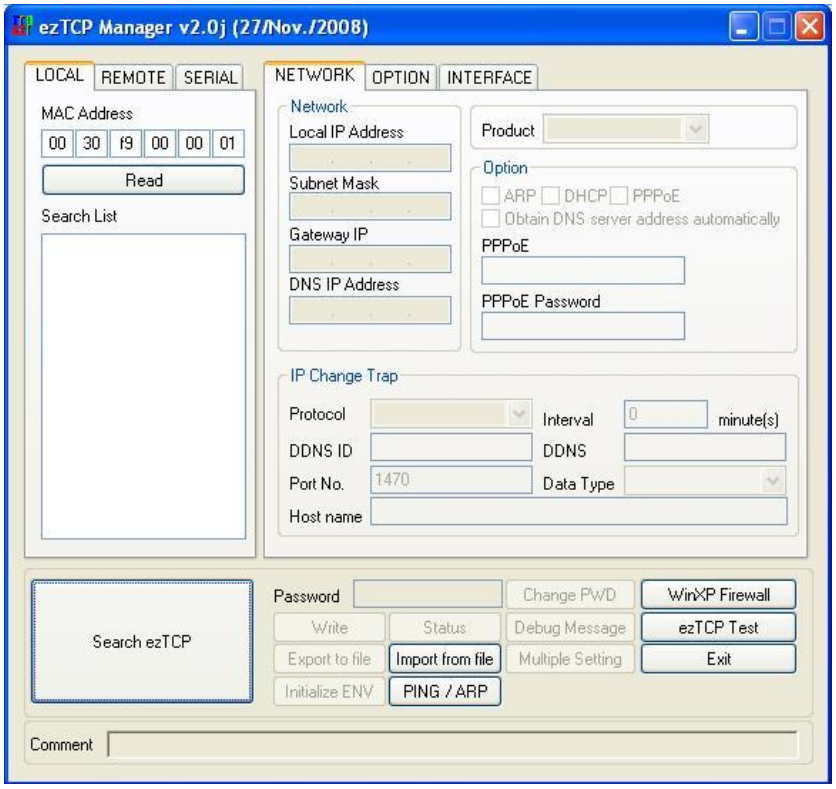


Figure 3-1 the initial window of the ezManager

3.2.2 Buttons of the ezManager

LOCAL	To set the CSE-H21, ezManager communicates with the CSE-H21 through UDP broadcast. The ezManager identify with the CSE-H21's MAC address. So user can configure the CSE-H21 even though user doesn't know its IP address or the IP address isn't set to it. User can configure CSE-H21 which is inside of router(within local network). The UDP port number that is used is 50005.
REMOTE	The ezManager communicates with the CSE-H21 through UDP unicast with IP address. So user can configure the CSE-H21 which is outside of the local network. The UDP port number that is used is 50005.
SERIAL	The ezManager use PC's COM Port(RS232 port) when it configures the CSE-H21. So user has to connect PC's COM port to COM1 port of the CSE-H21. And the CSE-H21 should be in the Serial Configuration Mode.
Search ezTCP	Searches all CSE-H21 on user local network. The result is displayed on the [Search List] box. Each value represents each ezTCP's MAC address. And parameters of the selected ezTCP are displayed in the right window. (The MAC address of CSE-H21 is on the bottom of its case.)
Read	If user inputs the MAC address of the CSE-H21 into the MAC address input box in the [LOCAL] tab or inputs the IP address of the CSE-H21 into the [REMOTE] tab and presses [Read] button, then user can read only the CSE-H21's parameters. If there are a lot of ezTCPs in the network so it is hard to find the ezTCP, it is very useful.
Write	Stores the modified parameters by pressing the [Write] button. The CSE-H21 resets automatically if the [Write] button is pressed.
Change PWD	This button is for setting or modifying the password of CSE-H21. If a password of the CSE-H21, user has to input the password in the text box of the ezManager when user sets parameters of the CSE-H21.
Status	User can read the current status of the CSE-H21 by pressing this button. If user presses this button, a new window is appeared and some information will be shown. (the running time, IP addresses, the amount of receiving and transmitting from/to the serial ports.
Debug Message	User can debug CSE-H21. If the [Debug] option of the [OPTION] tab is set and user presses this button, user can debug CSE-H21. When the debugging function is running, CSE-H21 broadcasts debugging data to the - 19 -thernet with UDP 50006. So user has to open the UDP 50006 port to debug CSE-H21. After debugging, user has to unset [Debug] option of the [OPTION] tab to prevent heavy network traffic.

Firewall	ezManger would not work if any firewall functions are working. This button is a shortcut to the [Windows Firewall].
ezTCP Test	You can simply test ezTCP's function in terms of both serial and network ports with this button.
Export to file	You can save the environmental variables in the screen to a file with this button.
Import from file	You can load the environmental variable from the file that you have saved.
Multiple Setting	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.
Initialize ENV	User can initialize the CSE-H21 with this button.
Search ezTCP	Searches all CSE-H21 on user local network. The result is displayed on the [Search List] box. Each value represents each ezTCP's MAC address. And parameters of the selected ezTCP are displayed in the right window. (The MAC address of CSE-H21 is on the bottom of its case.)
Exit	Terminating ezManager.

3.2.3 ezManager Configuration Items

NETWORK	
Network	
Local IP Address	CSE-H21'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 CSE-H21 IP address via DHCP
PPPoE	Decide whether to receive CSE-H21 IP address via PPPoE
PPPoE ID & Password	ID and Password that will be used in PPPoE
ARP	ARP Function activation status (Conditionally required for DHCP)
Obtain DNS server address automatically	If CSE-H21'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.
IP Change Trap	
Protocol	IP Change Trap Method
Interval	The interval to send IP information
DDNS ID	The user account which was registered to the service provider (If DDNS is selected)
DDNS PWD	The password of user account which was registered to the service provider (If DDNS is selected)
Port No	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	The host name of the CSE-H21 (example: eztcp.dyndns.com)

INTERFACE	
Serial Type	Fixed to RS232
Baudrate	Baudrate 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 Delay	The interval between byte and byte which is outputting from the CSE-H21. (Unit: 1 byte)
ezTCP Mode	Communication Mode
Local Port	Port number for waiting to be connected in Server mode
Peer Address	IP address or host name to connect in Client mode
Peer Port	Port number to connect in Client mode
Byte Count	Minimum number of bytes attempting to connect/transmit Data amount before the TCP connection
Timeout	Time out
Guard Time	When CSE-H21 sends data from its serial port to the ethernet, the [Guard Time] is a unit between two packets. If there is no data from its serial port during the specified [Guard Time], CSE-H21 sends data to ethernet. (unit: 10ms, minimum vale: 4 (40ms))
Telnet COM port control option	If the Telnet COM Port Control Option is enabled, CSE-H21 sends the CTS, DSR control signal to the communication counter part, and CSE-H21 sets its serial port items(RTS, DTR, Baudrate, databits, parity, stop bit) after getting information from the communication counter part.

OPTION	
Remote Search	Enable/disable [REMOTE] tab of ezManager
Telnet	Enable/disable telnet
Debug	Enable/disable the remote debugging function of CSE-H21 After debugging, user has to disable this function to reduce network load.
SSL	Enable/disable the SSL function
SSH	Enable/disable the SSH function
Comments	User specific information
Allowed Ethernet Address	The only host that has specified Ethernet address(MAC address) can access the CSE-H21
Allowed IP	The only host that has specified IP address range can

	access the CSE-H21
ezManager Lock	If this parameter is set, CSE-H21 replies to the only host that has parameters that is defined in the [Allowed Ethernet Address] or [Allowed IP].

3.2.4 ezManager Operation example

ezManager can be used to change the IP address related items, the serial port setup value, the serial port operation mode, and how to setup ezTCP. 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 LAN cable is connected correctly, pressing [Search ezTCP] or [Read] button will display the following window:

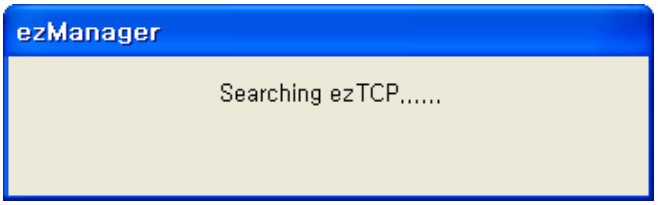


Figure 3-2 Searching ezTCP

- If a network-attached ezTCP is detected, the following message will be displayed. 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.)

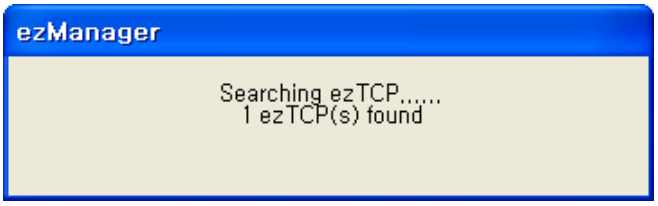


Figure 3-3 ezTCP is found

- 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.

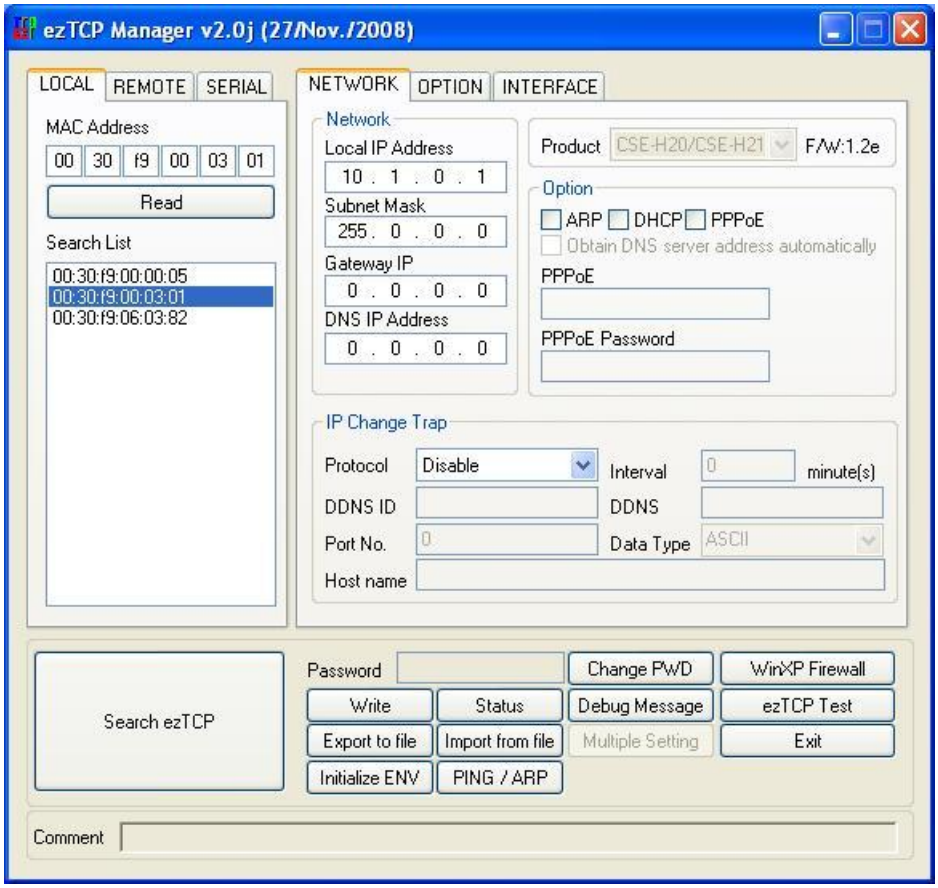


Figure 3-4 search result of ezTCP

- Set [ezTCP 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 ithe ping test is OK.

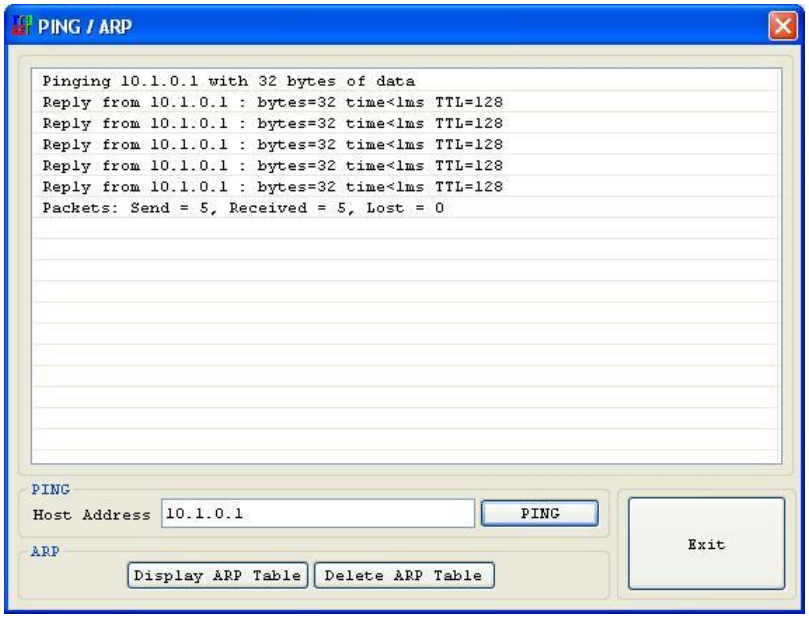


Figure 3-5 ping test when the IP address is 10.1.0.1

3.3 AT command

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

☞ *For more information, See "7. ATC Mode".*

3.4 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 [DHCP] item on ezManager. Note that the user may have to check [ARP] item according to the type of DHCP servers.

3.5 Setting PPPoE

PPPoE is used in most ADSL and VDSL. To use PPPoE function, PPPoE function should be enabled and PPPoE ID and PPPoE password should be configured. The local IP address of CSE-H21 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

CSE-H21 can operate in one of two modes (normal and ISP modes). Normal mode is ordinary data communication mode; and ISP mode is used to download CSE-H21 firmware through the Ethernet port.

4.1.1 normal mode

The normal mode is an operation mode that CSE-H21's works for normal purposes. If CSE-H21 boots up without any other treatment, it works in the normal mode.

☞ *Please refer to the 5. Normal Mode.*

4.1.2 Serial Configuration Mode

If you press the switch 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 COM1 port in this mode.

4.1.3 ISP Mode

If you press the switch 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 CSE-H21 with hotflash program that is a TFTP client through the Ethernet.

4.1.4 Comparison between two modes

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

Table 4-1 Operation Mode

Mode	How to initiate	Description	Baudrate
normal	Power on CSE-H21 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 CSE-H21 through COM1	115200bps/N/8/1
ISP	Pressing the ISP button over 1 second	Firmware download mode	115200bps/N/8/1

4.2 Upgrading new firmware

You can download new firmware of CSE-H21 in the ISP mode. You have to connect the Ethernet ports of you PC and CSE-H21 to your network in advance. The method is followed:

.

- Press ISP button more than 100m seconds. Then it works at the ISP mode. All LED except PWR LED and LINK LED will be off in the ISP mode.
- Run hotflash program that is supplied by Sollae Systems. And then, input IP address of CSE-H21 and select a new firmware to download by pressing the [FILE] menu. And press the [SEND] button. You have to uncheck the [Verify firmware version] in this case.

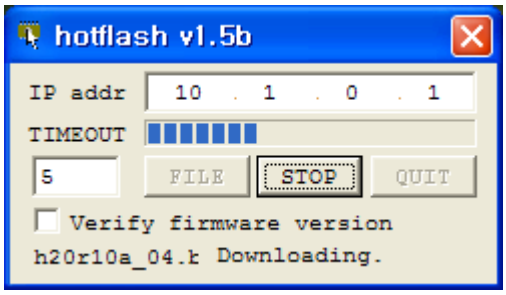


Figure 4-1 A firmware is downloading to the CSE-H21 with the hotflash

- After completing the download, the following message will be shown. And CSE-H21 boots up automatically and works at the normal mode.

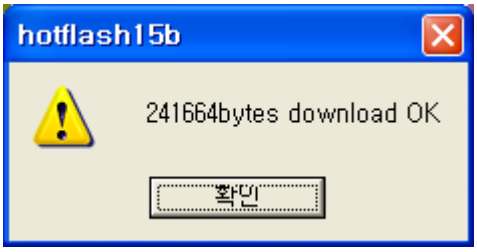


Figure 4-2 Completing firmware download with hotflash

4.3 Checking current status

4.3.1 Telnet login

You can log in the CSE-H21 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 CSE-H21. If you press "telnet [CSE-H21's IP address]" on the command prompt of Windows, you can log in CSE-H21

4.3.2 Commands for checking the status

- Network Status

If you type "st net", you can check the network status of CSE-H21.

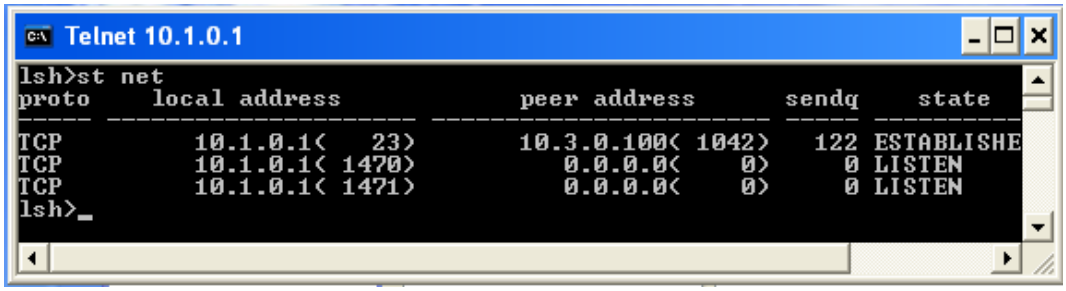


Figure 4-3 The network status

- Serial ports' status

  If you type "st sio", you can check the serial ports' status of CSE-H21 The tx_count and rx_count is the total bytes since the CSE-H21 has booted up.

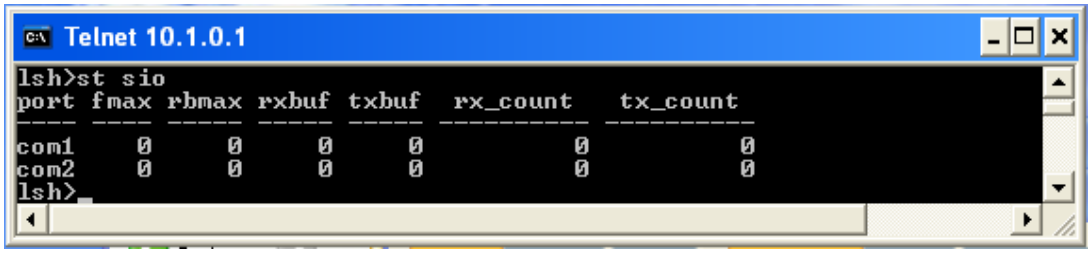


Figure 4-4 The serial status

4.3.3 Check Status in the ezManager

If you press the [STATUS] in the ezManager, you can monitor the current status of CSE-H21. 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.

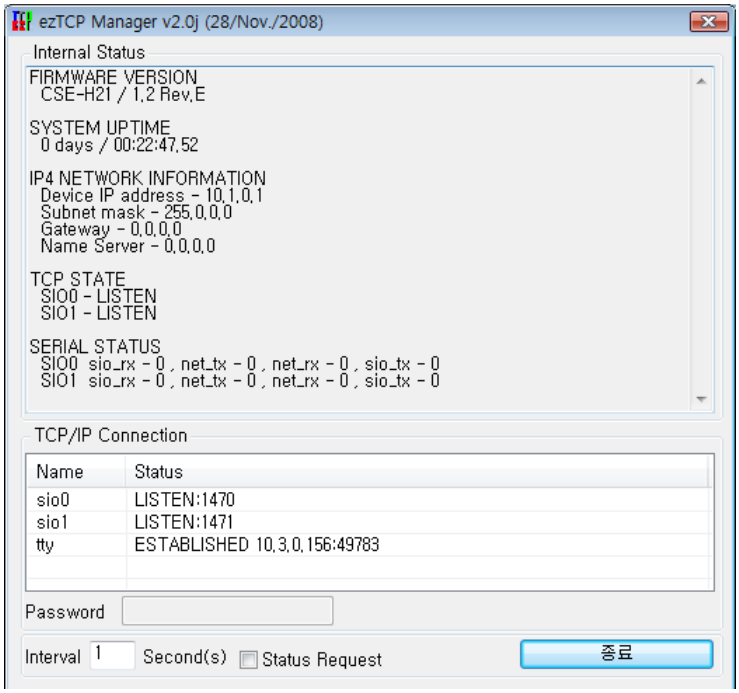


Figure 4-5 A screen shot of the [STATUS] window

4.4 IP Change Trap

CSE-H21 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. CSE-H21 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 CSE-H21 is that CSE-H21 registers its IP address to the DynDNS Inc.(www.dyndns.com)'s DNS server. So user has to register user name and hostname to the website of the DynDNS to use the DDNS function.

4.4.2 TCP/UDP

CSE-H21 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. CSE-H21 supports both ASCII and BINARY mode.

ASCII message format is followed:

Each byte of the ethernet address is divided by colons, so the total byes of the ethernet address is 17bytes. The IP address is the CSE-H21's IP address that is assigned to the CSE-H21. 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.

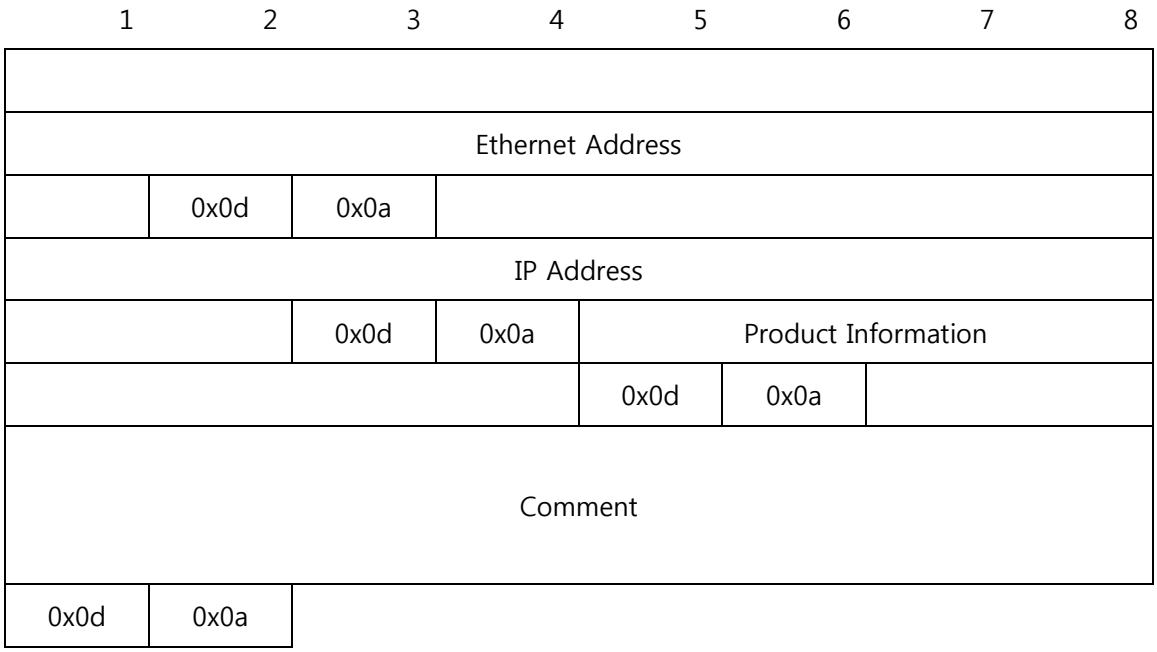


Figure 4-6 ASCII Message Format

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

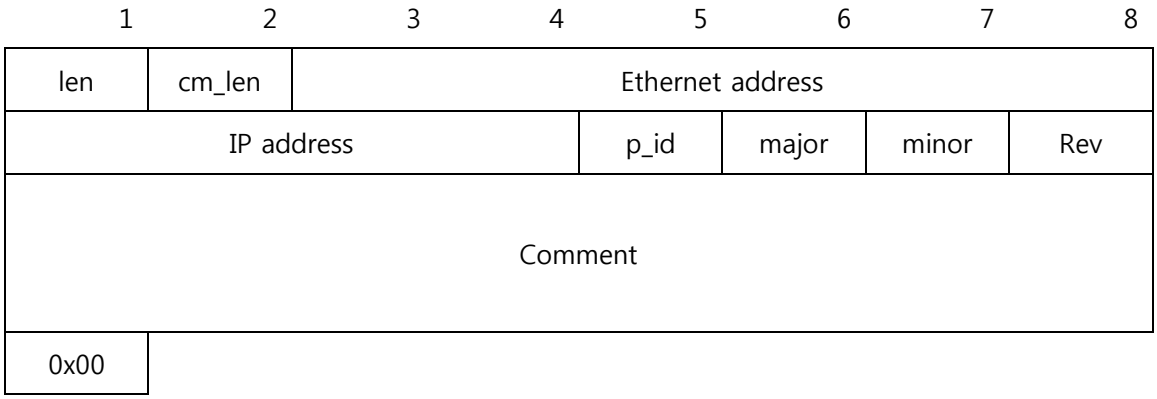


Figure 4-7 Binary Message Format

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

4.5 Remote Debugging

If the [Debug] field in the [OPTION] tab of the ezManager, CSE-H21 transmits debugging messages with UDP port 50006. Then user can get the messages with new window if user presses [Debug Message] button as followed:

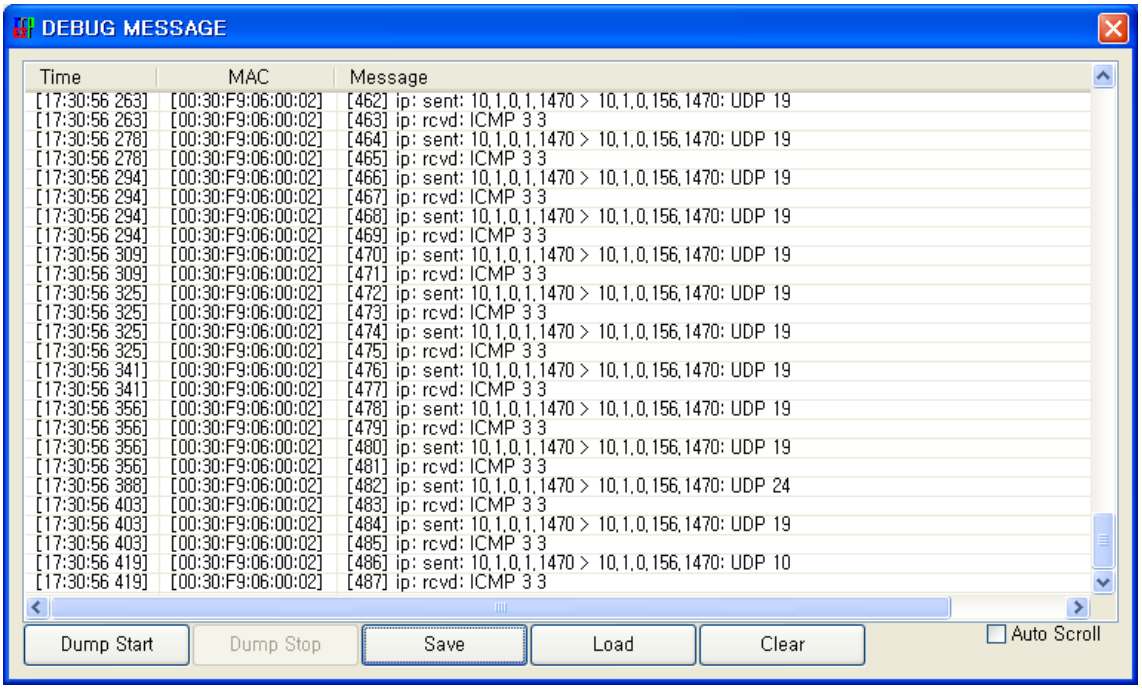


Figure 4-8 Debugging screen

This function is very useful when there are any problems when user installs the CSE-H21 in the user site.

5 Communication Mode

5.1 Introduction

Normal communication mode is suitable for the purpose of using CSE-H21.

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

Table 5-1 Communication Mode

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 CSE-H21 functions as a server.

When a host connects to predefined local port, the CSE-H21 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.

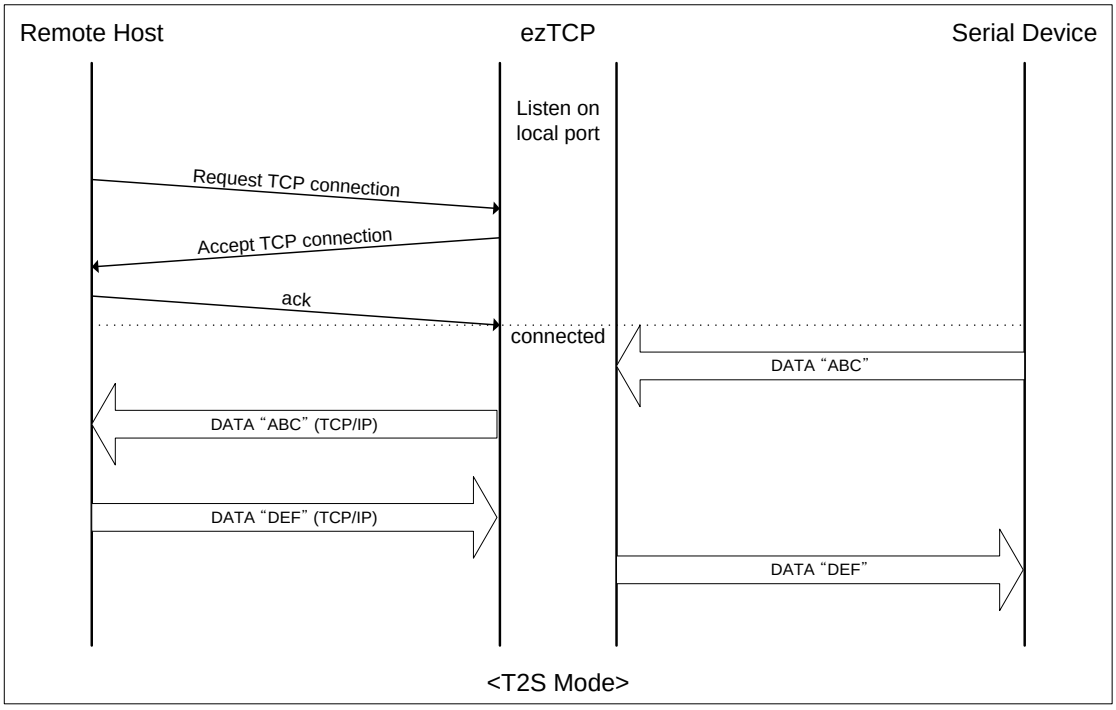


Figure 5-1 T2S Mode

5.2.1 TCP Connection

If a host connects to the pre-defined [Local Port] of CSE-H21, the host can communicate bi-directionally.

5.2.2 Connection Limitation

CSE-H21 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 CSE-H21.

- Allowed IP

When the [Allowed IP] is set, the only hosts that are specified by [Allowed IP] and [Net Mask] can connect to the CSE-H21

Table 5-2 An Example of Allowed IP

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

5.2.1 Serial Data Before the TCP Connection

If the [Byte Count] is 0, all data from the CSE-H21's serial port before the TCP connection are ignored. If the [Byte Count] is over 0, CSE-H21 stores serial data to its memory and it transmits these data when CSE-H21 is connected.

5.2.2 Data Transmission

Once TCP connection is established, hosts can communicates with the CSE-H21 bi-directionally. And CSE-H21 gathers data from its serial ports. It transmits data when there's no data during the specified in the [Guard Time]. If the [Guard Time] is 0, it transmits as soon as it receives data from the serial port.

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

5.2.3 Disconnection

CSE-H21 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 [Byte Count] 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.

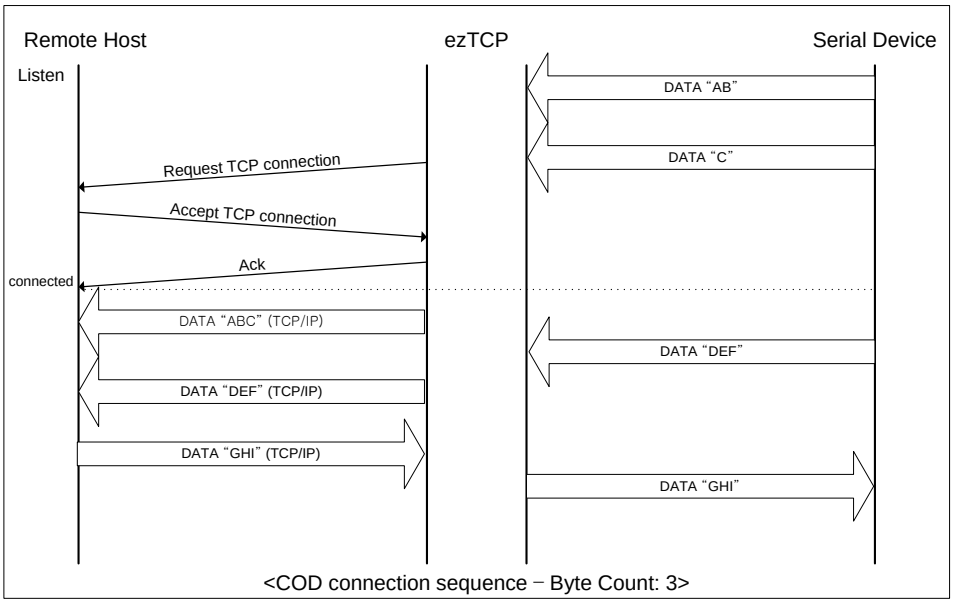


Figure 5-2 COD Mode

5.3.1 Serial Data Before the TCP Connection

If the [Byte Count] is 0, all data from the CSE-H21's serial port before the TCP connection are ignored. If the [Byte Count] is over 0, CSE-H21 stores serial data to its memory and it transmits these data when CSE-H21 is connected.

5.3.2 Data Transmission

Once TCP connection is established, hosts can communicates with the CSE-H21 bi-directionally. And CSE-H21 gathers data from its serial ports. It transmits data when there's no data during the specified in the [Guard Time]. If the [Guard Time] is 0, it transmits as soon as it receives data from the serial port.

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

5.3.3 Disconnection

CSE-H21 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], CSE-H21 tries to connect to the specified IP address. If the alphabetic hostname is set to the [Peer Address], CSE-H21 queries to the DNS server. After CSE-H21 gets the IP address from the DNS server, it tries to connect the IP address.

When CSE-H21 is in DHCP or PPPoE mode and the [Obtain DNS server address automatically] is set, CSE-H21 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 CSE-H21 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.

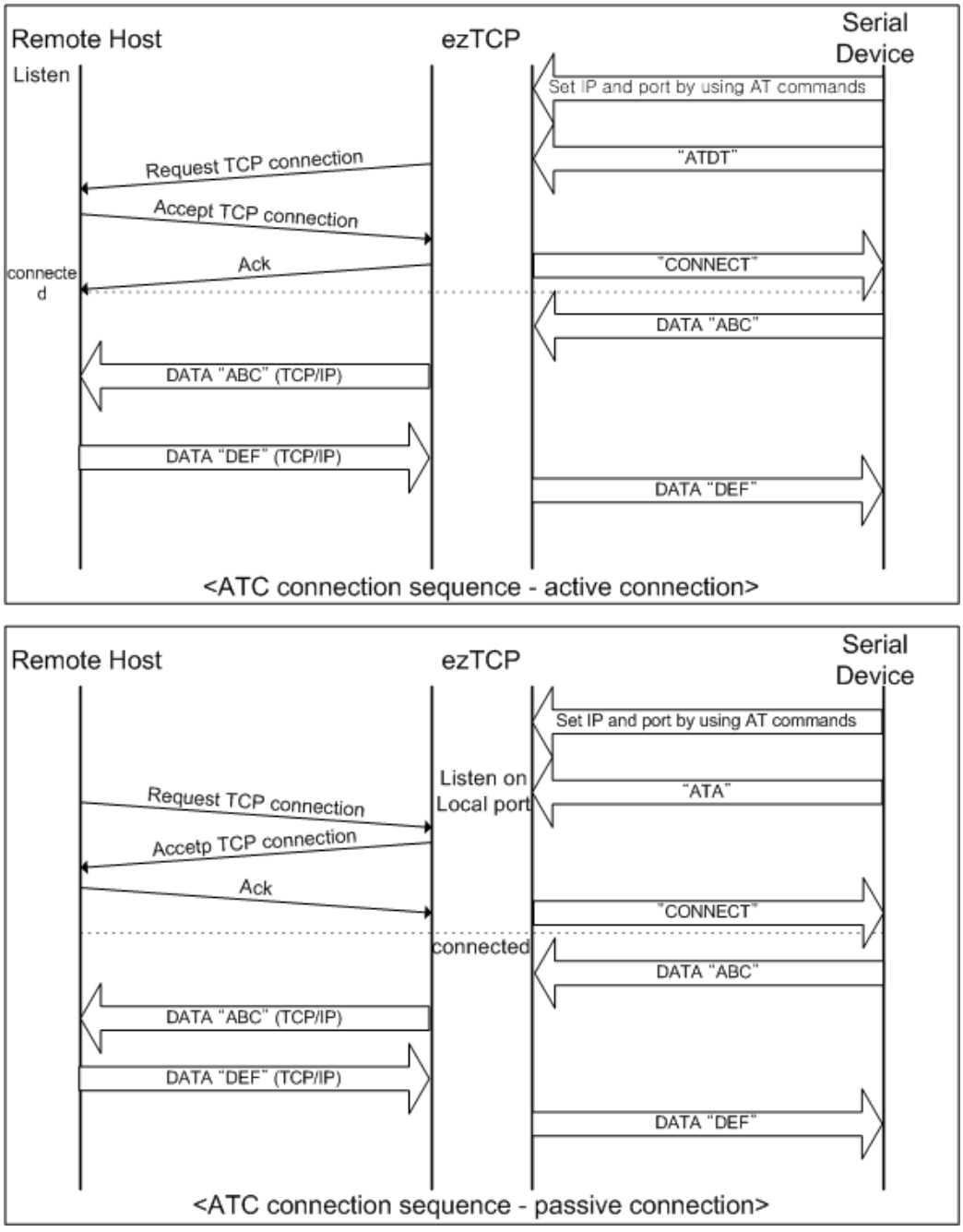


Figure 5-3 ATC Mode

☞ *Refer to "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 [Byte Count] 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.

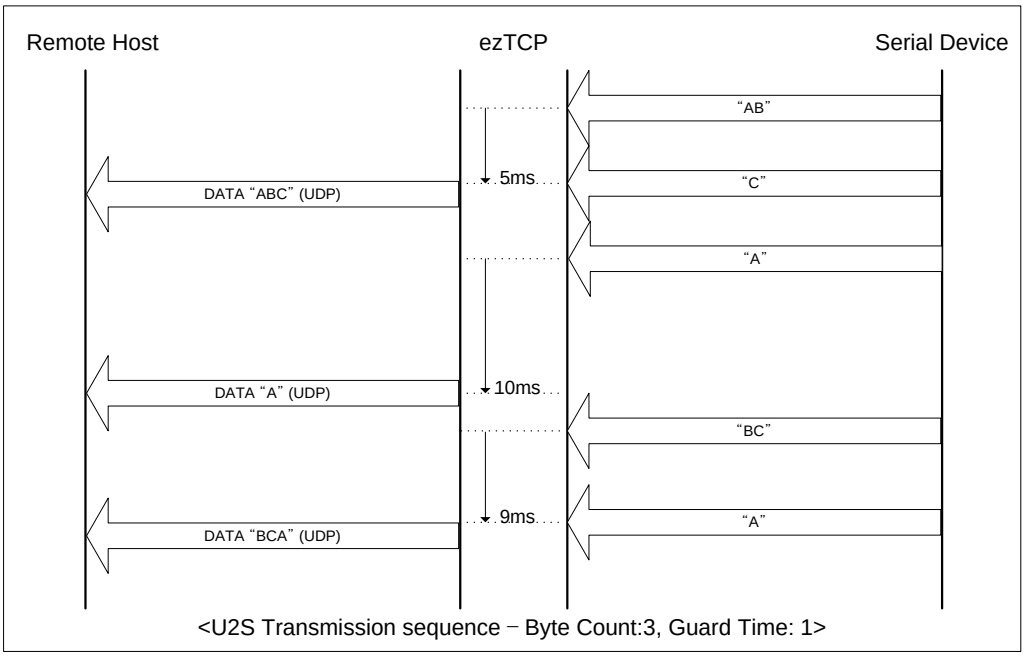


Figure 5-4 U2S Mode

6 ATC Mode

6.1 Overview

CSE-H21 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, CSE-H21 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 → CSE-H21 connection)
D	active connection	Connecting to host form CSE-H21
E	echo	Echo (E0 – no echo, E1-echo)
H	off-hook	disconnection
I	Info	Output CSE-H21 related-information ATI3: 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	
+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, CSE-H21 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 CSE-H21 convert TCP and send to ethernet

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 CSE-H21 as following time interval.

When transmitting +++ string to CSE-H21, +++ 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 CSE-H21's state is in AT command state during TCP connection, CSE-H21'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			

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 CSE-H21 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 Communcation			

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 CSE-H21			
◀	<CR><LF>CONNECT<CR><LF>		TCP connection OK
Data Communication			

6.7 Example of TCP Disconnection

6.7.1 Example of active disconnection

CSE-H21 disconnects the connection.

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

7.1 SSL

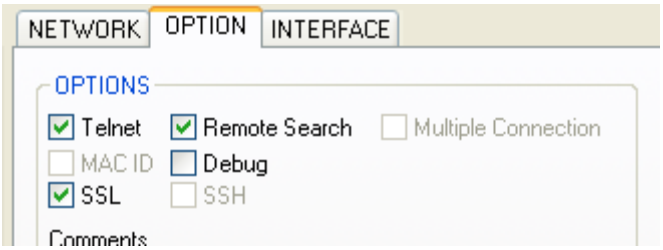
7.1.1 SSL (Secure Socket Layer)

SSL is cryptographic protocol that provides secure communication on the Internet. The SSL works over TCP.

7.1.2 How to set the SSL on CSE-H21

To works for SSL, you have to set the SSL-related parameters as the following steps.

- Set the [SSL] check box in the ezManager.



- Log in the CSE-H21 with telnet clinet.
- Generate an RSA key with a command. CSE-H21 supports 512, 768, and 1024 length keys.

  Command Format: rsa keygen [key length]

```
lsh>rsa keygen 1024
average 50sec required to find two 512bits prime numbers, please wait..
rsa: find 512bits random prime p..1 3 4 6 7 9 16 18 22 27 34 37 42 49 58 66 67
2 73 76 78 87 88 91 94 99 112 121 127 139 144 148 153 154 156 157 163 169 177 1
8 186 193 198 199 202 213 216 219 226 231 237 238 241 244 249 267 286 322 328 3
3 339 342 346 352 354 364 367 372 378 388 399 403 406 417 423 424 436 444 457 4
3 466 471 477 483 486 487 499 501 511 531 549 553 559 564 568 573 576 577 582 5
9 604 609 619 651 658 661 664 666 669 found
rsa: find 512bits random prime q..1 2 4 5 10 11 16 19 22 26 29 32 35 37 44 47 4
 56 64 70 77 79 86 91 95 100 101 115 119 122 131 134 142 151 152 found
rsa: RSA key pair(public/private key) generated.
rsa: key validation OK
rsa: rsa_server_key exist, replaced to new key
lsh>
```

- Make a certificate with a 'cert new' command. The certificate is a self signed.

- Save the parameters for SSL with a 'ssl save aa55cc33' command.

7.1.3 Restriction

To use the SSL with CSE-H21, there is a restriction. You can use only one serial port(COM1) if you set the SSL function.

7.2 SSH

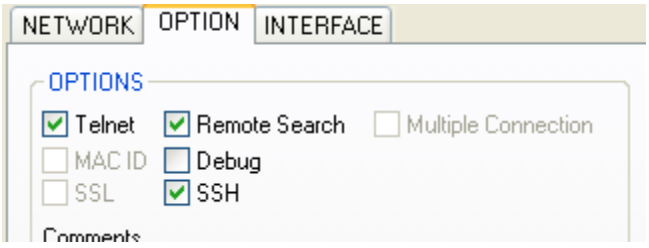
7.2.1 SSH (Secure Shell)

SSH is a network protocol that allows secure communications between two devices. You can use this function if your device is a serial port for console and you need secure communication.

7.2.2 How to set the SSH on CSE-H21

To works for SSL, you have to set the SSH-related parameters as the following steps.

- Set the [SSH] check box in the ezManager.



- Log in the CSE-H21 with telnet clinet.
- Generate an RSA key with a command. CSE-H21 supports 512, 768, and 1024 length keys.

Command Format: rsa keygen [key length]

```
lsh>rsa keygen 1024
average 50sec required to find two 512bits prime numbers, please wait..
rsa: find 512bits random prime p..1 3 4 6 7 9 16 18 22 27 34 37 42 49 58 66 67
2 73 76 78 87 88 91 94 99 112 121 127 139 144 148 153 154 156 157 163 169 177
8 186 193 198 199 202 213 216 219 226 231 237 238 241 244 249 267 286 322 328
3 339 342 346 352 354 364 367 372 378 388 399 403 406 417 423 424 436 444 457
3 466 471 477 483 486 487 499 501 511 531 549 553 559 564 568 573 576 577 582
9 604 609 619 651 658 661 664 666 669 found
rsa: find 512bits random prime q..1 2 4 5 10 11 16 19 22 26 29 32 35 37 44 47
 56 64 70 77 79 86 91 95 100 101 115 119 122 131 134 142 151 152 found
rsa: RSA key pair(public/private key) generated.
rsa: key validation OK
rsa: rsa_server_key exist, replaced to new key
lsh>
```

- Generate a DSA key with a 'dsa keygen'.

```
lsh>dsa keygne
lsh>dsa keygen
generating fips186 dsa key...done
verifying...done
```

.

- Set a username and a password to log in with a 'ssh id' command for the SSH.

```
lsh>ssh id
username: cse-h21
password: ********
  retype: ********
ID update ok.
lsh>_
```

- Save the parameters for SSH with a 'ssh save aa55cc33' command.

```
lsh>ssh save aa55cc33
save key...RSA DSA SSH_ID SSH_MSG ok
lsh>
```

7.2.3 Restriction

To use the SSH function with CSE-H21, there is a restriction. You can use only T2S mode (TCP Server mode) if you set the SSH function.

8 Technical Support, Warranty, and Notes on Operation

8.1 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.sollae.co.kr/Support/index.html

8.2 Warranty

8.2.1 Refund

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

8.2.2 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.

8.2.3 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.

8.2.4 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..

9 Revision History

Date	Version	Comments
Jun. 3. 2008	1.0	Initial Release
Aug. 1. 2008	1.1	Add SSL and SSH functions Add WEEE notation
Dec. 4. 2008	1.2	Modify ISP button function Add AT+PNIP, AT+PRHN Add Connect with a host name in ATC Mode Add Close TCP function