EZL-80c User's Manual

Version 0.6
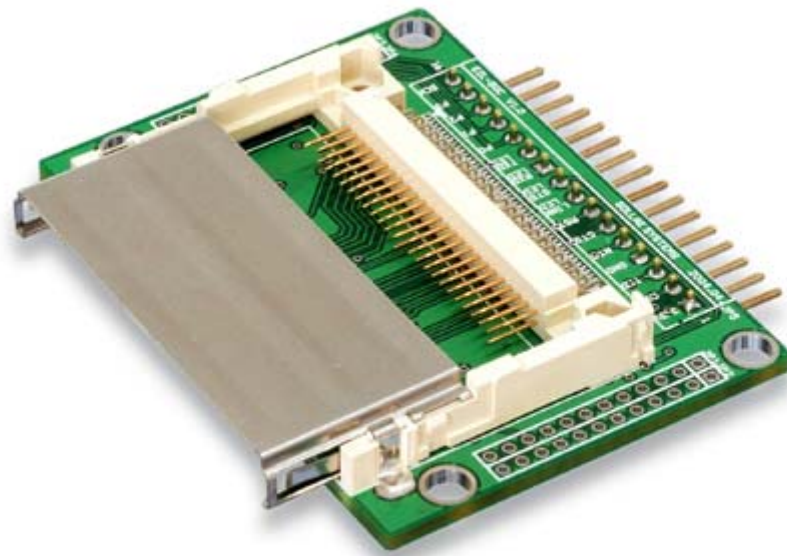
Sollae Systems Co., Ltd.

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1. OVERVIEW

A recent trend indicates that demand for data communication through the Internet continues to grow with the progress of the Internet.

For data communication over the Internet, the use of the internet communication protocol, TCP/IP is required. In order to communicate with any device over the Internet, you must use TCP/IP. To do so, you should implement TCP/IP directly, port open TCP/IP or use such an operating system (OS). But these methods impose a heavy burden in terms of time, money and technology.

The ezTCP series, serial-to-TCP/IP protocol converter product group of Sollae Systems, provides TCP/IP (Internet) communication function "simply by connecting to a serial port" and allows any device to communicate through the Internet. The series performs the TCP/IP processing on data coming in from the serial port and sends them to the Internet network, while it performs the TCP/IP processing on data from the Internet network and transmits actual data to the serial port.
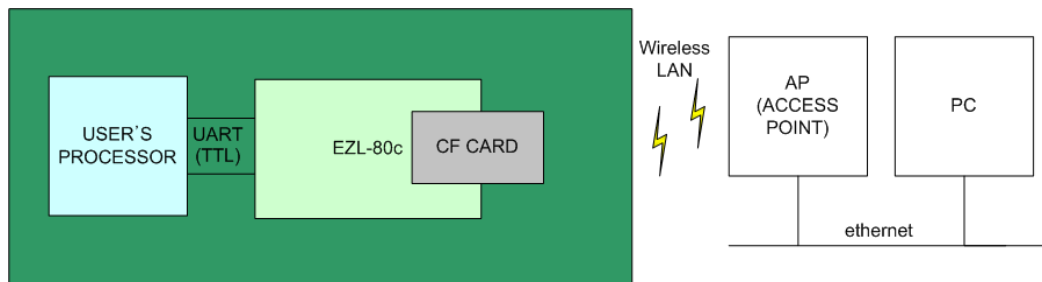
EZL-80 is a small-sized, modular product that provides TCP/IP communication through IEEE802.11b (wireless LAN) among the ezTCP product group and has a CF card socket and requires a 16-bit CF wireless LAN card.

EZL-80 performs the TCP/IP processing on data from the serial port and sends them to the wireless LAN, while playing the same role on data from the wireless LAN toward the serial port.

EZL-80 supports infrastructure networks through an access point (AP) and also provides ad-hoc network function performing communication without an AP. Since EZL-80 provides DHCP function as well as TCP/IP/UDP, it can be applied to a dynamic-IP network.

2. SPECIFICATIONS

2.1.   Contents

● EZL-80c body

<TOP SIDE>

<BOTTOM SIDE>
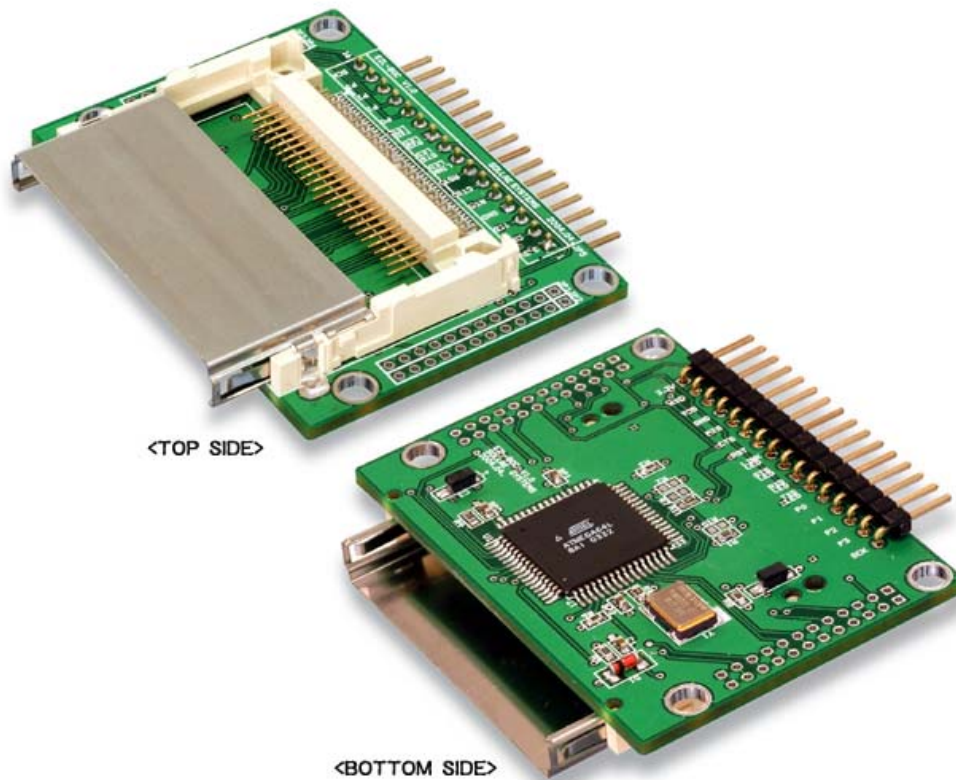
2.2. Specification

Power	Input Voltage	3.3V ±0.3V
	Current	10mA typical
Size	60mm x 56mm x 10mm	
Weight	about 10g	
Interface	Serial Port	2.54mm pitch 16 pin header(male)
	Network	CF card socket
Serial Port	TTL level(1200bps ~ 115200bps) RTS/CTS hardware flow control	
Wireless LAN	CF(external circuit required)	
Protocols	TCP, UDP, IP, ICMP, ARP, DHCP, WEP	
Comm. Mode	T2S	TCP - server mode
	COD	TCP - client mode
	ATC	TCP - server/client mode (AT command emulation)
	U2S	UDP
Operating Temp.	0 ~ 70	
Utilities	ezConfig	Configuration utility via wireless LAN
	ezSerialConfig	Configuration utility via serial
	hotflash	Utility for firmware download
	ezterm	Utility for testing socket program

☞ *Download utilities and firmware from http://www.eztcp.com.*

3. HARDWARE INTERFACE

3.1. Dimension
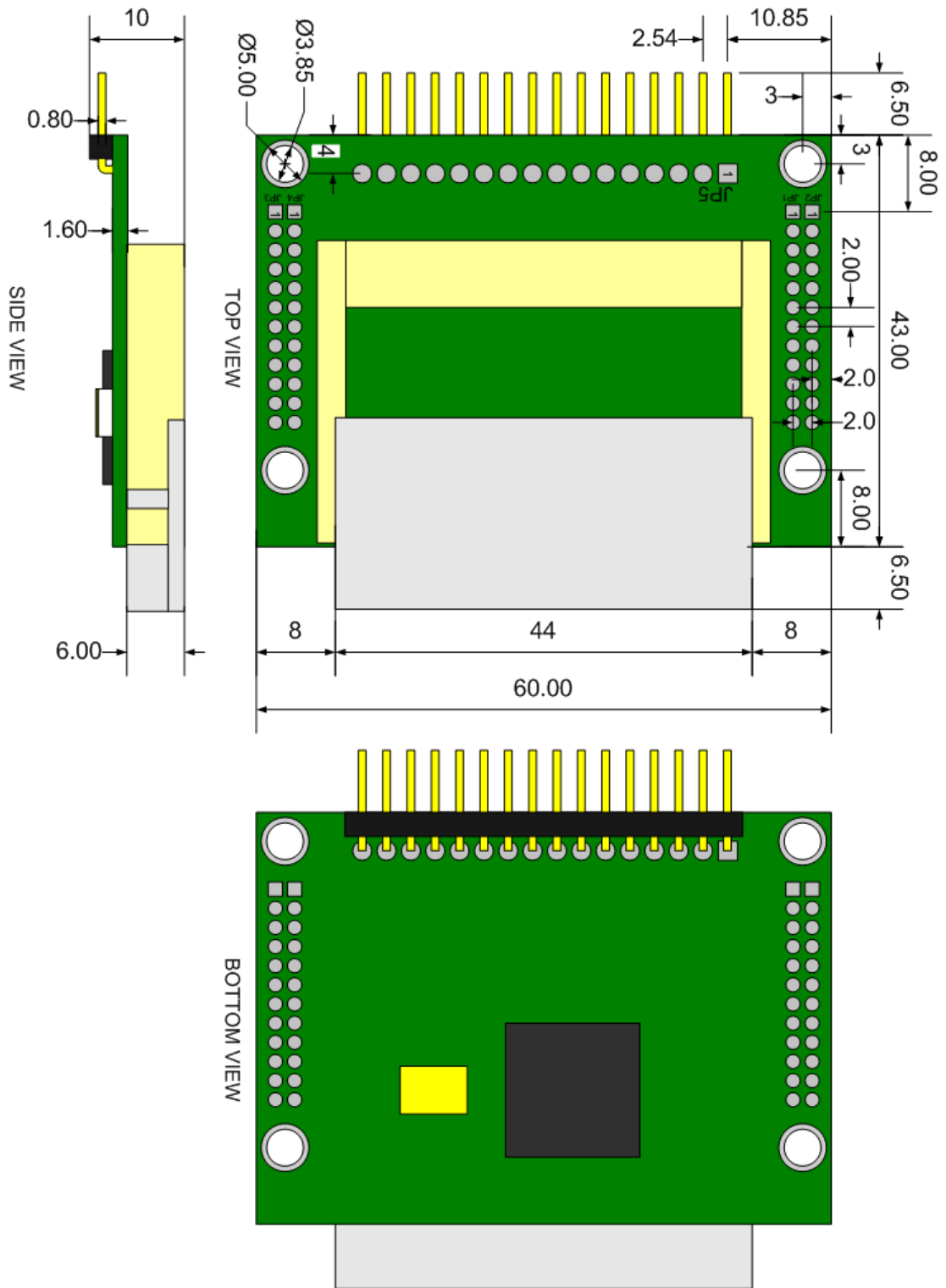
3.2.   Pins

3.2.1. JP5

JP5	NAME	DESCRIPTION	I/O	M/Opt
1	VCC_33	Power(3.3V)	-	M
2	RXD0	Serial RXD	I	M
3	TXD0	Serial TXD	O	M
4	GND	Ground	-	M
5	RTS0	Serial Ready To Receive	O	Opt
6	CTS0	Serial Clear To Send	I	Opt
7	RESET	Reset Active Low	I	Opt
8	LINK_LED	LINK LED	O	Opt
9	STS_LED	STATUS LED	O	Opt
10	RXD_LED	Wireless LAN RXD LED	O	Opt
11	TXD_LED	Wireless LAN TXD LED	O	Opt
12	P0	General Purpose Port(Reserved)	I/O	-
13	P1	General Purpose Port(Reserved)	I/O	-
14	RXD1	For Factory Use	I	-
15	TXD1	For Factory Use	O	-
16	SCK	For Factory Use	I	-

I: Input port

O: Output port

M: Mandatory

Opt: Option

The level of all ports is TTL level.

3.2.2. JP1, JP2, JP3, JP4

NUM	JP1,JP2	JP3,JP4
1	GND	VCC_33
2	TXD_LED	PEN
3	RXD_LED	GND
4	STS_LED	RESET
5	LINK_LED	SCK
6	GND	GND
7	CTSO	TXD1
8	RTSO	RXD1
9	GND	GND
10	TXDO	P1
11	RXDO	PO
12	VCC_33	GND

The level of all ports is TTL level.

3.3.   wireless LAN Interface

EZL-80, a modular product, should insert a CF wireless LAN card into CF socket..

For the wireless LAN card, use a 3.3V 16-bit PC card (PCMCIA) or a CF card, compatible with Intersil's Prism 2.5 or Prism 3.0.

3.4.   Serial Interface

The serial port is implemented on 3.3V TTL level and can communicate with a UART (Universal Asynchronous Receiver and Transmitter).

3.4.1. Flow Control

Flow control is used to avoid loss of data if there is an excessive amount of data. For instance, if the network causes delay in data transmission when the user device sends a large amount of data continuously, the buffer in the serial port may be full, resulting in loss of data. (The EZL-80 serial port has a 1-kbytes reception buffer and 512 bytes transmission buffer.)

The serial port flow control of EZL-80 is implemented RTR(ready to receive)/CTS (clear to send) protocol. The RTS port (RTR is called RTS in EZL-80 for convenience) is an output port that becomes 'active low' if storage space is available in the reception buffer of EZL-80. Meanwhile, the CTS port is an input port, which takes the active or inactive state of the RTS pin on the communication counterpart to which the CTS pin is connected.

The interconnection between the user's processor and EZL-80 should be done as follows.
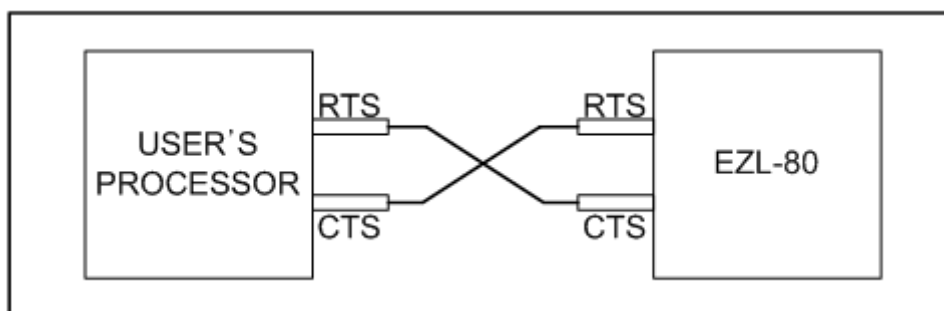
3.4.2. Flow Control Scenario

The following is a flow control scenario.

(It is assumed to be measured at the pins of EZL-80.)
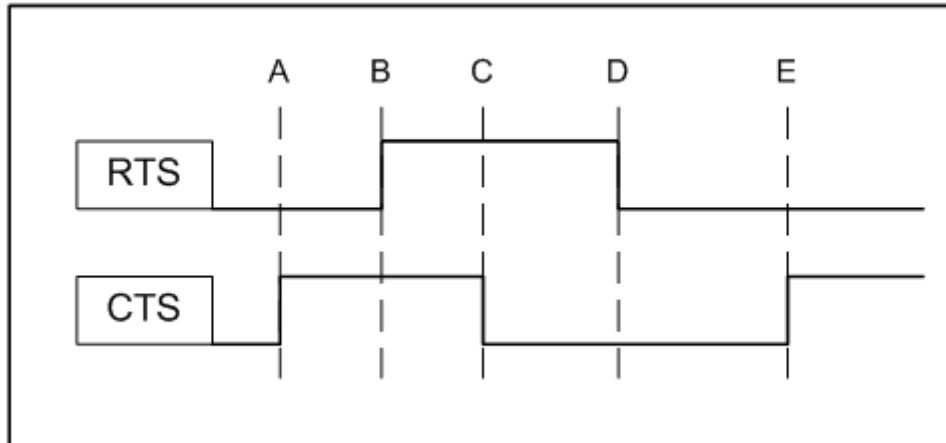
Initially, EZL-80 is ready to receive and transmit data, since RTS and CTS are both low.

At position 'A' the counterpart processor sends a signal that it is not ready to receive data. Then, EZL-80 stops sending data.

At position 'B' EZL-80 sends a signal that it is not ready to receive data. Then, neither party is ready to send or receive data.

At position 'C' the counterpart sends a signal that it is ready to receive data. At this time, EZL-80 has any data to send, it sends the data to the user's processor.

At position 'D' EZL-80 sends a signal that it is ready to receive data. Now both the parties send and receive data.

At position 'E' EZL-80 receives a signal from the user's processor that the latter is not ready to receive data and holds any data to transmit until CTS becomes active.

3.4.3.   If Flow Control Is Unused

In case the user's processor does not use flow control, it's OK to connect only RXD, TXD, GND signals between user's processor and EZL-80.

And user should set RTS/CTS to NONE by using ezConfig or ezSerialConfig.

4. WIRELESS LAN CONFIGURATION

4.1. The Types of Wireless LAN

4.1.1. Infrastructure

The infrastructure is a network connection mode that allows communication between wireless LAN devices or between the wireless LAN and the wired LAN (Ethernet) through the Access Point (AP). When a network type is set to infrastructure, communication with wired LAN via AP is possible, which allows both wired and wireless Internet communications.
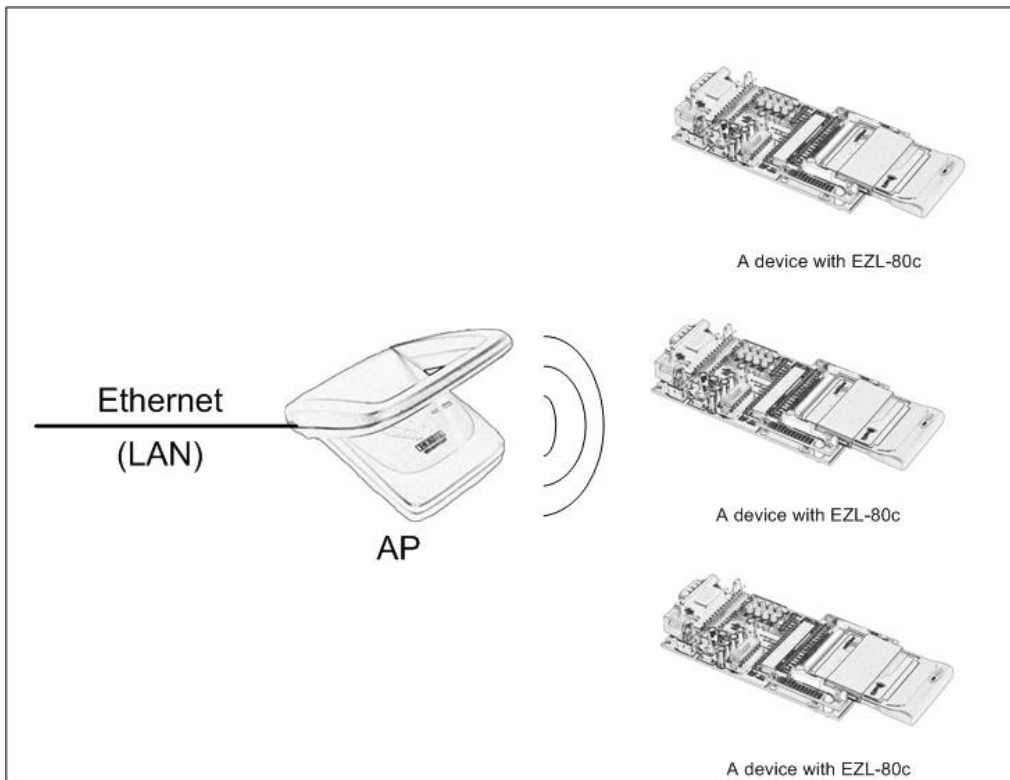
4.1.2. Ad-hoc

The ad-hoc network is designed to communicate between wireless LANs without any AP. Since communication is established without any AP, the user cannot access an external network or the Internet. This is also called a peer-to-peer mode.

A device with EZL-80c

A device with EZL-80c

A device with EZL-80c

A device with EZL-80c
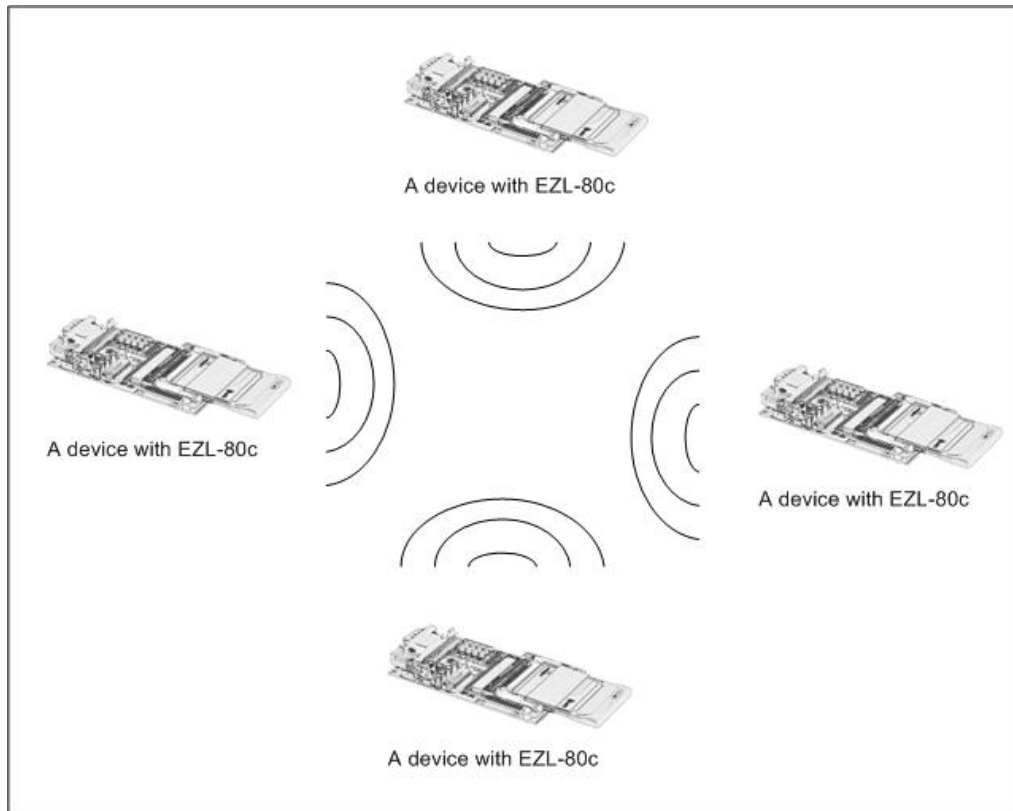
4.2.   Configuration Parameters For wireless LAN

4.2.1. Service Set Identifier (SSID)

When configuring a network, the user can configure different networks using different APs. In this case, the SSID is used to differentiate one network from another. In other words, when configuring an infrastructure network, the user can make communication with the AP which he/she wants to communicate with by setting the SSID of the desired AP in the ezTCP. (See 3.1.2.) For information about SSID of the AP, AP manual or AP configuration program can be referred to. If the user did not set the SSID, the ezTCP will be connected with the AP that is first found when power is supplied.

The maximum length of the SSID is 32 bytes, and the user can use ASCII code to set the SSID.

4.2.2. Channel

The channel is communication path in the network that it belongs to. Channel values are set as the same value with the AP.

4.2.3. Wired Equivalent Privacy (WEP)

This is about security of the wireless LAN. The wireless LAN provides similar security to that of the wired LAN using the WEP. To use the WEP, the user must set the key value. According to the key value, data is encoded in 64 bits or 128 bits for communication. If the user did not set the WEP, security-related problems may occur.

4.3. How To configure wireless LAN

Wireless LAN-related parameters can be configured through ezSerialConfig program.

To utilize ezSerialConfig program, apply power with no LAN card inserted and operate EZL-80 in serial configuration mode.

With this program you can configure IP address and serial port-related parameters as well as wireless LAN parameters.
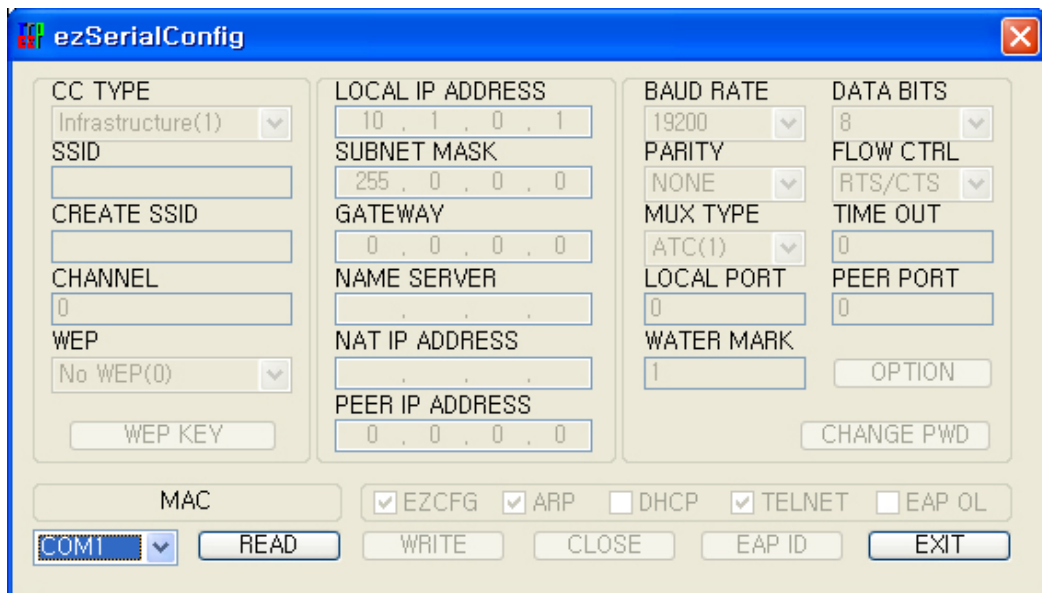
Operate EZL-80 in serial configuration mode to utilize ezSerialConfig. Follow the sequence as described below.

1. Run ezSerialConfig program in the PC.
2. With no LAN card inserted, connect EZL-80 and the PC by a serial cable and apply power.
3. Select the COM port of the PC to which the cable is connected and press the [READ] button.

4. Configure the environmental parameters of ezSerialConfig. At this time, you should configure wireless LAN-related items. (The other items may be configured with ezConfig program after the wireless LAN is inserted into EZL-80.)

5. Push the [WRITE] button in the ezSerialConfig window.

4.3.1. CC TYPE

Select the type of the wireless LAN.

Check if the type of network to which the product is installed is infrastructure or ad-hoc, and configure the type accordingly.

4.3.2. SSID

Configure the AP's SSID or the master's SSID in ad-hoc mode.

4.3.3. CREATE SSID

Configure the SSID if used as the ad-hoc master in ad-hoc mode.

4.3.4. CHANNEL

Configure the channel number used by the AP.

4.3.5. WEP

If WEP is used in the wireless LAN network, select the type of WEP and enter the key used by pushing the WEP key button.

4.3.6. OTHER ITEMS

For values of non-wireless LAN items, refer to '5.1 ezConfig' of this manual.

5. SETTING IP ADDRESSES AND ENVIRONMENTAL VARIABLES

5.1.   ezConfig – setting by wireless LAN

This section takes an example of using ezConfig, which is a configuration program via wired/wireless LAN. ezConfig can run on Microsoft Windows platform. The screen below shows the initial screen of ezConfig:
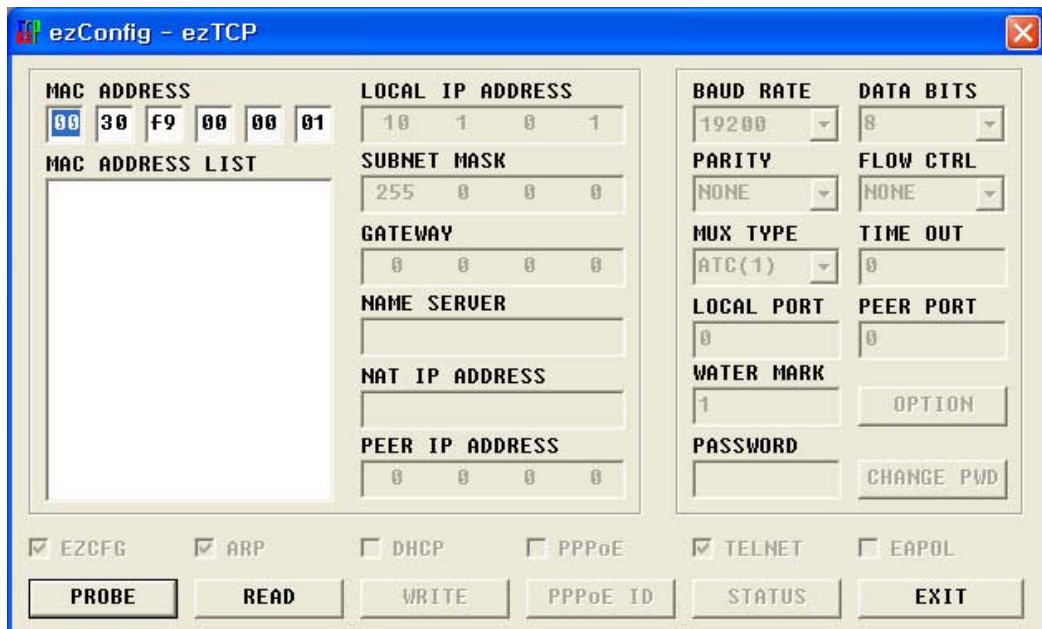
You can set not only the parameters of EZL-80 but also the parameters of other ezTCP series.

Each button on ezConfig functions as follows:

5.1.1. The buttons of ezConfig

- [PROBE] This button is used to search for all of the network-attached ezTCPs. The search results will be displayed on the MAC ADDRESS LIST box and you can select an item using a mouse or cursor as required. The value displayed on the box indicates the MAC ADDRESS of each ezTCP. The selected setup value

of ezTCP will be displayed on the right side.

- [READ] You can see only the ezTCP configuration values if you press this button after entering the 6-digit hexadecimal number printed on the ezTCP main body in the MAC ADDRESS box. It is useful when there are too many ezTCPs attached to the network to search for one from the LIST box.

- [WRITE] This button is used to save the changed value in ezTCP after modifying the configuration. Make sure not to press this button during operating ezTCP since ezTCP will automatically be reset right after its environment setup value is saved. Otherwise, it may cause malfunction.

- [EXIT] This button is used to close ezConfig. You can also close it by pressing ESC key on the keyboard.

- [CHANGE PWD] ezTCP provides User Authentication function to prevent an unwanted person from modifying the configuration. The authentication process is performed through the password string verification. When entering or changing the password strings, you can use this button. Changing the ezTCP configuration details if a password has been entered requires the proper password to be entered in the PASSWORD field.

- [STATUS] This button is used to read a dynamic variable value during operating ezTCP. Pressing this button will display a new window, where the time-elapsed after the power is on, the current IP address, and the data throughput of the serial port are indicated. Double-clicking each item on the MAC ADDRESS LIST will carry out the same function.

ezConfig 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

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

1. When the ezTCP power is turned on and the LAN cable is connected correctly, pressing [PROBE] or [READ] button will display the following window:

```
ezConfig

  Reading ezTCP's environment variables.....
        MAC address 00:30:f9:00:00:10
```
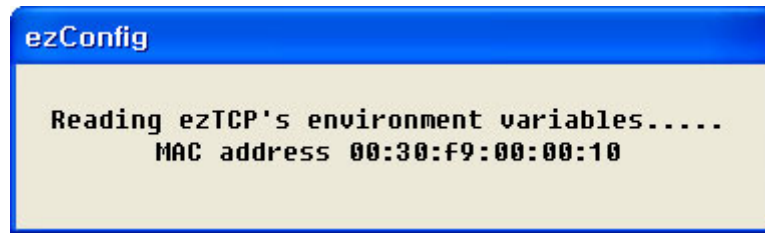
2. If a network-attached ezTCP is detected, the following message will be displayed. If a message pops up indicating that there is no response from ezTCP, check that the power is turned on and the cable is connected correctly, then try pressing [PROBE] or [READ] button.


```
ezConfig

              Searching ezTCP.....
                3 ezTCP(s) found
```
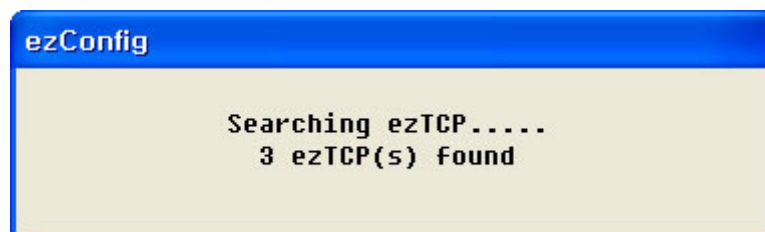
3. If more than one ezTCP are detected, ezTCP's MAC ADDRESS will be displayed in the [MAC ADDRESS LIST] box on ezConfig. Check if the MAC ADDRESS displayed in the [MAC ADDRESS LIST] window corresponds to that printed on ezTCP main body. The following screen shows this process:

4. Setup [MUX TYPE], [LOCAL IP ADDRESS], [LOCAL PORT], and the serial port settings according to a test environment as required. When the setup is completed, pressing [WRITE] will save the changed values in ezTCP. If an error message pops up during storing the configuration, check that ezTCP is connected correctly, and then try again.
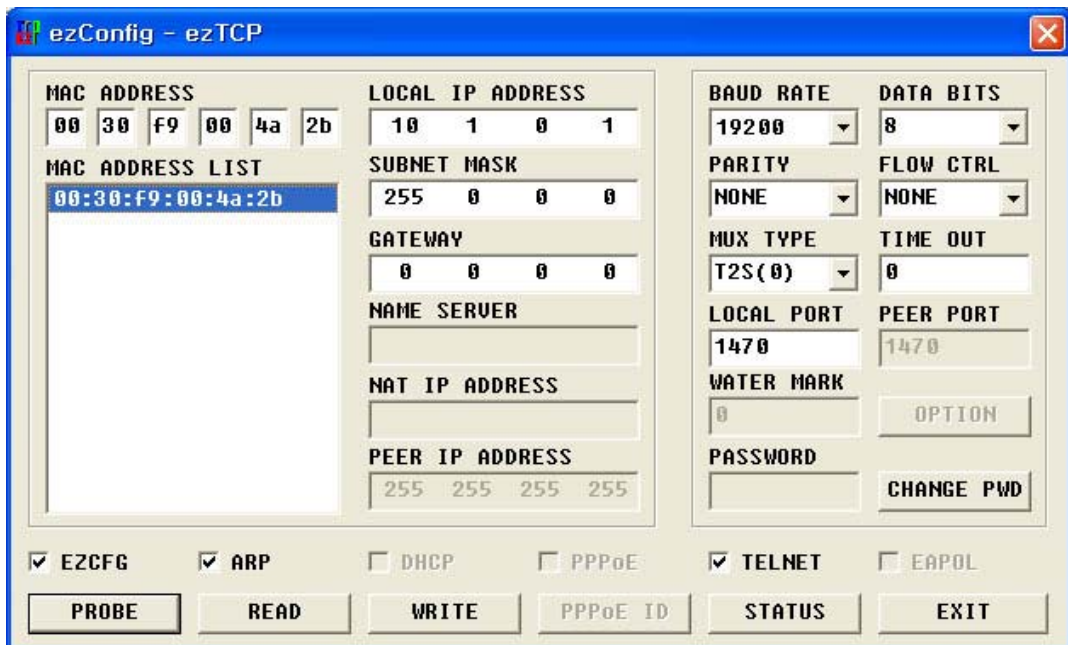
5. In Windows' MS-DOS prompt window, check the IP address is set correctly by giving the PING command. If the ezTCP IP address is set correctly, the PING results will be displayed as follows. If a message, "Request timed out", is displayed, check that IP address setup value again.

C:\>ping a.b.c.d

Pinging a.b.c.d with 32 bytes of data:

Reply from a.b.c.d: bytes=32 time=1ms TTL=64

Reply from a.b.c.d: bytes=32 time=1ms TTL=64

Reply from a.b.c.d: bytes=32 time=1ms TTL=64

Reply from a.b.c.d: bytes=32 time=1ms TTL=64

☞   *Wireless LAN-relate parameters can be set only via ezSerialConfig.*

☞   *Confer '7. Normal Communication Mode' for the parameters of IP address, serial port, and etc.*

☞   *You can download the newest ezConfig utility via http://www.eztcp.com*

5.2.　　ezSerialConfig – set by serial port

ezConfig is an utility which configure EZL-80 via serial port. You can configure not only wireless LAN-related items but also all items which can be set by ezConfig.
You should turn on EZL-80 without wireless LAN card to configure via ezSerialConfig.

☞　　*Confer '4. WIRELESS LAN CONFIGURATION' for more information.*

6. OPERATION MODE

6.1. Operation Mode Overview

The operation modes of EZL-80 are normal communication mode, serial configuration mode and ISP mode. Major differences among the modes are as follows.

Op. Mode	Description	Related Utility	LAN Card
Normal Comm Mode	Normal operation (TCP/IP protocol conversion)	ezConfig	Inserted
Serial Config Mode	Sets up parameters including wireless LAN items through the serial port.	ezSerialConfig	Not inserted
ISP Mode	Upgrades the EZL-80 firmware through the serial port.	wflash	Not inserted

6.2. How To Enter Each Mode

EZL-80 operates in normal communication mode if booted with the LAN card inserted. Otherwise, it works in serial configuration or ISP mode.

6.3. Serial Config Mode (for wireless LAN configuration)

Before connecting the wireless LAN, set up all wireless LAN items. Follow the sequence as described below.

1. Run ezSerialConfig program in the PC.
2. With no LAN card inserted, connect EZL-80 and the PC by a serial cable and apply power.
3. Select COM port which is being connected EZL-80, and push the [READ] button in the ezSerialConfig window.
4. Set up the ezSerialConfig environmental parameters. Configure wireless LAN items without fail. (The other items may be set up with ezConfig program in the Normal mode.)
5. Push the [WRITE] button in the ezSerialConfig window.

6.4. ISP Mode (For firmware upgrade)

In ISP mode, you can upgrade the firmware of EZL-80. Follow the sequence as describe below.

1. Run wflash program in the PC.
2. Select a firmware to download by pushing the [Download] button.
3. With no LAN card inserted, connect EZL-80 and the PC by a serial cable and apply power.
4. Apply power and the firmware will be automatically downloaded.

6.5.   Normal Communication Mode

This is the normal communication mode of EZL-80 as designed for its purpose.

When you apply power to an EZL-80 product with the LAN card inserted, It will initiates normal communication mode.

In normal communication mode are available four communication modes, T2S, ATC, COD and U2S, as shown in the table below.

Comm. Mode	Protocol	Connection Type	S/W Modification	Parameter change through the serial port	Topology
T2S	TCP	Passive	Not needed	No	1:1
ATC	TCP	Active/Passive	Needed	Possible	1:1
COD	TCP	Active	Not needed	No	1:1
U2S	UDP	No connection	Not needed	No	N:M

TCP is a protocol that requires a connection process. Connection always takes place a one-to-one basis. A host waiting for connection (passive connection) is called a server, and one attempting to make a connection (active connection) is called a client.

On the other hand, UDP communicates by the block without the process of connection, and thus allows multiple hosts to communicate simultaneously.

☞   *For detailed operation modes, refer to the next chapter.*

7. NORMAL COMMUNICATION MODES

7.1.   T2S (TCP to Serial)

In T2S mode, the ezTCP functions as a server.

When a TCP connection comes from a remote host to the predefined local port, the ezTCP 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. (Data coming to the serial port before TCP connection is established will be ignored.)

In T2S mode, the ezTCP functions as a server. Therefore, T2S mode cannot be used in a dynamic IP environment (DHCP)

<T2S connection sequence>
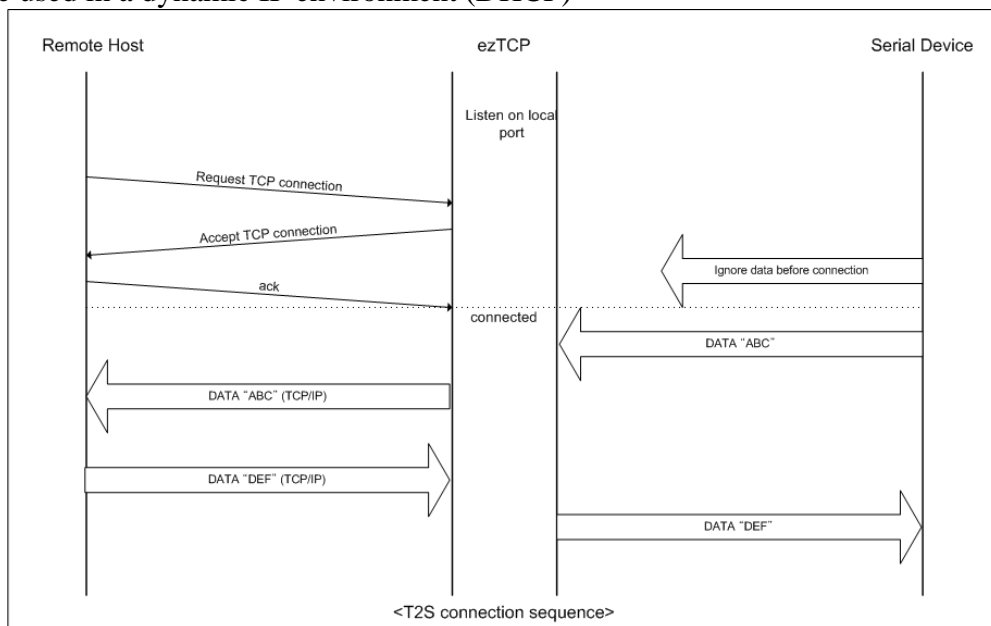
Set the following for T2S mode:

	Field	Description
IP Addresses	LOCAL IP ADDRESS	Local IP address of ezTCP
	SUBNET MASK	Subnet mask
	GATEWAY	Gateway IP address
	LOCAL PORT	Local port number to listen
	PEER IP ADDRESS	-
	PEER PORT	-
Serial Port	BAUD RATE	Speed of serial port(bps)
	DATA BITS	Data length
	PARITY	Parity
	FLOW CTRL	Flow control
Mode	MUX TYPE	T2S(0)
Connection Disconnection	WATER MARK	-
	TIMEOUT	Connection is terminated if there's no transmission data during [TIMEOUT]
Configuration Method	EZCFG	ezConfig function enable/disable
	ARP	ARP function enable/disable
Dynamic IP	DHCP	-

7.2. ATC (AT Command)

In ATC mode, the user can control the ezTCP 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.

<ATC connection sequence - active connection>

<ATC connection sequence - passive connection>
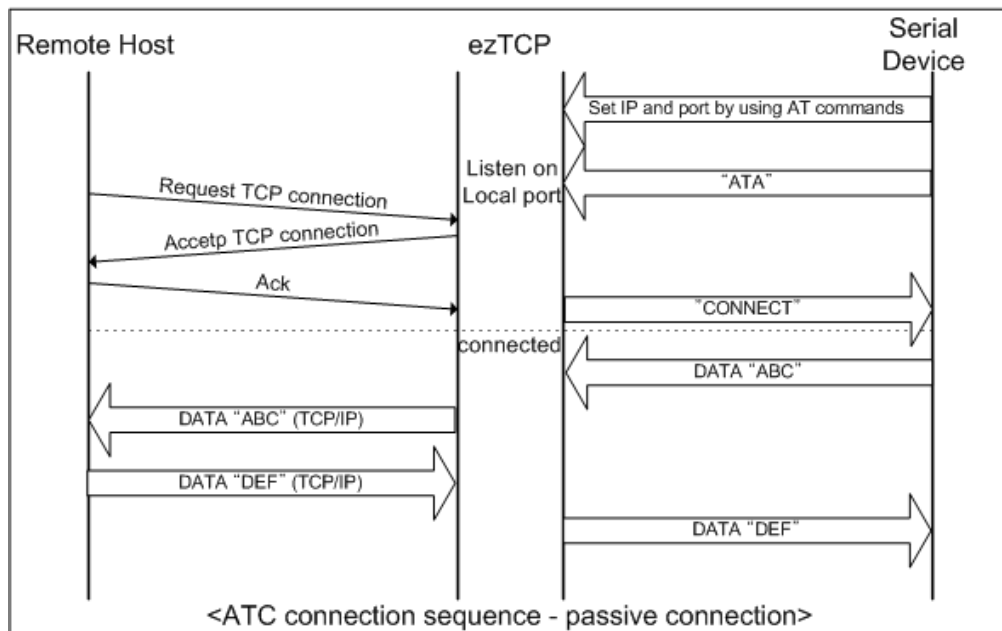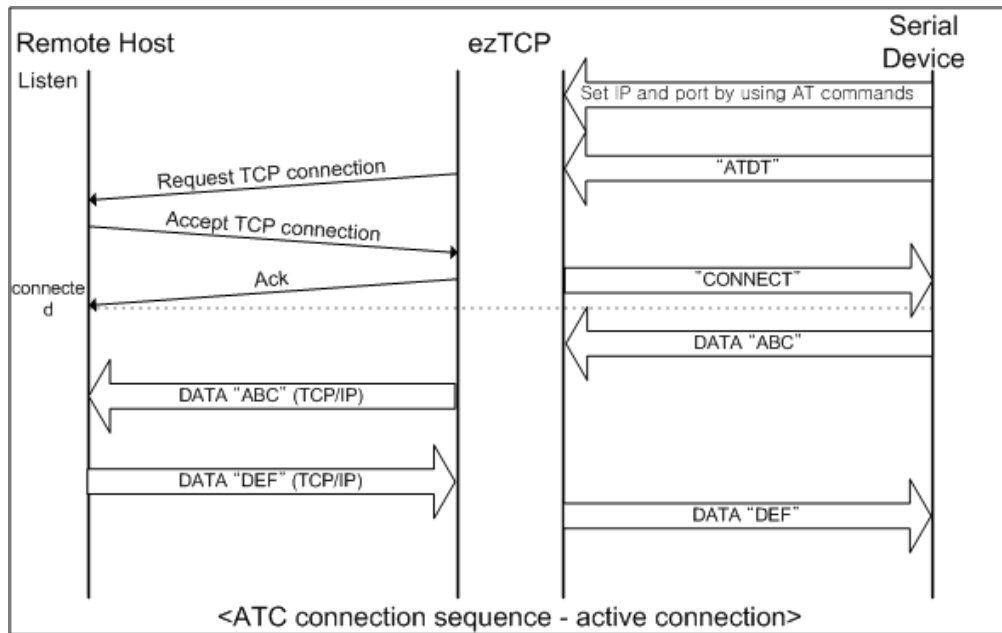
Set the following for ATC mode:

	Field	Description
IP Addresses	LOCAL IP ADDRESS	Local IP address of ezTCP
	SUBNET MASK	Subnet mask
	GATEWAY	Gateway IP address
	LOCAL PORT	Local port number to listen
	PEER IP ADDRESS	IP address of host to connect
	PEER PORT	Port number of host to connect
Serial Port	BAUD RATE	Speed of serial port(bps)
	DATA BITS	Data length
	PARITY	Parity
	FLOW CTRL	Flow control
Mode	MUX TYPE	ATC(1)
Connection Disconnection	WATER MARK	-
	TIMEOUT	Connection is terminated if there's no transmission data during [TIMEOUT]
Configuration Method	EZCFG	ezConfig function enable/disable
	ARP	ARP function enable/disable
Dynamic IP	DHCP	DHCP function enable/disable

☞ *Confer next chapter to get more information about AT commands.*

7.3.   COD(Connect On Demand)

In COD mode, the ezTCP functions as a client.

When data of the pre-specified size [WATER MARK] 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.

<COD connection sequence - WATERMARK: 3>
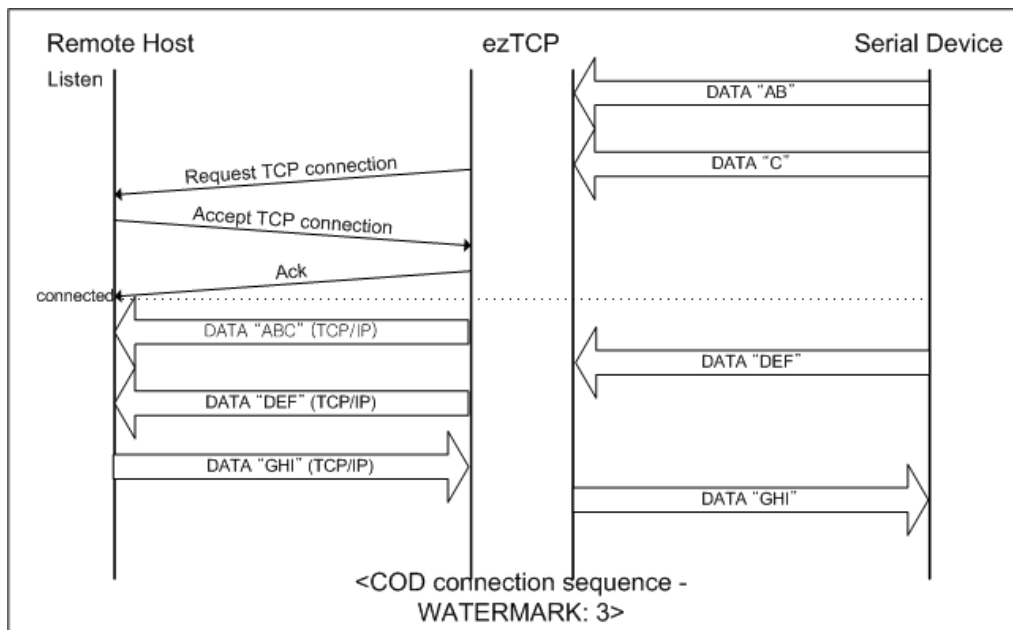
Set the following for COD mode:

	Field	Description
IP Addresses	LOCAL IP ADDRESS	Local IP address of ezTCP
	SUBNET MASK	Subnet mask
	GATEWAY	Gateway IP address
	LOCAL PORT	-
	PEER IP ADDRESS	IP address of host to connect
	PEER PORT	Port number of host to connect
Serial Port	BAUD RATE	Speed of serial port(bps)
	DATA BITS	Data length
	PARITY	Parity
	FLOW CTRL	Flow control
Mode	MUX TYPE	COD(2)
Connection Disconnection	WATER MARK	the number of bytes. ezTCP attempts a connection when it receive a mount of [WATER MARK] from its serial port.
	TIMEOUT	Connection is terminated if there's no transmission data during [TIMEOUT]
Configuration Method	EZCFG	ezConfig function enable/disable
	ARP	ARP function enable/disable
Dynamic IP	DHCP	DHCP function enable/disable

7.4.   U2S (UDP to Serial)

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 [WATER MARK] comes to the serial port of the ezTCP or if a specified period of time [TIMEOUT] elapses after first data reception, all data received for the same period is recognized as one block which is then transmitted to the UDP.   The [TIMEOUT] unit is 10ms.   If [TIMEOUT] is set to 2, the time period is between 20ms and 30ms.

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

In U2S mode, ezTCP doesn't support DHCP.

<U2S Transmission sequence - WATERMARK:3, TIMEOUT: 1>
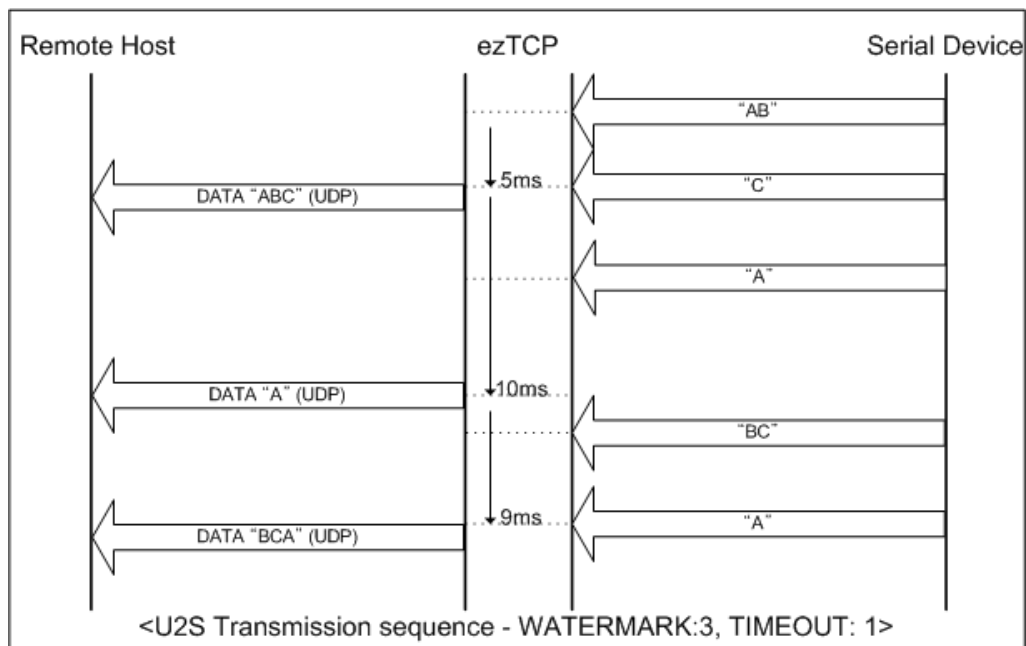
U2S   .

	Field	Description
IP Addresses	LOCAL IP ADDRESS	Local IP address of ezTCP
	SUBNET MASK	Subnet mask
	GATEWAY	Gateway IP address
	LOCAL PORT	Port number to receive UDP data
	PEER IP ADDRESS	IP address of host to send UDP data
	PEER PORT	Port number of host to send UDP data
Serial Port	BAUD RATE	Speed of serial port(bps)
	DATA BITS	Data length
	PARITY	Parity
	FLOW CTRL	Flow control
Mode	MUX TYPE	U2S(3)
Transmission Unit	WATER MARK	Byte size starting to send
	TIMEOUT	Receiving interval to send as a block (unit: 10msec)
Configuration Method	EZCFG	ezConfig function enable/disable
	ARP	ARP function enable/disable
Dynamic IP	DHCP	-

8. ATC MODE

8.1. Overview

In ATC mode, it is possible to set up and control EZL-80 by use of AT commands, which are modem commands. For instance, you can set the remote IP to connect by AT+PRIP command and make connection by ATD command. Thus, communication with multiple hosts in turn is possible. Also you can make passive connection by ATA command.

8.1.1. AT command format

AT commands start with "AT" and end with <CR>.

The format of AT commands is as follows.

AT	Command	<CR>(0x0d)

The response message from EZL-80 to an AT command is as follows.

<CR>(0x0d)	<LF>(0x0a)	Response code	<CR>(0x0d)	<LF>(0x0a)

Response Code

ATV1 (Initial setup)	ATV0	Description
OK	0	Command OK
ERROR	4	Command error
CONNECT	1	TCP connection established
NO CARRIER	3	TCP connection terminated
SET VALUE	SET VALUE	When a set value is queried (Ex: AT+PRIP?)

8.2. Basic AT Commands

Command	Function	Description
A	passive connection	Listening connection (connection from host to ezTCP)
D	active connection	Starting to connect to host

E	echo	Enable/disable echo of AT command (ATE1-enable, ATE0-diable)
H	off-hook	Terminating Connection
I	Inquery	Showing ezTCP's Information
O	Online	Toggle to on-line sate
V	response code	The type of response code (numeric-V0, verbose-V1)
Z	reset	Initializing ezTCP

8.3.　　Extended AT commands

Command	Function	Description
+PLIP	local IP address	
+PSM	subnet mask	
+PGIP	default router	
+PLP	listening TCP port	
+PTO	timeout	
+PRIP	Remote machine IP address	
+PRP	Remote machine TCP port	
+PWP	Write configuration	Saving configuration values to EEPROM
+PRC	Enable/disable ezConfig	ON: 1, OFF: 0
+PARP	Enable/disable ARP	ON: 1, OFF: 0
+PDC	DHCP	ON: 1, OFF: 0

8.4.　　Online State and Online Command State

If connection has not been established in ATC mode, the system is in online command mode and permits the use of AT commands.

Once connection has been established, the system is in online state and does not permit the use of AT commands. In order to use AT commands while TCP connection is established, it is necessary to switch to online command state and then use AT commands.

Online command state	While TCP connection is not established, AT commands can be used.
Online state	While TCP connection is established, all data are converted to TCP/IP.

8.4.1. How to switch to online command state from online state

In order to switch from online state to online command state, it is necessary to send a '+++' message in proper format within specified time. The '+++' message will be sent to the peer host.

The time interval between the last data transmission and inputting the first '+'	500ms or up
The time between '+'s	0~500ms
The interval which is no data transmission after the last '+'	500ms or up

8.4.2. How to switch to online command state

In case the system has been switched from online state to online command state while TCP connection is established, it can be switched back to online state by ATO command.

8.5.　　Example of Configuration by AT Commands

	Transmission Data		Description
	AT+PLIP=192.168.1.200<CR>		Set local IP address
	<CR><LF>OK<CR><LF>		Command OK
	AT+PGIP=192.168.1.254<CR>		Set gateway IP address
	<CR><LF>OK<CR><LF>		Command OK
	AT+PSM=255.255.255.0<CR>		Set subnet mask
	<CR><LF>OK<CR><LF>		Command OK
	AT+PLP=1470<CR>		Set local port
	<CR><LF>OK<CR><LF>		Command OK
	AT+PTO=10<CR>		Set TIME OUT
	<CR><LF>OK<CR><LF>		Command OK
	AT+PWP<CR>		Save configuration data to the EEPROM
	<CR><LF>OK<CR><LF>		Command OK

	<CR><LF>NO CARRIER<CR><LF>		After system resets

8.6. Example of Connection

8.6.1. Example of Active Connection

	Transmission Data		Description
	AT+PRIP=192.168.1.201<CR>		Set remote IP address to connect
	<CR><LF>OK<CR><LF>		Command OK
	AT+PRP=1470<CR>		Set remote port number to connect
	<CR><LF>OK<CR><LF>		Command OK
	ATDT<CR>		Connect to the remote host
Attempting a connection			
	<CR><LF>CONNECT<CR><LF>		Connection established
TCP/IP data transmission			

8.6.2. Example of Passive Connection

	AT+PLP=1470<CR>		Set local port
	<CR><LF>OK<CR><LF>		Command OK
	ATA<CR>		Listen connection
Listening connection from remote host			
Connection from remote host			
	<CR><LF>CONNECT<CR><LF>		Connection established
TCP/IP data transmission			

8.7. Example of Termination

8.7.1. Example of Active Termination

The following is the sequence to terminate connection initiated by EZL-80.

	Data		Description

Data exchange (TCP connection established)			
	[guard time]+++[guard time]		switching to online command state from online state.
	<CR><LF>OK<CR><LF>		switching to online command state completed
	ATH<CR>		TCP termination command
	<CR><LF>OK<CR><LF>		TCP connection terminated

8.7.2. Example of Passive Termination

In case an external host attempts to terminate a connection;

	Data		Description
Data exchange (TCP connection established)			
In case an external host attempts to terminate connection			
	<CR><LF>NO CARRIER<CR><LF>		TCP connection terminated

9. Technical Support, Warranty, and Notes on Operation

9.1.   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:

Website Address for Customer Support:
    http://www.sollae.co.kr/Support/index.html

Email Address:

9.1.1. Warranty

9.1.2. Refund

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

9.1.3. 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.

9.1.4. 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.

9.1.5. 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.