EZL-300L User's Manual

Version 2.1

Sollae Systems

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.

EZL-300L in ezTCP product group is a product that provides TCP/IP communication through wireless LAN. In other words, like other ezTCP products, EZL-300L sends data from the serial port to the wireless LAN after TCP/IP processing and vice versa.

EZL-300L supports infrastructure network via Access Point(AP) and ad-hoc network that doesn't require AP.

It provides DHCP function, so that it can be applied to the cable network and the xDSL network.

1.2. Components

- EZL-300L Body
- 5V Power Adopter (Option)
- RS232C cable for PC connection (Option)
- PCMCIA Card (Option)

1.3. Specifications

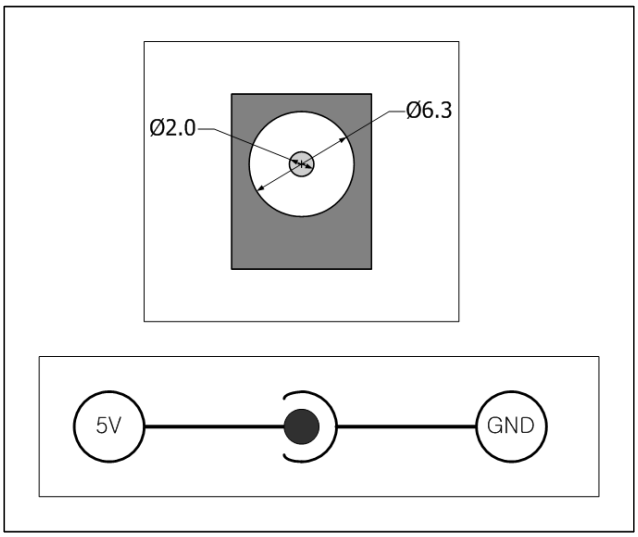
Power	Input Voltage	5V (±10%)
	Current	320mA typical (It depends on wireless LAN card)
Dimension	137mm x 78mm x 28mm	
Weight	about 140 g	
Interface	Serial	9pin Dsub male
	Network	16bit PC card
Serial Port	RS232 level(1200bps ~ 115200bps) RTS/CTS H/W , Xon/Xoff flow-control	
Network	IEEE802.11b wireless LAN(infrastructure/ad-hoc)	
Protocol	TCP, UDP, IP, ICMP, ARP, DHCP, WEP	
Communication Mode	T2S	TCP, Server Mode
	COD	TCP, Client Mode
	ATC	TCP, Server/Client Mode (AT command emulation)
	U2S	UDP
Utilitie	ezConfig	Configuration utility via LAN
	ezSerialConfig	Configuration utility via serial port
	ezterm	Socket test utility
	wflash	Firmware download utility via Serial

☞ *You can download free utilities and firmware from http://www.eztcp.com.*

1.4. Interface

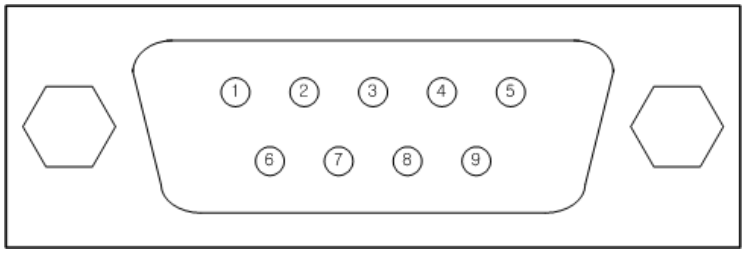
1.4.1. Power

DC 5V is used for EZL-300L and the specification is below:



1.4.2. Dsub Connector

The connector of serial port is 9 pin Dsub male. The specification is below.



#	Name	Description	Level	I/O	Etc.
1	NC				
2	RXD	Receive Data	RS232	I	Mandatory
3	TXD	Transmit Data	RS232	O	Mandatory
4	DTR	Data Terminal Ready	RS232	O	Always ON
5	GND	Ground	Ground	-	Mandatory
6	DSR	Data Set Ready	RS232	I	N/C
7	RTS	Request To Send	RS232	O	Option
8	CTS	Clear To Send	RS232	I	Option
9	NC				

1.4.3. Status LEDs

EZL-300L has 5 LEDs.

Each LED functions as follows:

Name	Meaning	Color	LED Status	Description
PWR	Power	Red	ON	Power is supplied.
STS	Status	Yellow	Blinking for a Sec	IP is allocated but TCP connection is not established.
			Blinking 4 Times/Sec	IP is not allocated.
			ON	TCP connection is established.
LINK	wLAN Link	Green	ON	Connected to wireless LAN
RXD	wLAN Rx	Yellow	Blinking	There are data on the wireless LAN
TXD	wLAN Tx	Green	Blinking	Packets are being transmitted to wireless LAN

1.4.4. wireless LAN Interface

EZL-300L requires a PCMCIA 16bit PC card. The card should be compliant to PRISM. (If you would use a wireless LAN card which is not provided from Sollae Systems, please test or contact us or test it by yourself in advance)

The MAC address of EZL-300L is in bottom of the body, not in PCMCIA card.

2. Installation and Test Run

2.1. Installation Method

You can install EZL-300L in the following steps.

Title	Item	Sub-Item	Description
1. Checking the communication environment	Check items	Wireless LAN environment	3.
		IP address environment	
		Serial port settings	
		Application program to be used	
2. Configuration wireless LAN	Configuration method	ezSerialConfig	4.1.
	Check items	Infrastructure/ ad-hoc	3.
		SSID(Service Set Identification)	
		Channel	
		WEP	
3. Connecting to the network	Check method	Check if LINK LED is ON.	
4. Configuring the environmental variables	Configuration method	Set by ezConfig, a utility program for configuration through the network.	4.2.
		Set by AT commands in ATC mode	7.
	Configuration items	IP address related items	
		Serial port related items	
		Communication mode (Decided depending on application program)	5.3.
5. Application to the field			

2.1.1. Checking the Communication Environment

Before installing EZL-300L, check the network environment where EZL-300L is to be installed, including the followings matters:

- Wireless LAN type(Infrastructure/adhoc)
- Wireless LAN SSID, channel
- WEP and WEP key
- IP address environment (local IP, subnet mask, gateway, etc.)
- Serial port items of the equipment to which EZL-300L is going to be connected (baud rate, data bit, parity, stop bit)
- Application program protocol to be used (TCP/UDP, server/client, etc.)

√ EZL-300L doesn't support authentication protocol, so it cannot be installed in the network that requires authentication protocol.

☞ *For application program protocol to be used, see "6. Normal Communication Mode".*

2.1.2. Configuring the Wireless LAN

Before using the EZL-300L, the user must set wireless LAN-related items. Wireless LAN-related items can be set via ezSerialConfig in a serial configuration mode and ezConfig in Normal mode.

Supply power without PCMCIA card insertion to enter into the serial configuration mode. In the serial configuration mode, the user can set not only wireless LAN-related items but also all setup values of the EZL-300L.

If user wants to configure with ezConfig, EZL-300L should be connected to the wireless LAN. So user should use ezSerialConfig for configuration at the first time.

2.1.3. Connecting to the Network

Insert the PCMCIA card while power is not supplied. Then, connect the device with the EZL-300L using RS232 cable that is compliant with the specification, and supply power. After power is supplied, the LINK LED should be turned on. When the LINK LED is on, it means that a link has been established between the AP and wireless LAN device or between the wireless LAN devices to enable communication between them.

2.1.4. 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 "ezConfig," the environmental variable configuration program.

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 compose an infrastructure network and 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

2.2.2. Installing AP

Connect between AP and PC with cross-over LAN cable. And check the link LEDs of AP and PC.

2.2.3. Installing EZL-300L

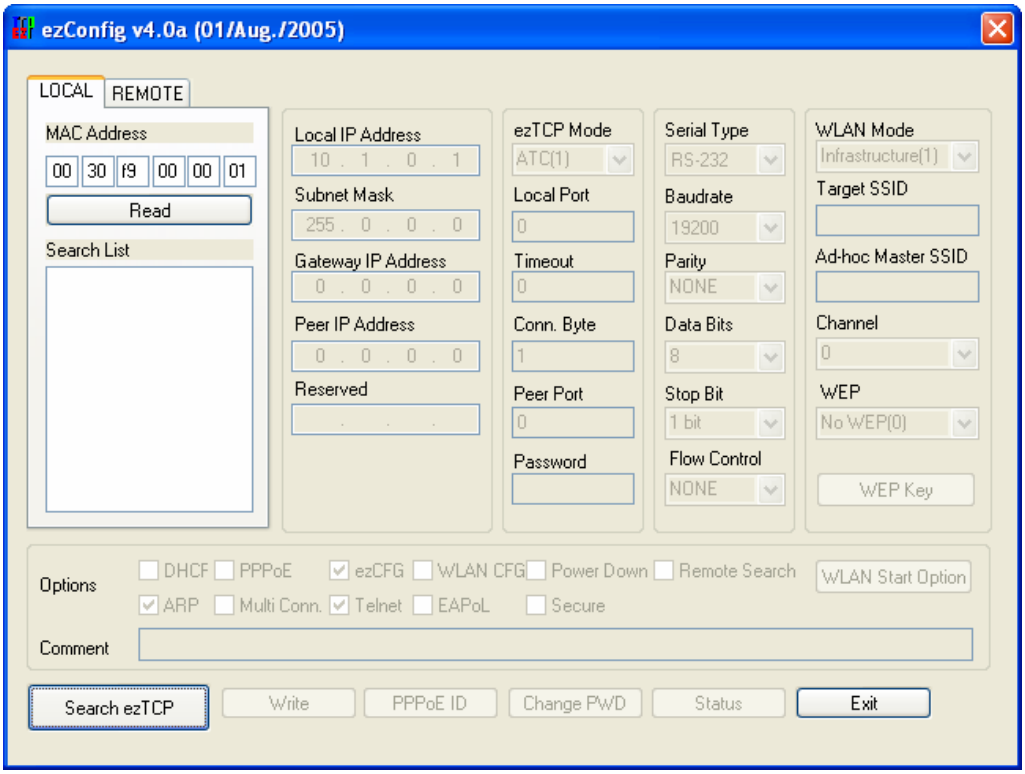
Insert the PCMCIA card while power is not supplied. Then, supply power. After power is supplied, the link LED should be turned on. When the link LED is on, it means that a link has been established between the AP and wireless LAN device or between the wireless LAN devices to enable communication between them.

√ SSID was not configured to EZL-300L, maybe it is impossible to communicate because EZL-300L connected other AP. In this case, user should set the SSID of the AP by using ezSerialConfig.

2.2.4. Configuring EZL-300L

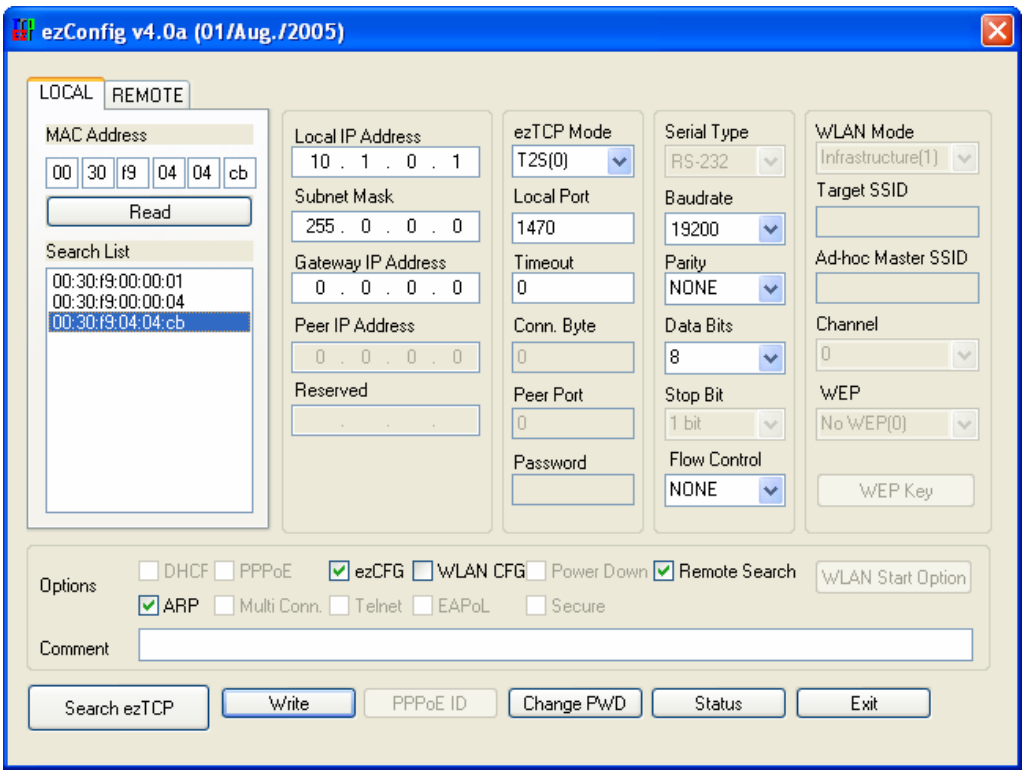
Configure EZL-300L setting using ezConfig, the ezTCP configuration program, as follows.

Run ezConfig, and click [Search ezTCP] button in the ezConfig window. And, ezConfig program will search all ezTCPs 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.



2.2.5. Connecting to the PC Serial Port

Connect the serial port of your PC and that of EZL-300L, using the supplied serial communication cable. Then, run serial communication program such as Hyper Terminal and Teraterm. When the program is run, select the same serial port values as those set to EZL-300L [19200bps, data bit: 8 bits, stop bit: 1 bit, no parity], which will finish the preparation for serial communication.

2.2.6. Communication Test

When the preparation for serial communication is finished, enter the following in the DOS window on your PC, to connect to TCP through Telnet program.

"Telnet 10.1.0.1 1470"

When TCP connection succeeds, STS LED of EZL-300L turns ON.

When the STS LED turns ON, enter “123” on the Telnet window, and "123" will appear on the hyper terminal. Enter “ABC” on the hyper terminal, and “ABC” will appear on the Telnet window. Then, communication test is OK.

.

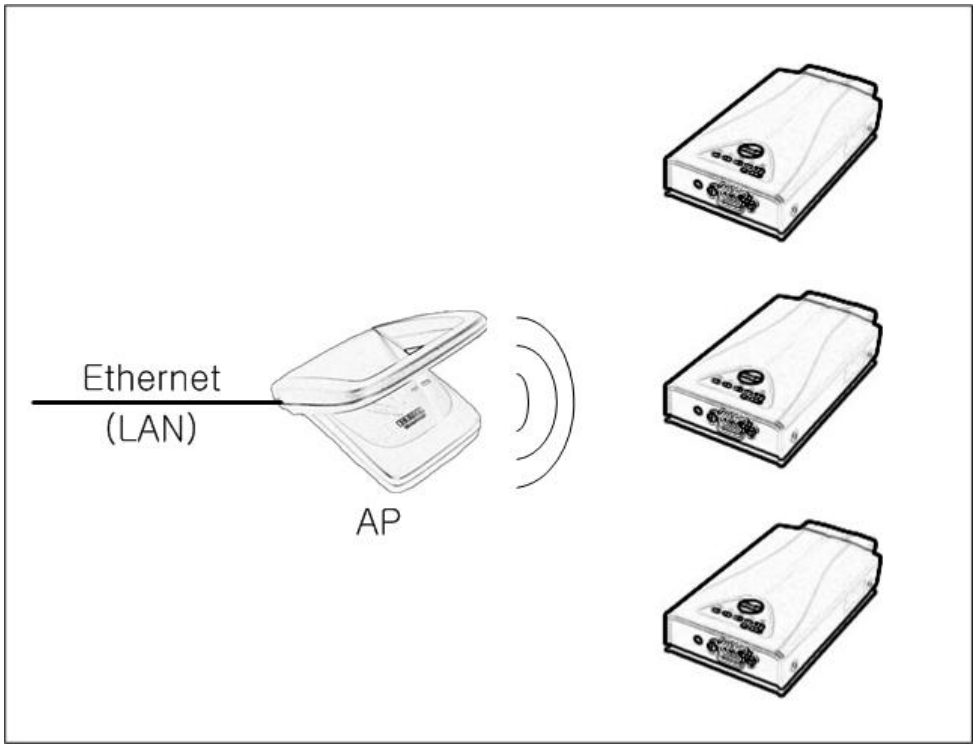
3. Configuring wireless LAN, IP Address, and Environmental Variables

3.1. Items to check the wireless LAN

3.1.1. Network Type (infrastructure/ad-hoc)

- infrastructure

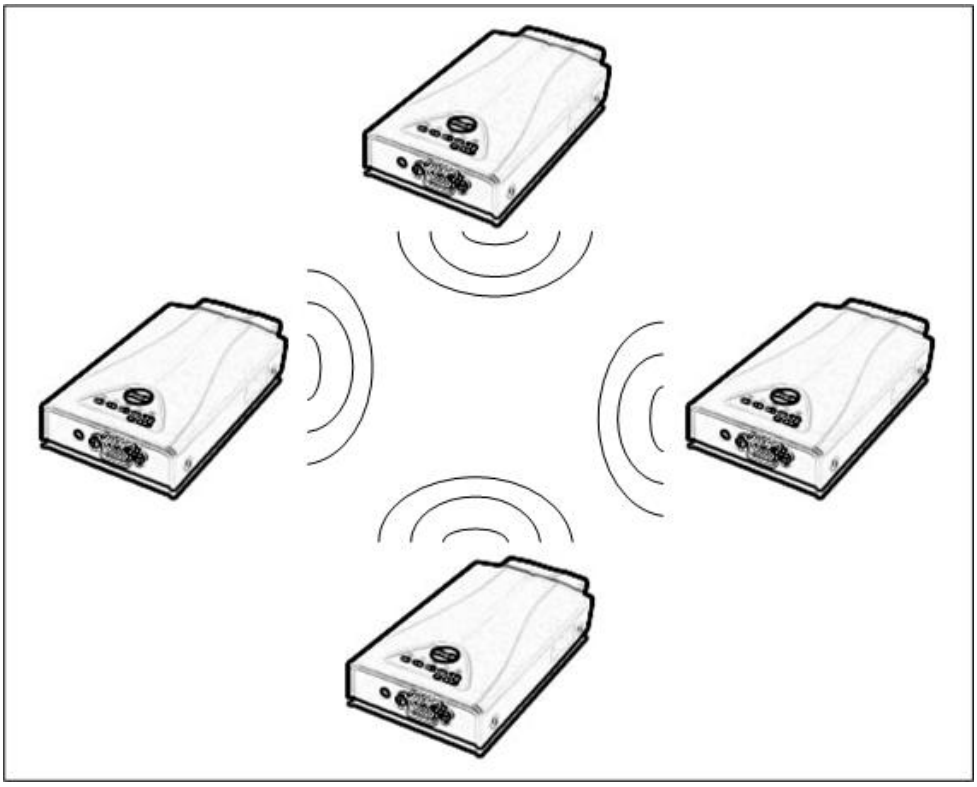
The infrastructure is a network connection mode that allows communication between wireless LAN devices or between the wireless LAN and the wired LAN (Ethernet) through the Access Point (AP). When a network type is set to infrastructure, communication with wired LAN via AP is possible, which allows both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



<infrastructure>

- Ad-hoc (peer-to-peer)

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.



<ad-hoc>

3.1.2. SSID(Service Set Identifier)

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 EZL-300L. 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 EZL-300L 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.

3.1.3. Channel

The channel is communication frequency in the network that it belongs to. The channel number is set automatically, though user didn't set it.

3.1.4. 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.

3.1.5. Authentication Protocol

Some wireless network requires authentication protocol (IEEE802.1x). Because EZL-300L doesn't support any authentication protocol, EZL-300L is not adoptable to some wireless LAN network if the network uses authentication protocol.

In this case, use another product of Sollae Systems.

3.2. Setting Wireless LAN Items of the EZL-300L

Wireless LAN-related items can be set by ezSerialConfig.

The following table describes each configuration field and their factory setting value.

Field	Description	Factory-set
TARGET SSID	SSID of the Network to Participate	Not set.
CREATE SSID	SSID of the Network to Newly Create When Configuring an Ad-hoc Network	Not set.
CC TYPE	0) IBSS: Ad-hoc Network	1
	1) BSS: Infrastructure Network	
	2) WDS: Reserved (Reserved)	
	3) Pseudo IBSS: Reserved (Reserved)	
CHANNEL	Channel number	0
WEP TYPE	0) WEP is not used.	0
	1) 64 bit WEP key	
	2) 128 bit WEP key	
KEY ID	Number of the Key to be Used	0

3.3. How to Configure the wireless LAN related Items

User can set the wireless LAN related items with ezSerialConfig in the Serial Config Mode and ezConfig in the Normal Communication Mode. EZL-300L also supplies a special option that connect a pre-defined network by Sollae Systems when boots up. That function is required for a circumstance that wireless related items are configured wrongly.

4. Configuring Environmental Variables

The wireless LAN related items, IP address, and serial port variables are should be set to EZL-300L. The configuration items can be set by ezConfig that is configuration utility via network, ezSerialConfig that is configuration utility via serial, and AT command sets in the ATC mode.

☞ *The items that can be configured by AT command set. For more information, see 7. ATC Mode.*

	Items	Descriptions
Wireless LAN	WLAB Mode	Infrastructure/Ad-hoc
	Target SSID	Target SSID
	Ad-ho Master SSID	SSID for Ad-hoc master
	Channel	Channel number
	WEP	WEP encoding bits (No, 64 bit, 128 bit)
	WEP key	WEP key
	WEP key ID	Key ID
IP Address related Items	Local IP Address	IP Address
	Subnet Mask	Subnet Mask
	Gateway IP Address	Gateway IP Address
	Local Port	Local port for server mode
	Peer IP Address	Peer IP address for client mode
	Peer Port	Peer Port for client mode
Serial Port	Baudrate	baudrate(bps)
	Data Bits	Data bits
	Parity	Parity
	Flow Control	Flow Control
Comm. Mode	ezTCP Mode	Communication Mode
Connectio Disconnection	Conn. Byte	Minimum bytes for TCP connection or UDP transmission
	Timeout	Time out

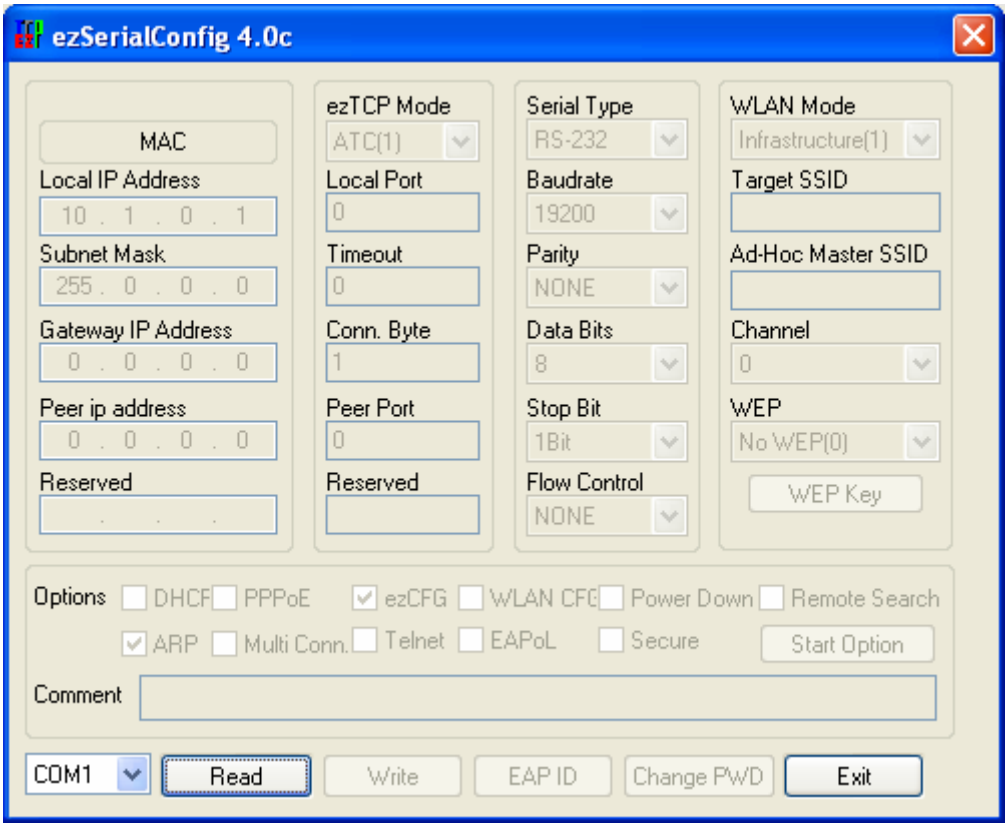
Configuration	ezCFG	Enable ezConfig function
	ARP	Enable IP configuration function by ARP
Dynamic IP	DHCP	Enable DHCP

4.1. ezSerialConfig

4.1.1. Overview of ezSerialConfig

ezSerialConfig is the configuration utility by serial port of EZL-300L.

All parameters of EZL-300L can be set by ezSerialConfig.



4.1.2. Configuration Method

① After connecting EZL-300L without PC card to COM port of PC via a serial cable, Turn on the EZL-300L.

② Execute ezSerialConfig.

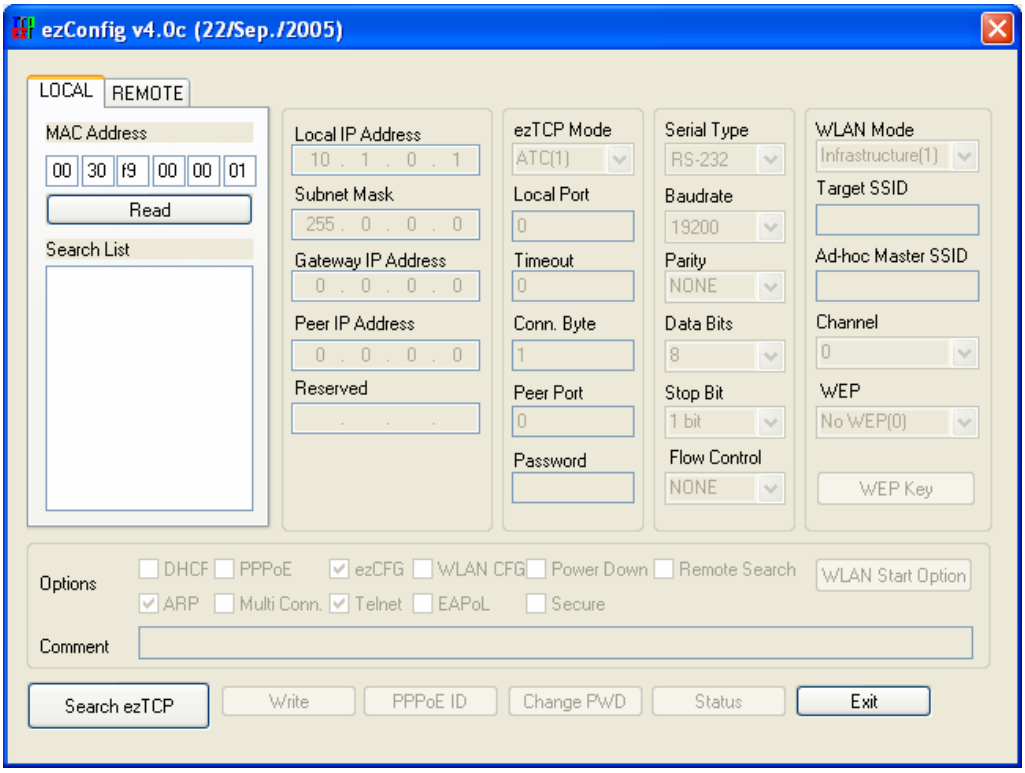
③ After selecting COM port in ezSerialConfig, press [READ]. If you press [READ] button, the configuration values of EZL-300L will be shown.

④ After inputting configuration value what you want, Press [WRITE] button. The configuration values will be saved into the EEPROM area of EZL-300L.

4.2. ezConfig

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

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



√ ezConfig can set not only EZL-300L's environmental variables but also other ezTCP series.

4.2.1. Communication Type of ezConfig

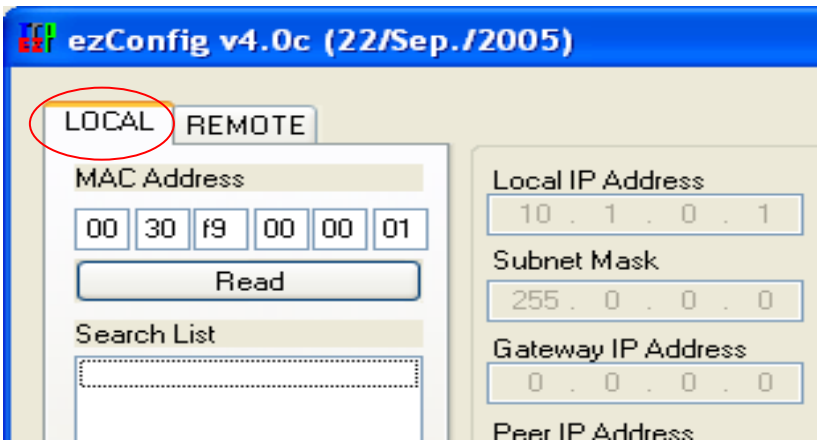
ezConfig is a configuration utility for ezTCP with UDP via network(wired or wireless LAN). There are two kinds of ways to communicate as following.

- UDP local broadcast

All wireless LAN or wired LAN devices can receive the ezConfig UDP local broadcast packets. Because the destination MAC address of the UDP local broadcast packet is ff:ff:ff:ff:ff:ff. User can differentiate each ezTCPs without knowledge of IP address of each devices in this way. ezTCPs that is searched can be distinguished by MAC address.

The Local broad cast packets cannot pass by router, so it can be used only same the local network.

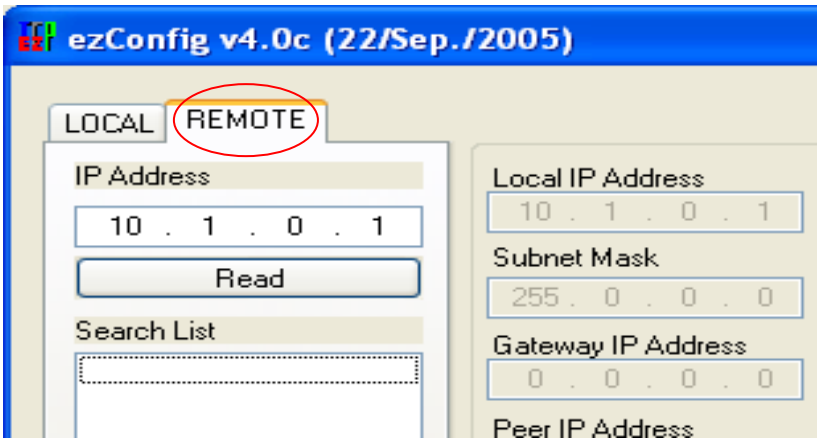
For using local broadcasting, select [LOCAL] tab that is located in left-above in the ezConfig.



- UDP unicast

The UDP unicast communication type communicates by IP address. Because the UDP unicast communicates by IP address, EZL-300L in other network can be configured if the network is connected to local network.. (The UDP port number is 50005.)

For using UDP unicast, select [REMOTE] tab that is located in left-above in the ezConfig.



See following table.

	UDP local broadcast	UDP unicast
Tab	LOCAL	REMOTE
Type	LAN broadcast	UDP unicast

	(Destination MAC Address: ff-ff-ff-ff-ff-ff)	(Communicating by IP Address)
Differentiating between ezTPs	MAC Address	IP Address
Configuration Area	Same network with the PC (can't pass a router)	All networks that are connected (UDP port: 50005)
Advantage	Searching is possible without knowledge of IP address (Searching is possible if IP address system is not correct to PC's network.)	Searching is possible to other network, if the network is connected.

4.2.2. Each Button of ezConfig

- [Search ezTCP]

This button is used to search for all of the network-attached ezTCPs. The search results will be displayed on the [Search 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] – LOCAL Tab

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.

- [Read] - REMOTE Tab

If press [READ] button of REMOTE tab after inputting the IP address of EZL-300L, ezConfig sends Request packet(UDP unicast packet, port number: 50005) to the EZL-300L. Before you configure EZL-300L of other network, please check firewalls between PC and EZL-300L.

- [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.

- [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.

√ ***If you forget the password, erase with ezSerialConfig in SerialConfig Mode.***

- [Status]

This button is used to read a dynamic status 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 [Search List] will carry out the same function.

4.2.3. Configuring wireless LAN

User should be careful to configure by ezConfig. If the wireless LAN configuration is wrong, user can't set the environmental variables with ezConfig. To configure, Remove the wireless LAN card, and configure those with ezSerialConfig in the Serial Config Mode.

The following is a example of configuring wireless LAN related items.

① Search ezTCPs with [Read] or [Search ezTCP] buttons. If the ezTCP is searched, select it.

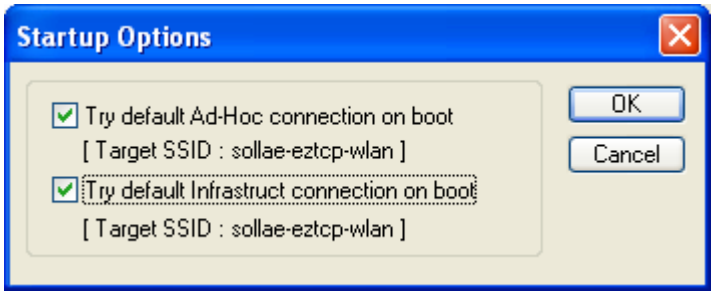
② Check [WLAN CFG] check box, then a new window will be open. Then click Yes button. Then the wireless LAN related items will be active.

③ Press [Write] button after configuring those.

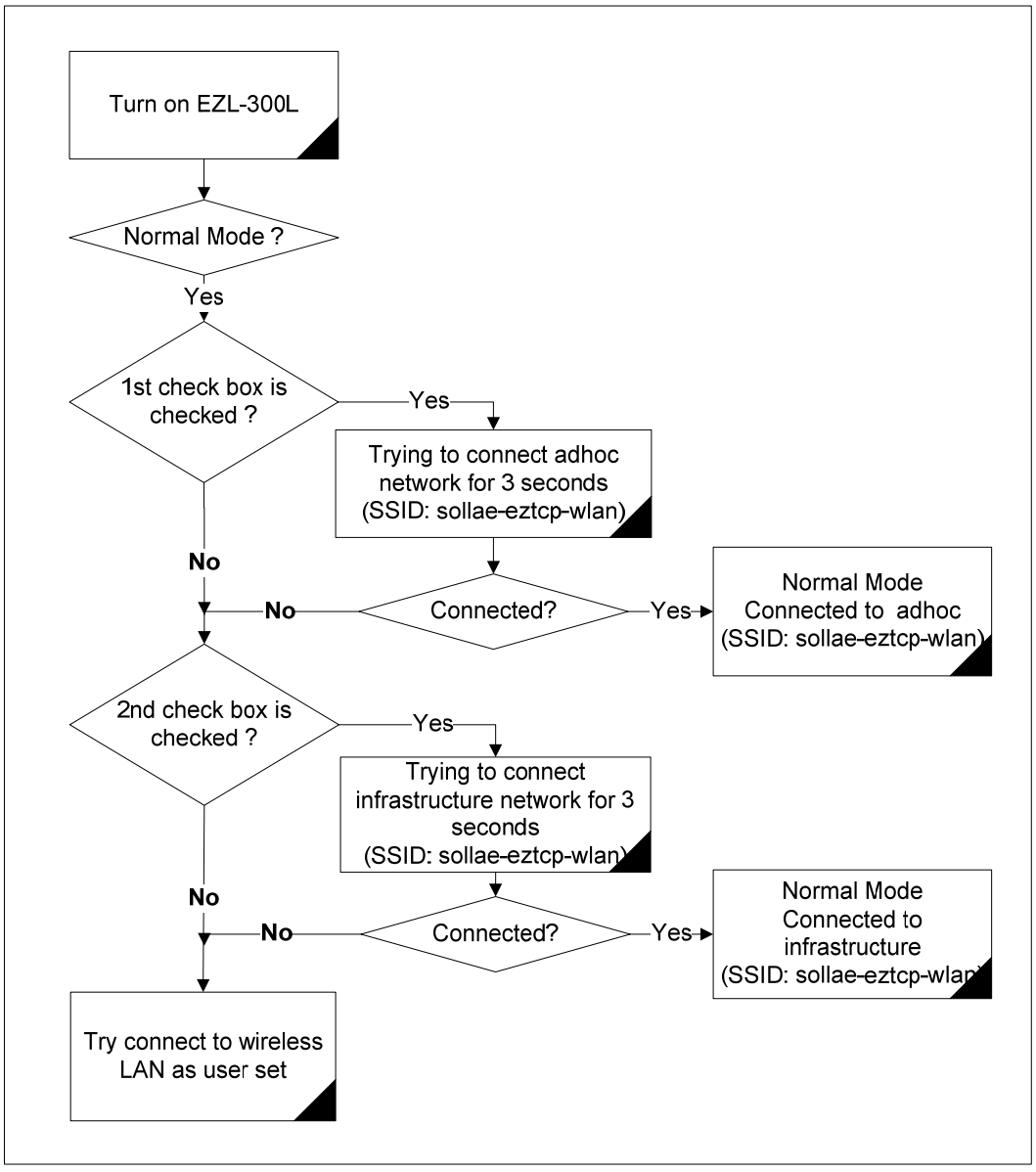
- Startup Option

EZL-300L supplies a function that is for miss-configuration occasions. When user set the Startup Option, EZL-300L try to connect to a special network in boot time in the Normal Mode.

If [WLAN Start Option] button is pressed, the following window will be shown.



EZL-300L will operate like below according to each check boxes.

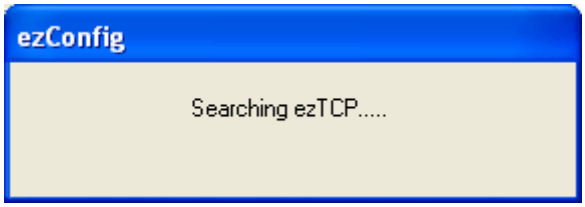


4.2.4. The example of configuration with ezConfig

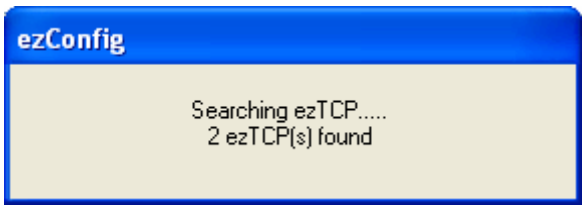
The following example shows how to read and change ezTCP's basic functions in the LOCAL tab. Try to change ezTCP setup value according to the following sequence:

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

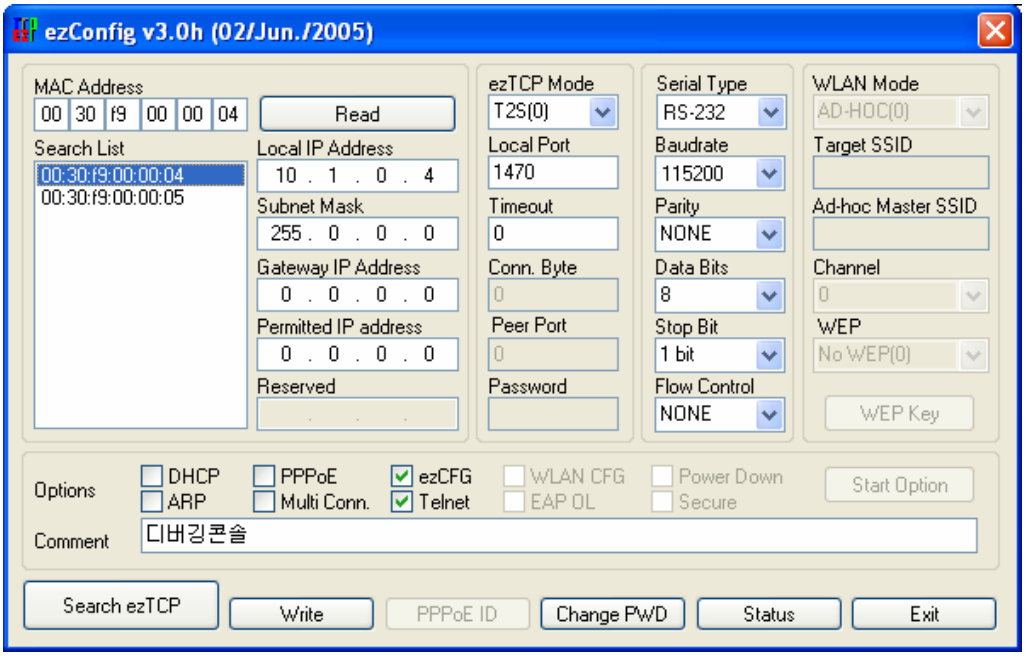
.



- 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, or wireless LAN card are connected correctly, then try pressing [Search] or [Read] button.



- If more than one ezTCP are detected, ezTCP's MAC ADDRESS will be displayed in the [Search List] box on ezConfig. Check if the MAC ADDRESS displayed in the [Search List] window corresponds to that printed on ezTCP main body. The following screen shows this process:



- Set [ezTCP Mode], [Local IP Address], [Local Port], and serial port related items. After setting press [Write] button. If there is any error during writing process, check the LAN between PC and EZL-300L.

- Check if the set IP address is correct with ping command in DOS prompt. Following is the message if the IP address is OK. If "Request timed out" message is shown, check IP address.

```
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
```

4.2.5. 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".*

4.3. Setting IP Address-related Items by 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 EZL-300L. Using DHCP automatic setup function requires the user to check [DHCP] item on ezConfig. Note that the user may have to check [ARP] item according to the type of DHCP servers.

√ ***DHCP cannot be used in T2S and U2S mode.***

5. Operation Mode

5.1. Operation Mode Overview

5.1.1. Overview

EZL-300L has three modes - Normal communication mode, Serial Config mode, and ISP mode. Normal communication mode is the data communication mode operating in the normal state. In Serial Config mode, the user can set environment variables through the serial port. In ISP mode, the user can download firmware to operate the EZL-300L.

Mode	PCMCIA Card	Description	Baud-Rate
Normal	Inserted	Data Communication Mode In the Normal State T2S, ATC, COD, U2S	set by the user
Console	Removed	Environment Variables through the Serial Port (by ezSerialConfig or console(hypher terminal)	115200 bps, N, 8, 1
ISP	Removed	Firmware Download Mode	115200 bps, N, 8, 1

5.1.2. How to Initiate Each Operation Mode

- Normal Mode

If power is supplied with the PCMCIA card inserted, the EZL-300L operates in Normal communication mode. When the EZL-300L enters into Normal mode, the EZL-300L attempts a wireless LAN connection, and the link LED is turned on after wireless LAN LINK connection is established.

- Serial Config Mode

Connect the serial port of the EZL-300L with the PC or notebook computer, and execute a ezSerialConfig. Then, supply power without the PCMCIA card inserted.

- ISP Mode

Connect the serial port of EZL-300L to a PC or a notebook, run serial communication program (Teraterm, etc.) using which you can send binary data, and then configure the serial port as follows: 115200 bps, 8 data bits, no parity, 1 stop bit, no flow control.

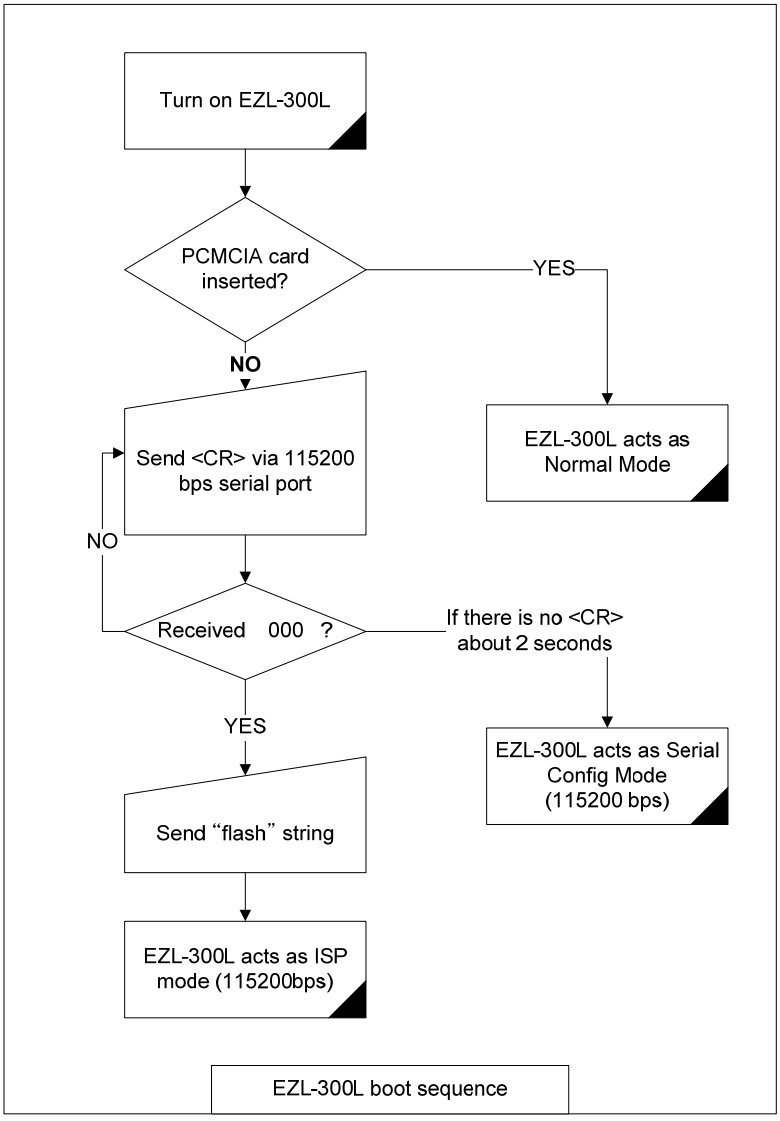
Press ENTER(CR, 0x0d) in the serial terminal as soon as power-on without PCMCIA card. Then 000 message will be shown, then input ‘flash’.

The following is the message displayed on the serial terminal when EZL-300L is

connected to the serial port in ISP mode.

```
000
100 AVR/64 BOOTLDR 10 SOLLAE SYSTEMS  203 vender: 0x1F, device code: 0x35
```

The Following describes the booting sequence.



User can download more easily if user use the wflash that is supplied by Sollae Systems.

5.2. Serial Config Mode and ISP Mode

5.2.1. Serial Config Mode

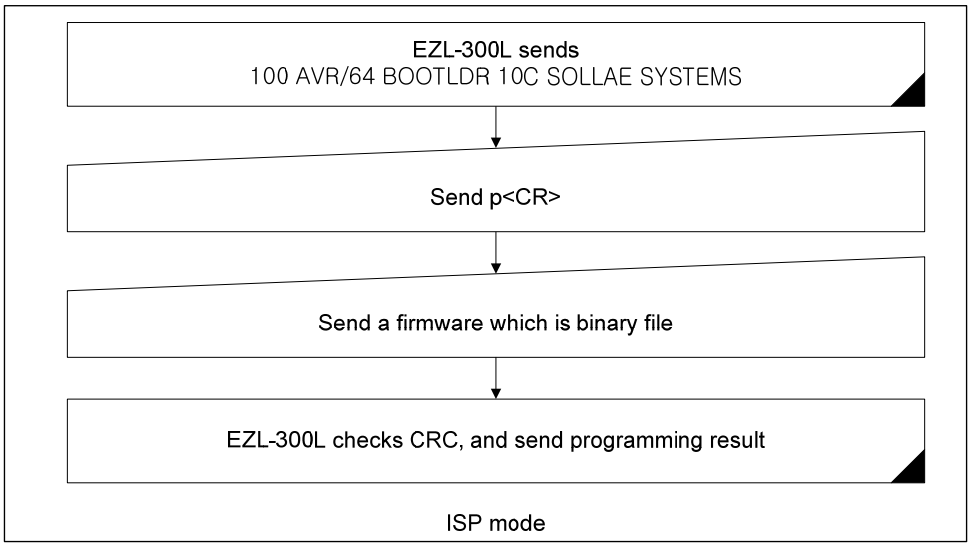
User can configure all parameters in the Serial Config Mode.

5.2.2. ISP Mode

User can download up-to-date firmware that is supplied by Sollae Systems in the ISP mode via serial.

Baudrate	115200 bps
Parity	no parity
Data bits	8 bits
Stop bit	1 stop bit

The following is the firmware download sequence.



☞ *You can also download the firmware easily if you use 'wflash' that is provided by Sollae Systems.*

5.3. Normal Communication Mode

Normal communication mode is for using normal function of EZL-300L.

EZL-300L operates as the Normal communication mode if user power on the EZL-300L with inserting wireless LAN card.

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	Configuration of Environmental Variables through	Topology

			Modification	Serial Port	
T2S	TCP	Passive Connection	Not needed	Impossible	1:1
ATC	TCP	Active/Passive Connection	Needed	Possible	1:1
COD	TCP	Active Connection	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.

☞ *For more information on communication modes, refer to the next chapter.*

6. Normal Communication Mode

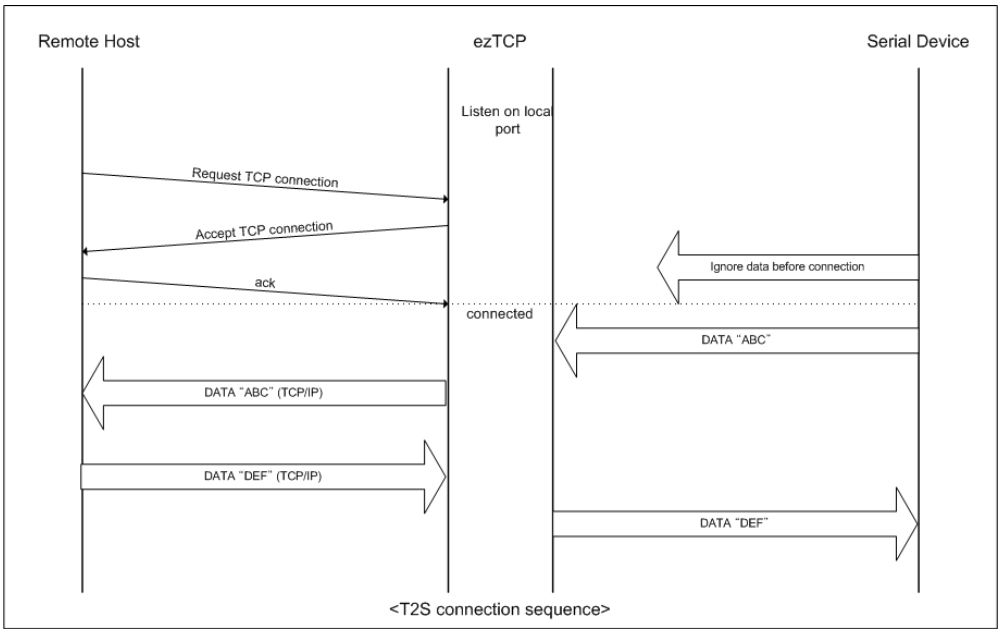
6.1. T2S (TCP To Serial)

In T2S mode, the EZL-300L functions as a server.

When a host connects to predefined local port, the EZL-300L accepts a TCP connection. When the EZL-300L 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.)

Because T2S is server mode, user should prepare the client program to connect, and T2S cannot be used in DHCP environment.

If EZL-300L is being connected, another connection can't be established.(EZL-300L supports only one connection.)



<T2S connection sequence>

Set the following for T2S mode:

	Item	Description
IP Address Relate Items	Local IP Address	IP address of EZL-300L
	Subnet Mask	Subnet mask
	Gateway IP Address	IP address of gateway
	Local Port	Port number for waiting to be connected in Server mode
Serial Port	Baudrate	Serial port speed (bps)
	Data bits	Data bit length
	Parity	Parity
	Stop bit	Stop bit
Communication Mode	ezTCP Mode	Communication Mode (T2S(0))
Disconnection	Timeout	Limit time to keep connection (unit: second)
Configuration Method	ezConfig	Enable ezConfig function.
	ARP	Enable IP setting by ARP.

- Timeout

If [Timeout] item is set and there is no data transmission for [Timeout] time, the connection is disconnected.

If [Timeout] is 0, EZL-300L sends TCP keep-alive packets every 10 seconds. If there is no response on the keep-alive packets 5 consecutive times, the connection will be disconnected.

- ARP

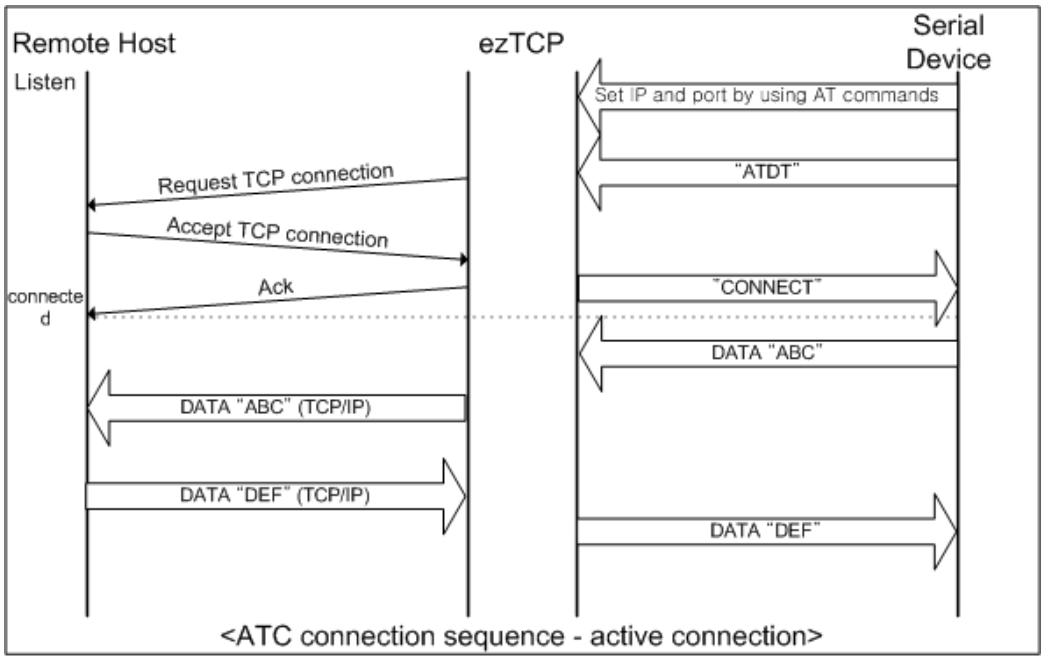
If ARP item is set, EZL-300L use an IP address temporarily, the IP address is the destination IP address of the first packet to the EZL-300L.(The destination MAC address of the packet is the EZL-300L's MAC address.)

This function is used very specially, so you can uncheck this item.

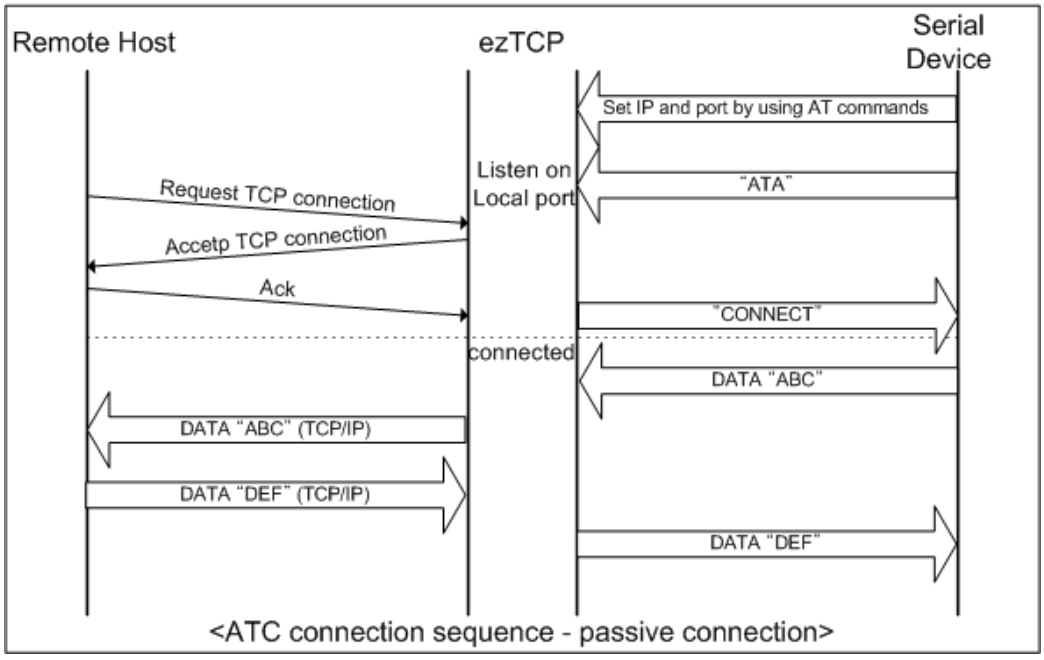
6.2. ATC

In ATC mode, the user can control the EZL-300L 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.

	Item	Description
IP Address relate Items	Local IP Address	IP address of EZL-300L
	Subnet Mask	Subnet mask
	Gateway IP Address	IP address of gateway
	Local Port	Port number for waiting to be connected in Server mode
	Peer IP Address	Peer IP address to connect
	Peer Port	Peer port number to connect
Serial Port	Baudrate	Serial port speed (bps)
	Data Bits	Data bit length
	Parity	Parity
	Flow Control	Flow control
Communication Mode	ezTCP Mode	ATC(1)
Disconnection	Timeout	Limit time to keep connection
Configuration Method	ezCFG	Enable ezConfig function.
	ARP	Enable IP setting by ARP.
Dynamic IP	DHCP	Select to receive EZL-300L IP address as DHCP.

☞ *See next chapter for more information about AT command set.*

6.3. COD

In COD mode, the EZL-300L functions as a client.

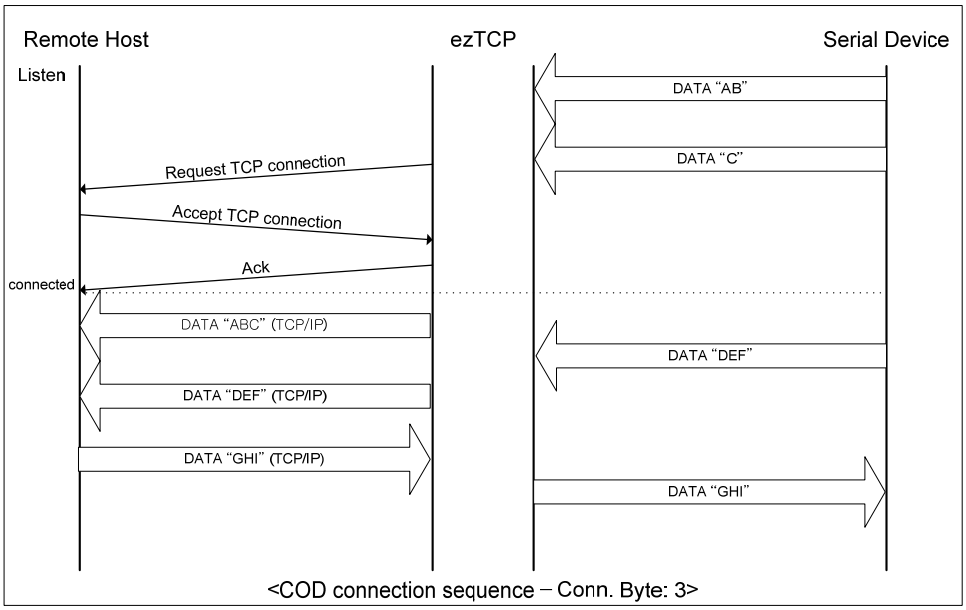
When data of the pre-specified size [Conn. Byte] comes to the serial port, the EZL-300L attempts a TCP connection to the TCP port [PEER PORT] of the preset host IP [PEER IP ADDRESS]. If the remote host accepts the TCP connection, TCP connection will be established.

If [Conn. Byte] is 0, EZL-300L tries to connect to the pre-defined host as soon as it power on.

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.

If [Timeout] item is set and there is no data transmission for [Timeout] time, the connection is disconnected.

If [Timeout] is 0, EZL-300L sends TCP keep-alive packets every 10 seconds. If there is no response on the keep-alive packets 5 consecutive times, the connection will be disconnected.



<COD connection sequence – Conn. Byte: 3>

Set the following for COD mode.

	Item	Description
IP Address relate Items	Local IP Address	IP address of EZL-300L
	Subnet Mask	Subnet mask
	Gateway IP Address	IP address of gateway
	Peer IP Address	Peer IP address to connect
	Peer Port	Peer port number to connect
Serial Port	Baudrate	Serial port speed (bps)
	Data Bits	Data bit length
	Parity	Parity
	Flow Control	Flow control
Communication Mode	ezTCP Mode	COD(2)
Disconnection	Timeout	Limit time to keep connection
Configuration Method	ezCFG	Enable ezConfig function.
	ARP	Enable IP setting by ARP.
Dynamic IP	DHCP	Select to receive EZL-300L IP address as DHCP.

6.4. U2S

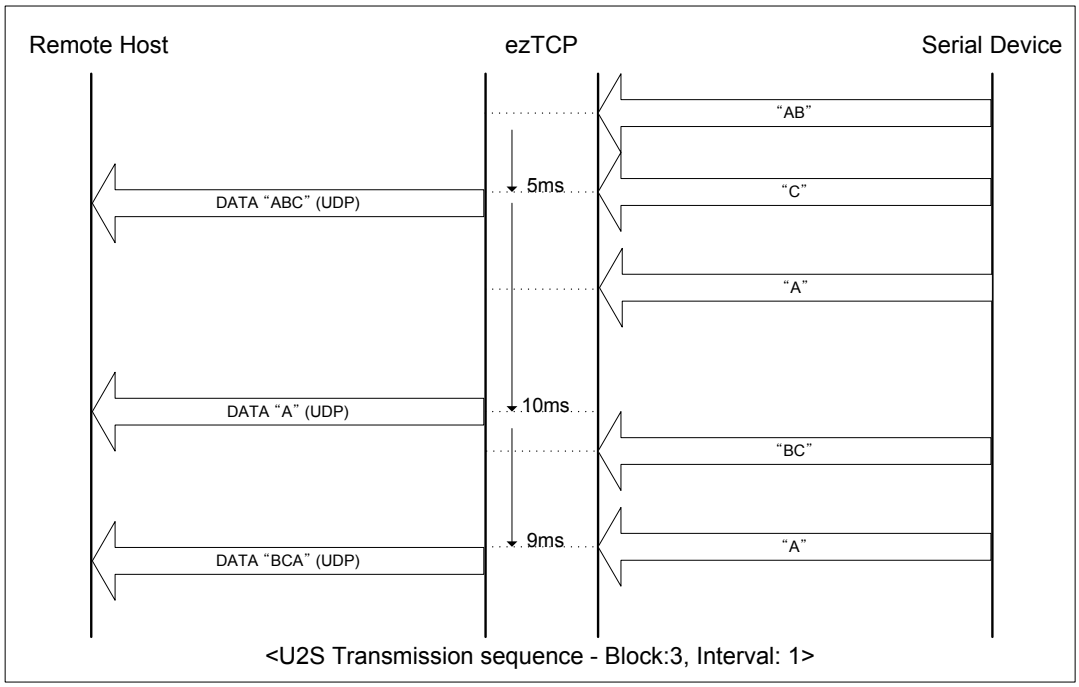
U2S mode allows for UDP communication.

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 [Conn. Byte] comes to the serial port of the EZL-300L or if a specified period of time [Tiemout] 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.

DHCP cannot be used in U2S mode.



<U2S Transmission sequence - Block:3, Interval: 1>

Set the following for U2S mode.

.	Item	Description
IP address Related Item	Local IP Address	IP address of EZL-300L
	Subnet Mask	Subnet mask
	Gateway IP Address	IP address of gateway
	Local Port	Port number for UDP data receiving
	Peer IP Address	Peer IP address to transmit
	Peer Port	Peer port number to transmit
Serial Port	Baudrate	Serial port speed (bps)
	Data bits	Data bit length
	Parity	Parity
	Flow Control	Flow control
Communication Mode	ezTCP Mode	Communication mode(U2S(3))
Packets	Block	UDP block size to transmit (unit: byte)
	Interval	Data gathering time from serial port to transmit as UDP (unit:10ms)
Configuration Method	ezConfig	Enable ezConfig function.
	ARP	Enable IP setting by ARP.

7. ATC Mode

7.1. Overview

EZL-300L 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, EZL-300L communicates several hosts alternatively.

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

7.1.1. 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?)

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

Command	Function	Description
A	passive connection	Listen connection (host → EZL-300L connection)
D	active connection	Connecting to host form EZL-300L
E	echo	Echo (E0 - no echo, E1-echo)
H	off-hook	disconnection
I	Inquery	Output EZL-300L related-information
O	Online	To online mode
V	enable result code	Result code (numeric-V0, alphabetic-V1)

Z	reset	Reset

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

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 and Reset
+PRC	ezConfig enable/disable	ON: 1, OFF: 0
+PARP	ARP setting function enable/disable	ON: 1, OFF: 0
+PDC	DHCP enable/disable	ON: 1, OFF: 0

7.4. Online State and Online Command State

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

Online 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 EZL-300L convert TCP and send to ethernet

7.4.1. Changing Online State to Online Command State

To change online state to online command state during the connection, +++ string should be transmitted to EZL-300L as following time interval.

When transmitting +++ string to EZL-300L, +++ string will be sent to peer host.

The time from final data the first '+' data of	No data over 500ms(guard time)

'+++' string	
time intervals between '+'s	0~500ms
Time interval after receiving last '+'	No data over 500ms (guard time)

7.4.2. Changing Online Command State to Online State

If EZL-300L's state is in online command state during TCP connection, EZL-300L's state can be changed into online state by an ATO command.

7.5. Example of Configuration with AT Command

7.5.1. Query with AT commands

If user send a ? after AT command, EZL-300L sends the value of the item.

	Serial Port		Description
	AT+PLIP=192.168.1.200<CR>	▶	Setting LOCAL IP address
◀	<CR><LF>OK<CR><LF>		Command OK
	AT+PLIP?<CR>	▶	Query Local IP addressa
◀	<CR><LF>192.168.1.200<CR><LF> <CR><LF>OK<CR><LF>		Response on the query

7.5.2. Configuring with AT commands

	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		System Reset

	CARRIER<CR><LF>		

7.6. Example of TCP Connection

Following examples are supposed that there is no echo with ATE0 command in advance.

7.6.1. 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			

If there is any data to the serial port of EZL-300L after ATD command and before the connection, EZL-300L quits the connection, and send NO CARRIER to its serial port.

7.6.2. 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 EZL-300L			
◀	<CR><LF>CONNECT<CR><LF>		TCP connection OK
Data Communication			

If there is any data to the serial port of EZL-300L after ATA command and before the connection, EZL-300L quits the connection, and send NO CARRIER to its serial port.

7.7. Example of TCP Disconnection

7.7.1. Example of active disconnection

EZL-300L disconnects the connection.

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

7.7.2. 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

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.eztcp.com/

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
Sep.29.2005	2.0	Initial Release
Dec.26.2005	2.1	Added Revision History Added Trash Mark for WEEE