

User Guide



FLC810E Industrial Wireless Ethernet Modem



It is essential that all instructions contained in the User Guide are followed precisely to ensure proper operation of equipment.

FCC Information

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received; including interference that may cause undesired operation.

Federal Communications Commission (FCC) Statement

This Equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



FCC RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body. The only antennas to be used with this device are as follows:

2.4 GHz Directional Antenna

<u>Gain</u>	Manufacturer	Manufacturer Model Number	Data-Linc Model
<u>10 dBi</u>	MAXRAD	MYP24010PTNF	<u>A2.4-YB</u>
<u>14 dBi</u>	MAXRAD	MYP24014PTNF	<u>A-FL-YB-14M</u>
<u>13.9 dBi</u>	<u>CUSHCRAFT</u>	<u>PC2415NA</u>	<u>A-FL-YB-14C</u>

2.4 GHz Omni Antenna

<u>Gain</u>	Manufacturer	Manfacturer Model Number	Data-Linc Model
<u>6 dBi</u>	MAXRAD	MFB24006	<u>A-FL-OB-6</u>
<u>5 dBi</u>	MAXRAD	MAXC-24505	<u>A-2.4-0</u>
<u>2 dBi</u>	MAXRAD	MHWS2400MSMARP	A-FL-OADJ-2
<u>0 dBi</u>	ZCOMAX	<u>XI-50XA</u>	<u>A-FL-ADJ</u>

Professional installation of this product is required.

Table of Contents

Introduction	Page
Features & Benefits	3
System Configurations	4
FastLinc™ FLC810E Installation	
Product Kit	6
System Requirements	6
Mechanical Description	6
Hardware Installation	7
Configuring the FLC810E	
Using FastLinc Configuration Utility	. 8
	19
Using Telnet	23
Advanced Settings for Security	~~~
	28
WEP Keys	. 29
Network Configuration	. 30
Taskaisel Cresting	22
	33
Troubloob acting	24
noubleshooling	. 34
Closson	25
Glossaly	
Technical Support	36
Return Material Authorization	36
Contact Information	36
Appendix A	
Enclosure Dimensions	37

Introduction

The FastLinc[™] 810E Industrial Wireless Ethernet Modem is specially designed for Point-to-Point and Point-to-Multipoint wireless applications, offering system-wide connections between PLCs at a speed of up to 11Mbps over the air data rate. Fully compliant with IEEE 802.11b standard, the FastLinc 810E modem provides powerful features such as the Windows-based configuration utility, MAC address filtering, WEP security and more.

Features and Benefits

- Creates a Point-to-Point connection linking two LANs, using 2 FastLinc 810E modems.
- Creates a Point-to-Multipoint system using three or more FastLinc 810E modems.
- External antenna connector allows for the use of high gain antennas.
- With an over the air data rate of 11Mbps and 5.5Mbps, the system is faster than an E1/T1 data link.
- Fully IEEE 802.11b compatible.
- Transmits in the license-free 2.4Ghz ISM band.
- Seamless roaming within the 802.11 & 802.11b wireless LAN infrastructure.
- Provides user authentication to enforce tight security.
- MAC address control for enhanced security.
- Easy to install and configure.
- Provides Windows-based configuration utility.
- Industrial ruggedized enclosure provides protection in harsh environments.

System Configurations

The FastLinc 810E Industrial Wireless Ethernet Modem can be configured in a variety of network system configurations.

Wireless Infrastructure

In a wireless infrastructure, the FastLinc 810E modem acts as a bridge. The FastLinc 810E modem connects the wireless clients together. The FastLinc 810E modem acts as a center point for all wireless communications. This would increase efficiency of the communications since the wireless adapters do not need to be within direct range of each other.



Wireless Infrastructure with Stations Attaching to a Wired LAN

The FastLinc 810E modem will provide an access point to the local LAN. An integration of wireless and wired LAN is called an Infrastructure configuration. A group of wireless LAN PC users and a FastLinc 810E modem construct a Basic Service Set (BSS). Each wireless PC in this BSS can talk to each other on the network via the FastLinc 810E modem.



Hardware Installation

This chapter describes initial setup of the FastLinc 810E modem.

I. Product Kit

Before installation confirm possesion the following items:

- (1) FastLinc 810E Industrial Wireless Ethernet Modem
- (1) Operation Manual
- (1) Power Adapter
- (1) Configuration Utility Software
- (2) Antennas

If any of the above items are not included or damaged, please contact Data-Linc Group for support.

II. System Requirements

Installation of the FastLinc 810E modem requires:

1. An AC power outlet (100V, 60Hz) which supplies the power for the FastLinc 810E modem.

2. A 10/100BaseT (UTP) Ethernet cable drop.

III. Mechanical Description

Top Panel

The following table provides an overview of LED activity on the top panel of the FastLinc 810E modem.

LED	Mode	Description
PWR	Continous Green	Power enabled
AP Active	Continuous Green	The FastLinc 810E Modem is ready to service
W-LAN	Flashing Green	Off: No wireless activity Flashing: Wireless RX/TX activity
Data	Flashing Green	Off: No Ethernet traffic activity Flashing: Wired LAN traffic activity
LINK	Continous Green	Off : No station connected to the FastLinc 810E Modem On: When one or more stations are associated with the FastLinc 810E Modem

Figure 1 Back Panel



Power Socket

The power adapter plugs into the socket labeled "12VDC".

Ethernet Ports

The user may connect the FastLinc 810E modem either to a hub or a PC. Please note to use the cross-over cable when a connection between the modem and a PC is desired. The two LEDs (10/100 & ELink) indicate the Ethernet physical link status. The 'ELink' LED is a good indicator to see if a proper Ethernet connection has been established.

Reset

The button labeled "Reset" enables the user to restore the modem's default setting, useful for a forgotten password. Please detach the DC power plug and press the "Reset" button on the connection panel of the modem. Reconnect the power while holding the button in for a few seconds until the "AP Active" LED indicator blinks. This will restore the modem's default settings and enable the user to configure the modem via the utility software, telnet or Web again. The default TCP/IP address is 192.168.1.1

IV. Hardware Installation

Take the following steps to set up the FastLinc 810E modem.

Site Selection

Before installation, determine the FastLinc 810E modem location. Proper placement of the FastLinc 810E modem is critical to ensure optimum radio range and performance. The Site Survey and Browser Utility shipped with the FLC800C laptop card is used to choose a proper placement for the FastLinc 810E modem. Typically, the best location to place the FastLinc 810E modem is the center of your wireless coverage area with mobile stations within the line of sight. Obstructions may impede performance of the FastLinc 810E modem.

Connect the Ethernet Cable

The FastLinc 810E modem supports 10/100M Ethernet connection. Attach your UTP Ethernet cable to the Ethernet connector on the FastLinc 810E modem. Please note to use the cross-over cable when you desire to connect the modem to a PC.

Connect the Power Cable

Connect the power adapter to the power socket on the FastLinc 810E modem, and plug the other end of the power into an electrical outlet. The FastLinc 810E modem will be powered on and all five indicators on the top panel will flash in sequence to test the functionality of the indicators.

Note: Only use the power adapter supplied with the FastLinc 810E modem. Otherwise, the unit may be damaged.

Configuring the FastLinc 810E

The FastLinc 810E modem is shipped with default parameters, which will be suitable for the typical infrastructure wireless LAN. Just simply install the FastLinc 810E modem and power it on. Nevertheless, the user can still adjust configuration settings depending on wireless network management objectives. The FastLinc 810E modem allows for configuration either via the configuration utility, Telnet or Web Management.

I. Using FastLinc 810E Utility

Installed on your Windows 95/98/NT/ME/2000/XP computer, the Windows-based utility provides a user-friendly interface. The utility enables the user to configure all of FastLinc 810E's on the network more easily than ever before.

The following instructions guide the user through the installation of the FastLinc 810E utility.

- 1. Insert the software floppy disk that came with the modem into the floppy drive on your computer.
- 2. From the Start menu on the Windows desktop, choose Run.
- 3. In the Run dialog box, type A:\setup then click OK.
- 4. Follow the on-screen instructions to install the utility software.
- 5. Upon completion, go to Program Files and execute the utility software. It will begin to browse all the FastLinc 810E's available on the network.



6. Double click a FastLinc 810E modem icon to access its property dialog box. Enter the password in the entry field. The default password is "default".

Password	×
Authentication Access to FastLinc 810E You must pass the authentication before controlling the Access Point.	
Enter Password : 🛛 🔭 🗐 🗸 Cancel	

7. After entering the correct password, a configuration window appears.

Information Tab

The user will see the basic information of the FastLinc 810E, such as MAC Address, Frequency Domain and Firmware Version.

FastLinc 810E	×
P Logout	
Information Statistics Configuration Upgrade Access Control	
MAC Address : 00:60:B3:19:3D:20	
Frequency Domain : FCC (North America) domain	
Firmware Version : 4. 1. 0	

MAC Address: Hardware identification number that distinguishes the unit from others. The number label is located on the bottom of the FastLinc 810E.

Frequency Domain: The regulated operating frequency per country.

Firmware Version: Displays the firmware version that is equipped with the FLC810E hardware.

Statistics Tab

The statistics tab contains three items for the user to monitor the Ethernet and wireless network traffic.

1.) Ethernet:

For monitoring the TX/RX on the wired network.

FastLinc 810E	
P Reset Logout	
Information Statistics Configuration Upgrade Access Co	ontrol
Ethernet Wireless Wireless Error	
[Receive] Packets : 534 Total Bytes : 5529 [Transmit] Packets : 6 Total Bytes : 572	41 58 54 29
Pause 📈	

2.) Wireless:

For monitoring the TX/RX of the wireless network.

FastLinc 810E	×
C Reset Logout	
Information Statistics Configuration Upgrade Access Control	
Ethernet Wireless Error	
[Receive] Fragments : 494 Unicast Packets : 0 Unicast Bytes : 0 Multicast Packets : 494 Multicast Packets : 22841 [Transmit] Fragments : Fragments : 8010 Unicast Packets : 0 Unicast Packets : 0 Multicast Packets : 0 Multicast Bytes : 707 Multicast Bytes : 72633	
Pause 📈	

3.) Wireless Error:

This item offers detailed information on wireless error packets that the AP (Access Point) receives and transmits.

FastLinc 810E	×
Preset Logout	
Information Statistics Configuration Upgrade Access Control	
Ethernet Wireless Wireless Error	
[Receive] Packet FCS Errors : 405 No Buffer : 0 Received WEP Errors : 0 [Transmit] 0 Deferred Transmissions : 9438 Retry Limit Exceed : 2 Single Retries : 0 Multiple Retries : 0 Wrong Source Address : 0 Other Reasons : 0	
Pause 📂	

[Receive]:

Packet FCS Errors: The number of wireless packets that fail during FCS transmission (Frame Check Sequence) when accessing the wired network.

No Buffer: The number of wireless packets that the AP ignores due to insufficient memory.

Received WEP Errors: The number of wireless packets that have WEP encryption errors.

[Transmit]:

Deferred Transmission: The number of packets that have deferred transmission due to the fact that the medium is busy.

Retry Limit Exceed: The number of packets that are not sent due to the reason that the packets exceed the retry limits.

Single Tries: The number of packets that are successfully sent on the first retry.

Multiple Retries: The number of packets that are successfully sent after several retries.

Wrong Source Address: The number of packets that are ignored by the FastLinc 810E because the source client is not in its BSS.

Configuration Tab

The configuration tab contains 5 items for configuration management.

1.) General:

AP name: In this entry field, you may enter any name. This will enable you to manage your FastLinc 810Es with more ease if you have multiple FastLinc 810Es on the network.

FastLinc 810E
C Reset Logout
Information Statistics Configuration Upgrade Access Control
General IEEE802.11 Administration IP Address WEP
AP Name :
FastLinc 810E
Apply Default Cancel

2.) IEEE 802.11

Radio Mode

This item enables the user to set the operation mode for the modems.

- Wireless LAN Modem (AP): Serves as a transparent Media Access Control (MAC) bridge connecting a wireless network and a backbone network.
- Inter-Building with Repeating (PxP): Connect two or more separate networks with the FastLinc 810E modem.
- Station Adapter Infrastructure (SAI): Serves as a wireless station (infrastructure). Connect the Station Adapter Infrastructure to a PC with a cross over 10baseT cable, and it is able to access the network via the Access Point (AP).
- Station Adapter Ad-Hoc (SAA): Serves as a wireless station (Ad-Hoc). Connecting to a PC with a cross over 10BaseT cable, the Ad-Hoc Station Adaptor, along with other Ad-Hoc Station Adapters can establish a small wireless network without an Access Point.
- Station Adapter 802.11 Ad-Hoc (SAA2): Same as SAA except that it operates under 802.11 standards.

Note: When setting the operation mode to either PxP or SAA set all devices in the network to the same channel. ESSID can be ignored. When SAA2 is selected set all devices with the same ESSID and channel.

FastLinc 810E	×
Information Statistics Configuration Upgrade Access Control	
General IEEE802.11 Administration IP Address WEP &	
Wireless LAN Access Point (AP) Wireless LAN Access Point (AP) Inter-Building with Repeating (PxP) Station Adapter - Infrastructure (SAI) Station Adapter - Ad-hoc (SAA) Station Adapter - 802.11 Ad-hoc (SAA2)	
Frag Threshold : 2346 TX Rate : Fully Auto	
Apply Default Cancel	

2.) IEEE 802.11 cont.

ESSID: The ESSID is a unique ID given to the FastLinc 810E. Wireless clients associating to the FastLinc 810E must have the same ESSID. The ESSID can have up to 32 characters.

Channel: The user may select any of the available channels as an operational channel for your FastLinc 810E.

RTS Threshold: RTS Threshold is a mechanism implemented to prevent the "Hidden Node" problem. "Hidden Node" is a situation in which two stations are within range of the same FastLinc 810E, but are not within range of each other. Therefore, they are hidden nodes for each other. When a hidden station starts data transmission with the FastLinc 810E, it might not notice that another station is already using the wireless medium. When these two stations send data at the same time, they might collide when arriving simultaneously at the FastLinc 810E. The collision will most certainly result in a loss of messages for both stations. Thus, the RTS Threshold mechanism will provide the solution to prevent data collisions. When the RTS is activated, the station and its FastLinc 810E, informing that it is going to transmit the data. Upon receipt, the FastLinc 810E will respond with a CTS message to all stations within its range to notify all other stations to defer transmission. It will also confirm to the requesting station that the FastLinc 810E has reserved the channel for transmission.

Fragmentation Threshold: The Fragmentation mechanism is used for improving the efficiency when there is high traffic within the wireless network. If you transmit large files in a wireless network, you can enable the Fragmentation Threshold and specify the packet size. The mechanism will split the packet into the packet size selected.

FastLinc 810E	×
Preset Logout	
Information Statistics Configuration Upgrade Access Control	
General IEEE802.11 Administration IP Address WEP [1
Radio Mode :	
Wireless LAN Access Point (AP)	
ESSID : Main Network	
Channel : CH01 2412MHz	
RTS Threshold : 2432	
Frag Threshold : 2346	
TX Rate : Fully Auto	
Apply Default Cancel]

3.) Administration:

The user may change the default password by entering the new password. Enter the new password in the *Confirm Change* field and click *Apply* to make the new setting take effect.

FastLinc 810E
Preset Logout
Information Statistics Configuration Upgrade Access Control
General IEEE802.11 Administration IP Address WEP
New Password : Anterna State S
Confirm Change : XXXXXXX
Apply Default Cancel

4.) IP Address:

To enable remote access to the FastLinc 810E using Telnet or Web Management, the user must assign an IP address to the FastLinc 810E. You may also assign other related Internet addressing options, such as subnet mask or gateway address. Consult your network administrator to obtain an available IP address.

Fa	stLinc 810E	N 100 N 1
	Preset Preset	ogout
	nformation Statistics Cor	figuration Upgrade Access Control
	General IEEE802.11	dministration IP Address WEP (
	[Management Port]	
	IP Address :	192.168.1 .1
	Netmask :	255.255.255.0
	Gateway :	192.168.1 .254
	Apply	Cancel

5.) WEP:

The FastLinc 810E modem allows the "128-bit(s)" user to create up to 4 data encryption keys to secure data from eavesdropping by an unauthorized wireless user. To activate and set the WEP keys, do the following:

1. From the WEP encryption item, pull down the menu and it will list three options:

- Disable- Allows wireless adapters to communicate with FastLinc 810Es without any data encryption.
- WEP64- Requires wireless stations to use data encryption when communicating with the FastLinc 810E.
- WEP128- Requires wireless stations to use data encryption when communicating with the FastLinc 810E.

2. WEP encryption is either 40-bits or 128-bits. When the menu or manuals reference 64-bits it is actually 40-bits.

The number of characters to enter for 40-bit encryption is five (5) ASCII characters long. However, if the string is preceded by the characters '0x', the characters can be typed as ten (10) hexadecimal characters. Hexadecimal characters must be 0 to 9 or A to F.

The number of characters to enter for 128-bit encryption is thirteen (13) ASCII characters long. However, if the string is preceded by the characters '0x', the characters can be typed as twenty-six (26) hexadecimal characters. Hexadecimal characters must be 0 to 9 or A to F.

You can also enter WEP keys in the Key 2, Key 3 and Key 4 if you wish. WEP will only use one Key. You will have to select one WEP key as an active key before enabling use of encryption.

FastLinc 810E	
Information Statistics Configuration Upgrade Access Control	
General IEEE802.11 Administration IP Address WEP (Note: The WEP key must be set up exactly the same on the FastLinc 810E as on the wireless client stations. If Key 1 is used on the FastLinc 810E and the value is (e.g. MyCar08), the same must be assigned to Key 1 for all client stations.
Key 2: Key 3: Key 4:	
ApplyDefaultCancel	

Upgrade Tab

This item is used for uploading the newest firmware version for the FastLinc 810E. The user may either enter the file name in the entry field or browse the file by clicking the Open File button. For information about the release of the newest firmware, contact Data-Linc Group.

FastLinc 810E	×
C Reset Logout	
Information Statistics Configuration Upgrade Access Control	
Firmware File	
D:\AP\ap.imp	
📌 Go	

Access Control Tab

With the Access Control Table enabled, the user can authorize wireless units to access the FastLinc 810E by identifying the MAC address of the wireless devices that are allowed access to transmit data. To create or edit the Access Control Table, do the following:

1.) Go to the Access Control tab and select "Enable Access Control". Note that when you enable the Access Control Table without any MAC address in the table, no access is allowed to communicate with the FastLinc 810E.

2.) Use the following buttons to manage the Access Control Table:

- Add to enter MAC addresses of authorized wireless devices one at a time.
- Edit to change the entries in the table if you enter the incorrect MAC address.
- Remove to remove MAC addresses one at a time.
- Clear to remove all MAC addresses in the table.
- **Import** to import an existing Access Control Table.
- Export to save the current Access Control Table to a location on your computer. You may save the file as a text document.

Note:The MAC address of the equipment attached to the remote FLC810E (PC, PLC, etc.) needs to be entered in this list.

FastLinc 81	IOE		X
C Rese AP	t Logout Statistics Configuration	on Upgrade Acces	s Control
🖂 Enabl	e Access Control		
No.	MAC Address	Up Bandwidth	Edit
1	00:60:B3:78:9D:BC	No Limited	Add
			Remove
<		>	
Impo	ort Export	Clear	Apply
Selected Iter	m: 1/1		

II. Using Web Management

The built-in Web Management provides a user-friendly graphical user interface (web pages) to manage your FastLinc 810Es. An AP with an assigned IP address (the default address is 192.168.1.1) will allow you via web browser (e.g., Netscape Navigator 3.0 - 4.5 or MS Internet Explorer 4.0 or higher) to monitor and configure the FastLinc 810E.

1. Open your web browser.

2. Enter the IP address of your FastLinc 810E in the Address field (the default address is 192.168.1.1). You will have access to the FastLinc 810E Web Pages of the FastLinc 810E modem.



3. Enter the password to login to the FastLinc 810E. The default password is "default". The main page will show up.

Information

General

This item displays the general information for the FastLinc 810E such as the MAC address, Frequency Domain, and Firmware Version.

Access Point - Internet	Explorer provided by Data-Linc Gr	oup
File Edit View Favorites	Tools Help	🕂
3 · 8 · 🗷 2 💰	0 😔 🎍	
Address 🕘 http://192.168.1.2	23/index2.html	💌 🄁 Go
	Informati	on General
	Ø FastLinc 810E (a	uddress: 00:60:B3:19:3D:20)
 Information General Statistics 	Access Point General Int These information parameters p Access Point.	Formation provide the basic identification of hardware/software version of this
> Link Status	MAC Address (BSS ID) 00:60:B3:19:3D:20
■ 802.1X	Frequency Domain	n FCC (North America) domain
	Firmware Version	n 4.1.0
> Firmware Upgrade		
> Logout		
ê		🌍 Internet

Statistics

This item displays the Ethernet and wireless network traffic.

🗿 Access Point - Interne	t Explorer provided by Dat	a-Linc Group		
File Edit View Favorite	s Tools Help			at 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 19
3 · 8 · 🛛 🖬 🕻	6 😔 🍇			
Address 🙆 http://192.168.1	.223/index2.html			🔽 ラ Go
	Info	rmation Sta	tistics	
	⊿FastLi	nc 810E (address: 00:60:I	33:19:3D:20)	
🖴 Information	• Wireless LAN Inter	rface Statistics		
> General	Wireless Receive		Wireless Transmit	
> Statistics	Fragments	500	Fragments	9117
> Link Status	Unicast Packets	0	Unicast Packets	0
🖿 Configuration	Unicast Bytes	0	Unicast Bytes	0
► 002.4V	Multicast Packets	500	Multicast Packets	831
002.17	Multicast Bytes	23000	Multicast Bytes	93319
	Packet FCS Errors	916	Deferred Transmissions	4577
> Firmware			Retry Limit Exceed	0
Upgrade			Signle Retries	0
N. L. amout			Multiple Retries	0
> Logoul	Discards: No Buffer	0	Discards: Wrong Source Address	0
	Discards: WEP Errors	0	Discards: Other Reason	0
Themat Interface Statistics				
	Ethenet Receive		Ethernet Transmit	
	Packets	8218	Packets	461
	Total Bytes	1269675	Total Bytes	134269
ど Done				🥥 Internet

Configuration

General

You may make the settings on the FastLinc 810E such as AP mode, ESSID, channel, RTS threshold, fragment threshold and password.

	Tools Help	
3 • 🗇 · 🗷 🗈 🦿	≥ ee è⊧	
ddress 🕘 http://192.168.1.:	223/index2.html	💌 🄁 G
	Configuration Ge	neral
	FastLinc 810E (address: 00:60:B3:	19:3D:20)
Information	General Parameters	
Configuration	You can change some systemwise parameters of this	Access Point here.
	Access Point Name: FastLinc 810E	
	Access Point Mode:	
> Access Control 802.1X	• Access Point	This mode (abbr., ap) is the default mode of the access point. It serves as an IEEE 802.11 wireless LAN access point.
Firmware	 Inter-Building with Repeating 	This mode (abbr., pxp) serves as a wireless bridge for multi-point inter-building LAN connection. It also repeats frames (repeating) within the range.
Logout	• Station Adapter - Infrastructure	This mode (abbr, sai) serves as an IEEE 202.11 wireless LAN infrastructure station adapter for a host. It acts simply as the converter which translates the host's IEEE 202.2 Bthermet frames to/from IEEE 202.11 wireless LAN frames.
	Station Adapter - Ad-hoc	This mode (abbr., saa) serves similar to above except it is in ad-hoc mode.
	Station Adapter - 802.11 Ad-hoc	This mode (abbr., saa2) serves similar to above except it is in IEEE 802.11 standard ad-hoc mode.
	IEEE802.11 Parameters The IEEE802.11 parameters concern the operation of LAN stations (disents) use matched configuration. F select the same ESSID like this Access Foint (as cor Foint.	'the wireless LAN protocol. Make sure your wireless or example, all your wireless LAN stations should afigured below) to communicate with this Access
	IEEE302.11 Parameters The IEEE302.11 parameters concern the operation of LAN statum cleanty use matched configuration. F select the same ESSID*like this Access Point (as cos Point. ESSID: Main Network.	'the workess LAN protocol. Make nue your wireless or example, all your wireless LAN stations should afigured below) to communicate with this Access
	EEEB302.11 Parameters The IEEE302.11 parameters concern the operation of LAN status clearly use matched configuration. F select the same ESSID' like this Access Point (as con Foint ESSID: Main Network Channel: CH01 2412MHz **	'the wareless LAN protocol. Make pure your wireless or example, all your wareless LAN extenore should afigured below) to communicate with this Access
	IEEES02.11 Parameters Tha IEEES02.11 parameters concern the operation of LAN status (clent) use matched configuration F select the same ESSID' like this Access Fourt (es cor Point ESSID: Main Network Channel: CH01 2412MHz * TX Rate: O Fully Auto	'the wardese LAN protocol. Make sure your wireless or example, all your wireless LAN stations should afigured below) to communicate with this Access
	IKEIS302.11 Parameters The IEEE302.11 parameters concern the operation of LAN station (ciently use and/ord configuration of Point ESSID: Main Network Channel: CH01 2412MHz v TX Rate: O Fully Auto Fixed 11 Moh	'the wareless LAN protocol. Make sure your wireless or example, all your wireless LAN stations should afigured below) to communicate with this Access
	IRREBOL 11 Parameters The IEEE001 11 parameters concern the operation of LAN status (clend) use matched configuration F select the same ESSID ¹ like that Access Fount cas con Fount ESSID ¹ Main Network Channel: CH01 2412MHz * TX Rate: Pally Auto Pixed 15 Mbr Auto Select 11 Mor 2M	'the wardess LAN protocol. Make new your windess or example, all your workess LAN entitions should digued below) to communicate with the Access
	EEEBS02.11 Parameters Tha IEEES02.11 garameters concern the operation of LaN status (clent) use matched configuration. F select the same ESSID' like this Access Point (as cor Font ESSID: Main Network Channel: CH01 2412MH2 ∞ TX Rate: Pully Auto Priced 11 MoA Friced 12 ShBa Auto Select HM or 2M Priced 22 MBa	'the wardess LAN protocol. Make sure your wireless or example, all your worders LAN stations should difgued below) to commanicate with this Access
	IEEES02.11 Parameters Tha IEEES02.11 garameters concern the operation of LAN status (cient) use matched configuration. F select the same ESSID' like this Access Fourt (as cor Fourt ESSID: Main Network Channel: CH012.412MHt ♥ TX Rate: Fixed 11 Mole Fixed 11 Mole	'the weekses LAN protocol. Make sure your wireless or example, all your weekses LAN eations should digues a below) to communicate with this Access
	IEEES02.11 Parameters Tha IEEES02.11 parameters concern the operation of LAN retards (clernd) use matched configuration F select the same ESSID' like this Access Point (as cor Point ESSID: Main Network. Channel: CH012412MHz ♥ TX Rate: ● Fully Auto Pixed 11 Mb/s Pixed 11 Mb/s RTS Threshold: 2432	'the window LAN protocol Moder new yoor window or nample, all your washes LAN statutors should digared below to communicate with this Access

WEP

To prevent unauthorized wireless stations from accessing data transmitted over the network, the FastLinc 810E modem offers WEP (Wired Equivalency Privacy). You can set up 4 encryption keys but choose one key to encrypt your data.

The number of characters to enter for 40-bit encryption is five (5) ASCII characters long. However, if the string is preceded by the characters '0x', the characters can be typed as ten (10) hexadecimal characters. Hexadecimal characters must be 0 to 9 or A to F.

The number of characters to enter for 128-bit encryption is thirteen (13) ASCII characters long. However, if the string is preceded by the characters '0x', the characters can be typed as twenty-six (26) hexadecimal characters. Hexadecimal characters must be 0 to 9 or A to F.

Access Point - Internet	t Explorer provided by Data-Linc Group	
File Edit View Favorites	Tools Help	.
3 • O · 🖹 🖻 🕻	s 🐵 💩	
Address 🕘 http://192.168.1.:	223/index2.html	🔁 Go
	Configuration WEP	
	FastLinc 810E (address: 00.60.B3:19:3D.20)	
🗅 Information	WEP Encryption	
😂 Configuration	The access point provides an industrial-standard WEP (wired equivalent privacy) function which prevent from data reception by uninvited wireless receivers. Here under are modes and key table t	can 10
> General	configure the WEP encryption.	
> WEP	• Disable no encryption	
Access Control	• WEP40 40-bit WEP data encryption	
	• WEP128 128-bit WEP data encryption	
> Firmware		
Upgrade	Use WEP Key	
> Logout	Keyl: •	
	Key2: •	
	Key3: • *****	
	Key4: • ****	
	Key Format: Ten hexadecimal digits (0-9 or A-F) heading by "Ux" or five alphabets (ASCII charact case-sensitive) are needed if 40-bit WEP is used; 26 hexadecimal digits or 13 alphabets are needed	iers, 1 if
	128-bit WEP is used. Example keys are: 0x1122304455 or abcae for 40-bit WEP, and	
	0x0102030400000000041011123 01 abcuergh1]kimi01120-00 WELL	
	APPY new configuration, or Heven to be unchanged.	
é	🥥 Internet	

Configuration cont.

Access Control

The Access Control Table enables you to restrict wireless stations accessing the FastLinc 810Es by identifying the MAC address of the wireless devices.

Access Point - Internet	t Explorer provided by Data-Linc Group	
File Edit View Favorites	Tools Help	- 🥂
3 · O · 🖹 🖻 🕈	۵ 🐵 🗟	
Address 🙆 http://192.168.1.:	223/index2.html	> Go
	Configuration Access Control	
	 Access Control The access control function contains an address list for you to control the accessibility from wireless stations i.e. 	
Configuration	blocks out those addresses that are not wanted. Here under are modes and address list to configure this feature.	
 > General > WEP > Access Control 802.1X 	• Disable open to public • Enable allow network access from stations in the list Change	
> Firmware Upgrade	MAC address/Up Band/Down Band/Total Band/Description [<< Add] (All addresses are allowed) (input new address above 00 60 B3:00 00:01, for example)	
> Logout	(Set Up Disable ❤ Bandwidt	ນ
	Disable ✔ (Set Down Bandwidt)	n)
	(Set Total Disable 🔽 Bandwidt	
	(Description	on)
	Del»	
	1 items in list	
ê	🖉 Internet	.:

Firmware Upgrade

Here, you can upload the newest firmware for the FastLinc 810E. You may either enter the file name in the entry field or browse the file by clicking the Browse button.

🗿 Access Point - Internet I	Explorer provided by Data-Linc Group
File Edit View Favorites	Tools Help 🦧
Q • Q • 🗷 🖻 🐔	🛛 😓
Address 餐 http://192.168.1.22	3/index2.html 💽 🎦 Go
	Access Point Firmware Upgrade
	FastLinc 810E (address: 00:60:B3:19:3D:20)
 Information Configuration 802.1X 	 Firmware Upgrade Here, you can upload the newest firmware of the Access Point. You may either enter the file name directly or locate the file by clicking on the 'Browse' button. For information about the release of the newest firmware, please contact your local reseller.
> Firmware Upgrade	Firmware File: A\AP\ap.img Browse Note for Netscape users: When the 'Browse' window is opened, please change the 'Files of type' into 'All Files (*.*)' before browsing the firmware file.
> Logout	Apply this new firmware.
Done	The second se

II. Using Telnet

The FastLinc 810E can be configured via the command prompt console with TCP/IP:

Telnet (TCP/IP) Connection: Assign an IP address to your FastLinc 810E through the modem Utility or use the default IP address. Telnet to the FastLinc 810E to get access to the FastLinc 810E console using standard Telnet commands.

1. Telnet to your FastLinc 810E. A window will show up.

2. Enter the password. The default password is "default".



Basic Commands

The following are the commands provided for configuring the FastLinc 810E. In loader mode, i.e., no valid firmware in the FastLinc 810E, only the commands with an asterisk (*) are provided.

Note: [xxx] stands for optional arguments.

Info*

Display some basic information of the FastLinc 810E, for example, firmware version, frequency domain, etc.

🛃 Telnet 192.168.1.223		- 🗆 🗙
FastLinc 810E > info Access Point's Basic I	nformation	
MAC Address (BSS ID): System Firmware Version: with WLAN NIC Firmware: Radio Type: Frequency Domain: Augilable Channel(s):	00:60:B3:19:3D:20 4.1.0 (P) 1.0.7 , (T) 1.3.10 Prism 2.5 FCC (North America) domain	
FastLinc 810E > _	CH01 2412MHz CH02 2417MHz CH03 2422MHz CH04 2427MHz CH05 2432MHz CH06 2437MHz CH07 2442MHz CH08 2447MHz CH09 2452MHz CH10 2457MHz CH11 2462MHz	
		-

Stats

Display the statistical values for the operation of the FastLinc 810E, for example, association status, LAN/WLAN interface load, etc.

🚮 Telnet 192.168.1.223					- 🗆 🗙
FastLinc 810E > stat === Station Table ===		Cirrol	Isat		^
No. Station Address Sta	tus Rate	Level	RX Time		
The table is empty.					
=== System Statistics ===					
[Ethernet Receive] Packets : 1 Total Bytes : 193	[Ethernet 5061 Packets 8622 Total B	Transmit] ytes	:	658 193040	
[Wireless Receive] Fragments : Unicast Packets : Unicast Bytes : Multicast Packets : Multicast Bytes : 4 Packet FCS Errors :	[Wireless 1029 Fragmen 0 Unicast 1029 Multicas 17334 Multicas 1466 Deferre Retry L Single J Multiple	Transmit J ts Packets Bytes st Packets st Bytes d Transmissi imit Exceed Retries e Retries	ions	18531 0 1675 185413 7954 0 0	
[Wireless Receive Discards No Buffer : Received WEP Errors : FastLinc 810E > _] [Wireless Ø Wrong So Ø Other Re	Transmit Di ource Addres easons	iscards] :s : :	0 0	

Ping ip_addr [num_pings] [data_size]

Ping (ICMP echo) to an *ip_addr* host with optional *num_pings* times with optional data size in a length of *data_size*.

📕 Telnet 192.168.1.223	- 🗆 🗙
FastLinc 810E > ping 192.168.1.100 5 1672 Ping 1: round-trip time = 3 ms Ping 2: round-trip time = 3 ms Ping 3: round-trip time = 3 ms Ping 4: round-trip time = 3 ms	
Fing 5: Found-Crip time - 3 ms 5 (100%) successful pings, average time = 3 ms FastLinc 810E > _	
	-

Set

List the configuration information.

set apname | channel | essid | rts_threshold | frag_threshold | ip_address | ip_netmask | ip_gateway

🛃 Telnet 192.168.1.22	3			- 🗆 🗙
FastLinc 810E > set Parameter Name	Current Value	New Value	Execute	<u> </u>
[General] apname web_port telnet_port [IEEE802.11] mode essid channel tx_rate tx_rate tx_retry antenna rts_threshold frag_threshold frag_thresss] ip_address ip_netmask ip_gateway	FastLinc 810E 80 23 ap DLG training 7 auto 7 diversity 2432 2346 192.168.1.223 255.255.255.0 192.168.1.254		Save Save Save Reset Reset Reset Reset Reset Reset Reset Reset Reset Reset Reset Reset Reset	
FastLinc 810E > _				-

To change factory default settings, type "set xxx (parameter) xxxx (value)". For example, set channel 7 command, will set the channel to number 7; set ESSID "Your Network" command, will set the ESSID as Your Network. Remember that, a "save" command is required for changes to take effect. Always reset your AP with the "Reset" command.

🛃 Telnet 192.168.1.22	3			- 🗆 🗙
FastLinc 810E > set FastLinc 810E > set FastLinc 810E > sau	channel 1 essid "Main Netwo	ork''		_
Parameter Name	Current Value	New Value	Execute	
[General]				
apname	FastLinc 810E		Save	
web_port	80		Save	
telnet_port [IEEE802.11]	23		Save	
mode	ap		Reset	
essid	DLG Default	Main Network	Reset	
c hanne l	7	1	Reset	
tx_rate	auto		Reset	
tx_retry	?		Reset	
antenna	diversity		Reset	
rts_threshold	2432		Reset	
frag_threshold []] IP Addwesses]	2346		Reset	
in address	192.168.1.223		Reset	
iv_netmask	255.255.255.0		Reset	
ip_gateway	192.168.1.254		Reset	
New configuration s FastLinc 810E > _	aved.			-

The following table is a list of parameters changes that can be made on the FastLinc 810E.

Parameter	Description	Default Value	
apname	A textual name for the identification of the FastLinc 810E	apxxxxx (where xxxxx is the last six octets of FastLinc 810E's MAC address)	
mode	Operation mode of the modem	AP	
channel	The radio channel number	1	
essid	The ESS ID (a.k.a.), SSID) of the FastLinc 810E	My Network	
rts_threshold	The threshold(number of bytes) for enabling RTS/CTS handshake. Data with a frame size larger than this value will perform the RTS/CTS handshake. Range of value: 0-24322432		
frag_threshold	The threshold(number of bytes) for the fragmentation boundary. Data will be transmitted in fragments smaller than this value. Range of value: 256-2432	2432	
ip_address	The IP address of the FastLinc 810E	192.168.1.1	
ip_netmask	ip_netmask The subnet mask address of the FastLinc 810E 255.255.255.0		
ip_gateway	The default gateway address fo the FastLinc 810E	9 192.168.1.254	

save

Save your new configuration. Remember that the "save command" is required every time you make the new configuration.

set default

Return the factory default settings of the FastLinc 810E except for the IP addresses. A 'save' command is required for changes to take effect.

cls⁺

Clear the console screen.

*exit** Exit the console.

?* or *help**

Print a help screen.

rz

Receive a firmware file by the Zmodem protocol. The console will enter Zmodem receiving mode and then use the "file upload" function of your terminal emulation program to upload a new firmware file (ap.img) to the FastLinc 810E. Upon completion, always remember to type the 'reset' command for running the FastLinc 810E with the new firmware.

reseť

Issue a reset signal. The FastLinc 810E will be reset if user confirms.

Advanced Settings for Security

This section describes the commands to control the security for FastLinc 810E. To prevent unauthorized wireless stations from accessing data transmitted over the network, the FastLinc 810E modem offers the following levels of security options.

- Access Control Table restricts wireless stations access to the FastLinc 810E.
- Data Encryption, known as WEP (Wired Equivalent Privacy), encrypts wireless data transmitted via wireless medium.

I. Access Control

auth mode | add | del | list| clear

The 'auth' command contains sub-commands that allow you to manage the access control (MAC address filter) of the FastLinc 810E. The access control table consists of a list for you to control the accessibility of any wireless stations or repeaters. The sub-commands are listed below:

mode open | allow

set the access control mode. The definition of each mode is specified as follows:

- open: open to public (default)

- restrict: only allow access of the authorized stations/repeaters in the table (no access is allowed if the list stays empty)

add mac_addr

add an address into the access control table

del mac_addr |index

delete a MAC address, or index an address from the access control table

list [start/end]

display the content of the access control mode and the address list. The optional arguments, start and end, can be affixed to select the range of items to be listed.

clear

clear all the addresses in the access control table.



II. WEP Keys

wep mode | set | list

The 'wep' command contains sub-commands that allow you to manage the data encryption (WEP, Wired Equivalent Privacy) function provided with the FastLinc 810E. The sub-commands are listed as follows:

mode disable | wep40

set the access control mode. The following are the definitions of each data encryption mode.

- none: no encryption (default)
- wep40: use 40-bit WEP data encryption

set key1 key_text: set WEP Key#1 as key_text

The number of characters to enter for 40-bit encryption is five (5) ASCII characters long. However, if the string is preceded by the characters '0x', the characters can be typed as ten (10) hexadecimal characters. Hexadecimal characters must be 0 to 9 or A to F.

The number of characters to enter for 128-bit encryption is thirteen (13) ASCII characters long. However, if the string is preceded by the characters '0x', the characters can be typed as twenty-six (26) hexadecimal characters. Hexadecimal characters must be 0 to 9 or A to F.

set key2 key_text

set WEP Key#2 as key_text with a same format as WEP Key#1.

set key3 key_text

set WEP Key#3 as key_text with a same format as WEP Key#1.

set key4 key_text

set WEP Key#2 as key_text with a same format as WEP Key#1.

set usekey 1/2/3/4

Select the WEP key to be used for encrypting data transmission. Only one key can be selected at a time.

list

Display current WEP settings.

Note: Your new WEP settings will take effect after resetting the FastLinc 810E.

📕 Telnet 192.168.1.223	- 🗆 🗙
FastLinc 810E > wep mode Usage: wep mode <disable wep40 wep128=""> disable: no encryption, wep40: use 40-bit WEP encryption, wep128: use 128-bit WEP encryption</disable>	
FastLinc 810E > wep list Current status of WEP (data encryption)	
WEP Mode: disable Key List: Key#1 = ***** Key#2 = ***** Key#3 = ***** Key#4 = **** Use Key#: 1	
FastLinc 810E > _	-

Network Configuration

FastLinc Wireless LAN products support the same network configuration options as the legacy Ethernet LANs defined by the IEEE 802 standard committee.

FastLinc Wireless LAN products can be configured as:

- 1. Ad-Hoc for departmental or SOHO LANs
- 2. Infrastructure for enterprise LANs
- 3. LAN-Interconnection for point-to-point link as a campus backbone.

Network Topology

Ad-Hoc

Example of Ad-Hoc Wireless LAN



An Ad-Hoc wireless LAN is a group of computers, each equipped with one wireless adapter, connected as an independent wireless LAN. Computers in a specific Ad-Hoc wireless LAN must be configured to the same radio channel.

Ad-Hoc wireless LAN is applicable at a departmental scale for a branch or SOHO operation.

Infrastructure

Example of Infrastructure Wireless LAN



The FastLinc Wireless LAN devices provide access to a wired LAN for wireless workstations. An integrated wireless and wired LAN is called an Infrastructure configuration. A group of wireless LAN PC users and a FastLinc 810E construct a Basic Service Set (BSS). Each wireless-equipped PC in this BSS can talk to any computer in the wired LAN infrastructure via the FastLinc 810E

Increase the effective Transmission Range

Infrastructure configuration will extend the accessibility of a wireless station to the wired LAN. Multiple FastLinc 810Es will allow roaming and it will increase the transmission range. The FastLinc 810E is also able to forward data within its BSS. The effective transmission range in an infrastructure LAN is doubled.

AD-HOC



FastLinc 800C

Infrastructure



Technical Specifications

Product	11Mbs Wireless LAN FastLinc 810E		
Wired Interface	10/100BaseT (RJ-45)		
Wireless Interface	11 Mbps Wireless LAN		
Modulation	DSSS (CCK, DQPSK, DBPSK)		
Operation Frequency	N. America/FCC: 2412-2.462 GHz (11 Channels)		
Speed Options (over the air)	11M/5.5M/2M/1M, also support Auto Rate Selections		
RF Technology	Direct Sequence Spread Spectrum		
Power Supply	DC 12V (External power supply included)		
RF Output Power	23 dBm (+ / - 2dBm)		
Sensitivity	-89dBm at 11Mbps, BER <8x 10 -2		

Troubleshooting

If you have trouble using the FastLinc 810E modem, the starting point to troubleshoot the problem with your FastLinc 810 modem is looking at the LED activity of the FastLinc 810E. The following is the "LED Error Table" provided to assist you in diagnosing and solving operational problems.

If you are still unable to solve the problem by checking the LED activity, the error may be caused from a configuration mismatch, which prevents the FastLinc 810E from establishing a wireless connection with the network. You may check the following to ensure normal operation of the FastLinc 810E:

WEP keys

If data encryption is activated, always remember to set WEP keys exactly the same on the FastLinc 810E as are on the wireless stations.

Access Control

Make sure that the MAC address of your FastLinc 810E is not included in the Access Control table of other wireless devices.

PWR	AP Active	W-LAN	Data	LINK	Description/Action
Continuous Green	Continuous Green	Flashing Green	Flashing Green	Steady Green	Nomal operation where flashing indicates interface activity - No action required
Continuous Green	On	Off	Off		Normal operation indicating no LAN activity - No action required
Off	Off	Off	Off	Off	Power failure - Check the power cord - Check the power supply
Continuous Green	Off	Off	Off	Off	Invalid loader firmware or the FastLinc 810E controller is dead - Return the unit to the vendor for support
Continuous Green	Flashing Green				Invalid FastLinc 810E firmware - Upgrade the firmware via the utility or consule mode.
Continuous Green	Flashing Green	Flashing Green			Wireless LAN initialization failure - Check whether the wireless module has been properly installed.
Continuous Green	Flashing Green		Flashing Green		Ethernet initialization failure - Return the unit to the vendor for support

<u>Glossary</u>

FastLinc 810E Modem - An Ethernet working device that seamlessly connects wired and wireless networks.

Ad-Hoc - An Ad-Hoc wireless LAN is a group of computers, each with wireless adapters, connected as an independent wireless LAN.

Backbone - The core infrastructure of a network. The portion of the network that transports information from one central location to another central location where it is off-loaded onto a local system.

Base Station - In mobile telecommunications a base station is the central radio transmitter/receiver that maintains communications with the mobile radio telephone sets within range. In cellular and personal communication applications, each cell, or FastLinc 810E cell, has its own base station. Each base station in turn is interconnected with other cells' base stations.

Bridge - An Ethernet working function that incorporates the lowest 2 layers of the OSI network protocol model.

BSS - Stands for "Basic Service Set," a FastLinc 810E and all the wireless clients that associated with it.

ESS - Stands for "Extended Service Set." More than one BSS can be configured as an Extended Service Set. Mobile users can roam between BSS in an ESS.

Ethernet - A popular local area data communications network, originally developed by Xerox Corp., which accepts transmission from computers and terminals. Ethernet operates on 10 Mbps baseband transmission over shielded coaxial cable or over shielded twisted pair telephone wire.

Infrastructure - An integrated wireless and wired LAN is called an Infrastructure configuration.

PCMCIA - Personal Computer Memory Card International Association, which develops standards for PC cards, formerly known as PCMCIA cards, are available in three "types" which are about the same length and width as credit cards, but range in thickness from 3.3 mm (Type I) to 5.0 mm (Type II) to 10.5 mm (Type III). These cards can be used for many functions, including memory storage, land line modems and wireless modems.

Roaming - A wireless clients around an ESS and get the continuous connection to the Infrastructure network.

RTS Threshold – Transmitters contending for the medium may not hear each other. RTS/CTS mechanism can solve this " Hidden Node Problem". If the packet size is smaller than the preset RTS Threshold size, the RTS/CTS mechanism will NOT be enabled.

Web Management - Network management using web browser connections to target devices.

Technical Support

Data-Linc Group maintains a fully trained staff of service personnel who are capable of providing complete product assistance. They can provide you with technical, application and troubleshooting, spare parts and warranty assistance. Our technical staff is based in Bellevue, Washington USA and may be reached at (425) 882-2206 or e-mail support@data-linc.com

Product Warranty

Data-Linc Group warrants equipment of its own manufacture to be free from defects in material and workmanship for one year from date of shipment to original user. Data-Linc Group will replace or repair, at our option, any part found to be defective. Buyer must return any part claimed defective to Data-Linc Group, transportation prepaid.

Return Material Authorization

If a part needs to be sent to the factory for repair, contact Data-Linc Group's corporate office and request a Return Material Authorization (RMA) number. The RMA number identifies the part and the owner and must be included with the part when shipped to the factory.

Contact Information

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Appendix A

Enclosure Dimensions

