

User Guide

FastLinc Family **54 Mbps High-speed OFDM** **Industrial Wireless Ethernet**



FLC830E
2.4 GHz Band

FLC910E
900 MHz Band

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

For coverage from process to perimeter



Think DATA-LINC for the world's broadest line of industrial grade modems ~ world class worldwide

DATA-LINC modems interface seamlessly with the major manufacturers' PLCs



Notes:



DATA-LINC GROUP is a Global Encompass Partner with Rockwell Automation and a Schneider Electric Collaborative Alliance Partnership Program Gold Level member. Its modems interface seamlessly with the other major PLC manufacturers as well.

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

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Warnings / FCC

FLC910E/FLC830E:

This equipment has been tested and found to comply with the limits for a Class B 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 these 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.

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.

Warning: Any changes or modifications to this product not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

Test to comply with FCC standard for HOME OR OFFICE USE.

FCC RF Radiation Exposure Statement:

1. This device must be professionally installed. 20cm minimum distance has to be labeled to be maintained between the antenna and the users.
2. This device and it's antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

Introduction

Data-Linc Group (DLG) has prepared this user guide for use by customers as a guide to the proper installation, operation, and maintenance of a FastLinc FLC830E or FLC910E wireless system.

The FLC830E and FLC910E are members of the FastLinc Industrial Ethernet Wireless Modem Family that provides high speed, secure wireless communications using direct sequence and OFDM technology in a standalone form. They provide long robust outdoor range and broader indoor coverage.

The FLC830E/910E is an easy to configure and use wireless LAN solution. They can be configured via a web browser. The FLC80E/910E integrates into industrial plant and wireless networks with flexibility and options required by networking professionals.

The FLC830E/910E includes Base Station (Access Point), Station Adaptor, Wireless Repeating (WDS), and Wireless Inter-building modes for creating wireless plant networks, adding Ethernet devices to the plant network using the wireless network, linking remote plant networks, or extending the network and coverage of the wireless network with the use of repeating.

The FLC830E/910E supports the use of external high gain antennas for increased performance and reliability and extending the range of the radio signal. The unit supports a wide input range (10-28 Volts DC) through the terminal connection on the front of the unit.

Requirements

Power

- 10-28VDC Power connector
- Current Draw Max 1200mA @ 12V (during transmit)

Ethernet Operation

- RJ45 - 10/100 BaseT Ethernet connected device.

RF Operation

- SMA antenna or coax connection. (FLC830E Reverse Polarity)

Ethernet Configuration

- A Web browser such as Microsoft Internet Explorer 6.0 or above
- OR
- A TCP Secure Shell (SSH) client

Features

- Encryption support for WEP64, WEP128, WEP152, WPA-PSK (TKIP), and WPA2-PSK (AES)
- DHCP Client support for obtaining a dynamic network IP address from a DHCP server.
- SNMP support using management information base (MIB).
- Configurable mode of operation. Select between Base Station (Access Point), Station Adaptor, Wireless Repeating, or Inter-building modes.
- Configurable mode of modulation. Select between OFDM or CCK modulation
- FLC910E offers 900MHz reliability. The lower frequency reduces line of sight issues, minimizes multi-path fading for plant floor and outdoor transmissions. The FLC830E offers 2.4 802.11bg standard communications.
- Capable of transmission rates up to 54Mbps.
- Configurable transmit power. Select between full, half, quarter, eighth, and minimum.
- VLAN support for up to 8 VLANs with multiple security settings per each.

Applications

The FLC830E/910E units are can be configured for multiple operating modes. All the modes essentially are used to extend the Ethernet network wirelessly to reduce the cost to add Ethernet to remote sites or create an Ethernet bridge between networks.

Base Station & Station Adaptor Modes

The FLC830E/910E can either act as a base station or a station adaptor. As the base station the modem acts as the center point for wireless communications, allowing modems configured as station adaptors to connect and build a network. As a station adaptor the modem acts as a node to attach an Ethernet device or LAN segment thru a base station.

Wireless Repeating Mode

The FLC830E/910E can act as a base station and repeater to repeat the transmission to other units to increase the reliability and extend the coverage area of the wireless network. This mode uses a half duplex operation mode to communicate with another wireless repeater and wireless stations. All the units are configured the same with the addition of the MAC address of units to communicate with, or automatic detection of the MAC address.

Wireless Interbuilding Mode

The FLC830E/910E can act in an interbuilding mode and create an interconnected wireless network. In this mode there is no central point of communications any unit connected wirelessly can communicate to any other unit in the system creating a mesh network. All the units are configured the same using the same channel and mode.

Installation

Unpacking the Hardware

- FLC830E or FLC910E OFDM Industrial High-Speed Modem
- 120 VAC Wall Transformer (US Power Connector)
- Cat5 Ethernet Cable
- CD with Manual
- Quick Start Guide
- Test Antenna

The equipment was carefully packaged to prevent shipping damage. It should be free from any defect, electrical or mechanical, and in good operating condition. If your package contents are damaged or missing, please contact your place of purchase immediately.

Hardware Overview

Front Panel

- Power 3 pin Pluggable Terminal Block.
Left to Right (Frame Ground, Power Ground, Power Positive)
- RJ45 Ethernet Connector.
- Reset Button.

Side Panel

- Antenna Connector.

Top Panel

-LED Indicators:

LED	Indication	Note
Power	Modem Power	Should be on (green) at all times
Status	Loading or Changing	Start-Up On = Entering Boot Mode Off = While Finishing Boot Mode Operating Slow Blinking = Reset Button Held for ~ 3 Seconds Fast Blinking = Reset Button Held for > 3 Seconds Note: The Status LED will blink while a firmware upgrade of reset to factory default occurs and the unit will reboot automatically
RSSI (5 Levels)	Signal Strength	Shows signal strength for Station Adaptors and Wireless Interbuilding Mode RF Links
Lan Act	Lan Connection	On = 100BaseT Connection Off = 10BaseT Connection Blinking = Lan Activity
Lan (100)	100BaseT Connection	On = 100BaseT Connection Off = 10BaseT if Lan Act is ON
W-Lan	Wireless Link Status	On = Wireless Connected (But no Activity) Off = No Wireless Link Blinking = Wireless Activity (Either Data or Linking)

Getting Started

Connections

- Connect the Test Antenna,
- Connect the Cat5 Ethernet cable to PC (for Configuration)
- Connect the Power Supply from wall to unit

The unit will begin the boot process upon power connected.

Note: The boot process takes about 70 seconds before the unit will be fully operational and configurable.

The LAN Link LED should be lit for a connection to the PC.

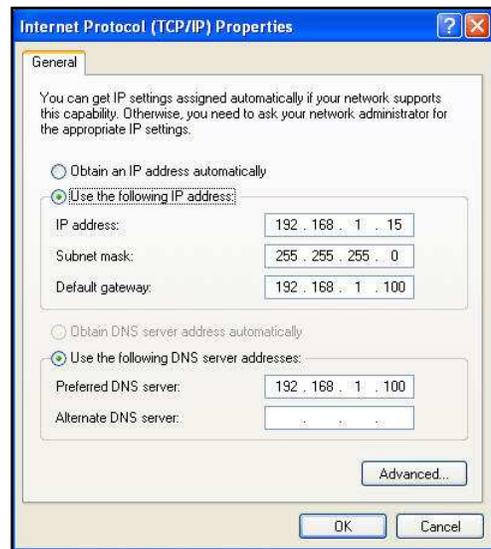
Setup PC for Configuration

Configure the PC TCP/IP settings to match the network for the FLC830E/910E to be configured. (Set the PC to a static IP Address of 192.168.1.X, where X can be from 2 to 254, and set a Subnet Mask of 255.255.255.0)

Note: You will need privileges on your PC to be able to access the IP Address 192.168.1.1. This might be changing your current IP address to be in the same subnet (ex. 192.168.1.2 with subnet mask 255.255.255.0), if you are not already on that subnet. (See Appendix B for more information on changing your IP Address)

Default Settings	
IP Address	192.168.1.1
User Name	admin
Password	password
Mode	Base Station
ESSID	Wireless
Security	None Set
Wireless Device Name	DEVICExxxxxx (xxxxxx = Last 6 digits of MAC Address)
Channel / Frequency	FLC830E - CH11 FLC910E - CH 3 / 918 MHz
Bandwidth	5 MHz

Example PC Settings for Configuration:



Configuring the FLC830E / FLC910E

- Start Internet Explorer©
- In the address bar type: “http://192.168.1.1” to access the web based configuration.
Accept the “Security Alert” or “I Understand the Risks” and “Confirm Security Exception”.

Note: Firefox users must also click to Confirm Security Exception.

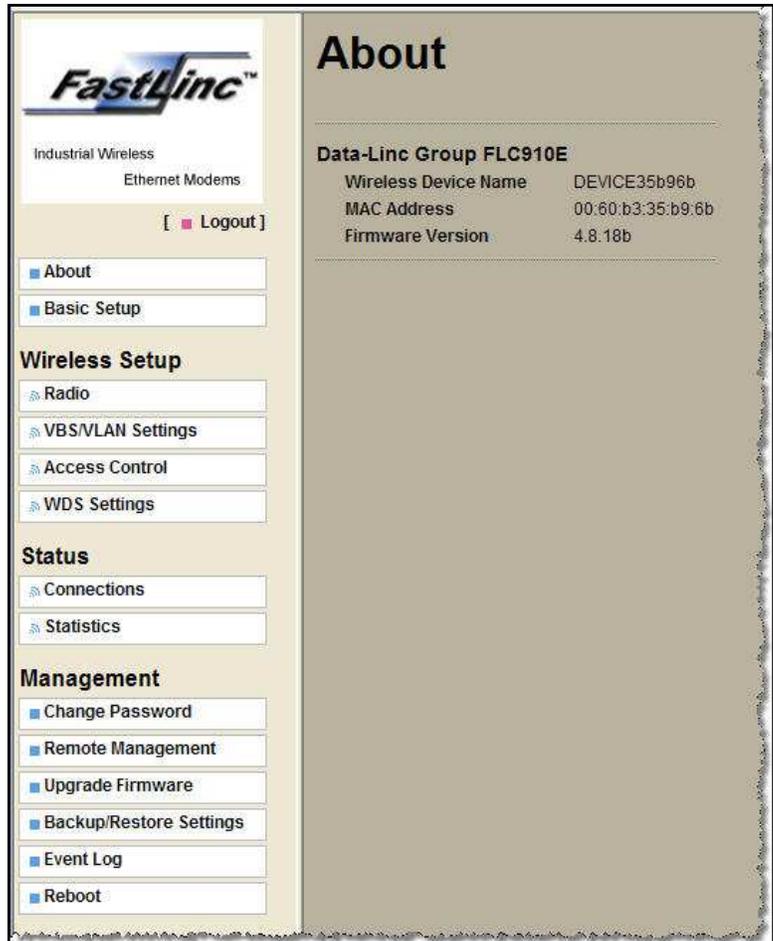
Note: To return the FLCFLC830E/910E to the default configuration and password, after the unit has fully booted, press and hold the reset button for 5 seconds until the Status LED begins to flash quickly. This will reboot and reset the unit to default configuration.

- Login into the unit using the defaults:
User Name: (admin)
Password: (password)



The image shows the login page for the FastLinc Industrial Wireless Ethernet Modems. At the top is the FastLinc logo. Below it, the text "Industrial Wireless Ethernet Modems" is displayed. There are two input fields: "Name" with the value "admin" and "Password" with masked characters. Below the fields are two buttons: "Login now" and "Reset".

Examples throughout are from a FLC910E



The image shows the configuration menu for the FastLinc Industrial Wireless Ethernet Modems. The page title is "About". The main content area displays the "Data-Linc Group FLC910E" information:

Wireless Device Name	DEVICE35b96b
MAC Address	00:60:b3:35:b9:6b
Firmware Version	4.8.18b

On the left margin, there is a menu with the following items:

- About
- Basic Setup
- Wireless Setup
 - Radio
 - VBS/VLAN Settings
 - Access Control
 - WDS Settings
- Status
 - Connections
 - Statistics
- Management
 - Change Password
 - Remote Management
 - Upgrade Firmware
 - Backup/Restore Settings
 - Event Log
 - Reboot

After successfully logging in the About page is displayed and on the left margin of the browser is the menu with information and setup options.

(See Appendix B for full details about the left margin menu items and settings)

Setting up a system

Basic Setup:

In the basic setup menu you have the option to set a different wireless device name than the default, which is DEVICExxxxxx, where the xx is a hexadecimal number related to last 6 digits of the MAC address.

For a system the IP Addresses on the units must be unique and use the same IP Subnet Mask. After changing the IP Address, the PC IP address may have to change to be on the same network to continue configuration.

Operating modes (Radio Settings):

The FLC830E/910E can operate as a base station, station adaptor, wireless repeater, or in wireless interbuilding mode to create a wireless network. The following will describe the setup of each type of unit and the connectivity between the units.

Base Station:

The "Base Station" operates as the central unit for the connectivity. "Station Adaptors" will connect and communicate with a "Base Station".

To setup the "Base Station" select "Base Station" from the drop down menu of "Operating Mode".

Apply this setting; the unit will be in base station mode.

Select the type of modulation OFDM or CCK.

Select the data rate to use. Note: Best will try to establish the highest possible data rate, but for longer distances using a fixed lower rate may improve system reliability.

Select the output power, from full – min depending on distance.

Select the bandwidth to use. The bandwidth selected will determine the usable channels / frequency.

Select the Channel to use based on the table below:

Bandwidth	FLC830E Ch. Available	FLC910E Ch. Available
20 MHz	CH1 thru CH11	CH2 or CH3
10 MHz	CH1 thru CH11	CH1, CH2, CH3, or CH4
5 MHz	CH1 thru CH11	CH1, CH2, CH3, or CH4

Apply the setting changes, if any.

Select the Edit button next to Base Station ID or VBS/VLAN Settings from the left. This will go to the VBS / VLAN Settings page.

VBS / VLAN Settings

Security Profiles for Base Station, Station Adapter , WDS and Wireless interbuilding mode

#	Profile Name	SSID	Security	Enable
<input type="radio"/>	1 BS_Profile1	Wireless	Open System	<input checked="" type="checkbox"/>
<input type="radio"/>	2 BS_Profile2	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	3 BS_Profile3	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	4 BS_Profile4	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	5 BS_Profile5	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	6 BS_Profile6	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	7 BS_Profile7	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	8 BS_Profile8	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	Sta_Profile	Wireless	Open System	<input checked="" type="checkbox"/>
<input type="radio"/>	wds_profile			<input checked="" type="checkbox"/>
<input type="radio"/>	Inter_profile			<input checked="" type="checkbox"/>

VLAN (802.1Q) Setup

1. BS_Profile1 VLAN ID:

2. BS_Profile2 VLAN ID:

3. BS_Profile3 VLAN ID:

4. BS_Profile4 VLAN ID:

5. BS_Profile5 VLAN ID:

6. BS_Profile6 VLAN ID:

7. BS_Profile7 VLAN ID:

8. BS_Profile8 VLAN ID:

Select the Profile and click the edit button.

Choose the SSID and Network Authentication settings for the network.

Security Profile for Vbs 1 Configuration

Profile Definition

Security Profile Name:

Wireless Network Name (SSID):

Broadcast Wireless Network Name (SSID): Yes No

Network Authentication:

Data Encryption:

Passphrase:

Key 1:

Key 2:

Key 3:

Key 4:

Wireless Client Security Separation Enable Disable

Authentication Types / Options	
Open System	None, WEP64, WEP128, and WEP152
Shared Key	WEP64, WEP128, and WEP152
WPA-PSK	TKIP
WPA2-PSK	AES

If using encryption, remember the authentication type and key for use when setting up the station adaptors that communicate with this base station.

Apply the settings.

The configuration is complete for the “Base Station”; some recommended additional actions are as follows:

- Change the unit password.
- Make a backup of the settings and save the file.

Station Adaptor:

The “Station Adaptor” can connect to a “Base Station” or “Wireless Repeater”.

To setup the “Station Adaptor” select “Station Adaptor” from the drop down menu of “Operating Mode”.

Apply this setting; the unit will be in “Station Adaptor” mode. If the base station is set to broadcast the SSID, select the site survey button to join the SSID. If SSID is disabled enter the SSID and the use BSSID MAC from the Base station. The data rate and bandwidth need to match the base station for a connection to be established.

Apply the settings.

Select the VBS/VLAN from the left margin to setup the security settings.

Select the sta_profile and click the edit button.

Security Profile for Station Adapter Configuration

Network Authentication:

Data Encryption:

Passphrase:

Key 1:

Key 2:

Key 3:

Key 4:

Wireless Client Security Separation Enable Disable

Select the Network Authentication and Data Encryption that is the same as the base station to associate with.

Authentication Types / Options	
Open System	None, WEP64, WEP128, and WEP152
Shared Key	WEP64, WEP128, and WEP152
WPA-PSK	TKIP
WPA2-PSK	AES

Apply the settings.

The "Station Adaptor" should be connected to the "Base Station" and the RSSI LEDs on the top should indicate the signal strength.

Wireless Repeater:

The FLC830E/910E can operate as a "Wireless Repeater" to repeat with other "Wireless Repeaters" to extend the area of the wireless network coverage. "Station Adaptors" can connect to the "Wireless Repeater" as if they (the "Wireless Repeaters") were "Base Stations".

This unit will be setup similar to the "Base Station" since this device operates as a "Base Station" with repeating or WDS operation. The security profile for BS_profile1 (or as many that are Enabled) and the wds_profile are active.

To setup the "Wireless Repeater" select "Wireless Repeater" from the drop down menu of "Operating Mode".

Apply this setting; the unit will be in "Wireless Repeater" mode.

Select the type of modulation OFDM or CCK.

Select the data rate to use.

Note: Best will try to establish the highest possible data rate, but for longer distances using a fixed lower rate may improve system reliability.

Select the output power, from full – min depending on distance.

Select the bandwidth to use. The bandwidth selected will determine the usable channels / frequency.

Select the Channel to use based on the table below:

Bandwidth	FLC830E Ch. Available	FLC910E Ch. Available
20 MHz	CH1 thru CH11	CH2 or CH3
10 MHz	CH1 thru CH11	CH1, CH2, CH3, or CH4
5 MHz	CH1 thru CH11	CH1, CH2, CH3, or CH4

Apply the setting changes, if any.

Select the Edit next to Base Station ID, this will go to the VBS / VLAN Settings menu page.

Select the Profile and click the edit button.

Choose the SSID and Network Authentication settings for the network. For the network to repeat use the wds_profile for the encryption settings.

Apply the settings.

Using the WDS Settings enter the MAC address of the other “Wireless Repeaters” in the network. Note: All “Wireless Repeater’s” in a given network must have the MAC addresses of all of the other “Wireless Repeaters” in said network. Any given network can have five “Wireless Repeaters”. If the unit to connect with is using encryption, enter the type and key in the wds_profile in the VBS/VLAN Settings.

Base Station Profile:

Authentication Types / Options	
Open System	None, WEP64, WEP128, and WEP152
Shared Key	WEP64, WEP128, and WEP152

WDS Profile:

Authentication Types / Options	
Open System	None, WEP64, WEP128, and WEP152

Apply the settings.

The “Wireless Repeater” is configured. It will connect to other “Wireless Repeaters” to repeat and the RSSI LEDs on the top should indicate the signal strength.

InterBuilding Mode:

The FLC830E/910E is capable of a proprietary version of wireless repeating mode. This mode is non- standard so it increases the security of the communications. For this mode Channel / Frequency, Modulation, Bandwidth, and Encryption type and key must match for the system. Access control can also be used in this mode for limiting the devices that can connect to the wireless network.

To setup the “Wireless Interbuilding” select “Wireless Interbuilding” from the drop down menu of “Operating Mode”.

Apply this setting; the unit will be in “Wireless Interbuilding” mode.

Select the type of modulation OFDM or CCK.

Select the data rate to use. Note: Best will try to establish the highest possible data rate, but for longer distances using a fixed lower rate may improve system reliability.

Select the output power, from full – min depending on distance.

Select the bandwidth to use. The bandwidth selected will determine the usable channels / frequency.

Select the Channel to use based on the table below:

Bandwidth	FLC830E Ch. Available	FLC910E Ch. Available
20 MHz	CH1 thru CH11	CH2 or CH3
10 MHz	CH1 thru CH11	CH1, CH2, CH3, or CH4
5 MHz	CH1 thru CH11	CH1, CH2, CH3, or CH4

Apply the setting changes, if any.

Select the VBS / VLAN Settings menu option from the left margin.

Select the inter_profile and click the edit button.

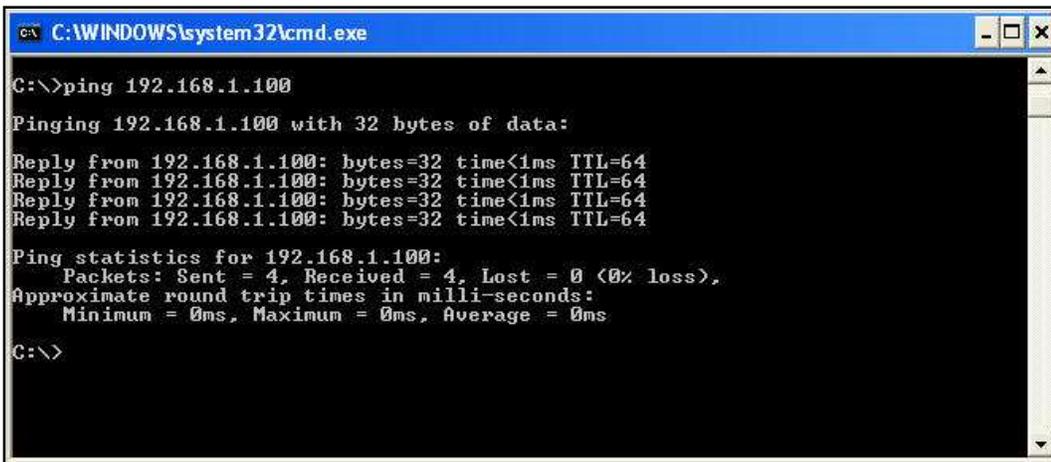
Select the encryption type and key.

Authentication Types / Options	
Open System	None, WEP64, WEP128, and WEP152

Apply the settings.

Testing

To verify connectivity a simple ping command can be used. Ping a device on the LAN connected to the opposing FLC830E/910E or the FLC830E/910E modem itself. For more detailed information or troubleshooting information please refer to the user's guide.



Troubleshooting

Some helpful things to know before trouble shooting a FLC830E/910E wireless network:

- The type of connection (Base Station/Station Adaptor/Wireless Repeater or Wireless Interbuilding).
- The network name (SSID) and/or BSSID.
- The type of network authentication and encryption used.
- The IP Address of the unit, if it is static.
- Does the unit respond to a ping request?
- The subnet mask of the unit.

I can't connect to the "Base Station" or "Wireless Repeater".

Verify the Network Authentication Type and Pass phrase or Key matches.

If using Access Control make sure the MAC address of the device is allowed to connect to the "Base Station" or "Wireless Repeater".

Technical Specifications

Input Voltage Range: 10-28VDC

Max Current Draw: 1200mA @ 12VDC

Power Connector: 3 Position Pluggable Terminal Block

Ethernet Connector: RJ45

RF Specification:

- Operation Modes: Base Station, Station Adaptor, Wireless Repeater, and Wireless Interbuilding
- RF Frequency Range: **FLC830E** 2.412-2.462 GHz
FLC910E 905-925 MHz
- RF Modulation based on connection speed (Mbps): (48&54 QAM-64), (24&36QAM-16), (12&18 QPSK), and (6&9 BPSK) using OFDM or DSSS(CCK).
- RF Data Rates: 54, 48, 36, 24, 12, 9, and 6 Mbps
- RF Channel Bandwidth: 5MHz, 10MHz, and 20MHz
- RF Receiver sensitivity less than 10% packet error rate: 54 Mbps: $\leq -72 \text{ dBm} \pm 2 \text{ dBm}$, 6 Mbps: $\leq -92 \text{ dBm} \pm 2 \text{ dBm}$
- RF Transmit Power: 25dBm \pm 1.5dBm
- RF Antenna Impedance: 50 ohms
- RF Antenna Connector: **FLC830E** Reverse Polarity Female SMA
FLC910E Standard Thread Female SMA

Operation Temperature: -40C to 75C (90% relative humidity (non-condensing))

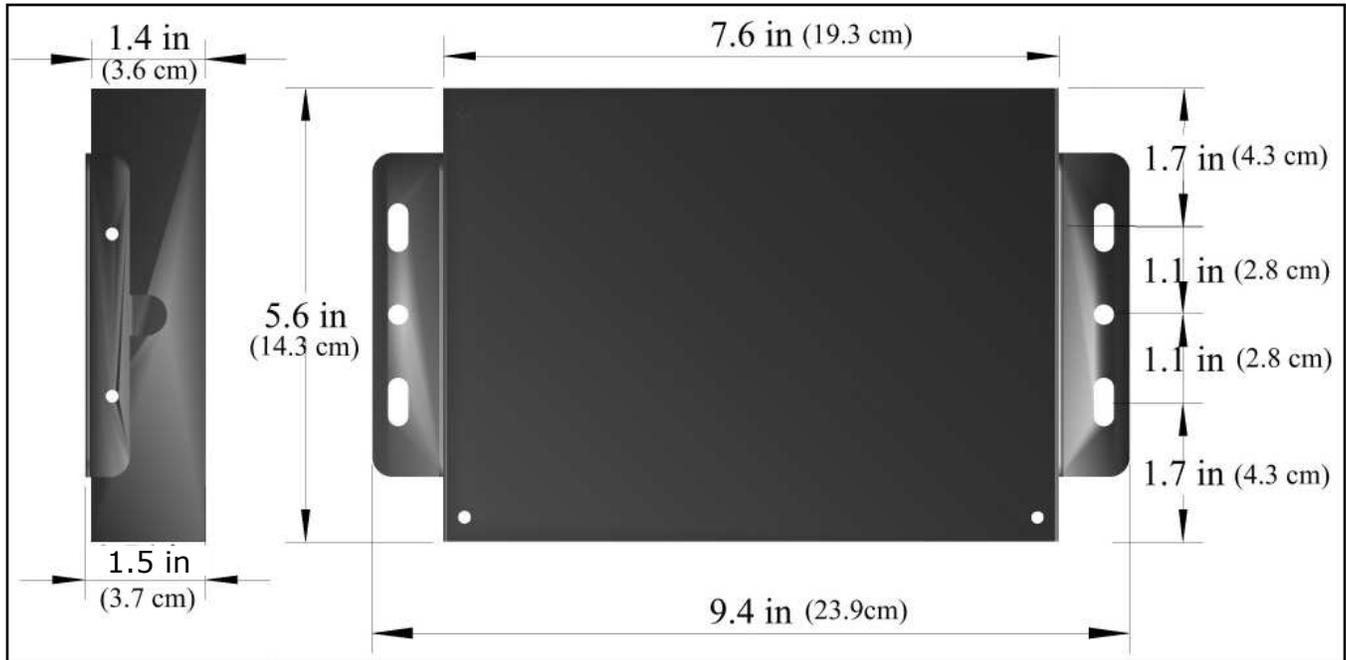
Enclosure Material: 18 Gauge Steel

Enclosure Dimensions (without connectors: 7.6Wx5.6Lx1.4H inches (19.3Wx14.3Lx3.6H cm) without mounting feet or 9.4Wx5.6Lx1.5H inches (24Wx14.3Lx3.7H cm) using the mounting feet.

Weight: 2.3 lbs (1.05 kg)

Appendix A: Dimensions, Drawings and Accessories

Enclosure Dimensions



Appendix B: Radio Setting Details

After successfully logging in the About page is the displayed page. This gives you the current device name, MAC Address, and the firmware version.

Located on the left margin of the page is the list of setting to change for configuration. A brief list of the fields in each section is as follows:

Basic Setup: (Described in detail in Part A)

Device Name, Ethernet Data Rate, Spanning Tree Protocol, VLAN(802.1Q), Management VLAN ID, IP Address options, and Time server options.

Radio: (Radio Settings) (Described in detail in Part B)

Operating Mode, Modulation, Channel/ Frequency, Data Rate, Output Power, Bandwidth, VQoS / TDM, Regatta Mode, and Advanced Parameters.

VBS/VLAN Settings: (Described in detail in Part C)

The Security Profiles for Base Station, Station Adapter , WDS (Wireless Repeater) and Wireless Interbuilding mode and VLAN (802.1Q) Setup.

Access Control: (Described in detail in Part D)

To add and remove access control based on MAC Addresses.

WDS Control: (Peer-to-Peer Links) (Described in detail in Part E)

Setup wireless point to point or multipoint WDS (Wireless Repeater) systems based on MAC Addresses.

Connections: (Described in detail in Part F)

Shows the units connected to the device or connection status of the Station adaptor.

Statistics: (Described in detail in Part G)

Shows the Ethernet and Wireless statistics for a selected connection group.

Change Password: (Described in detail in Part H)

Changes the password with the known current password.

Remote Management: (Described in detail in Part I)

Remote Console (SSH) and SNMP options.

Upgrade Firmware: (Described in detail in Part J)

Load a new firmware file.

Backup/Restore Settings: (Described in detail in Part K)

Save or load store configurations.

Event Log: (Described in detail in Part L)

SysLog setup and Event Log.

Reboot: (Described in detail in Part M)

Reboots the FLC830E/910E.



A – Basic Setup

Basic Setup

Wireless Device Name:

Ethernet Data Rate:

Spanning Tree Protocol (STP): Enable Disable

VLAN(802.1Q): Enable Disable

Management VLAN ID:

IP Address Manual DHCP

IP Address:

IP Subnet Mask:

Default Gateway:

Primary DNS Server:

Secondary DNS Server:

Time

Time Server:

Time Server Port:

Time Zone:

Adjust for Daylight Saving Time

Current Time: Wed May 12 07:29:00 2010

Wireless Device Name: This is the name given to the unit for identification purposes; it is only viewable when logged into the unit. It can only contain up to fifteen (15) numbers 0-9, letters A-Z and/or a-z, or hyphens.

Ethernet Data Rate: Automatic – will automatically detect 10BaseT or 100BaseT Ethernet connection

- T-Base10Mb – force to 10BaseT Ethernet connection
- T-Base100Mb – force to 100BaseT Ethernet connection

Spanning Tree Protocol(STP): Enable or disable the use of the spanning tree protocol. Enabling STP can prevent data storms or loops in the network.

VLAN(802.1Q): Enable or disable the use of VLAN separation. Enabling VLAN allows multiple bridged networks to transparently share the same physical network link without sharing of information between the networks.

Management VLAN ID: The ID of the VLAN this device will operate on.

IP Address: Manual or DHCP assigned. If DHCP assigned the unit will acquire a network address from a DHCP server.

Using Manual settings:

- IP Address: Network address for the device.
- Subnet Mask: Mask for determining the number of nodes on that network.
- Gateway: Address for a gateway for routing data to another network.
- Primary DNS: Dynamic Name Server for resolving names to IP Address.
- Secondary DNS: same as above

Time Server: Allows the time to be synchronized by using a NTP time server.

- Time server: Address of the time server
- Time Server Port: The port that the server is running on to synchronize time.
- Time Zone: Time zone for the location of the unit.
- Current Time: shows the current time.

B - Radio Settings

Radio Settings

Operating Mode: Base Station

Base Station ID:

Modulation: OFDM

Channel / Frequency: CH3 915.5~920.5MHz

Data Rate: Best

Output Power: full

Band Width: 5MHz

VQoS / TDM: Enable Disable

Antenna: Fixed on Primary
 Tx on Primary; Rx on Secondary

Regatta Mode: Enable Disable

Advanced Parameters

Sta Download Speed (1-1687): 1687 x64Kbps (Tx)

RTS Threshold (0-2346): 2346

Fragmentation Length (256-2346): 2346

Beacon Interval(20-1000): 100 ms

Space In Meters (0-100000): 10000 m

TDM Time Slice (2-32): 4 ms

Operating Mode: Select the mode of operation for the unit.

- Base Station: Unit for connecting to with Station Adaptors.
- Station Adaptors: Unit will connect to Base Station or Wireless Repeaters.
- Wireless Repeater: Unit will act as a Base Station and repeater. Can connect to Wireless Repeaters using WDS and can also act as a Base Station to allow Station Adaptors to connect to it.
- Wireless Interbuilding: A proprietary communications that link each unit together using channel number for network grouping.

Modulation: Select between the modulation types, either OFDM or CCK.

Channel / Frequency: Select the channel and frequency for the transmitter to use.
Options are limited by the selected Bandwidth.

Data Rate: Select the data rate to use. Best will try to establish the highest speed connection, but will fall back to a lower speed if that connection fails. Setting a lower rate can improve reliability in harsher environments.

Output Power: Select the percent of the output power to use. Full – min options. Adjusts the output amplifier gain for transmit power.

Bandwidth: Select the width of the band to use for transmitting. 5MHz, 10MHz, and 20MHz options.

VQoS/TDM: Enable or disable.

Regatta Mode: Enable or disable.

Advanced Parameters: For the wireless parameters.

C - VBS / VLAN Settings

Security Profiles for Base Station, Station Adapter , WDS and Wireless Interbuilding mode.

VBS / VLAN Settings

Security Profiles for Base Station, Station Adapter , WDS and Wireless Interbuilding mode

	#	Profile Name	SSID	Security	Enable
<input type="radio"/>	1	BS_Profile1	Wireless	Open System	<input checked="" type="checkbox"/>
<input type="radio"/>	2	BS_Profile2	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	3	BS_Profile3	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	4	BS_Profile4	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	5	BS_Profile5	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	6	BS_Profile6	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	7	BS_Profile7	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>	8	BS_Profile8	Wireless	Open System	<input type="checkbox"/>
<input type="radio"/>		Sta_Profile	Wireless	Open System	<input checked="" type="checkbox"/>
<input type="radio"/>		wds_profile			<input checked="" type="checkbox"/>
<input type="radio"/>		Inter_profile			<input checked="" type="checkbox"/>

VLAN (802.1Q) Setup

1. BS_Profile1 VLAN ID:	<input type="text"/>
2. BS_Profile2 VLAN ID:	<input type="text"/>
3. BS_Profile3 VLAN ID:	<input type="text"/>
4. BS_Profile4 VLAN ID:	<input type="text"/>
5. BS_Profile5 VLAN ID:	<input type="text"/>
6. BS_Profile6 VLAN ID:	<input type="text"/>
7. BS_Profile7 VLAN ID:	<input type="text"/>
8. BS_Profile8 VLAN ID:	<input type="text"/>

Enable the profiles to use.

BS_Profile1-9 can be renamed and are usable for Base Stations and Wireless Repeaters.
 Sta_Profile is for Station Adaptors only
 wds_profile is for Wireless Repeaters only
 inter_profile is for Wireless Interbuilding only

Select the profile to edit.

For a “Base Station” the Profile can be renamed and the wireless network name and security options are set for the profile.

The Wireless Network Name (SSID) is the name broadcast if Broadcast is set to “Yes”.

Broadcast Wireless Network Name (SSID) can be disabled. This will not allow a “Station Adaptor” to use the site survey to locate a “Base Station” to connect to.

Network Authentication:

- Select open, shared, WPA-PSK, or WPA2-PSK (Base Station only)
- Select open or shared (Wireless Repeater)

Data Encryption:

Dependent on the Network Authentication type selected. (WEP, TPIK, or AES)

Passphrase or Network Key: Enter the key for the network.

Wireless Client Security Separation: Enable or Disable. Enabled this allows peer-to-peer connectivity through the “Base Station”, if this is disabled the “Base Station” can communicate with all connected units, but the connected units can only communicate through the “Base Station” to the LAN, not onto the wireless network.

The screenshot shows a web-based configuration interface titled "Security Profile for Station Adapter Configuration". The interface is divided into several sections:

- Network Authentication:** A dropdown menu currently set to "Open System".
- Data Encryption:** A dropdown menu currently set to "None".
- Passphrase:** A text input field followed by a "Generate Keys" button.
- Keys:** Four radio buttons labeled "Key 1", "Key 2", "Key 3", and "Key 4", each followed by a text input field.
- Wireless Client Security Separation:** Two radio buttons labeled "Enable" and "Disable", with "Disable" selected.
- Navigation:** Three buttons at the bottom: "Back", "Apply", and "Cancel".

The Sta_profile, wds_profile, and inter_profile have only the Network Authentication and Data Encryption changeable.

D - Access Control

Restrict the access based on Hardware MAC Address.

Add or remove the MAC address of the units allowed access to the "Base Station".

Access Control

Turn Access Control On

Select Access Control Database: Local MAC Address Database

Trusted Stations

MAC Address

Delete

Available Stations

Station ID	MAC Address
------------	-------------

Add

Add New Station Manually

MAC Address: [] [] [] [] [] []

Add

Apply Cancel

E - WDS Settings

WDS is used to create a “Wireless Repeater” network. Up to 5 “Wireless Repeaters” be in a given network by entering the MAC Address of up to four other “Wireless Repeaters” in the WDS table. “Station Adaptors” are not entered.

Peer-to-Peer Links

Wireless Point-to-Point Bridge

Local MAC Address: 00 60 b3 35 b9 6b

Remote MAC Address: [][][][][][] 1687 ×64Kbps [Tx]

Wireless Point to Multi-Point Bridge

Local MAC Address: 00 60 b3 35 b9 6b

Remote MAC Address: Manual Automatic

Remote MAC Address 1: [][][][][][] 1687 ×64Kbps [Tx]

Remote MAC Address 2: [][][][][][] 1687 ×64Kbps [Tx]

Remote MAC Address 3: [][][][][][] 1687 ×64Kbps [Tx]

Remote MAC Address 4: [][][][][][] 1687 ×64Kbps [Tx]

Wireless Security Separator: Disable Enable

Apply Cancel

F - Connections

Show the information of the connected devices to the unit. Or the connection status of the “Station Adapter”.

Connections

Index	MAC Address	IP Address	Modulation/Data rate	RSSI (dBm)	Status
1	00:60:b3:35:b8:9a		OFDM/54.0Mbps	-53	Associated

Refresh

G - Statistics

Shows the statistics for the Ethernet and Wireless connections. Each VBS is separate and selectable from the drop down field.

Statistics		
Ethernet Statistic		
	Received	Transmitted
Packets	5969	11483
Bytes	419615	16350321
Wireless Statistic for VBS 1 ▾		
	Received	Transmitted
Unicast Packets	10955	5390
Broadcast Packets	37	194
Multicast Packets	141	279
Total Packets	11133	5863
Total Bytes	16198328	526588
<input type="button" value="Apply"/> <input type="button" value="Refresh"/>		

H - Change Password

Allows the password to be changed or reset to the default.

I - Remote Management

Enables the SSH console.

J - Upgrade Firmware

Upload a file from the local system to upgrade the firmware.

K - Backup/Restore Settings

Save and load stored settings.

Backup saves a copy of the configuration.

Retrieve will load settings from a stored file.

Restore will reset to default settings.

L - Event Log

Enables Syslog to a server on the LAN. The event log window shows logged activity information.

M - Reboot

Reboot will reset the unit and restart.

Appendix C: SSH Commands

get	set	del	keyword	Description
[X]	[X]		time	--time setting
[X]			-now	--current system time
[X]	[X]		-zone	--time zone
[X]	[X]		-daylight saving	--daylight saving
[X]	[X]		`-server	--time server settings
[X]	[X]		-name	--time server (domain name or IP address)
[X]	[X]		`-port	--time server port
[X]	[X]	[X]	system	--system setting
[X]			-version	--system firmware version
[X]	[X]		-devicename	--system name
[X]			-macaddr	--system MAC address
[X]	[X]		-dhcpclient	--system dhcp client
[X]	[X]		-ipaddr	--system IP address
[X]	[X]		-netmask	--system network mask
[X]	[X]		-gateway	--system gateway
[X]	[X]		-dns	--system dns
[X]	[X]		-primary	--primary system DNS server
[X]	[X]		`-secondary	--secondary system DNS server
[X]	[X]		-stp	--enable spanning tree protocol
[X]	[X]		-vlan	--system vlan
[X]	[X]		-mode	--on/off vlan function
[X]	[X]		`-manage id	--vlan management id
[X]	[X]		-ethrate	--ethernet data rate
[X]			`-ethstats	--ethernet statistics
[X]	[X]		ssh	--enable remote SSH access
[X]	[X]		snmp	--SNMP setting
[X]	[X]		-server	--enable SNMP agent
[X]	[X]		-trap server	--SNMP TrapServer IP address
[X]	[X]		-read community	--SNMP ReadCommunity
[X]	[X]		`-write community	--SNMP WriteCommunity
[X]	[X]		log	--syslog setting
[X]	[X]		-client	--enable syslog client
[X]	[X]		-ipaddr	--syslog server IP address
[X]	[X]		`-port	--syslog server port number
[X]	[X]	[X]	wlan	--wireless setting
[X]			-version	--wireless driver version
[X]	[X]		-vbsindex	--select vbs index
[X]	[X]		-modulation	--modulation
[X]	[X]		-channel	--wireless channel (depends on country and wireless mode)
[X]	[X]		-rate	--wireless transmission data rate
[X]	[X]		-bandwidth	--wireless bandwidth
[X]	[X]		-cpe mode	--use multicli or lan-to-lan
[X]	[X]		-cpedownflowwidth	--wireless down flow width for CPE mode
[X]	[X]		-power	--wireless transmit power
[X]	[X]		-VQoS/TDM	--enable TDM mode or not
[X]	[X]		-regatta	--enable Regatta mode or not
[X]	[X]		-tdm timeslice	--station's timeslice value

```

[X] [X]      |-antenna          --receive antenna selection
[X] [X]      |-fragmentationthreshold--wireless fragmentation threshold(even only)
[X] [X]      |-rtsthreshold     --wireless RTS/CTS threshold
[X] [X]      |-beaconinterval   --wireless beacon period in TU(1024 us)
[X] [X]      |-operating mode   --wireless operation mode
[X] [X] [X]  |-remotebss       --wireless remote AP(s) (depends on operationmode)
[X] [X] [X]  | |-p2p           --remote AP address for p2p mode
[X] [X] [X]  | | |-macaddress   --remote AP mac address for p2p mode
[X] [X]      | | |-bandwidth    --down flow width for p2p mode
[X]          | | |-status      --remote AP status or active p2p mode
[X]          | | |-ipaddr      --remote AP ipaddr
[X]          | | `-rssi        --remote AP rssi
[X] [X] [X]  | `-p2mp         --remote AP address for p2mp mode
[X] [X]      |   |-automatic    --p2mp automatic mode
[X] [X]      |   |-wirelessisolate--p2mp wirelessisolate
[X] [X] [X]  |   |-1          --1st remote AP for p2mp mode
[X] [X] [X]  | | |-macaddress   --remote AP mac address for p2mp mode
[X] [X]      | | |-bandwidth    --down flow width for p2mp mode
[X]          | | |-status      --remote AP status or active for p2mp mode
[X]          | | |-ipaddr      --remote AP ipaddr
[X]          | | `-rssi        --remote AP rssi
[X] [X] [X]  |   |-2          --2nd remote AP for p2mp mode
[X] [X] [X]  | | |-macaddress   --remote AP mac address for p2mp mode
[X] [X]      | | |-bandwidth    --down flow width for p2mp mode
[X]          | | |-status      --remote AP status or active for p2mp mode
[X]          | | |-ipaddr      --remote AP ipaddr
[X]          | | `-rssi        --remote AP rssi
[X] [X] [X]  |   |-3          --3rd remote AP for p2mp mode
[X] [X] [X]  | | |-macaddress   --remote AP mac address for p2mp mode
[X] [X]      | | |-bandwidth    --down flow width for p2mp mode
[X]          | | |-status      --remote AP status or active for p2mp mode
[X]          | | |-ipaddr      --remote AP ipaddr
[X]          | | `-rssi        --remote AP rssi
[X] [X] [X]  |   |-4          --4th remote AP for p2mp mode
[X] [X] [X]  |     |-macaddress   --remote AP mac address for p2mp mode
[X] [X]      |     |-bandwidth    --down flow width for p2mp mode
[X]          |     |-status      --remote AP status or active for p2mp mode
[X]          |     |-ipaddr      --remote AP ipaddr
[X]          |     `-rssi        --remote AP rssi
[X] [X] [X]  |-acl            --wireless access control
[X] [X]      | |-mode          --enable wireless access control (ACL)
[X] [X] [X]  | `-list         --display trusted APs
[X]          [X] |   |-all      --(delete only) all local ACL address
[X] [X] [X]  |     `-(null)    --edit local ACL address
[X]          |-association    --list of associated wireless clients
[X]          |-wlanstats      --wlan statistics
[X] [X] [X]  |-key            --wireless wep key setting
[X] [X]      | |-type          --wireless wep key type
[X] [X] [X]  | |-1            --wireless wep key 1
[X] [X] [X]  | |-2            --wireless wep key 2
[X] [X] [X]  | |-3            --wireless wep key 3
[X] [X] [X]  | `-4            --wireless wep key 4

```

```

[X] [X]      |-wds authenticator  --whether act as wpa authenticator
[X] [X]      |-spaceinmeter     --wireless space in meter
[X] [X] [X]  |-remotebssid      --wireless remote bssid in cpe mode
[X] [X]      |-remotessid       --wireless remote ssid in cpe mode
[X]          |-network-status   --wireless network status
[X]          |-bsscanlist       --bs list
[X]          |-signal level     --signal level(dBm)
[X]          |-remoterssi       --remote bs and rssi
[X] [X] [X]  |-vbs             --virtual bs infomation
[X] [X]      | |-active         --on/off this vbs
[X] [X]      | |-profile name   --set vbs profile name
[X]          | |-mac address     --vbs mac address
[X] [X]      | |-ssid           --network name of this vbs (1-32 chars)
[X] [X]      | |-ssidsuppress   --vbs ssid broadcast suppress
[X] [X]      | |-wirelessisolate --vbs isolate communication between clients
[X] [X]      | |-authentication --vbs authentication type
[X] [X]      | |-encryption     --vbs data encryption
[X] [X]      | |-default        --vbs wep default key index
[X] [X] [X]  | |-psk            --vbs pre-shared key (PSK) for WPA-PSK
[X] [X] [X]  | `--vlan entry    --set vlan entry infomation
[X] [X]      |   `--id          --vlan id of current vbs
[X]          |   `--vlan list   --get vlan list
[X]          password          --system password
[X]          reboot            --reboot system
[X]          exit              --logout
[X]          quit              --quit

```

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 are 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.

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