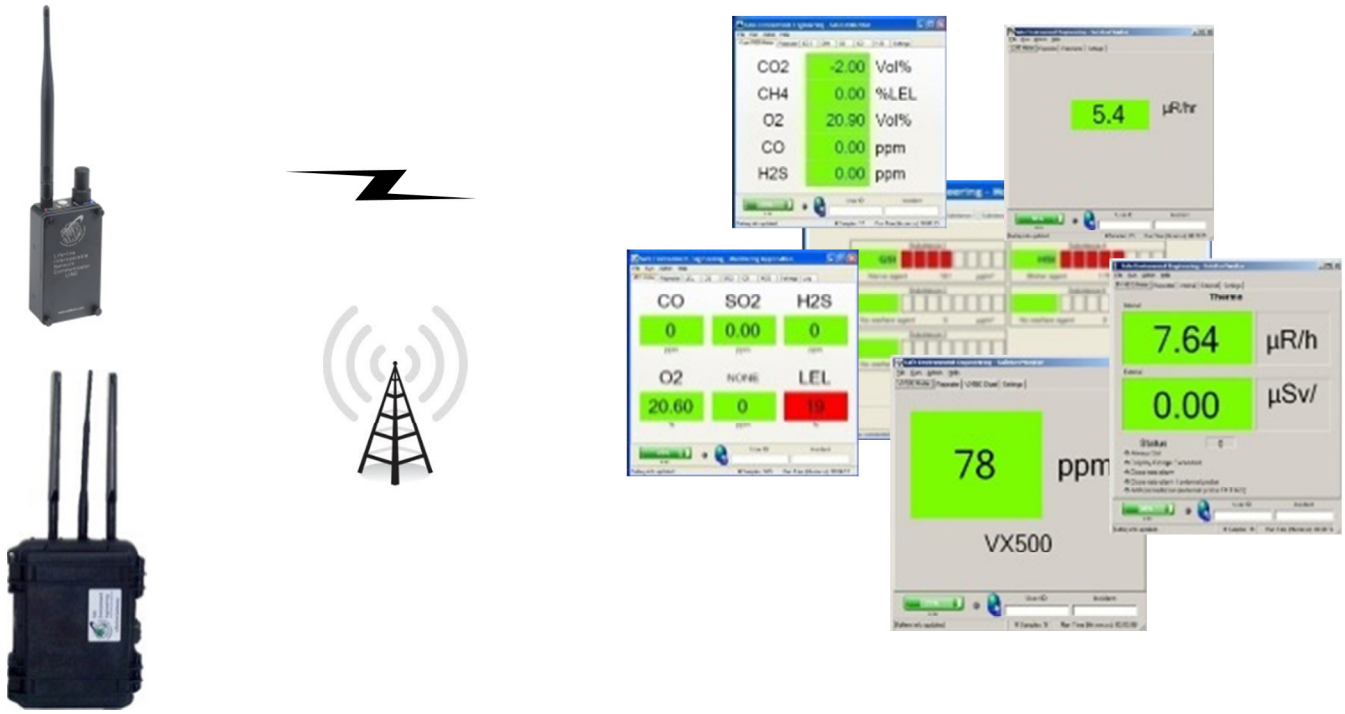
Life•line Meter Application System Manual

AT32670201



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Contents

1.0 Overview:

Management of hazards such as the release of chemical, radiological or biological agents requires timely information from sensors and detectors. Viewing meter readings while wearing Level A protection suits and gloves can be extremely cumbersome. The practice of transmitting readings by voice to incident command centers can be subject to security risks. Automatic wireless transmission of meter readings to incident command centers is a widely sought solution to these problems.

The solutions offered by Safe Environment Engineering provide a one stop total systems integration package for incident response agencies seeking the capability to communicate sensor data gathered on-site to an individual in an incident command center or anywhere in the world having an internet connection.

The Safe Environment Instrumentation Solution includes the following elements:

- Wireless data transmitters that can be physically attached to a variety of existing chemical, physiological or radiological sensors.
- Custom wired or infrared interconnections between the sensors and data transmitters that allow the capture of readings that appear on meter displays in a digital format.
- A wireless delivery system that can route data to any Internet connected computer.
- A software suite that remotely receives wireless data and includes real-time meter displays, settings for visible and audible alarms and charting components for visualizing trends.
- A variety of data sharing, alerting, visualization and messaging tools for data distribution among applications capable of using the Common Alerting Protocol (CAP).

The wireless software suite is built on a common operational platform (Microsoft .NET) that can be readily customized to provide archival data storage, data aggregation and data re-transmission. Sensor measurements can also be joined with GPS positional information and posted on map displays.

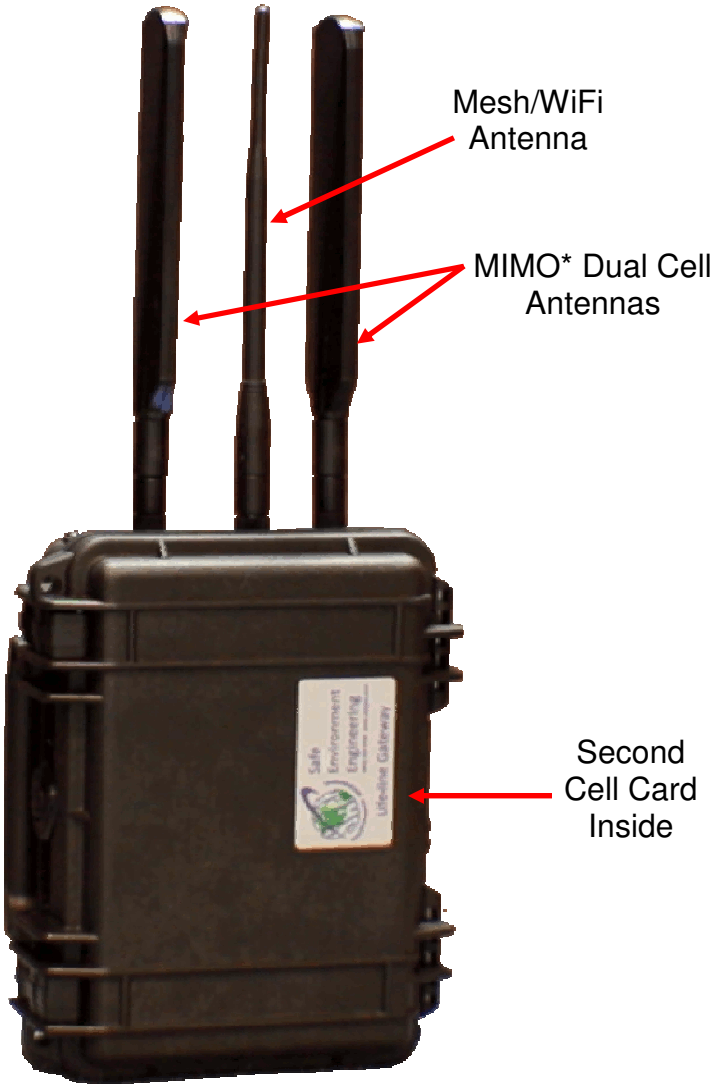
2.0 Installation:

The Lifeline Meter Applications are delivered in as an executable (.exe) file format for use with any Windows Operating System.

2.1 Lifeline Gateway:

The Lifeline Gateway bridges the data acquired from a meter's medium distance Wi-Fi radio (LINC) through cellular to any computer having Internet access. The Lifeline Gateway is sealed and operates on fully charged batteries for at least 8 hours.

The Lifeline Gateway is also a local "Hot Spot" for wireless Wi-Fi equipped computers to gain access to the Internet for research or other library information.



Lifeline Gateway

* MIMO – Multiple In Multiple Out

Mesh Indicator

Power Switch

SIM Behind Plate

Cell Status

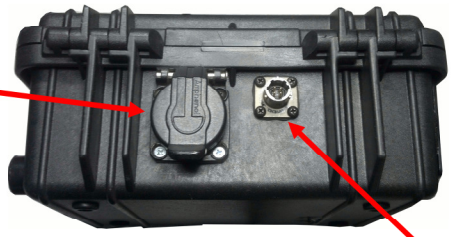
Battery Fuel Gauge

Lifeline Gateway Controls

To turn on the Lifeline Gateway insure that the antenna are attached and toggle the power switch. An indicator on the cell status panel will glow blue when the unit is on. The cellular signal strength and Mesh indicators will turn on as soon as both networks are verified and operational.

Battery Charger

Ethernet Port



Battery Charger Receptacle

Power Plug

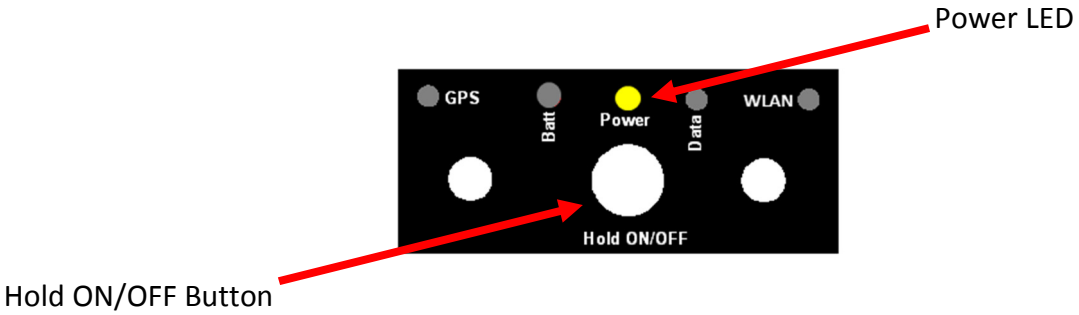
2.2 LINC Battery Installation:

Remove the 4 screws that hold on the LINC cover and insert a fully charge battery.

Install fully
charged battery

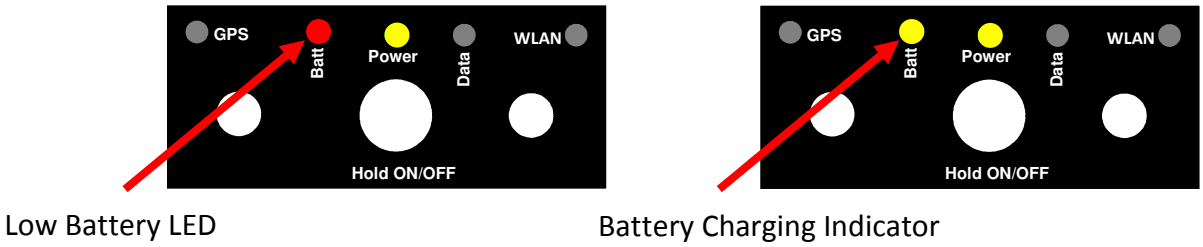
3.0 Turning On/Off the LINC:

Press and hold the Hold ON/OFF Button for 2 seconds until the Power LED illuminates Yellow. Press and hold the Hold ON/OFF Button for 3 seconds to power off the LINC.



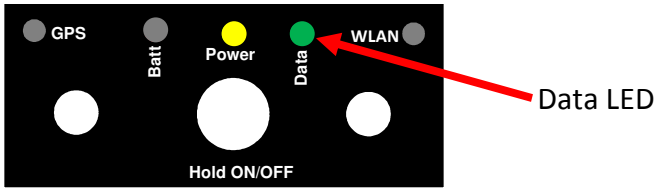
3.1 Low Battery/Charging Indicator:

A red Batt light indicates a low battery condition. The battery should be recharged or replaced. When charging the indicator will be yellow until fully charged when it will turn off.



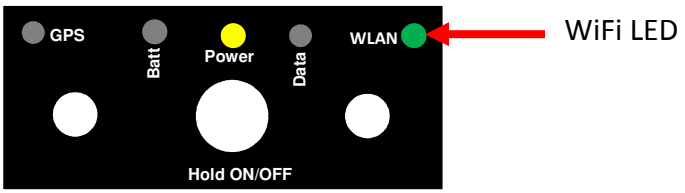
3.2 Data Indicator:

The green Data LED indicator lets the LINC user know that meter data is successfully getting back to the monitoring application.



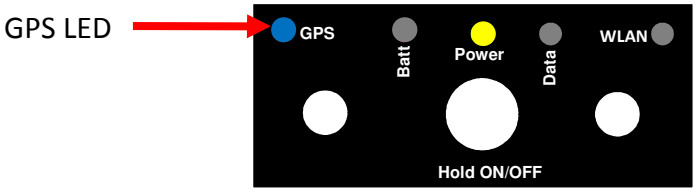
3.3 WiFi Indicator:

The Green WiFi LED indicator shows the status of the LINC's connection to a Lifeline Gateway or wireless local area network. If the LED is solid it indicated a connected condition if it is flashing it is not connected.



3.4 GPS Indicator:

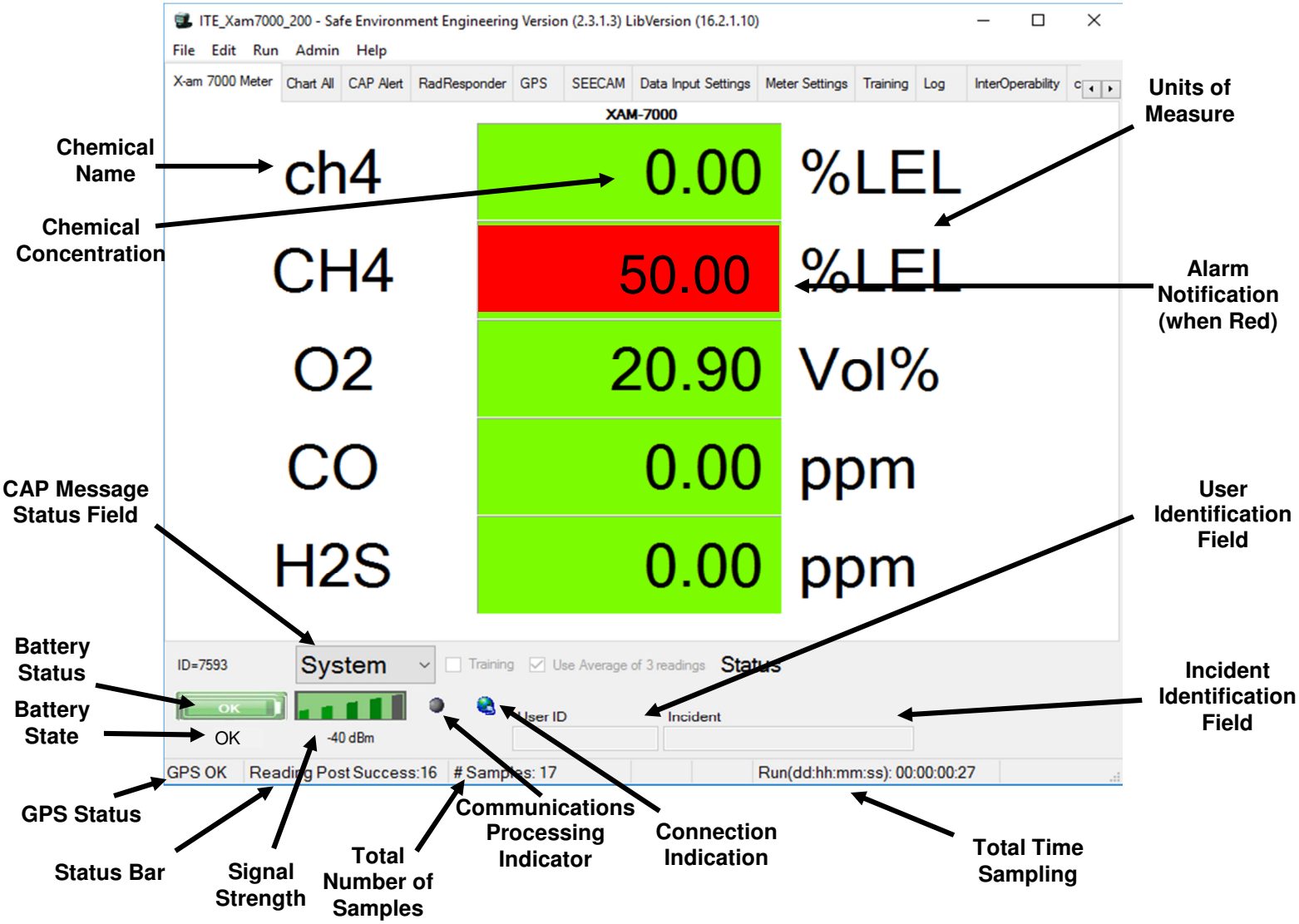
The Blue GPS LED indicator provides confirmation of valid GPS acquisition.



4.0 Starting the Monitoring Software:

On the desktop double click the Icon for the meter you wish to view.

4.1 Sample Monitoring Application Opening Screen (Drager meter shown)



- **Chemical Name** – Chemical abbreviation of the monitored substance. In the case of radiation, indication of what is being detected.
- **Concentration** – The amount of the substance being monitored.
- **CAP Message Status Field** – Allows quick setting of the alert status for CAP messages. **This status will be transmitted to all configured alerting services**. Possible values are Actual, Exercise, System, Test or Draft.

    - "Actual" - Actionable by all targeted recipients
    - "Exercise" - Actionable only by designated exercise participants; This mode also can be used with the SEE training simulator.
    - "System" - For messages that support alert network internal functions and the default value during normal operation
    - "Test" - Technical testing only, all recipients disregard
    - "Draft" – A preliminary template or draft, not actionable in its current form

- **LINC Battery Status** – The state of the LINC battery indicated as either OK or Low.

    - 

Battery voltage in operational range
    - 

Low Battery Alarm

- **Current Battery Status** – Text indicating the current battery status.
- **GPS State** - Text indicating either GPS OK or GPS OFF
- **Status Bar** – Text indicating different tasks the application is performing. Common messages Include:
    - Communications link has connected
    - Connecting to 192.168.x.x on Port 8023
    - Disconnected at HH:MM:SS AM/PM
    - Failed to connect to the meter: Timeout
    - Reading Post Success
    - Not enough data to parse GPS data
- **Total Number of Samples** – The total samples taken from the meter since the start of the current wireless link. If link is lost and re-established this number will reset.
- **Total Time Sampling** – The total amount of time the application has been acquiring samples.
- **Signal Strength** – Current signal strength of the LINC.
- **Communications Processing Indicator** – This indicator has 3 states:
    - Grey – The application is idle
    - Green – The application is processing data from the meter
    - Red – The wireless link is disconnected and data is not processing
- **Connection Indication** – The communications globe has 2 states:

-  A wireless link has been established with the meter.

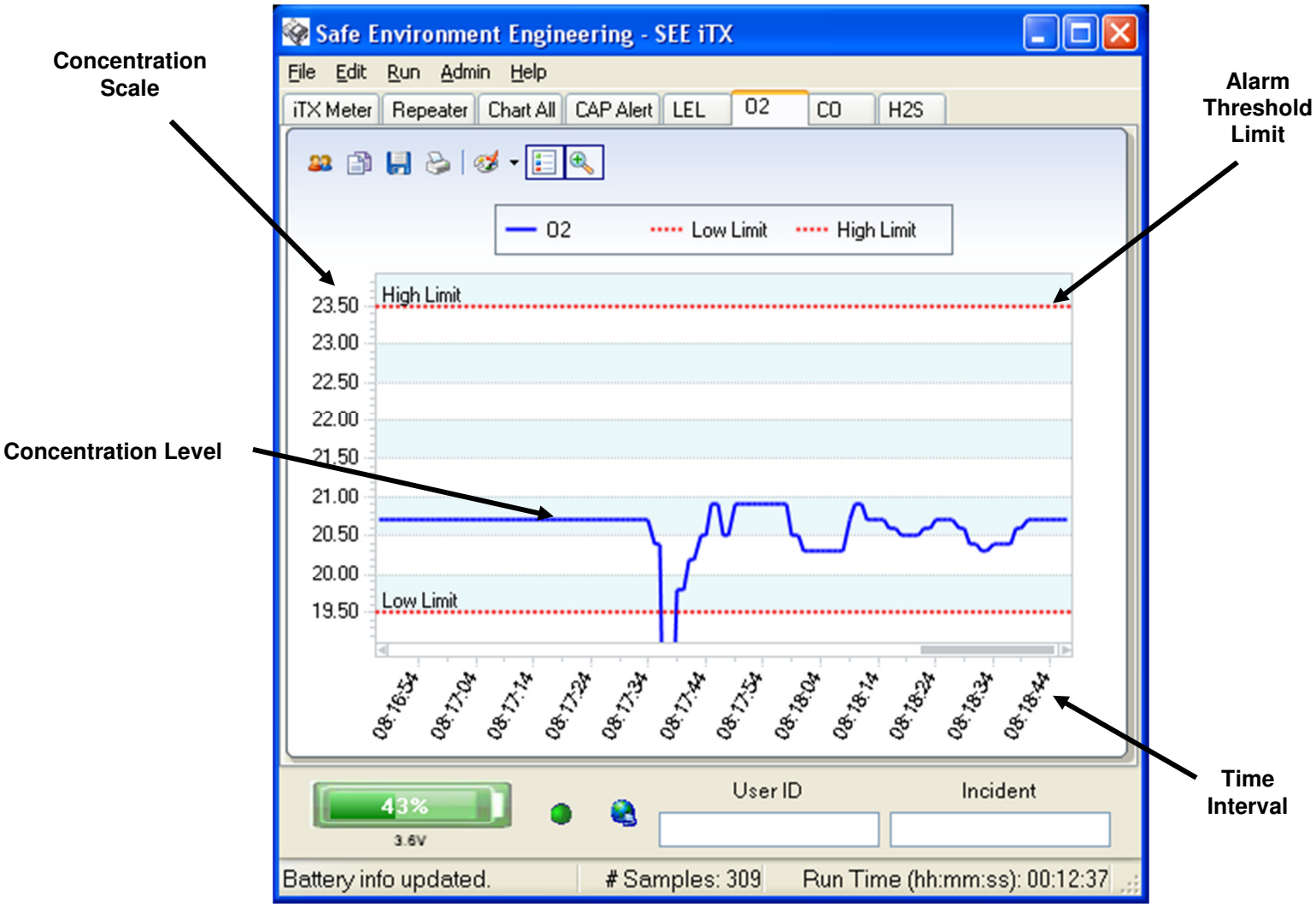
-  The wireless link with the meter is broken and the application is attempting to re-establish.
-  The network connection is disconnected

- **Total Time Sampling** – How long active samples have been accumulated
- **Source Meter** – Identifier for the currently connected meter.
- **User Identification Field** – Field to type a user's name and/or ID.
- **Incident Identification Field** – Field to type Incident name and/or ID.
- **Alarm Notification** – If high or low threshold limits are exceeded the display box for that chemical turns red.

If the monitor application is hidden by another display it is immediately displayed on top of any other application.

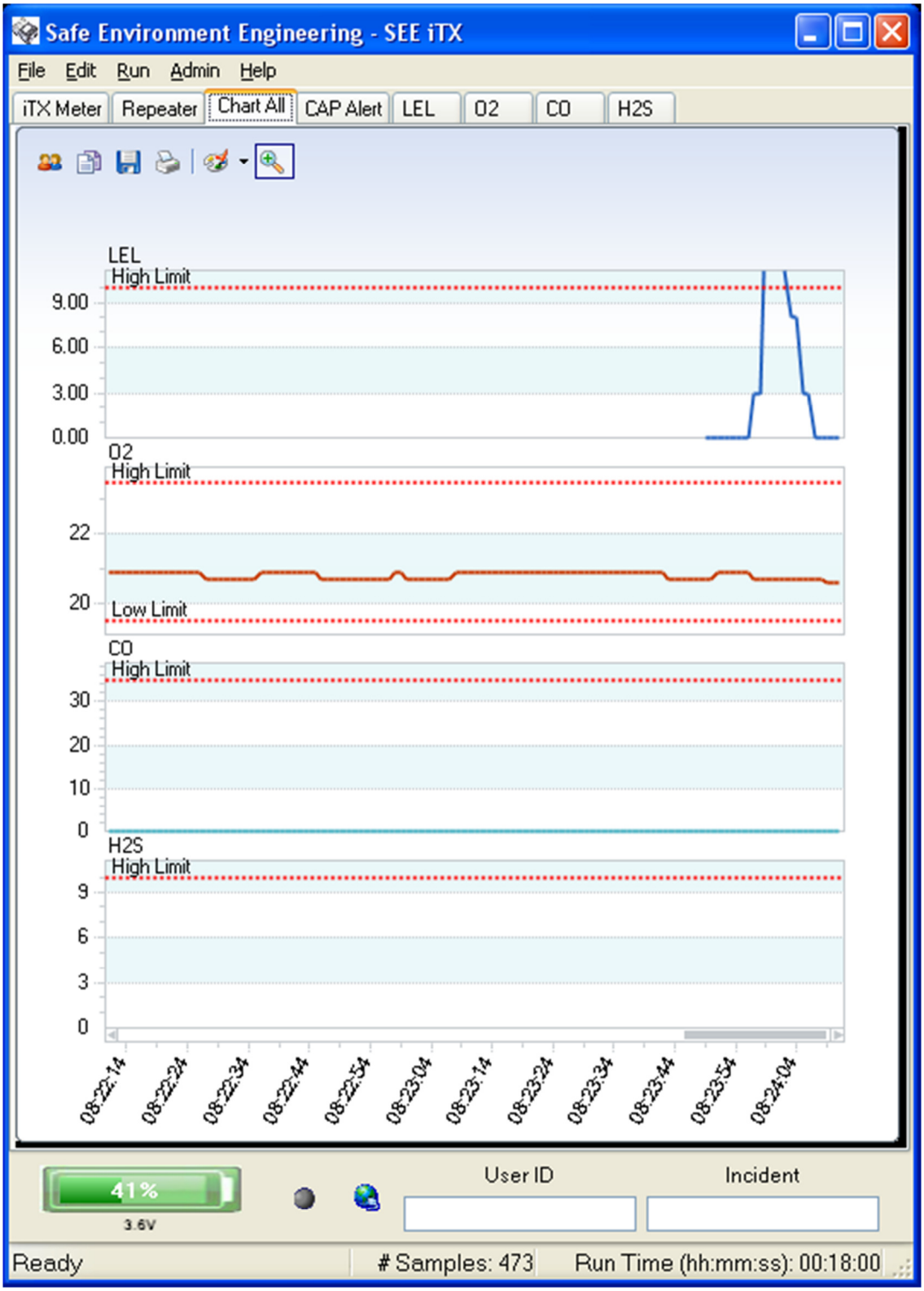
- **Units of Measure** – Units of measure used for each reading

4.1.1 Sample Strip Chart (iTX meter shown)



- **Concentration Scale** – The maximum resolution set between zero and the High Limit alert limit (see Appendix A).
- **Concentration Level** – The averaged concentration level measured in µg/m³ for the given Interval Resolution.
- **Alarm Threshold Limit** – The alarm threshold limits for High and Low are the levels that the alarm will automatically be set off.
- **Time Interval** – How many minutes of sample viewing is displayed on the chart. This interval window can be set from 1 to 10 minutes.

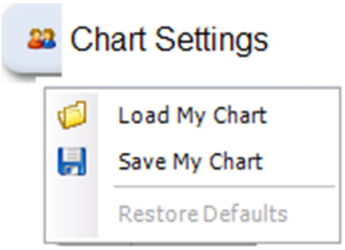
4.1.2 iTX Strip Chart – Chart All



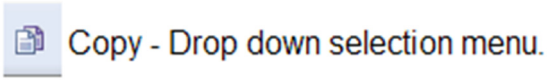
The Chart All Tab allows all the strip charts to be viewed simultaneously. Depending on the number of substances being monitoring resizing the display is advised for easy viewing.

4.1.3 iTX Strip Chart – Settings

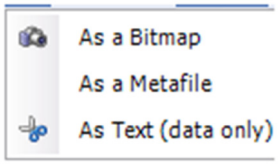
The following choice boxes appear in each meters monitor application chart screen:



Load My Chart loads a saved chart
Save My Chart saves the current Chart
Restore Defaults returns to the default settings



Each selection will copy the chart area into the clipboard.
The “As Text” choice copies the data points into the clipboard as text in a tabulated format and can be pasted into a wordpad document and printed.



Prints the selected chart area.

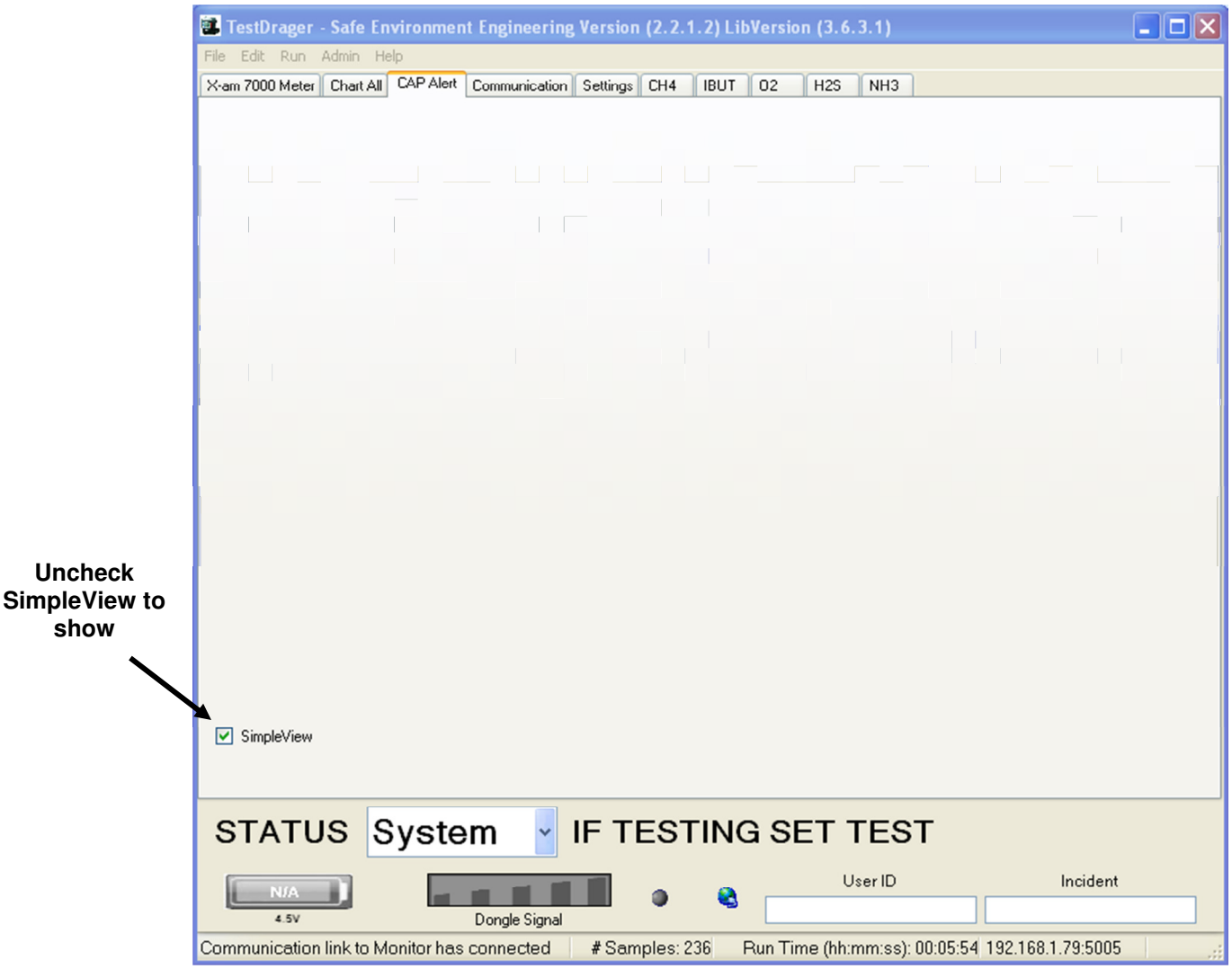
Palette selection choose one of the colors from a drop down menu to set the color scheme for the chart.

Zoom – Press this to set a manual zoom area. Drag the mouse outwards from the click to center the data around the selection frame. Press again to turn off the zoom.

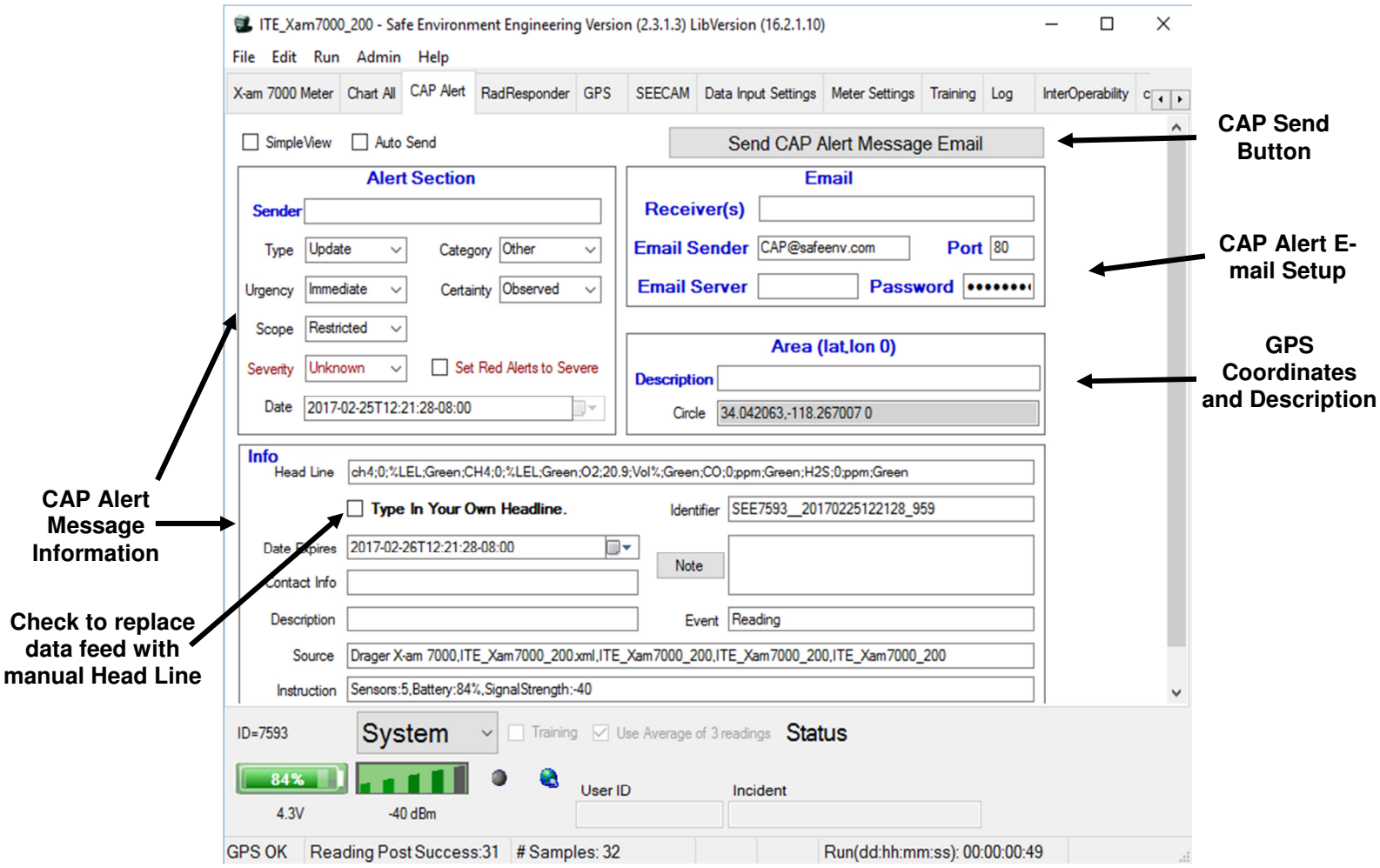
Legend Box – Select to show or hide the legend.

4.2.0 CAP Alert Tab

By default, the CAP settings are hidden.



Unchecking the SimpleView box will display the full CAP message interface.

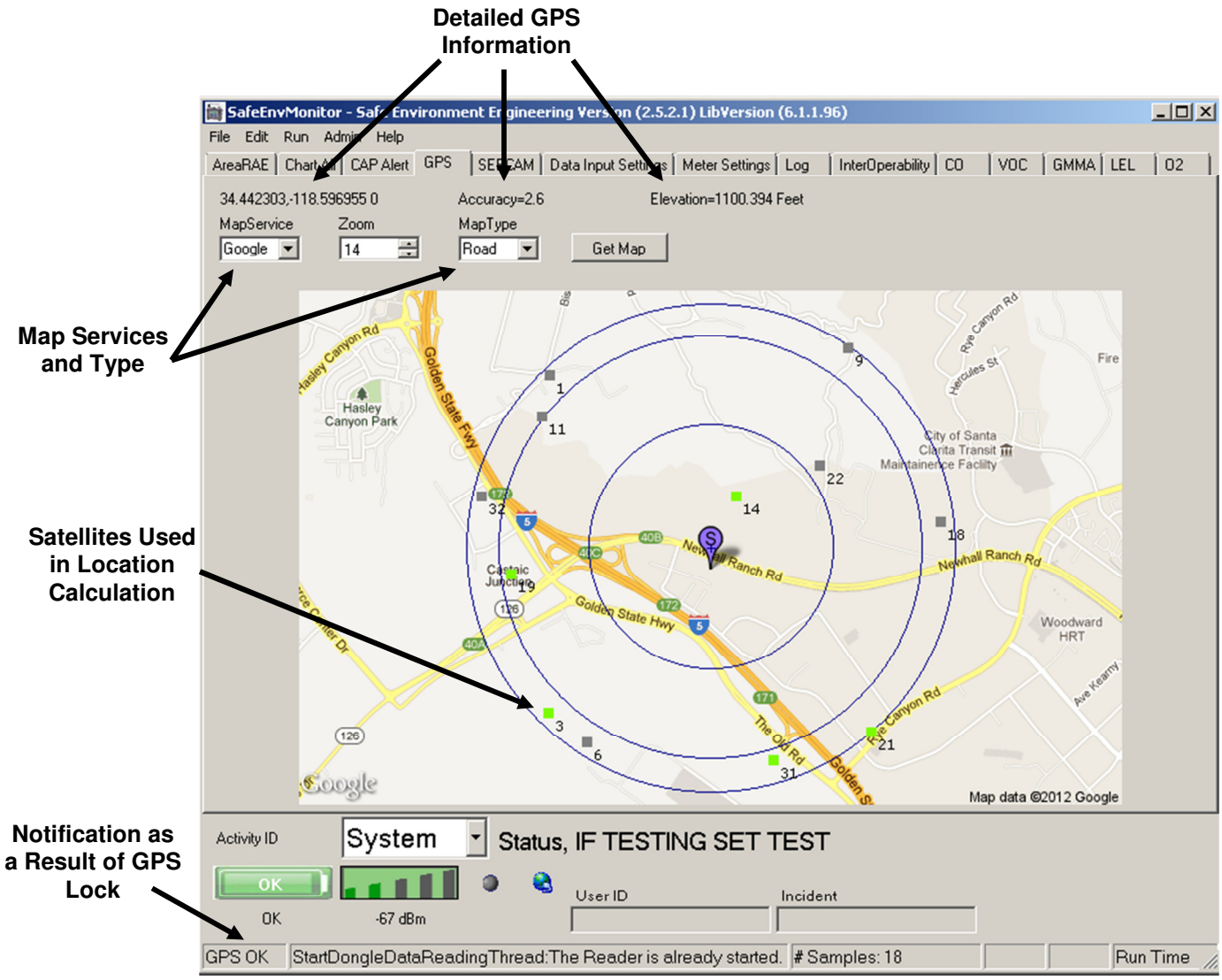


- **CAP Alert E-mail Setup** – CAP Alerts can be sent to E-mail recipients. Similar to other E-mail programs the Outgoing Server, password and Port number is needed to send an E-mail. Multiple E-mails can be sent by inserting a comma between addresses. Setup information is retained.
- **GPS Coordinates and Description** – Coordinates obtained from the associated GPS are displayed in this section as aWGS-84 coordinate pair with a zero radius area indicating a point. Users can type in an Area description for further information detail.
- **CAP Send Button** – Depressing the CAP Send Button will send on-demand CAP information to E-mail recipients and/or other WEB Services selected on this page.
- **CAP Alert Message Information** – CAP Alerts must contain basic additional information to insure the message transferred to other sources have sufficient information to produce actionable results.
    - **Identifier** – A unique message identification string that is generated each time new CAP information become available.
    - **Sender** – Identifies the originator of the alert. This must be an Internet domain name.
    - **Date Sent** – Represents the date and time an alert message is sent

- **Status** – Denotes the handling of the Alert. Mandatory values are Actual, Exercise, System , Test or Draft.
- **Message Type** – Denotes the nature of the Alert. Mandatory values are Alert, Update, Cancel, Ack or Error.
- **Source** – Provides necessary information on what and where the Alert comes from. Four elements complete the Source filed, the meter/sensor manufacturer and model number, the unique open file for the meter/sensor being monitored, the MAC address of the LINC being communicated with and the IP address of the computer hosting the application.
- **Scope** – Denotes the intended distribution of the Alert. Mandatory fields are Public, Restricted or Private.
- **Category** – Denotes the category of the event comprising the Alert. Mandatory values are Geo, Met, Safety, Security, Rescue, Fire, Health, Env, Transport, Infra or CBRNE.
- **Event** – Lifeline is a meter/sensor monitoring applications, therefore, the Event is hardcoded as a Reading.
- **Urgency** – Denotes the urgency of the Alert. Mandatory values are Immediate, Expected, Future, Past or Unknown.
- **Severity** – Denotes the severity of the Alert. Mandatory values are Extreme, Severe, Moderate, Minor or Unknown.
- **Certainty** – Denotes the certainty of the Alert. Mandatory values are Observed, Likely, Possible, Unlikely or Unknown.
- **Date Expires** – It may be desired to have the CAP data sent to other systems retained on those systems for evaluation, analysis or other analytical work. The Date Expires tell other systems how long to store the data. Minimum expires value is one day.
- **Headline** – Meter/sensor data is populated in this field. Four designators are included for each substance being monitored, substance name (periodic name), substance concentration, units and a green, yellow (where appropriate) or red indicator reflecting a “good”, “warning” or “alarm” state (as defined in the setting windows).
- **Info Description** – Used for meter/sensor probe type.
- **Instruction** – Used for indication of the number of sensors/substances being monitor and indication of remaining usable battery voltage of the LINC.

4.3.0 GPS Tab

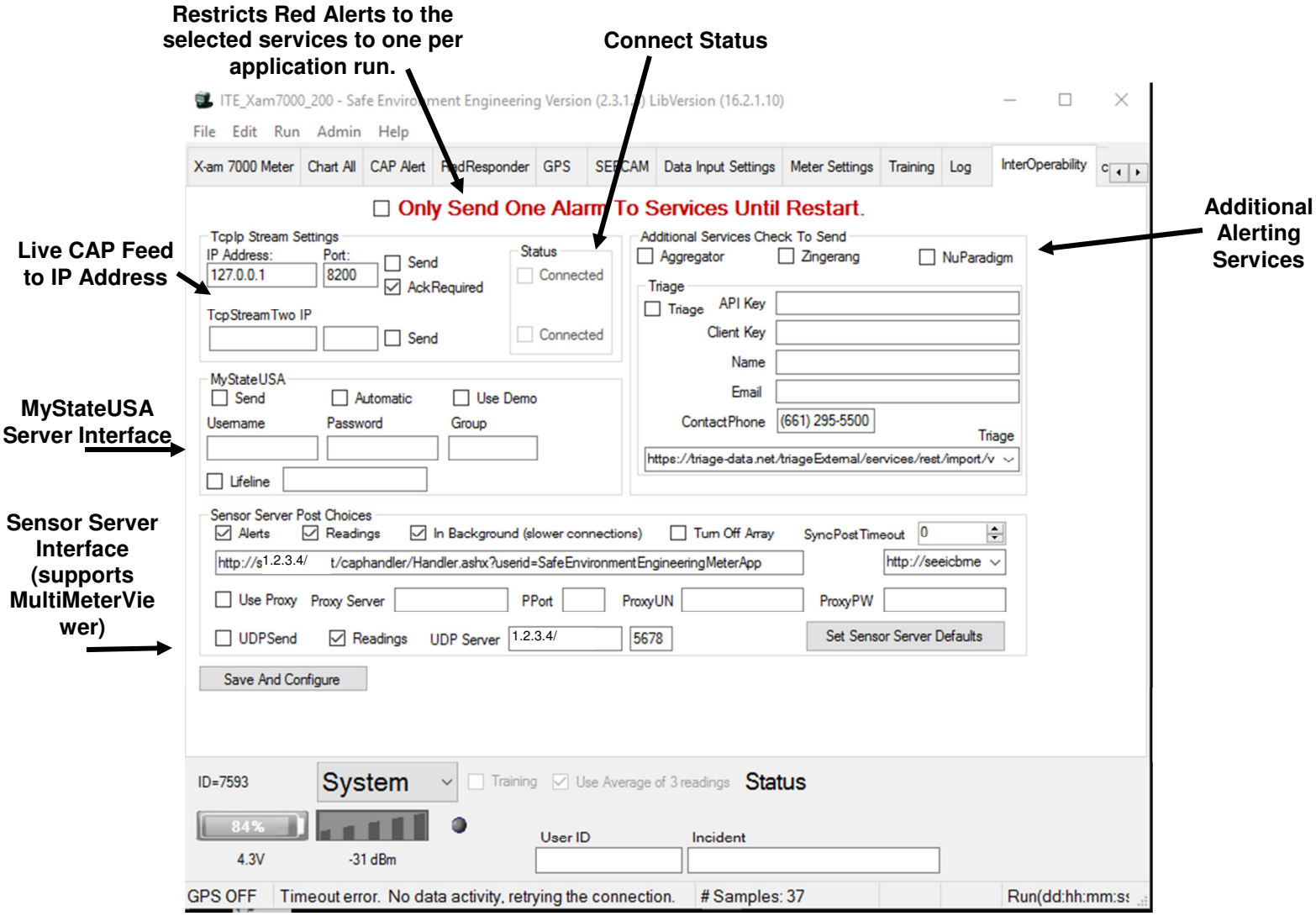
The GPS Tab provides location information specific to a LINC including the number of seen relative satellites, coordinates, accuracy and elevation. The user can also pick from different map services (Google, Bing) and from different map types (Road, Satellite or Both).



- **Detailed GPS Information** – This information includes coordinates (in decimal degrees), Accuracy (Dilution of Precision – DOP) and Elevation.
- **Map Services and Type** – Map services include no map (Default), Google or Bing. Also provided is a selection for viewing roads, satellite overlay or both.

- **Number of Satellites** – The Green and Grey boxes indicate the number of satellites used in calculating the location coordinate and the number of satellites seen by the GPS receiver.
- **GPS OK** – GPS OK is indication can be viewed from any tab and indicates a coordinate lock.

4.3.0 Interoperability Tab (password protected)



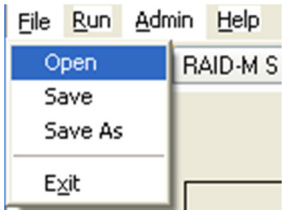
- **Restricts Red Alerts –** Prevents multiple alert notifications from the same incident
- **Live CAP Feed to IP Address –** Streaming CAP sent to a TCP/IP address with a given **Connect Status –** Grey check marks will populate these boxes when the connection is active.
- **Additional Alerting Services** – Nuparadigm and Zingerang are WEB middleware services providing database services to acquired Lifeline CAP data. Large database manipulation provides statistical and analytical utilization of the data to provide many metrics to users wishing to view trends or looking for specific queries of data sets. Rules can also provide data routing to multiple additional services. Triage is a feed to the DOE Triage server for posting radiological incident information.
- **MyStateUSA** – MyStateUSA is an interoperability service that provides both rules based information routing and notification services. This WEB service receives Lifeline CAP data and routes, reports and and/or alerts subscribed recipients using many different reporting tools such as cell phones, E-mails or through other partner programs to Emergency Alerting Systems (such as Amber Alerts).

- **Sensor Server Interface** – Enables posting data to a central server for data sharing, storage, and real-time multi-party data display. Either web posting OR UDP sends are supported. Selecting either Post URL or UDPSend will transmit Candidate alerts, and selecting Readings will stream sensor readings as well. Asynchronous and SyncPostTimeout settings are additional settings that may be needed for poor communication conditions.

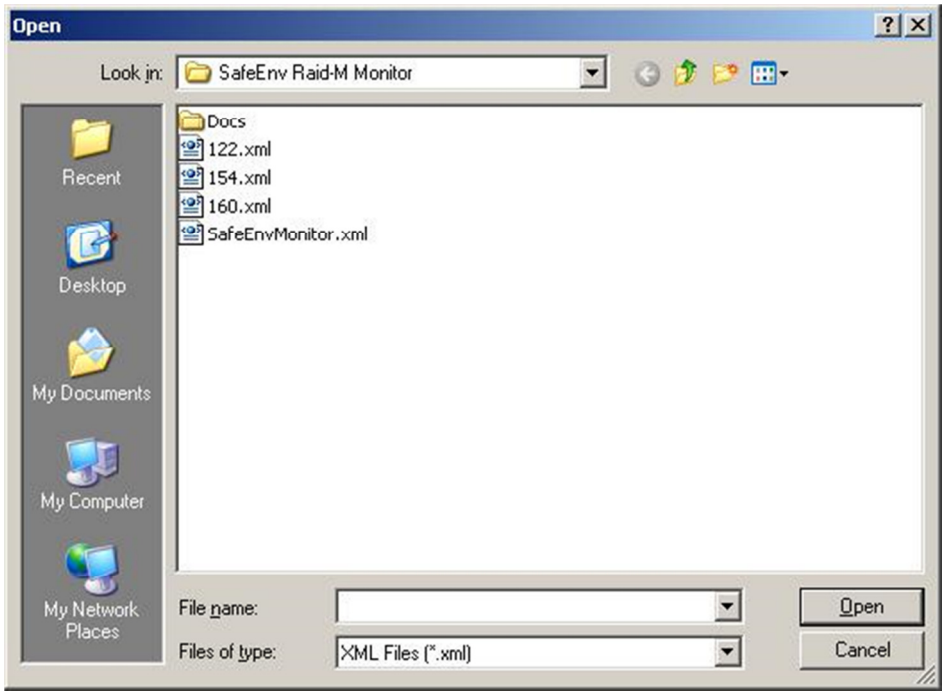
5.0 Getting Connected with the LINC:

Locate the Number on the side of the LINC:

Select Open from the File menu:



Highlight the xml file with the same Serial Number as the LINC and click open:



Select Start from the Run menu:

To Stop Select Stop from the Run menu:

6.0 Help:

Application and contact information:

Appendix A

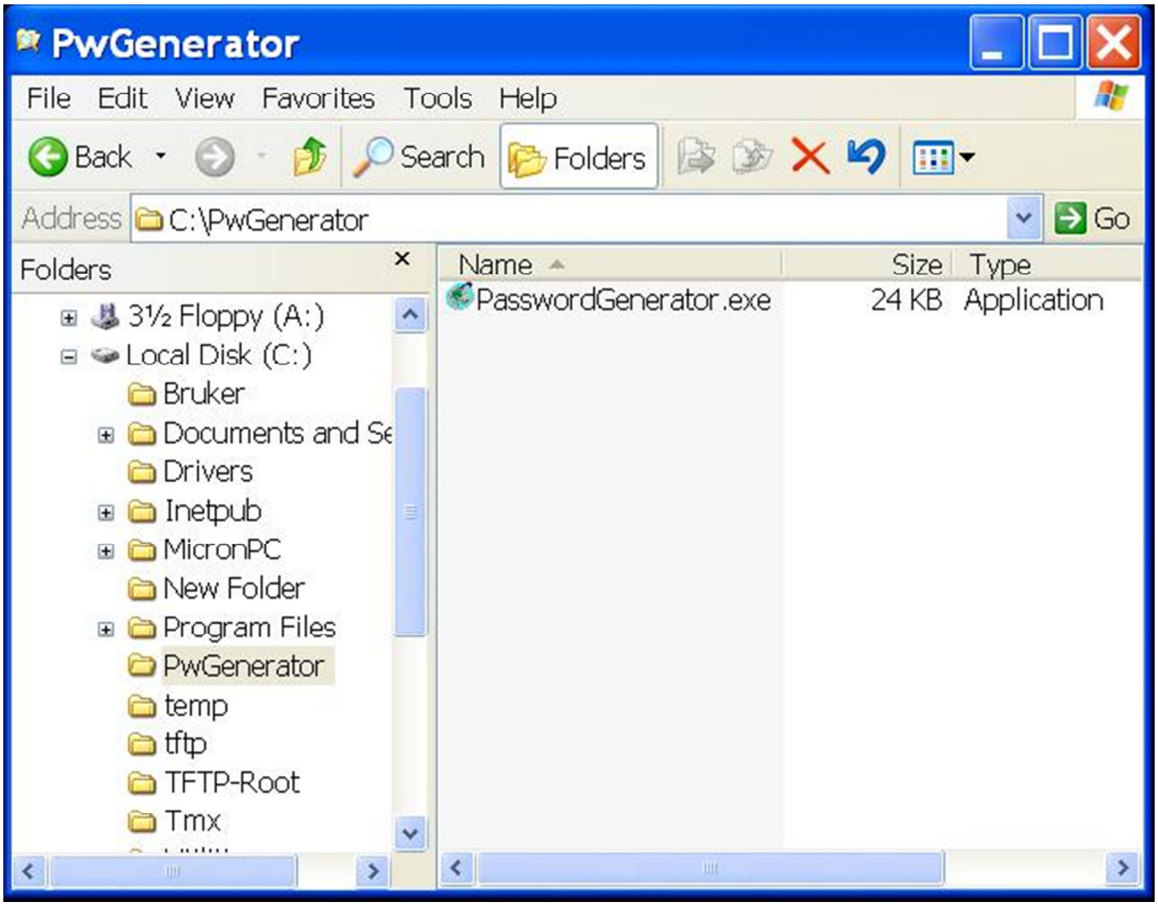
Administration Setting and Logging

Administration settings, Communication settings, and Logging functionality are hidden behind 3 password protected Tabs. The Settings Tab provides meter binding information and alarm threshold configuration. The Communication tab controls connections to specific meters and other services. Since these values typically do not need changing they have been password protected to eliminate inadvertent change. Logging is also provided to view statistical data and count information.

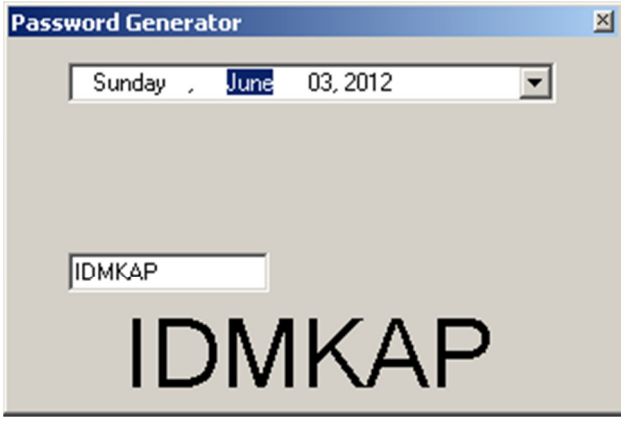
1.0 Password Generator:

The Password Generator is a date driven tool that will change daily to insure a relatively high level of security and to eliminate the need for memorized lists.

The Password Generator application can be found in the c:\Program Files\PwGenerator folder or on the Desktop of some computers:



Double clicking on the PasswordGenerator icon will generate the password of the day.

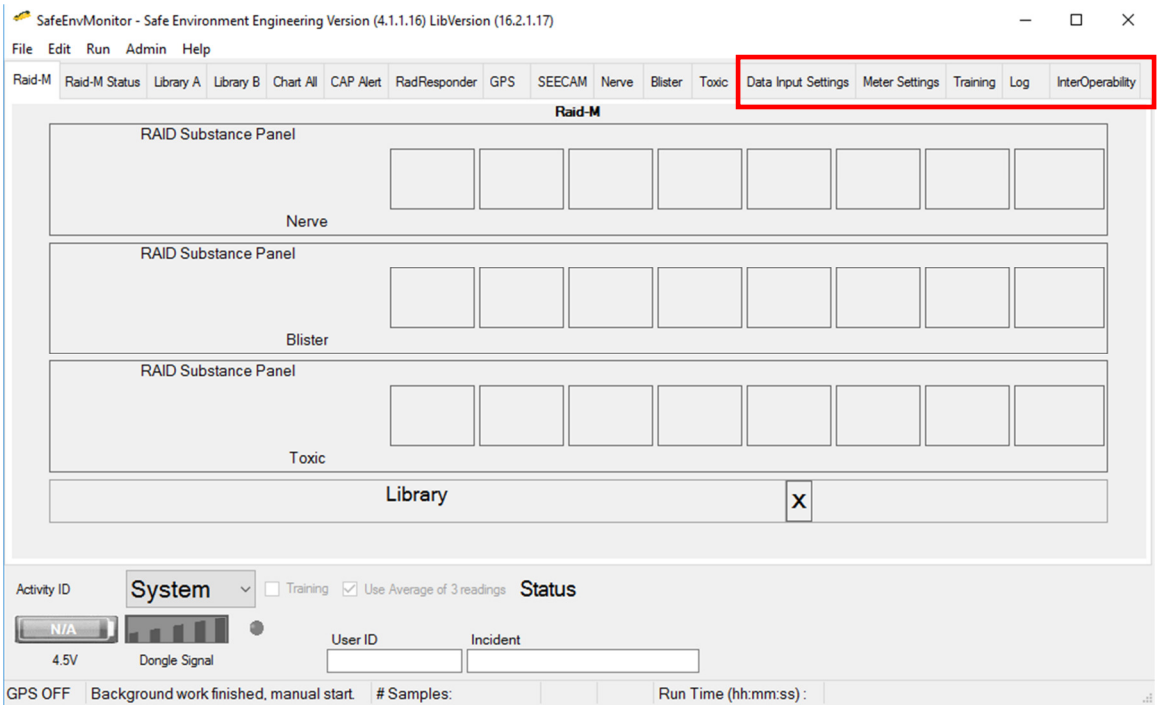


Please make note of the Password. In our example the password is IDMKAP (the password is not case sensitive). The password will be necessary to unlock the Administrative privileges of the application.

Enter the password into the Unlock Key and select OK:

The Admin window will activate 4 additional options – Data Input Setting, Meter Settings, Training, Log and Interoperability Tabs:

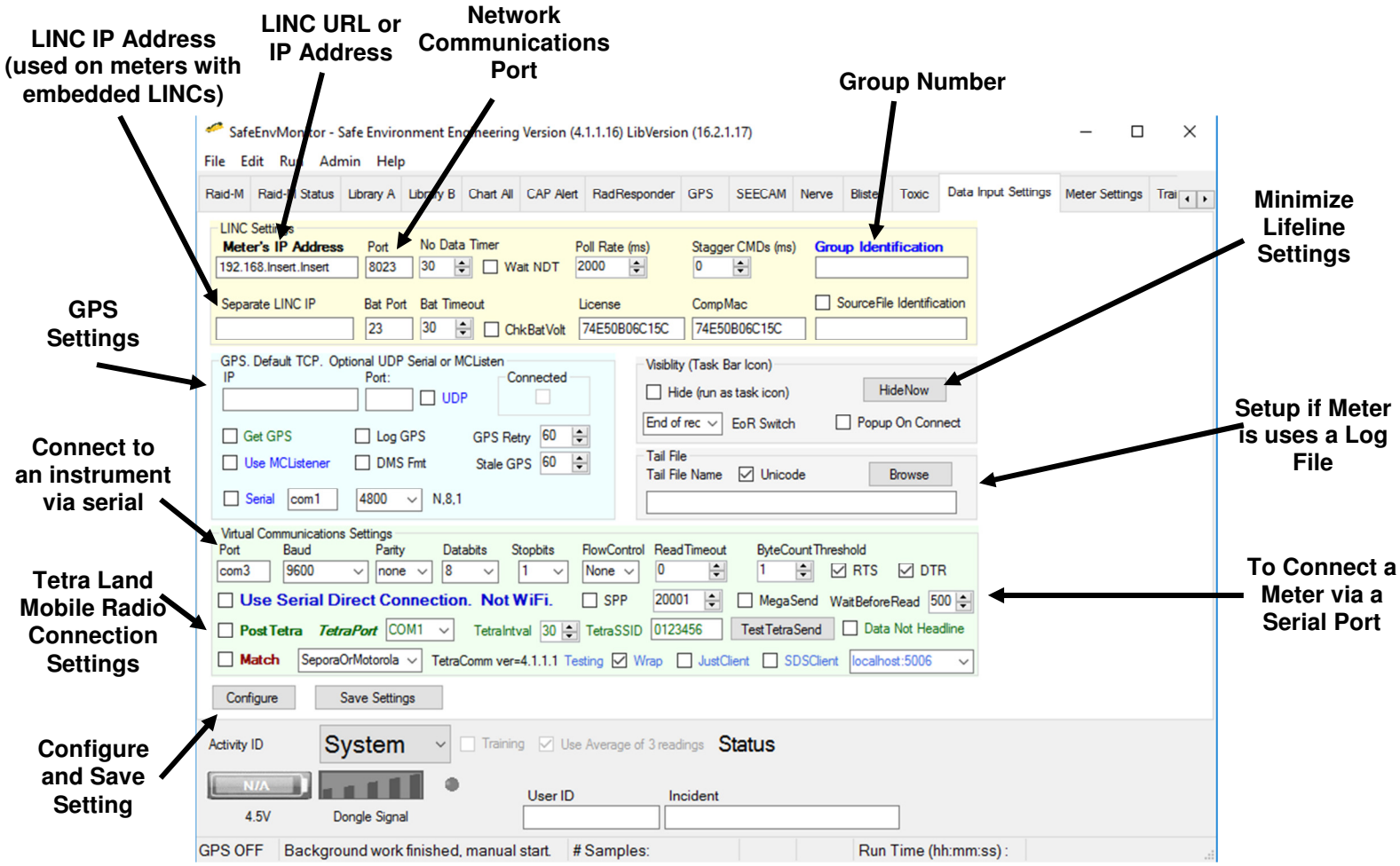
:



Appendix B

Data Input Settings

The Data Input Setting window provides general network for the LINC and connected meter:



- **LINC URL or IP Address** – The Identification or Address on the LINC case. This is also the network address of the wireless radio in the device.
- **Network Communications Port** – A network port that allows data to be exchanged with the wireless device (default 8023)
- **LINC IP Address** – This feature is used for meters that have been modified to have embedded wireless LINCs as well as Ethernet connections.
- **Group Identification** – This allows LINCs to be grouped together so that they can be sorted in applications such as the MultiMeterViewer.
- **Visibility** – Feature that allows Life•line to run minimized in the Task Bar.
- **GPS Settings** – The Identification or Address of the LINC's GPS. This can also be used to acquire GPS data from other devices such as meters that have their own embedded GPS (IP or Serial) (default GPS Port 8024)

- **Tail File** - Life•line can read log files of some meters. This feature sets up these parameters.
- **Virtual Communications Settings** – To configure Life•line to communicate directly to a meter via a serial port without the use of a LINC.
- **Tetra Settings** – Facilitates communication via the Tetra Land Mobile Radio system.
- **Save Settings** – All display data is saved to the current open xml file.
- **Configure** – Activates all changed settings and returns the application to the faceplate view.

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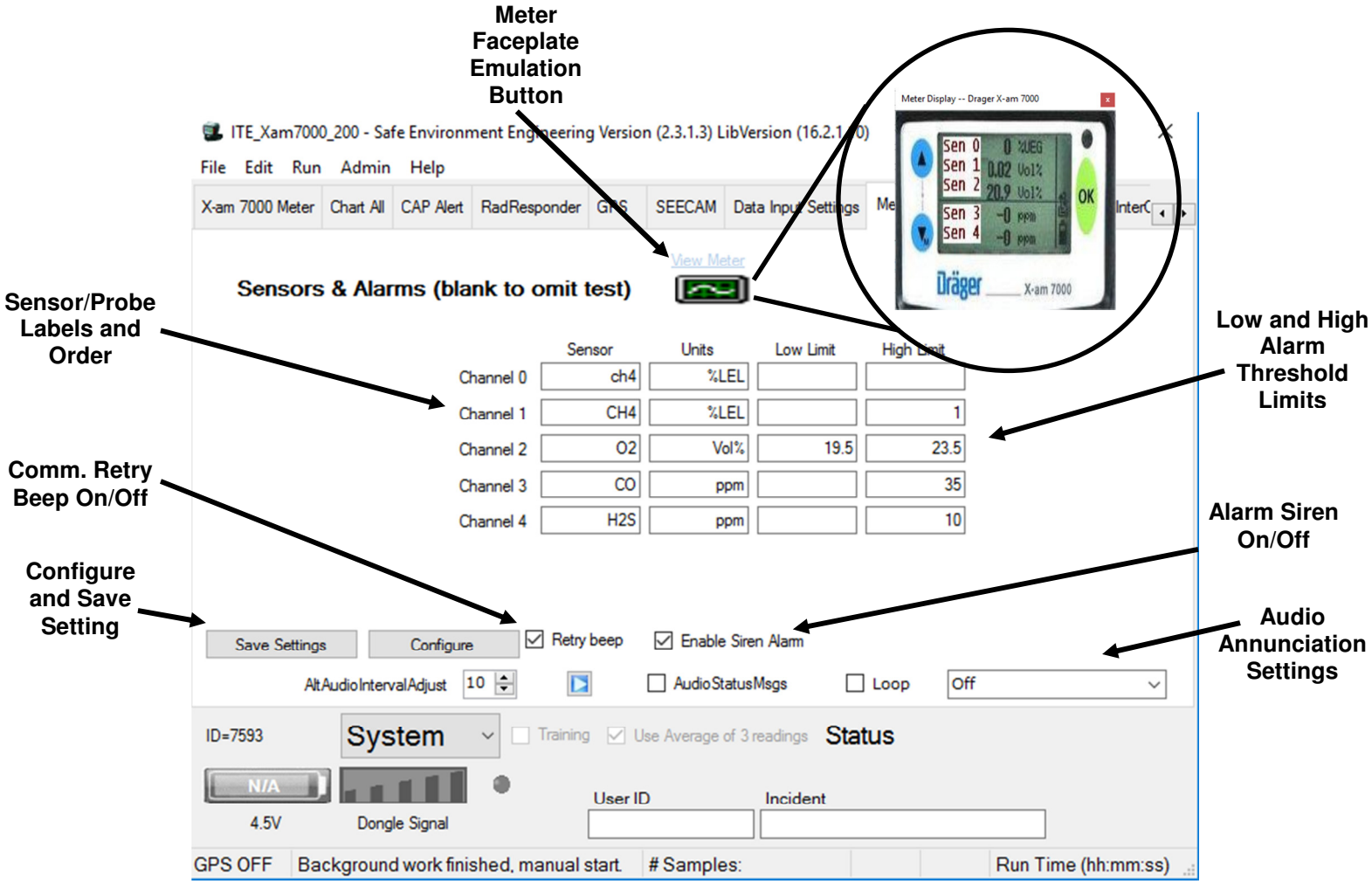
Appendix C

Meter Settings

The Meter Settings Tab is where Sensor and Alarm thresholds are set.



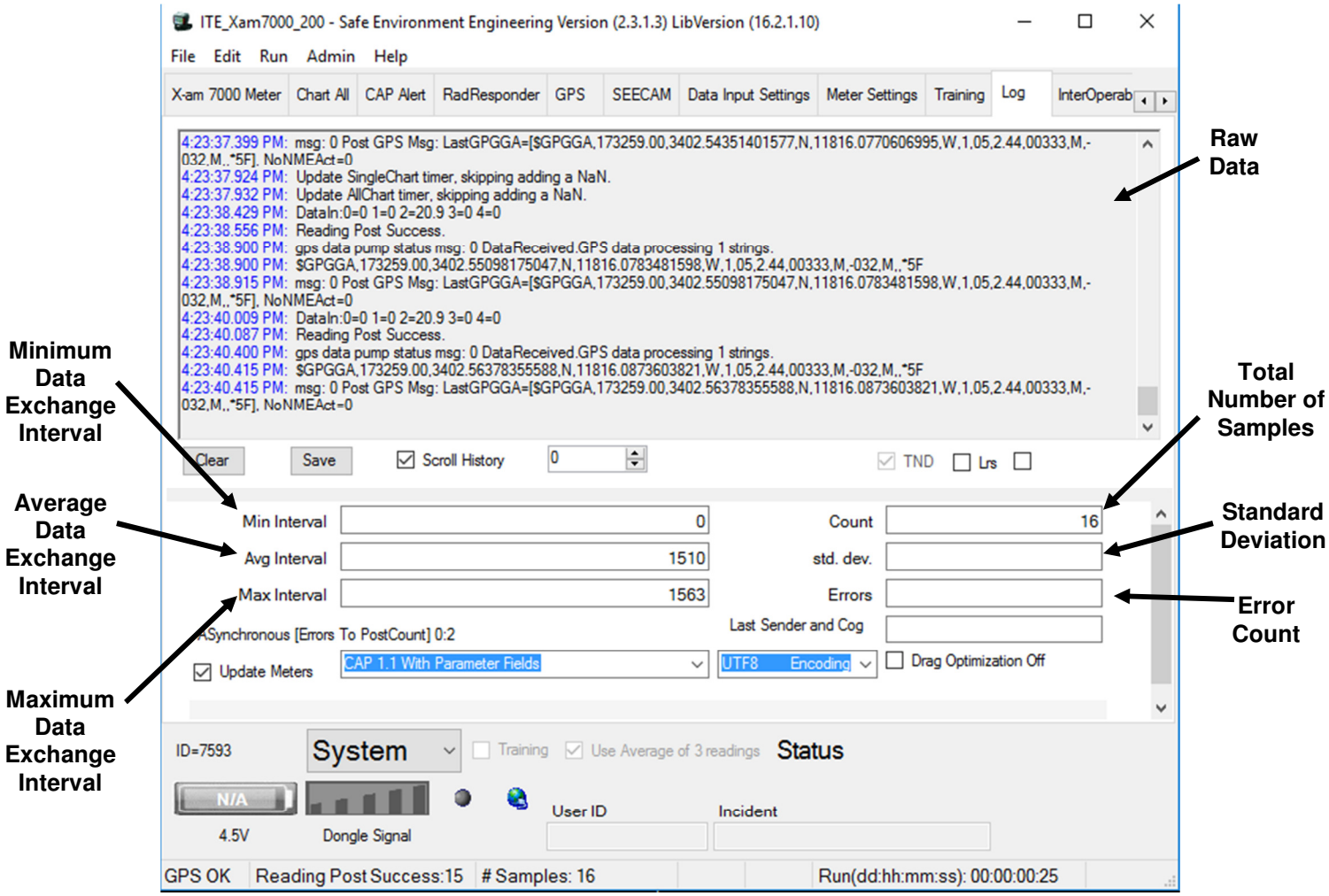
- **Meter Faceplate Emulation Button** – The order the data is received from the meter must match the order setup within the application to insure the display is accurate. This button will show an emulation of the meter's faceplate and correlating sensor position.
- **Sensor/Probe Labels** – The pull down will let you select what sensor/probe should be placed in its corresponding position.
- **Low and High Limit** – These fields allow for setting of Low and High alarm thresholds (when the display turns Red and returns an audible alarm). The High is typically the Immediately Dangerous to Life or Health (IDLH) limit and the Low is where a threshold should not go below (typically only used for Oxygen).

- **Retry beep** – If communications are lost an audible beep will sound every time the systems retries to reconnect. This feature turns the beep on or off.
- **Enable Siren Alarm** – This feature allows turning On or Off of the audible alarm annunciator.
- **Audio Annunciation** – Adds audible notifications for alarm status changes.
- **Save Settings** – All display data is saved to the current open xml file.
- **Configure** – Activates all changed settings and returns the application to the faceplate view.

Appendix D

Logging

Logging provides some statistical information to the viewer of the raw data acquired by the application along with information on timing intervals of the data messaging.



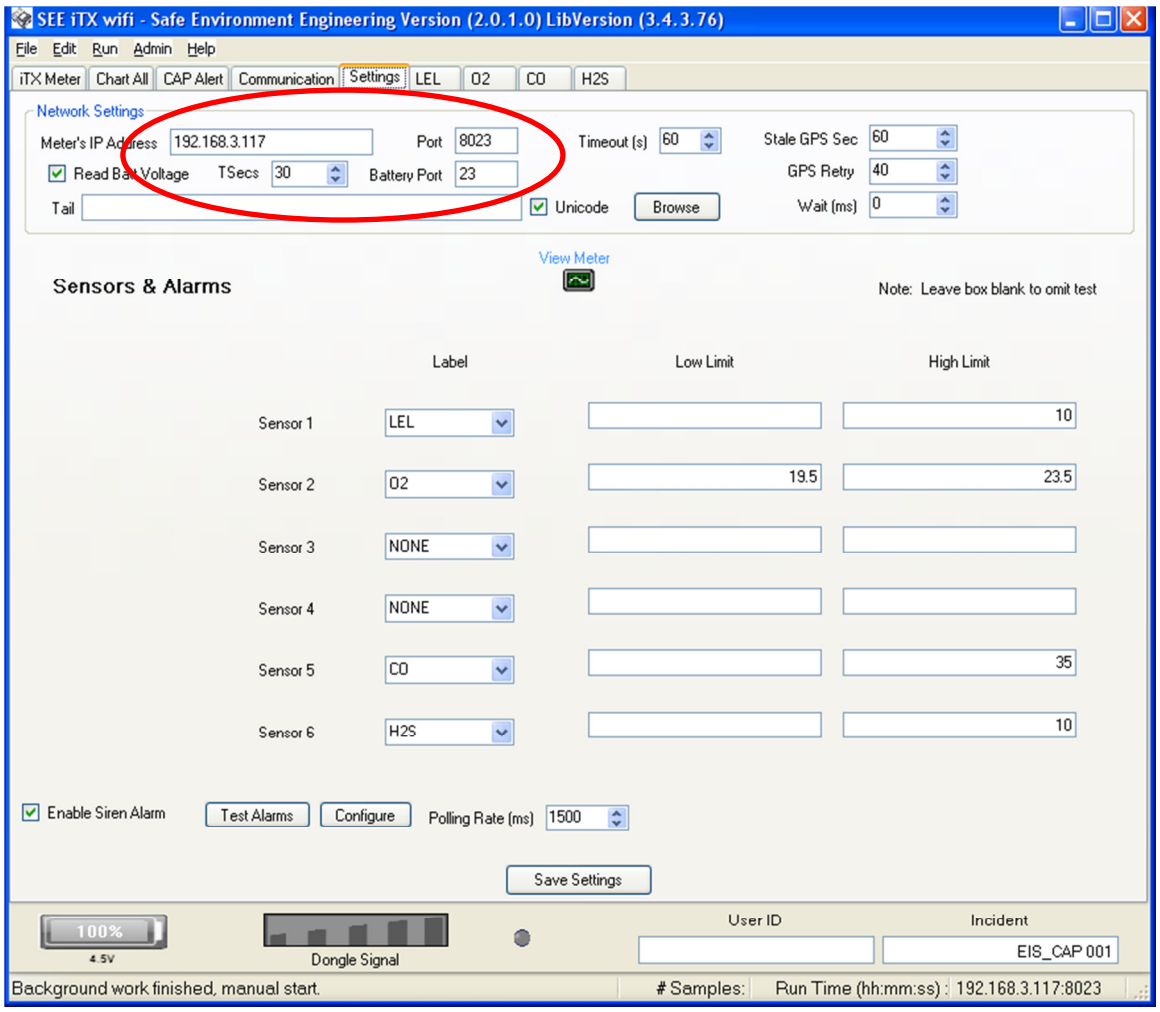
- **Total Number of Samples** - The total samples taken from the meter since the start of the current wireless link. If link is lost and re-established this number will reset.
- **Min Interval** – Minimum data exchange interval in milliseconds.
- **Avg Interval** – Average data exchange interval in milliseconds.
- **Max Interval** – Maximum data exchange interval in milliseconds.
- **Errors** – Error count number.
- **Std. dev.** – Standard deviation.
- **Raw Data** – The raw data received by the application.

Appendix E

Creating a New Meter File from an Existing Meter

This step involves opening an existing file, making the changes necessary then saving it as a different name.

1) Double Click the icon of the instrument you want to modify. If you are using the short cuts data is already preloaded otherwise select File and Open to select a template you will use to modify.
2) Open the Setting Tab as described in Appendix A and B.



3) Make the necessary changes.

For this example we will change the setting for a LINC using local WiFi to a connection using Ethernet or a cell card.

1) Change the Meters IP Address to the appropriate address provided to you by your Lifeline Agent.
2) Change Port Number
3) Change the Battery Port Number

SEE iTX wifi - Safe Environment Engineering Version (2.0.1.0) LibVersion (3.4.3.76)

File Edit Run Admin Help

iTX Meter | Chart All | CAP Alert | Communication | Settings | LEL | O2 | CO | H2S

Network Settings

Meter's IP Address: 1aware.safeenv2.com Port: 9014 Timeout (s): 60 Stale GPS Sec: 60

Read Batt Voltage TSecs: 30 Battery Port: 10014 GPS Retry: 40

Tail: Unicode Browse Wait (ms): 0

View Meter

Sensors & Alarms

Note: Leave box blank to omit test

	Label	Low Limit	High Limit
Sensor 1	LEL		10
Sensor 2	O2	19.5	23.5
Sensor 3	NONE		
Sensor 4	NONE		
Sensor 5	CO		35
Sensor 6	H2S		10

Enable Siren Alarm Test Alarms Configure Polling Rate (ms): 1500

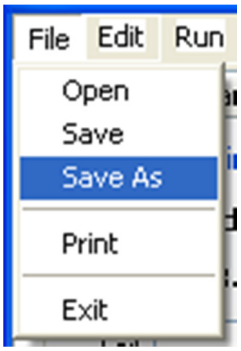
Save Settings

100% 4.5V Dongle Signal User ID Incident: EIS_CAP 001

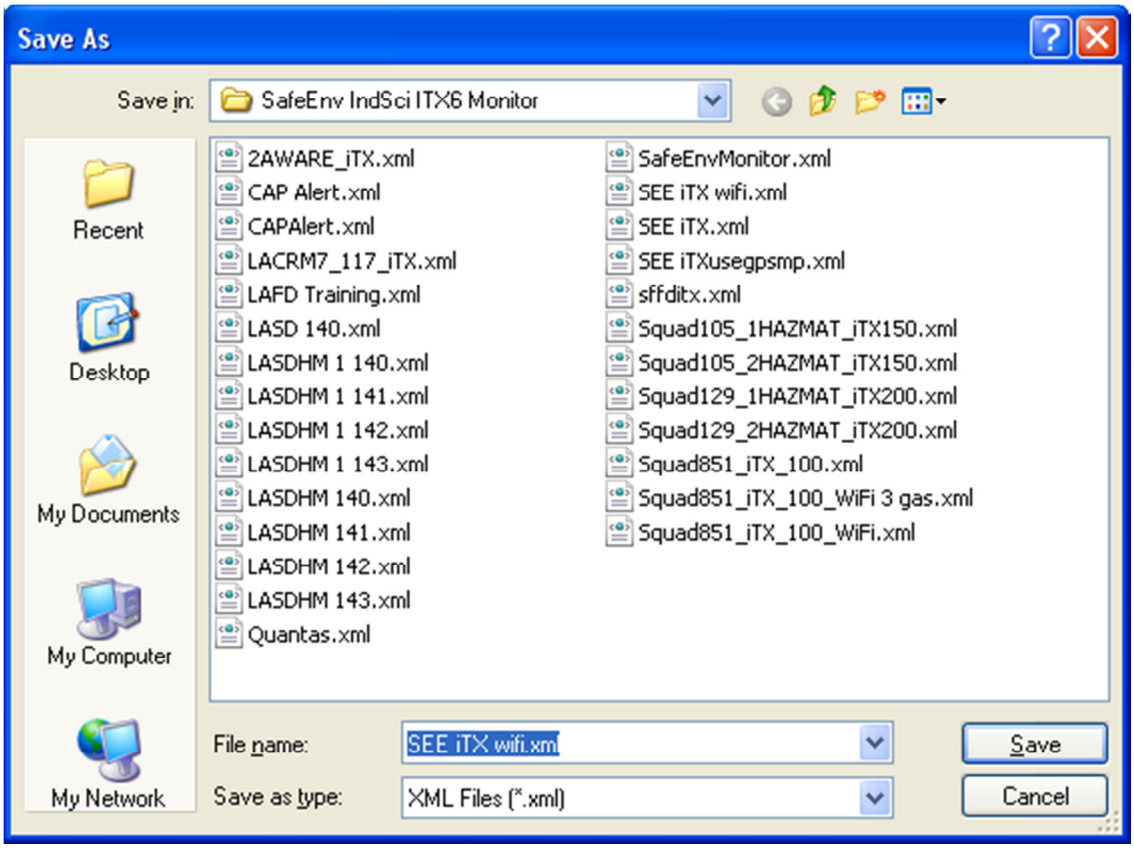
Background work finished, manual start. # Samples: Run Time (hh:mm:ss) : 192.168.3.117:8023

Note the changes made in the Network Settings section

4) Select File then Save As



5) Create a new File name and then Save

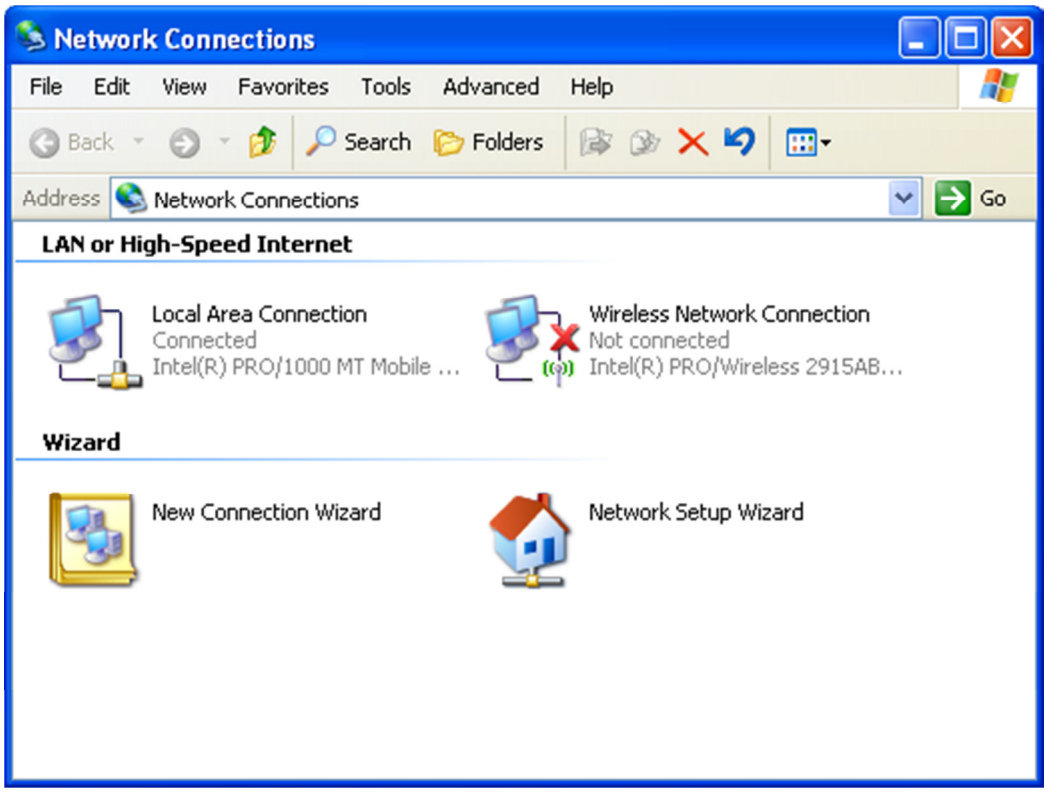


Appendix F

Using a Single Meter without a Gateway

With specially programmed LINCs it is possible to connect to a Lifeline system LINC (and thus a single meter) without using a Gateway by reconfiguring the wireless radio in a laptop. This is done by setting your wireless connection to ad hoc mode on the appropriate settings. The exact procedure will vary depending on the wireless network hardware and client software on your laptop, but it should be similar to the following steps shown using the built-in Windows Zero Configuration utility. (For Windows 7 and later simply select the LINC from the network list)

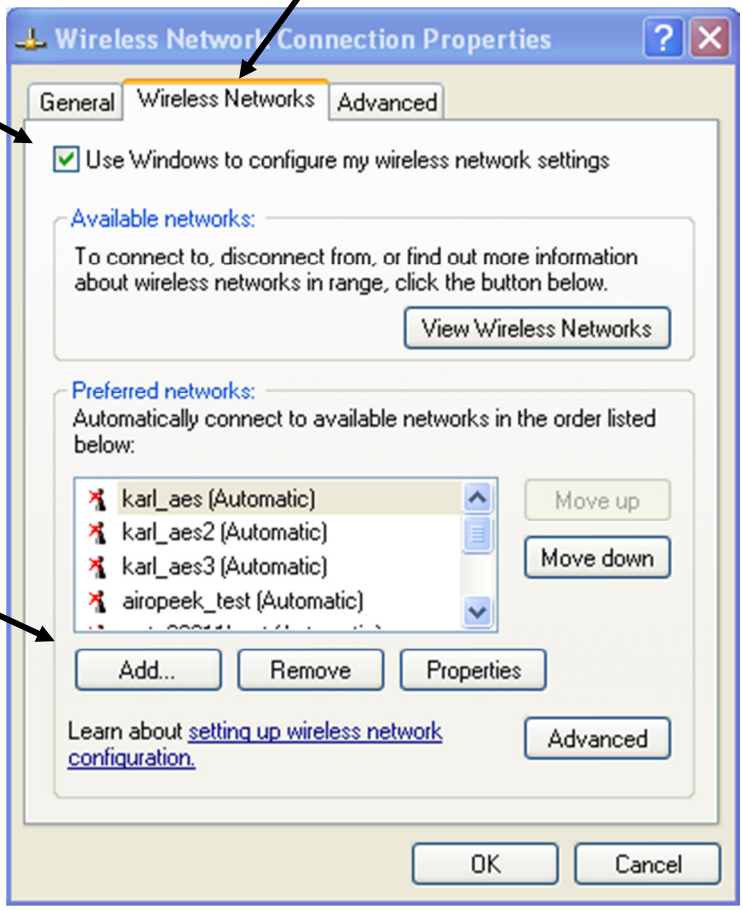
1) Go to the Control Panel and open Network Connections. Then right click on Wireless Network Connections and select Properties.



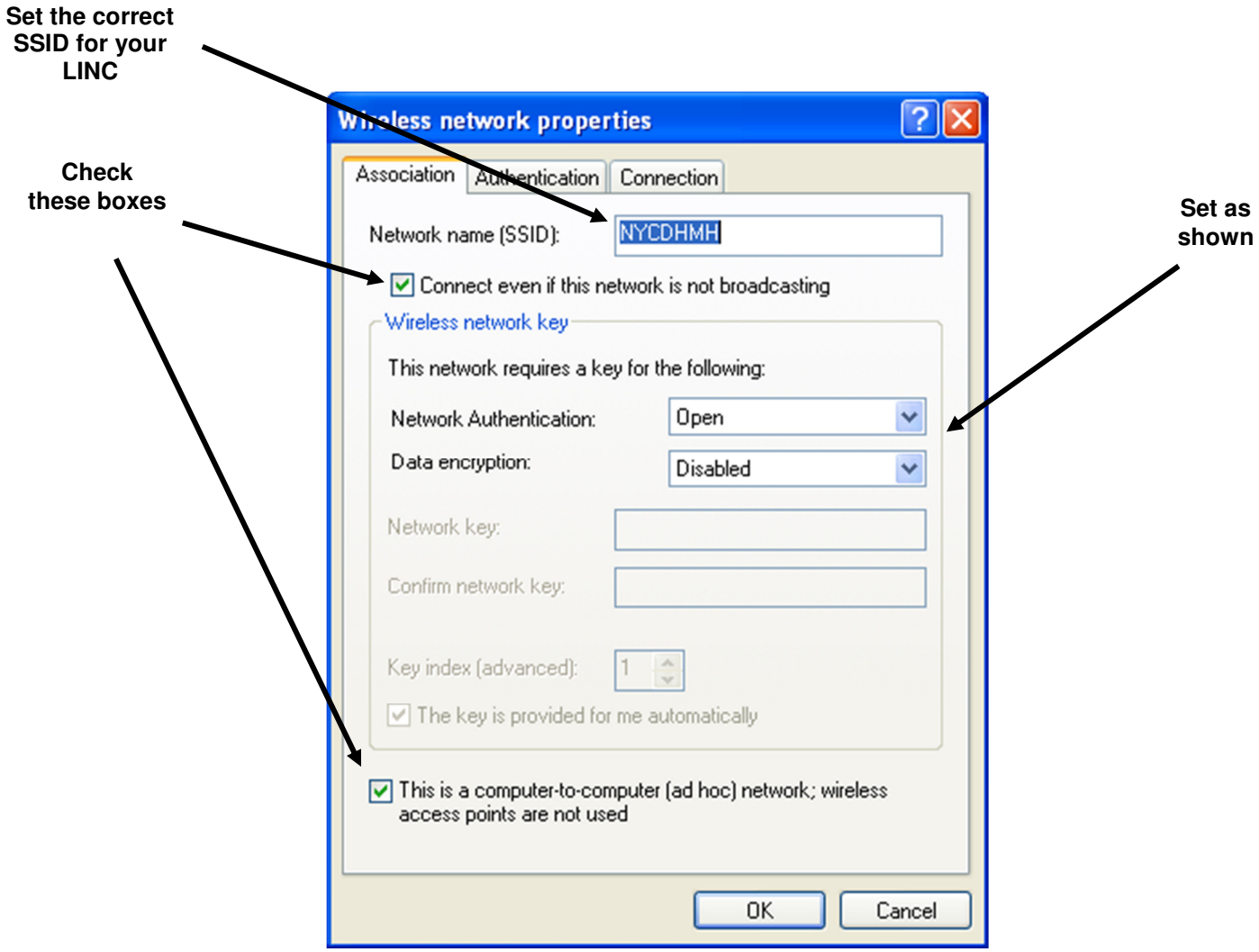
2) Click on the Wireless Networks tab at the top of the screen. Be sure that the “Use Windows to configure my wireless network settings” box is checked.

Box should be checked

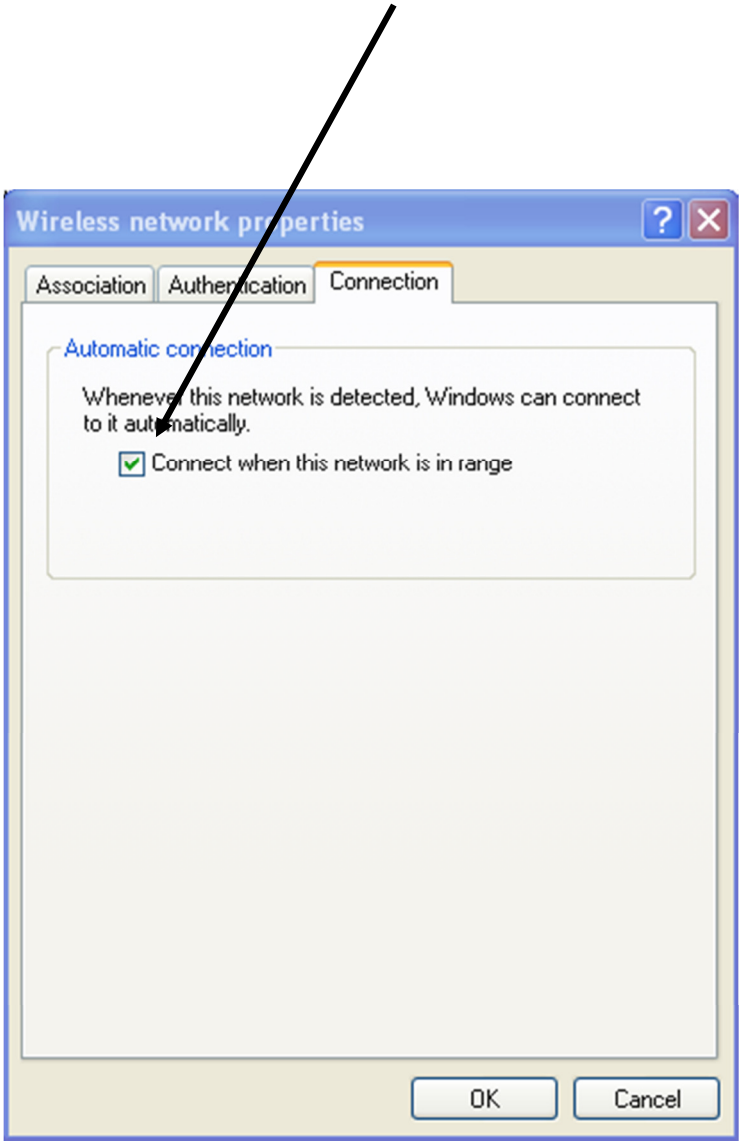
Click to add a new network



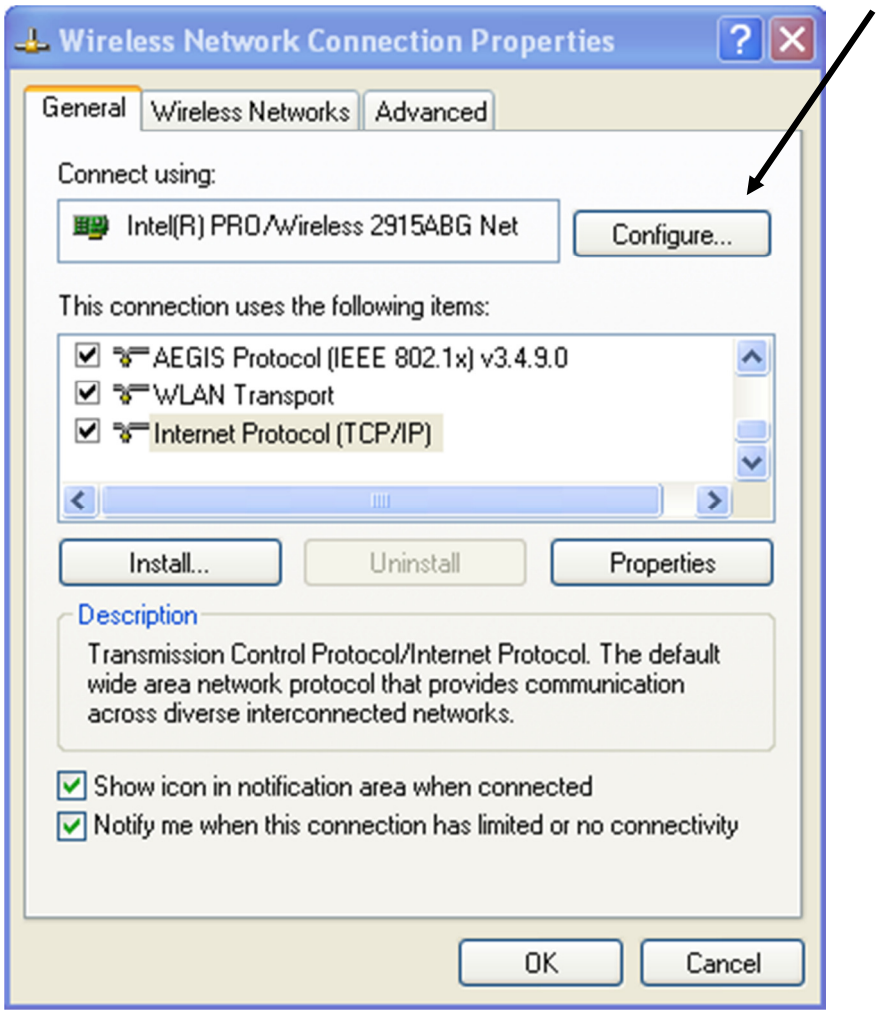
3) Click on Add under the list of Preferred Networks and configure as shown.



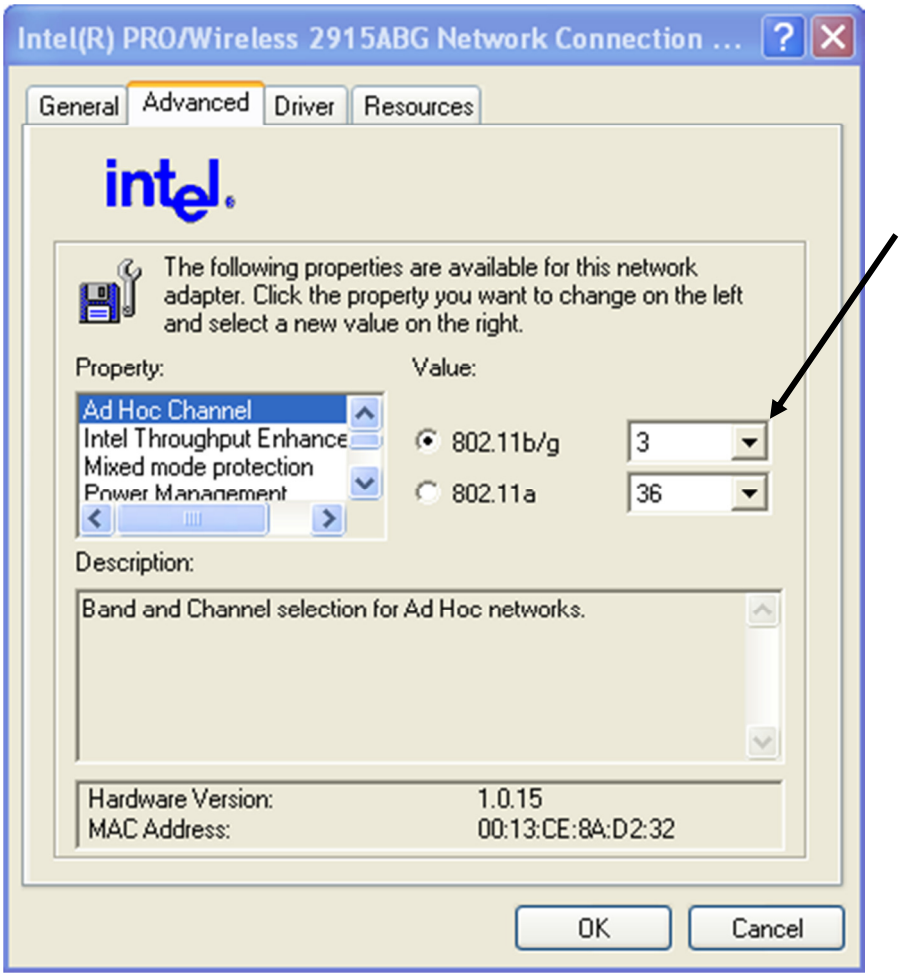
4) Under the Connection tab be sure that the “Connect when this network is in range” box is checked. Now click on the OK button. If you get a warning about using an unsecured network click “Continue Anyway”.



5) Now, return to the Wireless Network Connection Properties box and select the General tab. For ad hoc connections the wireless radio generally needs to be manually set to a specific channel matching the device or computer to which you are connecting. Here we will configure the radio to channel 3 under the B/G settings (the settings programmed on your specific LINC may be different). Click on the configure button next to your wireless card.

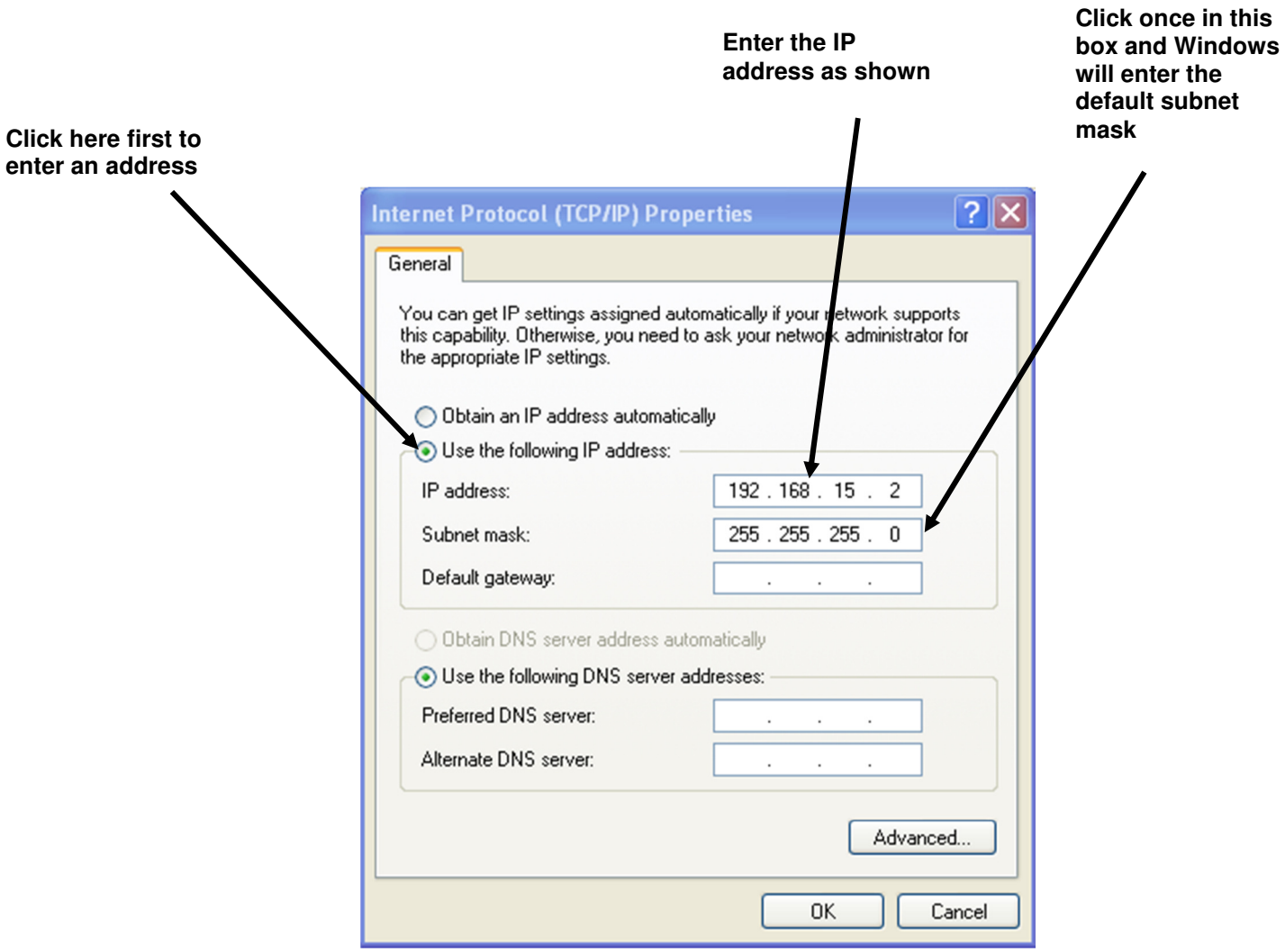


6) Set the ad hoc or general radio settings to be B/G channel 3 and click the OK button. You may not have separate settings for your ad hoc connections on your wireless adapter so you might have to manually set the radio to the correct band and channel.



7) Because we are not connecting to an access point, we will also need to set the network connection to a static IP address in the same network domain as the LINC. In this example we will be using 192.168.15.2 for the laptop address.

Again on the General tab of the Wireless Network Connection Properties box find the line in the center window for Internet Protocol (TCP/IP), double click it and configure it as shown, then click OK.



8) Finally, return to the Network Connections window we started with in step 1, right click again on the wireless connection, but this time select "View available wireless networks". Ensure that your meter LINC is turned on. The Wireless Network Connection display will open. The connection you have just made should display as Connected, or if not double click on the correct connection.