

User Guide

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



SRM6230/SRM6330

Long-range
Frequency Hopping
Spread Spectrum
Ethernet 900 MHz
and 2.4 GHz



All instructions contained in the User Guide must be followed precisely to ensure proper operation.

For coverage from process to perimeter



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

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Warnings / FCC

FCC Part 15 Notification

This device complies with part 15 of the FCC rules. Operation is subject to the following conditions:

- 1) This device may not cause harmful interference
- 2) This device must accept any interference received, including interference that may cause undesired operation.

The device must be operated as supplied by Data-Linc Group. Any changes or modifications made to the device without the express written approval of Data-Linc Group may void the user's authority to operate the device.

Note: 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 industrial 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.

Note: Whenever any SRM is placed inside an enclosure a label must be placed on the outside of that enclosure which includes the modem's FCC ID.

Note: Per FCC Rules, the maximum power allowed at the antenna is 4 Watts E.I.R.P.

RF Exposure



The SRM6230 has a maximum transmitted output power of 955 mW. It is required that the transmit antenna be kept at least 23 cm away from nearby persons to satisfy FCC RF exposure requirements.

The SRM6330 has a maximum transmitted output power of 500 mW. It is required that the transmit antenna be kept at least 23 cm away from nearby persons to satisfy FCC RF exposure requirements.

Note: The antenna used for the SRM must be professionally installed on a fixed-mounted permanent outdoor structure for satisfying RF exposure requirements, including antenna collocation requirements of 1.1307(b) (3).

Introduction

The SRM6230/SRM6330 modems are high performance, wireless radio modem designed for heavy-duty industrial data communications in the 902-928 MHz (SRM6230) and the 2.4 GHz (SRM6330) license-free bands. They employ advanced spread spectrum frequency hopping and error detection technology to achieve very reliable noise-and-interference immune operation. A high RF data rate of 188 Kbps and superior sensitivity provide ultra reliable data integrity. A line-of-sight range of 20+ miles that can be extended further with repeaters provides the user with unsurpassed flexibility and performance.

The SRM6230/SRM6330s can be operated in a number of different modes to satisfy a broad range of communications requirements. They can be configured for point-to-point or multi-point operation with an unlimited number of remote sites on a single Master, depending on data throughput requirements. Repeaters can be used in the system to extend range and eliminate dead RF zones that are blocked by obstructions.

An external antenna can be used with up to two hundred feet of coax. With an external antenna, radio modems can be located inside buildings or metallic enclosures, while the antenna can be located in a position to obtain line of sight.

The SRM6230/SRM6330s will operate in virtually any environment where Ethernet and/or Serial communications are required. The transceiver's Ethernet port is a standard 10/100 Base-T connector with Auto-MDIX. The serial ports are standard DB-9 DCE ports and a two position 485 port.

The user guide covers the operating modes and configurations that are available to users of the SRM6230 or SRM6330. It also provides the user with bench testing instructions, technical information and specifications.

In some applications, the SRM6230/SRM6330s will come pre-configured for the application in which it is going to be used. Even though the modems has been pre-configured, the IP address is set to factory default and must be changed to prevent IP conflicts between modems.

The SRM6230/SRM6330's are enhanced versions of the SRM6220/SRM6320's and are fully backwards compatible with past Data-Linc Group SRM6xxx Ethernet radio modems

Network Basics

All SRM6230/SRM6330 radio networks will have one Master radio, at least one Remote and may or may not have repeaters. All SRM6230/SRM6330s can be configured as a Master, Remote or Repeater.

When configuring a network, it is important to note that Remotes are configured to talk to Masters or Repeaters. When using “Network ID” without Repeaters, nothing more than setting all modems in a network to the same Network ID is required. If Repeaters are being used, Network ID must also be accompanied by Subnet ID in order to dictate a Remotes path to the Master, whether it be directly to the Master or by way of a Repeater. When using “Radio Call Book” without Repeaters, all Remotes must have the Call Book number of the Master in their call books. When using Repeaters, Remotes must have the Call Book of the device they are directly connecting to in their call books. Remotes connecting to a Repeater will have that Repeater’s Call Book entered and Remotes connecting to the Master will have the Masters Call Book entered. Repeaters can also be directed to connect to other repeaters in the same way. (See “Radio Settings” for more detail).

Figure 1

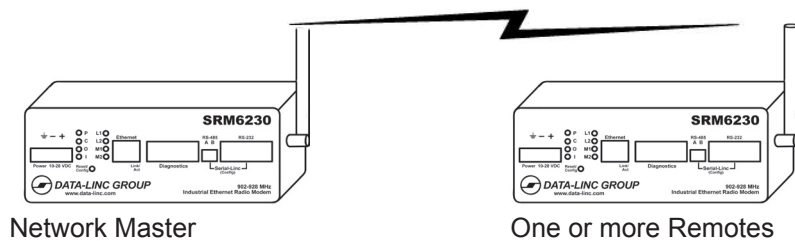
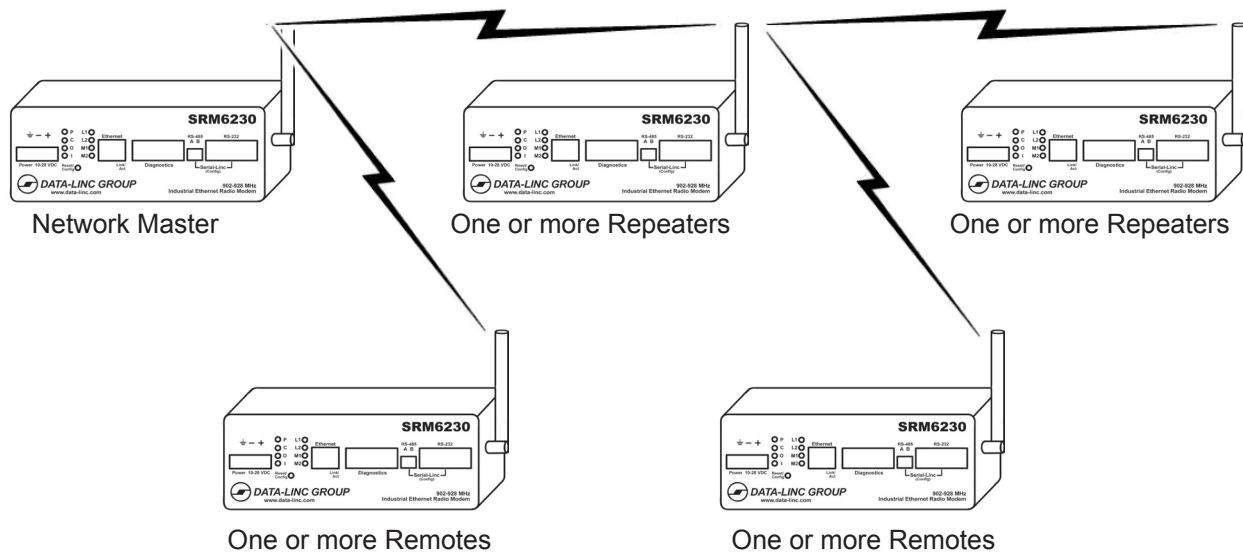


Figure 2



Data Communication Basics

The SRM6230/SRM6330s will carry both Ethernet and Serial communications. In either scenario, data being received by a Masters port(s) will be sent out [to] all Remotes in the network, and any data being received by the Remotes port(s) will be sent out [to] the Masters port(s). It is worth noting that Remotes cannot communicate with Remotes, so data being received by one Remote cannot be seen by another. When Repeaters are involved, they can be either passive or active. When passive, neither the Ethernet nor Serial ports are active. When active, both ports are functional. Please note that a Repeater will pass only data from its ports to the network Master, and only data from the network Master will be seen at the Repeaters ports.

Connections

Ethernet Connection

The Ethernet connector is a 10/100Base-T Auto-MDIX either a standard or crossover CAT5 cable can be used to connect the modem. When a connection is made, the Link/Act (green) LED will light up.

Serial Connection

For serial communications, there are three serial ports. The “Diagnostics” port is for use with LincView OPC. This port will not pass any serial data on a SRM6230/SRM6330 network. The other two ports are the “Serial-Linc” ports. They are used for configuration when using SetLinc™ and to pass serial data on a SRM6230/SRM6330 network. The small port on the left (green connector) is for AE-485, and the DB-9 port on the right is for RS-232. Only one of these ports can be used at a time on any given modem, however both ports are tied together, so any data seen on one port is also on the other one. The “Diagnostics” and “Serial-Linc” ports are DCE ports so connection from either DB-9 port to a PC is done via a standard straight-through cable.

Power Connection

The SRM6230/SRM6330s are DC powered and will accept 10 – 28 Volts DC. The connection is made via a three-screw type terminal block. The left most connection is for chassis ground, the center is V- (Ground) and right hand connection is V+ (Positive DC Voltage).

Antenna Connection

The SRM6230/SRM6330s antenna connection is a standard thread SMA connector, connect either the supplied bench test antenna, or external antenna and coax (not included)

LED Indicators

There are 10 LED indicators on the SRM6230/SRM6330s.

LED	Indication	Note
"P"	Modem Power	Should be on (red) at all times
"C"	RF Link	In all configurations this LED should be on (orange) except for Multi-Point Master where it will be off unless a Repeater or Remote is sending data to the Master.
"O"	Radio Transmitting Data	Should flash (yellow) when modem is transmitting data
"I"	Radio Receiving Data	Should flash (green) when modem is receiving data
"L1"	L1 Mode	Not applicable for standard use
"L2"	L2 Mode	Not applicable for standard use
"M1"	M1 Mode	Not applicable for standard use
"M2"	Configuration Mode	On solid (red) when the modem is in serial configuration mode, Rapidly blinks (red) while booting.
<No Label>	<Not Used>	<Not Used> (yellow)
Link/Act	Lan Link and Lan Activity	On Solid (green) when a Ethernet Lan Link is made. Blinks(green) when Lan Activity is detected.

SRM6230 / SRM6330 Configuration

The SRM6230/SRM6330s can be configured by way of a web browser or by using the provided SetLinc™ software program. When using a web browser, it is necessary to enter the IP address of the modem into the address bar of the web browser. The default IP address is 192.168.3.1, so the IP address of the PC must be 192.168.3.x (where “x” is the fourth address digit). When using the SetLinc™ Utility, it does not matter what the IP address of the modem or PC is. However, no two radios in a given network can have the same IP address, so setting the IP address in all radios is required.

SetLinc™ Configuration

SetLinc™ is a utility program used to configure the SRM6230/SRM6330 radio modems. It runs from a PC; however it does not need to be installed on the PC. Instead, all that is needed is to copy the file from the supplied CD or Memory stick to a known location on the PC, click on the file, and the program will start and be ready to use.

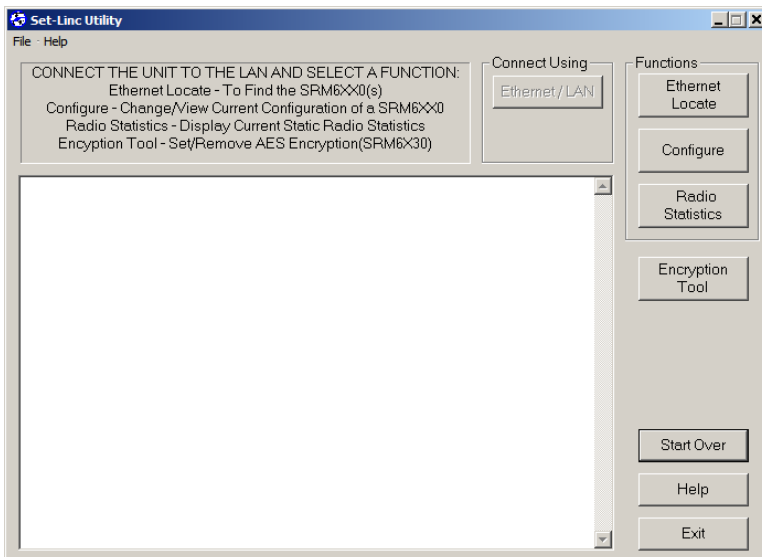
When using SetLinc™ you can connect to the SRM6230/SRM6330s either by the Ethernet port or the “Serial Linc” port. When using the Serial port, you will need to have access to the modem to activate the “config” button when prompted. When using the Ethernet connection, you do not have to have direct access to the modem; however you will be prompted to enter a password to gain access to the configuration menu. The default password is “default” and can be changed as needed. If the password has been changed and you do not know the password, you will be able to reset the password (along with the IP address); however it does require direct access to the modem (see “resetting password/IP address”).

Once connected, there is no difference in the way the modem is configured. In this manual, we will discuss all of the needed configuration parameters assuming an Ethernet connection is used.

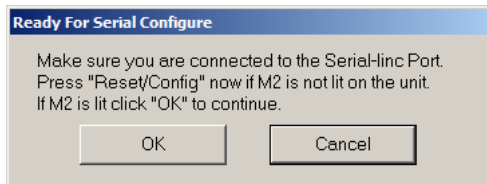
Note: Windows fire wall may or may not prevent SetLinc from accessing the network. If you are unable to locate a modem that is known to be connected to the same network that SetLinc is connected to, check your security settings or contact your IT department.

Accessing the Modem

Once SetLinc™ is on the PC that will be used for configuring the SRM6230 or SRM6330 start the program. This will bring up the entry page. From this page you will need to select a “Connect Using” button. You can either select the “Ethernet/LAN” or “Serial-Linc Port”.

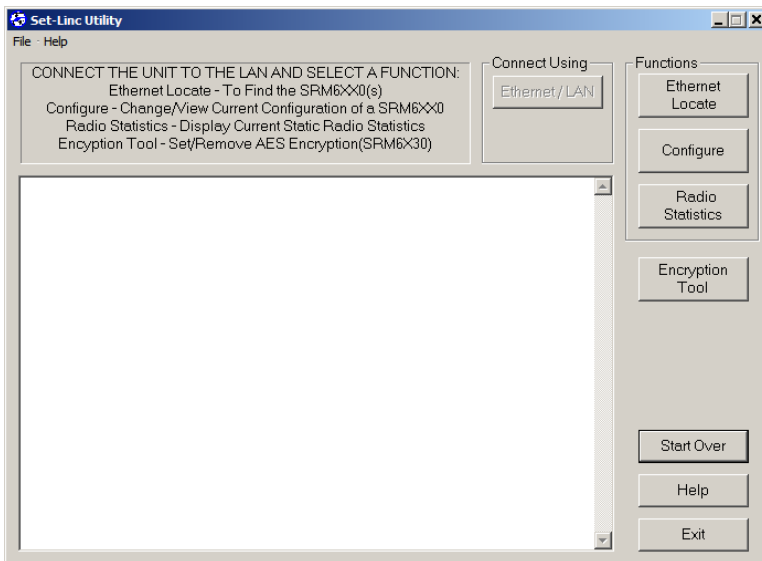


If you choose the serial port option, you will be prompted to make sure you are connected to the “Serial-Linc Port”. Press the “OK” button if the M2 LED on the SRM6230 or SRM6330 is lit otherwise push the “Reset/Config” button on the front of the modem. Once the button is pushed you will be brought to the main configuration page.

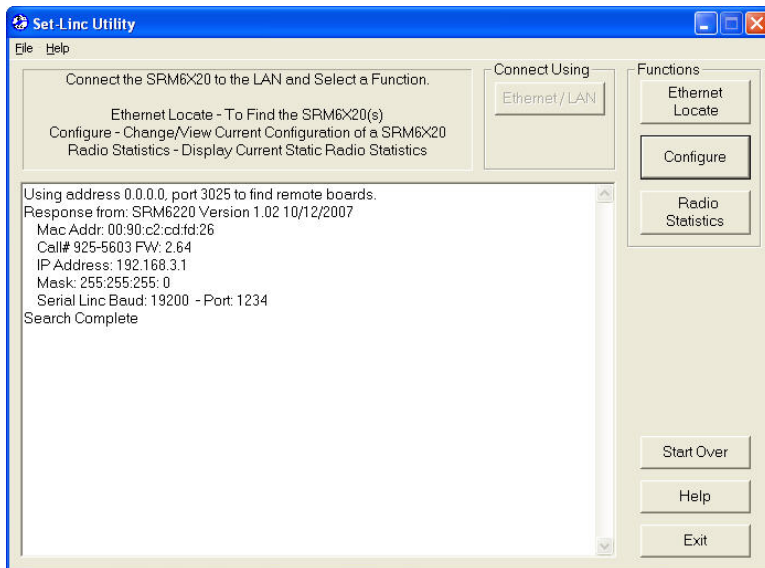


Note: Pushing the “Reset/Config” button puts the modem into configuration mode used with the serial port and turns the M2 LED on. When in this mode the modem will not operate. This should only be done when configuring the modem. The best practice is to push the “Reset/Config” button, once prompted to by the software.

To connect via the Ethernet connection, from the entry page click on the “Ethernet/LAN” button. You will then go to the locate page. From there click on the “Ethernet Locate” button.

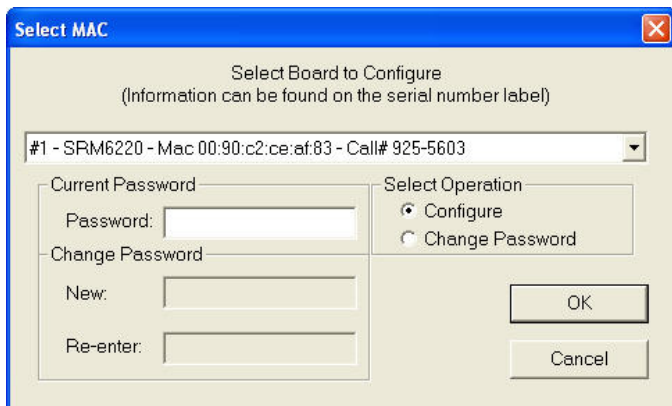


Any unit that is connected via Ethernet (either directly or on a Local Area Network) will appear in the display window with basic information about the unit. This information will include the IP address, MAC address and the unit's "Call" number. To select a particular device, click on the "Configure" button and a window will open with the MAC address and Call number of the different units.



Note: you will not be able to configure any radio across the wireless link.

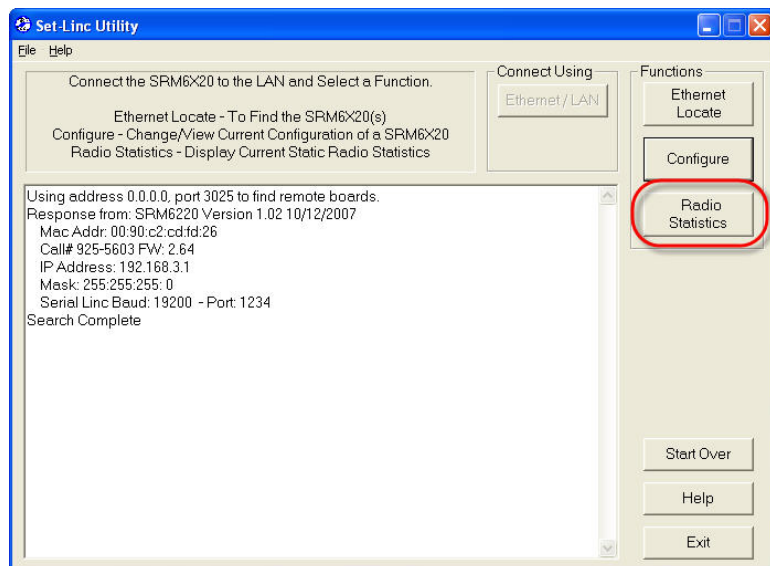
Select the unit you wish to configure, enter the unit's password into the Password box and select "OK". The default password is "default".



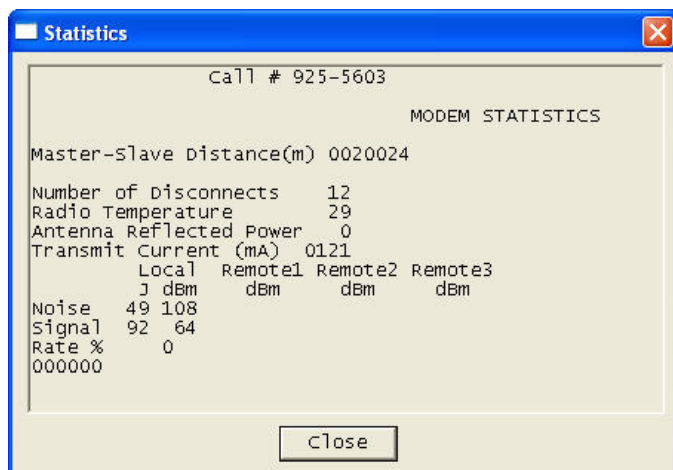
If you would like to change the password, select the "Change Password" button, enter the new password in the "New" box and re-enter the new password in the "Re-enter" box.

Radio Statistics

SetLinc™ allows you to access the SRM6230/SRM6330s' basic radios diagnostics. To access this information, click on the "Radio Statistics" button from the screen that comes up after you select the method you will be using to connect to the modem.



These statistics provide some basic information, such as received signal strength and average noise level.



Note: that in a Multi-Point Master modem, the only statistic that is valid is the noise.

Setting Up the Modem

Configure Parameters

File Help

IP Settings

IP Address: 192 168 3 1

Net Mask: 255 255 255 0

Serial Linc Settings

☐ Change Baud Rate: 19200 Port Number: 1234

Radio Settings

Operation Mode: 2 - Point to MultiPoint Master Freq Key: 12

Network System Type

Repeater(s)

☐ Repeater(s) in System

☐ Remote / Repeater Mode

Network ID

Network ID Number: 255 Subnet Xmit: 15 Subnet Recv: 15

Radio Call #: 925-5603 - Ver: 2.64

DATA-LINC GROUP
Industrial Data Communication Solutions

SRM6230 / SRM6330

IP settings:

No two modems in a given network can have the same IP address, nor can any modem have the same IP address as any network device that is connected via the LAN connection. Because of this you must change the IP address of the modem from its default address. To do this simply enter a new IP address in the "IP Address" box. For further information on correct IP addressing, please contact your IT administrator.

Serial Linc Settings:

If you're going to use the Serial port on the modems for data communications, you will need to set the modem's baud rate and port numbers. If you're going to use the modems as serial bridges (serial port on the Master to serial port(s) on the Remote(s) or vice- versa), then the baud rate needs to match the baud rate of the device it is attached to, and the port numbers need to match between the Master and any Remote using the Serial port. If you have Remotes in the network that you do not want to pass the serial data being sent by the Master, change those Remote's port numbers to something other than what the Master's port number is set to.

Radio Settings:

Operation Mode:

You will need to set the modem's operation mode depending on what role it plays in the network. It will either be a Master, Remote, or Repeater in either a Point-to-Point or Multi-point network. Note: Even if there are only two modems in a network, you can still set the modems up as Multi-point devices. In doing this, if you ever add Remotes to the network you will not have to change the configuration of the existing modems. To set the operation mode, open the pull down box and select the operation mode you will be configuring the modem as.

Freq Key:

The SRM6230/SRM6330s have 15 different "Frequency Keys". These "Keys" are different frequency algorithms that the modems use as hopping patterns. With this feature, you can have multiple networks operating in close proximity to each other while minimizing frequency interference. All modems in a given network need to have the "Freq Key" set to the same number. To do this, open the pull down box and select a number.

Network System Type:

There are two different ways to set the addressing used by a SRM6230 or SRM6330 radio network. The two types are "Network ID" and "Callbook". Because Network ID is easier to set up and more flexible when adding and/or replacing modems in a network, it is the preferred method.

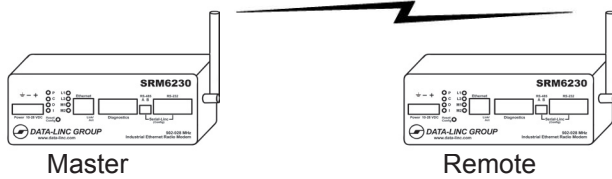
Network ID:

When using Network ID, all devices in a given radio network must have the same Network ID number set in the modem. If there are no Repeaters in the system there is nothing more to configure. If you are using Repeaters, you must direct any Remotes, whether or not they are going to use the Repeater, or go directly to the Master (Remotes in a network with Repeaters do not have to go through the Repeater). If the network has multiple Repeaters, the Repeaters also need to know if they are going directly to the Master, or if they are linking through other Repeaters. The combinations are limitless. To do this, the "Subnet ID's" needs to be set up. What the Subnet ID does is tell a given modem what "Receive ID" it will listen to, and what "Transmit ID" to transmit on. These two settings are labeled "Subnet Xmit" (transmit) and "Subnet Recv" (receive). To disable Subnet ID, the settings for both the Xmit and Recv must be set to "15". To enable Subnet ID, set either or both settings to something other than "15". A setting of "Xmit = 0 / Recv = 0" will set the modem to "roaming" which is not commonly used (for more information on Roaming contact Data-Linc Group Customer support)

When using Subnet ID, the Masters Xmit and Recv are always set to "15". A Remote's Xmit will also always be set to "15". A Repeater that is going to be connecting directly to a Master will have its Recv set to "0" and its Xmit set to "1" (Note: the Master should be set to "15", "15" or "0", "0"), if it is the only Repeater or the first Repeater in the network. If there is more than one Repeater, decide which Repeater is number two, three, etc... and set the Xmit to "2", "3", etc... In doing this you are setting up the "Transmit ID" that Remotes and/or other Repeaters will use to "Listen" to that modem. Any Remote in a network with Repeaters will have its Recv set to the number that its Repeater is using as its Xmit. See the examples below.

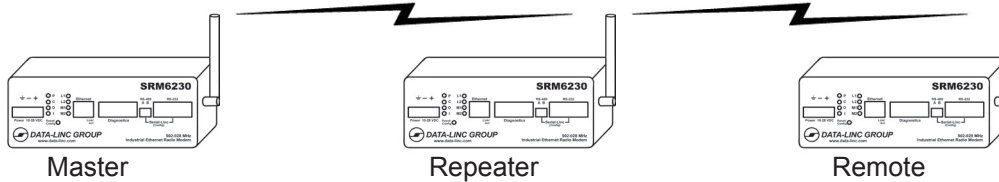
Network without Repeaters:

Master	Remote
Net ID=1234	Net ID=1234
• Xmit=15	• Xmit=15
• Recv=15	• Recv=15



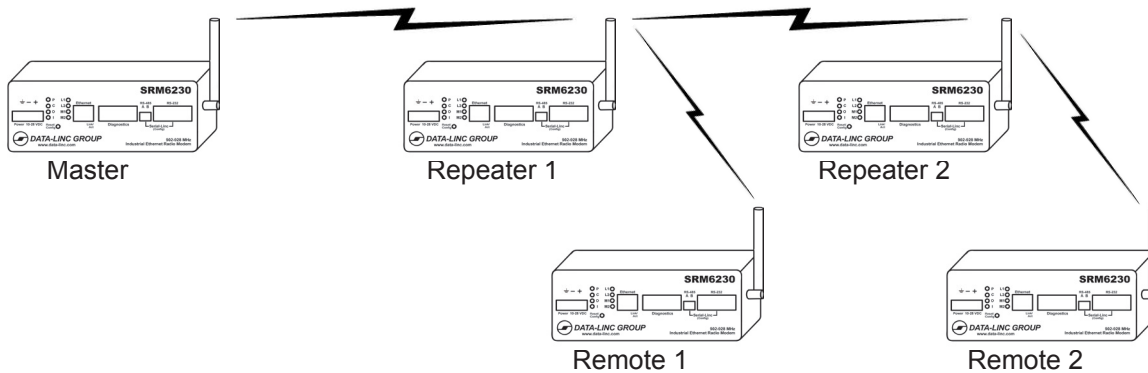
Network with one Repeater:

Master	Repeater	Remote
Net ID=1234	Net ID=1234	Net ID=1234
• Xmit=0	• Xmit=1	• Xmit=15
• Recv=0	• Recv=0	• Recv=1



Network with two Repeaters:

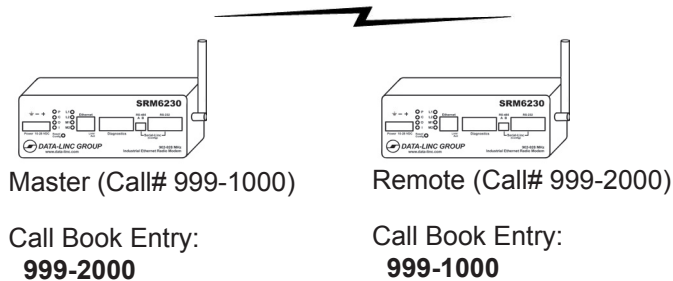
Master	Repeater 1 (Connects to Master)	Repeater 2 (Connects to Repeater 1)	Remote 1 (Connects to Repeater 1)	Remote 2 (Connects to Repeater 2)
Net ID=1234	Net ID=1234	Net ID=1234	Net ID=1234	Net ID=1234
• Xmit=0	• Xmit=1	• Xmit=2	• Xmit=15	• Xmit=15
• Recv=0	• Recv=0	• Recv=1	• Recv=1	• Recv=2



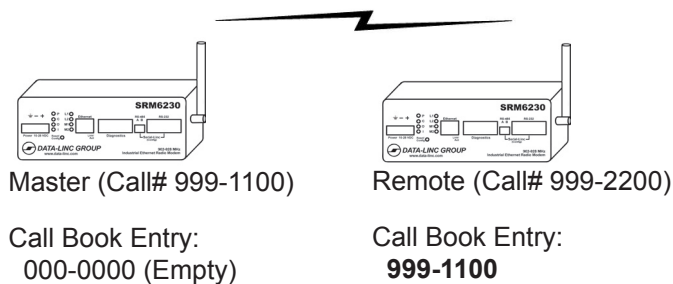
Callbook:

Each SRM6230 and SRM6330 has a unique “Callbook” number (9xx-xxxx). This number is a seven digit unique number that cannot be duplicated.

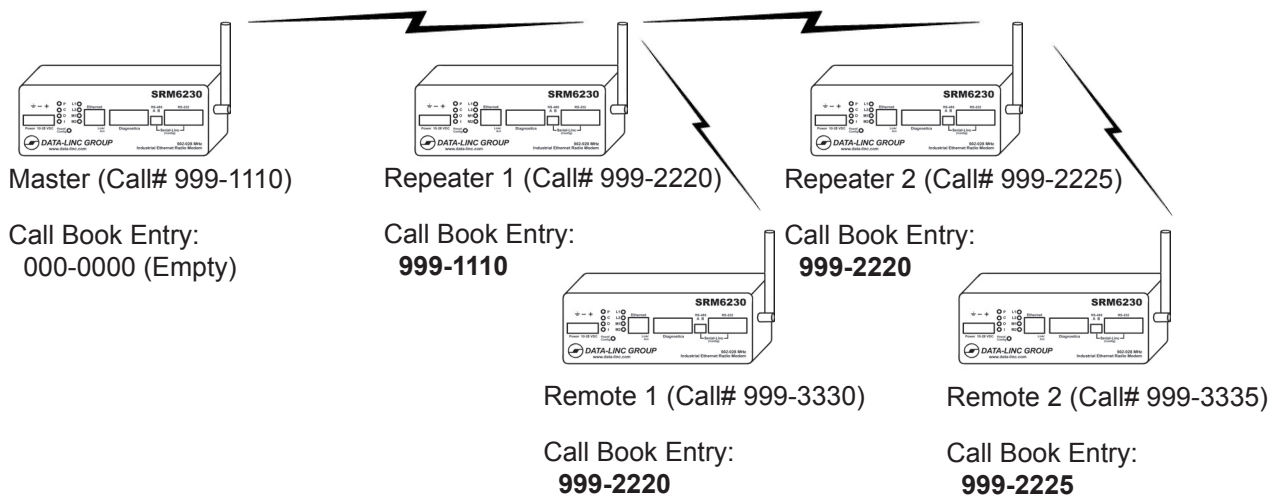
In a Point-to-Point network, the callbook number of the Master radio is in the Remote’s callbook table, and the Remotes callbook number is in the Masters callbook table. If Repeaters are used, their callbook number would go in the “Repeater Number” location.



When using Callbook addressing in a Multi-Point network, it is important to remember that you are addressing towards the Master radio. In a network without Repeaters, the Remotes have the Master’s callbook in their callbook table, and the Master has no entry.



When using Repeaters, any modem (Repeaters and/or Remotes) that are connecting to the Master will have the Master’s callbook number in their table. Any modems that are connecting through Repeaters (Repeaters and/or Remotes) will have the callbook number of that Repeater in their tables.



Repeater(s)

When configuring a network with one or more Repeaters, select the check box for “Repeater(s) in System”.

The screenshot shows the 'Configure Parameters' window with the following settings:

- IP Settings:** IP Address: 192.168.3.1, Net Mask: 255.255.255.0
- Serial Link Settings:** Baud Rate: 19200, Port Number: 1234
- Radio Settings:** Operation Mode: 2 - Point to MultiPoint Master, Freq Key: 12
- Network System Type:** Network ID, Callbook
- Repeater(s):** Repeater(s) in System (checked), Remote / Repeater Mode
- Network ID:** Network ID Number: 255, Subnet Xmit: 15, Subnet Recv: 15

The 'Repeater(s) in System' checkbox is highlighted with a red circle. The background image shows the SRM6230 / SRM6330 logo.

When configuring a Repeater for a Multi-Point network, and that Repeater also needs to act as a Remote (the ports need to be active), select the “Remote/Repeater Mode” check box.

The screenshot shows the 'Configure Parameters' window with the following settings:

- IP Settings:** IP Address: 192.168.3.1, Net Mask: 255.255.255.0
- Serial Link Settings:** Baud Rate: 19200, Port Number: 1234
- Radio Settings:** Operation Mode: 7 - Point to MultiPoint Repeater, Freq Key: 12
- Network System Type:** Network ID, Callbook
- Repeater(s):** Repeater(s) in System, Remote / Repeater Mode (checked)
- Callbook:** Callbook Number: 0, Repeater Number: 0

The 'Remote / Repeater Mode' checkbox is highlighted with a red circle. The background image shows the SRM6230 / SRM6330 logo.

Advanced Settings

Note: The Advanced Settings are for experienced users and, in most cases, these settings have been optimized at the factory and do not need to be changed.

Before making changes here please contact our Customer Support team at: 425-882-2206

To gain access to the Advanced Settings, click on the “Edit Advanced Options” button on the right hand side of the screen. When done with the settings, you can either leave the menu window open, or close it; when asked if you would like the changes to be saved select “Yes”. If you do not want to make the changes simply close the window (click on the “Close Advanced Options” button) and say “No” when asked if you want to save the changes. In doing this, any setting that was changed will revert back to how it was set before the window was opened.

Min Packet & Max Packet

The Min and Max Packet settings allow the user to designate the size of the packets (in bytes) used by the radio modem in its communication link. Because the packet size is defined by the SRM6230/SRM6330s' onboard processor, these setting should not be changed. The only time it may be necessary to change these settings is if the SRM6230/SRM6330s are being added to a network of SRM6210E/SRM6310Es that have different Min and Max Packet values.

Retry TO (Time Out)

The Retry Time Out setting allows you to set the number of “hops” that a Remote (or Repeater) must miss from its network Master before it will drop its connection and go into acquisition mode. The default setting is 255. When the SRM6230/SRM6330s are in an application where it will not move, or if it moves, but only to connect to the network Master (or a specific Repeater), then you should not change this setting. However, if your application involves Remote's that are mobile and need to change from a Repeater to another Repeater and/or the network Master, then lowering this setting can help speed up the process of the Remote changing its Master. The minimum setting is 8.

RF Power

The SRM6230/SRM6330s are variable output power radios with 1 Watt being the maximum power (1/2 Watt for the SRM6330). The power settings range from the lowest setting, 1, to the highest setting, 10. The default setting is 10, and for most applications there is no need to change this. Even with radios that are close together, there is no harm in leaving the radios at full power. If the modems are in applications where conserving power is needed, lowering the power can be a consideration.

RF Data Rate

The SRM6230/SRM6330s radios will operate at two RF data speeds. The default setting of “2” sets the modem to its higher speed. This optimizes the modem's throughput. A setting of “3” will slow down the RF speed, and, in some cases, help the modem in “difficult” RF environments but will lower the data throughput. In a Multi-Point network, all modems in the network must be set to the same RF speed.

High Noise

The High Noise setting can help the radio with noise rejection, but does so at a cost of range and data throughput. If a high noise environment is suspected, this setting can be used, but should be checked to see if it has a positive effect (Does the perceived problem get better?).

Number of Repeaters

This setting tells modems in a given network that Repeaters are being used. You will find that this setting will set itself when you check the “Repeater(s) in System” check box.

Master Packet Repeat

In a Multi-Point network, the network Master does not know how many [?]s and Repeaters there are. Because of this, there is no “packet acknowledgment” and no way for the Master to know if a receiving radio received the sent packet. To ensure reliable communications, the Master will resend each packet a defined number of times. The Master Packet Repeat setting defines the number of packet repeats. For optimum throughput, the default setting is “1” and should be changed only if the modems are in “harsh” RF environments (high noise, long range, etc.). Please note that setting the MPR to a higher number will reduce the throughput and should only be done if a performance problem is detected.

Remote Retry

Network Masters will acknowledge a packet sent by a Remote (see Master Packet Repeat), so there is no need to resend packets blindly. However, in large networks the Master may not receive the packet and/or the may not hear the Master’s acknowledgment. To deal with this the Remote can be set to resend the packet if it does not receive the acknowledgment from the Master. The Remote will keep resending the packet only until it receives the acknowledgment, or the number set in the “Retry” box is reached. The default setting is 9.

Repeater Freq

In a Multi-Point network all modems are using the same Frequency Key (hopping pattern) to stay synchronized. In most cases no two radios will be trying to transmit on the same frequency at the same time. However, in networks with two or more Repeaters, there can be frequency collisions between Repeaters and/or the network Master. Setting the “Repeater Freq” setting in the Repeaters in this type of network to “1”, and setting the Repeater’s “Frequency Keys” to different settings from each other and from the network Master will prevent the frequency collisions.

Remote/Repeater

The SRM6230/SRM6330s have the advantage of being able to use Repeaters that can also act as Remotes. This allows the use of locations where a radio is deployed to also be used as a Repeater site, without having to have two radio modems. Setting the “Remote/Repeater” to “1” enables the data ports on a Multi-Point Repeater. Please note that the modem’s primary setting is as a Multi-Point Repeater not a Multi-Point Slave. You will find that this setting will set itself when you check the “Repeater/Remote mode” check box.

Diagnostics

The SRM6230/SRM6330s are fully compatible with LincView OPC diagnostic software. They can be connected to the PC running LincView OPC via either a serial connection or via an Ethernet connection. When setting up an SRM6230 or SRM6330 network Master to run diagnostics, the “Diagnostics” setting needs to be set to either “1” for a serial connection or “129” for an Ethernet connection.

Note: For serial connections, the default setting is “1” which will give a diagnostics packet to the software at every frequency hop. In large networks this might affect the overall system performance. Increasing the number of hops before a packet is delivered can help improve the performance in these situations. To do this increase the Diagnostics setting. For a serial connection the setting ranges from 1 to 60.

MAC Filter

When enabled, the MAC filter monitors the Ethernet traffic that is on the LAN side of the modem, and filters out traffic where the destination and source addresses are both on the LAN side. This limits the amount of traffic that is broadcast across the limited bandwidth of the radio.

Note: Not all network traffic that is not destined to cross the RF link will be filtered. Broadcast and Unicast packet (as well as others) will not be blocked by the MAC filter. If the SRM6230/SRM6330s are connected to anything other than a dedicated network, it is strongly recommended that a managed switch be placed in front of the modem, and any traffic not supposed to cross the radios be blocked.

Hop Table Versions (Example using the 900 MHz SRM6230)

The SRM6230 has 7 different hop table settings (all within 902 – 928 MHz). These settings allow you to alter the frequencies used by the 15 different Frequency Keys. These hop tables can be used to meet international regulations, or in the case where many different networks are collocated, they can be used to set different networks to use different frequencies. The different tables are:

Selection	Name	Band
0	Standard	Full 902-928 MHz
1	Australia	910-928 MHz
2	International	902-928 MHz, 16 fewer frequencies than full Standard set
3	Taiwan	916-920 MHz (May not be legal for use in Taiwan)
4	New Zealand	921-928 MHz
5	Notch	902-928 MHz, center frequencies of 911-919 notched out
6	Brazil	902-915 MHz

Note: All radios in a given network must be set to the same “Hop Table”

Hop Table Versions (SRM6330)

The SRM6330 has 6 different hop table settings (all within 2.400 - 2.4835 GHz). These settings allow you to alter the frequencies used by the 15 different Frequency Keys. These hop tables can be used to meet international regulations, or in the case where many different networks are collocated, they can be used to set different networks to use different frequencies. The different tables are:

Selection	Band
0	Entire band, 2.400 - 2.4835 GHz
1	Entire band, but offset frequencies from selection 0
2	Lower 1/3 of band
3	Middle of band
4	Upper one third of the band
5	2 outer 1/3s of band, avoids the middle

Note: All radios in a given network must be set to the same “Hop Table”

Frequency Zones (Example using the 900 MHz SRM6230)

Frequency Zones allows for the division of the 902-928 MHz frequency range to be divided into 16 smaller frequency ranges, each having 7 channels. This function can be used when many networks are collocated, or if there is other equipment in the area that operates in some segment of the 902-928 MHz band, and the SRM6230 might cause problems with this equipment. The SRM6230 comes set with all zones enabled, and, unless there are reasons to do otherwise, should not be changed. If it is necessary to disable a “zone”, uncheck the box for that zone. Please note, in North America, a minimum of 50 channels (8 zones) must be used at all times.

The following table defines the Frequency Zones:

Zone Number	Beginning Freq. MHz	Ending Freq. MHz
1	902.2464	903.6288
2	903.8592	905.2416
3	905.4720	906.8544
4	907.0848	908.4672
5	908.6976	910.0800
6	910.3104	911.6928
7	911.9232	913.3056
8	912.5360	914.9184
9	915.1488	916.5312
10	916.7616	918.1440
11	918.3744	919.7568
12	919.9872	921.3696
13	921.6000	922.9824
14	923.2128	924.5652
15	924.8256	926.2080
16	926.4384	927.8208

Note: **All radios in a given network must be set with the same “Frequency Zones”.**

Frequency Zones (Example using the 2.4 GHz SRM6330)

Frequency Zones allows for the division of the 2.4000-2.4835 MHz frequency range to be divided into 16 smaller frequency ranges, each having 5 channels. This function can be used when many networks are collocated, or if there is other equipment in the area that operates in some segment of the 2.4 GHz band, and the SRM6330 might cause problems with this equipment. The SRM6330 comes set with all zones enabled, and, unless there are reasons to do otherwise, should not be changed. If it is necessary to disable a “zone”, uncheck the box for that zone.

Zone Number	Min. Freq. MHz	Max Freq. MHz
1	2400.3072	2405.4912
2	2405.4912	2410.6752
3	2410.6752	2415.8592
4	2415.8592	2421.0432
5	2421.0432	2426.2272
6	2426.2272	2431.4112
7	2431.4112	2436.5952
8	2436.5952	2441.7792
9	2441.7792	2446.9632
10	2446.9632	2452.1472
11	2452.1472	2457.3312
12	2457.3312	2462.5152
13	2462.5152	2467.6992
14	2467.6992	2472.8832
15	2472.8832	2478.0672
16	2478.0672	2483.2512

Note: All radios in a given network must be set with the same “Frequency Zones”.

0 represents a required value. In order to stay within the EU 440 specifications, it is necessary to use the proper frequency zone combination based upon frequency off-set. When using a frequency off-set of 0 (default value) the first zone must be disabled. Using frequency off-sets 1 or 2, Zone 15 must be disabled.

Resetting the IP address and Password

If you need to reset the SRM6230/SRM6330's IP address and password, and you don't have access to SetLinc™ via a serial connection, you can hold the "Reset/Config" button (below the LEDs) while powering the modem up. When the "M1" LED flashes, the address and password have been reset to factory default. The IP address will now be "192.168.3.1" and the password will be "default".

Web Browser Configuration

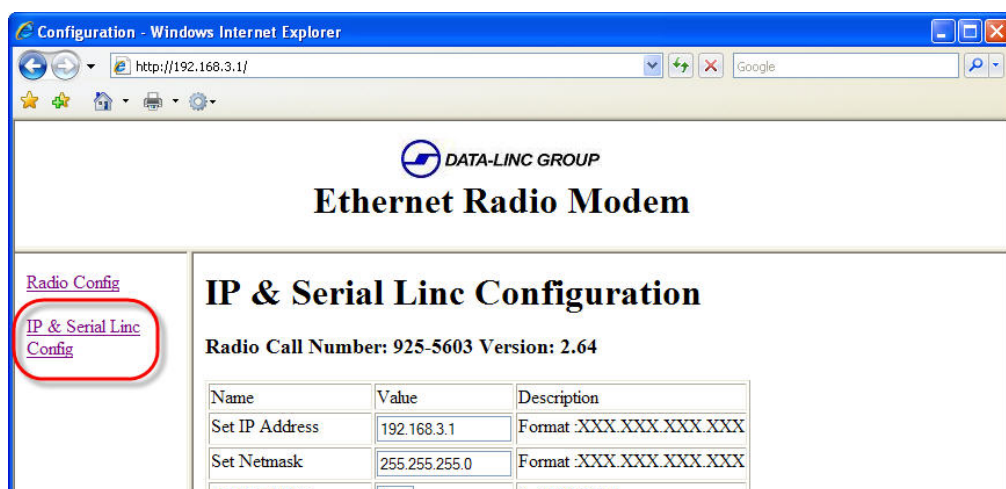
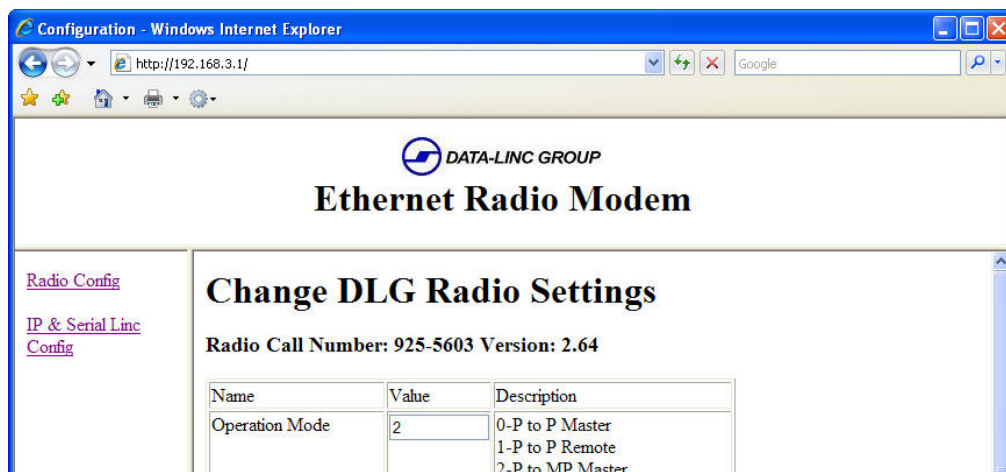
To configure the SRM6230/SRM6330 via a web browser, you must be connected to the modem's Ethernet port, know the IP address of the modem and know the password. The default IP address is "192.168.1.1" and the default password is "default".

The screenshot shows a web browser window titled "Configuration - Windows Internet Explorer". The address bar shows "http://192.168.3.1/". The page header features the "DATA-LINC GROUP" logo and the title "Ethernet Radio Modem". Below this, the section "Password" is displayed. Under "Password", it says "Radio Call Number: 925-5603 Version: 2.64". There is a table with two columns: "Name" and "Value". The first row has "Password" in the "Name" column and an empty text box in the "Value" column. The "Description" column contains the text "Enter Configuration Pages". Below the table are two buttons: "Submit" and "Reset". The browser's status bar at the bottom shows "Done" and "Internet" with a 100% zoom level.

Name	Value	Description
Password	<input type="text"/>	Enter Configuration Pages

Note: When using the default IP address, the IP address of the PC must be 192.168.1.x (where "x" is the fourth address digit).

Once connected to the SRM6230/SRM6330 that you would like to configure (or connected to the network that the modem is on) enter the IP address of the modem. This will bring up a password prompt screen.



Note: To change the password in the SRM6230/SRM6330 you must use the supplied SetLinc™ configuration utility.

After supplying the password, you will be brought to the “Change DLG Radio Settings” screen where you can make changes to the basic radio’s configuration. For details of the different parameters. Please see descriptions in the first part of this manual.

To configure the IP address, MAC filter and serial port settings, click on the “IP & Serial Linc Config” button on the left side of the screen. From this screen you can enable the MAC filter, set the IP address and configure the serial port.

Testing the Connection

The SRM6230/SRM6330s have two basic methods of testing the link between modems. Using the set IP address you can ping the modem from either the LAN connection or across the wireless connection. If a Remote is connected to a Master and the RF path is connected, you will be able to ping the Remote from the Master and the Master from the Remote. You cannot ping Remotes from Remotes. When the network has Repeaters, the Repeaters can also be ping'd (from the Master only) as long as the Repeaters ports are active (see Advanced configuration). However, if your network has Repeaters without active ports, and you can ping any Remotes that are linked to the Master via the Repeater(s) then the Repeaters are functioning correctly.

Another method of testing the SRM6230/SRM6330s' connection is a serial loop back test. Because the SRM6230/SRM6330s work with both Ethernet and Serial communications, doing a serial loop back test is possible. Even if your application is not using the serial ports, these are always active and can be used to test the connection path. To do a loop back test, connect a terminal program (such as Hyper Terminal) on either the Master or one of the Remotes in a network. On the other end of the connection path jumper pins "2" and "3" of the DB-9 "Serial Linc" port. Configure the terminal program to run at the same speed the serial ports are configured to run at (the default speed is 19.2 Kbaud) and, using the computers keyboard, type. The characters you type should echo back to you.

If either of these tests fail, go back to the configuration portion of this manual and confirm that the modems are configured correctly and/or contact Data-Linc Group's Customer Support Team (425)882-2206.

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.

Contact Information

Corporate Office

Data-Linc Group

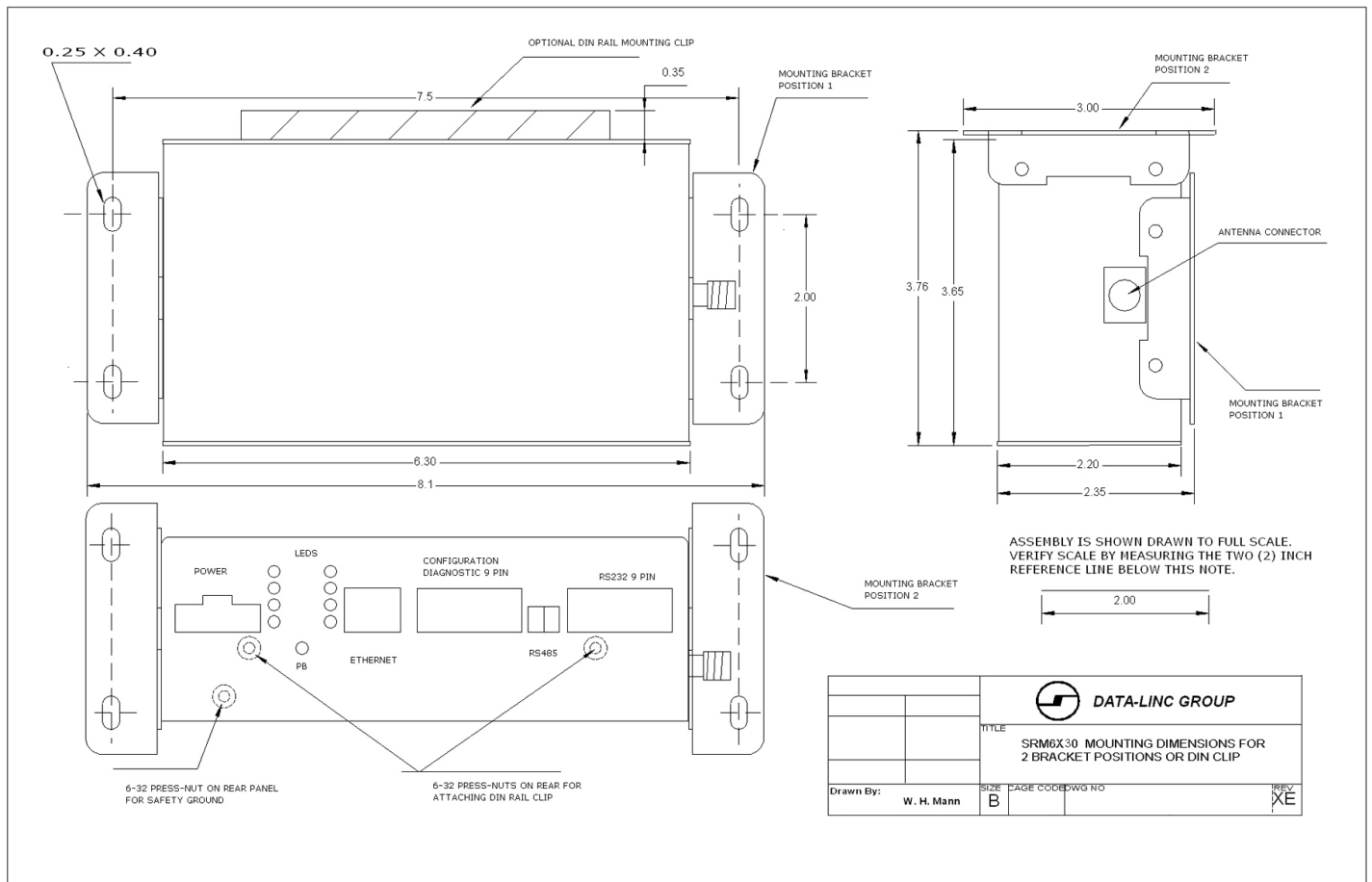
1125 12th Ave NW
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Issaquah, Washington 98027 USA

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Web site: www.data-linc.com

Appendix A: Technical Specifications

	SRM6230	SRM6330
Input Voltage Range	9-30 VDC	
Power Consumption	8 Watts Max (2 Watts Min.)	
Transmitter Output Power	1 Watt Max (10 Steps)	500 mW Max (10 Steps)
Transmitter Modulation	GFSK, 144 Kbps -188 Kbps	
Receiver Sensitivity	-110 dBm @ 10-4 raw BER -108 dBm @ 10-6 raw BER	-102 dBm @ 10-4 raw BER
Operating Frequency	902-928 MHz ISM Band (No FCC site licence required)	2400-2483.5 MHz ISM Band (No FCC site licence required)
Operating Temperature Range	-40 - 167 F (-40 - 75 C)	
Operating Humidity	0 - 95% (non-condensing)	
RF Data Error Detect / Correction	32 bit CRC, Resend on Error	
RF Data Encryption	Substitution, Dynamic Key, optional AES	
RF Data Rate	188 Kbps	
RF Range	Rated 25 miles (40 km) with line-of-sight, 35 miles (56 km) with line-of-site under optimal conditions; (farther with repeaters)	Rated 10 miles (16 km) with line-of-sight; (farther with repeaters)
Maximum Data Throughput	110 Kbps (in point-to-point mode)	
Ethernet Connection	RJ-45 Port 10/100Base-T Auto-MDIX	
Serial Connections	Application Data [Either RS-232 DB-9 Female DCE Port or RS-485 Terminal Block] Diagnostics Data [RS-232 DB-9 Female DCE Port]	
Power Connection	3 Position Pluggable Terminal Block	
Antenna Connection	Standard Thread SMA	
Operating Modes	Point-to-Point, Point-to-Multipoint, Repeater, Repeater/Remote	
Enclosure Material	18 Gauge Steel	
Enclosure Dimensions	2.25" x 3.625" x 6.30" (5.72 x 9.21 x 16.0 cm)	
Mounting Options	Two L Brackets for Back or Bottom mounting (DIN clip bracket available)	
Weight	1.94 lbs. (0.88 kg.)	

Appendix B: Enclosure Dimensions



Note: Enclosure Size, Mounting Holes and Locations may change without notice.

Contact Data-Linc Group (425) 882-2206 for the latest Enclosure Dimensions.



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