User Guide

SRM8200

High-speed, Long-range 900MHz
Adaptive FHSS Spectrum
Ethernet &/or Serial Protocols
Supports Edge Computing

Standard License-free 900MHz Band	
The Americas	902-928 MHz
Factory Locked License-free Bands	
Australia	915 - 928 MHz
Brazil	902 - 907 & 915 - 928 MHz
New Zealand	915 - 928 MHz
Peru	916 - 928 MHz

For coverage from process to perimeter to the edge

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

DATA-LINC GROUP™
Field-proven performance ~ Industrial grade support
The industrial wireless communication experts

Corporaate Headquarters
1125 12TH Ave NW
Suite B-2
Issaquah, WA 98027 USA

User Guide

SRM8200 900MHz

161-11914-000A 032023

Warnings / FCC
FCC Part 15 Notification

Federal Communication Commission Interference Statement

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 modem frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to modem communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to modem 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 of the following measures:

- Reorient or relocate the receiving antennas.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one to which the receiver is connected.
- Consult the dealer or an experienced modem/TV technician for help.
- Verify that the ambient temperature remains between -40 to +75° C, taking into account the elevated temperatures when installed in a rack or enclosed space.
- Verify the integrity of the electrical ground before installing the device.

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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

FCC Radiation Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. To avoid the possibility of exceeding modem frequency exposure limits, you shall keep a distance of at least 100 cm between you and the antennas of the installed equipment. This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

About Data-Linc Group

Since 1988, Data-Linc Group has provided reliable communication solutions for industrial automation systems. Data-Linc is an alliance partner with most major PLC manufacturers including Rockwell Automation, Siemens, Schneider Electric, GE Fanuc, and Omron, as well as others, providing expert technical support and communications consultation. Data-Linc's industry proven wire and RF technology has been successfully implemented in all major industries including automotive plants, consumer goods manufacturing/packaging, steel mills, mines, oil and gas refineries, paper mills, utilities, water/wastewater and transportation systems. Data-Linc products are available for installation worldwide.

Technical Support

Data-Linc Group maintains a fully trained staff of service personnel capable of providing complete product assistance: technical, application and troubleshooting, spare parts and warranty assistance. Our technical staff are based in Issaquah, 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 with a Data-Linc assigned RMA# and detailed problem description and transport 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 Headquarters
Data-Linc Group
1125 12th Ave. NW, Suite B-2
Issaquah, Washington 98027 USA
Telephone: (425) 882-2206
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E-mail: info@data-linc.com
Web site: www.data-linc.com

- **Note**: In the United States of America, whenever any Data-Linc Group modem is placed inside an enclosure, a label must be placed on the outside of that enclosure which includes the modem's FCC ID.

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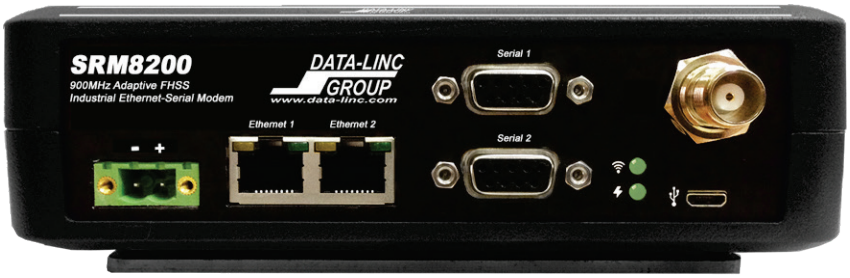
1. INTRODUCTION



CAUTION
To avoid possible damage to the modem, always have an antenna connected when power is applied.

Data-Linc's SRM8200 is a license free 900MHz long range modem with dual Ethernet and dual serial connectivity. The SRM8200 is a wireless high performance modem designed for heavy-duty industrial data communications. It has RF speed of up to 4 Mbps and is based on Adaptive FHSS, a new paradigm for band utilization that takes optimal advantage of spectrum gaps. With advanced features like edge computing, forward error correction, packet compression, packet aggregation and 128-bit/256 AES encryption options, the SRM8200 performs exceptionally well in harsh industrial and crowded RF environments.

The SRM8200's range is up to 40 miles with line-of sight (LOS) and may be extended with Repeaters and/or high gain antennas to provide unsurpassed flexibility and performance. Repeaters not only serve to extend range but also to eliminate dead RF zones by circumventing obstructions and establishing LOS.

An external antenna may be used with up to two hundred feet of coax for antenna positioning to maximize RF performance. The modem can be used indoors and inside metallic enclosures with external antenna. SRM8200 networks offer an unlimited number of remote sites communicating with a single Gateway. The SRM8200s operate in virtually any environment where Ethernet and/or serial communications are required. Each modem has two Ethernet ports with standard Auto-MDIX 10/100 Base-T connectors and two independent RS232 DB-9 DCE serial ports.

All SRM8200 modems are identical and user configurable permitting a single modem spare. Modem configuration can be saved to a file, archived, applied to other modems or emailed. Operating modes are Gateway, Endpoint, Gateway_Repeater and Endpoint_Repeater

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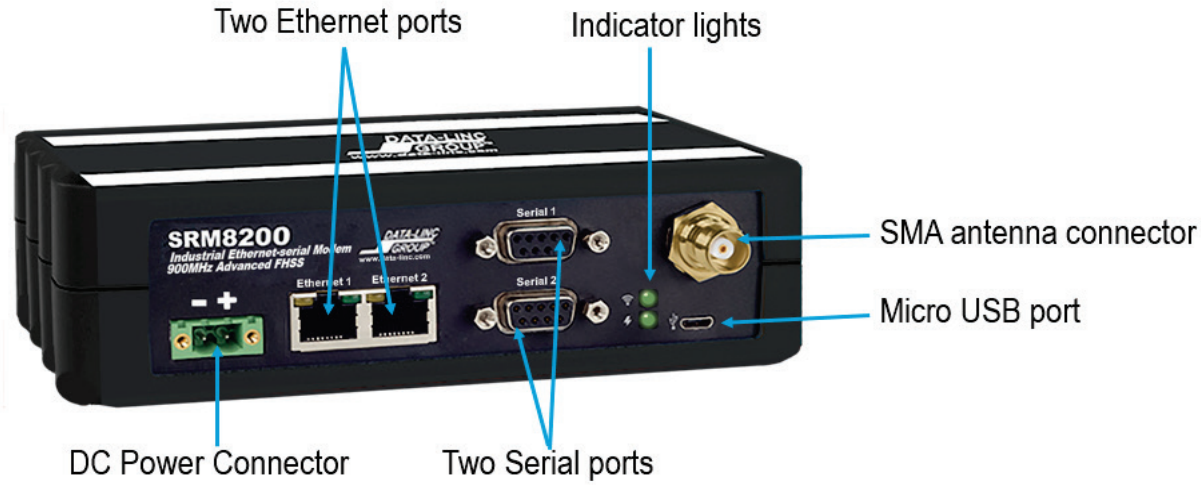
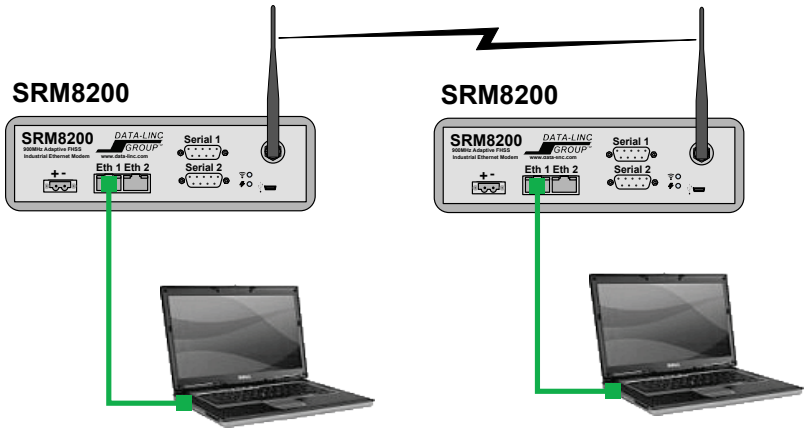
FRONT PANEL OVERVIEW



This User Guide covers the operating modes and configurations that are available to SRM8200 users. It also provides the user with bench testing instructions and technical information. Upon request, the SRM8200 can be factory configured before shipment as a value-added service for network startup convenience. The SRM8200 utilizes the latest advanced technology and is the first product in the SRM8 series of wireless adaptive technology modems. The SRM8200 can interoperate and co-exist with other Data-Linc products however due to different RF technologies they cannot be combined at the RF level. Networks support peer-to-peer communications.

For demonstration this guide provides a two modem application walk-through and how-to steps to create it as illustrated:



This document also discusses more complex networks and repeaters.

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1.1 PROVIDED EQUIPMENT

Each SRM8200 modem includes:

Quantity	Description
1	SRM8200
1	Mounting bracket assembly and screws
1	Power Supply, In:100 to 240 VAC,50/60 HZ., Out: 12VDC @ 1.5 amps
1	Test Antenna, 2.15 dBi
1	CAT5 Cable, 6 foot

Additional equipment for setup and testing:

- One or more computers running Windows 7 or later (Windows 10 preferred).
- Web Browser (Internet Explorer, Edge, Firefox, Chrome, etc.).
- USB cable with standard USB connector and micro USB connector.
- USB/RS232 Adapter or built-in serial port.
- A serial terminal emulator program such as Hyper Terminal, Tera Term or Putty. This guide uses Tera Term.

1.2 MOUNTING OPTIONS

SRM8200 is provided with mounting brackets that allow easy and flexible mount orientations. The bracket rear also allows use of an optional DIN rail clip (part number DIN-CLIP).

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Mounting brackets are installed at the bottom of the unit from factory.

Mounting brackets when moved to the side of the unit.

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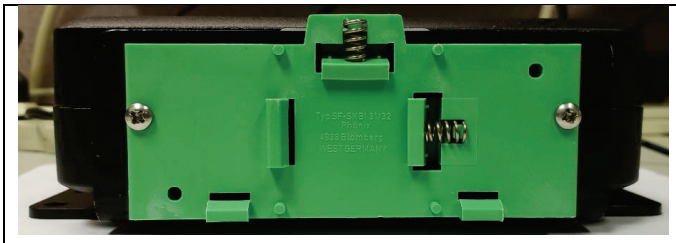	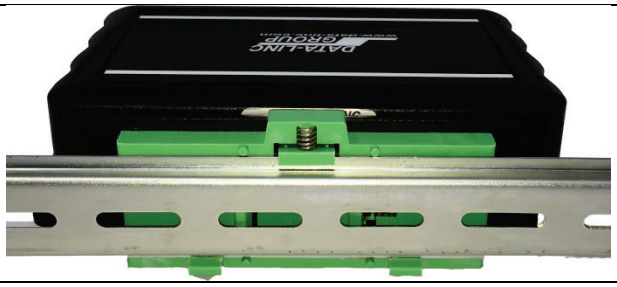
DIN rail clip option can mount modem vertical or horizontal on rail.	DIN Clip clipped to DIN rail.

Bracket orientated for wall mount	Bottom Mount

Please note: The mounting brackets come with every SRM8200 and DIN Clips are sold separately

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1.3 COMMON DEFAULTS

SETTING	DEFAULT
Ethernet	
IP Address	192.168.111.100
Subnet Mask	255.255.255.0
Gateway	192.168.111.1
Login Credentials	
Account	admin
Password	admin

1.4 LED INDICATORS

The LED indicators on the front panel of SRM8200 are:

LED	LED Color	Description
Top (RF Link)	1. Off	No wireless link.
	2. Solid Green	Wirelessly connected.
	3. Flashing Green	Signal from other modem but not connected.
Bottom (Power)	1. Off	No power.
	2. Solid Green	Power On.
Ethernet Left	1. Off	10 mbps connection.
	2. On	100 mbps connection/
Ethernet Right	1. Off	No Ethernet connection.
	2. On	Ethernet connection.
	3. Flashing	Ethernet traffic.

There are no other valid states for the LED indicators.

1.5 ANTENNA COMPONENTS

The SRM8200 uses a standard thread female SMA connector.
The FCC permits use with these antenna types and gains:

- omni-directional of 10.5 dBi or less
- directional of 16 dBi or less

Contact Data-Linc for antenna system components including antennas, lightning arrestors, panel pass-through devices and tested coax cables with end connectors.

1.6 CONFIGURATION METHODS

- Web Browser
- Command Line Interface (CLI)
- SSH
- Drag and Drop

1.7 WIRELESS OPERATING MODES

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SRM8200 can be configured for networks with and without repeater services. All SRM8200 networks should have one Gateway modem and at least one Endpoint. Gateway_Repeater and Endpoint_Repeater can be added in the network as needed. An Endpoint_Repeater is considered a generic or standard repeater.

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2. APPLICATION WALK-THROUGH

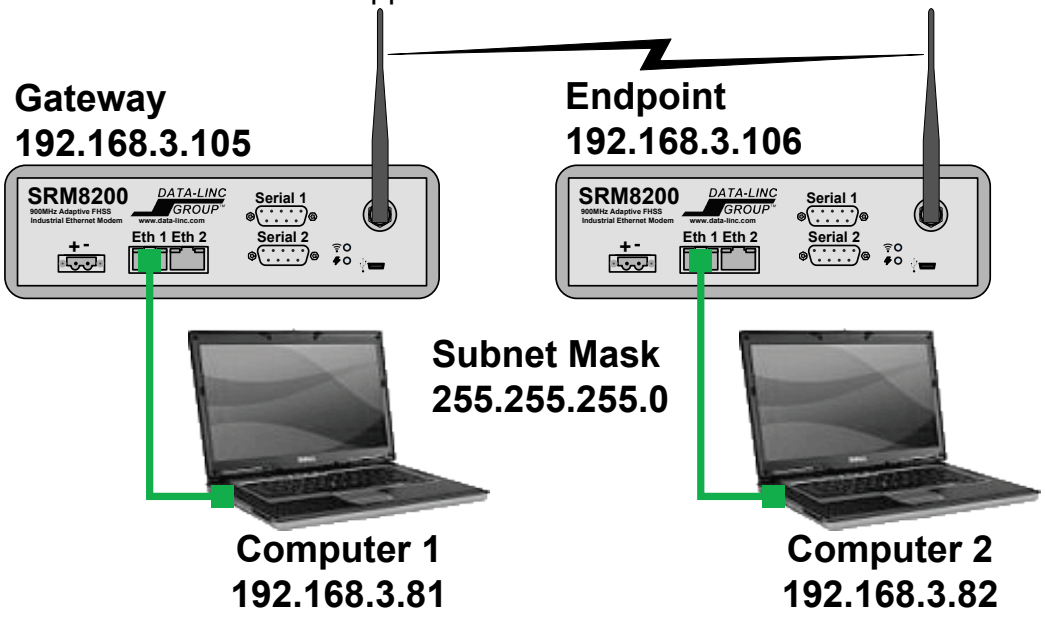
The SRM8200 modem can be used in numerous diverse applications and network architectures. This section of the user guide, by simple procedures and architecture, will guide through the process of defining an application using the SRM8200 modem.

2.1 DOCUMENT THE APPLICATION

Documenting, building and testing a network are a multi- step process:

- Prepare a network drawing identifying all related equipment
- Plan and implement equipment and modem IP addresses
- Determine modem operating modes then configure each modem.
- Attach all equipment and test

We will build and test this application network:



The IP Addresses of all modems and attached equipment form an Ethernet network. This example uses subnet mask 255.255.255.0 that provides 254 IP addresses (range of 1 to 254). An IP address like 192.168.3.81 has two parts, 192.168.3 is the Ethernet network number (same for all devices) and last octant .81 (host number) unique for each device.

Here are the Ethernet settings for this application:

Device	IP Address	Subnet Mask	Default Gateway
Computer1	192.168.3.81	255.255.255.0	192.168.3.105
Computer2	192.168.3.82	255.255.255.0	192.168.3.105
SRM8200 – Gateway	192.168.3.105	255.255.255.0	192.168.3.105
SRM8200 – Endpoint	192.168.3.106	255.255.255.0	192.168.3.105

Note: Since this network is isolated (without a router or internet connection) that means the Gateway address is not used.

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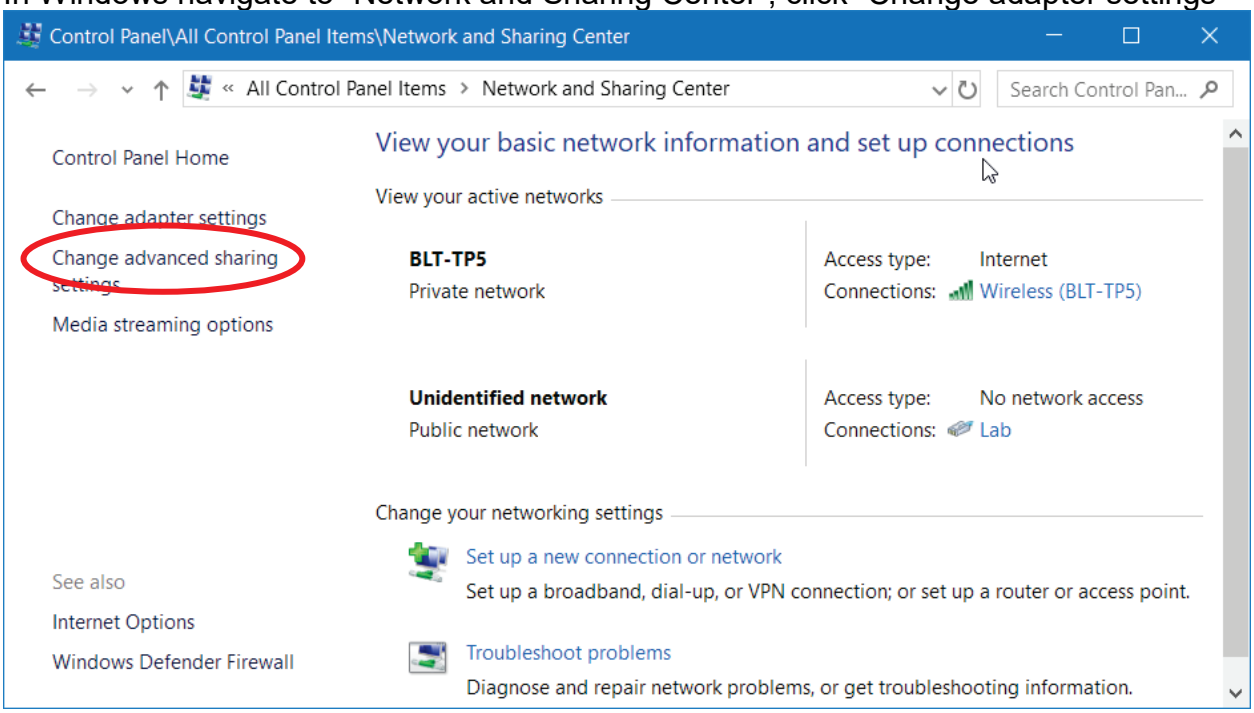
2.2 ASSIGN COMPUTER IP ADDRESS

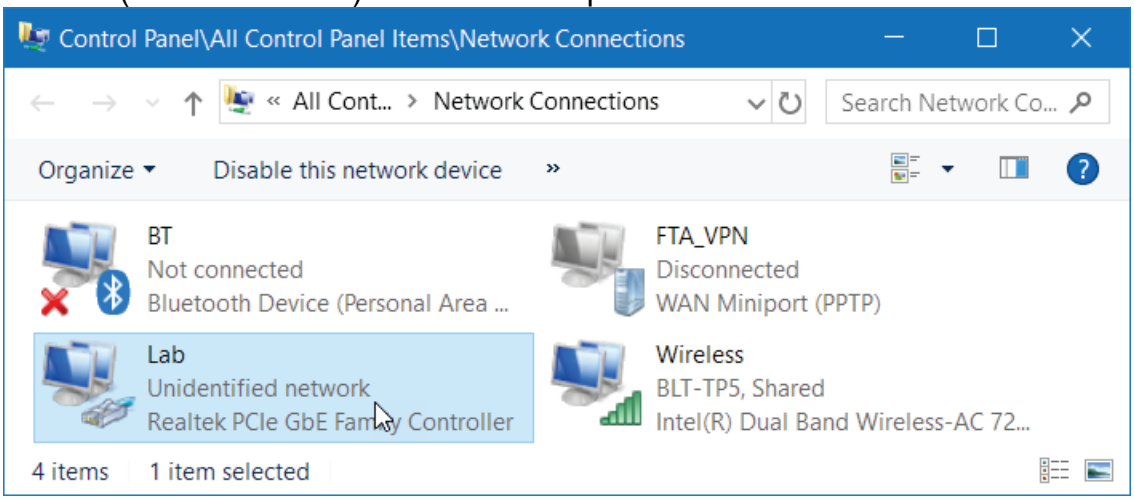
The application uses two computers so the following procedure is performed on both.

- If unsure about changing IP Addresses consult your network administrator or do a web search.
- Record the current Ethernet adapter settings for possible restoration.
- This procedure is for Windows 10. Windows 7 is nearly identical.

1. In Windows navigate to “Network and Sharing Center”, click “Change adapter settings”



2. The Ethernet adapters window appears. Right click on the adapter connected to the modem (Lab in this case) and select “Properties”.



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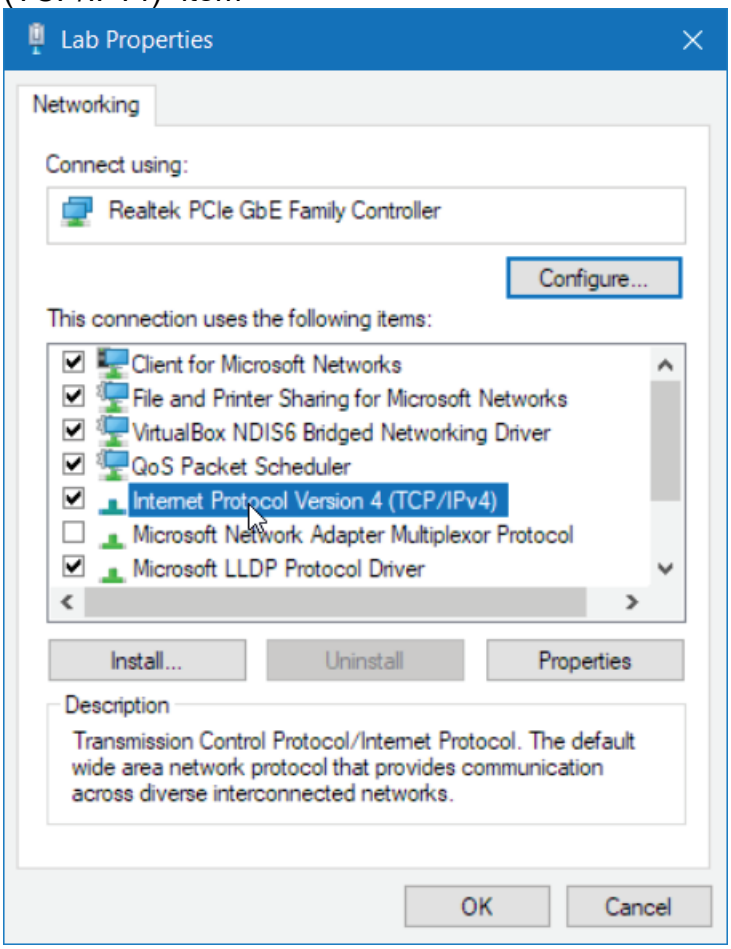
3. The adapter properties window appears. Double click on “Internet Protocol Version 4 (TCP/IPv4)” item



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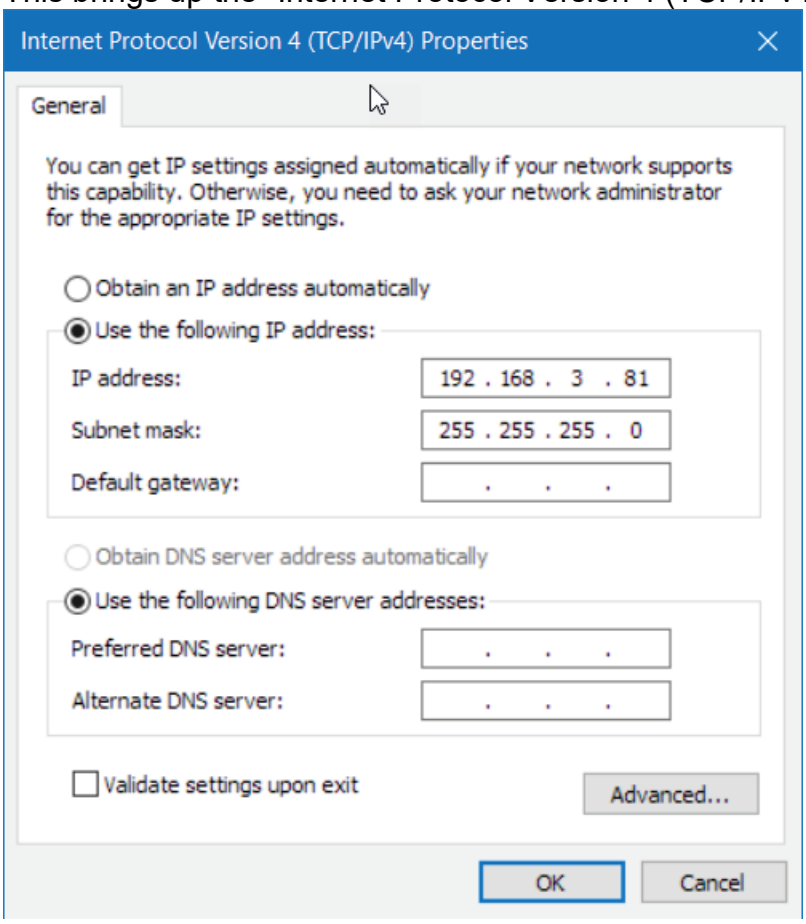
4. This brings up the "Internet Protocol Version 4 (TCP/IPv4)" Properties window.



Change the computer IP address to its application IP Address (Computer 1 = 192.168.3.81. Computer 2 = 192.168.3.82). The computer IP address is configured.

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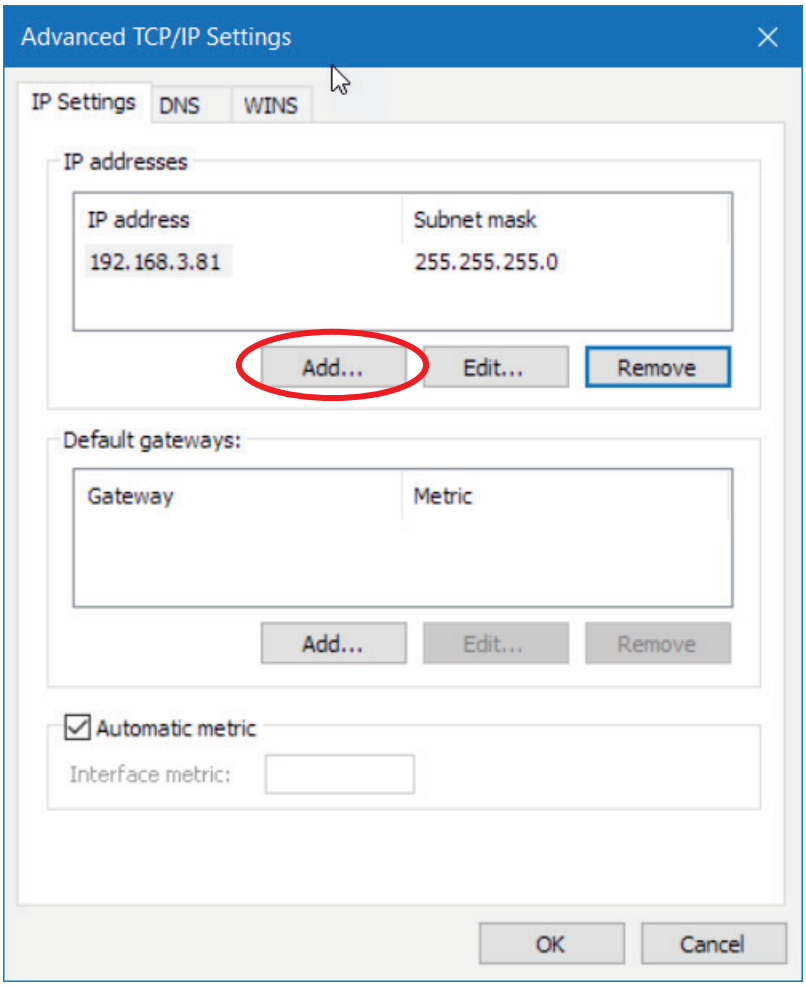
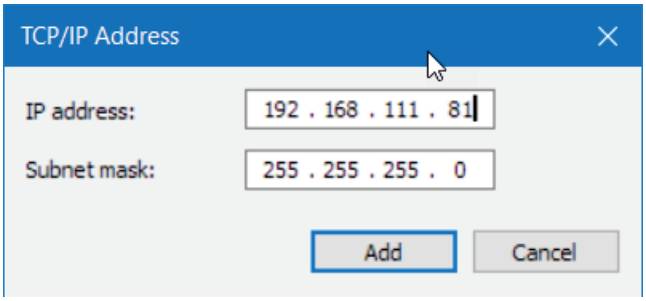
5. This and the next steps are optional and very helpful. Later the SRM8200 default IP address will be changed to the application address. That will be easier if a second IP address is added. Click the “Advanced…” button.



6. The TCP/IP Address window appears. Enter the configuration IP address (application computer 1 = 192.168.111.81 and application computer 2 = 192.168.111.82). Click the “Add” button.



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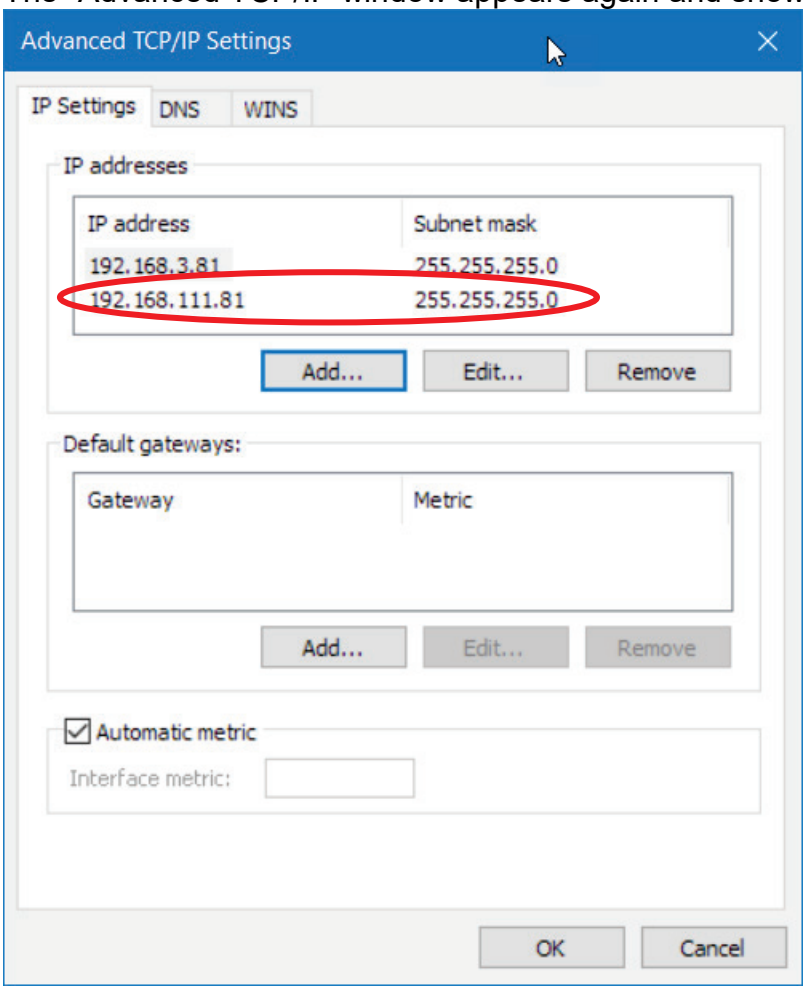
7. The “Advanced TCP/IP window appears again and shows the second IP address.



Done. The computer Ethernet Adapter now has two IP Addresses. This allows easy use of the modem via its default IP address or the application IP address.

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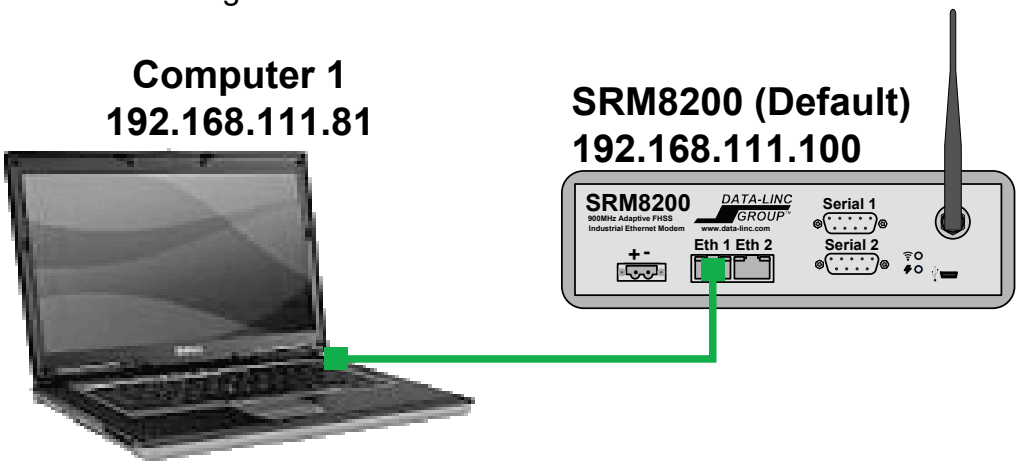
2.3 CONFIGURE A DEFAULT MODEM

This is the configuration network:



1. The computer's IP address (the second address entered previously) is already set.

2. Before applying modem power connect the test antenna. Connect the power supply green female phoenix connector to the modem's green male power supply connector and apply power.

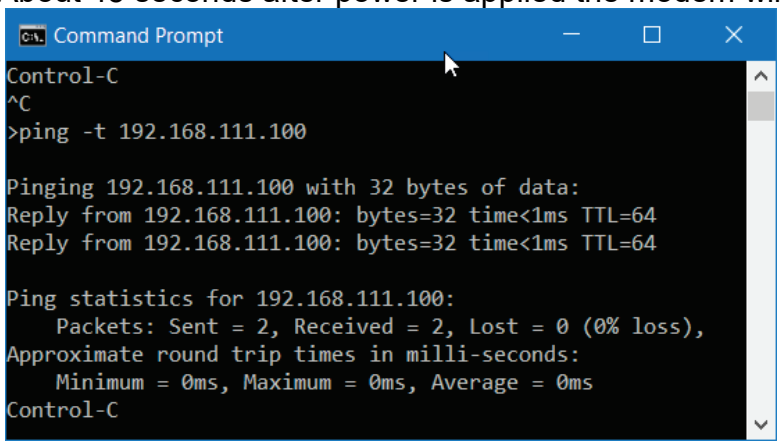
3. Connect a CAT5 cable to either of the SRM8200 Ethernet ports and to a computer.

2.4 PING TEST THE SRM8200

This is a quick test of Ethernet communications between the computer and SRM8200.

1. Open a Windows command prompt (DOS box).

2. Perform a continuous SRM8200 ping by executing this command:
   ping –t 192.168.111.100
   About 45 seconds after power is applied the modem will respond to pings.



   After receiving several good ping replies press "CNTL-C" to end the ping command.

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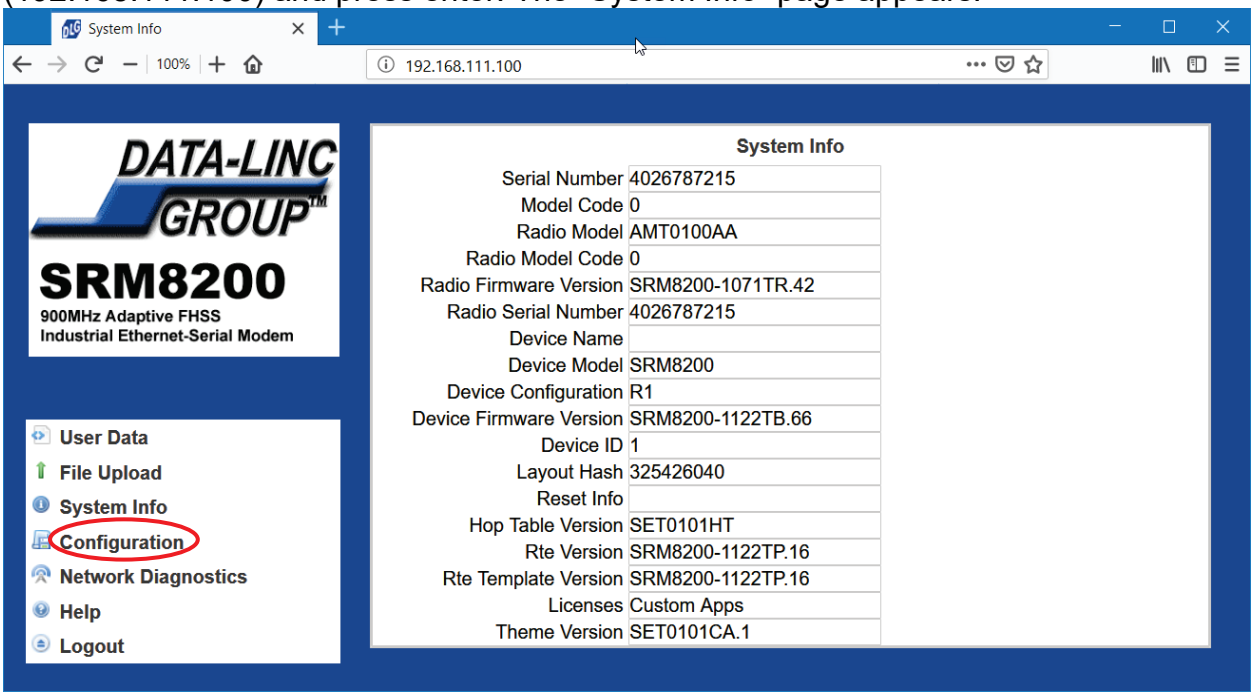
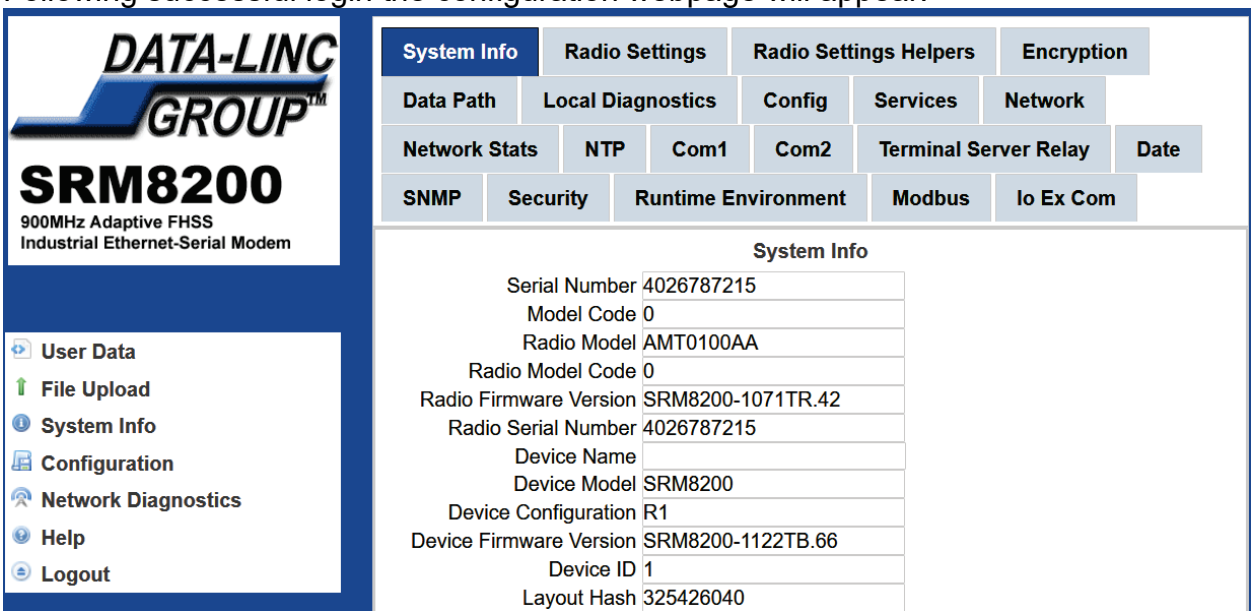
2.5 OPEN THE WEBPAGE

1. Start a web browser, on the address bar enter the modem's IP address (192.168.111.100) and press enter. The "System Info" page appears.



2. To configure the modem, click on the "Configuration" link in the left column. When prompted enter the default username and password.
   - Username = "admin"
   - Password = "admin"
3. Following successful login the configuration webpage will appear.



4. Done. Explore the configuration tabs.

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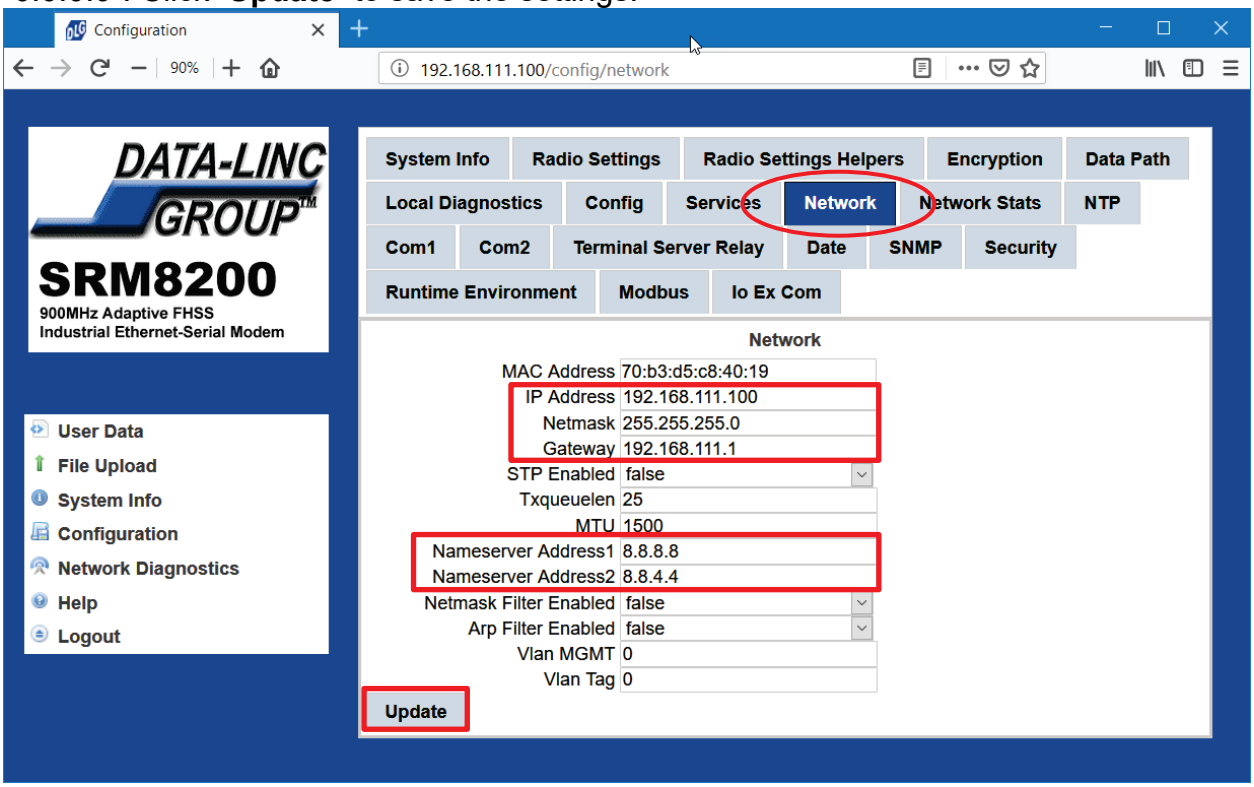
2.6 CHANGE SRM8200 IP ADDRESS

Default SRM8200 Ethernet Settings:

- IP Address = 192.168.111.100
- Subnet Mask = 255.255.255.0
- Default Gateway = 192.168.111.1

The modem's default Ethernet settings need to change to application Ethernet settings.

1. On the top menu click "Network" to view/modify the Ethernet settings. Enter the application IP settings (IP Address = 192.168.3.105, subnet mask = 255.255.255.0, Gateway = 192.168.3.105. Additionally, change the both Nameserver Addresses to "0.0.0.0". Click **'Update'** to save the settings.



Notice how the top tabs automatically adjust to the web browser width.

Note: Data-Linc suggests setting the two Nameserver Address fields to all zeros so the modem does not ARP* to discover its own Ethernet addresses. This will slightly reduce network traffic.

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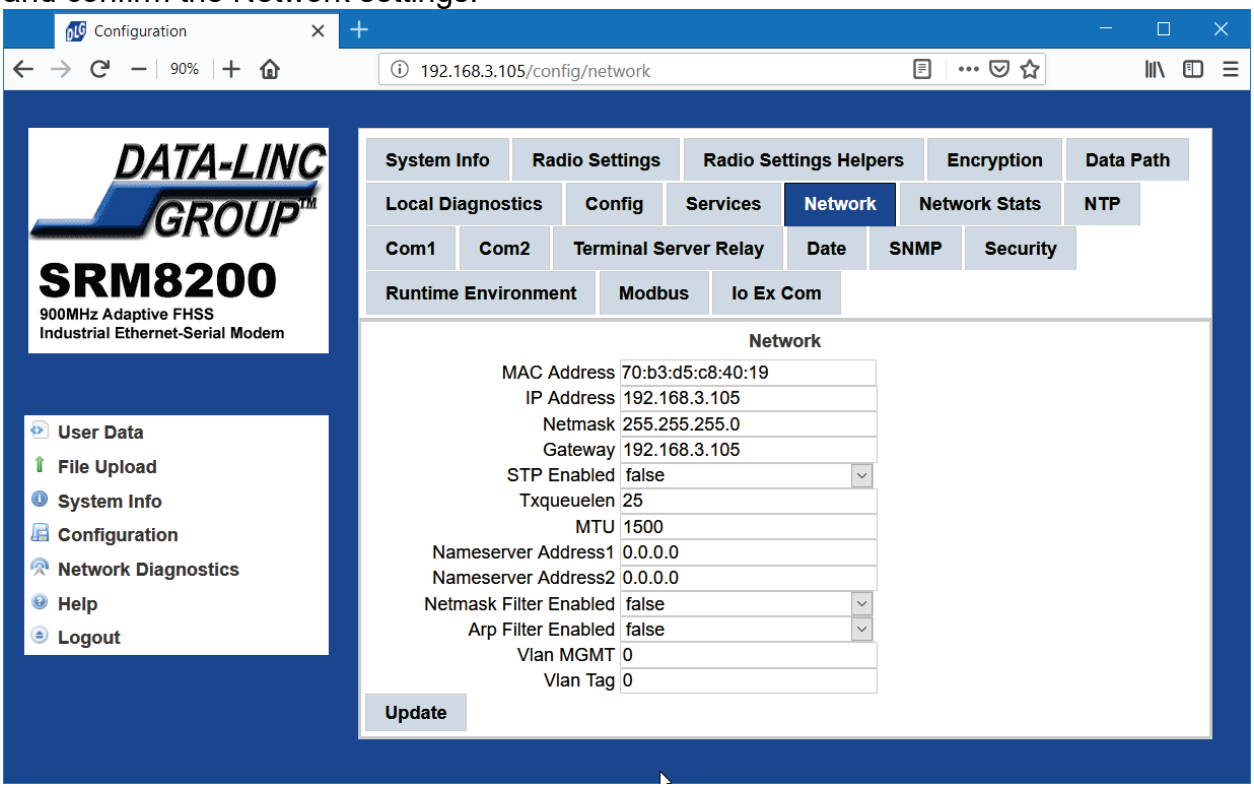
2. The modem IP address changed so the webpage renew fails. Wait a few seconds then on the web browser address bar enter the modem's new IP address, login again and confirm the Network settings.



DEFINITIONS

***ARP** – Address Resolution Protocol

This associates MAC Addresses to IP Addresses – Computers and network devices send out broadcast packets looking for an IP Address of a device and its associated MAC Address.

DNS – Domain Name Server

This converts a URL into an IP Address. Example: www.yahoo.com is converted to the IP Address - 72.30.35.9.

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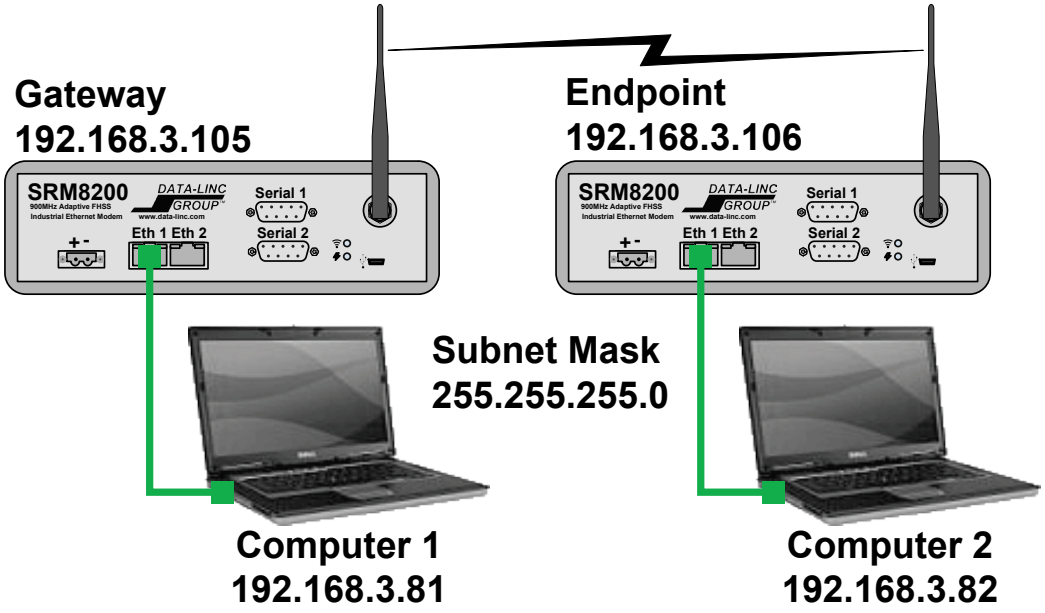
2.7 COMPLETE THE BUILD



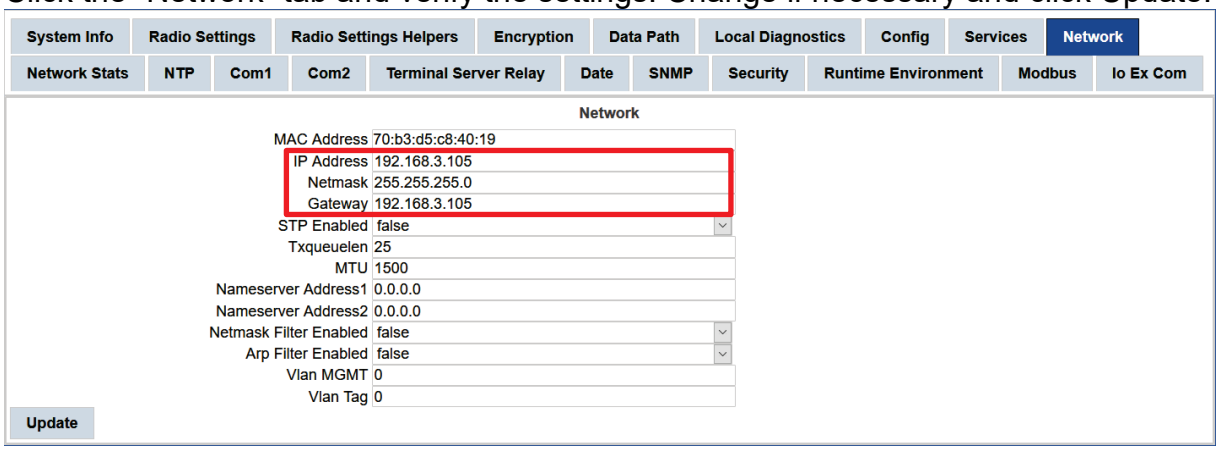
In order to create a Gateway to Endpoint network as shown above, there are five basic configuration settings that need to be changed:

- IP address (set earlier)
- Modem Mode (one modem will be a Gateway, the other a Endpoint)
- RF Data Rate (we'll use Rate_500K)
- Network ID (can be any 1- 4 digit number, we'll use 400)
- Modem Hopping Mode (we'll use Hopping_ON)

It's important to set RF Data Rate, Network ID and Modem Hopping Mode are the same for the Gateway and Endpoint modems. The rest of the settings can be left as shown on Gateway and Endpoint screenshots below. Transmit Power will be set to minimum for bench testing which can be changed as needed.

1. Configure the Gateway Modem

Click the "Network" tab and verify the settings. Change if necessary and click Update.



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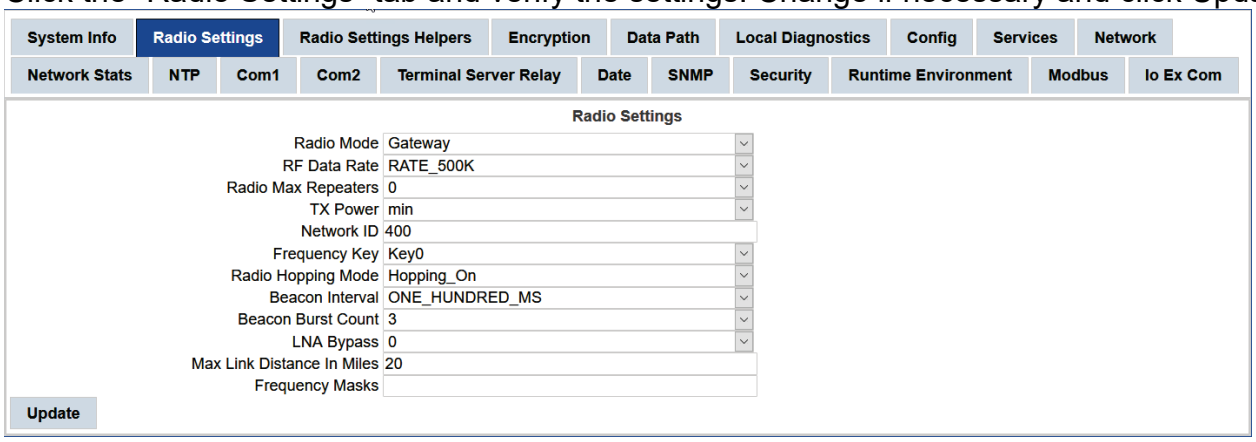
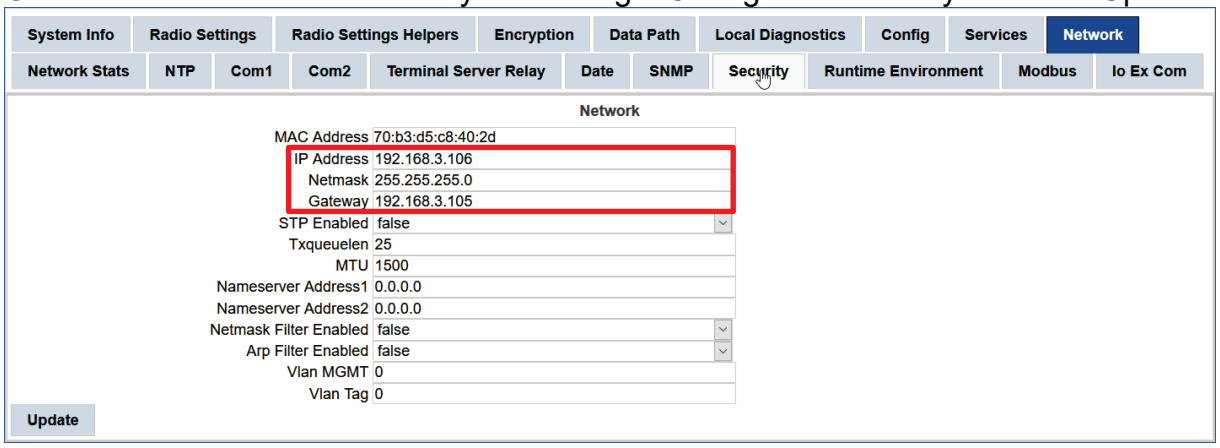
Click the “Radio Settings” tab and verify the settings. Change if necessary and click Update.

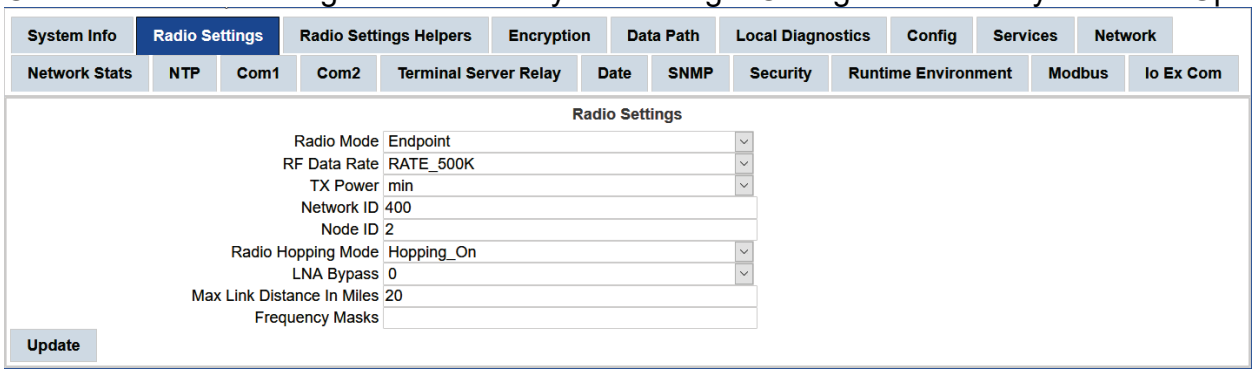


2. Configure Endpoint Modem

Click the “Network” tab and verify the settings. Change if necessary and click Update.



Click the “Radio Settings” tab and verify the settings. Change if necessary and click Update.



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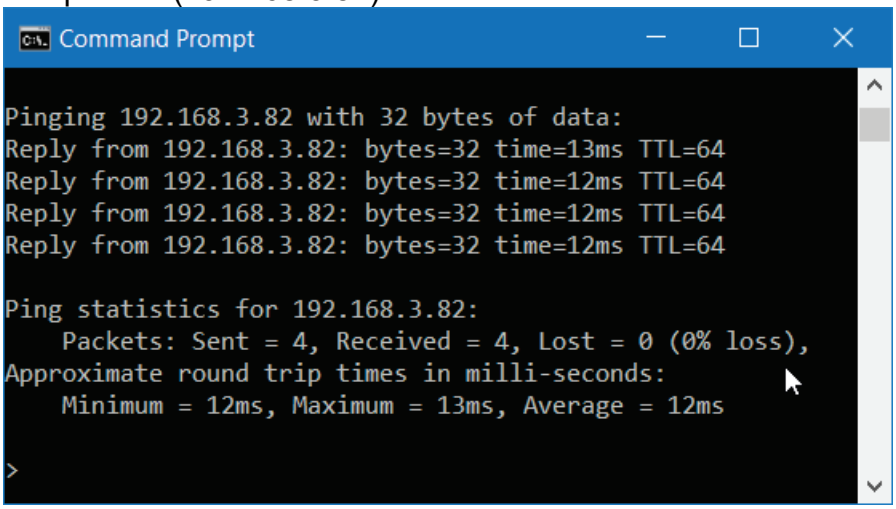
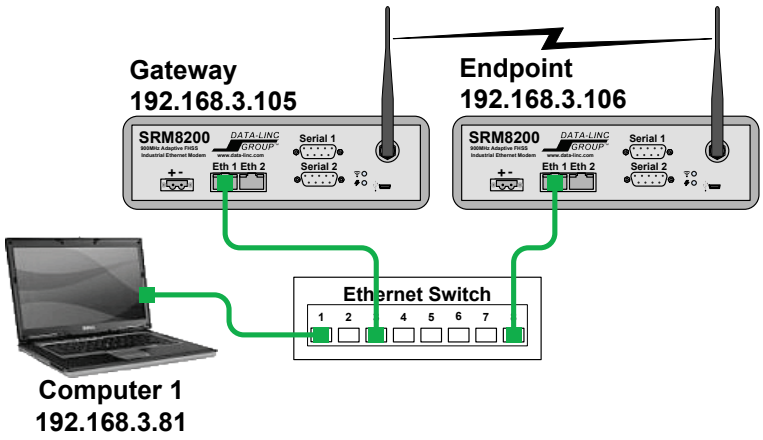
2.8 APPLICATION TEST

1. When wirelessly connected the top LED will be ON (green) for each SRM8200. OFF or flashing red indicates no RF link between the two modems.
2. To verify wireless communication perform ping tests. All equipment and modems will reply to a ping from either of the two computers. The test below shows correct ping response from computer 1 (192.168.3.81), wirelessly through the modems, to computer 2 (192.168.3.82).



2.9 BAD SITUATION

For quicker modem configuration it was decided to connect both modems to a computer using a typical Ethernet switch. When the modems are properly configured RF communication begins. That will cause an Ethernet traffic loop between switch ports 3 and 8; a “broadcast storm”. This will greatly deteriorate network and wireless operation but not damage equipment.



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3. WEBPAGE UPDATE RULES

- Settings are not applied until Update is pressed.
- If changes are made on a tab then navigate to another tab those changes are lost.
- Some changes may affect other visible settings when updated.
- Always press Update after making a change.

- Modem power does not need to be cycled for changes to take effect.

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4. SRM8200 OPERATION MODES

There are four modes of operation on SRM8200:

Gateway: In Gateway operation mode, an SRM8200 broadcasts RF packets that are received by all Endpoint and Endpoint_Repeater modems that are within RF range. The Gateway also synchronizes the RF channel list and can be considered as a Master modem in Master/Remote topology. Two Gateway options are available, Gateway, and Gateway_Repeater.
The Gateway setting is used for a typical wireless network where communication is needed from the Gateway to all Endpoints and from Endpoints to the Gateway. A SRM8200 wireless network can have one Gateway. It can be set up as a Gateway_Repeater or a Gateway, but regardless of which is used, there can only be one of them on the network.

Endpoint: In Endpoint operation mode, an SRM8200 collects and sends data packets between the Gateway and Endpoint_Repeaters. In a network where all the Endpoints can pick up a signal from each other, a Gateway is not necessary as all modem communication can be controlled by Endpoints. If Endpoints cannot pick up a signal from each other, then the Gateway modem must be set as a Gateway_Repeater which will repeat the signal from Endpoint to Endpoint. This topology provides communications from Endpoint to Endpoint through the Gateway_Repeater modem, which can be considered as a Remote/Repeater in Master/Remote network topology. There can be an unlimited number of Endpoints within a network.

Gateway_Repeater: In Gateway_Repeater mode, a SRM8200 connects Endpoint modems that are unable to communicate directly with each other.

Endpoint_Repeater: In Gateway mode, an SRM8200 rebroadcasts packets to all Endpoints and Endpoint-Repeaters within range. It can be considered as a generic or standard Repeater in a Master/Repeater-Remote network topology.

It is recommended to have at least one modem set up as a Gateway in a network. This helps synchronize the wireless network.

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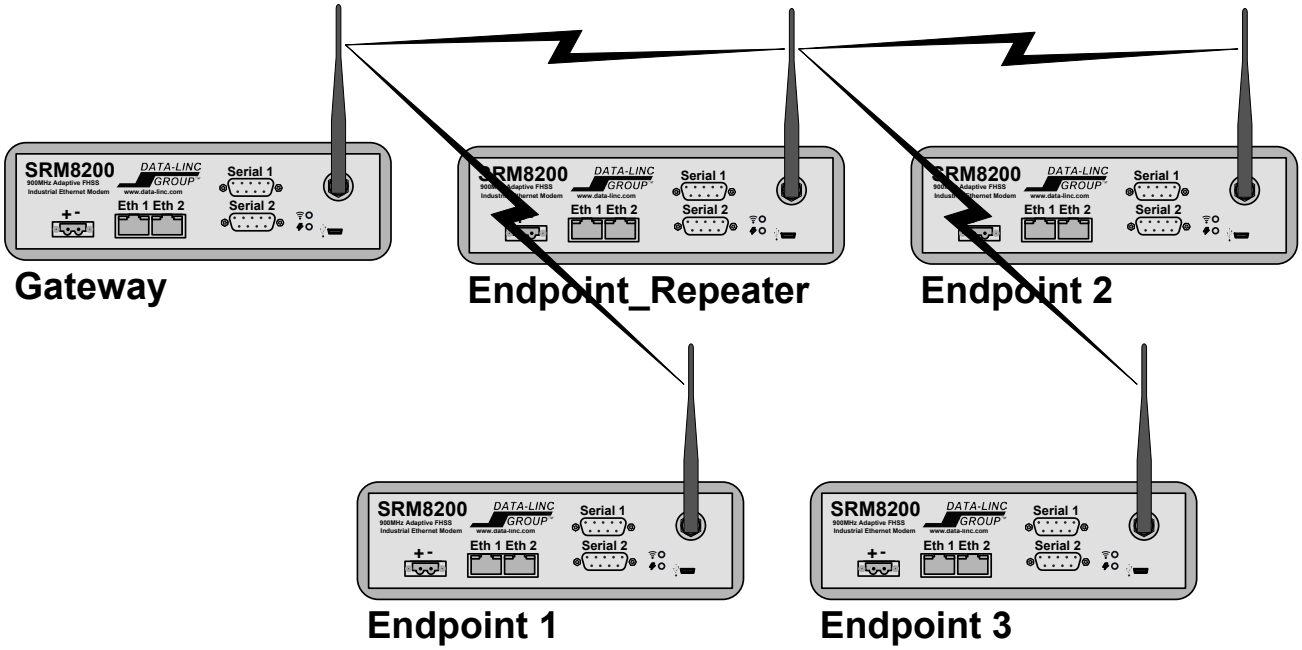
5. NETWORKS WITH REPEATERS



Two Gateway options are available for the SRM8200, Gateway and Gateway_Repeater. In any SRM8200 wireless network, you can only have one Gateway. It can be set up as a Gateway_Repeater or a Gateway, but regardless of how the Gateway is configured, there can only be one in the network.

The Gateway mode is used in a wireless network where communications is needed from the Gateway to all Endpoints and Endpoints to the Gateway.

If Endpoint modems can pick up the signal from each other they will communicate with each other. In a wireless network where all the Endpoints can pick up a signal from each other a Gateway is not necessary, all modems can be set to Endpoints.

If you want to use the Network Diagnostics webpage you will have to set up one of the modems as a Gateway and run the Network Diagnostics when connected to the Gateway because the Network Diagnostics page will not run on an Endpoint.

If Endpoints cannot pick up the signal from each other, then the Gateway modem needs to be configured as a Gateway_Repeater so that it will repeat the signal from Endpoint to Endpoint by providing communications from Endpoint to Endpoint-through the Gateway_Repeater modem.

If an Endpoint cannot pick up the signal from the Gateway, the closest Endpoint to it, that it can pick up a signal from the further away Endpoint, and also has Gateway communications, will need to be set up as an Endpoint_Repeater. This will allow the Endpoint that cannot pick

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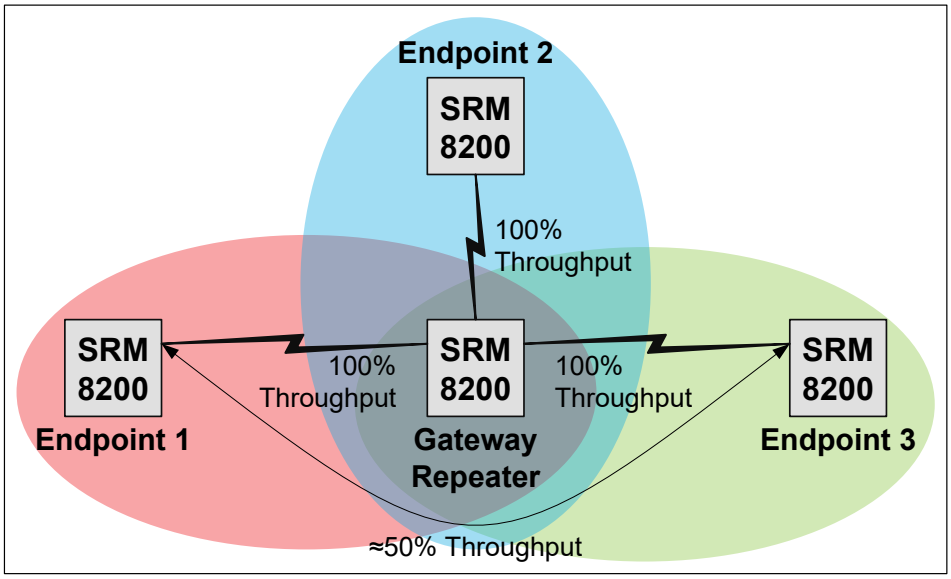
up a signal from the Gateway to establish communications to the Gateway modem through the Endpoint_Repeater.

NOTE: Using a Gateway_Repeater or an Endpoint_Repeater causes a 50% loss of bandwidth or throughput. The diagrams that follow show the network topology and the loss of throughput for the different links.

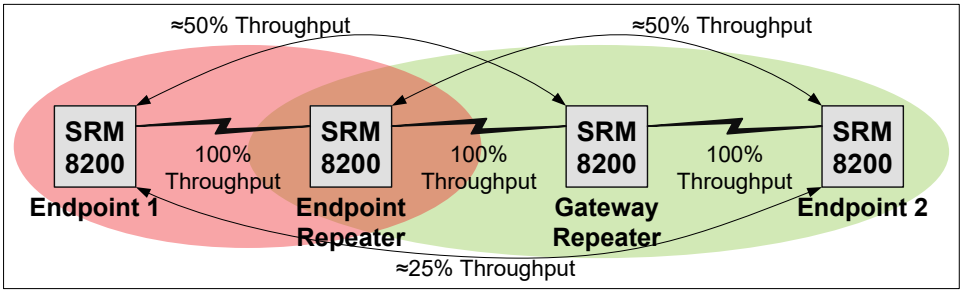
5.1 GATEWAY_REPEATER

In the diagram below the Endpoints cannot pick up the wireless signal from each other. So, they have to establish communications to each other through the Gateway that is configured as a Gateway_Repeater.



GATEWAY_REPEATER

In the diagram below, Endpoint 1 cannot pick up the signal from the Gateway_Repeater, but it can pick up the signal from the Endpoint_Repeater. The Gateway_Repeater provides communications between both Endpoints and the Endpoint_Repeater.



GATEWAY_REPEATER AND ENDPOINT_REPEATER

This network can be achieved with Hopping On and Hopping Off settings. Configuration settings for both the options are shown with screenshots following.

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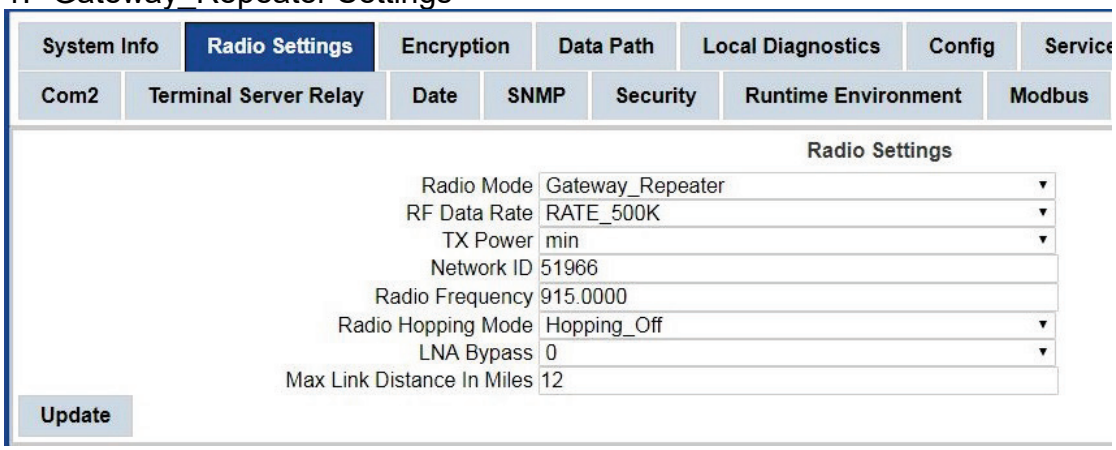
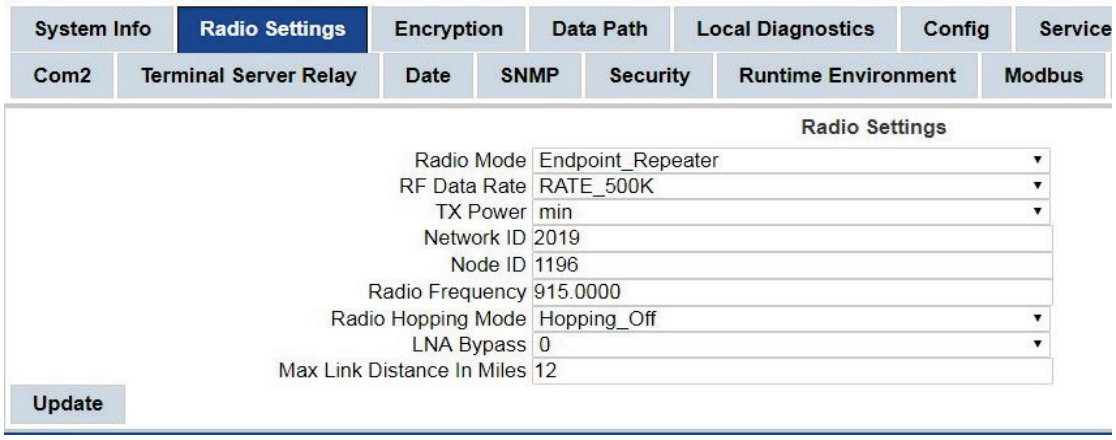
5.2 OPTION 1: WHEN HOPPING OFF

The first examples show a wireless network when Hopping is set to Off. When Hopping is off, the Modem Max Repeaters setting is not available on the Gateway, and there is no Repeater Slot setting available on the Endpoint_Repeater. Neither is needed when Hopping is off. For Gateway settings, a Data Rate of 500K is used with Network ID 2019 at 915.000 MHz frequency.

1. Gateway_Repeater Settings



2. Endpoint_Repeater Settings



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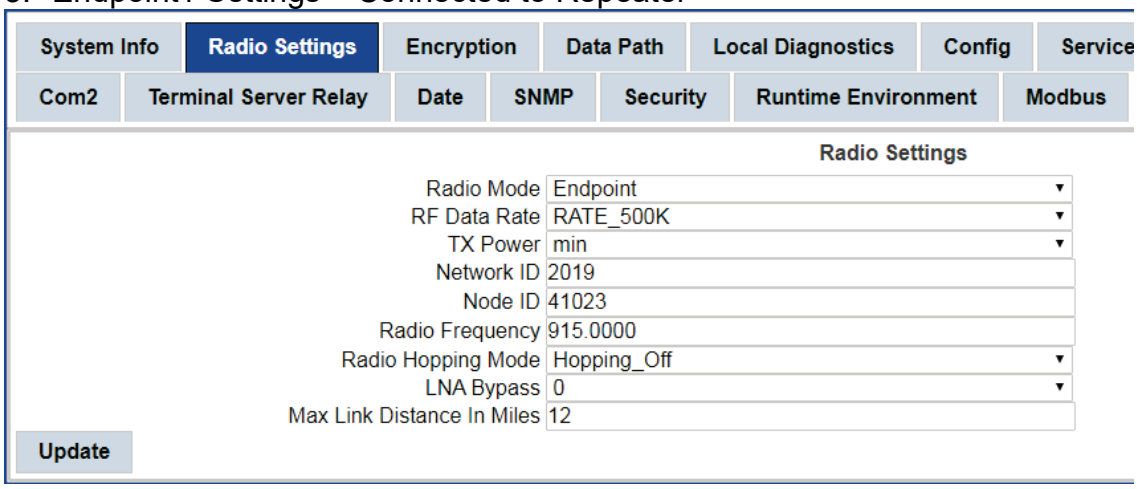
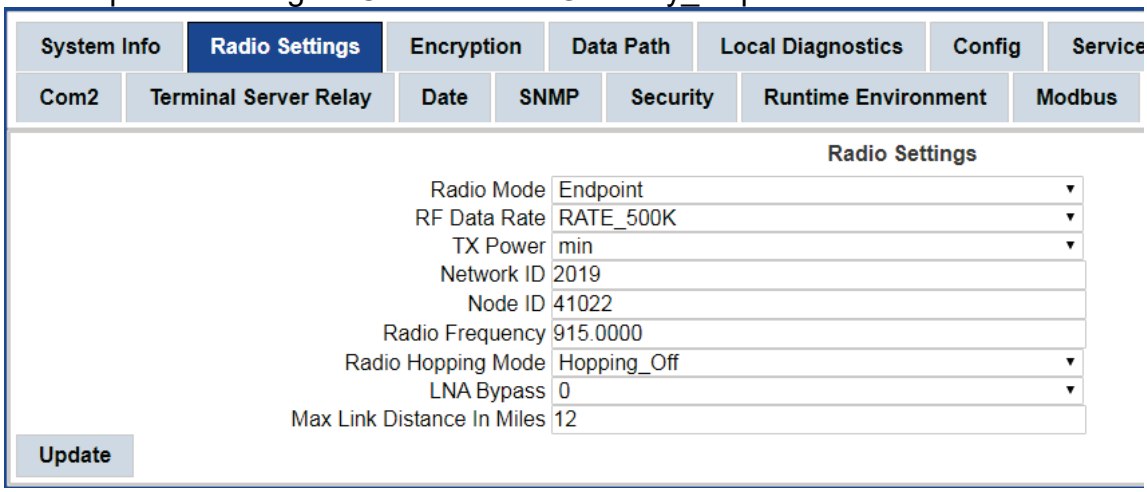
3. Endpoint1 Settings – Connected to Repeater



4. Endpoint2 Settings – Connected to Gateway_Repeater



NOTE: The only difference between the Endpoint connected to the Repeater and the Endpoint connected to the Gateway_Repeater is the Node ID which must be different for each modem on the network.

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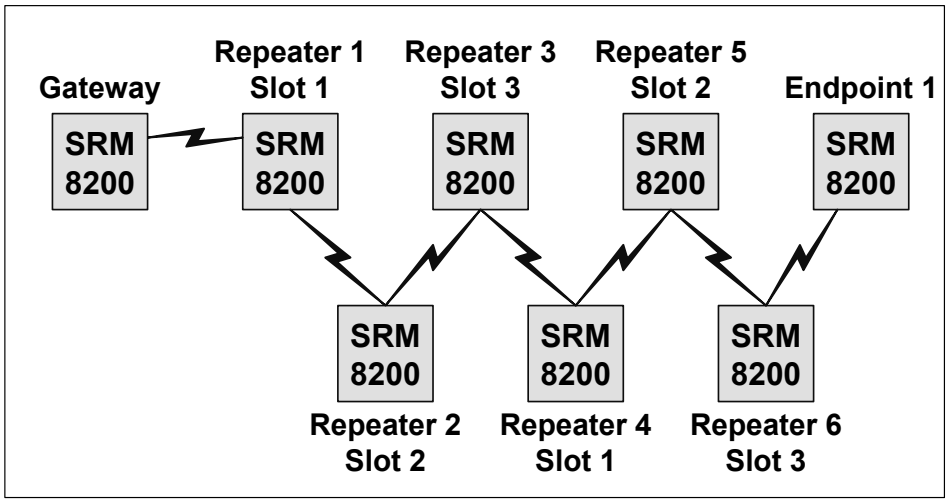
5.3 OPTION 2: WHEN HOPPING ON

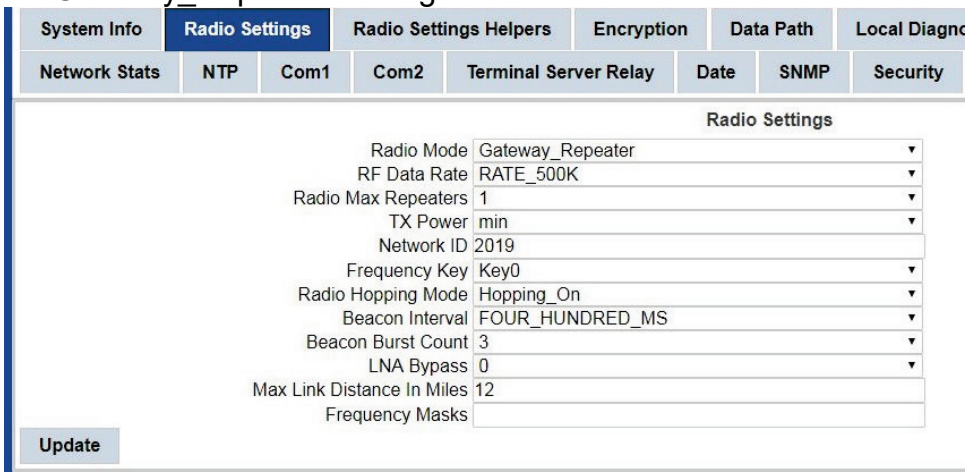
When Hopping is on, the Modem Max Repeaters setting is available and must be set to the number of Repeaters on the network with a Maximum of 3.

If there are more than 3 Repeaters on the network set Modem Max Repeaters to 3, arrange the Repeaters in the network with the Repeater programmed to Slot 1 closest to the Endpoint, and sequentially number the repeaters from the Endpoint 1, 2, 3, and after 3 repeat the Slot number of 1, 2, 3 in order again as needed. Example below:



Again, make sure each modem on the network has a unique Node ID and the Network ID is the same for all modems in the network. The example below, like the one above, uses an RF Data Rate of RATE_500K and Network ID 2019, but Hopping is on so there is no option for Node ID, but there is a Modem Max Repeaters option for Gateway_Repeater and a Modem Repeater Slot option for the Endpoint_Repeater.

1. Gateway_Repeater Settings



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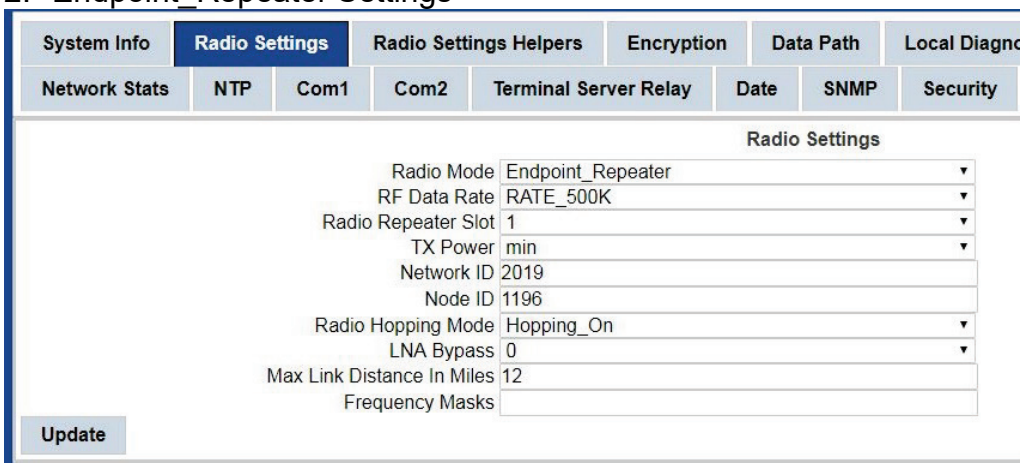
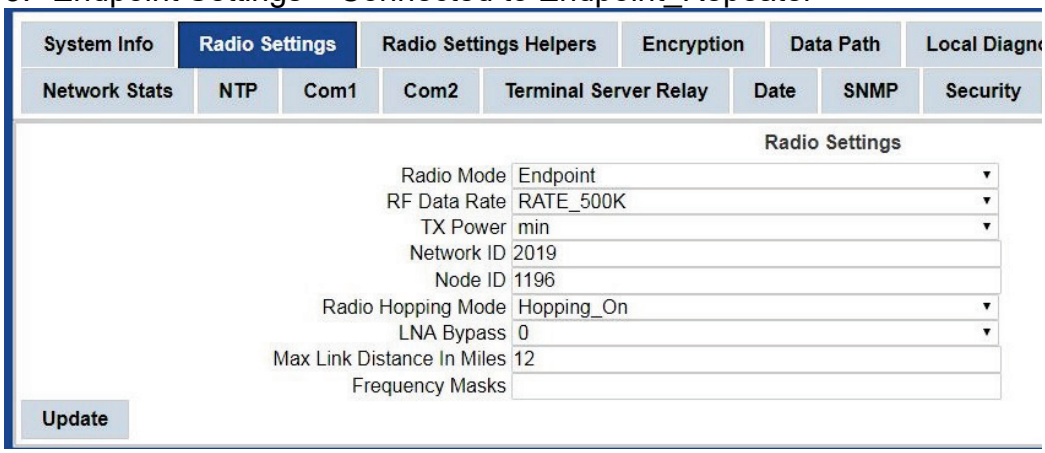
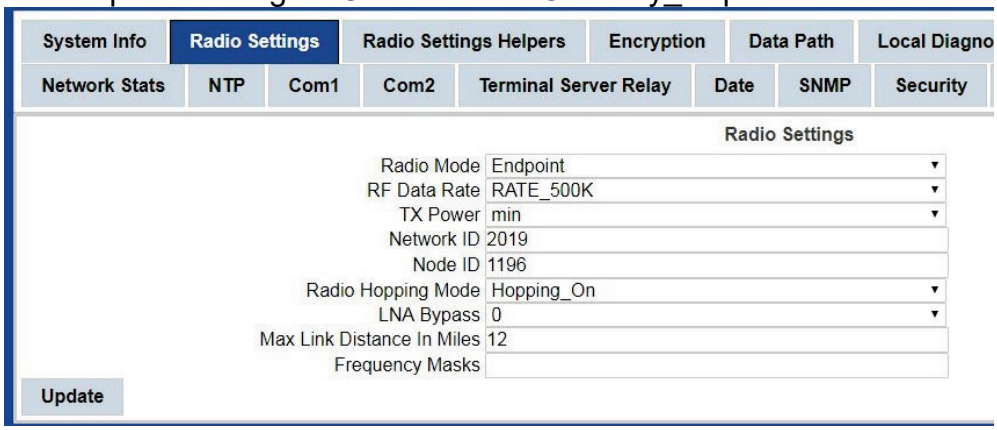
2. Endpoint_Repeater Settings



3. Endpoint Settings – Connected to Endpoint_Repeater



4. Endpoint Settings – Connected to Gateway_Repeater



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6. ROUTE MINIMUM SIGNAL MARGIN SETTINGS

On the Data Path tab, the 5th setting from the top of the page is “Route Min Signal Margin”. This is the setting that you will use to direct the route through a Repeater network. In cases where the Endpoints cannot pick up a signal from any other modem on the network, this setting can be set to -4 dB. In cases where the Endpoint can pick up a signal from another Endpoint or Endpoint_Repeater it will be necessary to set this value. Allowable values in this field are: -5 to 60.

You will need to remember you are dealing with “margin”, which is the difference between the Noise Floor or Receiver Sensitivity (whichever is stronger) to Signal Strength.

Suggested procedure for setting Route Min Signal Margin

1. Power off all the modems on the network except the Repeater that you want to connect the Endpoint to, and the Endpoint.
2. From either the Endpoint or the Endpoint_Repeater, log into the modem through the Ethernet port and select the Local Diagnostics webpage.
3. Bring up the Windows Command prompt and ping the IP Address of the Remote. Make sure the wireless link LEDs on the front of the modems are solid green indicating the two modems are connected.
4. Go to the Local Diagnostics webpage.
5. Note the Signal Strength and Margin.
6. Power off the Endpoint_Repeater and power on the next closest modem to the Endpoint.
7. If you do not get solid green wireless link LEDs on the Endpoint_Repeater and the next closest modem, set the Route Min Signal Margin to -4 on both the Endpoint and the Endpoint_Repeater.
8. If you do get a solid green link bring up Windows Command prompt and try to ping the Remote modem, Log into your local modem and bring up the Local Diagnostics page and note the signal strength and margin.
9. Margin to the further away modem will be less than the margin to the closes modem (because the receiver sensitivity remains the same, but the signal is weaker, so the number will be less than the first connection).
10. Set the Route Min Signal Margin on both the Endpoint and the Endpoint_Repeater to a value halfway between the lower margin value and the higher.

Example: The margin on the closest modem to the Endpoint is 46 dB. Margin of the further away modem link is 30 dB. Set the Route Min Signal Margin on both the Endpoint and Endpoint_Repeater to 38 dB, and on the next closest unit to the Endpoint, set its value to -4 dB.

The value will be too strong for the further away modem to log on and low enough so that the closer modem will. By setting the value on the next closest unit to the Endpoint to – 4dB it will effectively disable it from trying to connect to the next closest modem.

NOTE: You will only have to perform this procedure if more than one modem can connect to the Endpoint that does not have a link to the Gateway.

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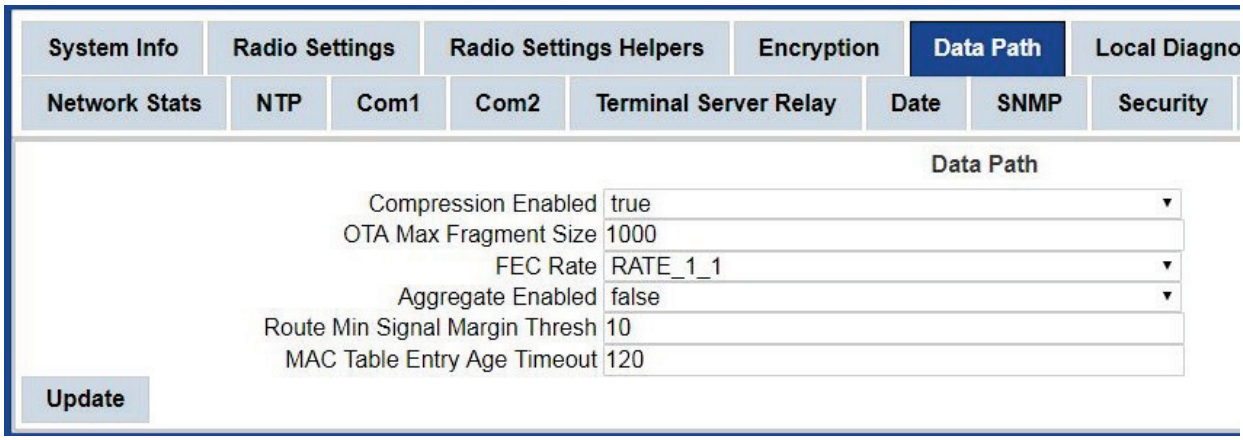
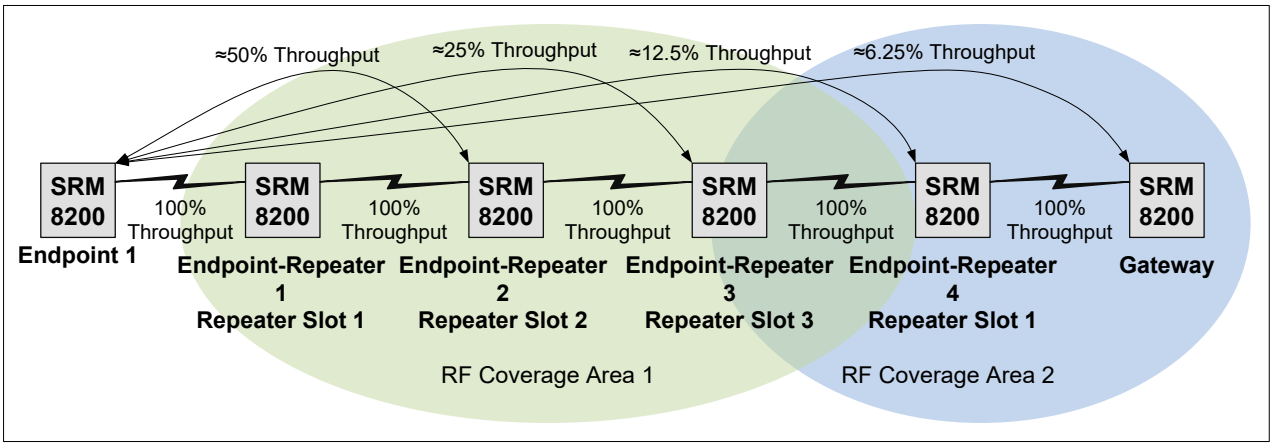


In this diagram multiple Endpoint_Repeaters and the Modem Repeater Slot settings are shown. Note the loss of throughput to the Gateway when multiple Repeaters are used.



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7. OTHER MODEM PARAMETERS

7.1 MODEM MODE

For a simple network one of the modems will be set up as a Gateway and the other modem as an Endpoint.

Additional Settings under Mode are Gateway_Repeater and Endpoint_Repeater will be covered in a later section of this document.

7.2 RF DATA RATE

The available settings under RF Data Rate:

RATE_4M	RATE_500K,
RATE_1M	RATE_250K
RATE_1.5M_BETA_FEATURE	RATE_115.2K

NOTE: RATE_1.5M_BETA_FEATURE is not covered in this manual.

At the RATE_115.2K and RATE_250K settings, the hopping capability is automatically enabled and only the Beacon Interval can be adjusted with the settings.

At the RATE_500K, RATE_1M, and RATE_4M settings, hopping capabilities are optional and user selectable.

General Guidelines for RF Data Rate Settings:

Range	Rate
Link Distances of 40 miles or longer	Use RATE_115.2K
Link Distances of 20 to 40 miles	Use RATE_115.2K or RATE_250K
Link Distances 10 to 20 miles	Use RATE_115.2, RATE_250K, RATE_500K
Link Distances 10 miles or less	Use any of the RF Date rates up to and including RATE_4M

NOTE: RATE_4M needs a -65dB signal strength or stronger to achieve higher bandwidth links. Also, the antenna needs to be at least 10 feet high or higher to allow Fresnel zone clearance for the higher throughput setting. RF data rate also depends on sensitivity.

Kbps	Sensitivity
115.2K	-106
250K	-98
500K	-95
1M	-95
4M	-83

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Data rate selection will also be dependent upon line-of-sight (LOS) and height of the antenna above ground. For links with a compromised LOS, and for links where the antenna is not more than 10 feet above ground, the lower RF Data Rates are recommended.

NOTE: If you have questions related to the calculations of Fresnel zone, range, bandwidth, or any other theoretical consideration, please contact Data-Linc Group Technical Support.

7.3 MODEM MAX REPEATERS

This setting needs to be enabled when Repeaters are used on the network with a maximum setting of 3. More than 3 Repeaters can be used in a network however Modem Repeater Slot settings on the Endpoint_Repeater will need to be reused if there are more than three repeaters. If no Repeaters are present, Modem Max Repeater setting should be set to 0.

7.4 TX POWER

Maximum transmit power is 30dB and should be adjusted to an optimum signal strength of -50 to -70dB, with -50dB being the optimum reading.

7.5 NETWORK ID

The network ID must match on all modems in a network – 1 to 4 digits are allowed in the network ID. Do not reuse Network IDs within the same geographical area.

7.6 NODE ID

This is an auto generated ID that is displayed on the Endpoint modem. This is only programmable in the Command Line Interface (CLI).

7.7 FREQUENCY KEY

Frequency Key 0 through 16 are available.

For 115.2K RF Data Rate setting:	
Key0 – Key 14	Classic hop tables
Key15	Standard randomized hop table
Key16	Sequential hop table in reverse order of center frequencies
For all other Data Rate settings:	
Key0	Uses the standard randomized hop table
Key1	Uses the sequential hop table in reverse order of center frequencies

NOTE: Frequency Key selection is only available on the Gateway modem. Endpoint modems coordinate with the Gateway and use the Gateway's frequency key.

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7.8 RADIO FREQUENCY

This setting is only available for the RATE_500K through RATE_4M when Hopping is turned off. Available frequency ranges for the Data Rates are:

Data Rate	Frequency Range
RATE_4M	904.5504 – 925.7472
RATE_1M	903.0528 – 927.0144
RATE_500K	902.7072 – 927.3600
RATE_250K	**902.5344 – 927.4176**
RATE_115.2K	**902.4768 – 927.5904**

NOTE: The frequency cannot be programmed for the 115.2K and 250K settings. The frequencies shown are for information purposes and are displaying the high and low frequencies used in the hopping pattern.

7.9 RADIO HOPPING MODE

As stated in the RF Data Rate section above this setting is not available when the unit is programmed to RF Data Rates of RATE_115.2K, and RATE_250K. This example uses the RATE_4M setting and the Modem Hopping Mode will be an available setting for programming.

Hopping On versus Single Channel Mode (Hopping Off) Summary

Hopping On	Single Channel
More overhead / less throughput	Maximum throughput
Less chance of interference	Greater chance of interference
Requires a Gateway	Doesn't require Gateway
Must be used with RF data rates 115kbps and 250kbps	Used for RF data rate 500kbps or above

Additional Hopping Information

SRM8200 modems are peer to peer modems. All modems can communicate with all other modems whose signals they can receive.

When Hopping is off a Gateway modem is not necessary. Having a Gateway modem in the network will not cause problems, it's simply unnecessary. All modems can be configured as Endpoints. However, to use the Network Diagnostics webpage you will need to configure one of the modems as a Gateway and connect to the Gateway to view Network Diagnostics.

When Hopping is on there MUST be a Gateway modem in the network, because the Gateway modem controls things like the timing and beacon burst counts. Endpoints can communicate with each other if they can access a modem signal from other Endpoints.

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If the Endpoints and Endpoint_Repeaters can only receive a signal from the Gateway and cannot hear each other, then to achieve Endpoint to Endpoint communications the Gateway modem must be configured as a Gateway_Repeater. This will allow the Gateway_Repeater to repeat the signal from one Endpoint to the other.

7.10 Beacon Interval

Available selections for the Beacon Interval

- FOUR_HUNDRED_MS
- TWO_HUNDRED_MS
- ONE_HUNDRED_MS
- FIFTY_MS
- TWENTY_FIVE_MS

The faster the beacon intervals are set, the lower the throughput of the modem. Adjusting the beacon interval to two and four hundred milliseconds will provide a slightly higher throughput across the wireless link when compared to the one hundred millisecond beacon interval.

NOTE: With Endpoint_Repeaters in the network, hopping on, and beacon interval set to 25 and 50 milliseconds, the network delay may be so great that it will drop pings to some Endpoints. The solution is to increase the beacon interval.

7.11 Beacon Burst Count

The available settings are 1 through 7. This is the number of beacons that are sent out by the modem at Beacon Interval. Default setting is 3. Data-Linc recommends setting the Beacon Burst Count to no less than 2 and use the default unless otherwise instructed by Data-Linc Tech Support.
Increasing the number of beacons in a noisy environment may improve RF link reliability.
Decreasing the number of beacons in an environment where noise is minimal may improve throughput.

7.12 LNA Bypass

The modem RF receiver includes a 10 dB Low Noise Amplifier to boost received signal strength. Default setting is 0.

0 = Enabled, use the amplifier
1 = Disabled. Do not use the amplifier

7.13 Max Link Distance In Miles

This setting does affect the wireless link performance. It should be set to the approximate distance between modems. Default setting is 20.

Minimum Value = 5
Maximum Value = 120

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8. ENCRYPTION SETTINGS

Encryption settings must match on all modems in the network to maintain over-air compatibility. When enabling or changing encryption in a network, start with the furthest Endpoints from the Gateway, then Repeaters, and the Gateway last. As encryption changes on each modem, the modem will drop off the network until all the modems are configured with the same encryption. Then all modems will be connected again and resume communications.

Encryption Mode

Two encryption modes are:

AES_CTR = Counter Mode
AES_CCM = Counter Mode with Message Integrity Check

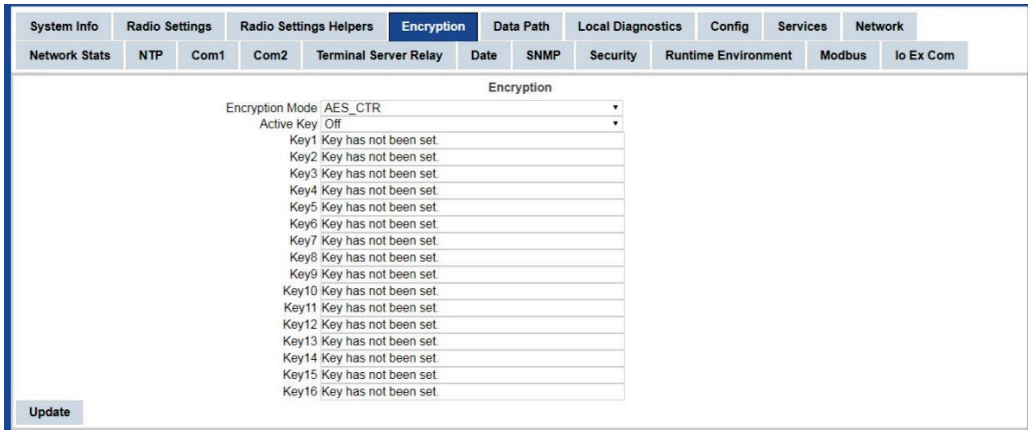
Active Key

By default, Active Key is set to Off which disables encryption. To enable encryption the options are to use Key1-16. When Active Key is set to off this is a read only setting.

- Whichever key you select you will need to set that key to a hexadecimal value using only numbers 0-9 and letters A to F (not case sensitive).
- 128-bit encryption will have a hexadecimal key of 32 characters or less.
- Example = **1234567890abcdef1234567890abcdef**
- 256-bit encryption will have a hexadecimal key of 64 characters or more.
- Example = **1234567890abcdef1234567890abcdef1234567890abcdef1234567890abcdef**
- The same exact key must be used on all modems in the network for them to communicate.

SUGGESTION: Type the key up in a notepad document and copy and paste it into each modem to avoid typing errors.

Once a key is programmed you will no longer be able to view its value, instead it will show 128 bit key or 256 bit key.



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9. DATA PATH

The Data Path page allows the user to program Compression, Aggregation, and Forward Error Correction along with other settings that assist with over the air data transmission.

9.1 COMPRESSION ENABLED

When compression is enabled the outgoing packets are analyzed. If they can be compressed, they will be prior to transmission to reduce the number of bits sent over air.

Settings are:
True = Compression is enabled
False = Compression is disabled

When compression is enabled ping times increase as the modem analyzes and compresses packets prior to transmission over air.

9.2 OVER THE AIR MAX FRAGMENT SIZE

Default setting is 1000. Values from 64 to 1000 can be entered into the field. This setting does not have to match all modems on the network.

- Smaller Fragment Size will increase link reliability in high RF noise environment.
- Larger Fragment Size will decrease link reliability in high RF noise environment.
- Smaller Fragment Size will decrease data throughput over air.
- Larger Fragment Size will increase data throughput over air.

9.3 FEC RATE

Forward Error Correction (FEC) settings must match on all modems on the network to maintain over the air compatibility.

Settings Are:
RATE_1_1 = Disabled (default).
RATE_7_8 = Enabled.

When FEC Rate is Enabled:

- Throughput is reduced by 13%.
- RF sensitivity improves by 3dB and maximizes range in noisy RF environments.
- Redundant information is added to a data stream to detect then possibly correct packet errors thereby saving time otherwise needed to retransmit a packet.
- Net throughput in noisy environments could increase as a result of error reduction and the decreased need to resend.

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9.4 AGGREGATE ENABLED

When Aggregate is enabled it increases throughput by combining multiple RF packets into one, minimizing the number of packets required for transmission. This setting does not need to match with all modems in a network.

Settings Are:
False = Disabled (default)
True = Enabled

Enabling Aggregate:

- Increases latency by 20 msec and reduces poll rates.
- May increase throughput as fewer and larger packets are sent over the air.
- Does not affect medium to large packets.

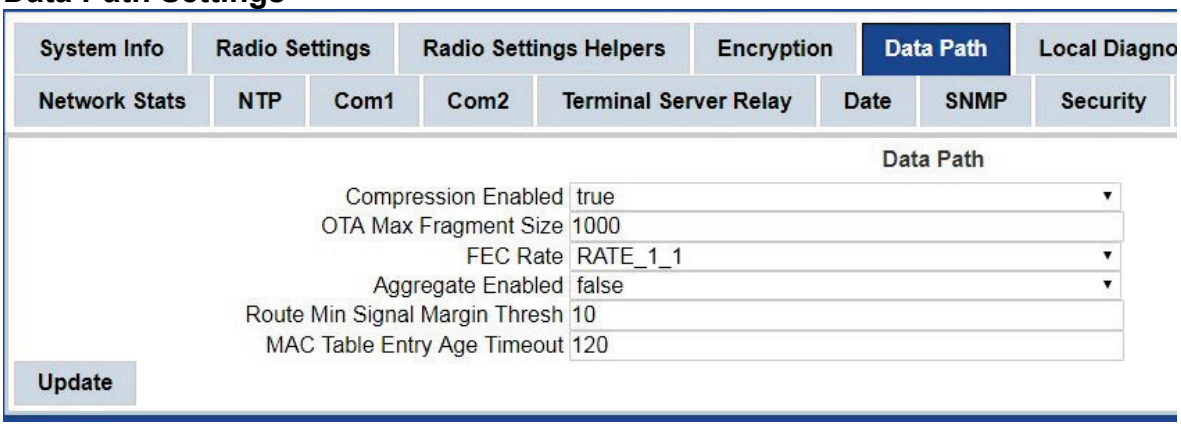
9.5 ROUTE MIN SIGNAL MARGIN THRESHOLD

This setting is only used when there are Repeaters in the network. It designates the minimum signal margin in dB for the next hop to be considered as part of the packet route. When Repeaters are used the packets take the path through the modem network with the minimum number of hops. By increasing the threshold value, the possible routes can be reduced to allow a particular routing path to be preferred over others.

Default setting is 10 – for 10 miles.

Settings are:
Minimum value = -5
Maximum value = 60

Data Path Settings



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10. DIAGNOSTICS

10.1 LOCAL DIAGNOSTICS

The Local Diagnostics webpage is read only. Only the first 7 lines of information on the Local Diagnostics page are covered in this manual.

Signal Level
This is the receive signal strength for the modem in dB.
Optimum = -50 to -70 dB

NOTE: A signal strength of -65 or stronger is needed for a RATE_4M wireless link, and the antennas need to be at least 10 feet off the ground to get the proper Fresnel zone clearance for the 4M links as well.

NOTE: Data-Linc does not have recommended maximum signal strength for the SRM8200 modem. -50 to -70 dB is optimum but if Tx Power is set to “min” and the signal is -20 dB (30 dB stronger than the optimum range) this is acceptable and will not damage the modem with too much electrical energy coming from the antenna

Signal Margin
This is the difference between the signal level and the noise level.
Optimum = 20 or higher

Noise Level
This is the amount of noise detected on the link in dB. Your signal level should be 20 points greater than the noise. For example: if noise is -110dB, signal should be -90dB or better.
Optimum = -100 to -120dB

NOTE: Receiver sensitivity for the SRM8200 is -98 dB. Margin is computed with reference to the receiver sensitivity value when noise is in the range of -99 to -120 dB. When noise is stronger than -98 dB, margin is computed with reference to the noise level

VSWR
Voltage Standing Wave Ratio (VSWR) = Percentage of power reflected back into the modem from the antenna and coax.
Not Current = 0
Optimum = 1
Acceptable = 1 to 10

Readings above 10 require troubleshooting the antenna and coax. Please:

- Physically inspect all coax connectors for damage and moisture intrusion.
- Ensure all coax connectors are hand-tight and weather exposed connectors are properly sealed.
- Physically inspect the antenna and its elements for damage.
- Check the coaxial cable outer sheath for damage.

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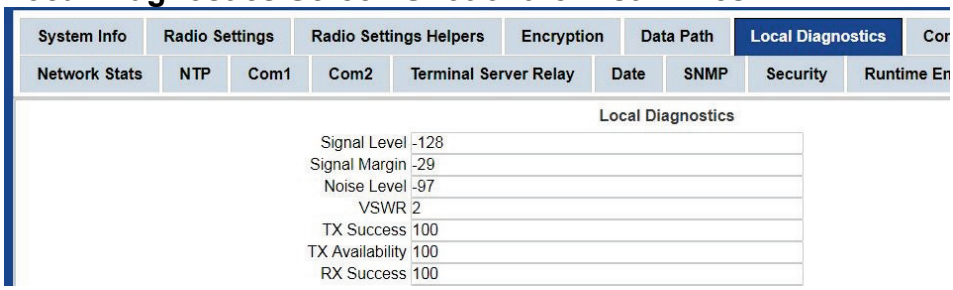
Tx Success
Percentage of packets transmitted across the wireless link without retransmit.
Optimum = 90 to 100%

Tx Availability
Percentage of packets transmitted without back-off.
Optimum = 90 to 100.

Rx Success
Percentage of packets correctly received across the wireless link.
Optimum = 90 to 100%

Local Diagnostics Screen Shot of the first 7 lines



The above Local Diagnostics screenshot displays optimum readings for a wireless link.

NOTE: The key values for local diagnostics are:
- Signal Level
- Signal Margin
- Noise Level
- VSWR

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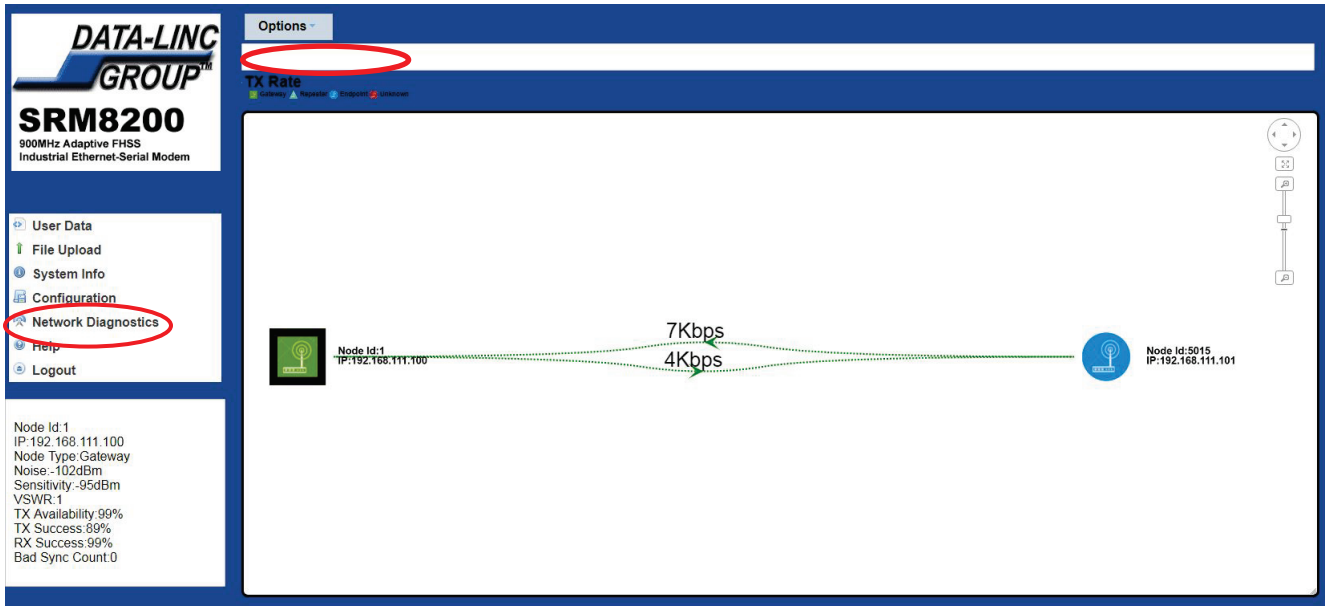
10.2 NETWORK DIAGNOSTICS AND MAPPING

The Network Diagnostics tab on the left menu shows a map of a graphic display and modem statistics for all the nodes in the network.

Indicators:

Click on Network diagnostics to view the network layout - it takes a few minutes to render. The progress bar on top shows percentage completed.



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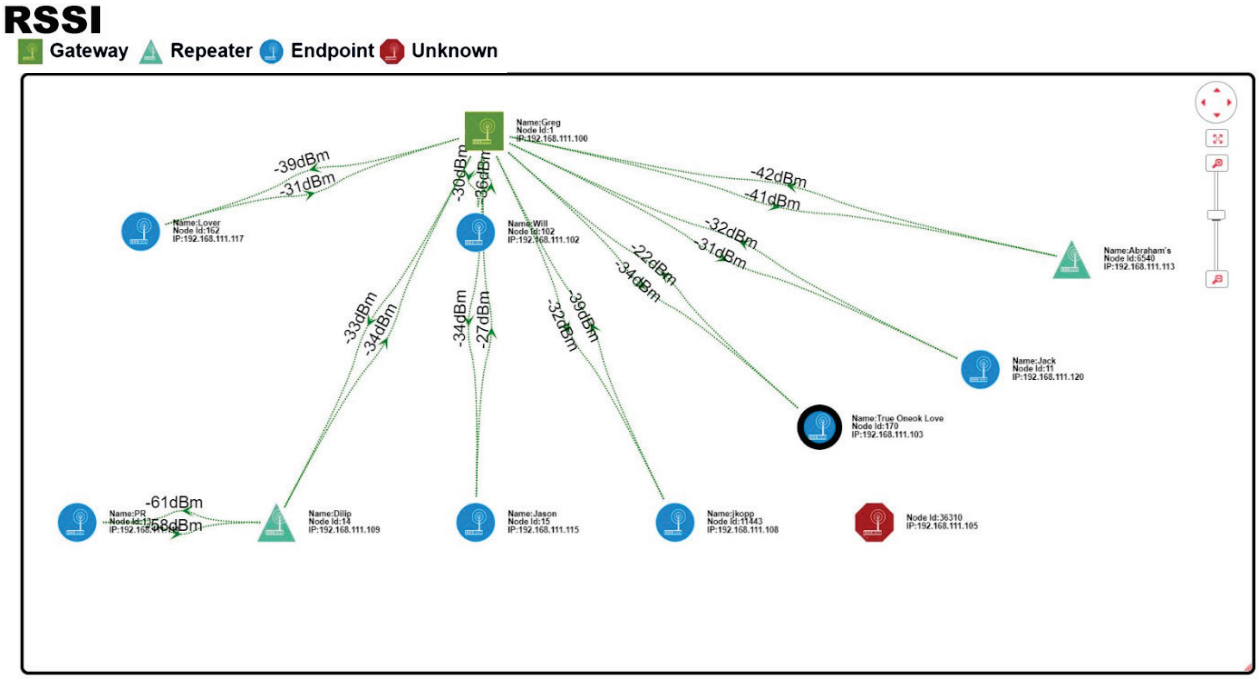
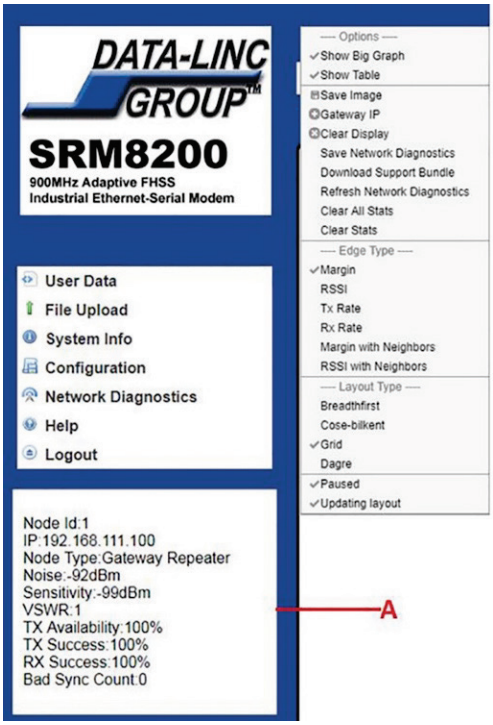
The screenshot below is a network example showing the wireless link between Gateway, Endpoints and Repeaters. Green dotted lines indicate good RF link. Optimal RSSI for SRM8200 is -50dBm to -70dBm. The lower the RSSI number (without negative sign), better is the RF strength.



You can zoom-in/out and move nodes to see each node clearly on the network layout. Click on any of the nodes to directly open its browser interface page. You will need to know the login credentials to access configuration page.



The Options tab on top has a list of dropdown menu for viewing modem statistics as shown. Use these options as needed. Anytime you make a change in the network, you need to click on 'Clear Stats' from the dropdown menu to view updated RF strength.

The box on the lower left (indicated as **A)** shows the information for the modem node when your mouse cursor is hovering over it.

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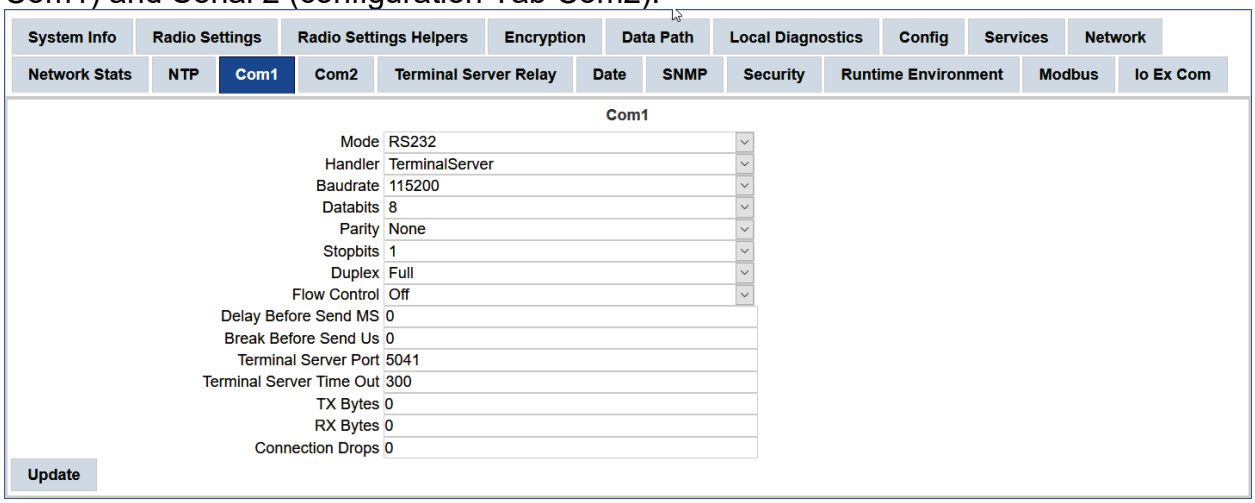
11. SERIAL (COM) PORTS

The SRM8200 has two independent DB9 Serial Ports labeled Serial 1 (Configuration Tab Com1) and Serial 2 (configuration Tab Com2).



11.1 MODE

RS232 – this is the only option available at this time via the webpage interface for the Serial Port Operation Mode. RS485 and RS422 are not supported by SRM8200 current version.

11.2 HANDLER

- ModbusRTU, ModbusPassthru, Setup, and Off – Not available at this time.
- **CLI** – When selecting this parameter, the Command Line Interface can be brought up by connecting a Terminal Emulator program to the COM port with the same Baud Rate, Databits, Parity, Stopbits, and Flow Control settings that are set on the COM port configuration Tab. The same terminal commands are used to display and program the modem through this interface that are used through the micro USB port and SSH TCP/IP connections. With a terminal emulator connected to the port press enter and the modem responds with “SRM8200 Shell” and the CLI prompt.
- **Trace** – Not covered in this document
- **Terminal Server** – Set up is covered in sections below.

11.3 PORT CHARACTERISTIC SETTINGS

- **Baudrate** - This is the port speed designated in Kilobits per second.
- **Databits** – Options are 7 and 8.
- **Parity** – Options are None, Odd, Even.
- **Duplex** – Only available Option is full – use the CLI to configure half-duplex.
- **Flow Control** – Options are Off and Hardware.

NOTE: Baudrate, Databits, Parity, Stopbits, and Flow Control settings must match the settings of the device connected to the port.

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11.4 Delays and Timeouts Settings

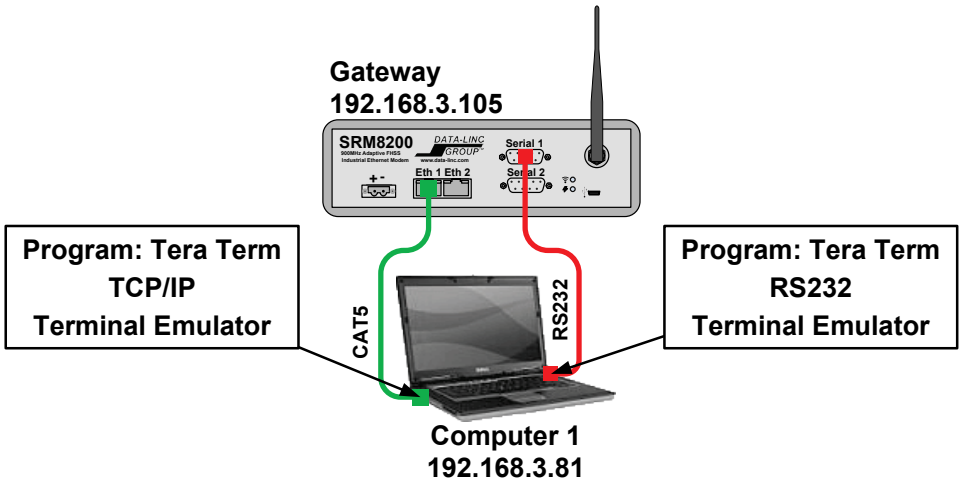
- **Delay Before Send MS** - This is the programed delay that the modem will observe before sending data out the COM port. Time is in milliseconds.
- **Break Before Send Us** – the number of milliseconds that the modem will wait before sending a break command.
- **Terminal Server Port** – Default for COM1 is 5041, and for COM2 is 5042. This is the TCP port number that TCP/IP devices will use to communicate with the device connected to the COM port.
- **Terminal Server Time Out** – the amount of time the modem will wait with no traffic before dropping the connection to the COM port.

11.5 Port Statistics

- **Tx Bytes** – a read only parameter that shows the number of bytes transmitted out the COM port.
- **Rx Bytes** – a read only parameter that shows byte count of received data.
- **Connection Drops** – Read only parameters showing how many times the connection to the COM port was dropped (most likely due to no RS232 traffic).

11.6 COM Port TCP/IP Communications Setup

This is an example of a simple single modem test of serial port and TCP/IP communications. We'll use equipment configured earlier. Notice use of two instances of Tera Term, a TCP/IP emulator and a serial RS232 emulator:



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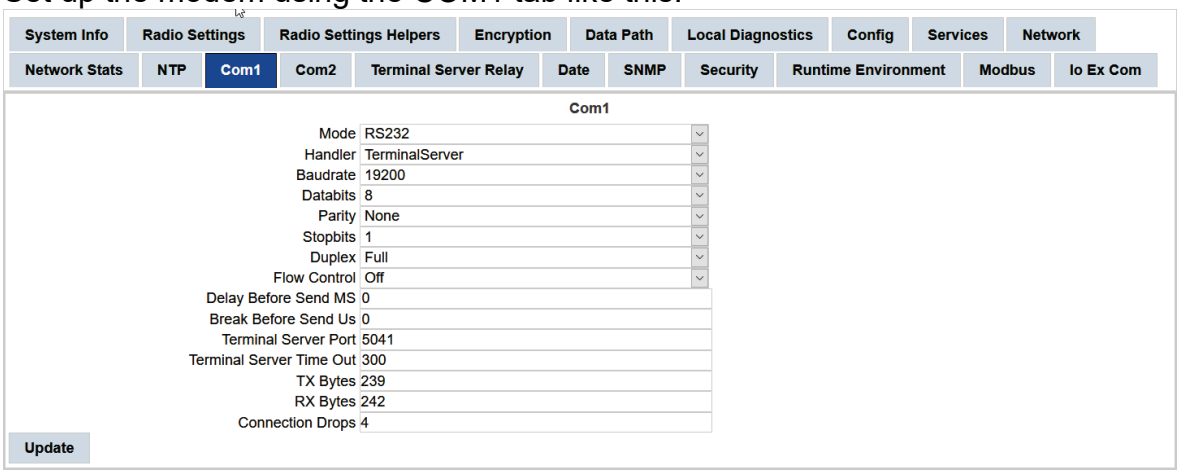
1. Set up the modem using the COM1 tab like this:



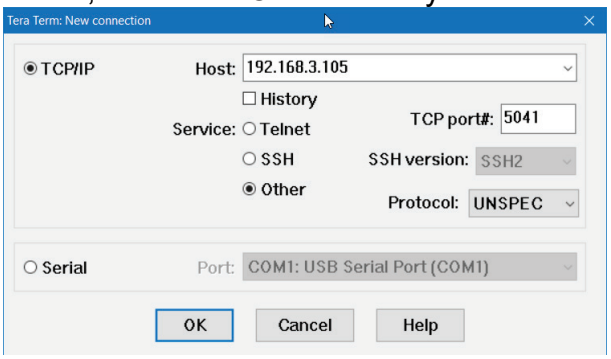
Remember Baudrate, Databits, Parity, Stopbits and Flow Control must match the settings of the serial device connected to the Serial port.

Next the terminal emulators will be configured but before starting it's helpful to make a quick Tera Term program change. Tera Term uses text line input which means the enter key must be pressed to send entered text. To send text character by character the file TERATERM.INI file requires a setting change. Locate the file in the "C:/Programs(x86)/Tera Term" folder and double click it to open. If asked for a program to open, use Notepad or Word Pad. With document open type "CTRL-F" to open the find window, search for "EnableLineMode" and change the setting from

EnableLineMode=on to **EnableLineMode=off**

Click file and save.

2. Start the Tera Term program for use as a TCP/IP terminal emulator, configure as below, then click OK. It's ready to use:



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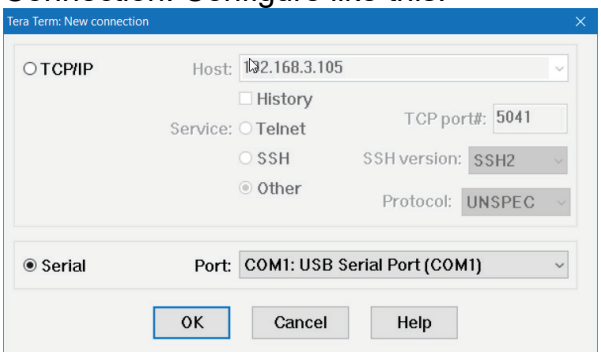
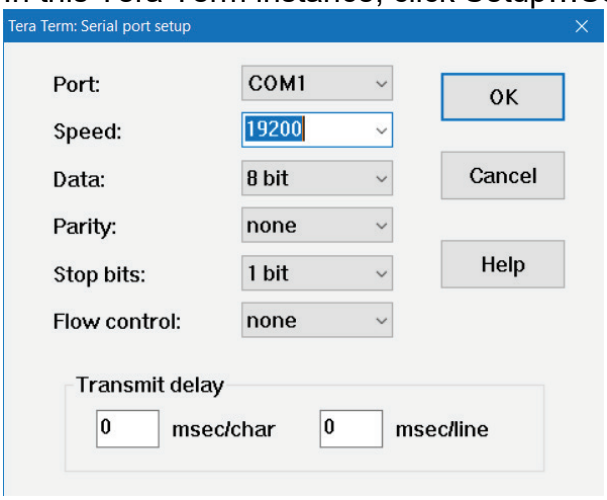
3. Prepare the RS232 serial terminal emulator. From the current session click File…New Connection. Configure like this:



This computer has a USB/RS232 adapter on port COM1. Your PC COM port is likely different so choose the correct one. Click OK. The session opens.

4. In this Tera Term instance, click Setup…Serial Port and this dialog appears:



Match the port settings to the SRM8200 Serial (COM) 1 port. Click OK.

5. Verify operation by typing text into the serial terminal emulator and it will appear in the TCP/IP terminal emulator. Text typed into the TCP/IP emulator may not appear in the other program until Enter is pressed.

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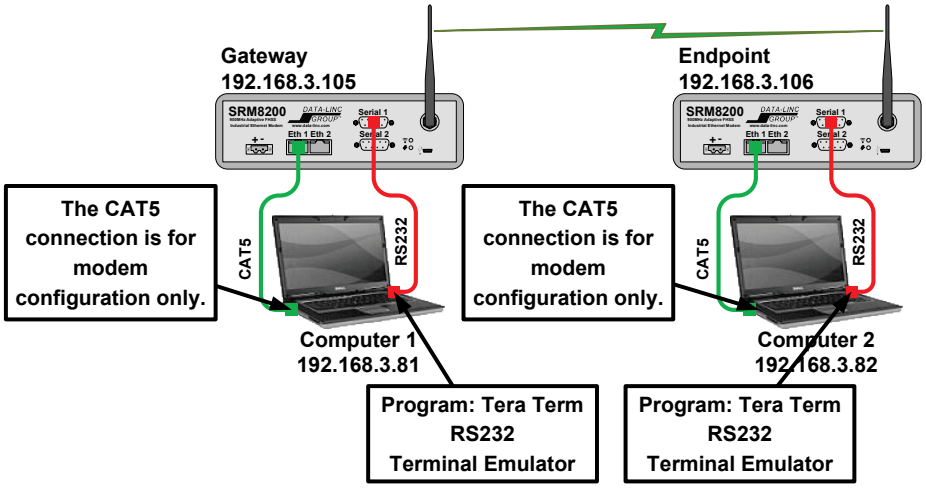
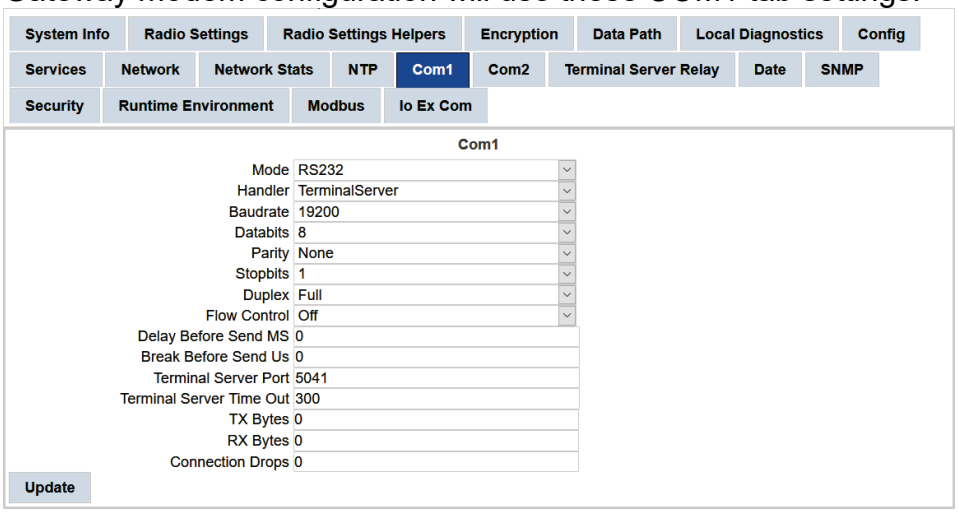
11.7 SERIAL TO SERIAL COM PORT SETUP

This chapter illustrates modem-to-modem serial communications. It uses the Walk-Through equipment and identical settings except serial-to-serial communications will be added resulting in this architecture:

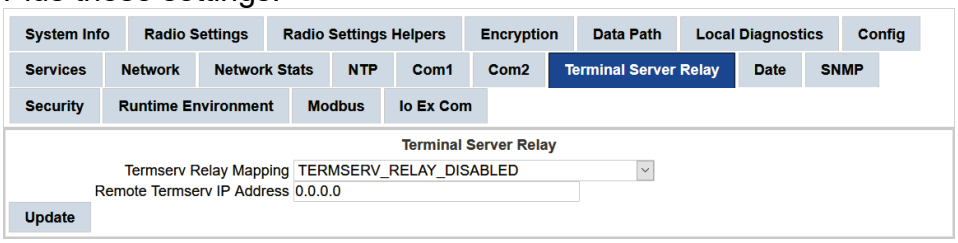


As described in the "COM Port TCP/IP Communications" section Tera Term will be used on both computers and configured as an RS232 terminal emulator.
To achieve serial to serial connections the SRM8200 modem requires enabling the modem's Terminal Server Relay function and correct setup of the serial port. This example uses Serial 1 (COM1) on both modems.

1. Gateway modem configuration will use these COM1 tab settings:



Plus these settings:



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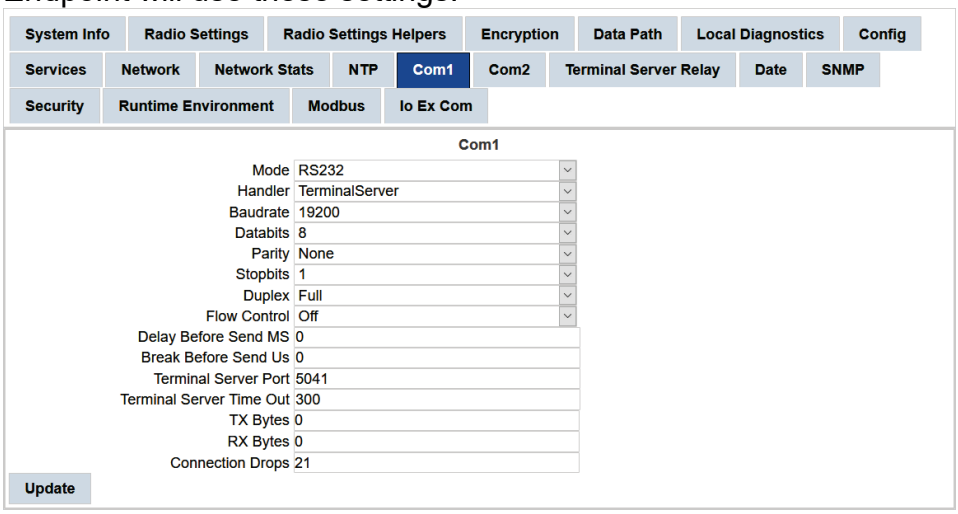
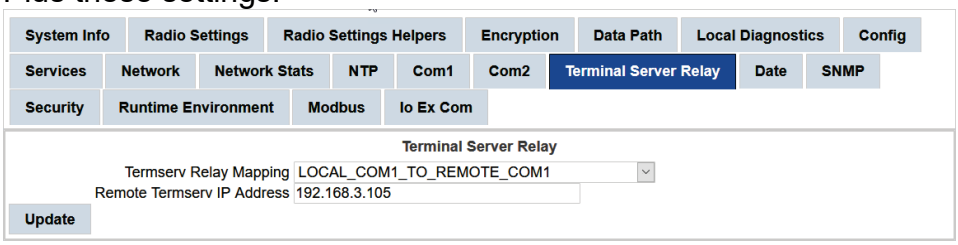
2. Endpoint will use these settings:



Plus these settings:



NOTE: If you are only running one Endpoint you can enter its IP Address in the Gateway Remote Termserv IP Address field, although it is not necessary.

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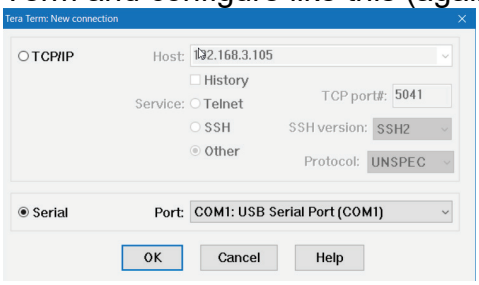
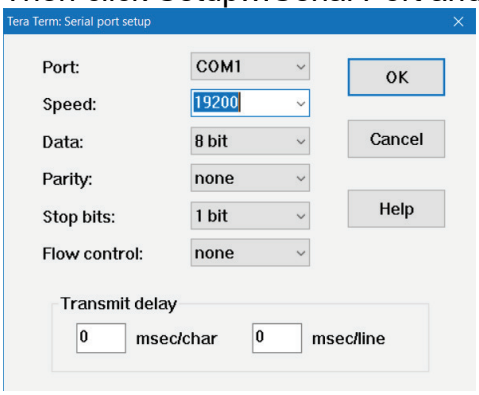
3. Tera Term RS232 terminal emulator is set up the same on both computers. Start Tera Term and configure like this (again, your computer COM port may be different):



Then click Setup…Serial Port and this dialog appears:



Match the port settings to the SRM8200 Serial (COM) 1 port. Click OK.

4. To verify serial communications, type characters into the terminal window connected to the Gateway, and they show on the terminal window connected to the Endpoint. When typing into a terminal window connected to the Endpoint, characters typed will show on the Gateway terminal window. This verifies that you have serial-to-serial connections across the wireless link and have correctly configured the serial ports and terminal servers.

NOTE: The Baudrate, Databits, Parity, Stopbits, and Flow Control settings can differ from the Gateway to the Endpoints and on each Endpoint. Communications will work without error across the wireless link. The COM port settings on the modem are necessary for communications to the connected device but are not necessary for data sent across the wireless link.

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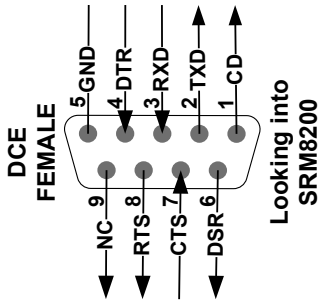
11.8 RS232 PORT PINOUT

The pinout for both RS232 ports is identical.

DRAWING	PIN	PURPOSE	DIRECTION
	1	Carrier Detect (CD)	Output
	2	Transmit Data (TXD)	Output
	3	Receive Data (RXD)	Input
	4	Data Terminal Ready (DTR)	Input
	5	Logic Ground	
	6	Data Set Ready (DSR)	Output
	7	Ready To Send (RTS)	Input
	8	Clear To Send (CTS)	Output
	9	No Connection	

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12. COMMAND LINE INTERFACE (CLI) ACCESS

There are several ways to access the Command Line Interface on the SRM8200 modem:

- Use the micro USB port
- Use the Ethernet interface and SSH
- Use a serial port configured with the Handler parameter set to CLI.

These methods require use of a terminal emulator program.

Note: On Windows 7, if you don't see SRM8200 on Windows Explorer, update the driver.

1. Go to Device Manager and right click on the port that says it did not install correctly and update the drivers.
2. Manually point it towards the drive that the driver window opened as (D, E, etc.).
3. This action locates the drivers, installs them and activates the COM port that then allows access to the CLI interface through the terminal window.

12.1 MICRO USB PORT ACCESS

1. Using a Micro USB to standard USB cable, connect micro USB end of the cable to the modem USB port (below the antenna connector) and the other end to a computer.
2. The SRM8200 USB driver should automatically install when the connection is made. There may be popup windows much the same as when other USB devices are attached to the computer.
3. Open Windows Explorer. Examining the folders structure you will see:
    a. At least one folder named "SRM8200 Drivers (x:)" where x is a Windows assigned drive identifier. **Do not use this folder. It contains USB driver specific files.**
    b. A folder named "SRM8200-xxxx" where xxxx is the modem's serial number. This folder contains SRM8200 internal files that can be used. Refer to the "Drag and Drop" chapter.
4. In Windows control panel, open Device Manager.
    a. Expand "Ports (COM & LPT)".
    b. A new port was added, "USB serial device (COMx)" where x is the port number. It is used to access the modem CLI interface.
5. Open the terminal emulator software and set it up for a serial connection on the COM port where Windows installed the driver and configure it as follows:
   Baudrate = 115200
   Databits = 8
   Parity = None
   Stopbits = 1
   Flow Control = None
6. When the terminal window opens, press the enter key to bring up the login prompt, enter the user name **"admin"**, press enter, type in the password **"admin"**, press enter and SRM8200 shell will appear on the command line.
7. Refer to section "CLI Commands Introduction" for CLI overview and use.

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12.2 SSH Terminal Access

To access the CLI through SSH terminal you will need to know the IP Address of the modem.

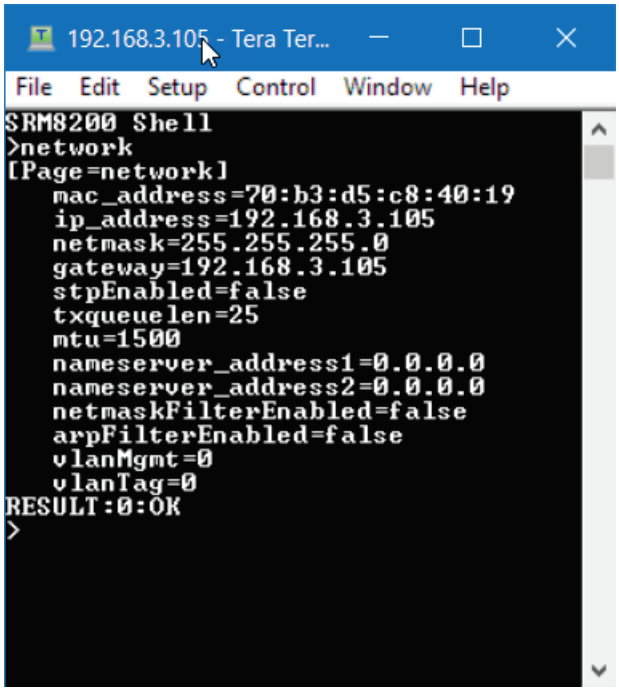
1. Make sure you can ping the modem.
2. Open your terminal emulator software and configure it for an SSH connection to the IP Address of the modem. Use SSH default port 22.
3. Login to the modem using Account “admin” and password “admin”. When the terminal window opens and if “Shell 8200” does not appear press enter to bring up the log in prompts.

NOTE: When configuring a remote modem over low bandwidth wireless (115.2K or 250K) it’s preferable to use the SSH terminal access to avoid webpage update time.

12.3 CLI Commands Introduction

Top level CLI commands such as **network** correspond to the menu tabs on the webpage such as Com1 or Security. Type the command **system.pages** then press enter to see these top level names.

For example, if the IP address of the SRM8200 is not known use the USB configuration method and enter the command: **network**. This will display the network settings.



Set command examples:
network.ip_address=x.x.x.x
Where x.x.x.x will be the modem’s new IP address.

network.netmask=255.255.0.0
Will set the subnet mask.

If the Management vlan or vlan tag, were set and the modem cannot be accessed by IP address then assessing the CLI via the micro USB port, these commands will be useful:

network.vlanmgmt=0
Will set the vlanMgmt setting to zero and restore Ethernet port access by IP Address.

network.vlantag=xx
Will set the vlanTag to xx.

To change the login password:
System.password=current_password,new_password,new_password

To restore the default login password: **system.passwordRestoreDefaults** then cycle power or enter the command: **config.reset=now**

For a full list of CLI commands type **help** or click help on the webpage.

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13. DRAG AND DROP

SRM8200 can also be configured via drag and drop of config file. To be able to configure using drag and drop method, follow the instructions below to become familiar with the modem settings and parameters and to learn how to configure the modem using drag and drop.

1. Plug into the modem via a micro USB cable
2. Open SRM8200 driver folder (appears as camera icon in windows explorer)
3. Copy config.txt to your desktop.
4. Open config.txt (use notepad) from your desktop.
5. Make some changes and save the file
6. Rename config.txt to config.cfg
7. Drag the file config.cfg to the SRM8200 folder.
8. The modem will automatically apply the setting changes.

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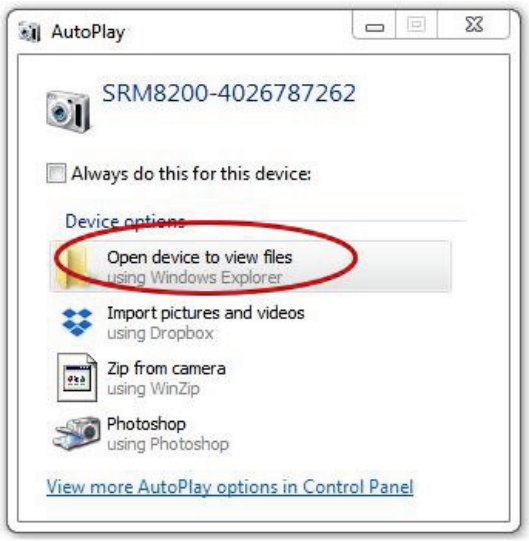
14. RESTORE FACTORY DEFAULT

If necessary the modem can be restored to factory default:

1. Open a Notepad document.
2. Copy and paste these two commands into the document
   system.passwordRestoreDefaults
   config.factoryDefaults=set
3. Save the document with the name: config.cfg.
4. Connect a computer and modem using a micro USB cable.
5. When the two drives come up in Windows Explorer, open the drive for the files (not the drivers).
6. Click on the Windows Explorer window to display files and folders.
7. Now, click on the camera drive icon to see the .txt and other files on the modem.
8. Drag and drop the config.cfg file you just created into the window.
9. Bring up a Command prompt and run: ping -t 192.168.111.100.
10. When modem reboot completes it will respond with good ping replies. It is now in factory default and ready for re-configuration.



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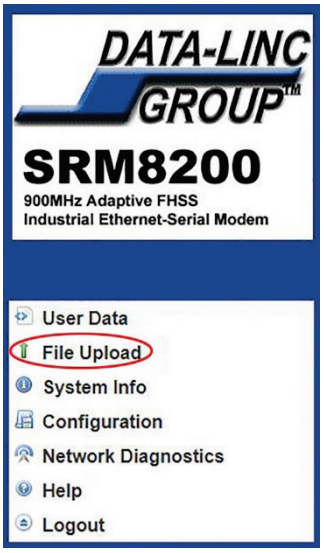
15. FIRMWARE UPDATE

CAUTION: The firmware update process completes with a reboot and the modem will stop communicating for about 45 seconds.



SRM8200 firmware can be uploaded to any modem even over the wireless network.

1. Login to a modem via Ethernet.
2. Click File Upload.
3. Browse for the Data-Linc provided firmware file, click Send.
4. The modem will reboot itself to save the new firmware. There is no need to power cycle the modem.

NOTE: It will take around twenty minutes to complete the update.

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16. TROUBLESHOOTING A NETWORK

16.1 SUPPORT BUNDLE

Type the IP address of the modem followed by '/support', (for example 192.168.111.100/support) to create and auto-download a support bundle for the modem. The support bundle is a zipped file in the support bundle, once you unzip it, you can find configuration setting for all modems in the network. The support bundle can be created for any modem in the network with its IP address.

Support Bundle Issue:
If the modem's date/time is not set the support bundle downloaded will not contain configuration files. To set the date/time perform the following:

1. Log into the command line interface via the USB port.
   Run the command:

   ntp.ntpreference=REFCLK_LOCALCLOCK

   (Note: This can also be done on the web page using the NTP tab).

To manually change the date and time run the command:

date.timeString=mm/dd/yyyy hh:mm:ss

Where:
mm = month (01=Jan., 02=Feb., etc.)
dd = day of the month
yyyy = year
hh = Hour, in 24-hour format (01 for 1:00 AM, 13 for 1:00 pm, etc.)
mm = minute
ss = second

NOTE: date.timeString cannot be changed via webpage configuration.

16.2 ADDING REPEATERS

In networks with Hopping ON and repeaters will be added, start at the Gateway and change "Radio Max Repeaters" first then add Endpoint_Repeater modems.

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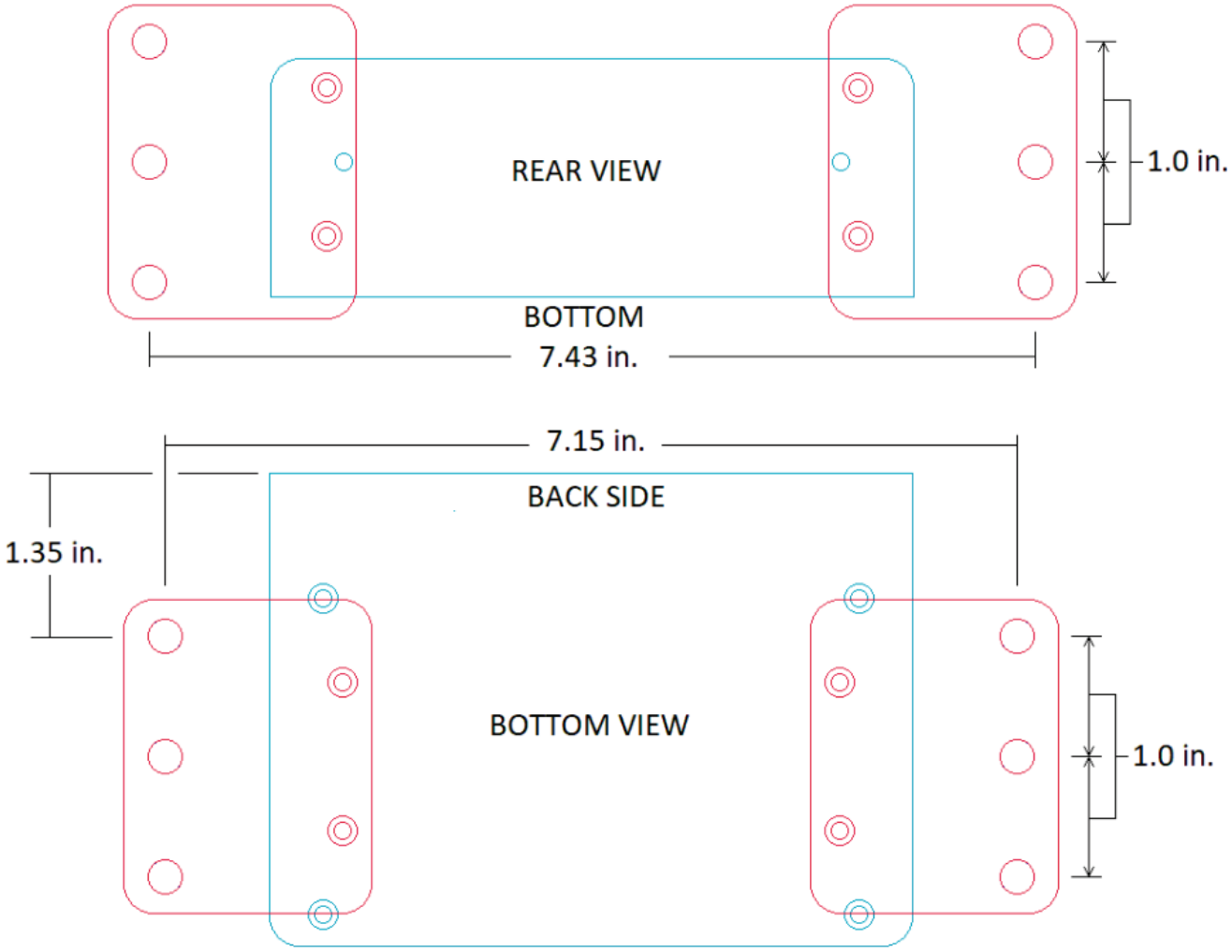
17. SRM8200 DIMENSIONS

Please note: The mounting brackets can be detached or moved to the back of the units as needed.



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18. APPENDIX A

18.1 GENERAL TIPS

1. IP Address Change: When the modem IP address is changed the modem webpage interface will stop responding. To correct enter the new IP address of the modem on the browser tab to access modem settings.
2. An Endpoint_Repeater is considered a generic or a standard repeater.
3. Login credentials can only be changed from Command Line Interface (CLI). Please see CLI section for details.

18.2 ADDITIONAL PAGES

For the additional pages available in the SRM8200 leaving them at default settings will work for the present example.

Pages not covered in this User Guide:

- Config
- Services
- Network Stats
- NTP
- Date
- SNMP
- Security
- Runtime Environment
- Modbus
- Lo Ex Com

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