# FCC Part 24
# Transmitter Certification

# Test Report

**FCC ID: DNY0A1MINIM1900**

**FCC Rule Part: CFR 47 Part 24E**

**ACS Report Number: 06-0115-24E**

Manufacturer: EMS Technologies, Inc.
Model: EkoMini M1.9

# Operator's Manual

# EkoMini M1.9
# IN-DOOR REPEATER MANUAL

A Division of EMS Technologies, Inc.

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## Disclaimer

Every attempt has been made to make this material complete, accurate, and up-to-date. Users are cautioned, however, that EMS Wireless reserves the right to make changes without notice and shall not be responsible for any damages, including consequential, caused by reliance on the material presented, including, but not limited to, typographical, arithmetical, or listing errors.



**WARNINGS, CAUTIONS, AND GENERAL NOTES**

This product conforms to FCC Part 15, Section 21. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

In accordance with FCC regulations regarding human exposure to radio frequency energy, this device shall be installed such that a minimum separation distance of 20cm is maintained between it and general population.

This Class B digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. 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.

Cet appareillage numérique de la classe B répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement.L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

## RF Exposure

In accordance with FCC requirements of human exposure to radiofrequency fields, the server and donor radiating elements shall be installed such that a minimum separation distance of 20 cm and 23 cm, respectively, is maintained between the radiating element and the general population.

## Safety Considerations

When installing or using this product, observe all safety precautions during handling and operation. Failure to comply with the following general safety precautions and with specific precautions described elsewhere in this manual violates the safety standards of the design, manufacture, and intended use of this product. EMS Wireless assumes no liability for the customer's failure to comply with these precautions.

**WARNING**

WARNING calls attention to a procedure or practice, which if ignored, may result in damage to the system or system component. Do not perform any procedure preceded by a WARNING until described conditions are fully understood and met.

**Warning -- For Your Safety**

Disconnect all power before servicing the unit.

Install the product securely on a stable surface in a protected location where no one can step or trip over the supply cord and where the supply cord will not be damaged.

Do not expose this device to rain or other moisture.

The input voltage range is 100 – 240 VAC, Single Phase, 50 – 60 Hz.
Use only a grounded electrical outlet when connecting the unit to a power source. If you do not know whether the unit is grounded, consult a qualified electrician.
A readily accessible disconnect device that is suitably approved and rated shall be incorporated into the field wiring.

**If You Need Help**

If you need additional copies of this manual, or have questions about system options, or need help with installation and using of the system, please contact EMS Wireless' Customer Support Department.

EMS Wireless
Customer Support Department
2850 Colonnades Court NW, Norcross, GA 30071
770.582.0555 x5310

**Service**

Only authorized service personnel will service any part of this product and only in accordance with procedures outlined in this manual. If the product does not meet its warranted specifications, or if a problem is encountered that requires service, notify EMS Wireless' customer support department. Service will be rendered according to the EMS Wireless' warranty and repair policy. The product shall not be returned without contacting EMS Wireless and obtaining a return authorization number from the Customer Support department.

When returning a product for service, include the following information: Owner, Model Number, Serial Number, Return Authorization Number (obtained in advance from EMS Wireless Customer Support Department), service required and/ or a description of the problem encountered.

**Warranty and Repair Policy**

The EMS Wireless Quality Plan includes product test and inspection operations to verify the quality and reliability of our products.

EMS Wireless uses every reasonable precaution to ensure that every device meets published electrical, optical, and mechanical specifications prior to shipment. Customers are asked to advise their incoming inspection, assembly, and test personnel as to the precautions required in handling and testing ESD sensitive opto-electronic components. Physical damage to the external surfaces voids warranty.

These products are covered by the following warranties:

1. General Warranty

EMS Wireless warrants to the original purchaser all standard products sold by EMS Wireless to be free of defects in material and workmanship for the duration of the warranty period of one (1) year from date of shipment from EMS Wireless. During the warranty period, EMS Wireless' obligation, at our option, is limited to repair or replacement of any product that EMS Wireless proves to be defective. This warranty does not apply to any product, which has been subject to alteration, abuse, improper installation or application, accident, electrical or environmental over-tress, negligence in use, storage, transportation or handling.

2. Specific Product Warranty Instructions

All EMS Wireless products are manufactured to high quality standards and are warranted against defects in workmanship, materials and construction, and to no further extent. Any claim for repair or replacement of a device found to be defective on incoming inspection by a customer must be made within 30 days of receipt of the shipment, or within 30 days of discovery of a defect within the warranty period.

This warranty is the only warranty made by EMS Wireless and is in lieu of all other warranties, expressed or implied, except as to title, and can be amended only by a written instrument signed by an officer of EMS Wireless. EMS Wireless customer support representatives are not authorized to make commitments on warranty returns.

In the event that it is necessary to return any product against the above warranty, the following procedure shall be followed:

a. Return authorization shall be received from the EMS Wireless Customer Support prior to returning any device. Advise EMS Wireless Customer Support of the model, serial number, and the discrepancy. The device shall then be forwarded to EMS Wireless, transportation prepaid. Devices returned freight collect or without authorization may not be accepted.

b. Prior to repair, EMS Wireless Customer Support will advise the customer of EMS Wireless test results and will advise the customer of any charges for repair (usually for customer caused problems or out-of-warranty conditions).

If returned devices meet full specifications and do not require repair, or if non-warranty repairs are not authorized by the customer, the device may be subject to a standard evaluation charge. Customer approval for the repair and any associated costs will be the authority to begin the repair at EMS Wireless. Customer approval is also necessary for any removal of certain parts, such as connectors, which may be necessary for EMS Wire- less testing or repair.

c. Repaired products are warranted for the balance of the original warranty period, or at least 90 days from date of shipment.

3. Limitations of Liabilities

EMS Wireless' liability on any claim of any kind, including negligence, for any loss or damage arising from, connected with, or resulting from the purchase order, contract, or quotation, or from the performance or breach thereof, or from the design, manufacture, sale, delivery, installation, inspection, operation or use of any equipment covered by or furnished under this contract, shall in no case exceed the purchase price of the device which gives rise to the claim.

EXCEPT AS EXPRESSLY PROVIDED HEREIN, EMS WIRELESS MAKES NO WAR- RANTY OF ANY KIND, EXPRESSED OR IMPLIED, WITH RESPECT TO ANY GOODS, PARTS AND SERVICES PROVIDED IN CONNECTION WITH THIS AGREEMENT INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. EMS WIRE- LESS SHALL NOT BE LIABLE FOR ANY OTHER DAMAGE INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH FURNISHING OF GOODS, PARTS AND SERVICE HEREUNDER, OR THE PERFORMANCE, USE OF, OR INABILITY TO USE THE GOODS, PARTS AND SERVICE.

EMS Wireless test reports or data indicating mean-time-to-failure, mean-time-between-failure, or other reliability data are design guides and are not intended to imply that individual products or samples of products will achieve the same results. These numbers are to be used as management and engineering tools, and are not necessarily indicative of expected filed operations. These numbers assume a mature design, good parts and no degradation of reliability due to manufacturing procedures and processes.

**Introduction**

EkoMini is quick and easy to install, using a minimum set of common tools. This section will provide the basic steps to performing the installation of EkoMini. Please read complete instructions before beginning assembly.

**Description**

The EkoMini is a bi-directional amplifier unit and was designed to provide enhanced RF coverage for wireless systems in small facilities. Usage includes providing coverage in retail stores, offices, warehouses, restaurants, etc.

The EkoMini is housed in an indoor mountable enclosure.
The EkoMini supports most system protocols including CDMA, GSM/PCS1900 and TDMA and is available in models that cover all licensed 1.9 GHz PCS bands A through F, ESMR/SMR 806-866 MHz and Cellular 821 to 894 MHz. Band selective filtering in both uplink and downlink signal paths is accomplished with down conversion to an intermediate frequency and SAW filtering to provide maximum selectivity from out of band carriers.

The EkoMini features auto set-up, lightweight compact enclosure, optional remote alarming, excellent electrical specifications, high reliability and cost-effective pricing.

## Functionality

In order to function properly, during initial set-up the downlink signal must be presented to the EkoMini. Without the downlink signal, the unit will not operate properly.

The EkoMini is capable of automatically adjusting its own signal gain levels up to the maximum output power levels. The EkoMini detects the downlink output power and adjusts the level for 20-dBm composite output power and continues to monitor and reset the gain as required for proper system performance. For example, when a CDMA protocol system is being amplified, there could be an error in set-up initially resulting from only pilot sync, and paging Walsh codes being present on the RF carrier. The EkoMini will reduce the system gain until no signal is received that will exceed the output power set- ting. This prevents the EkoMini from setting up to a higher power level than actually desired if all of the Walsh codes were present. The gain does not continually change to maintain an output power of 20 dBm (AGC) since this would defeat and fight the benefits of power control in the system. The user may reduce or limit the power output level by adjusting the peak power limit as described below. The user peak power switches will set the unit's output power up to 14 dB below the maximum power output of 20 dBm; the user interface to control this feature is the peak power switches.

The EkoMini has 30 dB of gain control in the uplink and downlink signal paths. This gain is controlled by two methods. Up to 14 dB can be con- trolled by adjusting the user peak limit switches located behind an access plate on the side of the unit to limit the maximum output power level. The uplink and downlink attenuators are controlled by the internal microprocessor to adjust the maximum gain of the unit for both paths. The uplink and downlink signal paths are adjusted to the same setting by the microprocessor unless the user offsets, reduces the gain in the uplink signal path. The user has control to reduce the uplink gain by 6 dB, this can be used to balance the uplink and downlink paths as well as reduce contribution of noise to the base station receivers.

The EkoMini has a total of 30 dB of gain control in the uplink and downlink signal paths, which is controlled by the microprocessor. The microprocessor monitors the uplink and downlink detected signal levels and adjusts the gain to prevent overdriving the linear power amplifier circuits.

The EkoMini monitors the downlink-detected signal and adjusts the gain to achieve rated output power, +20 dBm. The uplink attenuation is adjusted by the microprocessor to the same gain level. Path loss is normally equal in both directions. The microprocessor continues to monitor the detected out- put power on both paths to prevent overdrive. Should the downlink de- tected power increase above the desired level; the processor will reduce the gain in both uplink and downlink paths. A subscriber unit getting very close to the rerad antenna, may cause uplink signal overdrive. The processor will temporarily reduce the gain in the uplink (reverse) path when uplink signal overdrive is sensed, which will reduce the coverage during this condition. Proper placement of the rerad antenna will reduce the occurrence of this condition.

## Protocol Selection

To insure proper RF power output the proper protocol must be selected this insures the software will properly distinguish the detected RF power level. CDMA is the only protocol that requires a different look up table/RF calibration.

**Band Selection**

All Frequency Bands must be factory set and cannot be altered in the field. If you desire your EkoMini to be set to a different Frequency Band than originally ordered, it must be returned to the factory. Please contact Customer Service.

**System Set Up Instructions:**

- During initial set-up, downlink signal must be presented to the unit.
- Apply Power
- Log in to GUI via Web browser
- Set Up Peak Power and Uplink Offset
- Restart Unit Using Setup Screen.

## Getting Started

Unpack all of the boxes and insure all of the material is included for your installation requirements and undamaged in shipment.

*EkoMini with IP Modem*

| *QTY* | *Description* |
|---|---|
| *1* | *EkoMini* |
| *1* | *Manual* |
| *1* | *Test Data, Factory* |

## Mounting

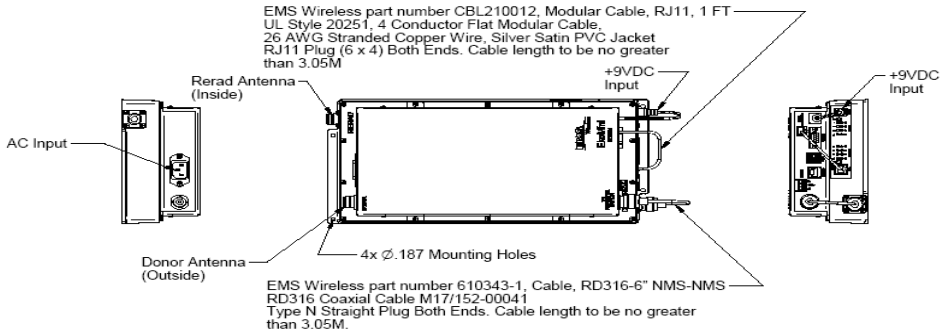
EkoMini is designed for optimum use as an in-door repeater. The housing is not weather resistant and the automatic set up procedure assumes sufficient isolation between antennas is assured. When the donor antenna is mounted outside and the rerad/server antenna is mounted inside of a building isolation is assured to be adequate.

Antennas mounted outside shall comply with Article 810 of the National Electrical Code, ANSI/NFPA 70, specifically, clearances from power and lightning conductors, mounting, and, if necessary, groundings.

Since the EkoMini has a minimum gain of 40 dB, isolation of at least 55 dB must be obtained between the donor and the rerad antenna. Should adequate isolation not be obtained an oscillation could occur which could cause damage to the unit.

- Connect coaxial cables to the Donor and Rerad ports.
- Connect primary power module to unit
    - For EkoMini with IP Modem connect AC Power to AC Power Input on Modem Module and connect 9VDC Output of Modem Module to EkoMini DC Input.

## Installation



This unit will be installed by a professional installer using the appropriate anchors, etc. to support a minimum of 30 lbs(actual weight of unit is 10 lbs) with four(4) #8 screws a minimum of 1 ¼ inch in length(not provided with unit) for the surface where the unit is being mounted in the orientation shown located within 2.95 meters of the unit.

Standard hand/power tools possessed by any qualified installer are adequate for both installing and removing the unit.

The power supply cord must not be attached to the building surface nor run through walls, ceilings, floors, and similar openings in the building structure. The power supply cord must be inserted in a standard receptacle.

**CAUTION !**
**DOUBLE POLE / NEUTRAL FUSING**

Select Mounting location of Donor directional antenna and orient toward the base station to maximize signal level. For best performance this should be line of sight between the Donor antenna and the base station antenna.

**Alarms**

All alarms are considered major since there are no field replaceable modules in the unit. All alarms are indicated locally and immediately by the Alarm LED indicator blinking red. Once the Alarm State has existed for 5 minutes, the Alarm LED will have a constant red indication. Certain problems will result in the unit automatically shutting down after 5 minutes of sensed failure. This is done by disabling the RF output stages in both the uplink and downlink signal paths. Removing DC power from the unit for a period of 30 seconds or longer will reset the auto shut down.

| Failure | Action | Alarm Code |
|---|---|---|
| Alarm Cleared | 0 | |
| Synthesizer Lock, Uplink | Auto Shut Down | 1 |
| Synthesizer Lock, Downlink | Auto Shut Down | 2 |
| Downlink RF Overdrive | Auto Shut Down | 3 |
| Uplink RF Overdrive | Auto Shut Down | 4 |
| No Downlink RF Detected* | Alarm Only | 5 |
| Internal Voltage Failure | Alarm Only | 6 |
| Low Current Draw | Alarm Only | 7 |
| Keep Alive(1) | Auto Shut Down | 8 |
| External Alarm | Alarm Only | 9 |

*Minimum detectable RF level is approximately -10dBm. Unit will alarm below this level.

**Indicators**

The EkoMini is equipped with three LED indicators on the end of the unit which provide the following information:

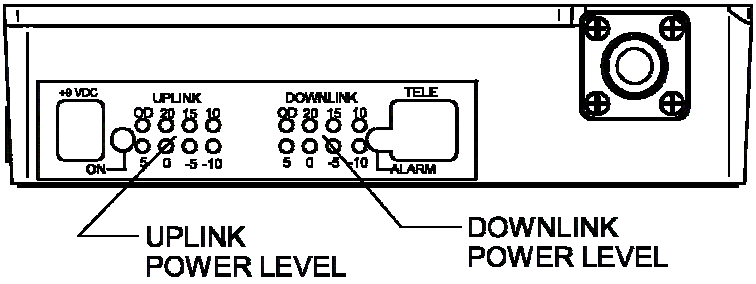
Indicator State Description

On Off No DC Input Power Applied Green DCPower on, normal function Green Flashing DC Power on, Set up fault-Band Selection

Alarm Off No Alarm
Red Flashing 5 Minute Warning
(See list of alarms) Red Alarm

Uplink RF Power levels per picture below

Downlink RF Power levels per picture below




No RF Uplink Detected; this is a normal state for the uplink RF path. The normal levels of RF received and amplified from the subscriber unit may be below the -10 dBm detectable level. A quick check can be made by getting within a few feet of the Rerad Antenna, while watching the Uplink RF indicator.

**Primary Power**

The EkoMini with IP Modem operates on AC input voltages of 100 to 240VAC only.

**Donor Antenna**

This input/output is connected to an antenna, which is directed at the desired cell site.

**Rerad Antenna**

This input/output is connected to an antenna, which is mounted in the desired area to be covered. The antenna should be mounted at a location where adequate coverage is provided for the area desired while EkoMinimizing the potential of subscriber units normally operating close enough to overdrive the unit.

**Serial Number**

Each unit has a unique electronic serial number. This number is displayed on the decal on the unit and is also displayed with the history log when using the modem interconnect.
Installation:
Note 1: Only qualified technicians should perform Installation and system set up. The user is cautioned that modification or changes to this device not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
Note 2: Manufacturer's rated output power of this equipment is for single carrier operation. For situations when multiple carrier signals are present, the rating would have to be reduced by 3.5 dBm, especially where the output signal is re-radiated and can cause interference to the

adjacent band users. This power reduction is to be determined by means of input power or gain reduction and not by an attenuator at the output device.

**AC Systems (EkoMini with IP Modem)**

The voltage input range is 100-240VAC, single phase 50-60Hz. Use only a grounded electrical outlet when connecting the unit to a power source. If you do not know whether the outlet is grounded, consult with a qualified electrician.

A readily accessible disconnect device that is suitably approved and rated shall be incorporated into the field wiring.

**User Interface Overview**

The IPWMM (IP connected wireless modem module) allows the user to monitor the operation of the repeater and control some of it's function remotely. The modem connects through a CDMA200 network and looks and acts like an IP connection. Once the user knows the IP address of the modem he/she can connect to the repeater using a laptop connected to the internet.

The IPWMM also can be connected directly to a computer through an Ethernet Crossover Cable and will then allow local monitoring and control of the repeater. Password protection is used to control access to the repeater.

The EkoMini will Auto-Setup on Power Up so it is important to ensure the RF input and output cables are connected before plugging in the unit to a power source. The IPWMM requires up to 3 minutes to load and connect to the network after power up even though the EkoMini typically sets up in less than 30 seconds.

List of items and information needed to configure the EkoMini. See the Table below for a list of items needed.

| Item Number | EMS Part Number | Description |
|---|---|---|
| 1. | -na- | EkoMini IPWMM, Site ID or Cascade Code pre-programmed into the repeater |
| 2. | -na- | A computer running windows and Ethernet port (RJ45) |
| 3. | -na- | Ethernet crossover cable |
| 4. | | EkoMini User's Guide |
| 5. | -na- | A Site ID or Cascade code for the repeater. |
| 6. | -na- | The SNMP server IP address. This is where heartbeats and other SNMP messages will be sent. The format is standard IP format, 255.255.255.255 |
| 7. | -na- | The desired heartbeat time in minutes. |

## Using A Web Browser to Control the EkoMini
## Web Browser Overview

The web browser will allow you to monitor the operation of the EkoMini and configure some of the parameters. The web interface can be used locally with a computer connected to the EkoMini or through the wireless modem connection.

## Connecting Remotely or through the Ethernet Power
## Local Connection

The user must make sure the computer connected locally is configured properly to use the local ethernet connection. Make sure you are using an Ethernet Crossover cable or the connection will not work. Connect the ethernet crossover cable from the ethernet port on the computer to the ethernet port on the IPWMM.

The instructions that follow will show how to set up the computer to interface to the IPWMM. The instructions are for a computer running Windows XP. The computer must be set up to have a static IP address. How to do this is explained below.

### Setting up Windows XP for Static IP

1. Start up the computer and click on the Start button, lower left of the screen.
2. Click on “Control Panel”. See Figure 1.
3. In the “Control Panel” window, double click on “Network Connections” See Figure 2
4. In the “Network Connections” window find the Local Area Connection. Move the mouse over it, left click to highlight it. See Figure 3.
5. Click the right mouse key and select from the menu “Properties”
6. On the “Local Area Connection Properties” window, select “Internet Protocol” and click on the “Properties” button. See Figure 4.
7. In the “Internet Protocol (TCP/IP) Properties” click on the “Alternate Configuration” tab. See Figure 5.
8. Make sure the ‘User Configured’ option is selected.
9. Enter the IP address and Subnet Mask as shown in Figure 5.
10. Click the OK button. The computer may take awhile to save the changes.
11. You are ready to connect now.
12. Start an Internet browser session (Explorer or equivalent)

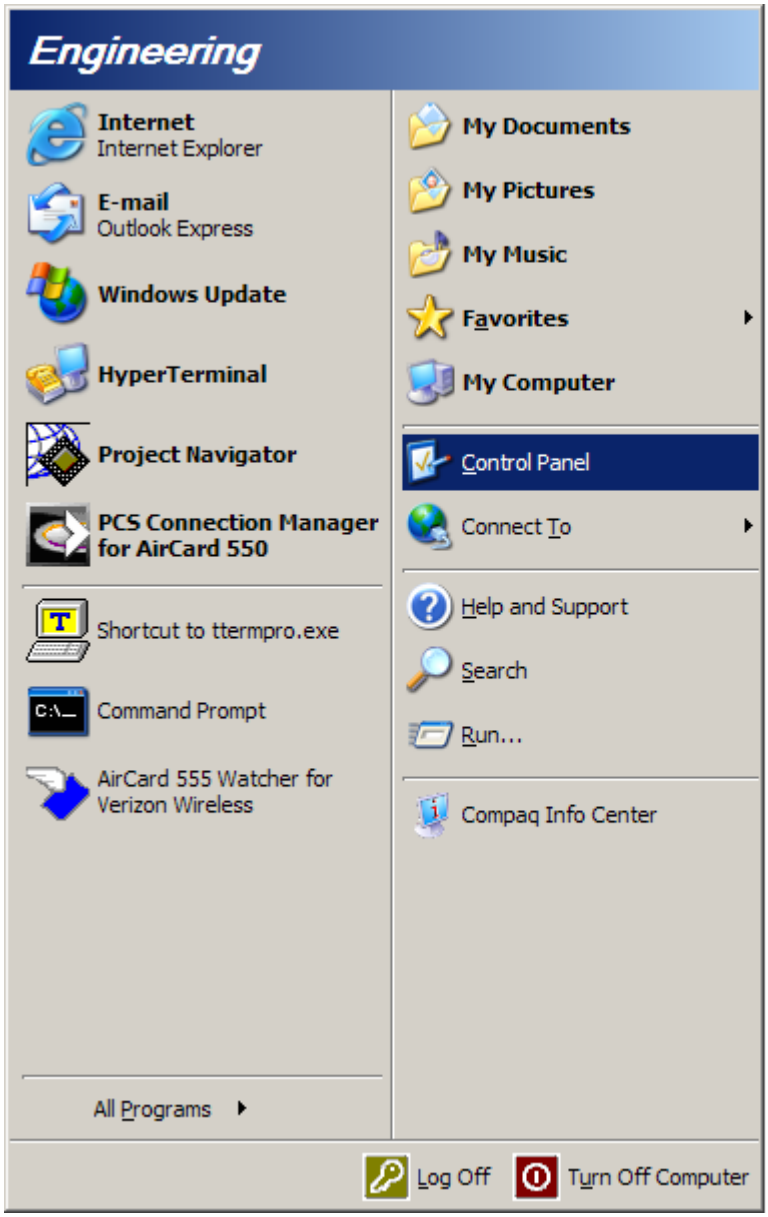

Engineering
Internet
Internet Explorer
E-mail
Outlook Express
Windows Update
HyperTerminal
Project Navigator
PCS Connection Manager for AirCard 550
Shortcut to ttermpro.exe
Command Prompt
AirCard 555 Watcher for Verizon Wireless
All Programs
My Documents
My Pictures
My Music
Favorites
My Computer
Control Panel
Connect To
Help and Support
Search
Run...
Compaq Info Center
Log Off
Turn Off Computer

Figure 1

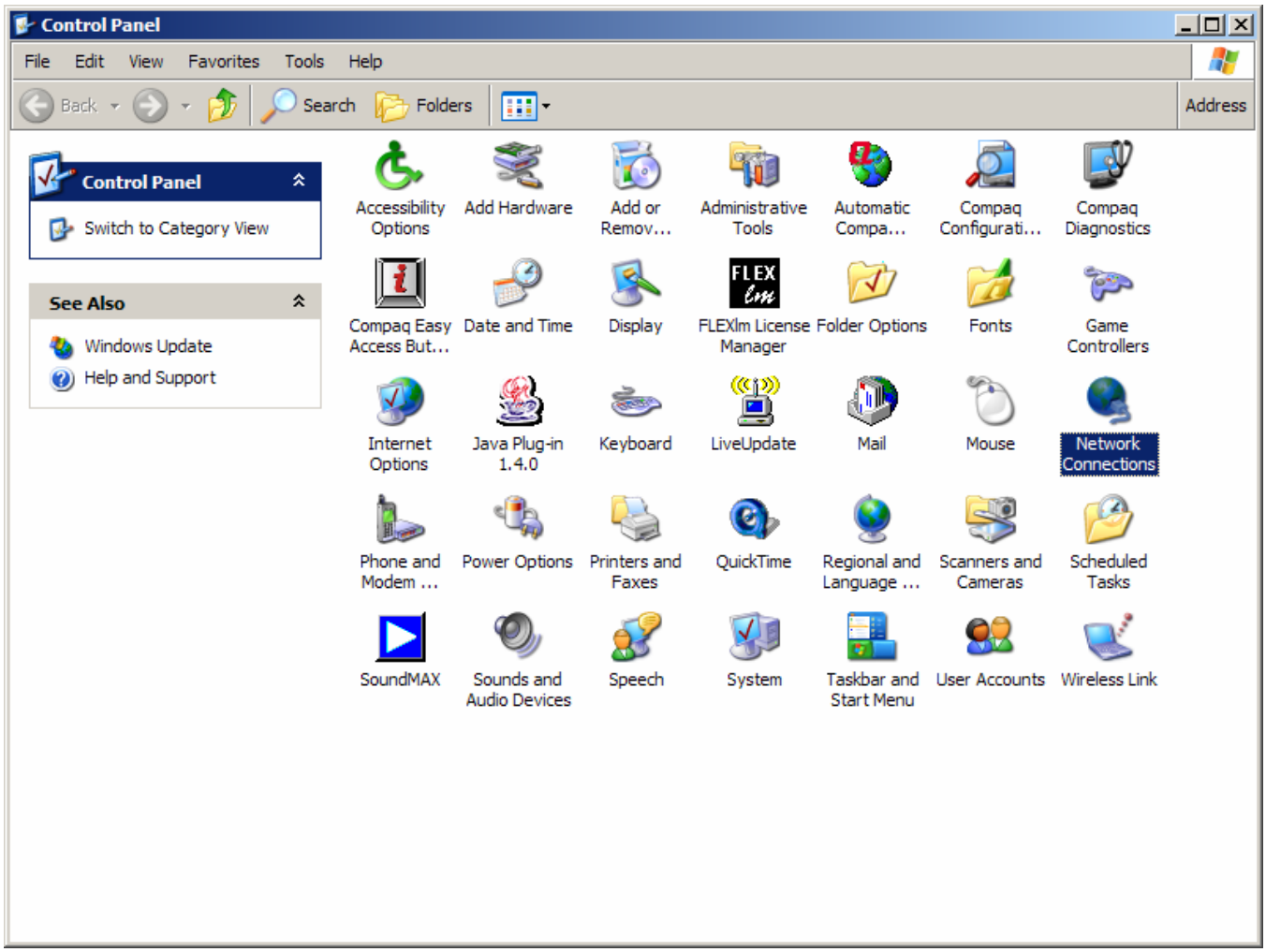

Control Panel
File Edit View Favorites Tools Help
Back Search Folders Address
Control Panel
Switch to Category View
See Also
Windows Update
Help and Support
Accessibility Options
Add Hardware
Add or Remov...
Administrative Tools
Automatic Compa...
Compaq Configurati...
Compaq Diagnostics
Compaq Easy Access But...
Date and Time
Display
FLEXlm License Manager
Folder Options
Fonts
Game Controllers
Internet Options
Java Plug-in 1.4.0
Keyboard
LiveUpdate
Mail
Mouse
Network Connections
Phone and Modem ...
Power Options
Printers and Faxes
QuickTime
Regional and Language ...
Scanners and Cameras
Scheduled Tasks
SoundMAX
Sounds and Audio Devices
Speech
System
Taskbar and Start Menu
User Accounts
Wireless Link

Figure 2

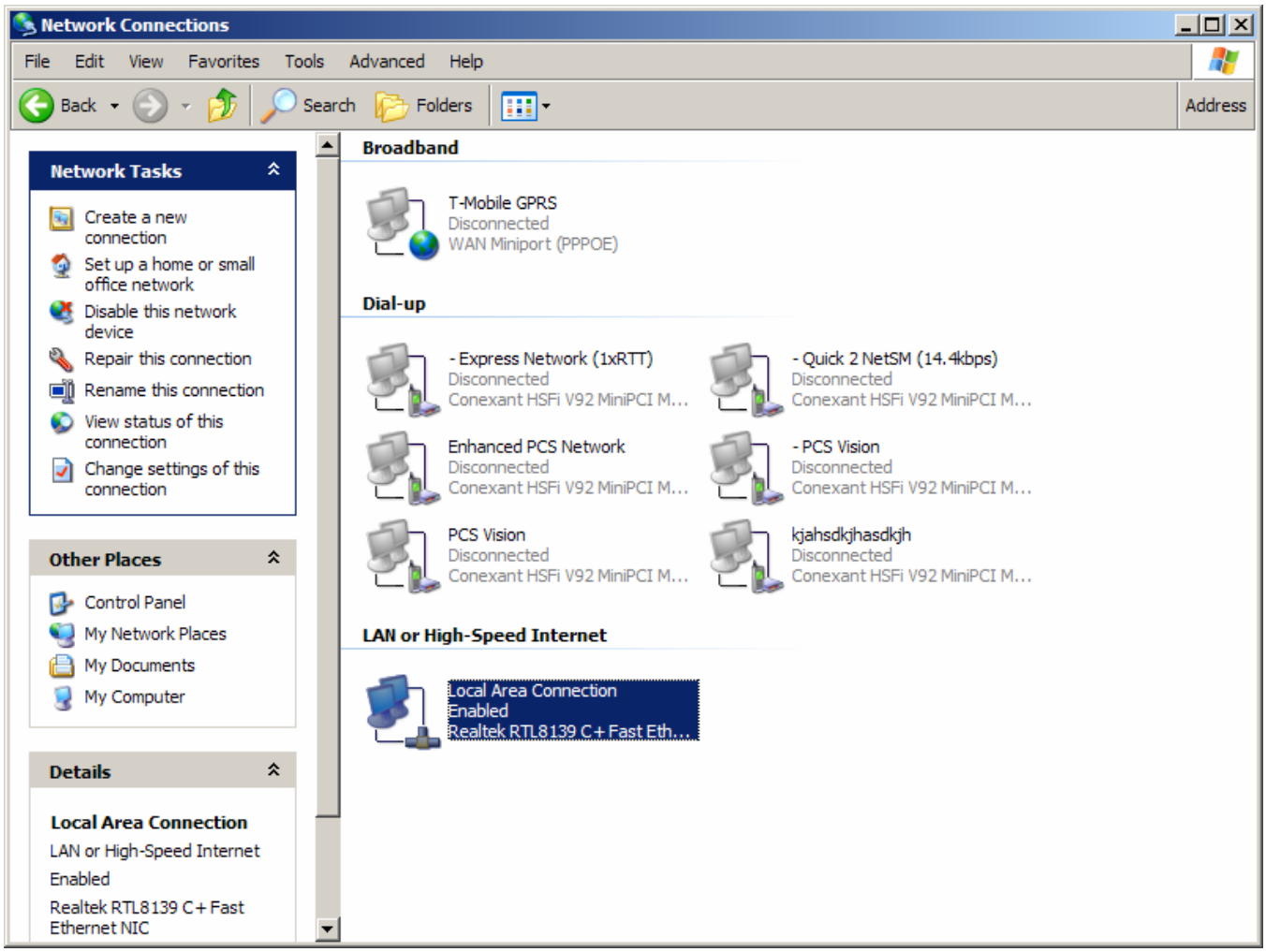

Network Connections
File Edit View Favorites Tools Advanced Help
Back Search Folders Address
Network Tasks
Create a new connection
Set up a home or small office network
Disable this network device
Repair this connection
Rename this connection
View status of this connection
Change settings of this connection
Other Places
Control Panel
My Network Places
My Documents
My Computer
Details
Local Area Connection
LAN or High-Speed Internet
Enabled
Realtek RTL8139 C+ Fast Ethernet NIC
Broadband
T-Mobile GPRS
Disconnected
WAN Miniport (PPPOE)
Dial-up
- Express Network (1xRTT)
Disconnected
Conexant HSFi V92 MiniPCI M...
- Quick 2 NetSM (14.4kbps)
Disconnected
Conexant HSFi V92 MiniPCI M...
Enhanced PCS Network
Disconnected
Conexant HSFi V92 MiniPCI M...
- PCS Vision
Disconnected
Conexant HSFi V92 MiniPCI M...
PCS Vision
Disconnected
Conexant HSFi V92 MiniPCI M...
kjahsdkjhasdkjh
Disconnected
Conexant HSFi V92 MiniPCI M...
LAN or High-Speed Internet
Local Area Connection
Enabled
Realtek RTL8139 C+ Fast Eth...

Figure 3

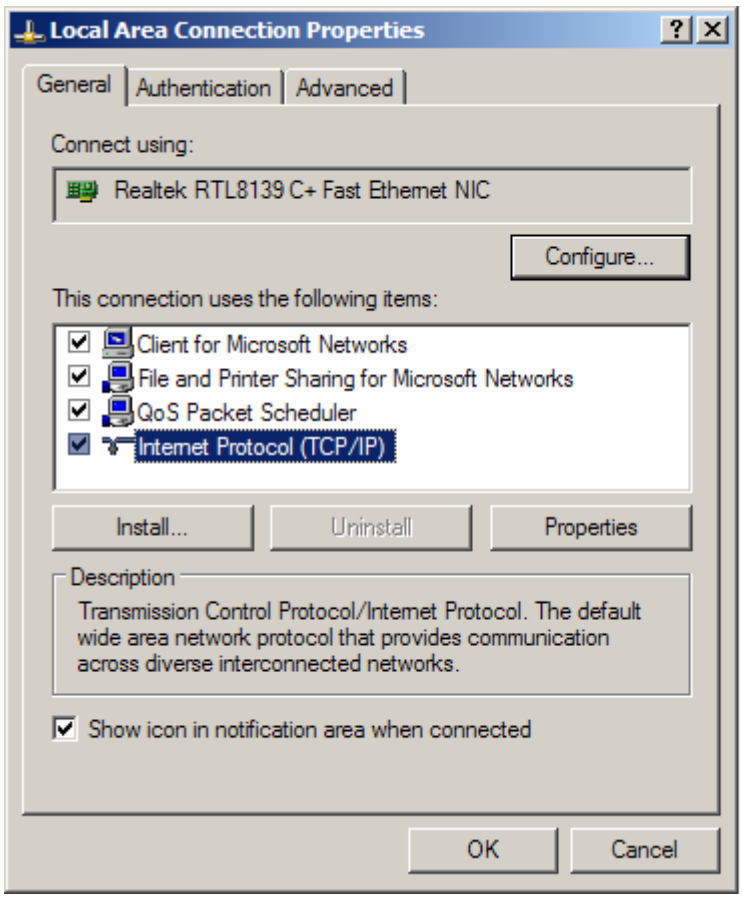

Local Area Connection Properties
General
Authentication
Advanced
Connect using:
Realtek RTL8139 C+ Fast Ethernet NIC
Configure...
This connection uses the following items:
Client for Microsoft Networks
File and Printer Sharing for Microsoft Networks
QoS Packet Scheduler
Internet Protocol (TCP/IP)
Install...
Uninstall
Properties
Description
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
Show icon in notification area when connected
OK
Cancel

Figure 4

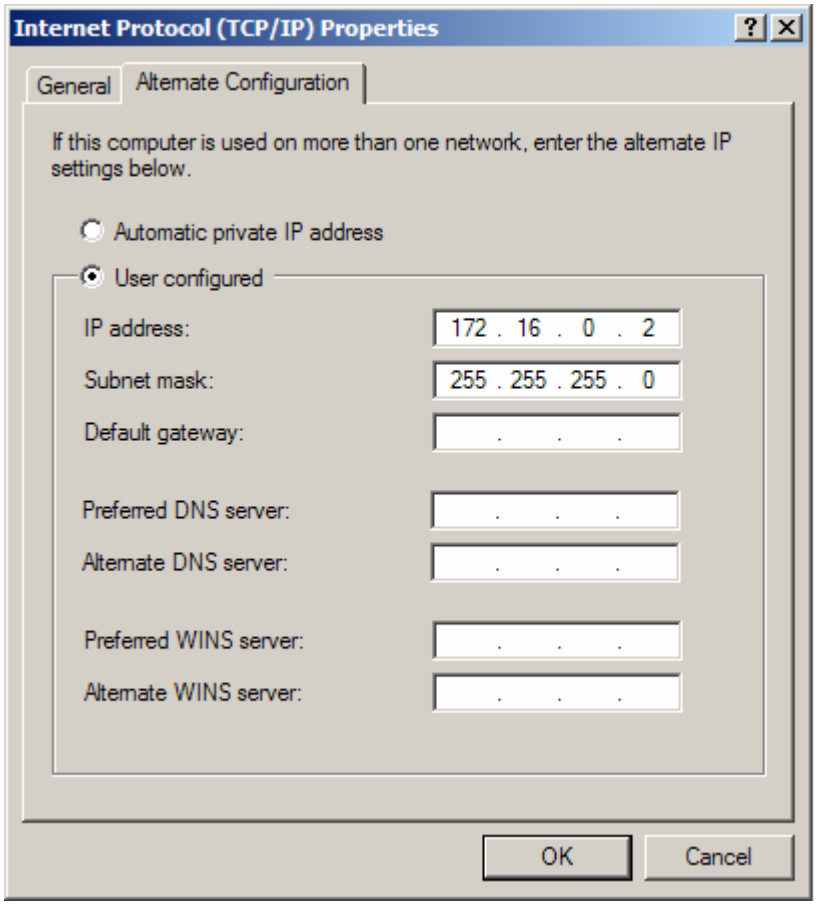


Figure 5

When connecting locally enter http://172.16.0.1 in the browser address bar.

**Remote Connection Through the Wireless Modem**

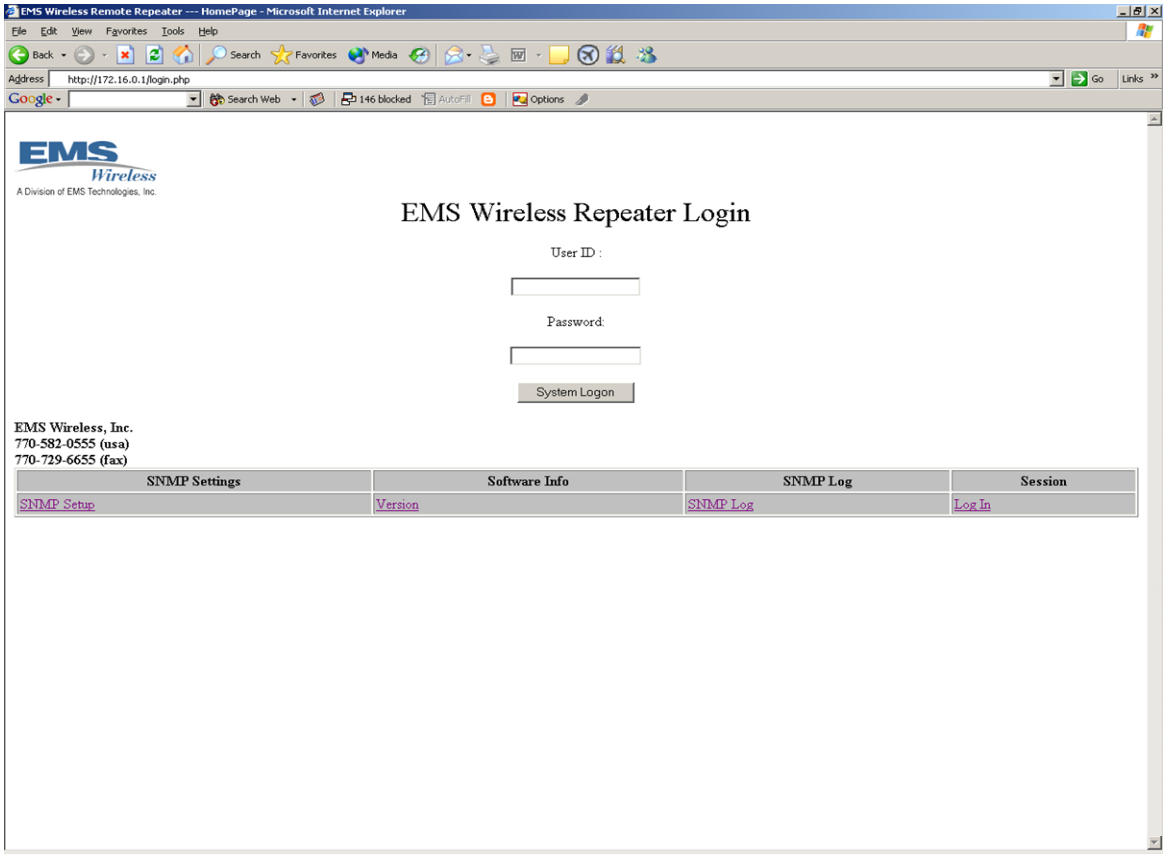
You'll need to find out the IP address of the modem and enter it into the browser address bar. The wireless service provider needs to supply this address since the addresses are dynamically allocated. Be sure there are no firewalls that prevent connection. Wireless service providers usually operate closed networks, so if the EkoMini modem is on one of those the computer accessing the EkoMini needs to be on that network too.

**Pre-Login Access**

You can view some of the settings without logging into the EkoMini. The items are described below.

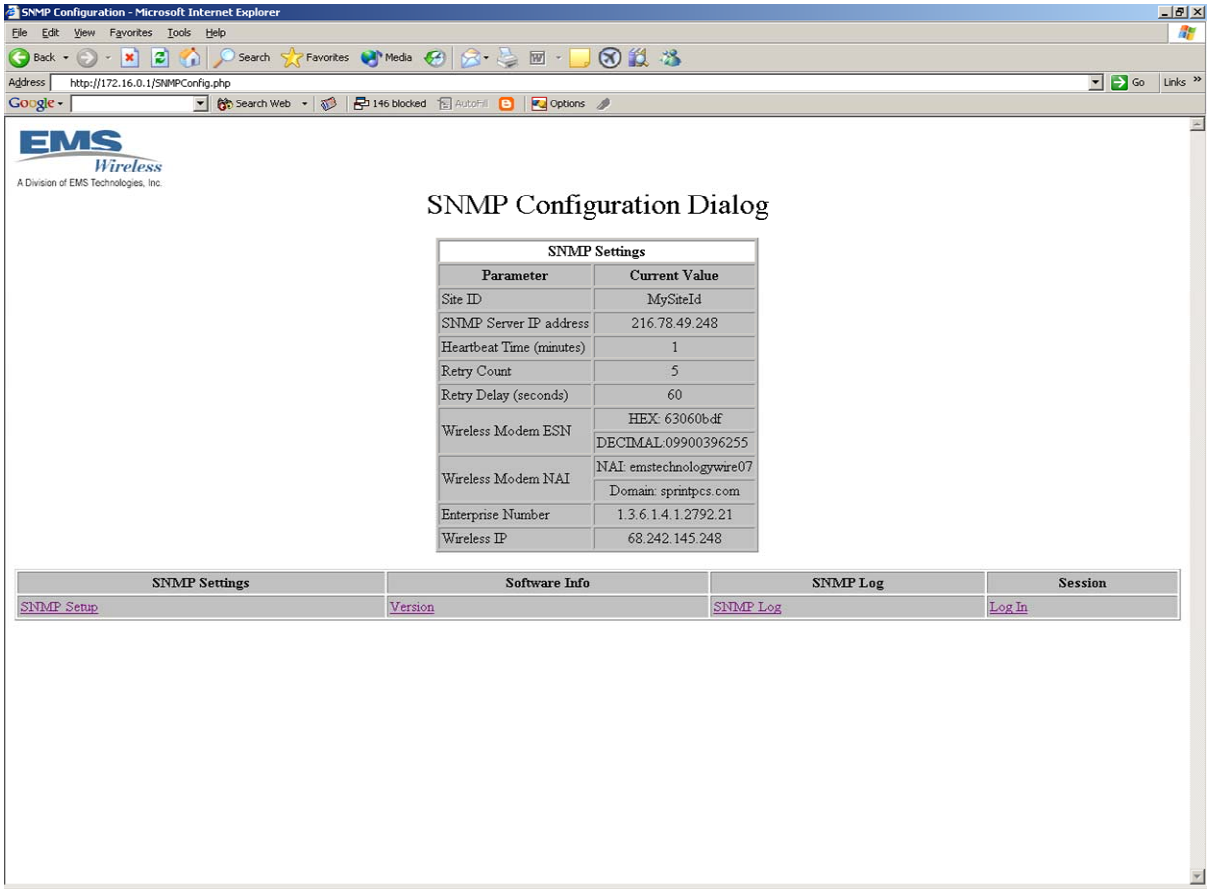
## Start/Login Page

From this page you can view some of the screens or log in to gain access. We'll look at what you can do without logging in.



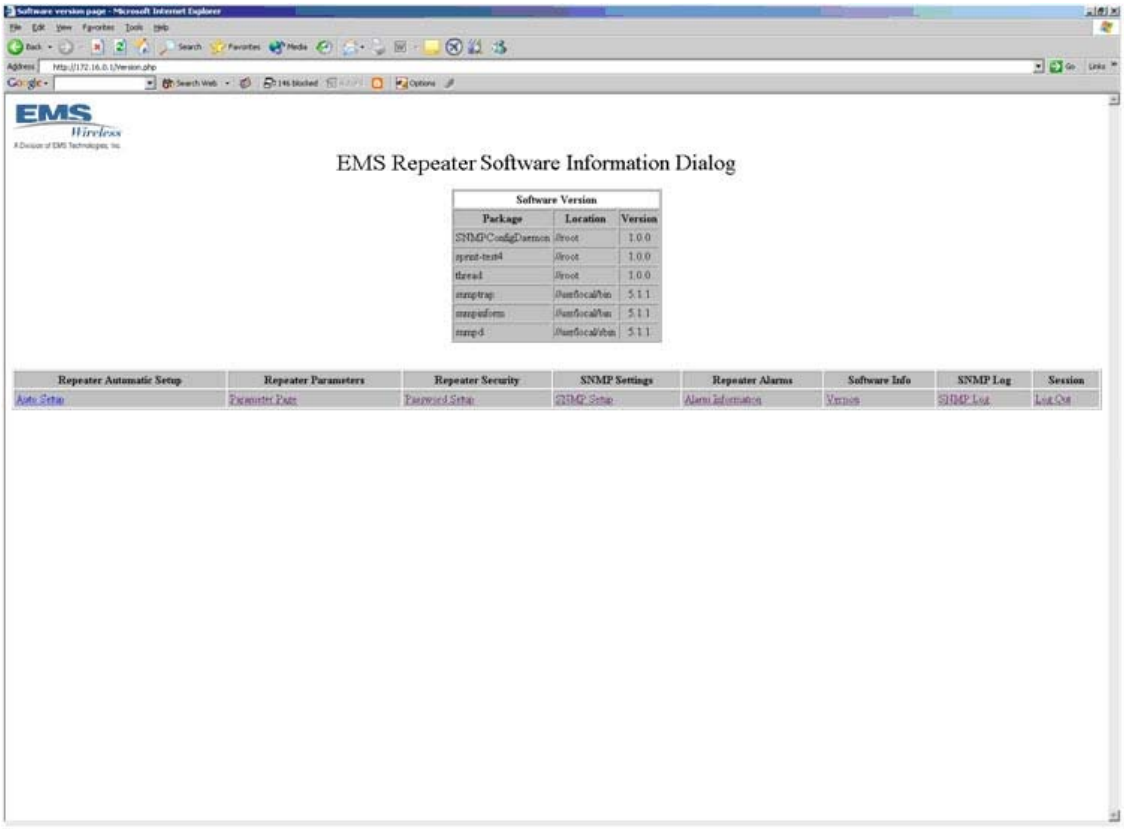
## View SNMP Settings

SNMP can be used to transport alarm and heartbeat messages from the EkoMini to server that can decode those messages. On this page you can view some of the settings. See the section below on the SNMP page (after login) to read about the items on this page.



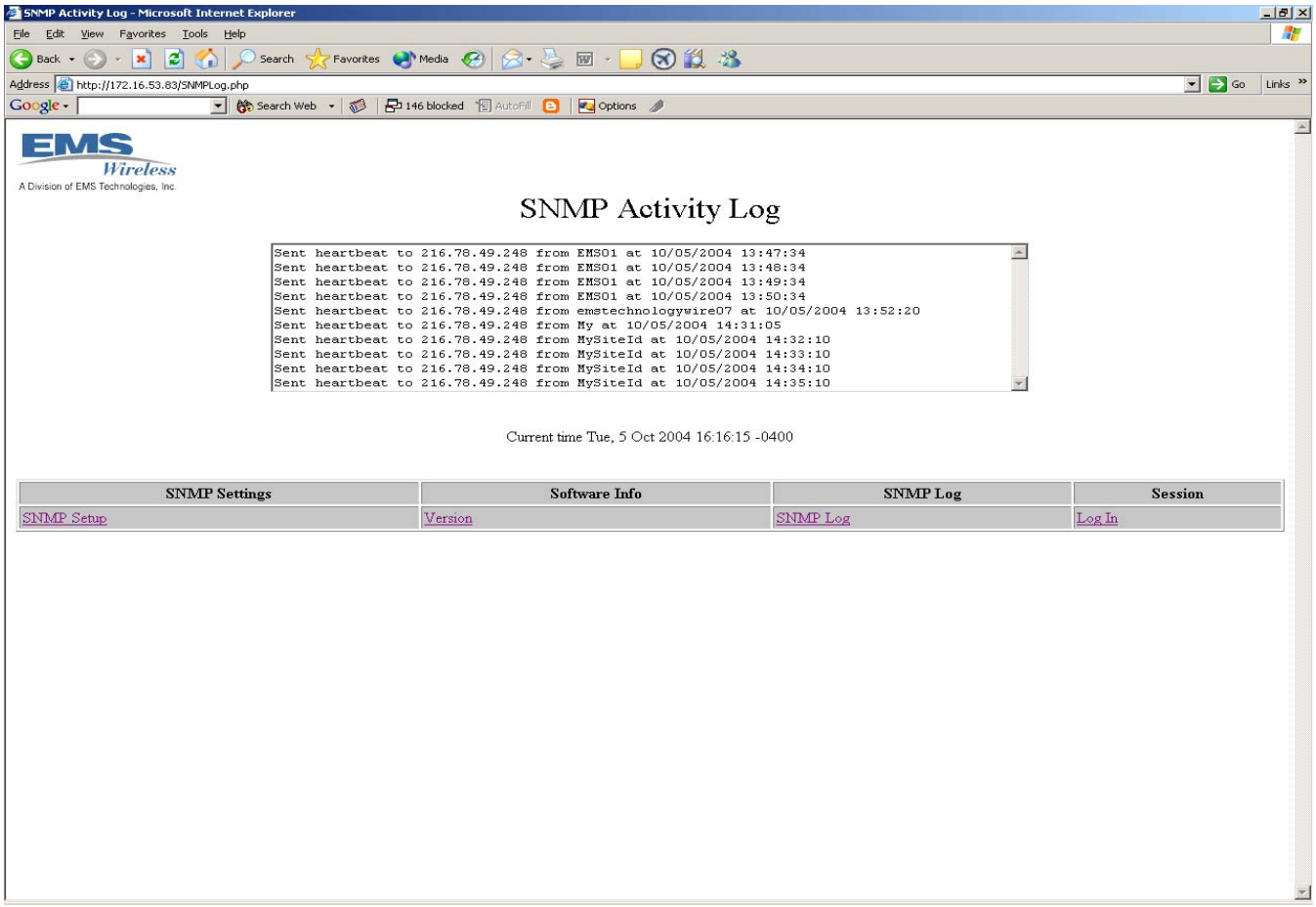
## View Software Version Information

On this page you can view the software versions installed in the machine. There is nothing here to set.



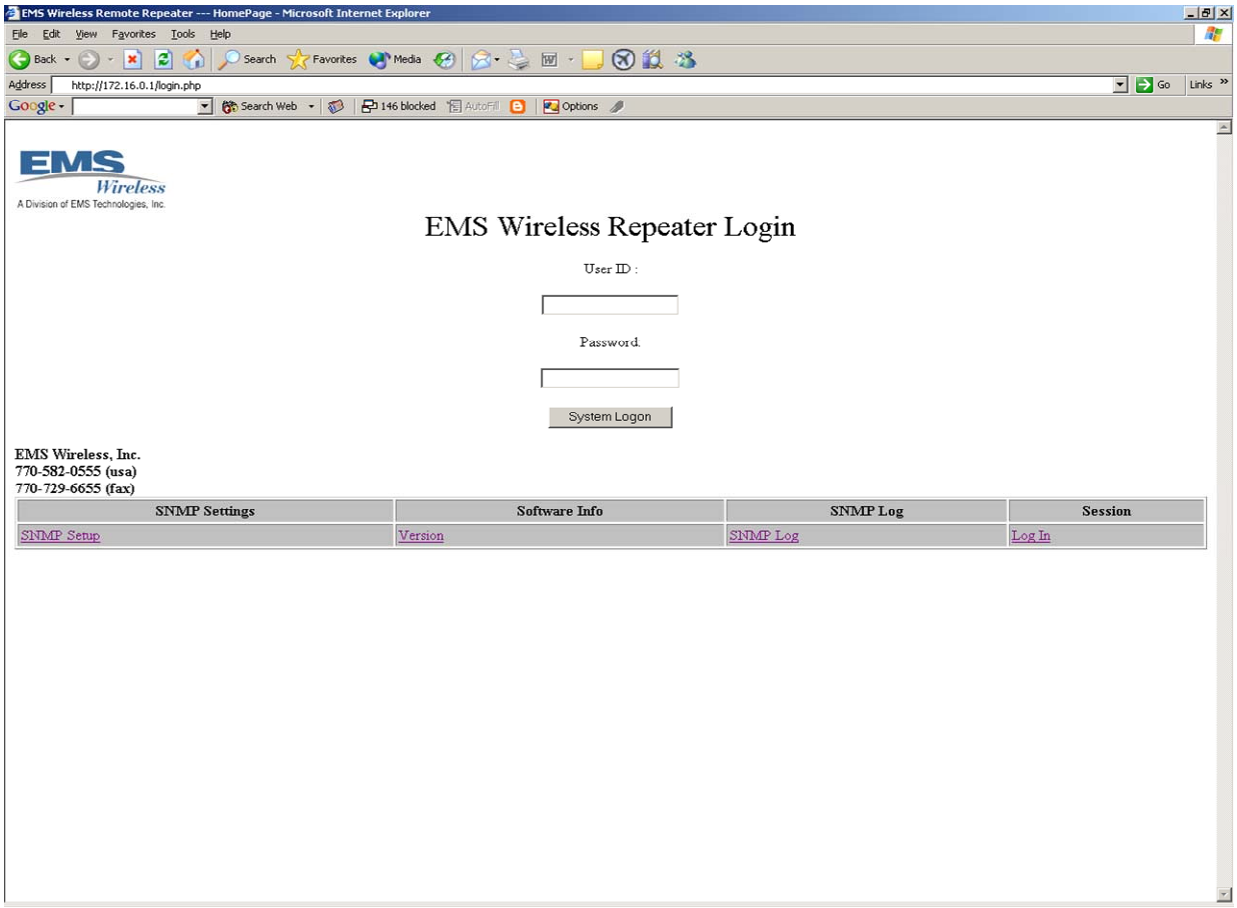
## View SNMP Log

On this page you can see the SNMP messages that have been sent by the repeater. This may prove useful when first setting the repeater up to see that the messages are going to the right IP address. Note that the heartbeat messages are not acknowledged by the server on the other end, someone on the SNMP server end needs to verify the messages are being received.



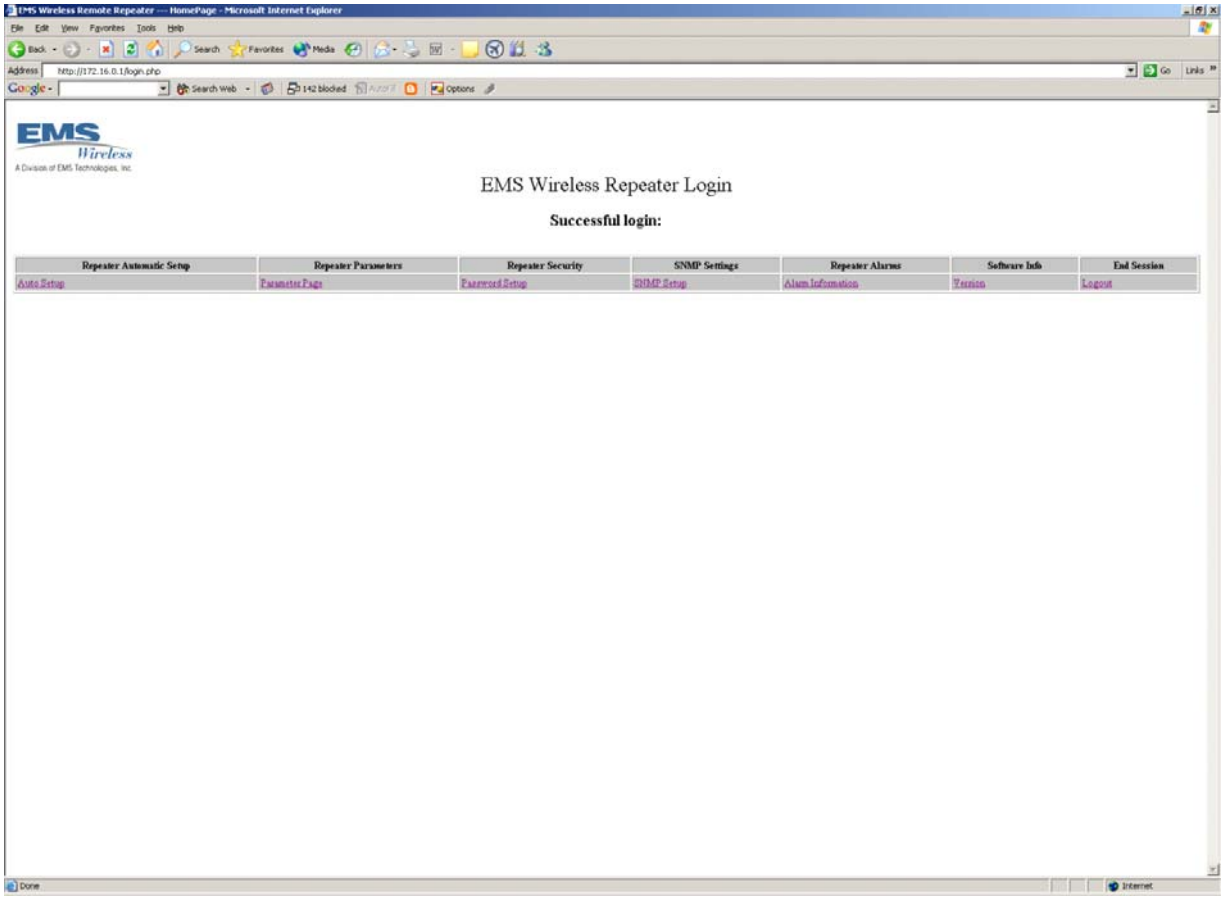
## Login to the EkoMini

To gain access to the EkoMini you'll need a username and password. Enter the default passwords USERNAM1 in the User ID field, PASSWRD1 in the Password field and click the System Logon button.



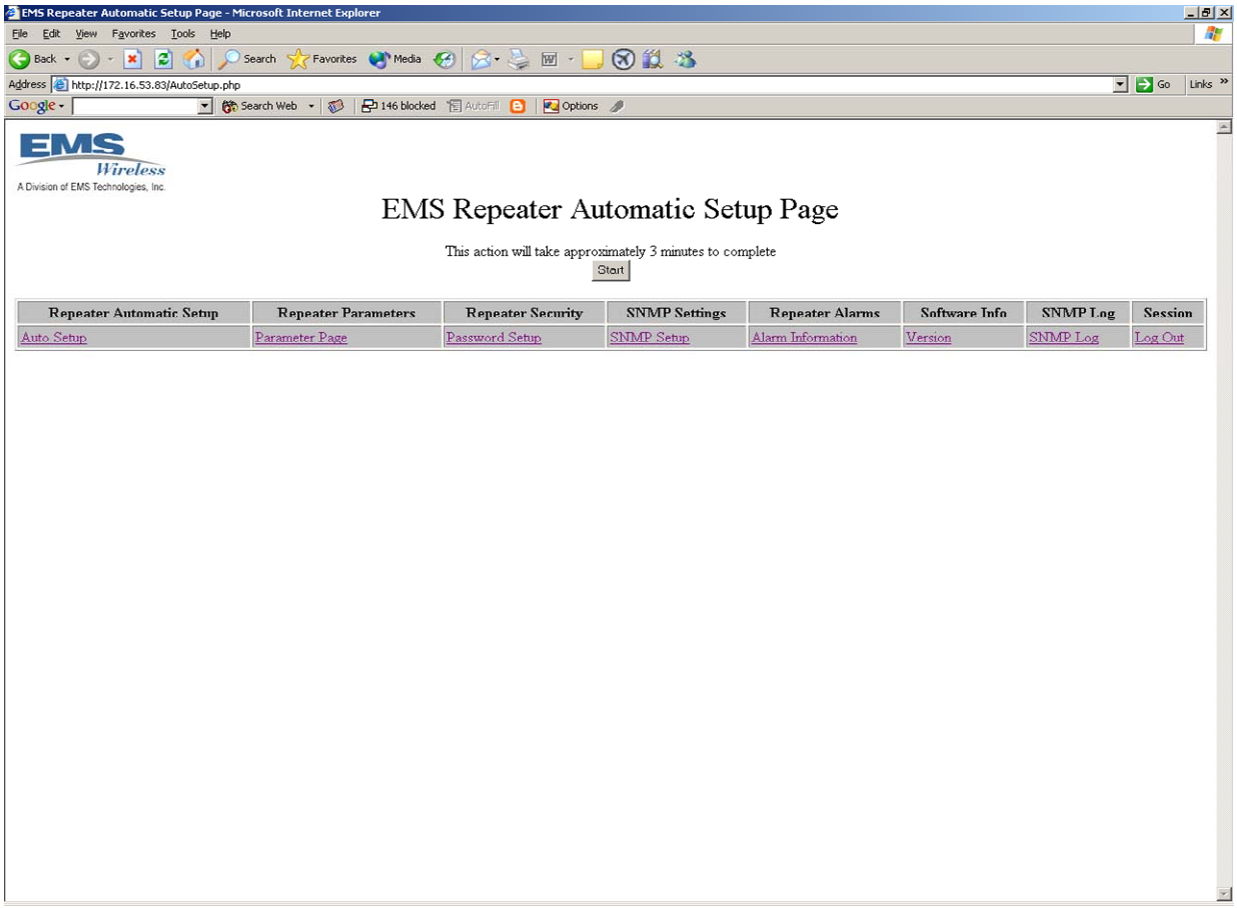
## After Logging In – View the Main Page

After login you will see the main page. From here you can view the EkoMini setup, alarm information and alarm reporting (SNMP) configuration.



## Setup the EkoMini – Auto Setup Page

Refer to the EkoMini manual for the steps you need to take before attempting to set up the EkoMini for operation. After the EkoMini has been connected to power, the donor and server antenna port to port to port isolation has been verified, the antenna port return loss has been verified then it's safe to setup the EkoMini. On the Main Page hit the Auto_Setup link. You'll the Automatic Setup Page. Press start and wait for 3 minutes. The repeater will set its gain to the proper level for operation.



**Setup the Monitoring - SNMP Page**

You need to setup the IP address where the heartbeat messages and any alarm messages will be sent. You can also set the time between heartbeats. Note: A heartbeat is a message sent from the repeater to the SNMP Server IP Address that shows the repeater is still operating.

**Site ID**

The Site ID is set to identify the repeater site. This is part of the message sent to the SNMP server. You can use this field to shut off the SNMP messages or to set the Site ID to be equal to the NAI code in the modem as described below.

**Shutting off SNMP Messaging**

If you would like to shut of the SNMP messaging you can change the Site ID field to blank, in other words clear the field and then hit the save button. All SNMP messages will be disabled.
Setting the Site ID to the modem NAI. If you enter NAI in the Site ID field the EkoMini will read everything in the modem NAI to the left of the '@' sign and use this as the Site ID in the SNMP messages.

**SNMP Server IP Address**

This is the address where the repeater sends the messages. Provided by the wireless service provider. Needs to be in IP Address format, 255.255.255.255 type format.

**Heartbeat Time**

Sets the time period between the heartbeats. The wireless service provider should specify this.

**Retry Count and Delay**

Set the number of times the repeater will try to send an alarm and the period of time between resends. A few times 60 seconds apart should be fine.

**Wireless Modem NAI**

This shows the NAI that is programmed into the PCMCIA wireless modem.

**Wireless Modem ESN**

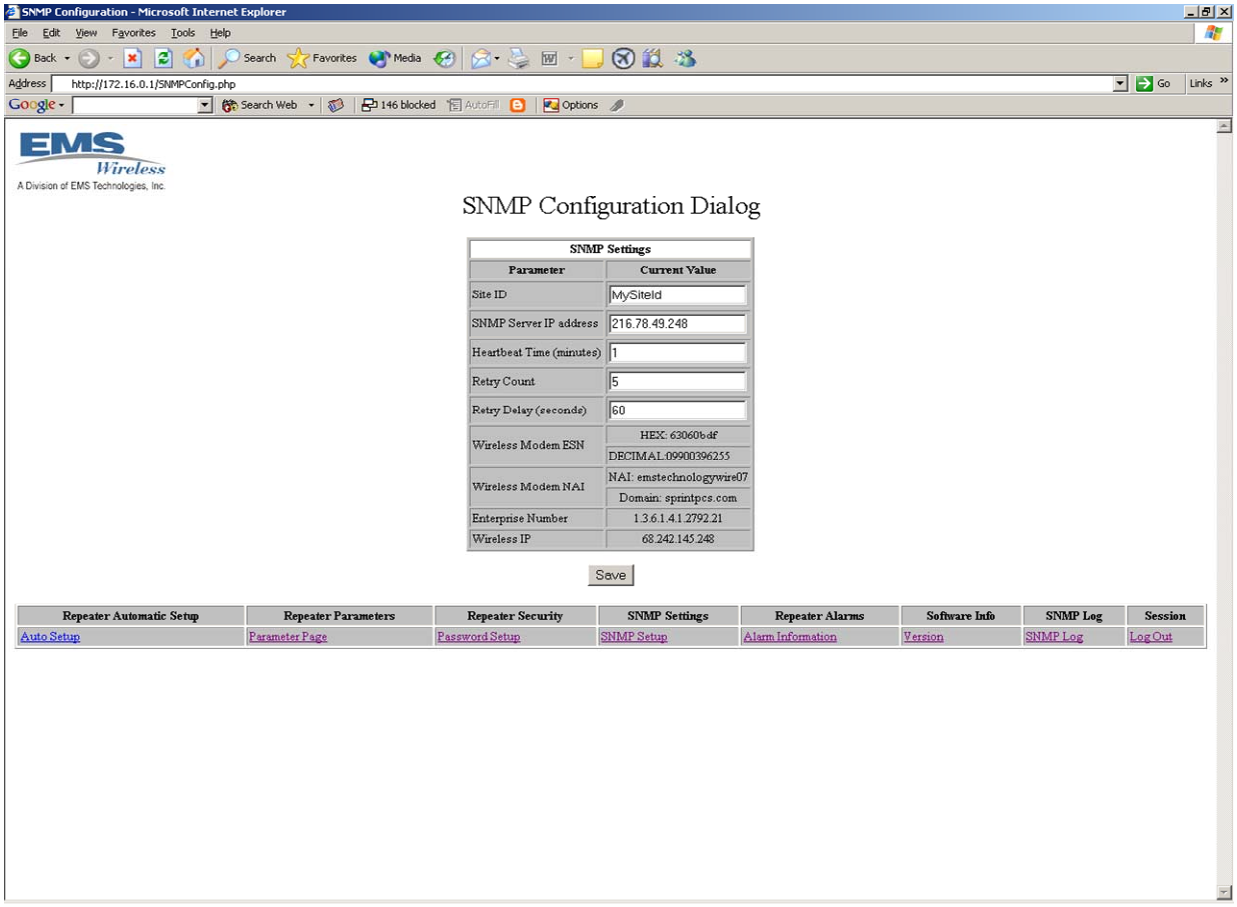
This is read from the PCMCIA modem. They are display for convenience. Note that every modem manufactured has a unique ESN, so this field uniquely identifies a particular modem.

**Enterprise Number**

This shows part of the SNMP message sent to the SNMP server.

**Wireless IP**

This shows the IP address of the wireless modem. This IP address is assigned by the wireless network.



**If Desired View Repeater Parameters – Repeater Parameter Page**

At any time you can go ahead and look at the operating parameters of the repeater. See the EkoMini manual for a description of the non-obvious parameters. After you have made a change in the parameters click the Save button to save them.

EMS Wireless
A Division of EMS Technologies, Inc.

## EMS Wireless Repeater Parameters

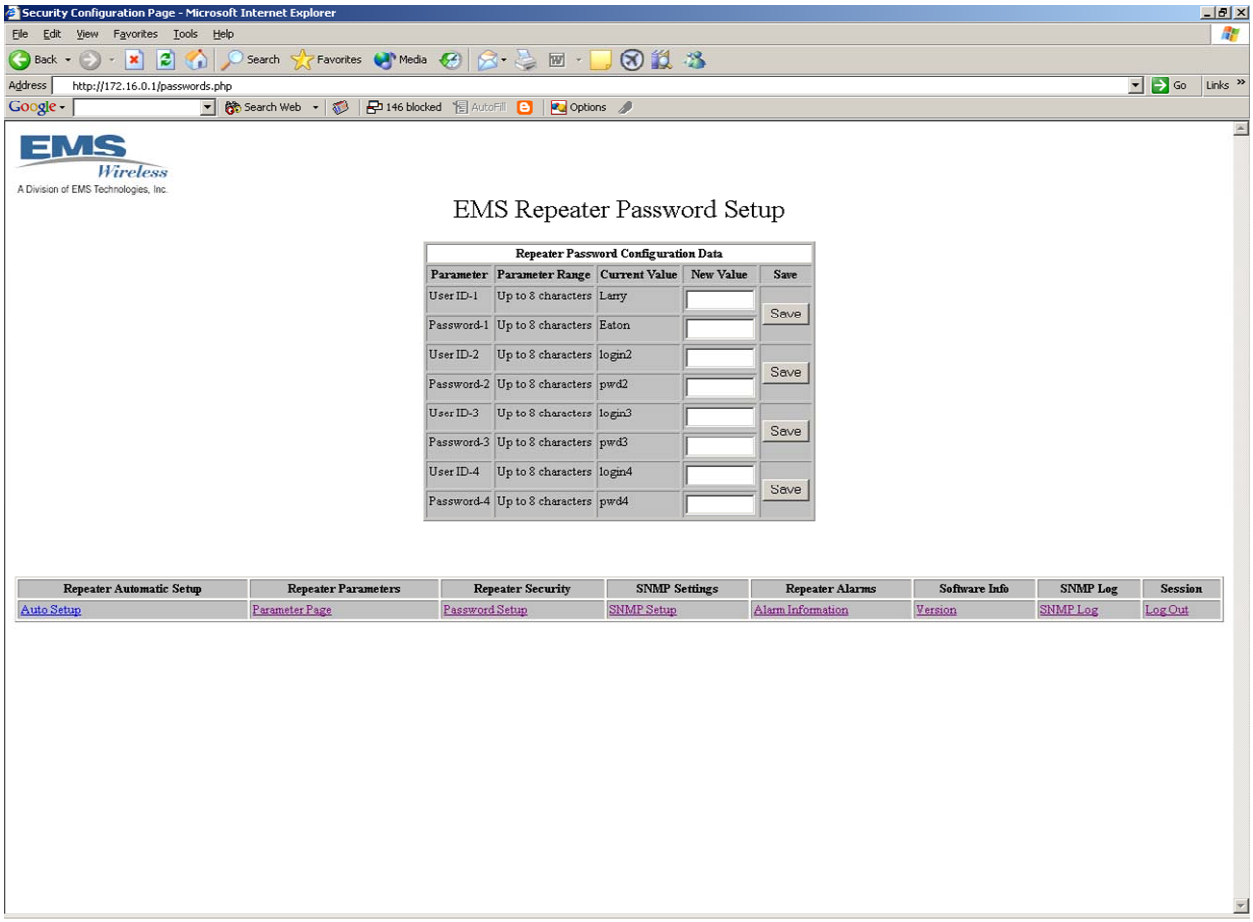
07-06-2005 11:07:01

| Repeater Statistics Data | | | | |
|---|---|---|---|---|
| **Parameter** | **Parameter Range** | **Current Value** | **New Value** | **Save** |
| Serial Number | | EO2622000007 | | |
| Model Number | | EKOMINI-19-15-WAE-A | | |
| Date | | 07-06-05 | | Save |
| Time | | 11:07:01 | | Save |
| Repeater ID | Maximum length 20 | testunit-1 | | Save |
| Protocol | | CDMA | | |
| Downlink Frequency 1 | 1930.00-1990.00 | 1937.50 | | |
| Uplink Frequency 1 | 1850.00-1910.00 | 1857.50 | | |
| Operational Time | | 0 days, 54 minutes | | |
| Downlink RF Output (dBm) | 0- | -8 | | |
| Uplink RF Output (dBm) | -11 to 28 | -11 | | |
| Uplink RF Offset (dB) | 0-16 | 0 | | |
| Downlink RF Peak (dBm) | 7 - 21 | 21 | | |
| Downlink Attenuation | 0 - 30 | 0 | | |
| Uplink Attenuation | 0 - 30 | 0 | | |
| Temperature | -50.0 - +90.0 | 30.4 | | |
| Downlink Recovery | On/Off | Off | | Save |
| Flash Backup | On/Off | On | | Save |
| Active Alarms | Up to 9 | 1 | | |
| Firmware Version | | 4.0.1 | | |

| Repeater Automatic Setup | Repeater Parameters | Repeater Security | SNMP Settings | Repeater Alarms | Software Info | SNMP Log | Session |
|---|---|---|---|---|---|---|---|
| Auto Setup | Parameter Page | Password Setup | SNMP Setup | Alarm Information | Version | SNMP Log | Log Out |

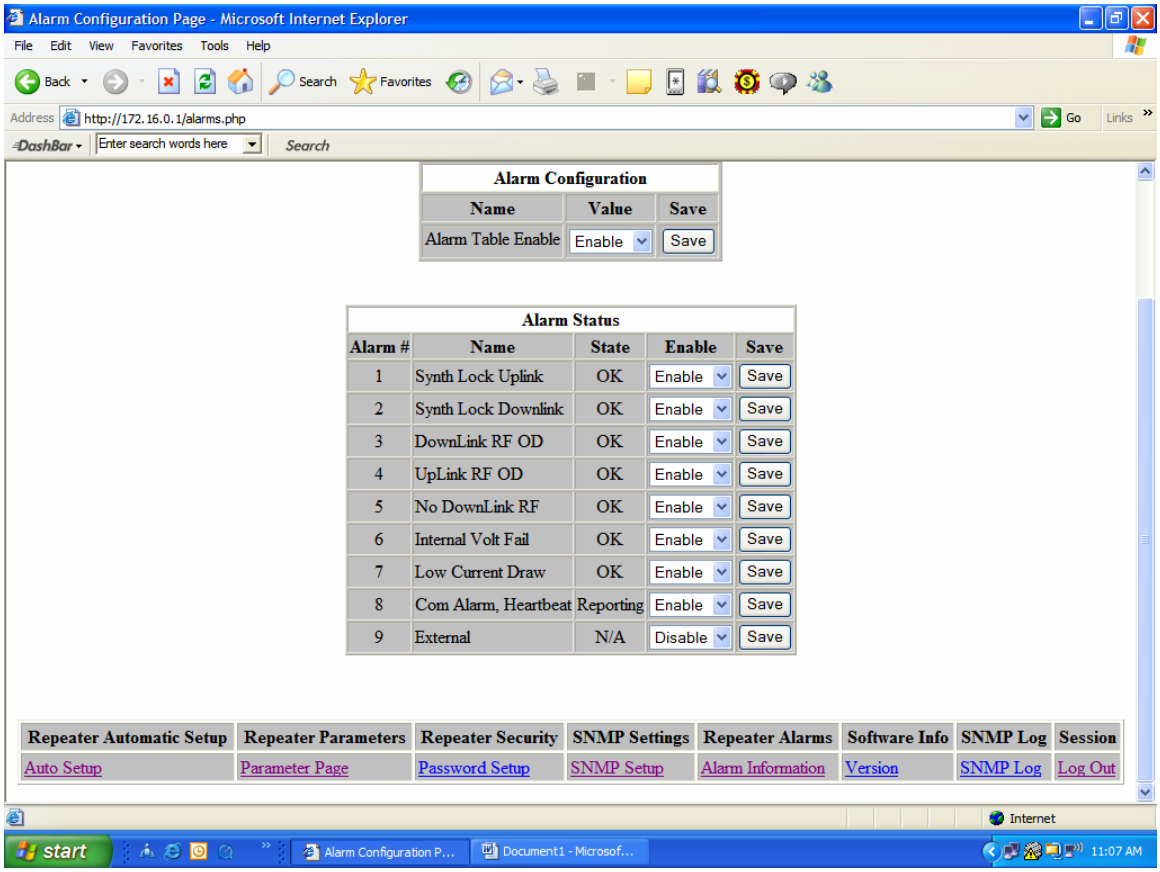
## Password Page

On this page you can change usernames and passwords. See the EkoMini user's guide to understand passwords and access level.



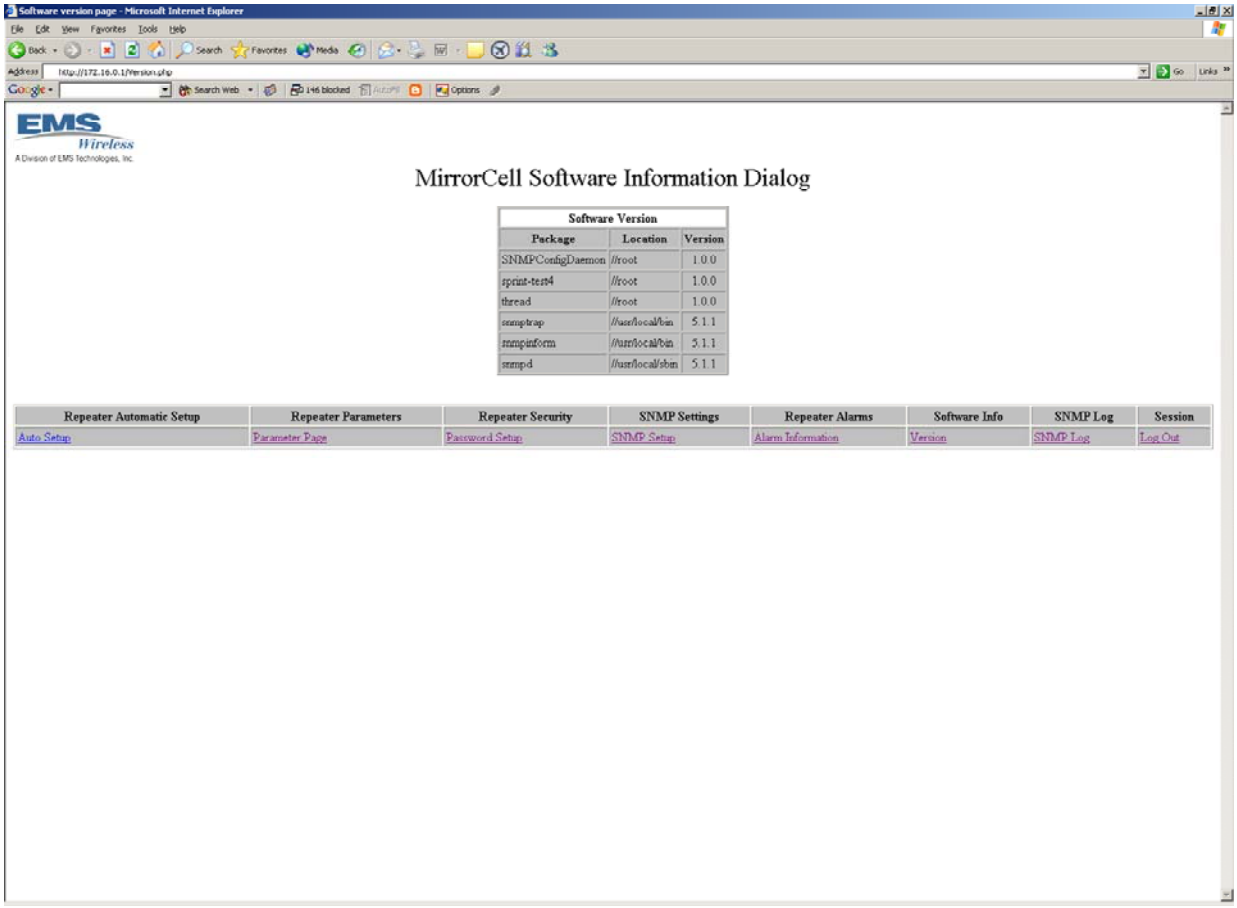
## Alarm Page

On the alarm page you can determine if an alarm is active and if it's enabled. If an alarm is set to Disable then the alarm will be ignored. The Alarm Table Enable on the top of the page will allow you turn off all alarms or to turn on the alarms as described in the Alarm Status Table. See the EkoMini Users Manual for the meanings of the alarms, the alarm types and the alarm state.



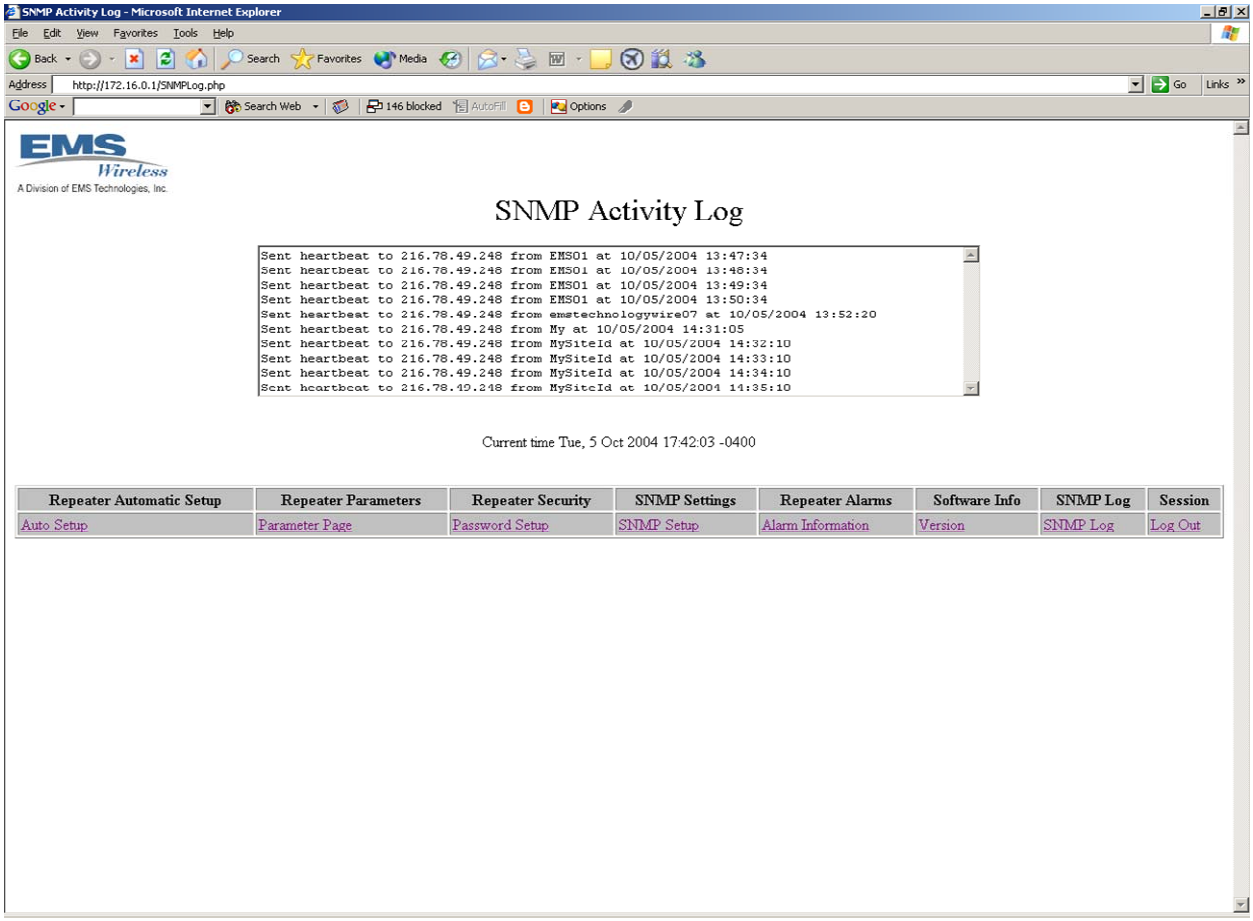
## Version Page

This page shows the software version numbers. It is for reference.



## SNMP Log Page

This page shows SNMP messages being sent by the repeater.



**SNMP Reporting Format**
**Overview of SNMP Reporting**
**Heartbeat – Periodic Reporting**

This table is intended to describe the periodic reporting requirement. The transport mechanism is UDP using SNMP version 3 (USM compatible) protocol. Alarms are sent via INFORM PDU. Heartbeats are sent via TRAP PDU. Self-reporting will use the following format: **Site ID**, **Date, Time, Parameter Name, Alarm Status.**

**Note: all existing sites will need to be updated to the existing format if a reporting capability is desired.**

| Item Number | Name | Description |
|---|---|---|
| 8. | **Site ID** | **Site ID** is the repeater Network identification |
| 9. | **Date** | **Date** be in the form: **MM/DD/YEAR (i.e., 09/26/2003)** |
| 10. | **Time** | **Time** be in the form: **HR:MIN:SEC (i.e., 19:54:36)** |
| 11. | **Parameter Number** | **1** = HEART BEAT |
| 12. | **Alarm Status** | **Alarm Status** = SET |

An example of the wireless periodic reporting (heartbeat) follows:

**Repeater Number1|09/26/2003|19:54:36|HEART BEAT|SET**

This Identifies a Repeater Number 1, which is outputting a “heartbeat” message on September 26, 2003 at 7:54:36 PM.

**Self-Reporting Alarms**

This table is intended to describe how the network repeater generates a self-alarming report: **Site ID**, **Date, Time, Alarm Parameter, Alarm Status.** Each alarm occurrence generates a complete message with the requirement as described in this table.

| Item Number | Name | Description |
|---|---|---|
| 13. | **Site ID** | **Site ID** is the repeater Network identification |
| 14. | **Date** | **Date** be in the form: **MM/DD/YEAR (i.e., 09/26/2003)** |
| 15. | **Time** | **Time** be in the form: **HR:MIN:SEC (i.e., 19:54:36)** |
| 16. | **Alarm Parameter** | **Alarm Parameter** will be one of the following:<br>1. 2 - RF Pilot Power<br>2. 3 - VSWR<br>3. 4 - RSSI<br>4. 5 - Over/Under Current<br>**5.** 6 - Over Temperature |

| | | |
|---|---|---|
| 17. | **Alarm Status** | **Alarm Status** will be SET for alarm conditions, and will be CLEAR when the alarm clears. |

An example of the Over Temp notification Wireless Alarm Reporting follows:

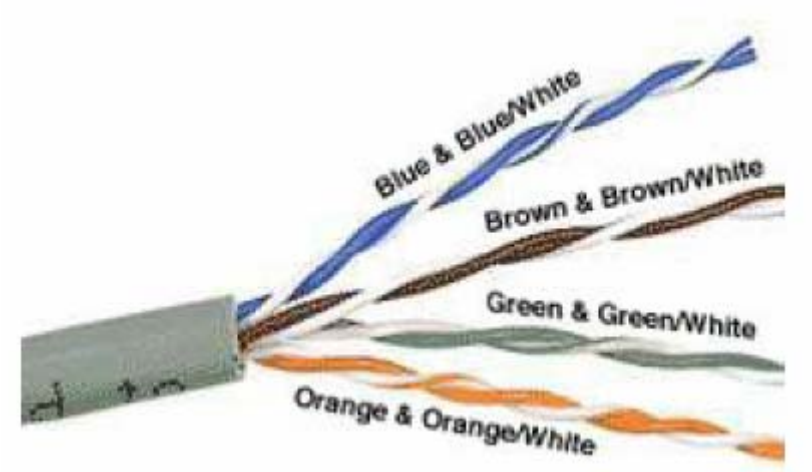
**Repeater Number 1|09/26/2003|19:54:36|Over Temperature|SET**

This message is an example of the Overtemp alarm reported when the Repeater Number 1's internal temperature rises above its maximum operating level.

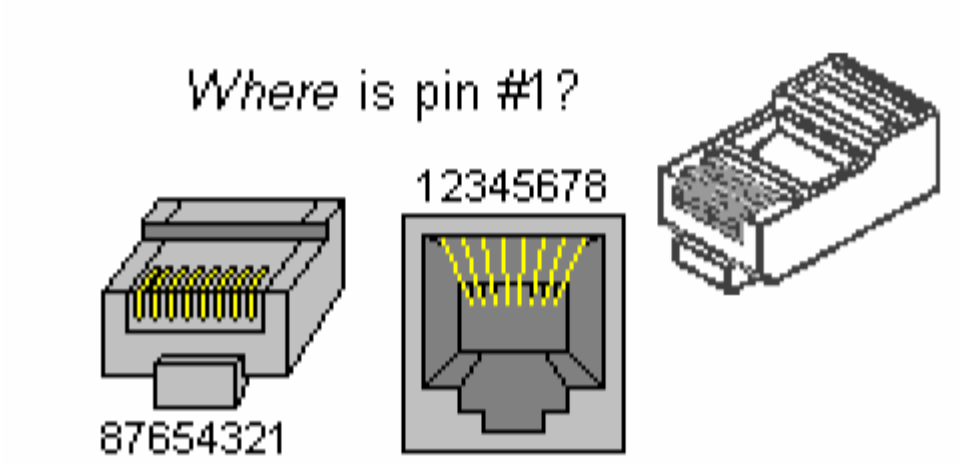
**Appendix**
**Ethernet Crossover Cable Information**

Ethernet crossover cables are available from many sources. Here is some background information on crossover cable construction.

**CAT5 Cable Colors**




**RJ45 Pinout**




**Cross-Over Cable Standard Wiring**

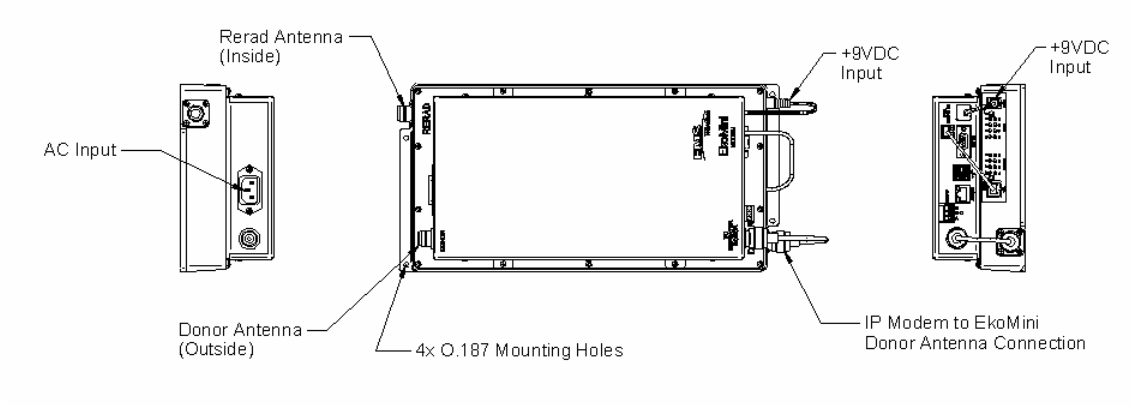
## Cross-Over Cable:

| RJ45 Pin # (END 1) | Wire Color | Diagram End #1 | RJ45 Pin # (END 2) | Wire Color | Diagram End #2 |
|---|---|---|---|---|---|
| 1 | White/Orange |  | 1 | White/Green |  |
| 2 | Orange |  | 2 | Green |  |
| 3 | White/Green |  | 3 | White/Orange |  |
| 4 | Blue |  | 4 | White/Brown |  |
| 5 | White/Blue |  | 5 | Brown |  |
| 6 | Green |  | 6 | Orange |  |
| 7 | White/Brown |  | 7 | Blue |  |
| 8 | Brown |  | 8 | White/Blue |  |

WINDOWS 2000 Computer Interface Setup
System Requirements: **Windows 2000, Ethernet**

- Connect computer to the modem jack with an **Ethernet Crossover Cable.**

- Left-click - StartMenu -> Settings -> Right-click Network and Dialup Connections -> Click Open
- Right click on the LAN connection in use.
- Select “Properties”
- Highlight “Internet Protocol (TCP/IP)”, click on “Properties”
- Select the “Use The Following IP address” radio button.
- Enter the following:
    - IP address: 172.16.0.2 / Subnet mask: 255.255.255.0 / Gateway 172.16.0.1
- Click Ok.
- Restart Machine.


Rerad Antenna
(Inside)
+9VDC
Input
+9VDC
Input
AC Input
Donor Antenna
(Outside)
4x O.187 Mounting Holes
IP Modem to EkoMini
Donor Antenna Connection

## Trouble Shooting

The EkoMini has no field replaceable parts; repair limited to correcting improper set-up or customer software programming, installation issues or defective units.

| Problem | Check | Corrective Action |
|---|---|---|
| No Power (no Green Light) | Power Source | Reconnect or Repair |
| | Power Source OK | Replace Unit |
| Alarm Indication | No RF Downlink Indication | Check RF Input Source |
| | No Uplink RF Indication | Check RF Antenna Input |
| | Recycle AC Power | No Change |
| | Reset Switch | No Change |
| | | Replace Unit |
| Remote Alarms inoperable | Generate Alarm, Remove RF input | Program Software |
| | Software OK, | Check Telephone line |
| | Telephone Line OK | Replace Unit |
| No RF DownLink Power | Check Band Switches | Set Switches & Recycle Power |
| | Switches Set Properly | Replace Unit |
| Low DownLink RF Power | Check Input Power Level | Relocate Donor Antenna, Improve Signal Strength<br>Increase Donor Antenna Gain<br>Shorten Coaxial Cable Length |
| | Signal Strength Good | Reset Switch, Start New System Set-up |
| | Low RF Output Power | Replace Unit |

| Specifications: | Reverse Link | Forward link |
|---|---|---|
| Frequency-Models | | |
| EkoMini 1.9-15, Band A | 1850 – 1885 MHz | 1930 – 1945 MHz |
| EkoMini 1.9-15, Band B | 1870 – 1885 MHz | 1950 – 1965 MHz |
| EkoMini 1.9-15 Band C | 1895 – 1910 MHz | 1975 – 1990 MHz |
| EkoMini 1.9-5, Band D | 1865 – 1870 MHz | 1945 – 1950 MHz |
| EkoMini 1.9-5 Band E | 1885 – 1890 MHz | 1965 – 1970 MHz |
| EkoMini 1.9-5 Band F | 1890 – 1895 MHz | 1970 – 1975 MHz |
| Channel Bandwidth | 14.75 or 4.75 MHz | 14.75 or 4.75 MHz |
| Number of Channels | Multiple | Multiple |
| Output Power Composite, Adjustable | 6 to 20 dBm | 6 to 20 dBm |
| Return Loss | 15 dB | 15dB |
| Impedance | 50 Ohms | 50 Ohms |
| Noise Figure, Maximum | <8 dB | <8 dB |
| Gain, Maximum | 70 dB nominal | 70 dB nominal |
| Gain Range | 30 dB | 30 dB |
| Gain Steps | 2 dB | 2 dB |
| Peak Limiting adjustable | 14 dB | 14 dB |
| Reverse Path Gain Offset, below forward Path gain setting | 0 to 6 dB (2 dB Steps) | 0 to 6 dB (2 dB Steps) |
| Spurious | ≤ -13 dBm | ≤ -13 dBm |
| Signal Delay | <4 usec | <4 usec |
| Input RF Signal, Max Level | <-20 dBm | <-20 dBm |
| Gain Flatness | +1/-2 | +1/-2 |
| Connectors | N-Female | N/Female |
| Optional, Remote Alarms | | |

**Parameters**

**EkoMini-M1.9**

| Mechanical | Specifications |
|---|---|
| Housing (WxHxD) | 7 "x 2.25" x 14.5" |
| Weight | 6.5 lbs. |
| Housing Material | Aluminum |
| Indoor Housing | |
| MTBF | 75,000 hours |
| Power Supply | 90 VAC, 50 – 60 Hz to 260 VAC, 50-60 Hz |
| Current Draw | 500 mA |
| Operating Temperature | 5° to +45° C |
| Cooling | External Convection |