



**BusWorks® 9xxEN Series**  
**10/100 Mbps Industrial Ethernet I/O Modules**

## **Connecting Acromag Series 9xxEN Modules Via RadioLinx Ethernet Modems**

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**OBJECTIVE**

The purpose of this document is to provide a procedure for connecting an Acromag Series 9xxEN I/O Module to an existing network via RadioLinx Ethernet Modems.

## BACKGROUND – IP ADDRESSES

Any TCP/IP packet contains two addresses: a unique fixed MAC address, and a unique IP address.

To communicate on the Internet, computers must have unique identifiers in order to differentiate one computer from another. This is accomplished through the assignment of an IP address. An IP address is a 32-bit identifier comprised of 4 octets (8-bits), with each octet a number from 0 to 255 and separated by a decimal point. For example, [Acromag Series 9xxEN I/O Modules](#) use a default IP address of 128.1.1.100.

Every host on a network must have at least one unique IP address. A personal computer with more than one network interface card (NIC) will have a unique IP address for every NIC card installed, as each NIC card may function as a node on a network. Additionally, all hosts on the same physical network must have the same network prefix.

IP addresses are divided into separate classes. Classes are pre-allocated to organizations that request them in address blocks. Three classes are used for host groups, Class A, Class B, and Class C. In Class A, the first octet identifies the network address, the remaining octets the host or node address. In Class B, the first two octets identify the network, the last two the host. In Class C, the first three octets identify the network, and fourth octet the host. As such, the total number of hosts that may be allowed on a network is determined by its Class designation.

A network is further divided into subnets. For example, a subnet is a network on where you are currently located. That network can be made larger by adding more subnets. Subnet division is accomplished using subnet masks. The default subnet mask for a Class A network would be 255.0.0.0. For Class B it would be 255.255.0.0. For a Class C network, a default subnet mask is 255.255.255.0. That is, the subnet mask flags the bits of the IP address that belong to the network address (first part), with the remaining bits corresponding to the host portion (last part). Thus, the unique subnet to which any IP address belongs to is recovered by performing a bit-wise AND operation between the IP address and the subnet mask. As such, a default IP address of 128.1.1.100 with a subnet mask of 255.255.255.0 tells us that this Class C sub-network address is 128.1.1.0 and the host address is at node 100 or 128.1.1.100. In assigning a node address, the first (.0) and last nodes (.255 for our example) are typically reserved and should not be used. The first node address is reserved for the network server (128.1.1.0 for our example). The last node address is usually reserved for a network bridge or switch (128.1.1.255 for our example). Other nodes may also be reserved for servers and other devices on the network. For example, the node 10 address is commonly used for a DNS server. The use of reserved node addresses may degrade performance.

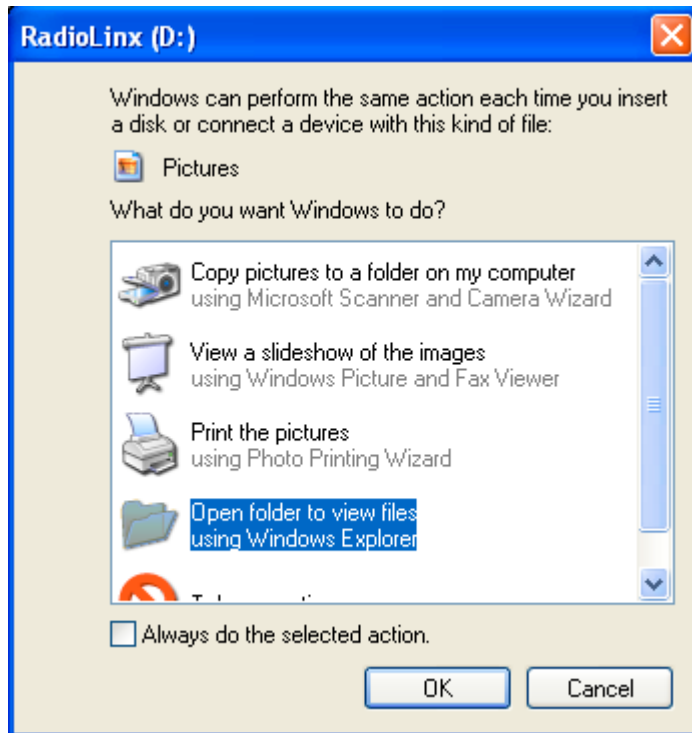
Any network segment has at least two nodes, one at each end. Since your PC is already connected to the internet, it already has a NIC card installed with its own unique IP address that represents your PC as an independent network node or host on your network. In addition, the unique IP address of your PC may be assigned dynamically and you will usually have no control over what it happens to be at any given time. Further, we have assigned a fixed default IP address to Acromag modules of 128.1.1.100. Thus, in order to connect this same PC to an Acromag Series 9xxEN Ethernet I/O Module, we need to install a second NIC card dedicated to creating another network that will communicate directly with the Acromag module (and share the module's default network address prefix of 128.1.1). Because each node on any network segment must have its own unique IP address, the second NIC card must be given a unique IP address different from the one used by the first NIC card that is already used to connect to the internet. Further, it must share the same 128.1.1 address prefix as the Acromag I/O module. The resultant IP address will be different from the IP address already installed in the Acromag module by giving it a different node number, as it also represents another unique node/host on that network.

Note that if you don't care about preserving your existing network connection, you do not need to have a second NIC card installed in your PC. You can follow this procedure for changing the IP address of your primary NIC card, but you will not be able to use that card later to connect to your existing network unless you change its IP address back to its original settings.

## Getting Started

If the RadioLinx Software has not already been installed, follow this procedure. Otherwise turn to the next page.

Insert the RadioLinx Solutions CD into the CD-ROM drive.



1. If using Windows XP, wait for the pop-up prompt. Select **Open folder to view files using Windows Explorer** and click **OK**.

**Note:** If not using Windows XP, open **My Computer** and double-click on the **CD-ROM** drive.



2. Double-click on the **RLX-IH** folder.
3. Double-click on the **RLX-IH Browser** folder.
4. Double-click on **Setup** and follow the installation procedure.

## Setup for RadioLinx Industrial Hotspot

1. The Ethernet port on the RadioLinx does not have built in crossover. The Ethernet port on your computer may or may not include automatic crossover. Because of this, we need to attach the RadioLinx Industrial Hotspot to the computer using a crossover cable.

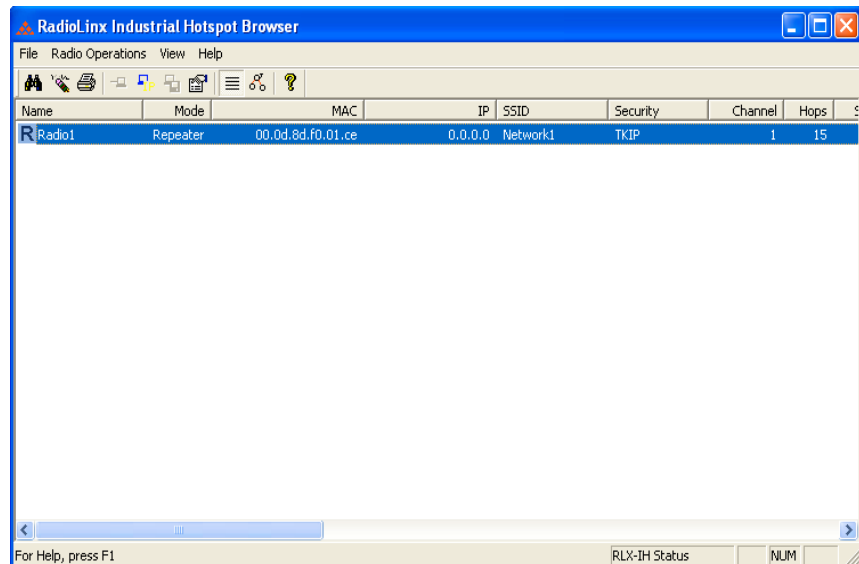
**Note:** If an Acromag module network has not already been setup, please refer to [Connecting Acromag Series 900EN Ethernet Modules To Your PC](#), a free white paper that you can download from the Acromag website ([www.acromag.com](http://www.acromag.com)). This article will help you set up your network.

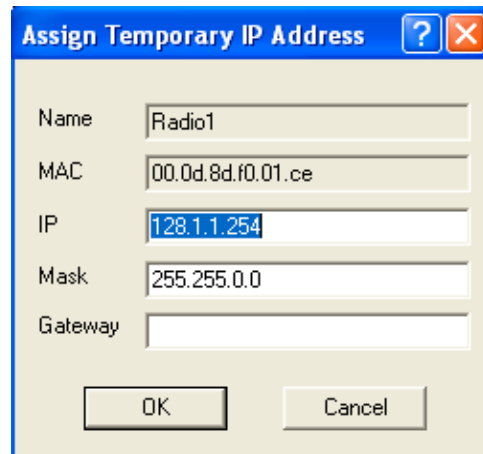
**Note:** When the RadioLinx has booted (about 30 seconds after applying power), and when most the LED's have turned off, check to see if the Ethernet LED is on. If it is off then it signifies that an Ethernet connection has **not** been established, and you should follow the instructions found in **Problems With Your Ethernet Connection** on page 10.

2. Run the newly installed **RadioLinx IH Browser** by double-clicking on the shortcut found on your desktop.

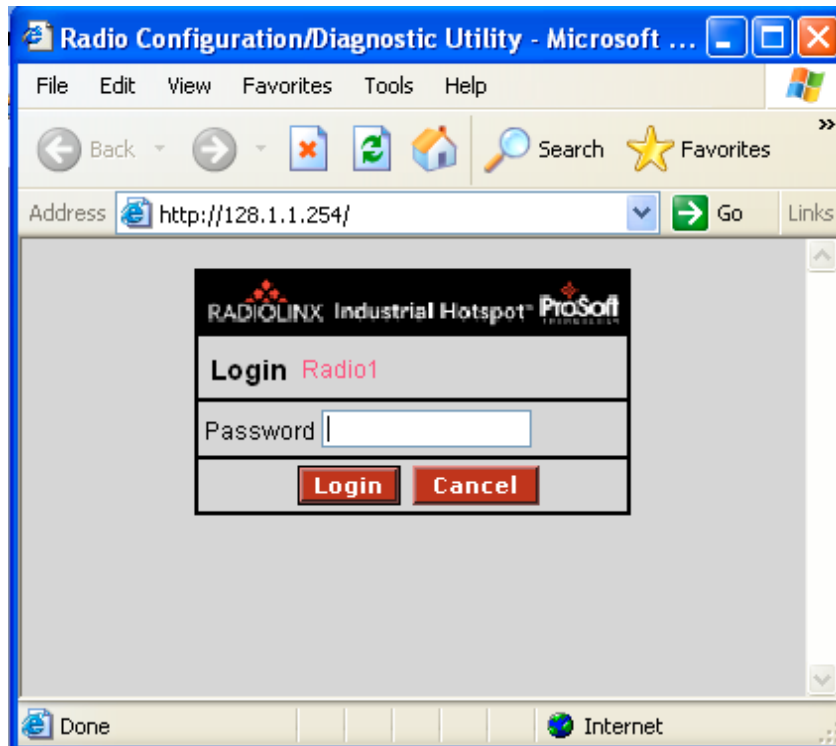


3. Double-click on Radio1.





4. The **Assign Temporary IP Address** window should open. Make sure the information is correct, and click on OK. Click OK again on the following window that alerts you that this IP address is temporary.
5. Double-click on Radio1 once again to open up the **IH Browser**.



6. Type in the default password (**password**) and click **Login**.

7. The page shown at right should open.

**RADIOLINX Industrial Hotspot™ ProSoft TECHNOLOGY**

Radio Name: Radio1 Signal Strength: Scanning...  
 Radio MAC: 00.0D.8D.F0.01.CE Parent MAC: none  
 Firmware: IH1\_160 Branch Length: n/a  
 Update every: 10 sec # Radios Linked: 0  
 Up Time: 0 Day 0 Hr. 46 Min. 25 Sec. Link Time: n/a

**Radio Network Settings**  
 Radio Name: Radio1  
 Network SSID: Network1  
☐ Master 1 Channel  
☒ Repeater Parent Link  
 Current: Auto Select  
☐ Client Auto Specify  
 Client MAC: 00.00.00.00.00.00

**Security Settings**  
 Encryption Type: WPA  
☒ Enter Keys Manually  
 WPA phrase: \*\*\*\*  
 WEP key 1: \*\*\*\*  
☐ Get Keys from RADIUS Server  
 Server IP: 0.0.0.0  
 Secret: \*\*\*\*  
☐ MAC Filter Edit Filter  
☐ Hide Network SSID

**Radio Access Settings**  
☒ Obtain IP address - DHCP  
☐ Use the following IP address  
 IP Address: 128.1.1.254  
 Subnet Mask: 255.255.0.0  
 Def. Gateway: 0.0.0.0  
 SNMP  
 Login Password

Apply Changes Cancel Changes Factory Defaults Help

Configuration help No Changes  
 WPA Phrase: Enter 8-63 characters. Used to generate a WPA encryption key.

### For use as a Master Radio

8. Click the **Master** option and choose an open channel. We will use this radio as our master radio.
9. In the **Radio Name:** give the radio a custom name. We will use **Master** in our name to help with future identification.
10. Change the **Network SSID** to a name that will identify your network.

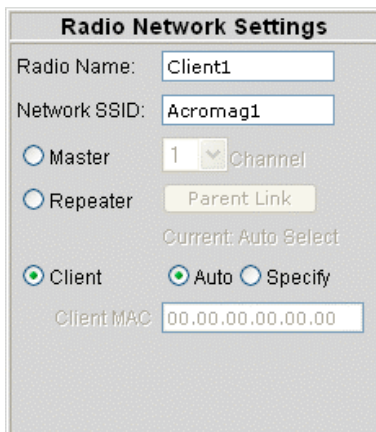
**Radio Network Settings**  
 Radio Name: Master Radio1  
 Network SSID: Acromag1  
☒ Master 1 Channel  
☐ Repeater Parent Link  
 Current: Auto Select  
☐ Client Auto Specify  
 Client MAC: 00.00.00.00.00.00

### For use as a Repeater Radio

8. Click the **Repeater** option and choose an open channel. We will use this radio as a repeater.
9. In the **Radio Name:** give the radio a custom name. We will use **Repeater** in our name to help with identification.
10. Change the **Network SSID** to the same thing that was used for the master radio.

**Radio Network Settings**  
 Radio Name: Repeater1  
 Network SSID: Acromag1  
☐ Master 1 Channel  
☒ Repeater Parent Link  
 Current: Auto Select  
☐ Client Auto Specify  
 Client MAC: 00.00.00.00.00.00

## For use as a Client Radio



**Radio Network Settings**

Radio Name:

Network SSID:

☐ Master
 ☐ Repeater
 ☒ Client

Channel:

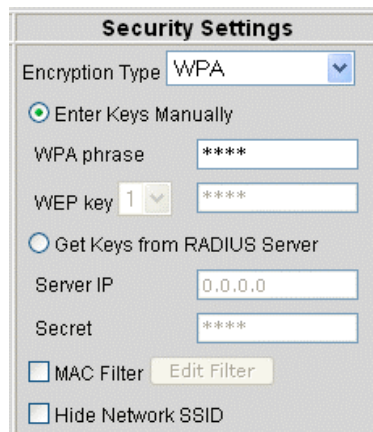
Current: Auto Select

☒ Auto
 ☐ Specify

Client MAC:

8. Click the **Client** option. We will use this radio as a client.
9. In the **Radio Name** field, give the radio a custom name. We will use **Client** in our name to help with future identification.
10. Change the **Network SSID** to the same thing that was used for the master radio.  
**Note:** Clients are only needed if they connect through another brand of 802.11b access point.

## Security Settings



**Security Settings**

Encryption Type:

☒ Enter Keys Manually
 ☐ Get Keys from RADIUS Server

WPA phrase:

WEP key 1:

Server IP:

Secret:

☐ MAC Filter 
☐ Hide Network SSID

11. These settings may be left alone unless connecting to an existing network.

If you *are* connecting to an existing network, consult your networking administrator for more help.

## Radio Access Settings



**Radio Access Settings**

☒ Obtain IP address - DHCP
 ☐ Use the following IP address

IP Address:

Subnet Mask:

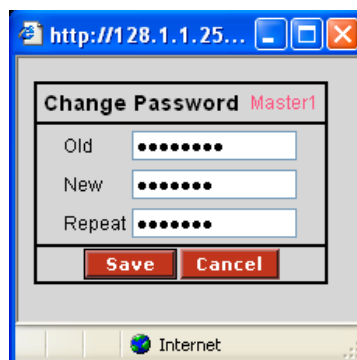
Def. Gateway:

12. If your network uses DHCP, you do not need to change anything.

If not, click on the **Use the following IP address** button, and enter the IP Address, Subnet Mask, and Def. Gateway given to you by your networking administrator.

13. Click on **Login Password**.

## Change Password



**Change Password Master1**

Old:

New:

Repeat:

Internet

14. If you would like to change your password, you may do so now.



## Save Changes



3. Click on the **Apply Changes** button at the bottom of the page to save your changes to the RadioLinx modem.

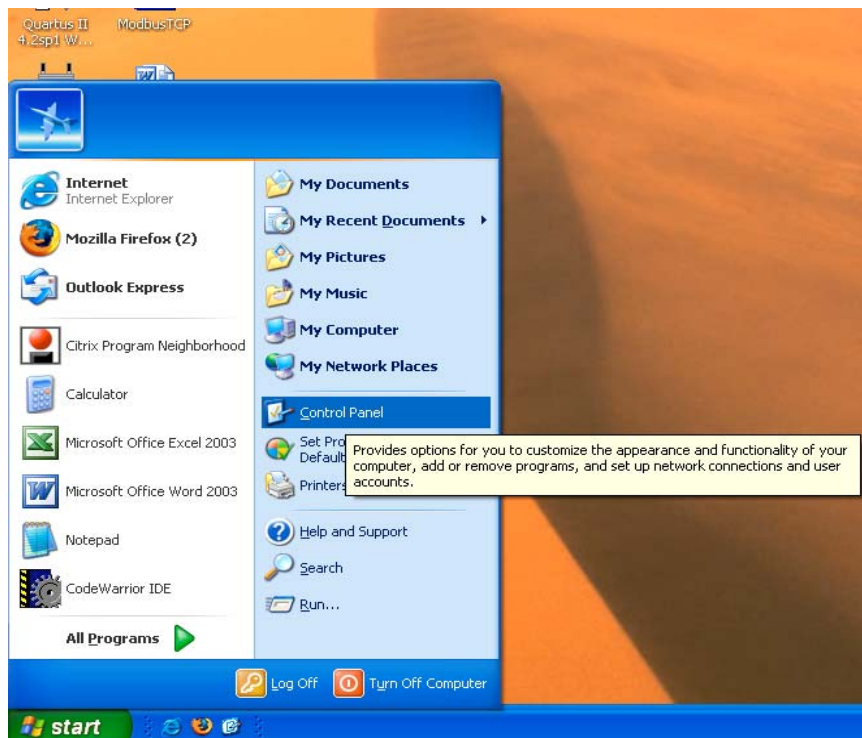
The Radio will now run through a boot cycle and save the changes.

## Connecting the Acromag Modules

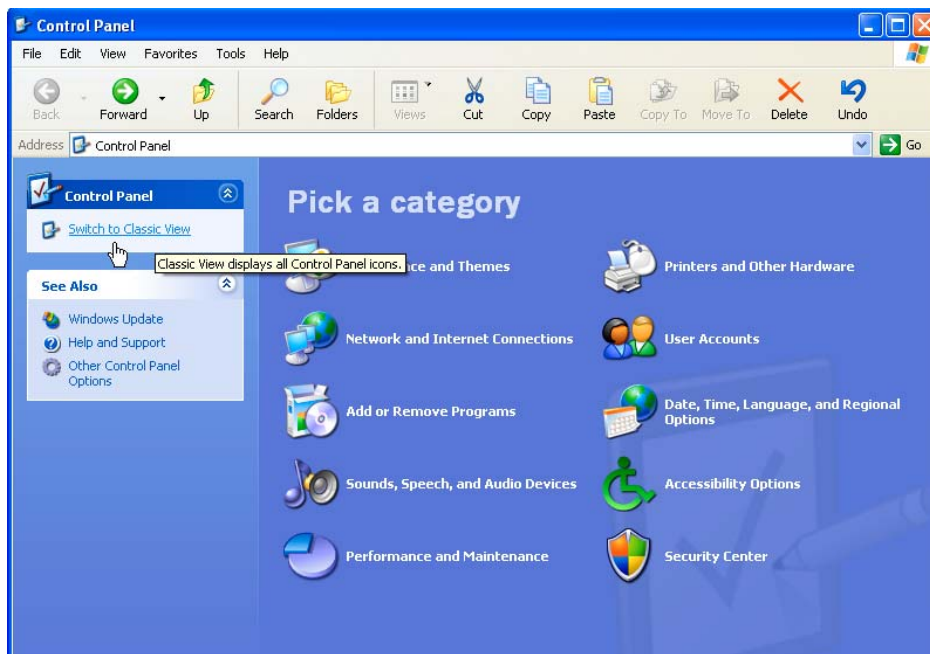
Now you are ready to connect the Acromag module to the network. Connect the master radio to the computer using the crossover Ethernet cable. The repeaters should now act like an extension of the network. Attach a crossover Ethernet cable between the Acromag 9xxEN module and a repeater. The module can now be used as if it were wired directly to the network.

## Problems With Your Ethernet Connection

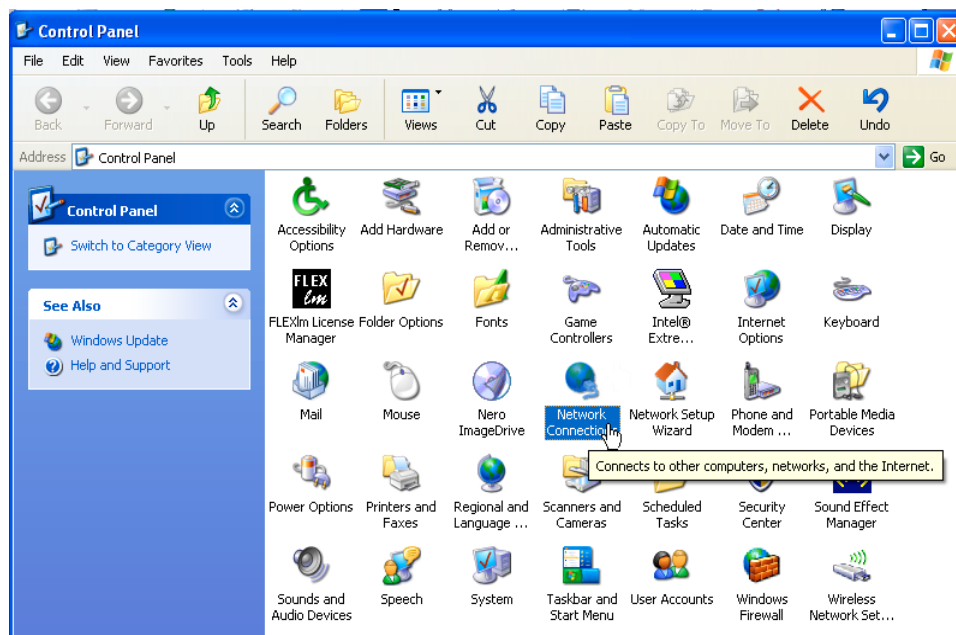
1. Open the control panel (screens may be different for other operating systems than Windows XP).



2. Switch the Control Panel into Classic View (Windows XP only) by clicking on **Switch to Classic View**.



3. Double-click on the **Network Connections** icon.



4. Right-click on the **Local Area Connection** icon that has a red X through it, and select **Disable**.
5. Wait until it says *disabled* under the name. Then right-click on the icon again and select **Enable**. The green Ethernet LED of the radio should now be ON to signify a connection has been established. If not consult your network administrator.

