ProSoft TECHNOLOGY

Technical Note

How to Setup wireless EtherNet/IP Messaging with ControlLogix

RLXIB-IHW Industrial Hotspot 802.11abg

Introduction

To carry out the wireless communication between 2 ControlLogix PLC, 2 ProSoft Technology modules RLXIB-IHW-E RadioLinx Industrial Hotspot 802.11abg are used.

For the architecture of this implementation, we used:

- 2 modules RLXIB-IHW-E
- 2 ControlLogix with 2 1756-ENBT/A card.
- A laptop equipped with RSLogix 5000.
- 1 Ethernet Switch (needed to do a wired communication test)

This document gives the details of the implementation of the system.

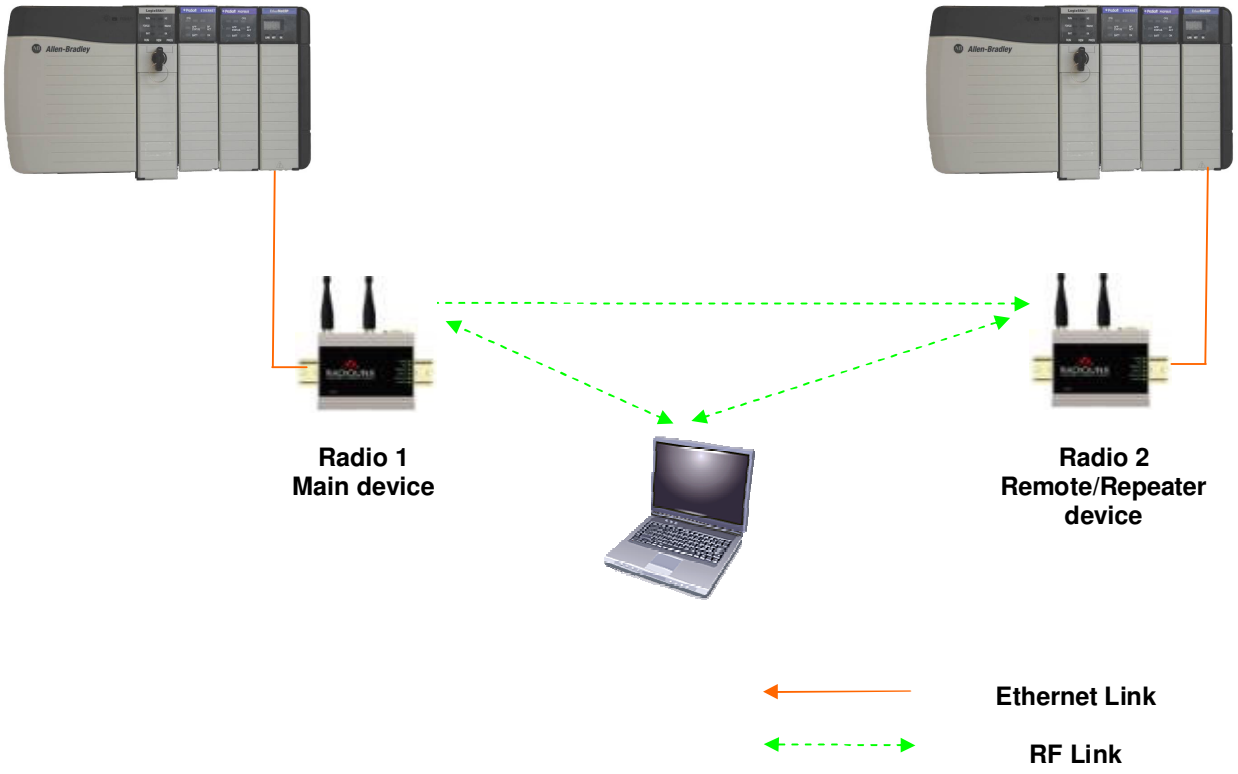
Note:
RLXIB-IHW-E has AP (Access Point) mode available (See end of the technical note).

Rockwell Automation Encompass™ Product Partner Global

RadioLinx®

Author: JPrat
Date: January 09

Architecture



Index

Procedure

Note:
If your PC is not connected to a DHCP server or directly connected via Ethernet to the radio module, **DO NOT FORGET TO ASIGN A FIXED IP ADDRESS** to the PC Ethernet card.

Here are the basic steps needed to establish communications:

A. Setting of the Main Radio.

A.1. Install RadioLinx IH browser:

Download RLX-IH Browser from:
http://www.prosoft-technology.com/content/download/12739/165690/file

Then install the Browser on your PC.

A.2. Plug the cables to the RLXIB-IHW:

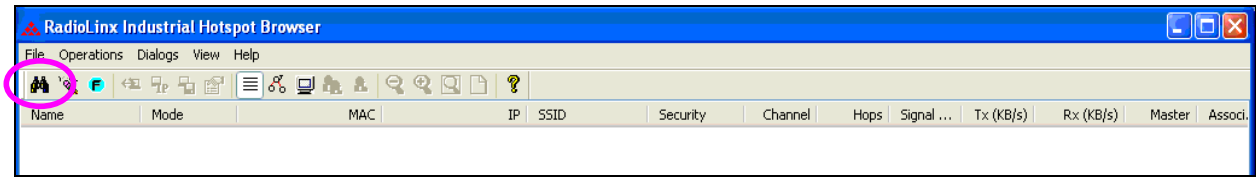
From left to right: Power connector, serial port and Ethernet port.

Plug the power cable.
For Ethernet connection:

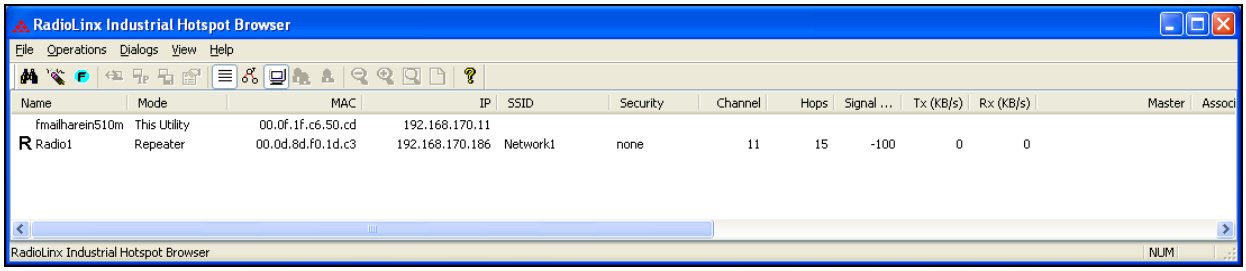
- If you are connecting to the radio through an Ethernet hub or switch, use the gray (straight-through) cable.
- If you are connecting to the radio directly from your PC without going through an Ethernet hub or switch, you must use the red (crossover) cable.

A.3. Launch RadioLinx IH browser:

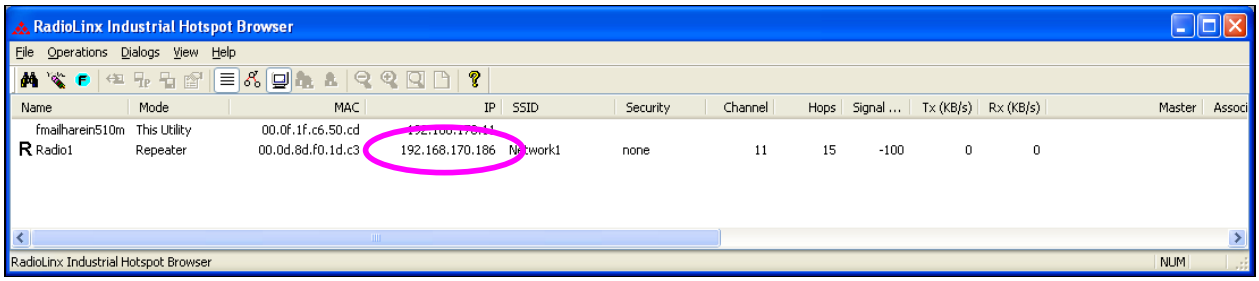
Click on the binocular:



The radio appears:

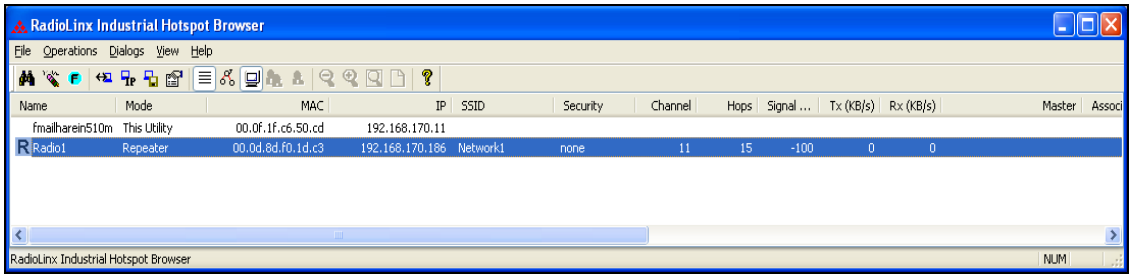


At this point the setting of the radio is the factory default.
If the radio is connected to a network with a DHCP server, the radio may already have an IP address assigned to it.

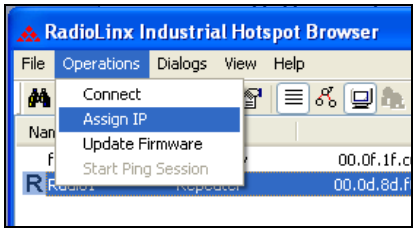


If no IP address appears:

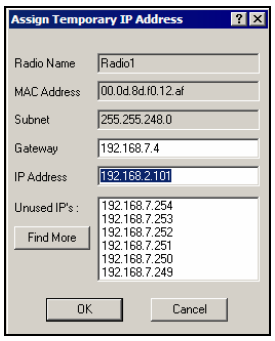
- Select the Radio on the list



- Then from Operations menu, select Assign IP

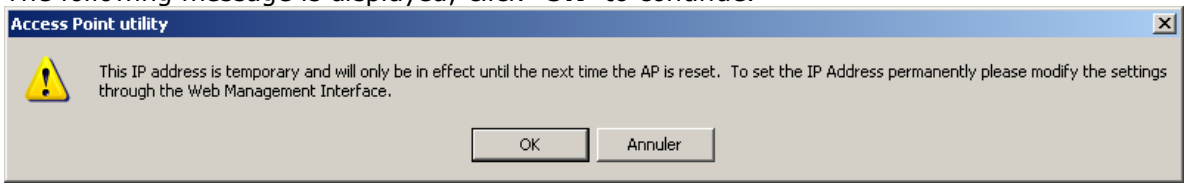


- The following window is displayed:



- Click OK to accept the temporary IP address, subnet mask, and default gateway.

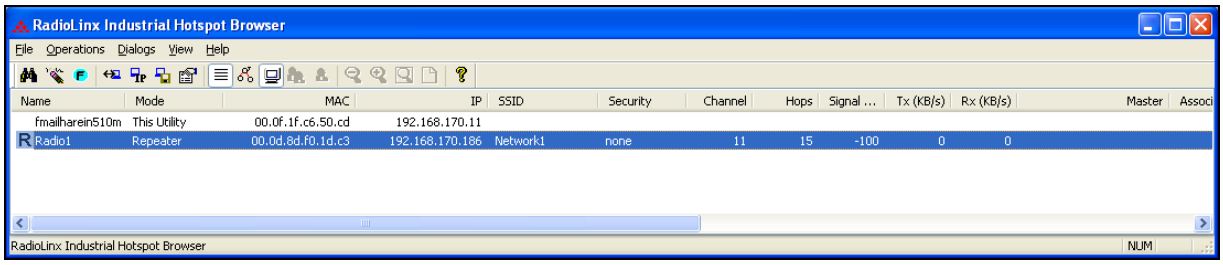
The following message is displayed; click "**OK**" to continue.



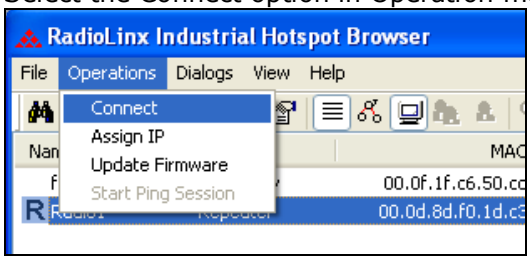
Now a temporary IP address is assigned to the RLXIB-IHW-E module.

A.4. Go online with the RLXIB-IHW-E for configuration:

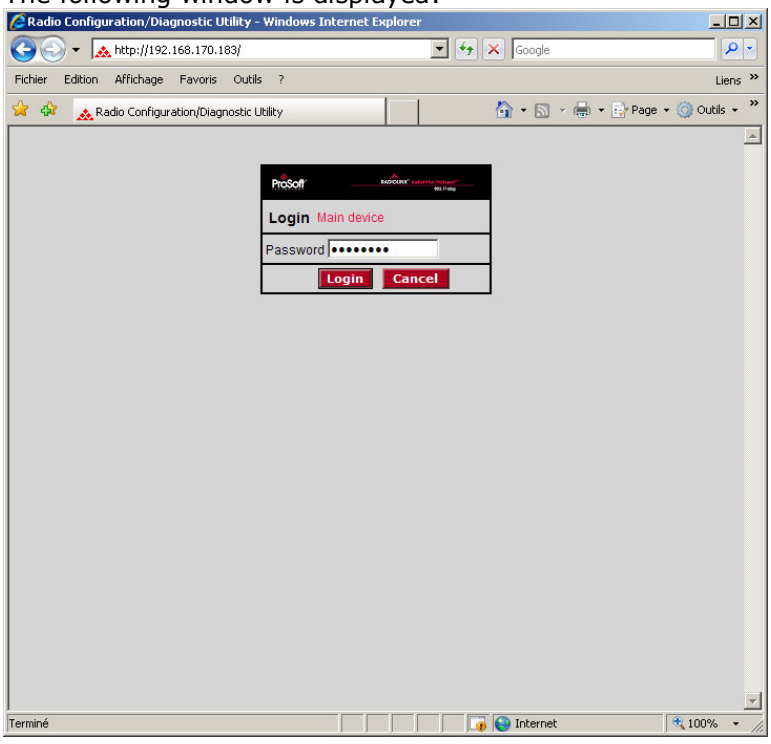
To go online to the RLXIB-IHW for configuration (or diagnostics), from the Browser select the Radio1:



Select the Connect option in Operation menu.

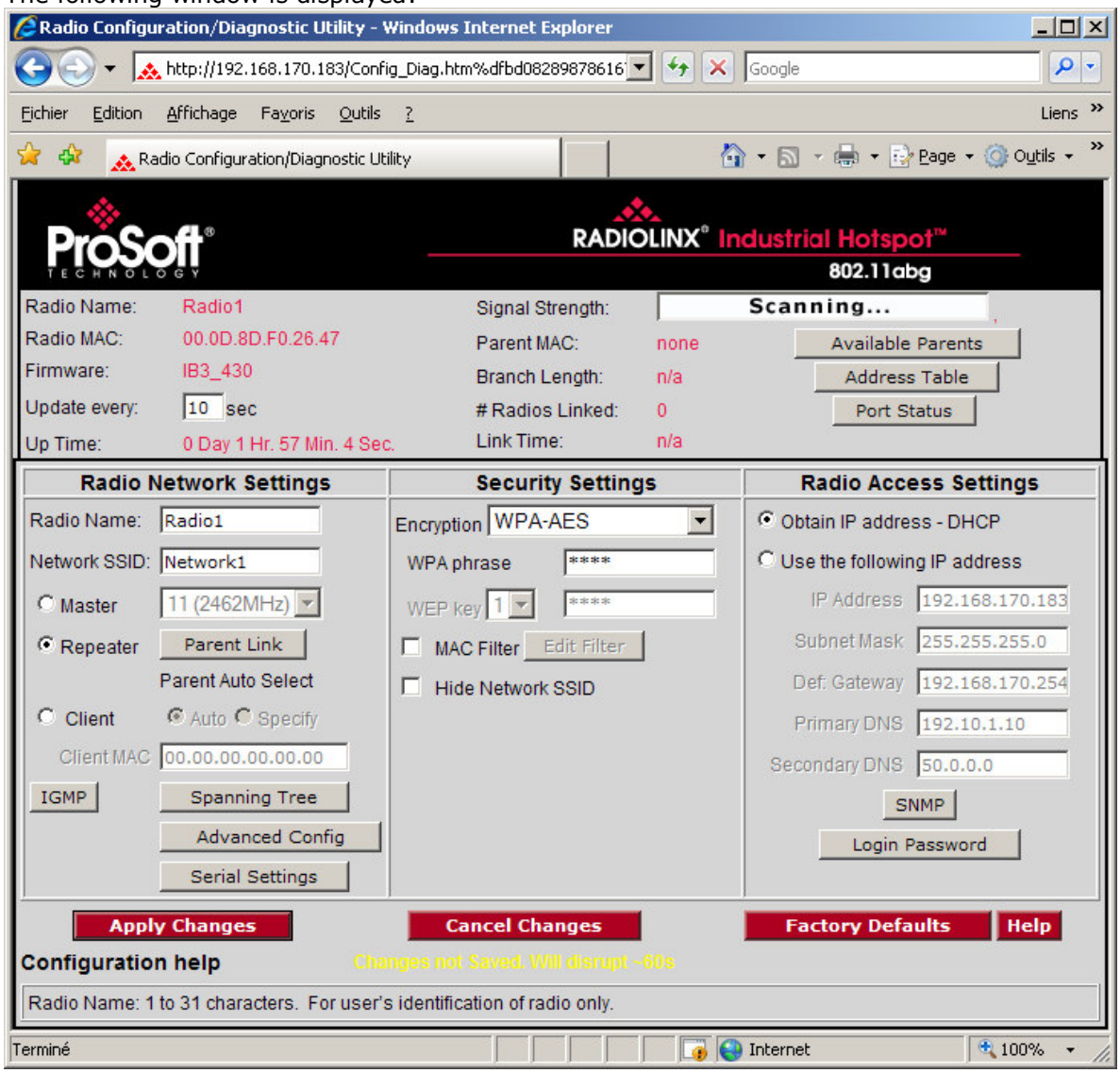


The following window is displayed:



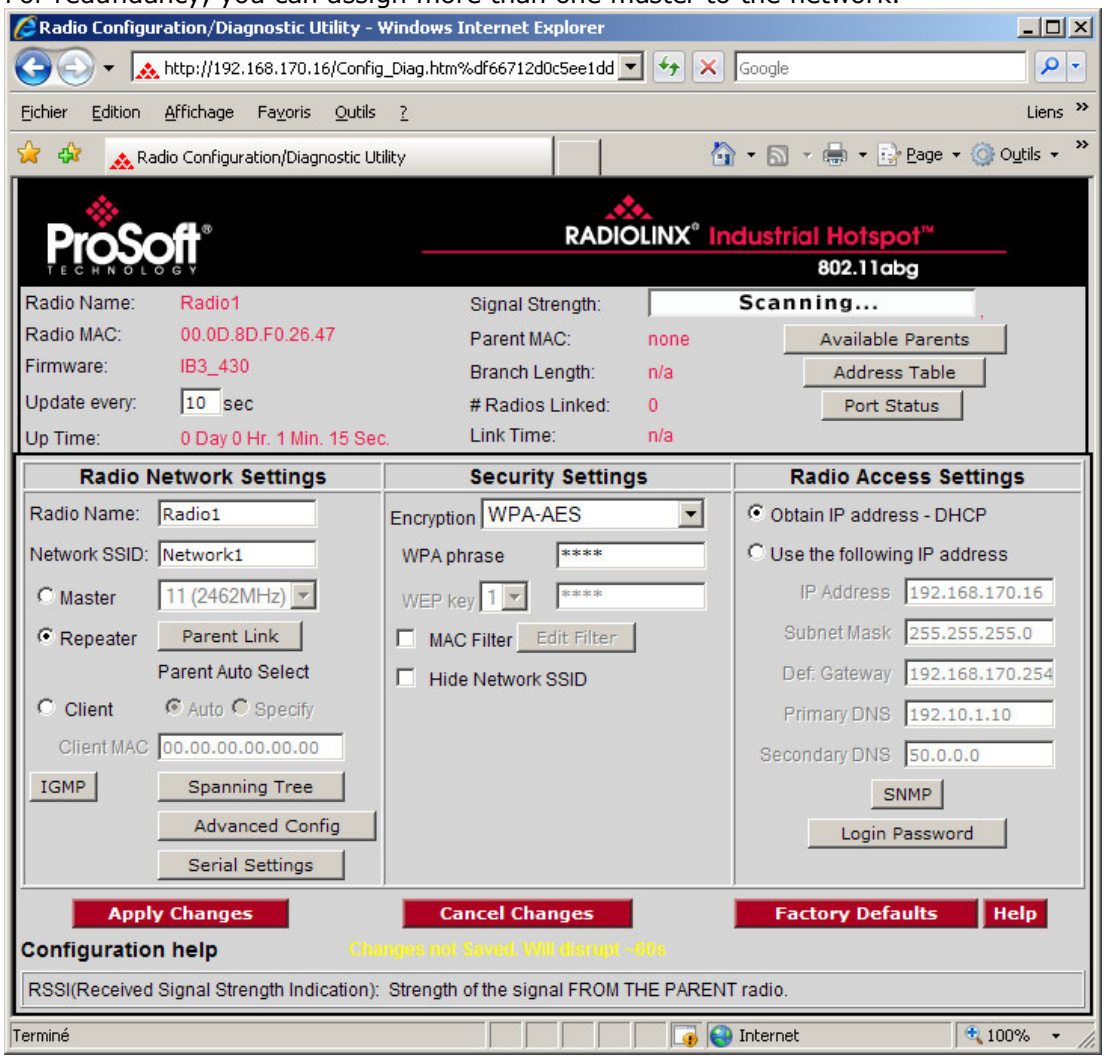
Enter your password to log in to the radio and then press **Login**.
The default **password** is password (lower case).

The RLW-IHW-E configuration is protected by a login password.
The default **password** is password (lower case).
To prevent unauthorized access to the radio configuration, you should change the default password when you have finished your configuration.
The following window is displayed:



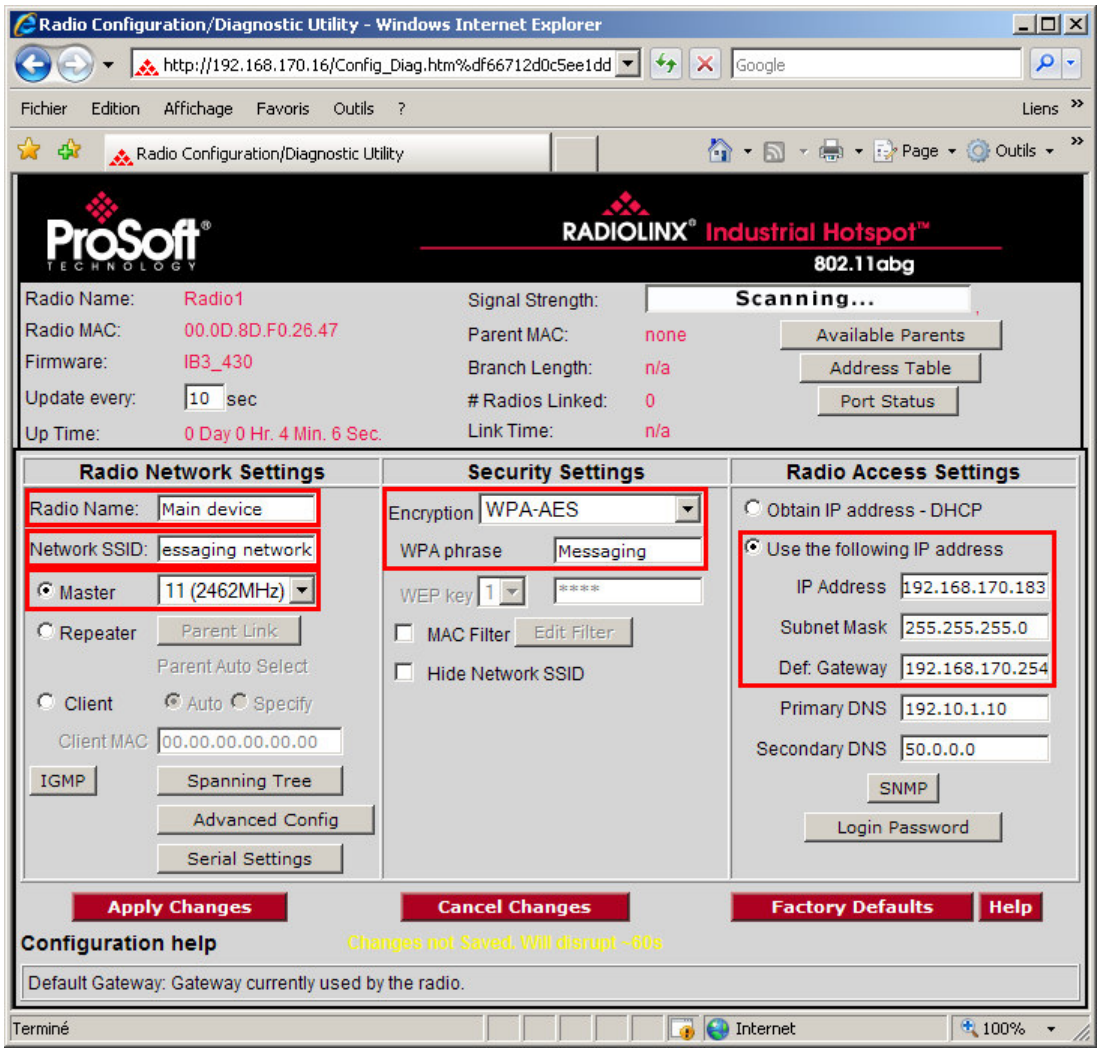
A.5. Set up the Main RLXIB-IHW-E – Master mode

The master is the "root" or top-level radio in a network.
You must have at least one master radio per network.
For redundancy, you can assign more than one master to the network.

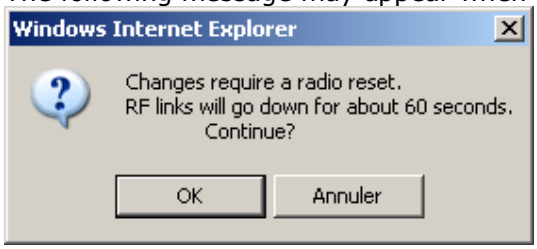


From the RadioLinx web page:

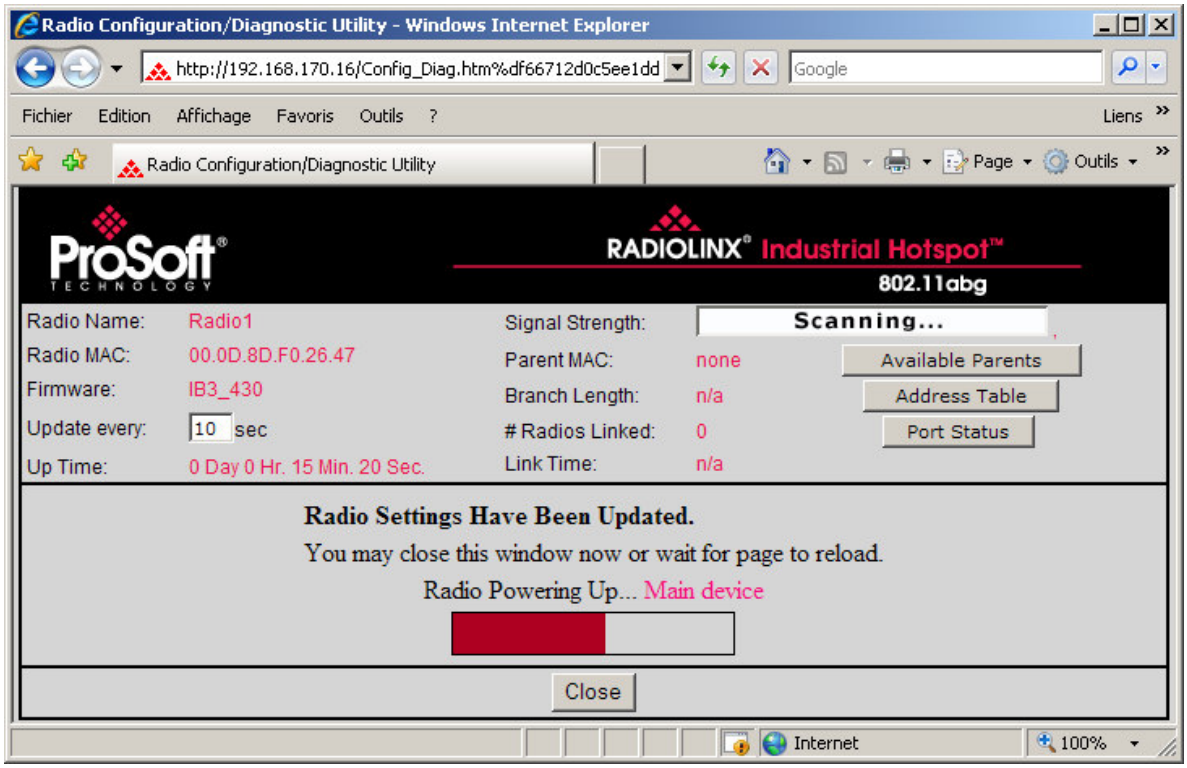
- Change the name of the radio to **Main Device**
- Change the SSID name to **Messaging Network**
- Select **Master** and leave the channel per default (11)
- For Encryption chose **WPA-AES** and enter your **WPA phrase**
- Enter a valid **IP address** and **Subnet Mask**



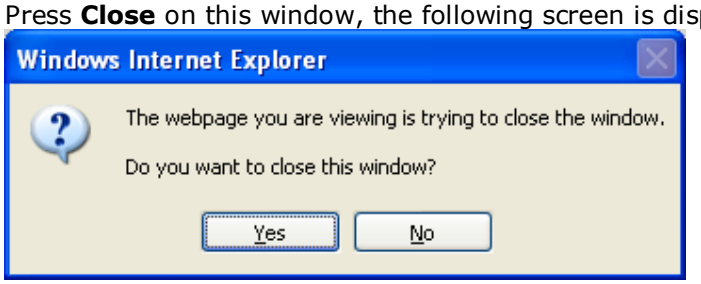
Now the new settings are ready, press **Apply Changes** to valid them.
The following message may appear when pressing "**Apply changes**", click "**OK**".



The RLXIB-IHW-E reboots:



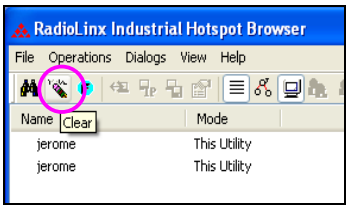
Press **Close** on this window, the following screen is displayed:



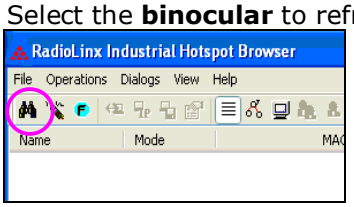
Press **Yes**.

A.6. Settings verification:

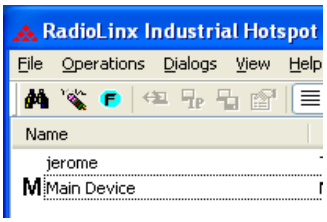
- Select **Clear** to delete the current radio list



- Select the **binocular** to refresh the screen and get an update radio list



- When configured the name of the radio is preceded by an M (for Master) in the RLX-IH Browser.



The setting of the Master radio is finished.

- Disconnect the Ethernet cable from the radio.

B. Setting of the Remote/Repeater radio

B.1. Plug the cables to the RLXIB-IHW:

From left to right: Power connector, serial port and Ethernet port.

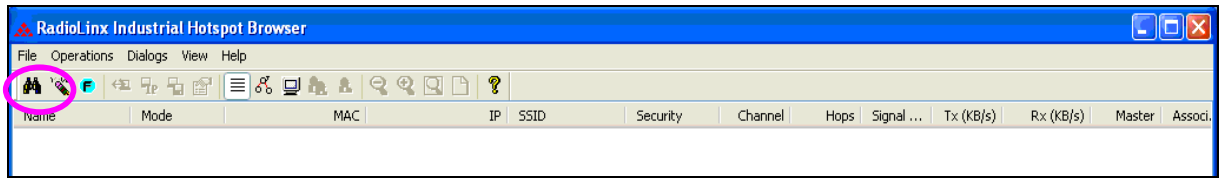
Plug the power cable.

For Ethernet connection:

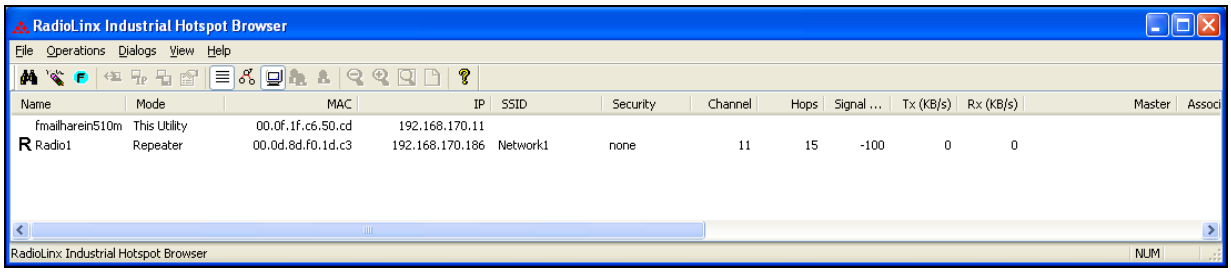
- If you are connecting to the radio through an Ethernet hub or switch, use the gray (straight-through) cable.
- If you are connecting to the radio directly from your PC without going through an Ethernet hub or switch, you must use the red (crossover) cable.

B.2. Launch RadioLinx IH browser:

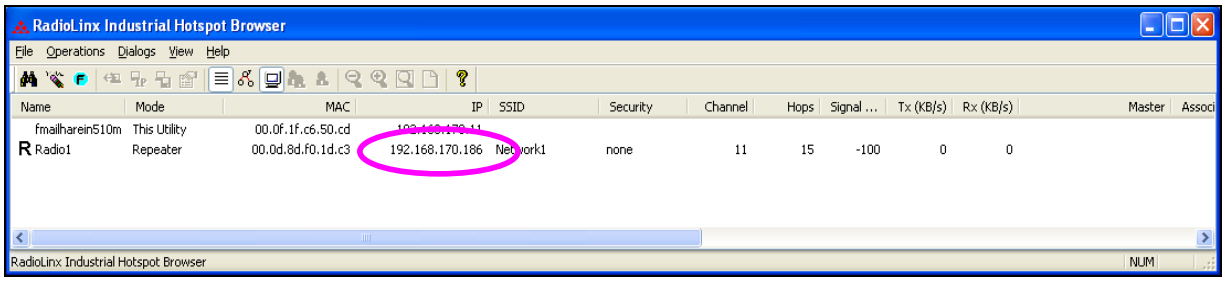
Click on the binocular:



The radio appears:

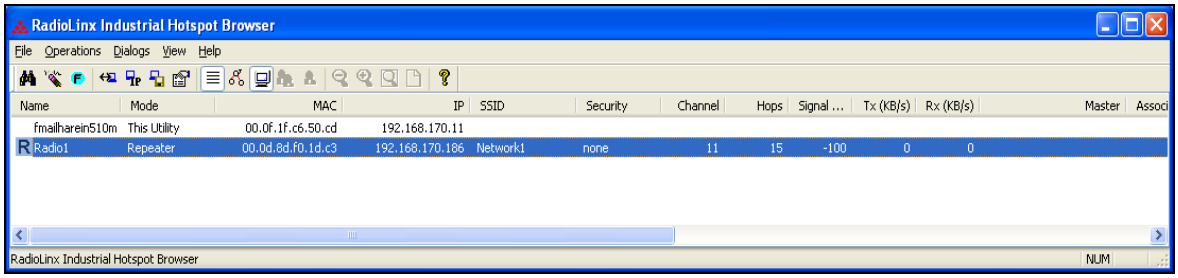


At this point the setting of the radio is the factory default.
If the radio is connected to a network with a DHCP server, the radio may already have an IP address assigned to it.

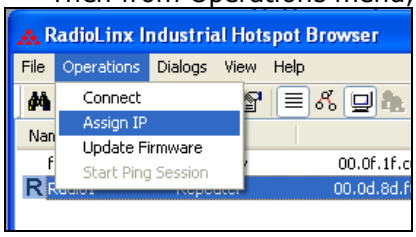


If no IP address appears:

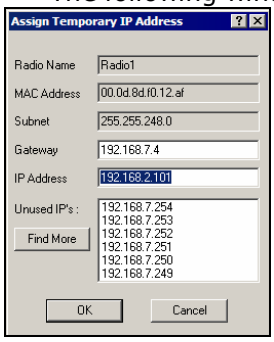
- Select the Radio on the list



- Then from Operations menu, select Assign IP

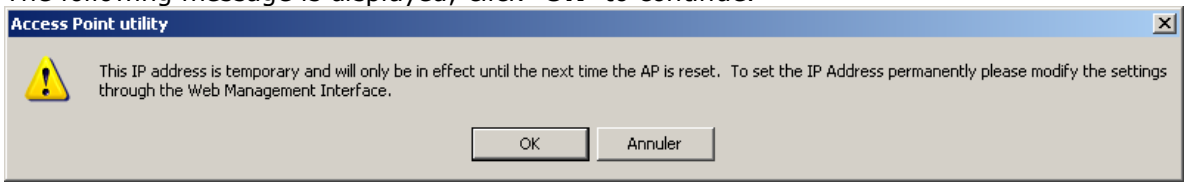


- The following window is displayed:



- Click OK to accept the temporary IP address, subnet mask, and default gateway.

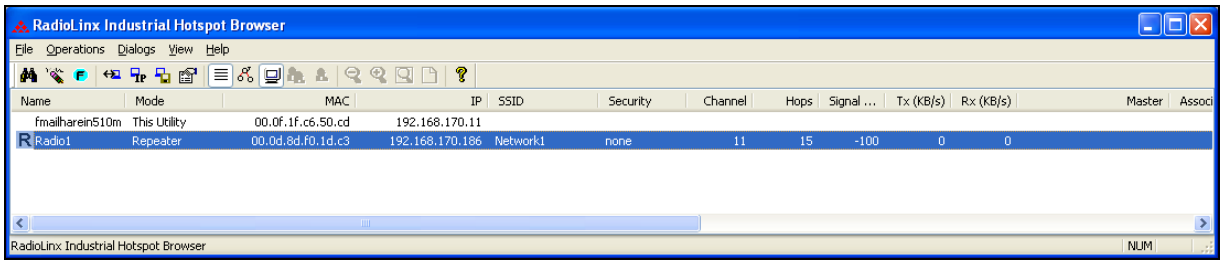
The following message is displayed; click "**OK**" to continue.



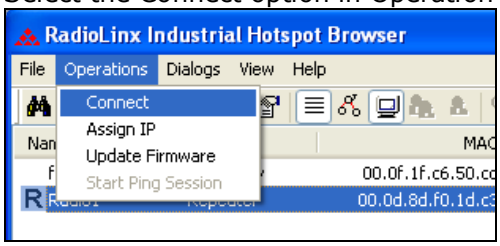
Now a temporary IP address is assigned to the RLXIB-IHW-E module.

B.3. Go online with the RLXIB-IHW-E for configuration:

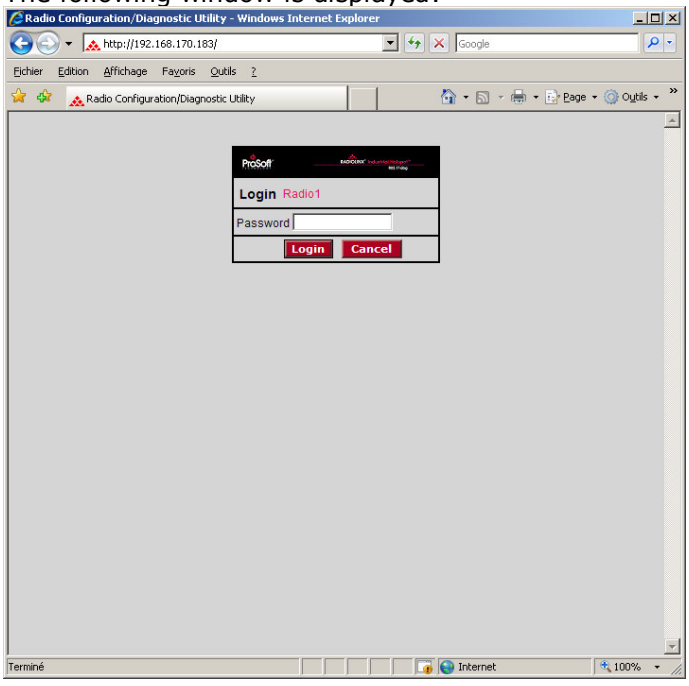
To go online to the RLXIB-IHW for configuration (or diagnostics), from the Browser select the Radio1:



Select the Connect option in Operation menu.

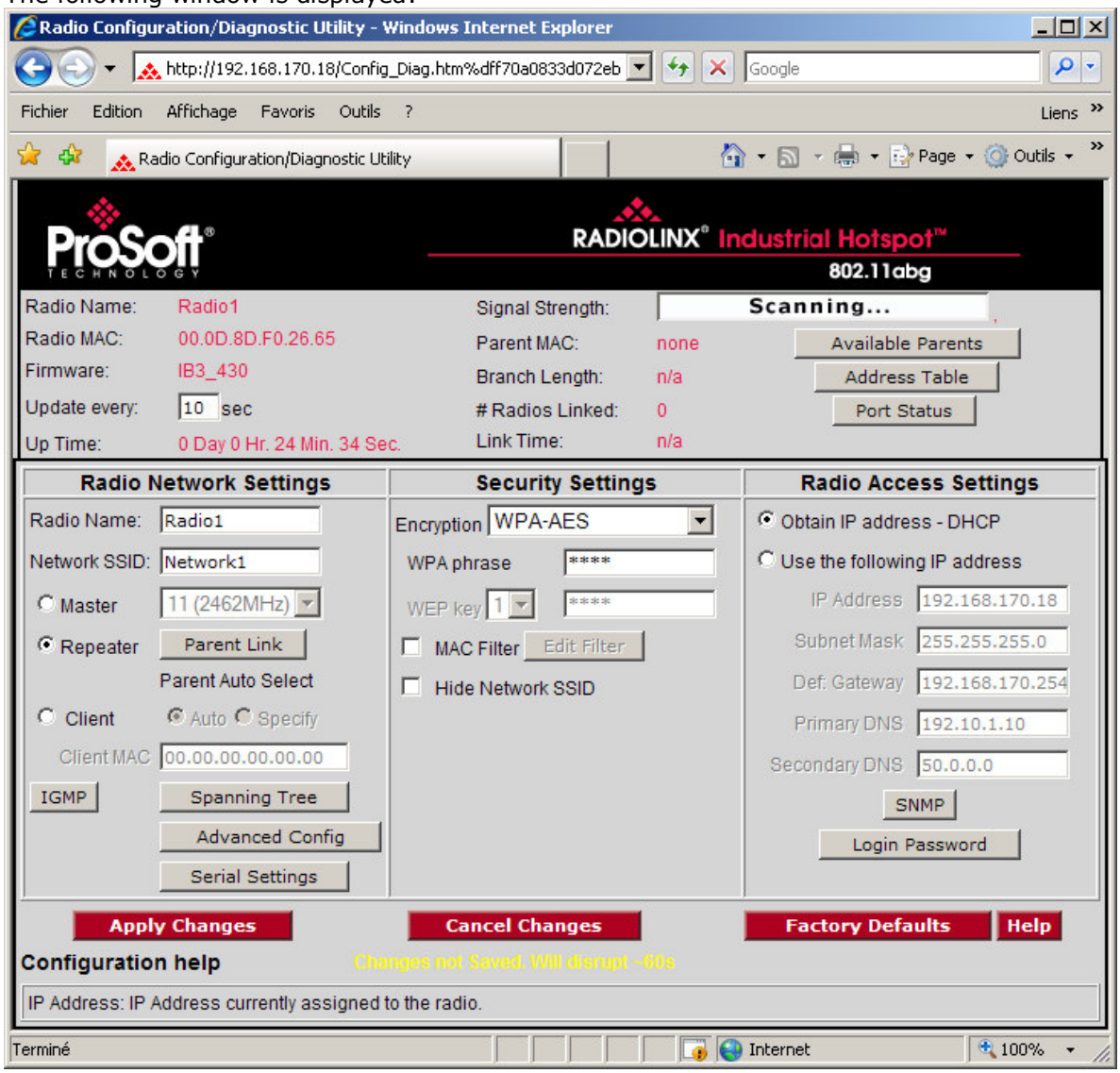


The following window is displayed:



Enter your password to log in to the radio and then press **Login**.
The default **password** is password (lower case).

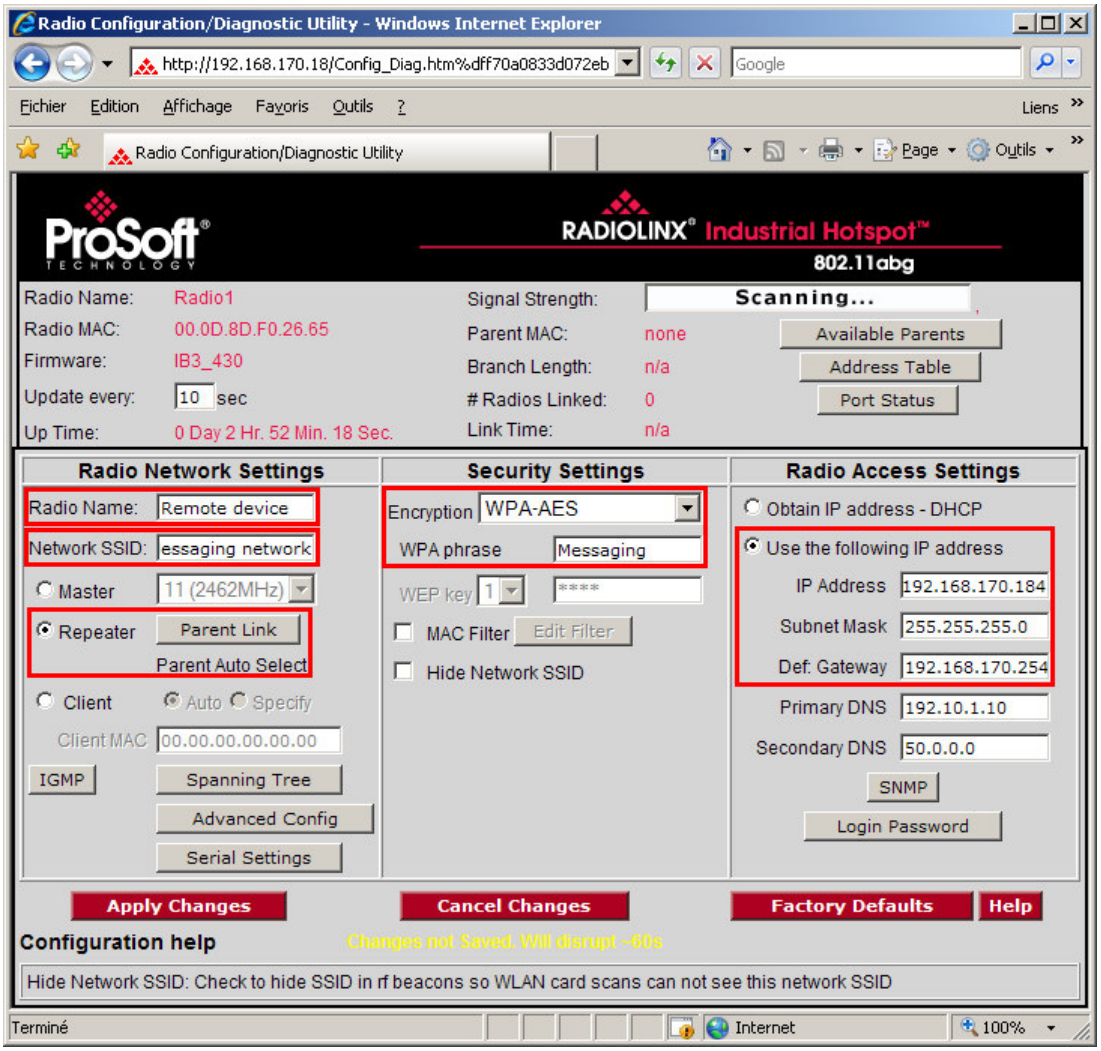
The RLW-IHW-E configuration is protected by a login password.
The default **password** is password (lower case).
To prevent unauthorized access to the radio configuration, you should change the default password when you have finished your configuration.
The following window is displayed:



B.4. Set up the Remote/Repeater RLXIB-IHW-E – Repeater mode

A RLXIB-IHW-E Remote/Repeater connects automatically to the best available parent radio on the network.

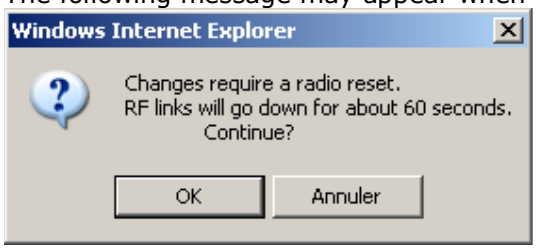
- Change the name of the radio to **Remote Device**
- Change the SSID name to **Messaging Network**
- Select **Repeater**.
- For encryption chose **WPA-AES** and enter your **WPA phrase**
- Enter a valid **IP address** and **Subnet Mask**



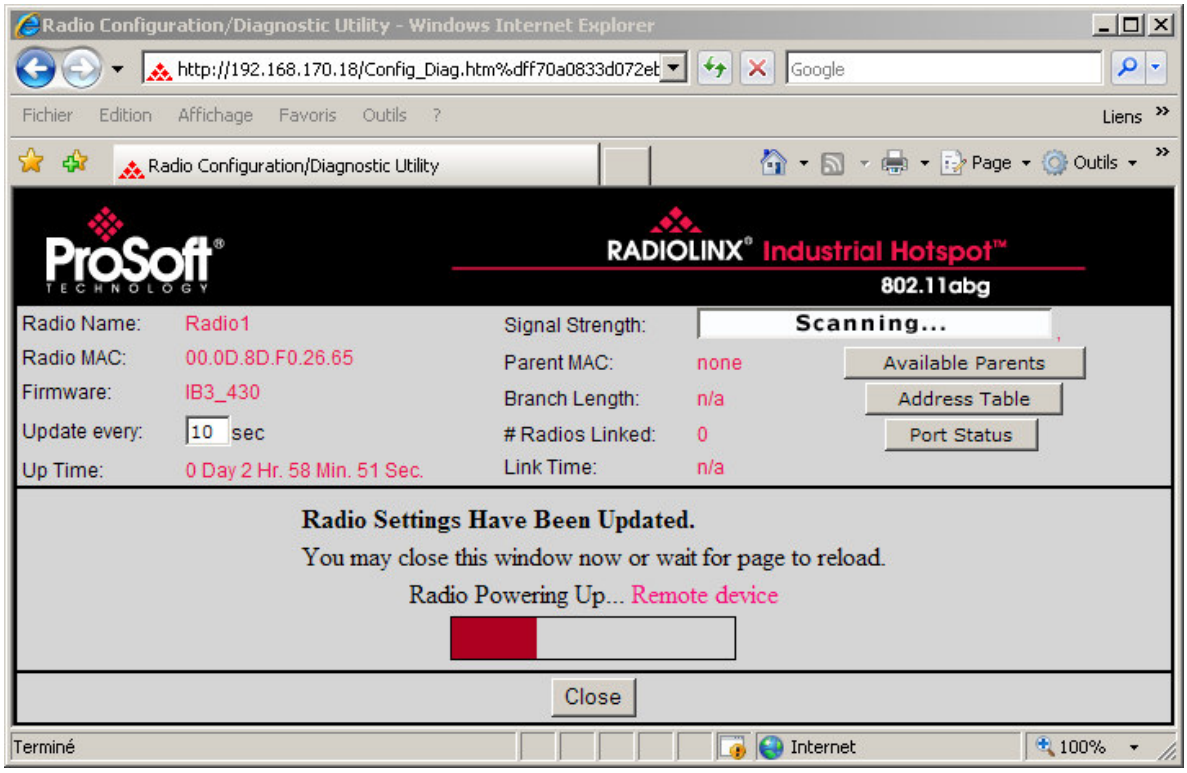
Important: The Network SSID and WPA phrase are case sensitive.
Use **exactly** the same combination of upper case and lower case letters you entered for the RLXIB-IHW-E Main device, otherwise the Repeater radio will not be able to connect to the Master radio

Now the new settings are ready, press **Apply Changes** to valid them.

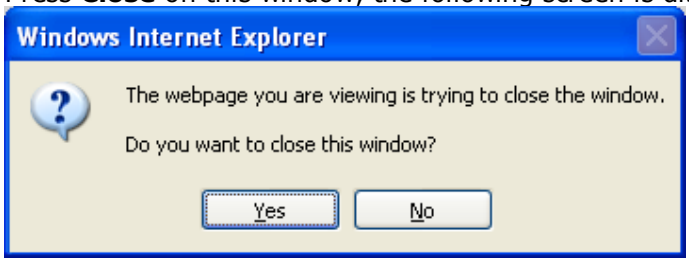
The following message may appear when pressing "**Apply changes**", click "**OK**".



The RLXIB-IHW-E reboots:



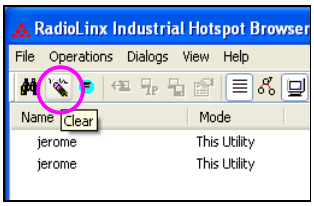
Press **Close** on this window, the following screen is displayed:



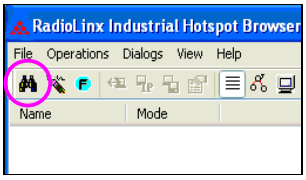
Press **Yes**.

B.5. Settings verification:

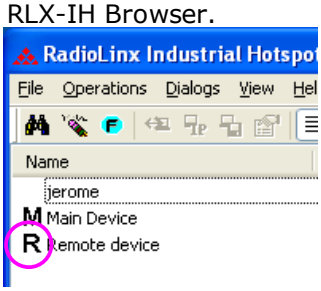
- Select **Clear** to delete the current radio list



- Select the **binocular** to refresh the screen and get an update radio list

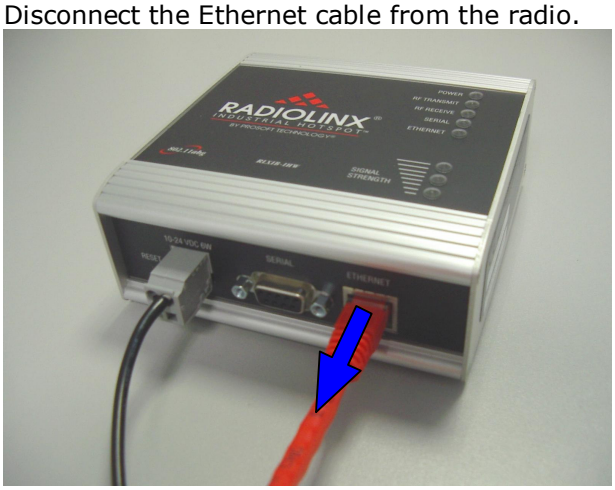


- When configured the name of the radio is preceded by an R (for Repeater) in the RLX-IH Browser.



The setting of the Repeater radio is finished.

- Disconnect the Ethernet cable from the radio.

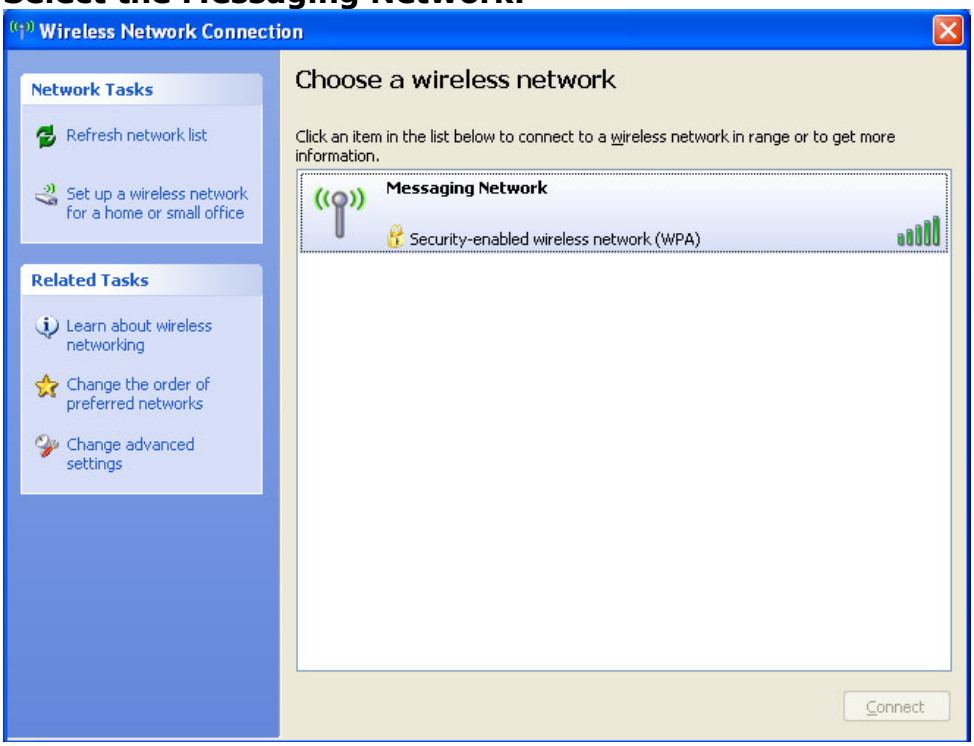


C. Connect laptop Client by wireless to the Access Point to check the wireless network.

Note:
You have to setup a fixed IP address to the PC wireless card and this IP address must be compatible with the RadioLinx IP addresses previously setup.
In this application the PC wireless card IP address must be 192.168.170.20.

The laptop will establish communication with the best Access Point.

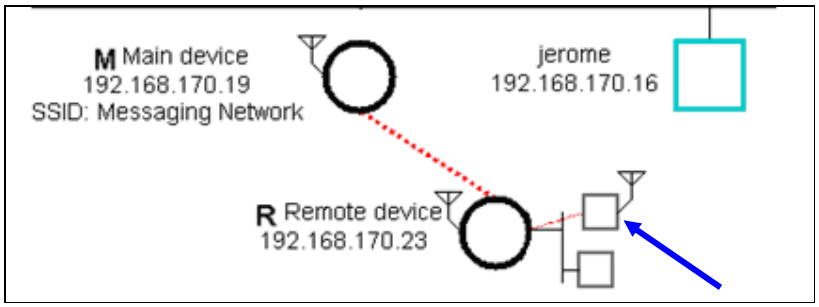
C.1. Select the Messaging Network.



The communication is established by wireless between the laptop and the access point.

C.2. Check connection in RadioLinx IH browser.

Select Topology Diagram to show on which radio the laptop is connected



The Laptop is connected to the Radio Remote device.

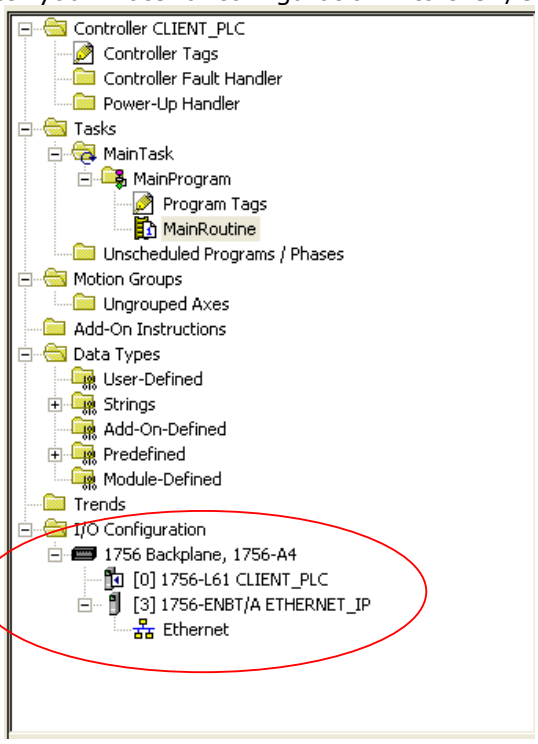
The 2 RLXIB-IHW-E are present on the wireless network, your wireless setup is done.

D. Programming Messaging instructions into the Client ControlLogix PLC.

CIP Data table Read and Write will be used to send/receive data from/to the Sever ControlLogix PLC.

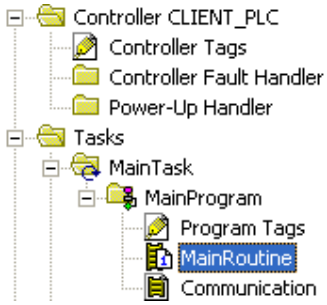
D.1. Material Configuration.

Launch RSLogix 5000 and create a new project.
Enter your material configuration into the I/O configuration folder

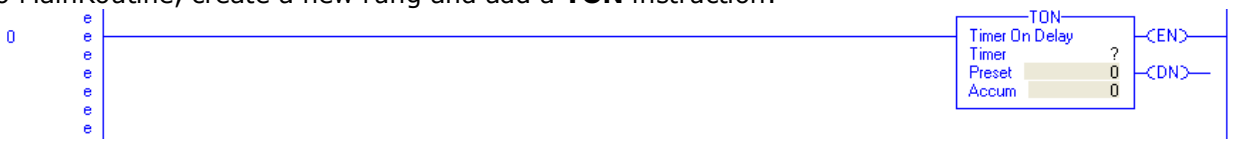


D.2. Conditions for Message instructions

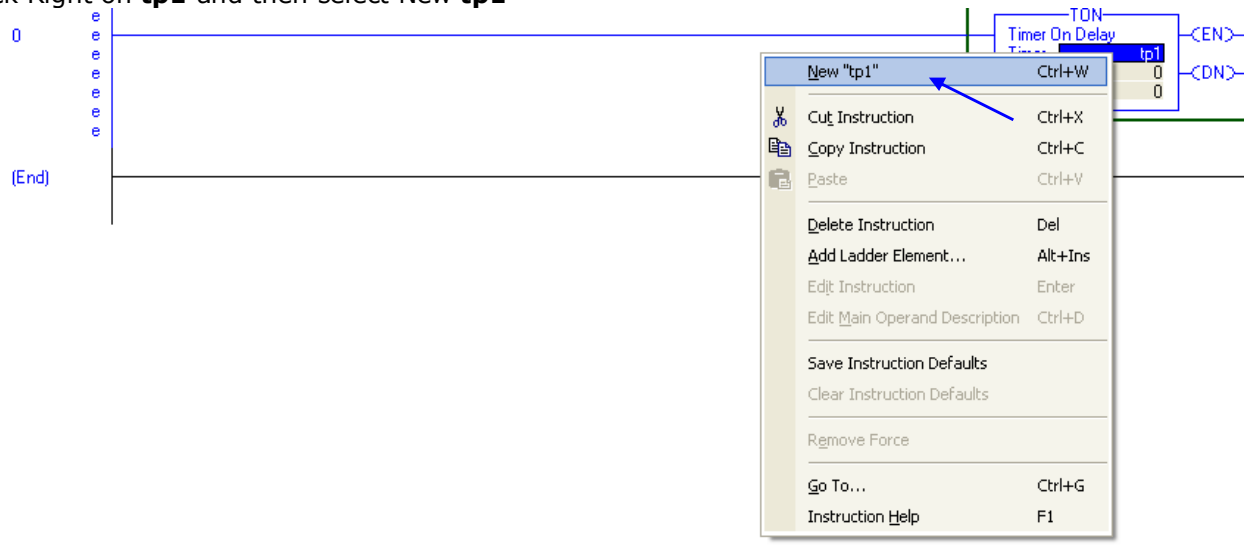
Into the **MainProgram** folder open the MainRoutine:



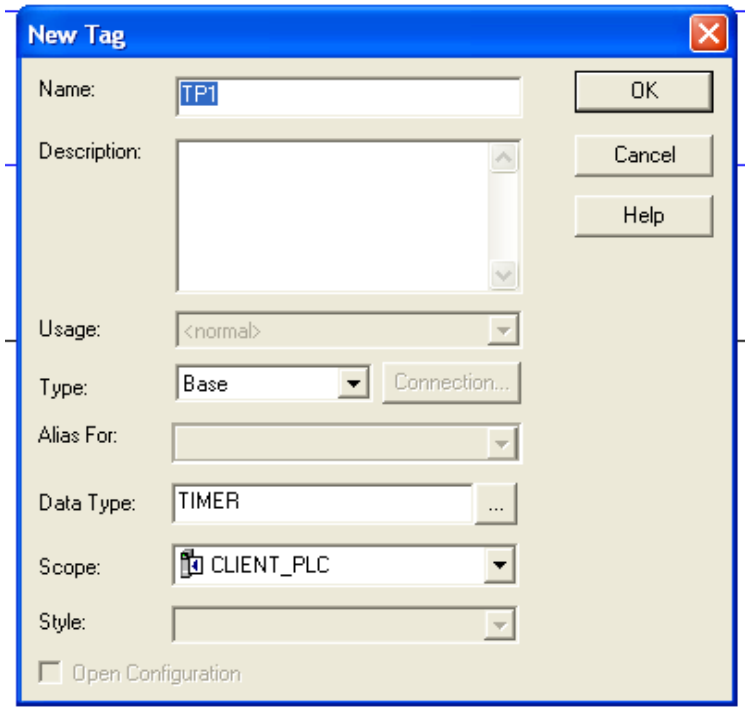
To periodically send/receive data from/to the CLX Server, a TON instruction will be used.
Into MainRoutine, create a new rung and add a **TON** instruction:



Double click on the **?** and then enter **tp1**
Click Right on **tp1** and then select New **tp1**

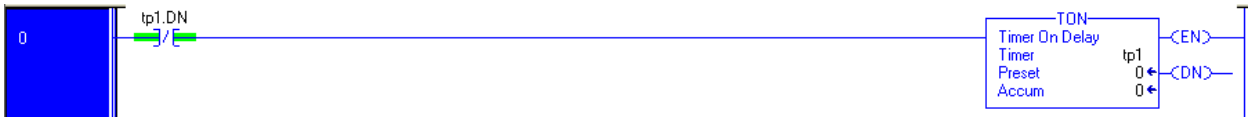


In the screen below select OK.



Then enter 500 into the Preset time.

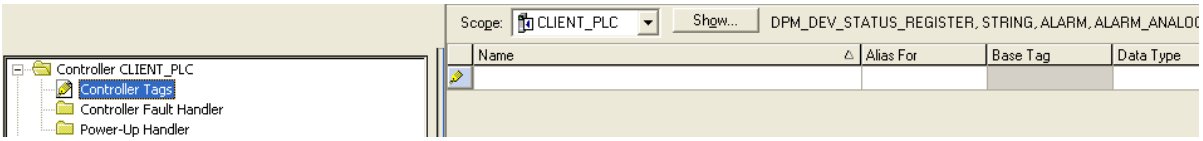
We will use the done bit of the Timer to enable/disable the messages instruction.
Into the Rung 0 insert **XIO tp1.DN** as TON condition:



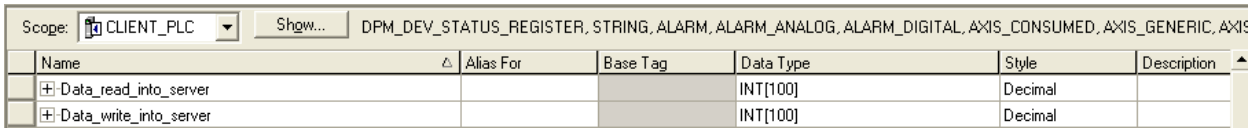
D.3. Create ControlLogix PLC tags.

With messaging instruction, tags are needed into the CLX client and the CLX server.

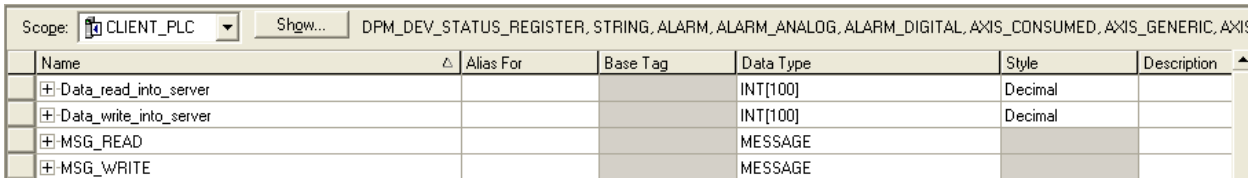
Selecting Controller Tags into the Controller folder and select **EditTags**, the screen bellow is shown:



Create two tables of INT(100):
- Data_read_into_server
- Data_write_into_server



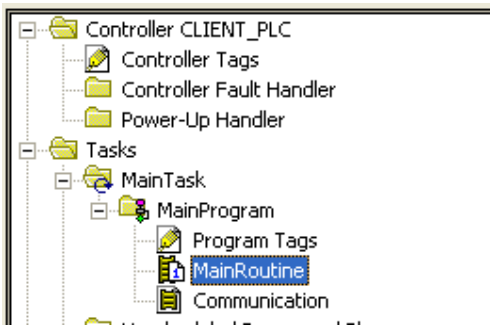
Then, create two tags with Data Type of Message:
- MSG_READ
- MSG_WRITE



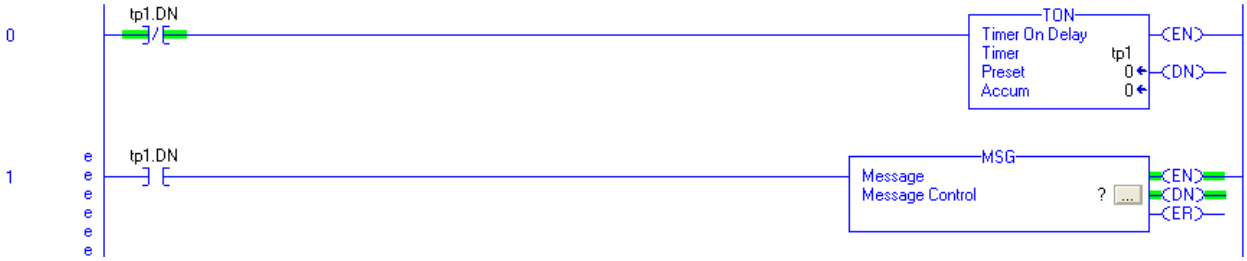
At this step, the needed tags into the CLX client are defined.

D.4. Create Read MESSAGE instruction into the Client ControlLogix PLC.

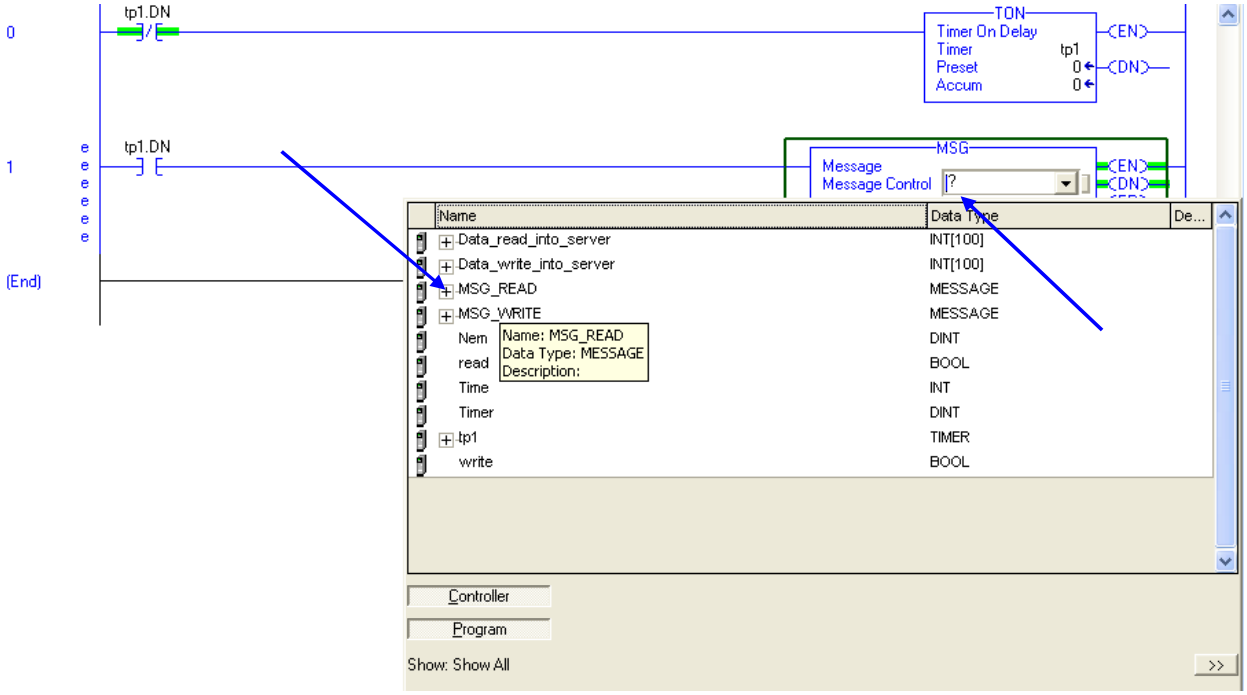
Into the **MainProgram** folder open the MainRoutine:



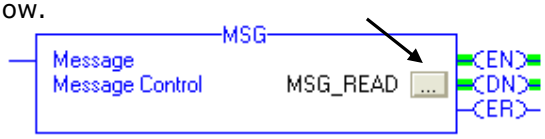
Create a new rung, insert **XIC tp1.DN** and then add a **MSG Instruction**:



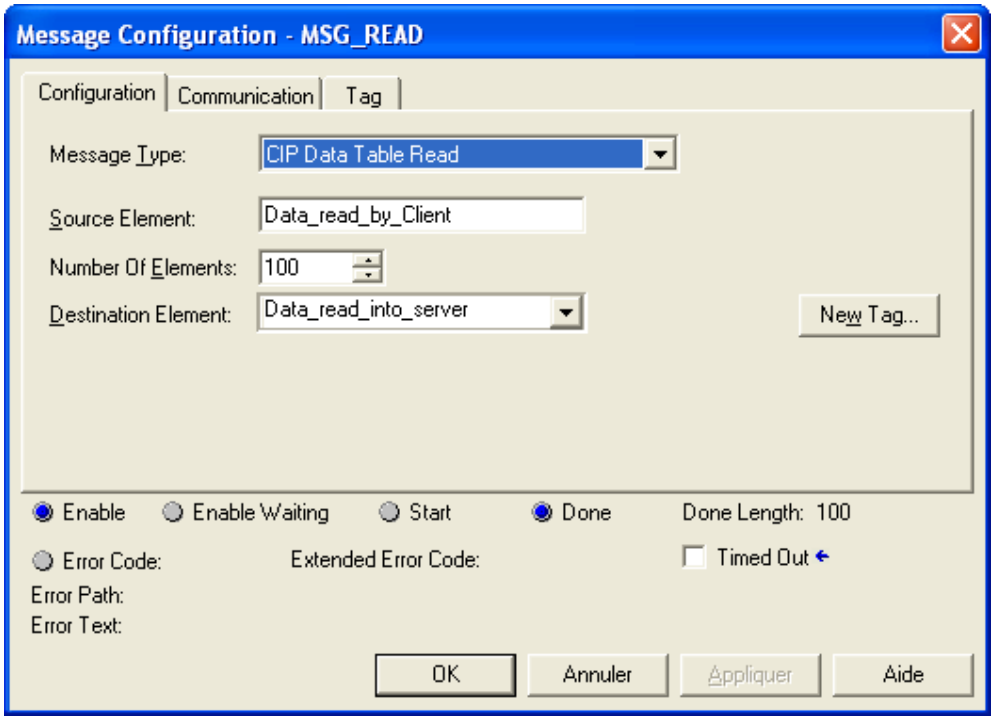
Double click on the **?** and then select MSG_READ into the tags list.



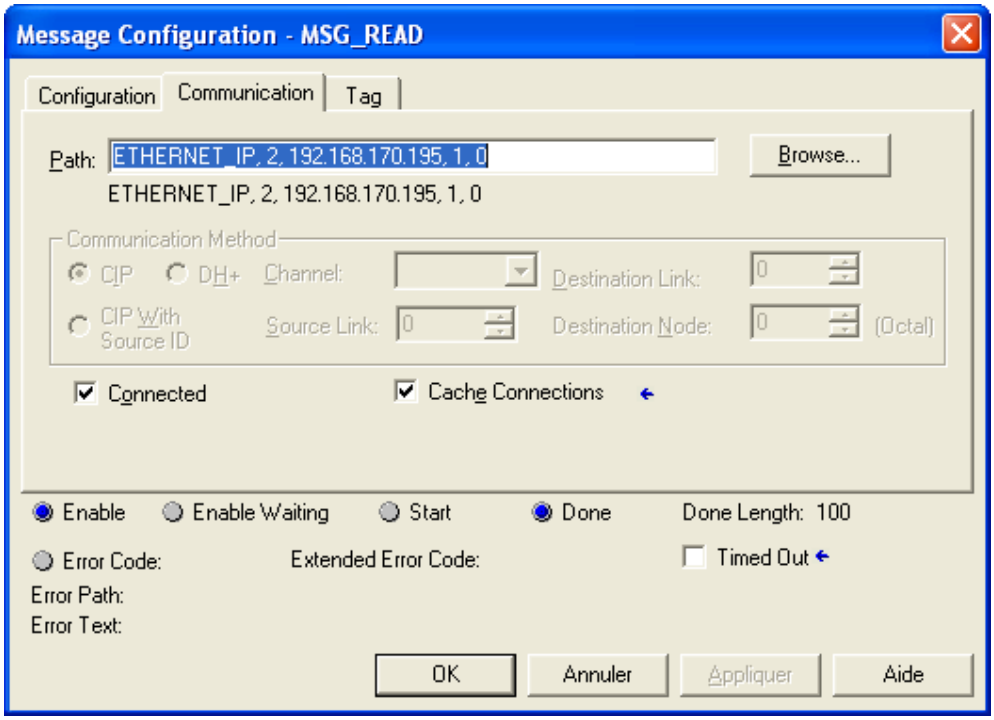
Selecting the box into the MSG instruction allow you to show the Message configuration below.



- Change the Message Type to **CIP Data Table Read**.
- Change the Source Element to **Data_read_by_Client** (Client ControlLogix PLC memory area)
- Change Number Of Element to **100** (Data table size)
- Change the Source Element to **Data_read_into_Server** (Server ControlLogix PLC memory area)



Selecting the Communication tab allows you to set the path to join the Server ControlLogix

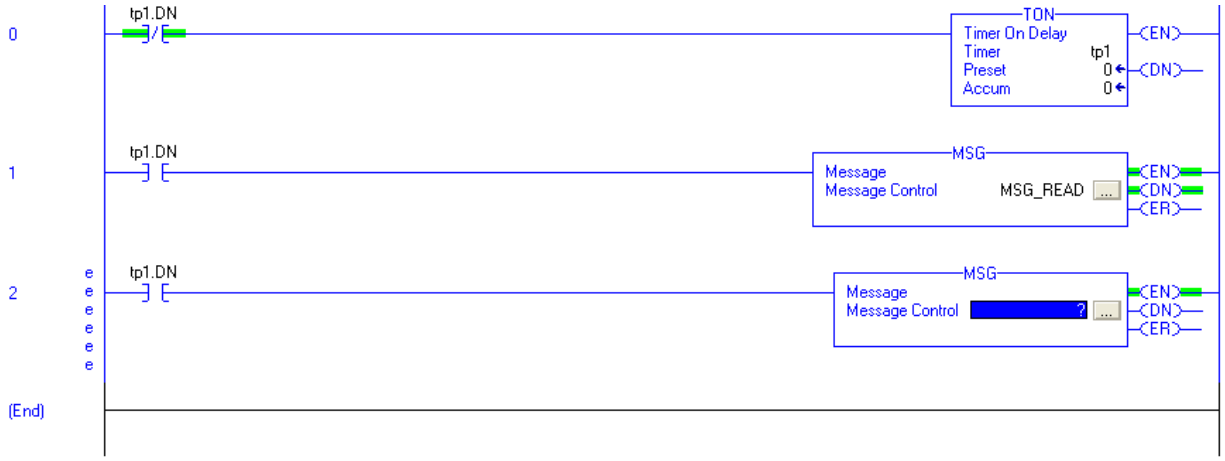


Set the Path to **ETHERNET_IP, 2, 192.168.170.195, 1, 0** :

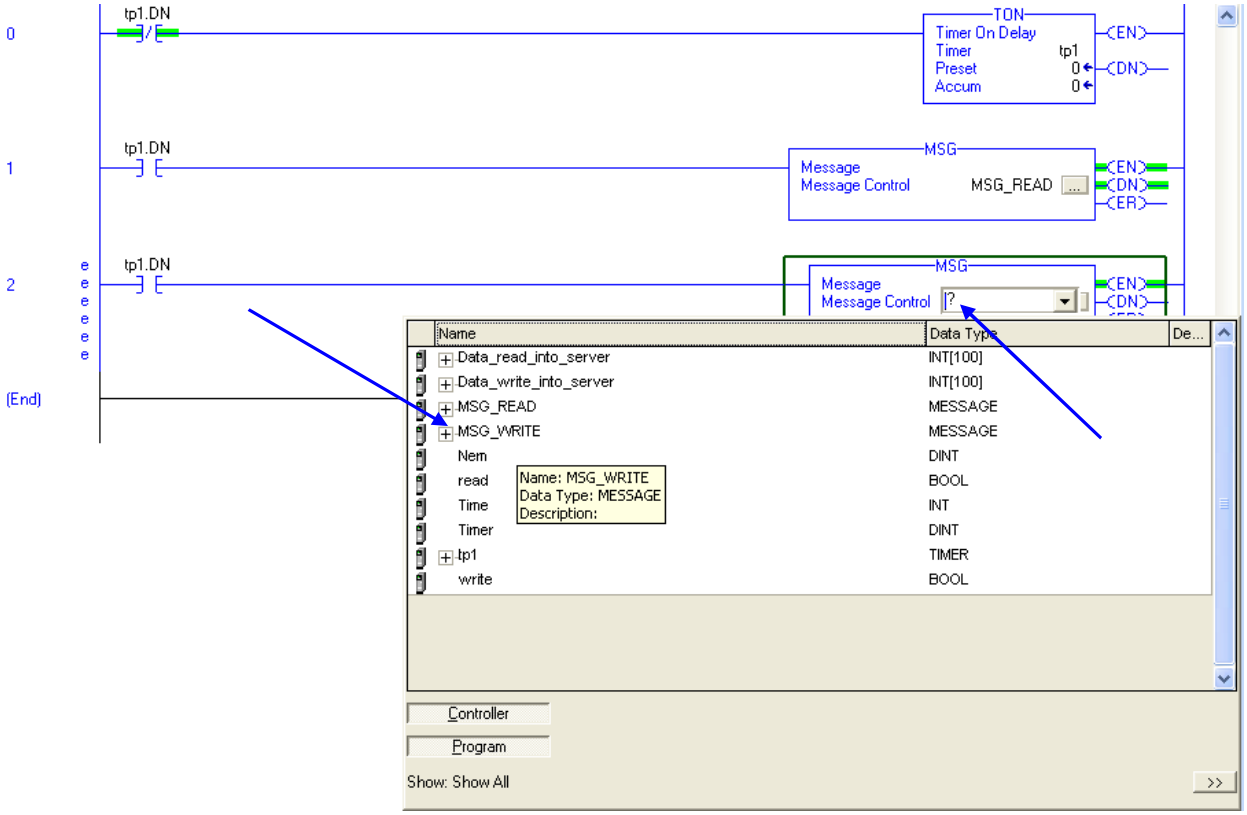
- **ETHERNET_IP** represents the PLC **client** ENBT Card IP address
- **2** represent the port number into the Ethernet card
- **192.168.170.195** represents the PLC **server** ENBT Card IP address
- **1** represent the backplane
- **0** represent the PLCs processor

D.5. Create Write MESSAGE instruction into the Client ControlLogix PLC.

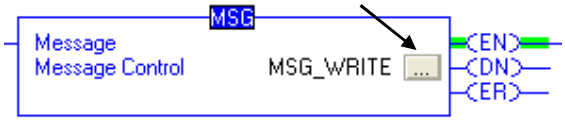
Into MainRoutine, create a new rung, insert **XIC tp1.DN** and add a MSG Instruction:



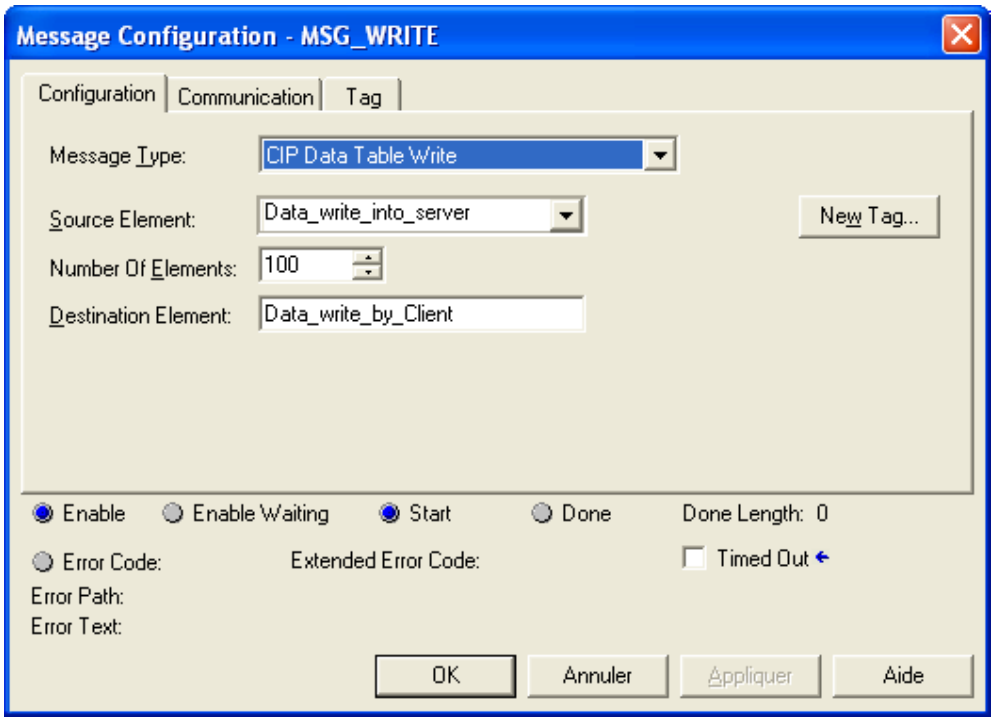
Double click on the **?** and then select MSG_WRITE into the tags list.



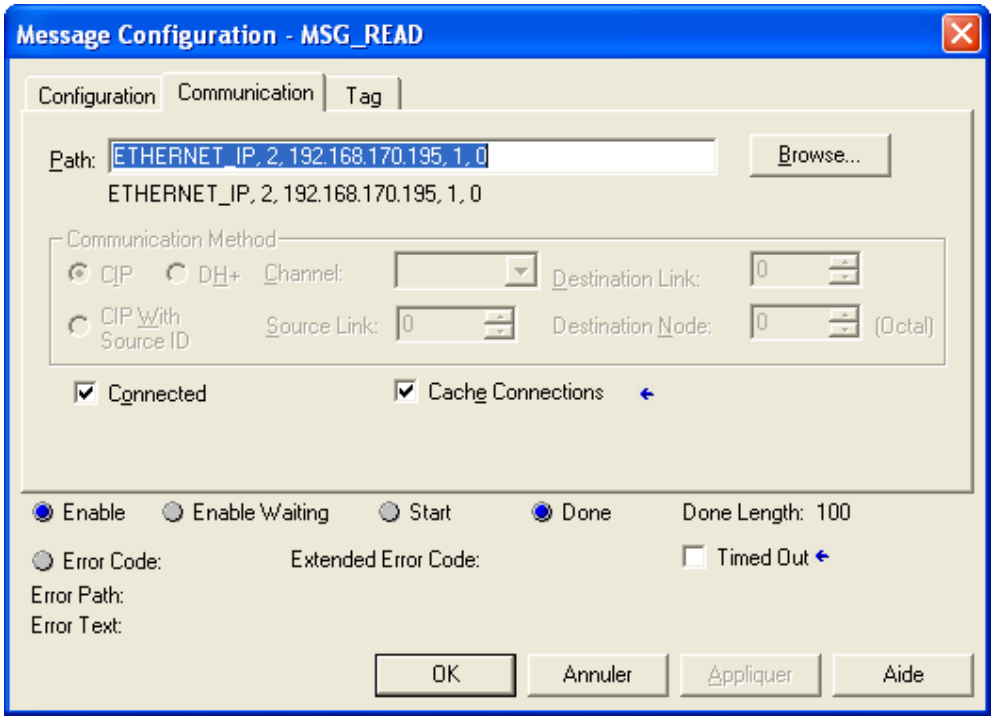
Selecting the box into the MSG instruction allow you to show the Message configuration below.



- Change the Message Type to **CIP Data Table Write**.
- Change the Source Element to **Data_write_Into_Server** (Client ControlLogix PLC memory area)
- Change Number Of Element to **100** (Data table size)
- Change the Source Element to **Data_write_by_Client** (Server ControlLogix PLC memory area)



Selecting the Communication tab allows you to set the path to join the Server ControlLogix



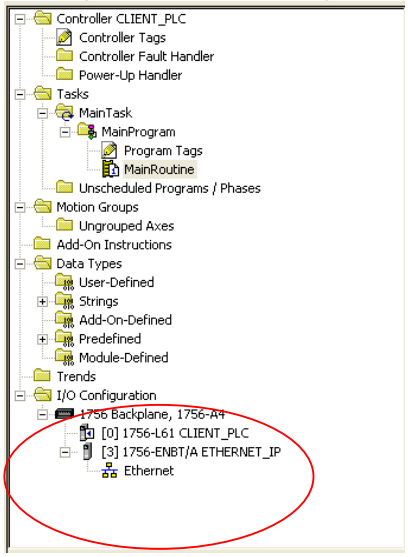
Set the Path to **ETHERNET_IP, 2, 192.168.170.195, 1, 0** :

- **ETHERNET_IP** represents the PLC **client** ENBT Card IP address
- **2** represent the port number into the Ethernet card
- **192.168.170.195** represents the PLC **server** ENBT Card IP address
- **1** represent the backplane
- **0** represent the PLCs processor

Now the programming of the Client ControlLogix PLC is finished.
Save the Project and download it into the ControlLogix Client PLC

E. Programming Messaging into the Server ControlLogix PLC

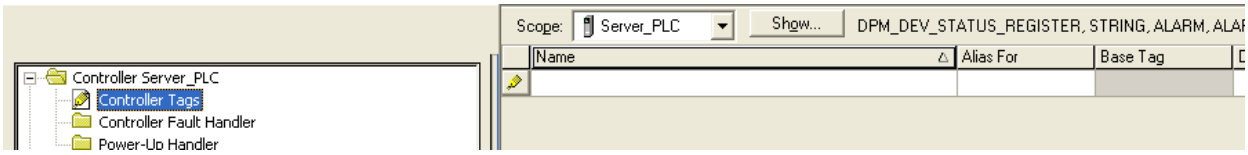
Launch RSLogix 5000 and create a new project.
Enter your material configuration into the I/O configuration folder



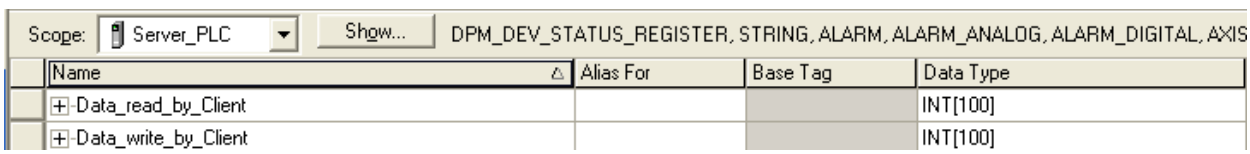
E.1. Create data exchange table.

The Client CLX with the Message Instructions will read and write date into the Server CLX, so data tables need to be created into the Server CLX.

Selecting Controller Tags into the Controller folder and select **EditTags**, the screen bellow is shown:



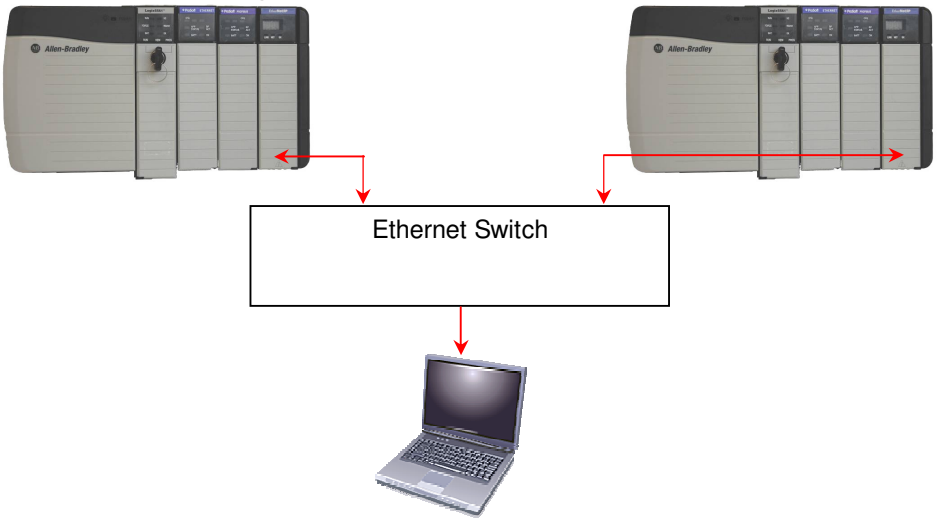
Create two tables of INT [100]:**Data_read_by_Client - Data_write_by_Client**



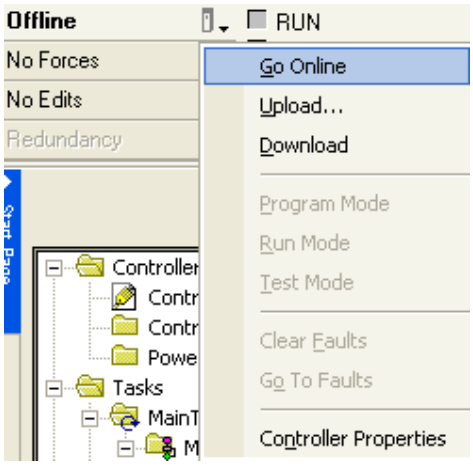
At this step, the tags required by the Server ControlLogix PLC are defined.
Nothing else is required into the Sever CLX program.
Save the project and download it into the ControlLogix Server PLC

F. Test wire EtherNet/IP communication

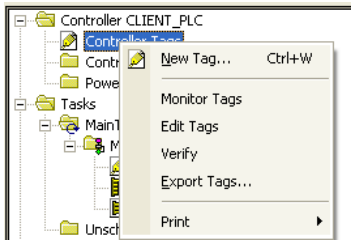
Connect the ControlLogix PLCs and the PC as below:

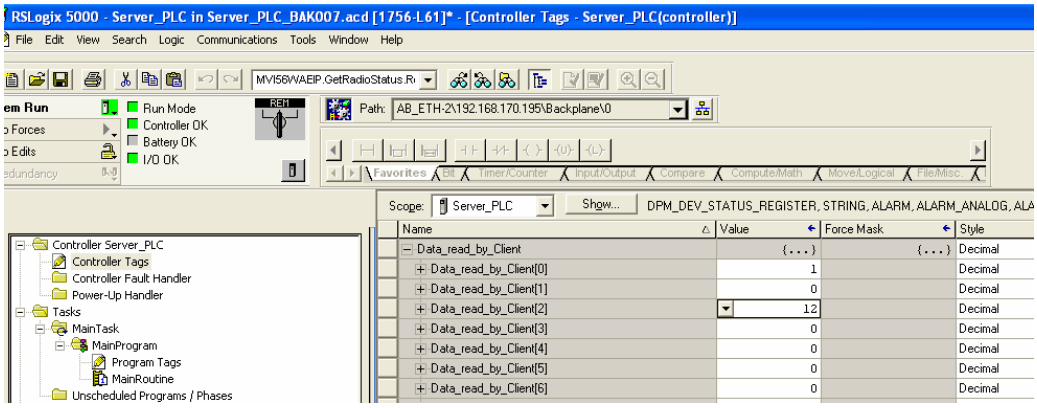


Go online with the two ControlLogix PLC.

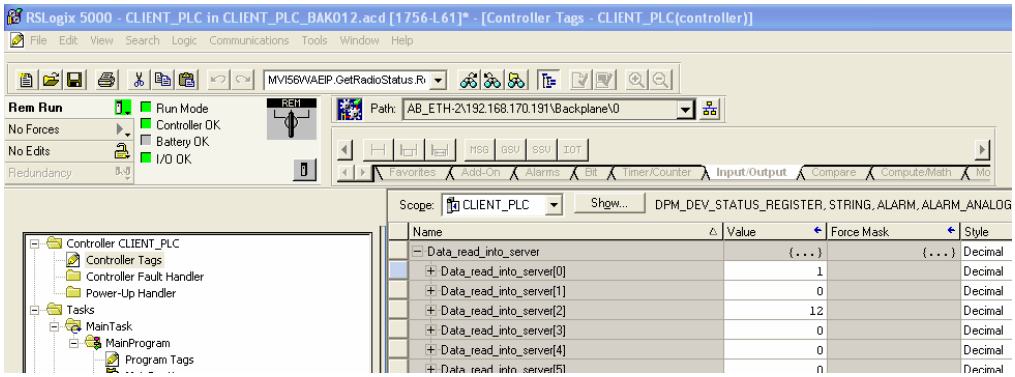


Into the two projects, click right on the Controller Tags and then select Monitor Tags





Data exchange



If you enter values into the Client CLX tag Data_write_into_server you should see these values into the Server CLX tag Data_write_by_Client.

If you enter values into the Server CLX tag Data_read_by_Client you should see these values into the Client CLX tag Data_read_into_server.

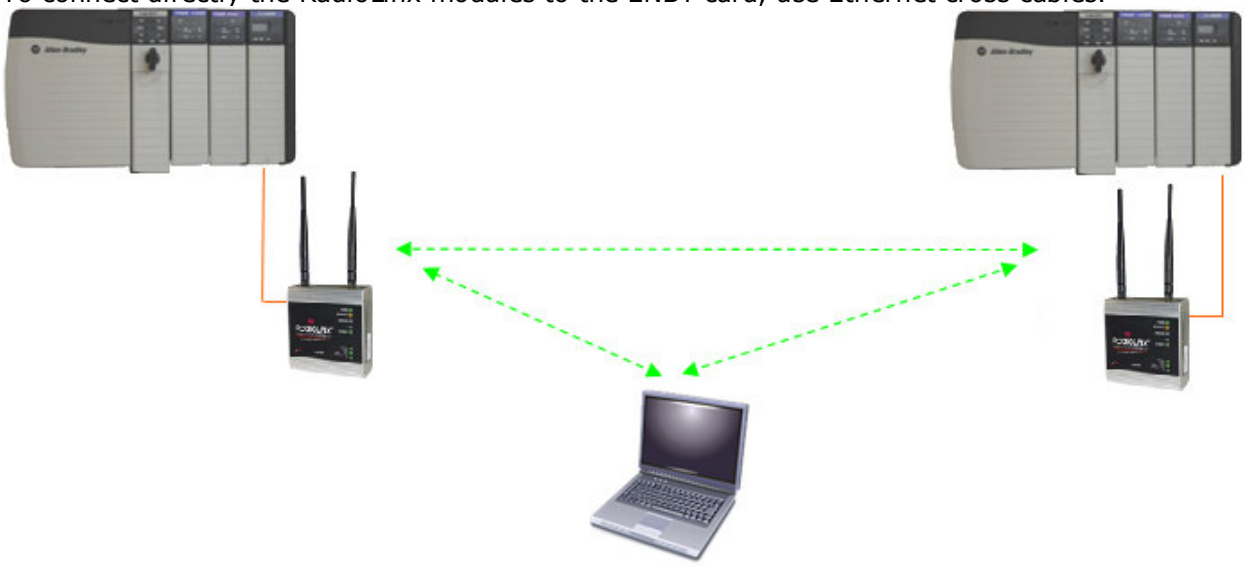
Your EtherNet/IP messages are up and running

G. Test wireless EtherNet/IP communication

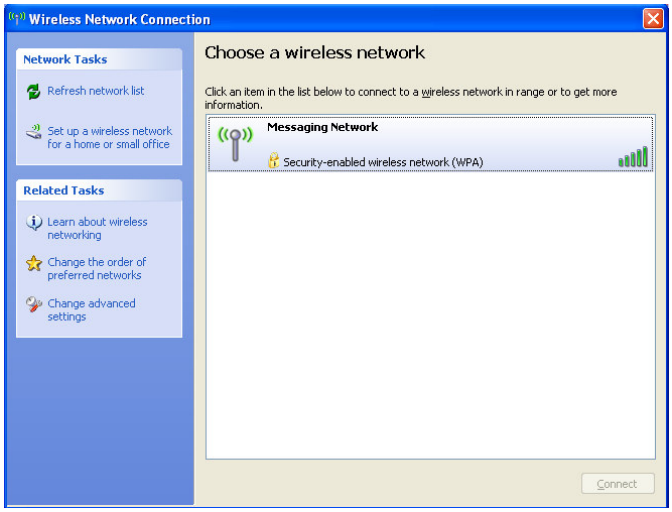
Note:
You have to setup a fixed IP address to the PC wireless card and this IP address must be compatible with the RadioLinx IP addresses previously setup.
In this application the PC wireless card IP address must be 192.168.170.20.

Insert the RLXIB-IHW modules as below to create the wireless network.

To connect directly the RadioLinx modules to the ENBT card, use Ethernet cross cables.

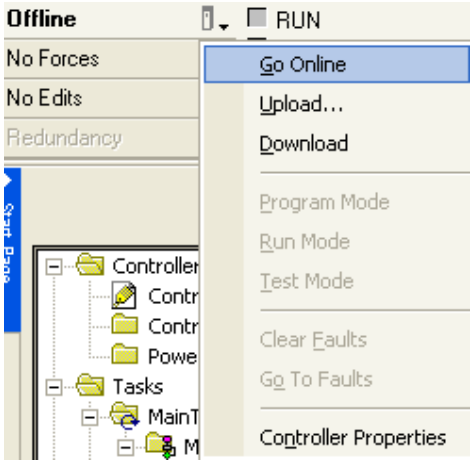


Connect the Laptop to the wireless Network **Messaging Network**.
The laptop will establish communication with the best Access Point.

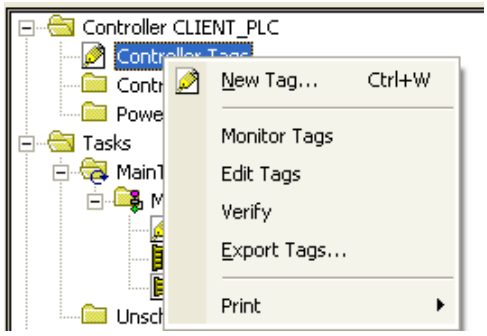


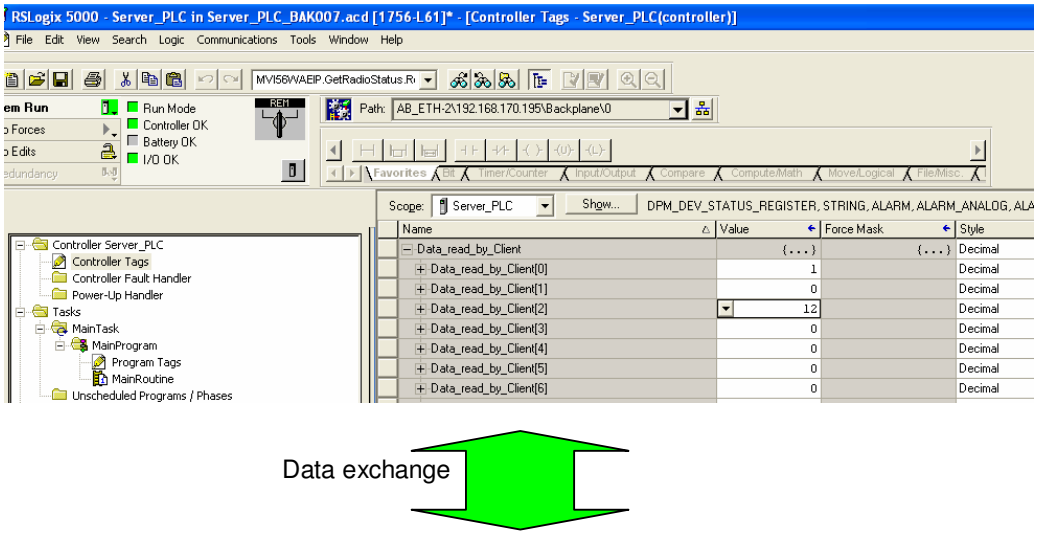
The communication is established by wireless between the laptop and the access point.

Go online with the two ControlLogix PLC.



Into the two projects, click right on the Controller Tags and then select Monitor Tags





If you enter values into the Client CLX tag Data_write_into_server you should see these values into the Server CLX tag Data_write_by_Client.

If you enter values into the Server CLX tag Data_read_by_Client you should see these values into the Client CLX tag Data_read_into_server.

Your EtherNet/IP communication is up and running using the wireless connection

Congratulations

Technical Note

For further information feel free to contact **ProSoft Technology Technical Support** at one of the following addresses:

Europe & Africa: **ProSoft Technology**
Blagnac (Toulouse), France
+33 (0)5.3436.8720 Phone
+33 (0)5.6178.4052 Fax
support.emea@prosoft-technology.com

Middle East: **ProSoft Technology**
Dubai, United Arab Emirates
+971 (0)4.214.6911 Phone
+971 (0)4.214.6912 Fax
fmohammed@prosoft-technology.com

North America: **ProSoft Technology**
Bakersfield, California USA
+1 (661) 716.5100 Phone
+1 (661) 716.5110 Fax
support@prosoft-technology.com

Latin America: **ProSoft Technology**
The Woodlands (Houston), Texas USA
+1 (281) 298.9109 Phone
+1 (281) 298.9336 Fax
latinam@prosoft-technology.com

Asia & Pacific: **ProSoft Technology**
Salangor (Kuala Lumpur), Malaysia
+603 7724.2080 Phone
+603 7724.2090 Fax
asiapc@prosoft-technology.com

ProSoft® TECHNOLOGY

www.prosoft-technology.com