

PURPOSE

The purpose of this document is to provide the reader with an application note for using an Allen Bradley CompactLogix Series PLC communicating EtherNet IP with a WI-GTWY-9-MD1 gateway.

This application should be read in conjunction with user manuals for details on powering and programming WI-GTWY-9-ET1. The reader would also have a firm understanding of the EtherNet IP protocol available from www.odva.org and programming the AB CompactLogix Series PLC's.

There are 2 ways of exchanging data between the Gateway and PLC. The first is by adding the gateway as a module to the PLC this however only limits you to one Input (Consumed) Instance of 256 words and Output (Produced) Instance of 256 words. The second is by creating a message instruction and tags to view the remaining I/O instances. The WI-GTWY-9-ET1 can handle up to 6 produced and 6 consumed connections simultaneously each of 256 words. This application note shows the 1st of adding the Gateway as a module to the PLC.

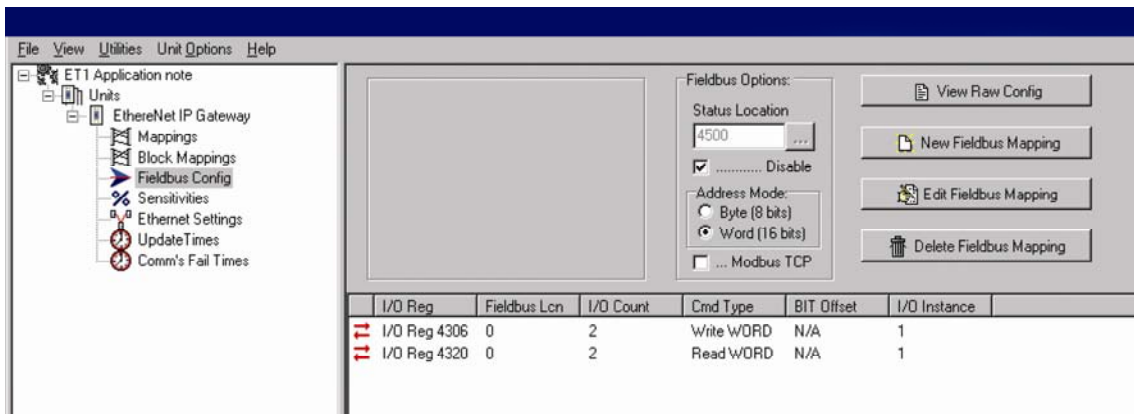
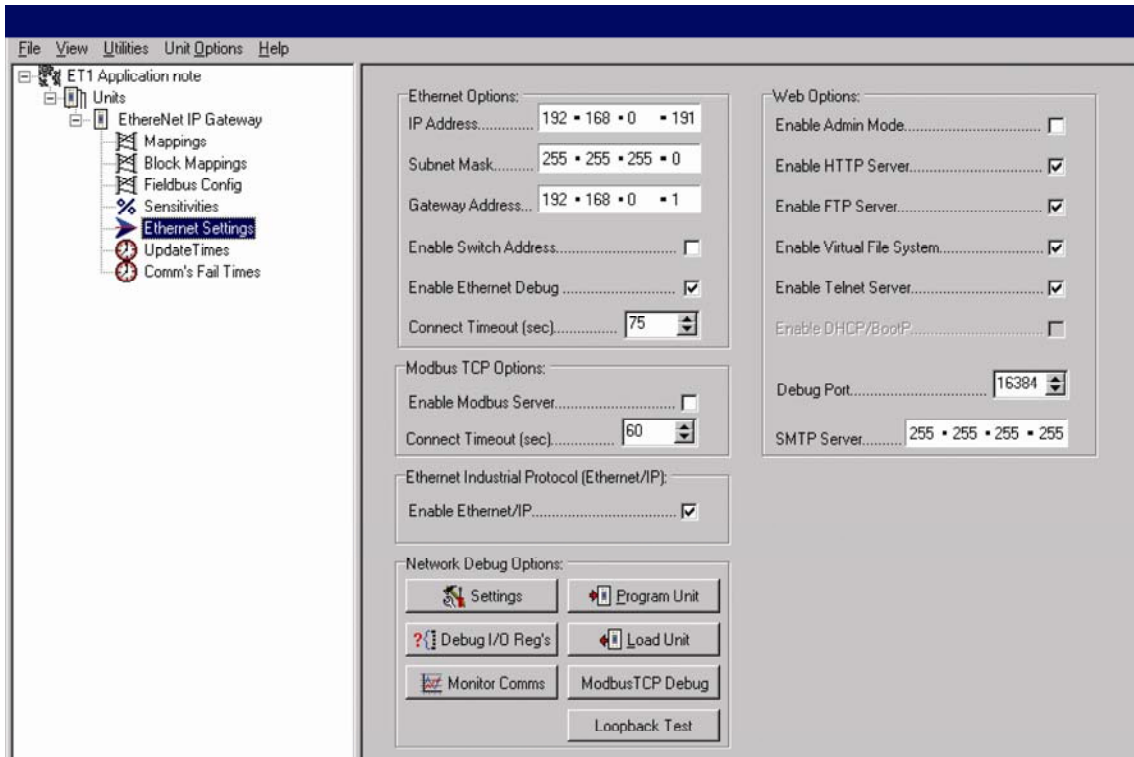
MATERIALS

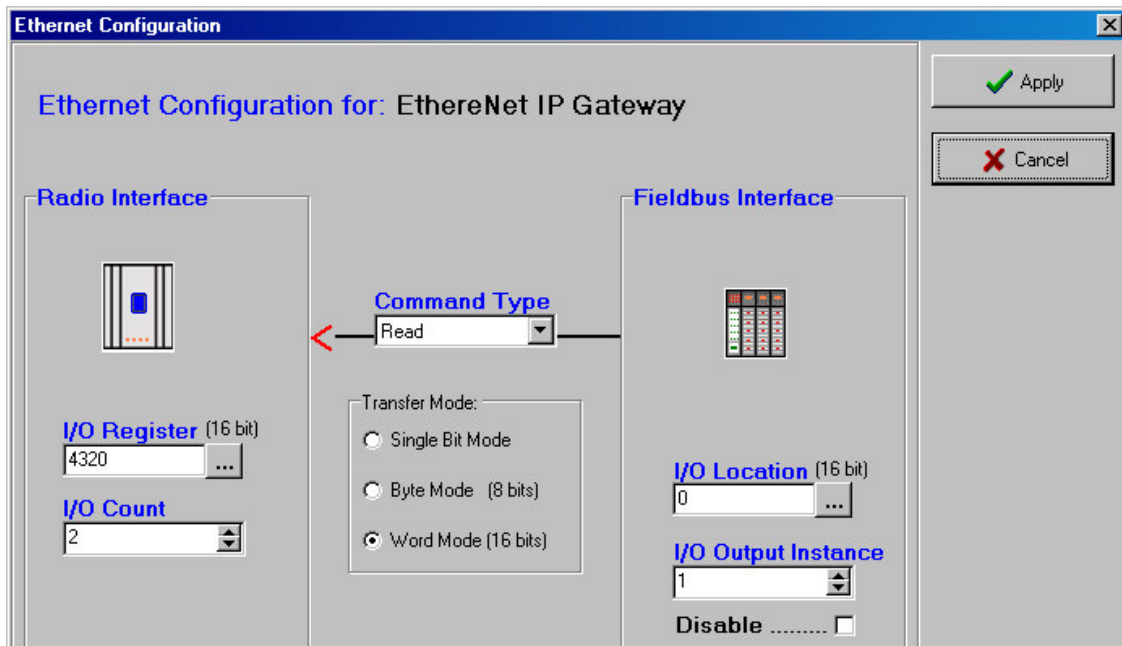
The materials used for this application were,
AB CompactLogix L35E PLC,
RSLogix5000 & RSView programming software,
WI-GTWY-9-ET1,
EDS File for WI-GTWY-9-ET1,
W-Series Configuration utility,
RS232 DB9 serial cable,
RJ45 Ethernet cables and Network Hub (depending on connection crossover cables may be needed)

WI-GTWY-9-ET1 CONFIGURATION

Under Ethernet Settings the modules IP address needs to be set. If going through a network then this address will need to be entered also under Gateway address. Ensure the Enable Ethernet/IP checkbox has been enabled and Enable Modbus Server has been disabled.

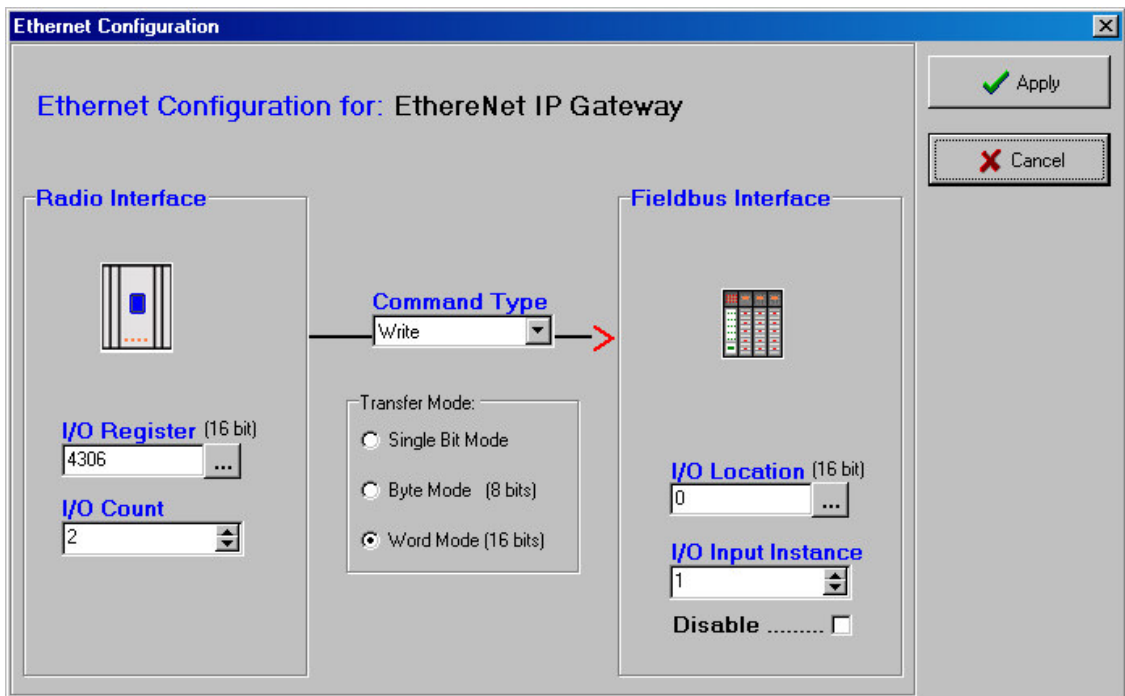
To exchange data between the WI-GTWY-9-ET1 and PLC a series of Fieldbus Configurations that link the I/O registers of the Gateway to the Fieldbus (PLC) need to be made. For this example the local onboard Digital I/O will be written to (Regs 4300, 4301) and read from (Regs 4324, 4325) the PLC. The configuration below shows the 2 Fieldbus mappings to Input Instance 1 and Output Instance 1.





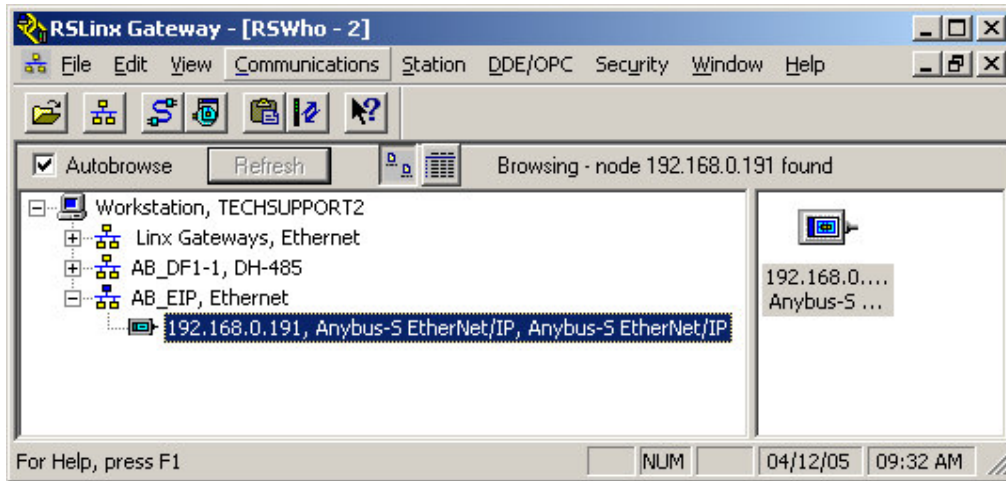
The above example shows a Command Type Read from the Fieldbus Interface to the Gateway. This will come from the PLC's output tags.

The next Command Type Write mapping below is to the Fieldbus Interface in which the PLC will read this value and store in its Input tags.

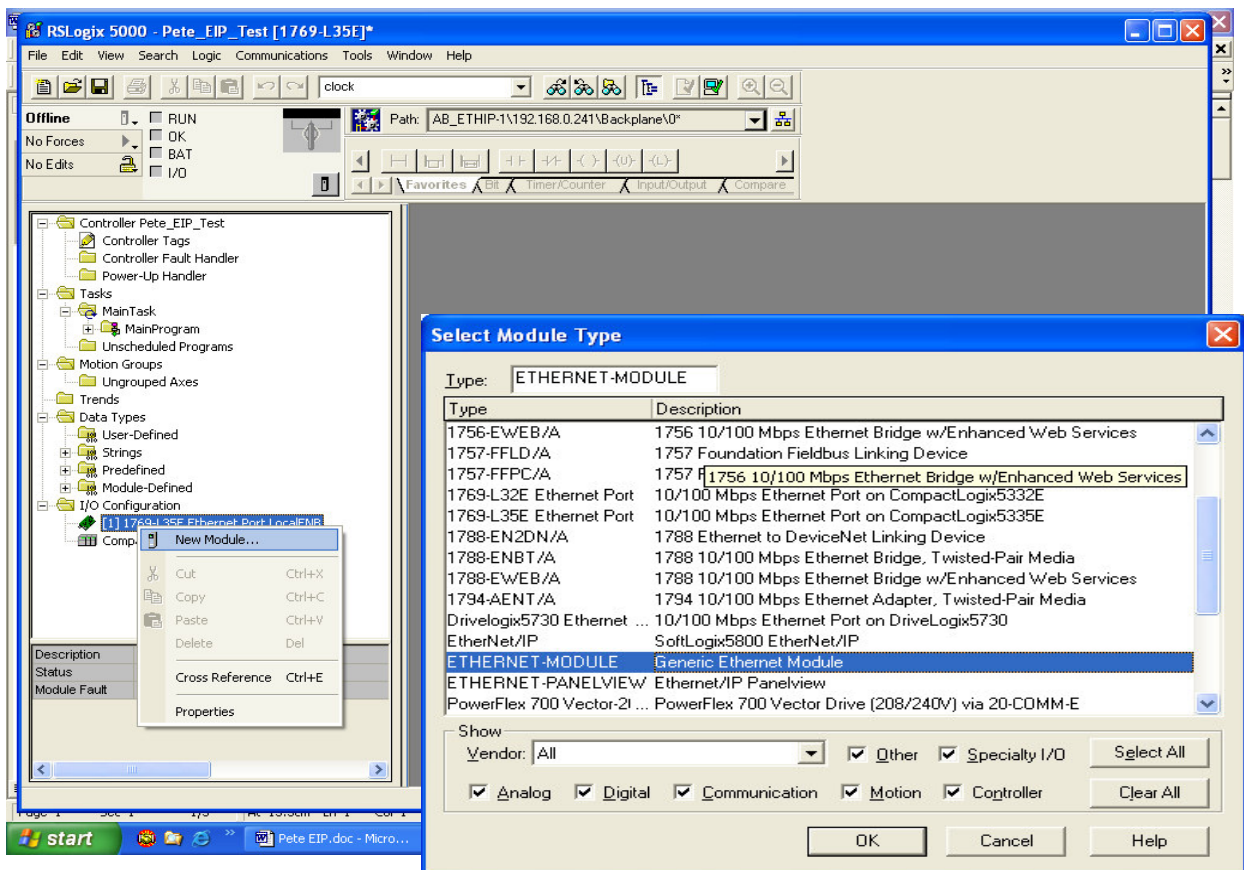


Once mappings are complete configuration will need to be downloaded to module via RS232 cable as per manual.

Once the EDS file has been loaded open up into RSLinx, expand the workstation as shown below to locate the WI-GTWY-9-ET1. The WI-GTWY-9-ET1 will be identified in RSLinx as an Anybus-S EtherNet/IP device.

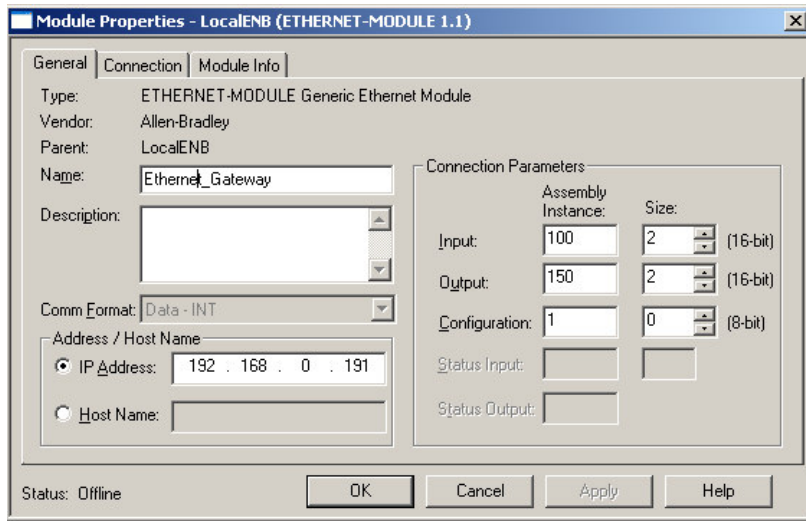


Open RSLogix and create a new project file, under the I/O configuration where the PLC Ethernet port is identified right click on this and add a new module. From the available list select Generic Ethernet module



This now makes the WI-GTWY-9-ET1EtherNet/IP connection available to the PLC. The Parameters of the WI-GTWY-9-ET1 must be entered in the Module properties

The IP address is the same as the IP address used in the W-series Configuration utility.



The Comm Format and connection parameters must be closely looked at and values entered in respect to the Fieldbus Configuration made earlier.

The Comm Format will select the size of register for the Connection Parameters. Data -INT is a 16-bit register, which is the same size as the WI-GTWY-9-ET1 registers.

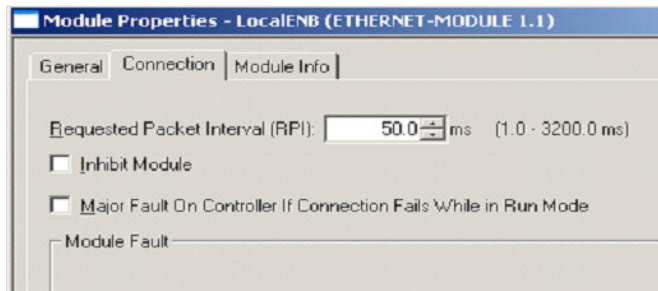
For the Connection Parameters you have to assign which Input Instance and Output Instance you want to read and write from the WI-GTWY-9-ET1. The Input Assembly Instance 100 is Input Instance 1 on the WI-GTWY-9-ET1 and Output Assembly Instance 150 is Output Instance 1 on WI-GTWY-9-ET1.

NOTE: The size of Registers that you will be transferring has to be equal to or less than the amount in the Fieldbus configuration otherwise an error will occur as the PLC will be trying to read or write from a location that does not exist on the WI-GTWY-9-ET1.

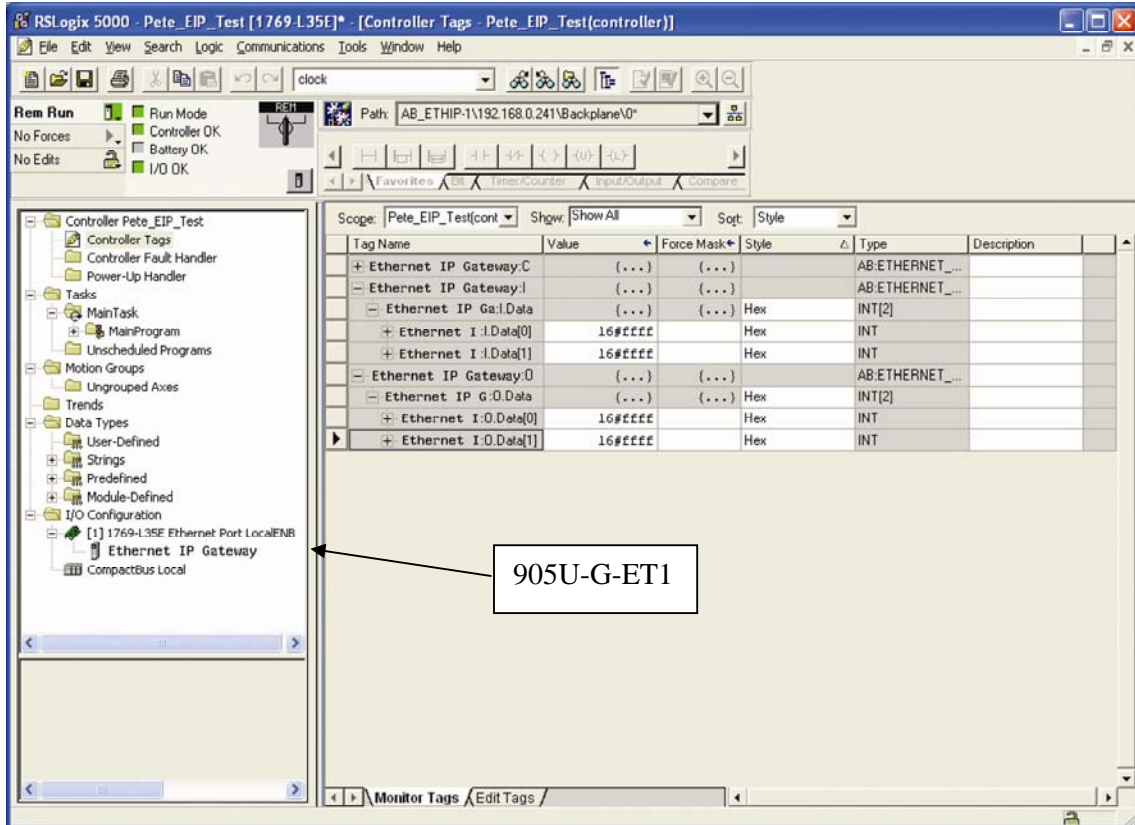
In the Fieldbus Config of the **WI-GTWY-9-ET1**, 2 words are being transferred to the Input area and 2 words to the output area so the size for the input & output in this configuration will be 2 with a Comm Format Data - INT

For Configuration Parameter this is not supported with the WI-GTWY-9-ET1 however a value must be entered to proceed with configuration.

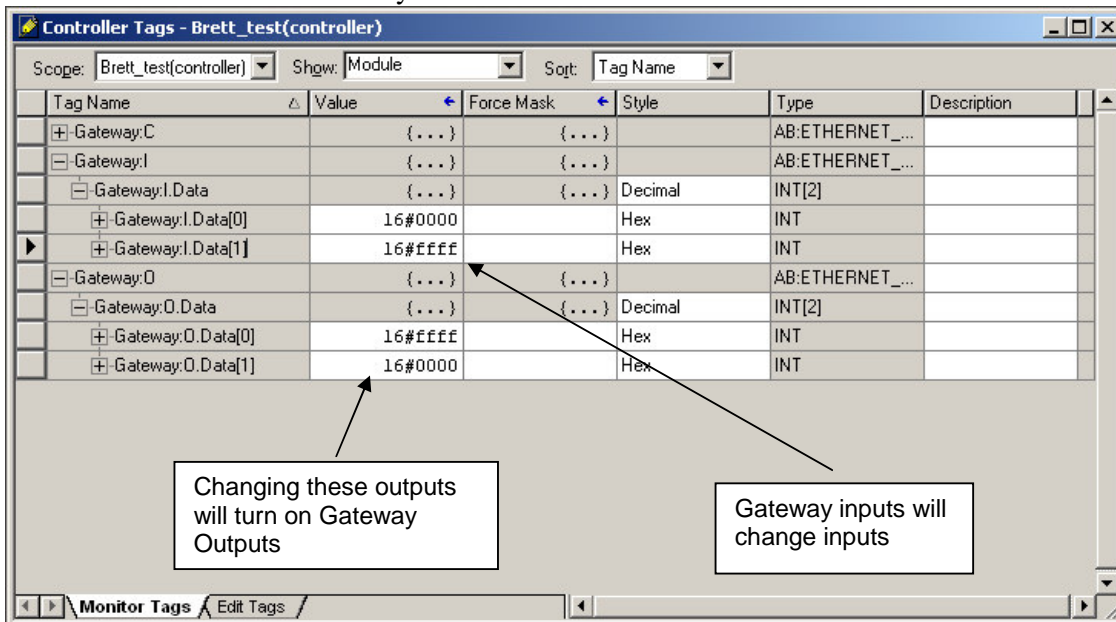
Select next and enter in the RPI time of 50ms then finish. This is the time interval that the PLC will request data from the Gateway module and will need to be adjusted to suit the application noting that network traffic may be increased due to fast packet interval time.



RSLogix now has the WI-GTWY-9-ET1 setup in the current project, which will be seen under I/O configuration in PLC project. To view and write data to the WI-GTWY-9-ET1 first download project to PLC and then select Controller Tags from top of project tree.

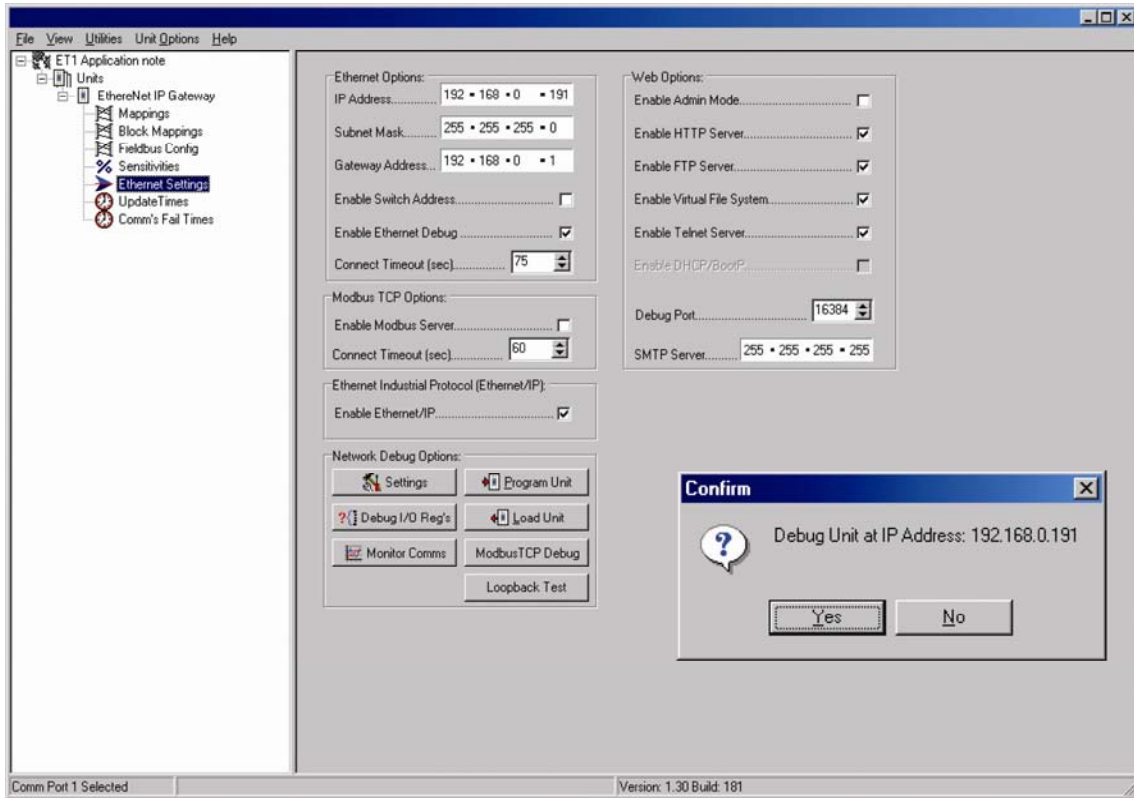


To view the inputs to PLC expand “I & O” data fields, select style to Hex and expand again to see the 2 words. The “I” data Tag will show values when the local DIO 1 and DIO 2 have been turned on from the Gateway.



If a value is entered in the O data Tag this will be sent to the WI-GTWY-9-ET1. A value of FFFF will turn on one of the local Digital outputs as configured in the W-Series Fieldbus Config.

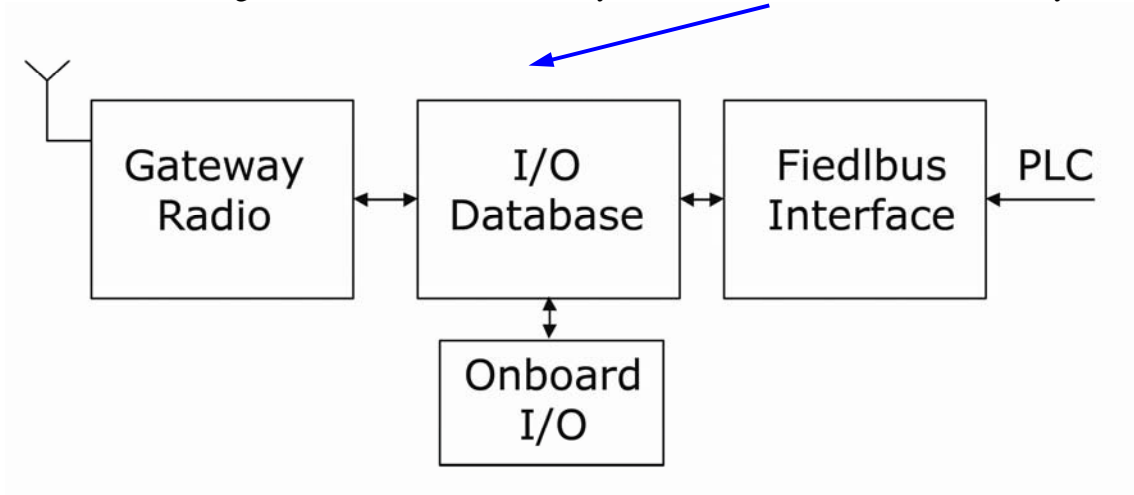
You can view the current values in the Elpro registers by using online diagnostics over an Ethernet Connection to debug any problems



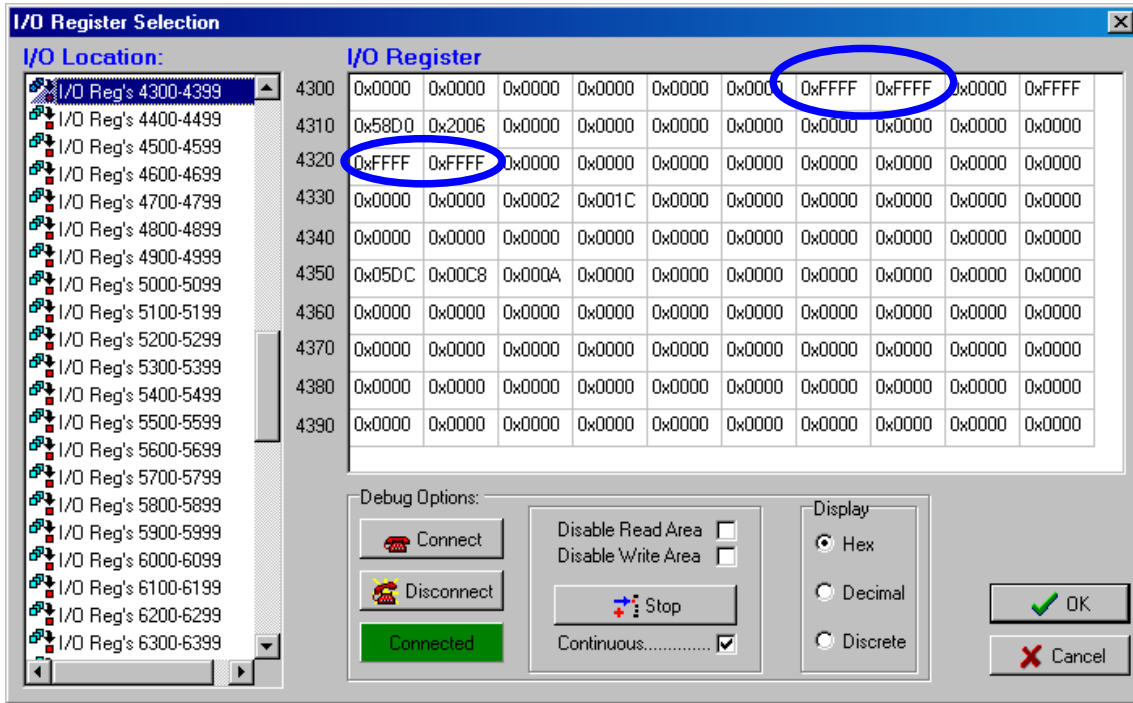
Select Ethernet Settings in Configuration Program, Select Debug I/O Regs and confirm that you want to debug the I/O registers at IP address.

Once in the register Selection screen select Connect and ensure you have the Green connected box below to indicate you have a valid Ethernet connection to the WI-GTWY-9-ET1 from the Software. From the I/O location bar on the left-hand side scroll down to I/O reg's 4300-4399. Check the continuous check box and select read.

The W-series configuration will now continuously scan the I/O Database in the Gateway.



Registers 4306 and 4307 are Digital inputs 7 & 8 configured to be sent to the PLC. If you had made these inputs then a value of 0xFFFF will be seen indicating the module has received the message and sent to the Fieldbus area. This would then be seen on the PLC as a Input. If input is not seen on PLC the Fieldbus configuration would need to be checked to confirm you have a config of a write command from this register to the Fieldbus Interface. If this is correct then in RSLogix when setting up the WI-GTWY-9-ET1 confirm that the correct amount of Inputs was configured for that Instance & Comm Format is correct.



From the PLC if you entered in a value to turn the Digital Outputs on and from above application FFFF was used you would see these values in registers 4320 & 4321. The DI/O LEDs 1 & 2 would also be lit on the WI-GTWY-9-ET1. If you had made a Change of state message on PLC and was not seen in these registers then the Fieldbus configuration would need to be checked to confirm you have a config of a read command from Fieldbus Interface to these 3 registers. If this is correct then in RSLogix when setting up the WI-GTWY-9-ET1 confirm that the correct amount of Outputs was configured for that Instance.

You will see values in other registers these are internal status of the Gateway e.g. Low Battery Volts Reg 4308, Supply Volts Reg 4309, Batt Volts Reg 4310 &, System Clock Reg 4330 - 4333.



The Disable Read Area and Disable Write Area are used when diagnostics are needed for configurations over the radio network.

If you can read values from the slave device but are not able to get them sent to the correct destination or you believe values are incorrect you can select Disable Read Area. This will stop the PLC overwriting values from the Fieldbus Interface into the I/O database so you can then double click on a register location that is being mapped over the radio network enter in a value and check it at the destination module to confirm correct location and value. Once this has been confirmed ensure that the Disable Read Area has been deselected.

If you want to do local diagnostics to view values coming in from the radio network without sending value to the PLC and you can not disconnect the Ethernet cable due to creating a possible Bus Failure for other devices on the network you can select Disable Write Area. This will stop any values being written to the Fieldbus and onto the PLC. Once this testing is completed ensure that the Disable Write Area has been deselected.

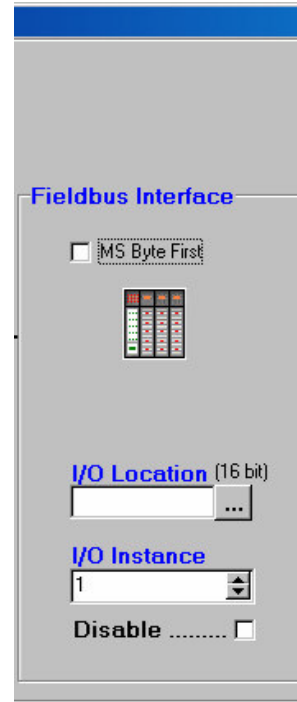
Note: This application note is using the local Digital Inputs for testing the communications. A digital input is either On or Off and depending on the format you read it as in the PLC i.e Hex, Discrete or Decimal it will always be the same for on (FFFF, 1, 65535) and off (0000, 0, 0) . When transferring Integer values such as for level, pressure and temp then values will always be different. The WI-GTWY-9-ET1 uses a Motorola Brand Processor and Allen Bradley PLC's use Intel processors. The common problem between these 2 types of Processors is that the byte order is swapped around. This is called Big Endean Little Endean. For example if the value of ABCD was stored in the 905U-G this would be shown as CDAB in the PLC tag database.

There are ways of correcting this depending on the Firmware version of the Gateway which can be found from the module serial number located on the underside of the module. The firmware version is written in digits 5 through 7 of the serial number, so a module with serial number 04051709468 has firmware version 1.70

For Firmware versions 1.70 or higher.

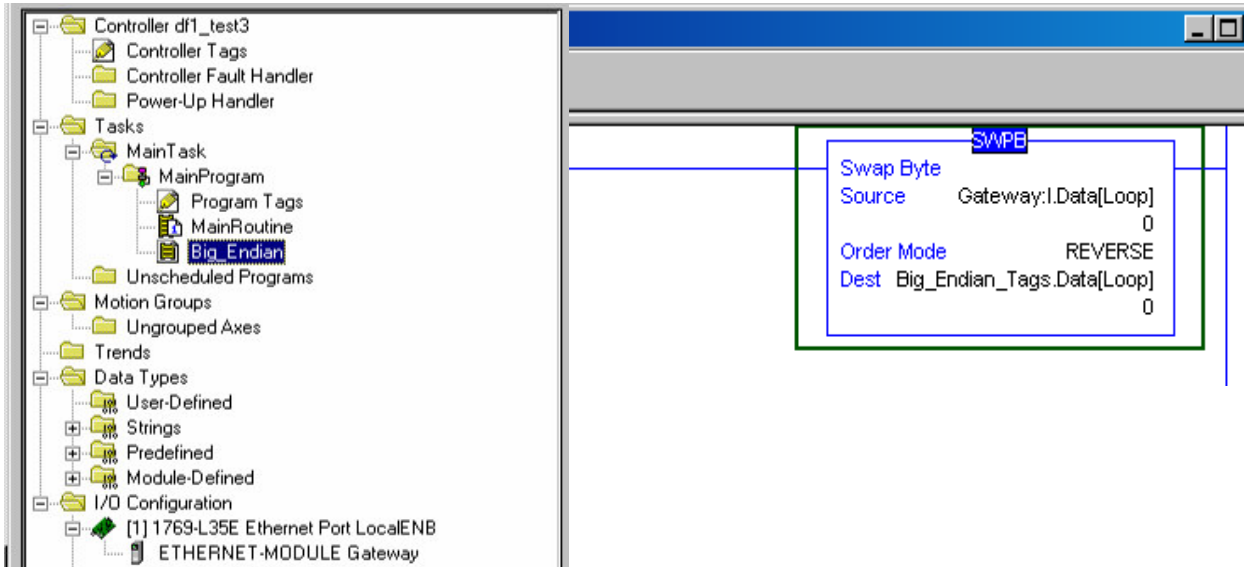
When creating a Fieldbus Mapping you can select How you want the byte order to be. You can have it swapped in the configuration software so the PLC will see the correct value or leave it as it is and use the PLC logic to do a Swap Byte function.

If using the Configuration software when you create a Fieldbus Config mapping ensure that you have the MS Byte First Check box un-checked. This way the actual byte order will be swapped around



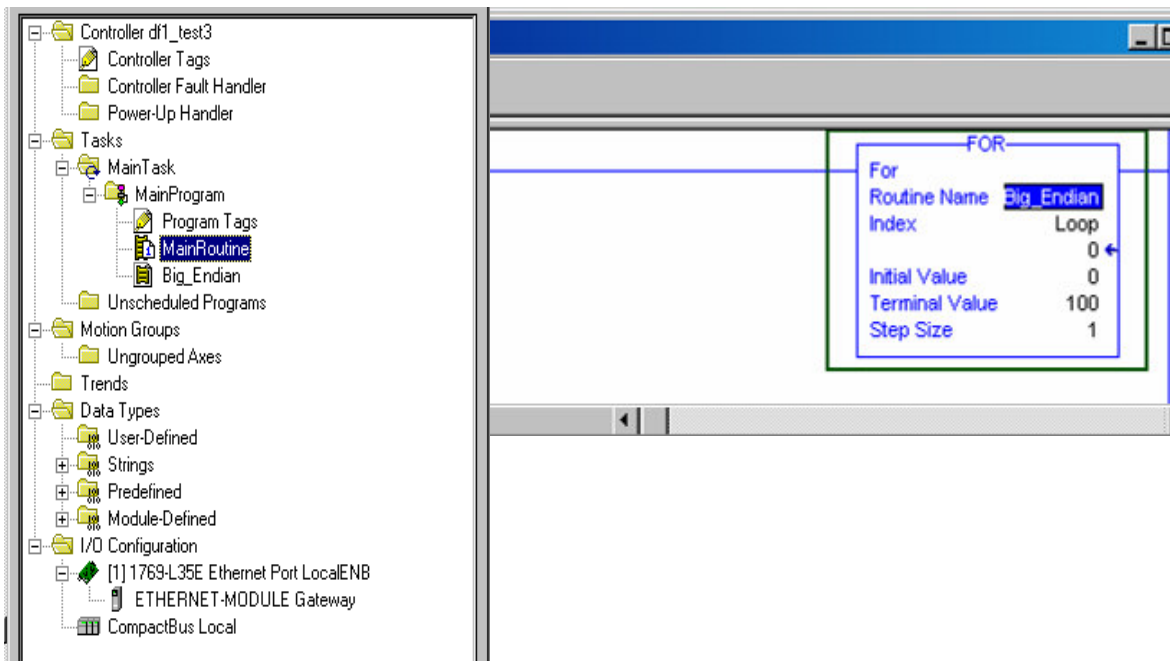
For Firmware versions below 1.70.

For all other firmware versions this must be done in the PLC configuration. In RSLogix 5000 there is an instruction called Swap Byte (SWPB) found under the Move/Logical heading. Which reads the input values does the swap byte order and places them into a new tag destination.

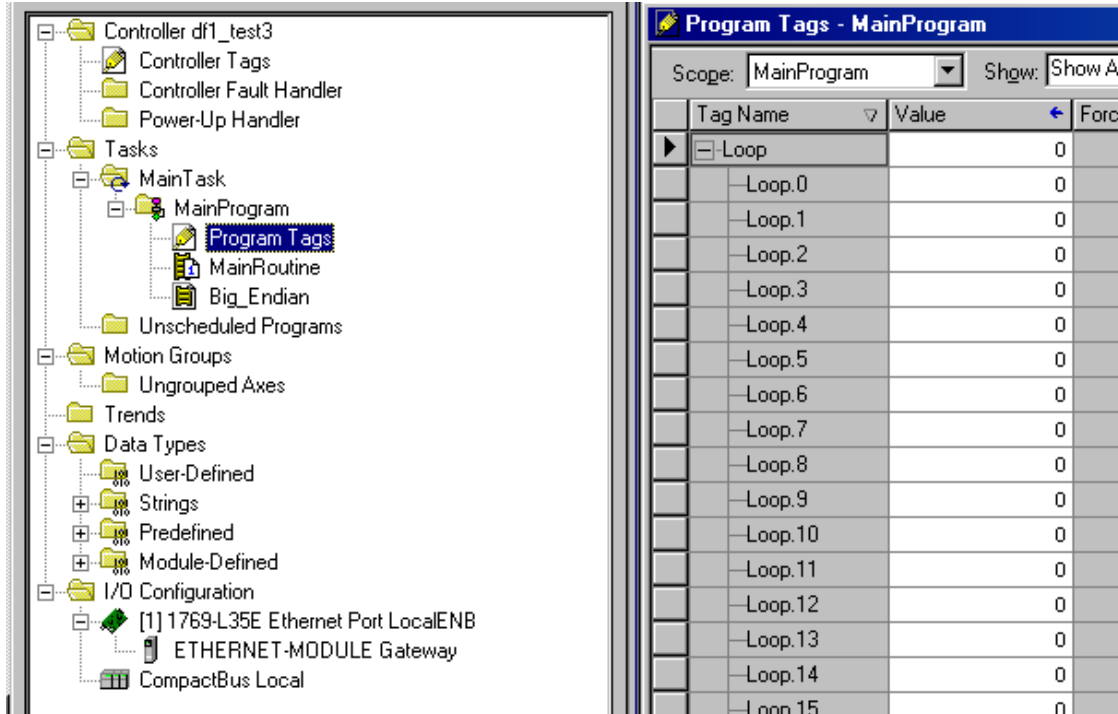


If a large amount of words are being transferred then instead of doing this function for each word

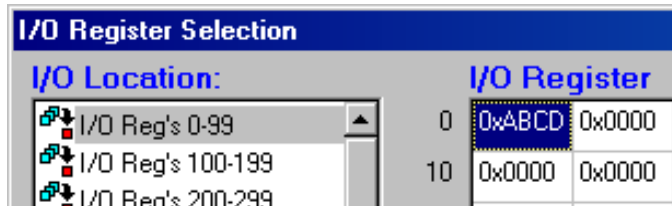
You can create a FOR instruction which will execute a routine repeatedly. This example has the routine of Big-Endian being looped for a list of 100 I/O points under the Terminal Value section. If transferring 200 I/O points, then you would put a value of 200 or higher in this section. The above routine is Big Endian which is the Swap Byte instruction.



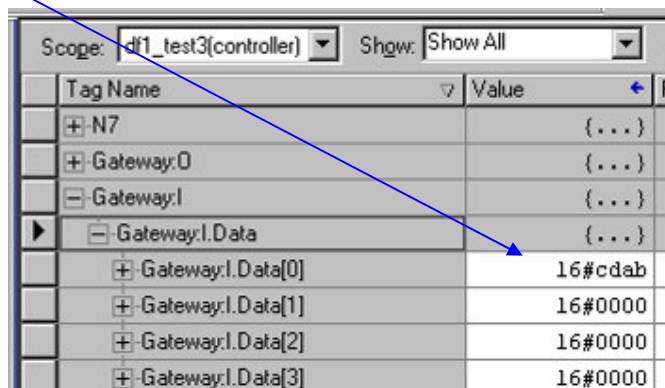
The index of Loop from above is a program tag set up in the main program under tasks.



Example below shows a value of hex ABCD entered into the Gateway register 0



This is read into the PLC as CDAB



After the Swap Byte Order routine is complete the corrected value is placed into the destination Tag.

Scope: df1_test3(controller) Show: Show All

Tag Name	Value
+ N7	{...}
+ Gateway:O	{...}
+ Gateway:I	{...}
+ Gateway:C	{...}
- Big_Endian_Tags	{...}
- Big_Endian_Tags.Data	{...}
+ Big_Endian_Tags.Data[0]	16#abcd
+ Big_Endian_Tags.Data[1]	16#0000
+ Big_Endian_Tags.Data[2]	16#0000