TURCK

Industrial Automation

BLXX-PG-EN-IP for ControlLogix

SARTUP GUIDE

G1025
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Content

1 Introduction

1.1 About this Startup Guide

This manual contains information about setting up a programmable EtherNet/IP gateway. This example uses BL67 hardware. With the exception of the IO modules, the setup for a BL20 programmable EtherNet/IP gateway is identical.

2 Required Parts

2.1 TURCK Hardware

- The following parts will be required to setup this system.
- BL67-PG-EN-IP – Programmable EtherNet/IP gateway
- BL67-8DI-P – 8 discrete input module
- BL67-8DO-0.5A-P – 8 discrete output module
- BL67-B-4M12 – BL67 base module
    - o two bases will be needed – one for each discrete module
- RSSD RJ45S 441-*M - *=length in meters
- A 24 VDC power supply
- 24 VDC discrete input and output devices with M12 connectors

2.2 Other Hardware

- ControlLogix rack
- 1756 Controller module
- 1756 EtherNet Communication module

2.3 Software

The following software will be required to setup this system.

- CoDeSys v 2.3.9.26 (http://turck.us/Support/Software_~_Videos/)
- RSLogix5000

2.4 Target, library and program files

The following files will be required to setup this BLident system.

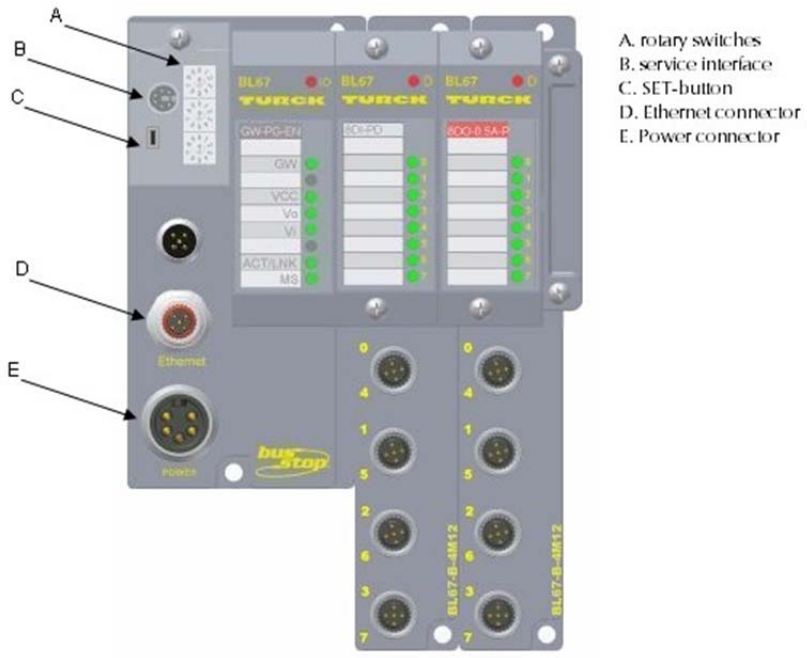
- Targets.zip – Target Files for CeDeSys for all Gateways (http://turck.us/Support/Software_~_Videos/)

3 Setup

3.1 Hardware Setup

1. Prepare the BL67 hardware.
2. Set the IP address of the gateway. The rotary switches should be set to a value between 000 and 254. In this case the first three bytes of the IP address are always 192.168.1. The last byte of the IP address is set using the rotary switches.
3. Power up the programmable gateway.
4. Push the SET button for 10 to store the gateway configuration.

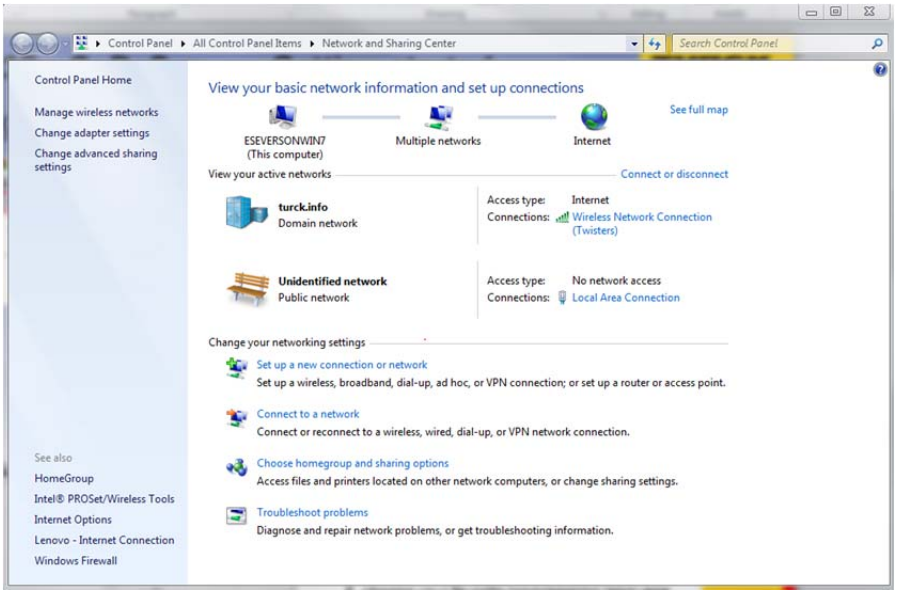
After the reboot, the gateway I/O LED should be solid green. The hardware is ready. The final configuration should look like the figure below.



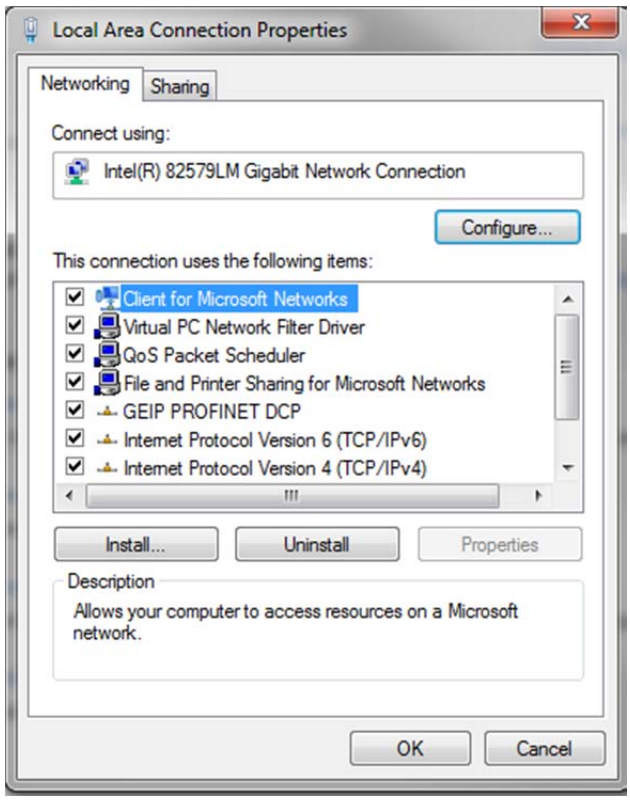
5. Connect the gateway to the PC using the Ethernet programming cable.

3.2 PC Setup

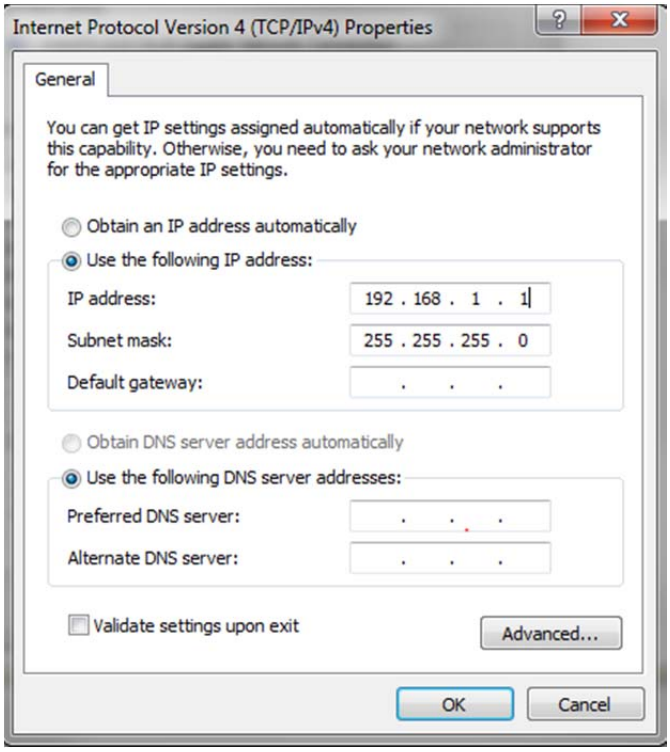
1. Open the “Network Connections” folder.



2. Right-click on the “Local Area Connection” icon and choose “Properties.”



3. Highlight "Internet Protocol (TCP/IP)" and click on the "Properties" button.



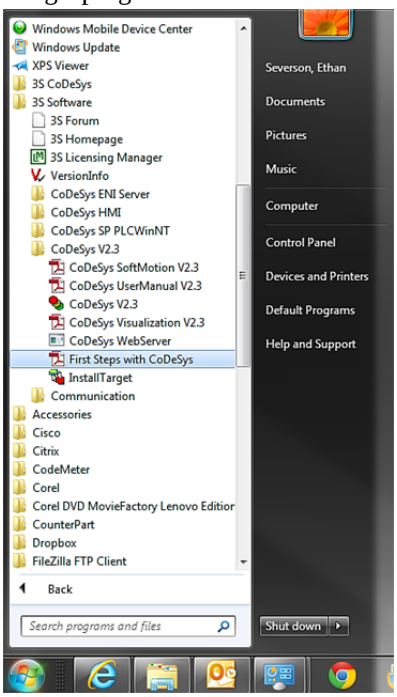
4. Choose the "Use the following IP address" option and set the IP address to 192.168.1.x. The x can be set to anything from 0-255 and must be a unique number. It cannot be the same as the IP address chosen for the gateway.
5. The "Subnet Mask" should be set to 255.255.255.0.
6. Close the "Internet Protocol (TCP/IP) Properties" and "Local Area Connection Properties" windows by clicking the "OK" button.

3.3 Software Installation

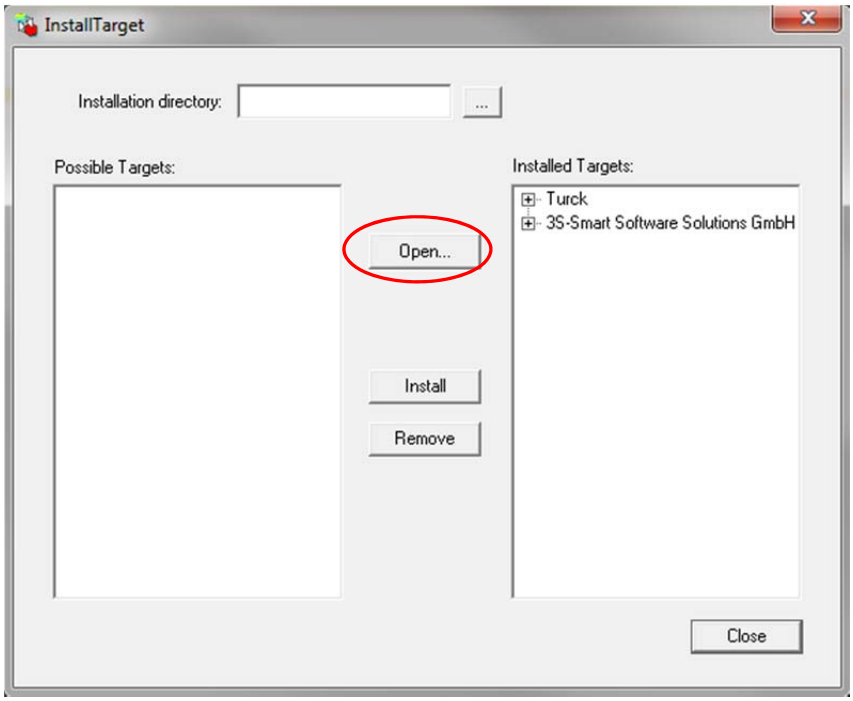
The CoDeSys software and all TURCK target files will need to be downloaded and installed before downloading to a gateway and running this sample project. The required version of CoDeSys is version 2.3.9.26. The software can be downloaded from the following from the TURCK website: http://www.turck.us/Support/Software ~ Videos/. This start-up guide assumes that the software and its file and directory structure are created in the default folders dur- ing installation.

The target files, found on the same website as the CoDeSys software, also need to be downloaded. Download Targets.zip. There is no specific folder that these files need to be saved in. To install the target files into the CoDeSys software follow the instructions below.

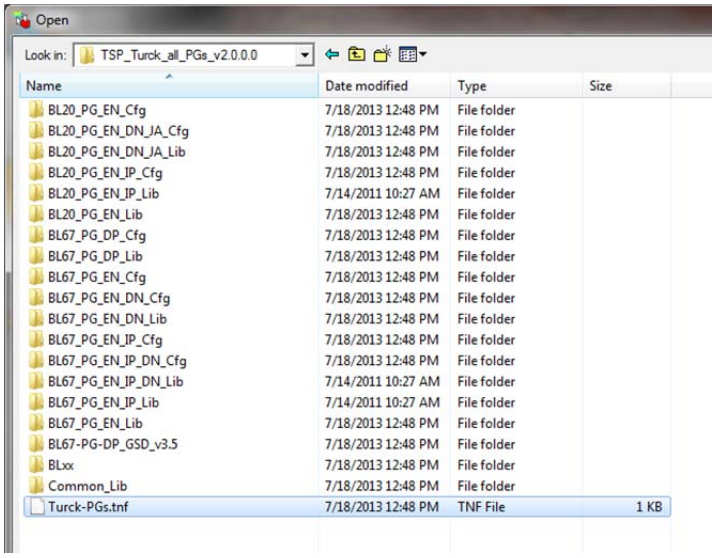
1. Open the InstallTarget program.



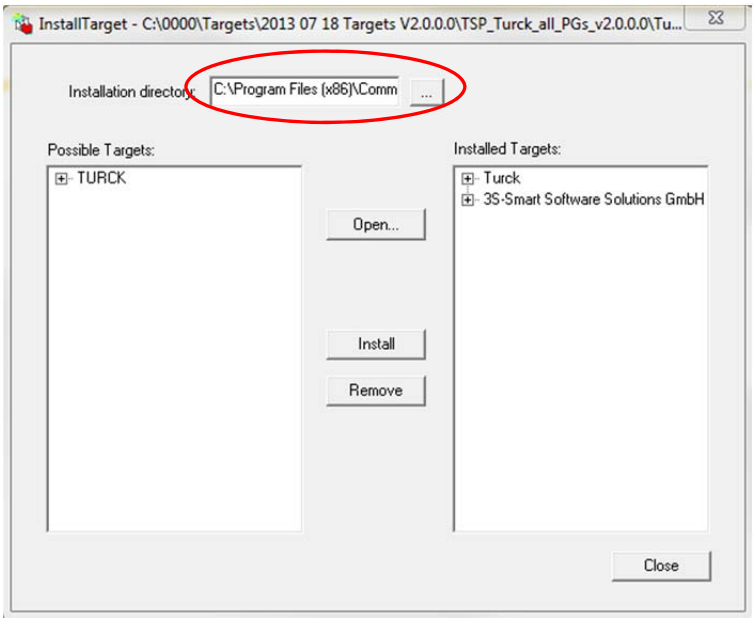
2. Click on the "Open…" button.



3. Open Turck-PGs.tnf file in the folder where the target files have been saved.



4. The BL67-PG-EN-IP target will be located in the "Possible Targets:" window. The targets can be installed individually or all at once.
    a. The "Installation directory:" will be filled in automatically. To avoid possible errors while opening, compiling and downloading projects into the gateways the default directory should be used. The default directory should be C:\Program Files (x86)\Common Files\CAA-Targets\Turck\.



5. To install individual target, highlight BL67-PG-EN-IP in the "Possible Targets:" and click on "Install" button. The BL67-PG-EN-IP target can now be seen in the "Installed targets."

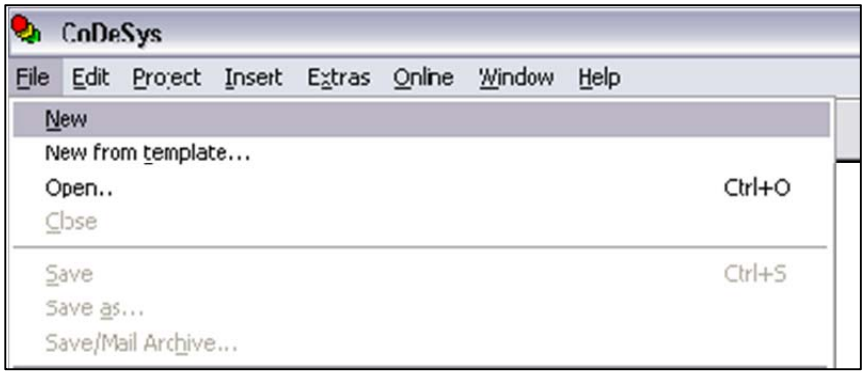
6. To install all the targets, highlight “Turck” and click on “Install” button. All TURCK targets can now be seen in the “Installed targets.”

4 Sample Project

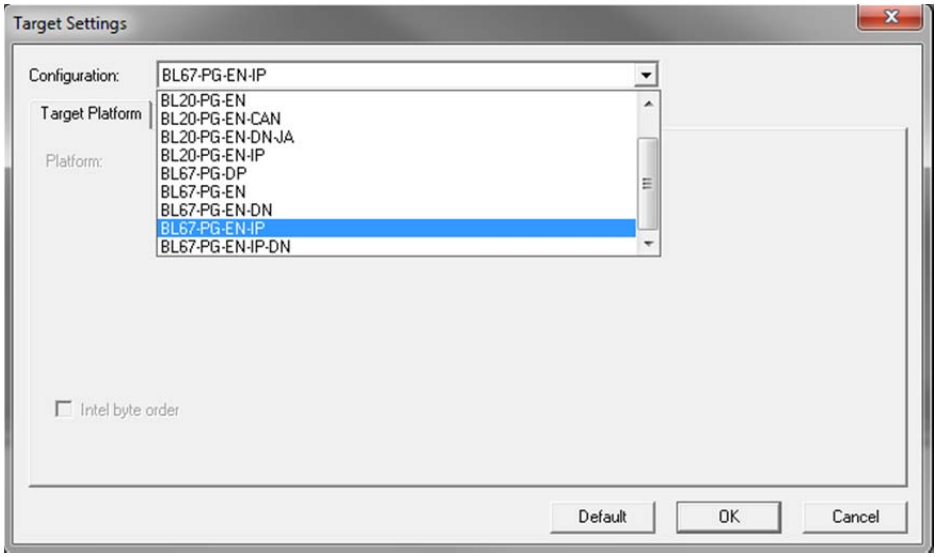
The following steps will take you through the steps required to create, compile, download and run a new CoDeSys project. The EtherNet/IP communication will also be discussed. The CoDeSys software will need to be installed for the following steps. The recommended version is 2.3.9.26. The hardware will not work with versions higher than 3.0.

4.1 Create New Project

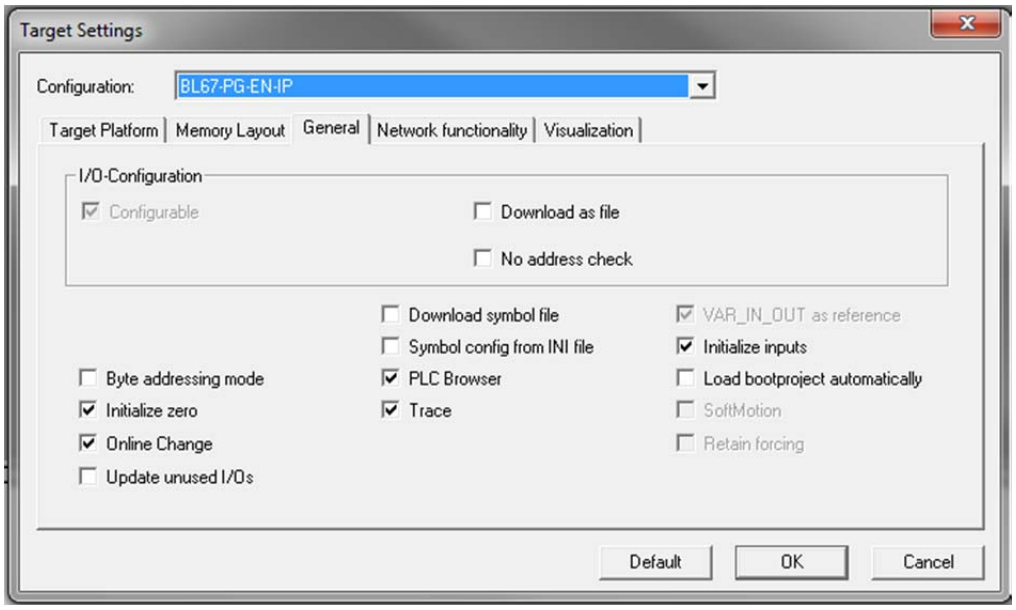
1. Start CoDeSys
2. Open a new project
    a. File >> New



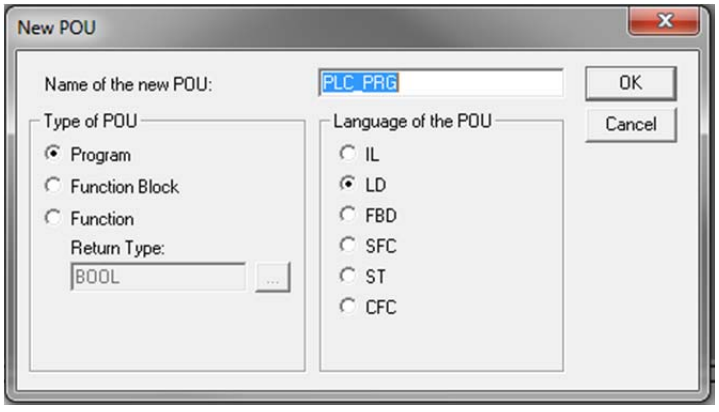
3. Select the BL67-PG-EN-IP target



4. Click “OK”
    a. Use the default settings
    b. NEVER change the “Byte Addressing Mode” setting



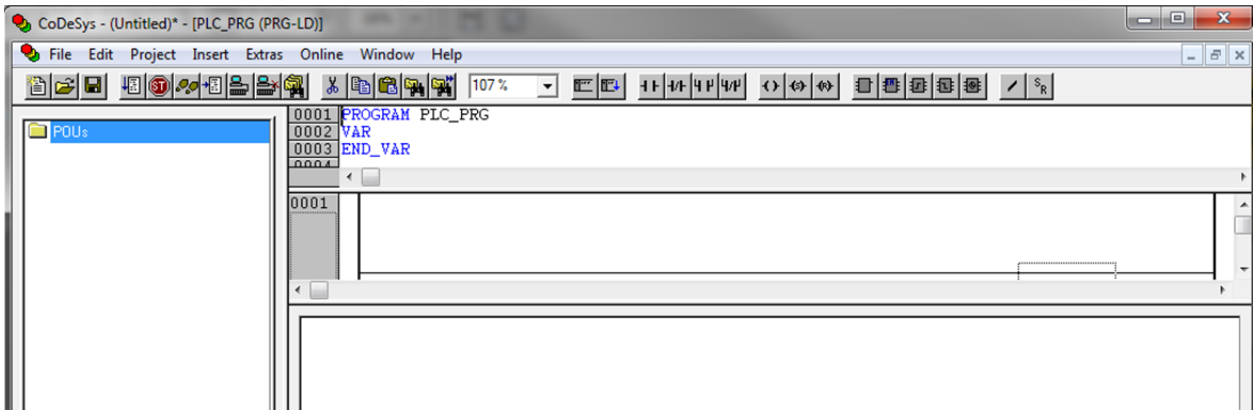
5. Choose a programming language
    a. This example project is written in LD (ladder logic)
6. Use the default Name “PLC_PRG.”
    a. PLC_PRG is similar to OB1 in Siemens. This is the program that gets executed automatically. If you change the name, and do not do a TASK configuration, the program will not run.
    b. The Type of the POU should be “Program.”



7. Click “OK”
8. Save your new project
    a. File >> Save as…
    b. Choose a directory

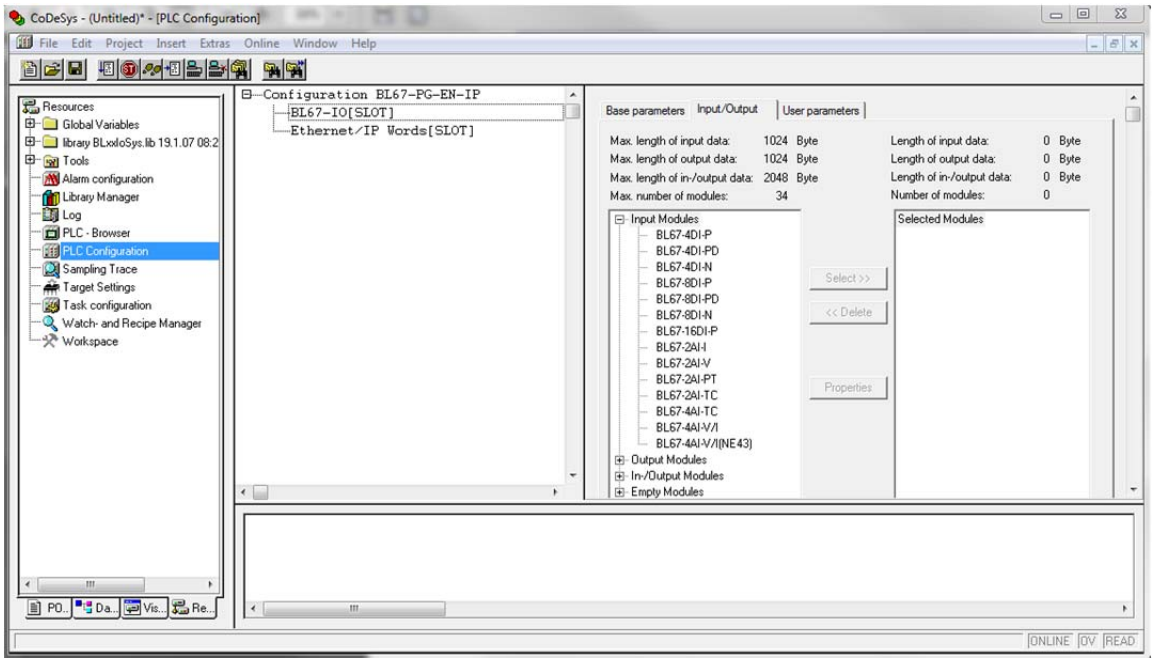
c. Enter a name
d. Click "Save"

This is your new project

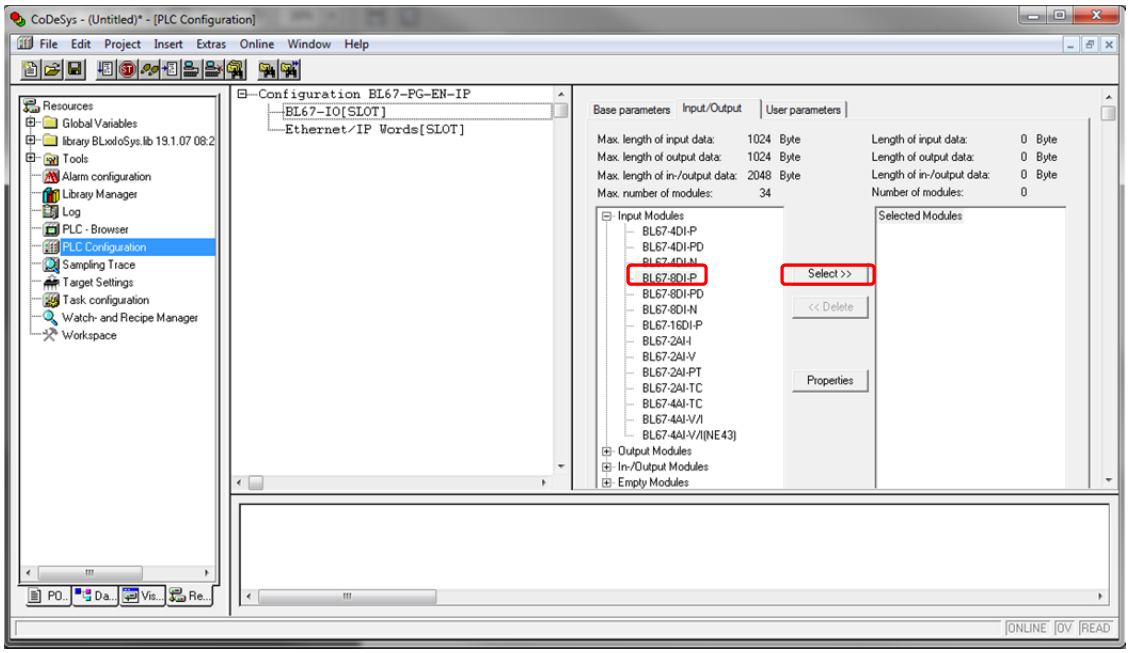


4.2 PLC I/O Configuration

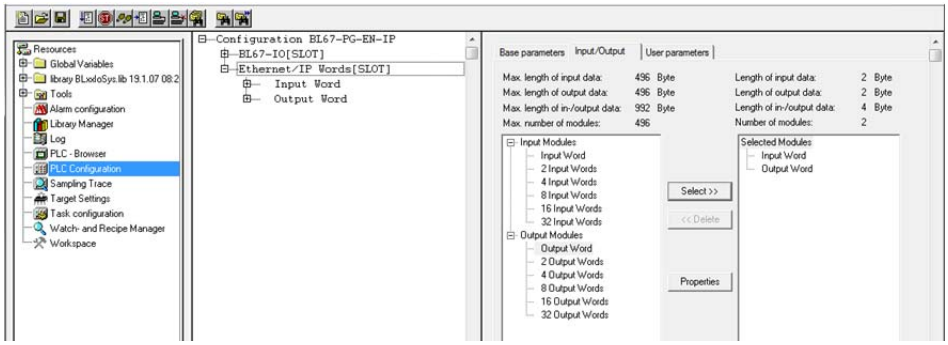
1. Open the BL67 IO configuration
    a. Resources tab >> PLC Configuration >> Configuration BL67-PG-EN-IP >> BL67-IO[SLOT] >> Input/Output



2. Insert the 8DI-P module by highlighting it and clicking the "Select>>" button.

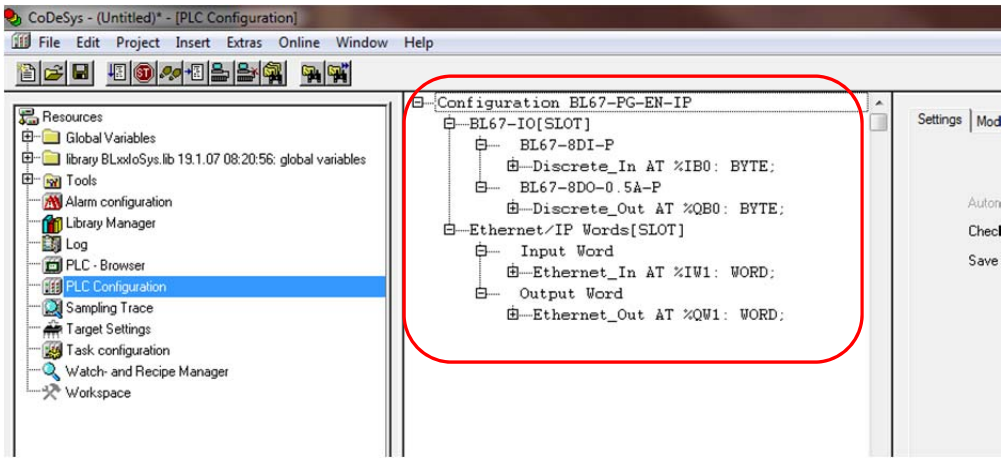


3. Repeat for the 8DO-0.5A-P module.
4. Got the EtherNetIP configuration
    a. Resources tab >> PLC Configuration >> Configuration BL67-PG-EN-IP >> Ethernet/IP Words[SLOT] >> Input/Output tab
5. Insert one input and one output register by highlighting the registers and clicking the "Select>>" button

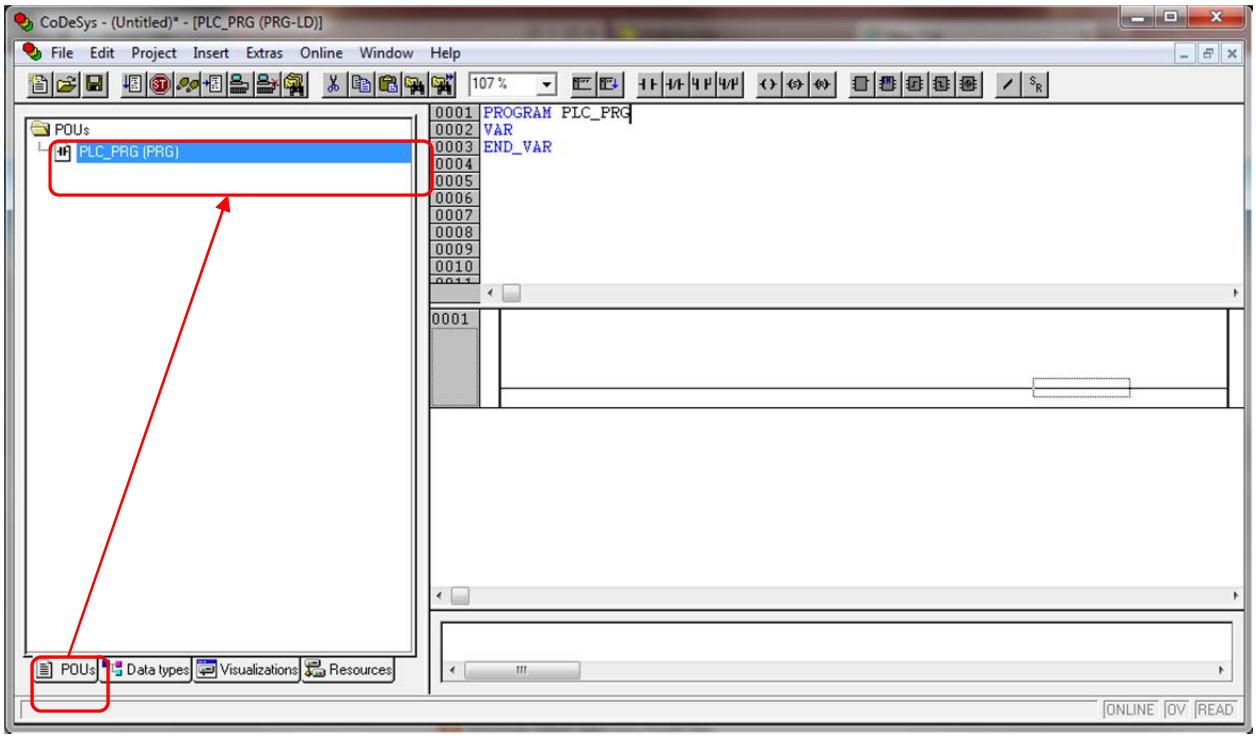


4.3 Write a program

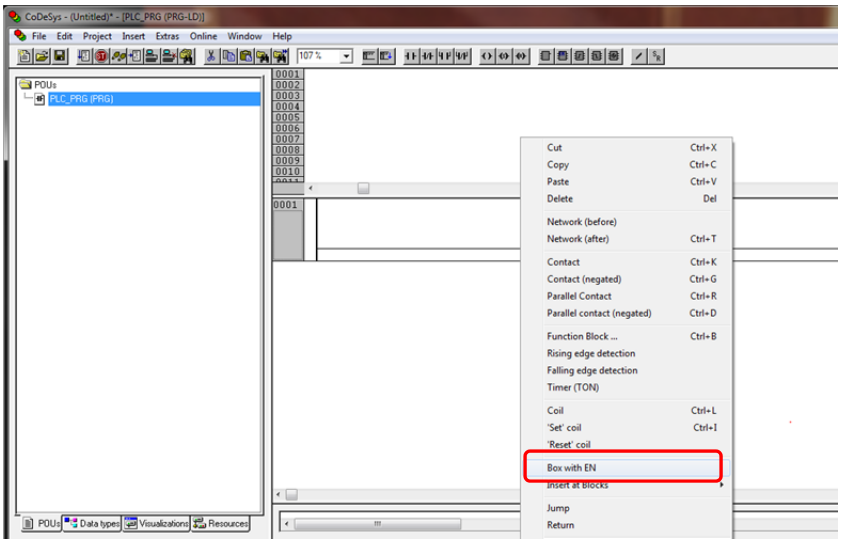
1. Open the "PLC Configuration" in the "Resources" tab
2. Define the following aliases in the "BL67-IO[SLOT]" and "Ethernet/IP Words[SLOT]"
    - Discrete_In AT %IB0: BYTE;
    - Discrete_Out AT %QB0: BYTE;
    - EtherNet_In AT %IW1: WORD;
    - EtherNet_Out AT %QW1: WORD;
    b. Expand the 8DI-P, 8DO-0.5A-P, Input Word and Output Word.
    c. Click on the "AT." A text box appears.
    d. Type in "Discrete_In," "Discrete_Out," "EtherNet_In" and "EtherNet_Out" AT "%IB0:BYTE;" "%QB0: BYTE;" "%IW1: WORD;" and "%QW1: WORD;" respectively.



3. Open the “PLC_PRG (PRG)” program in the “POU’s” tab.

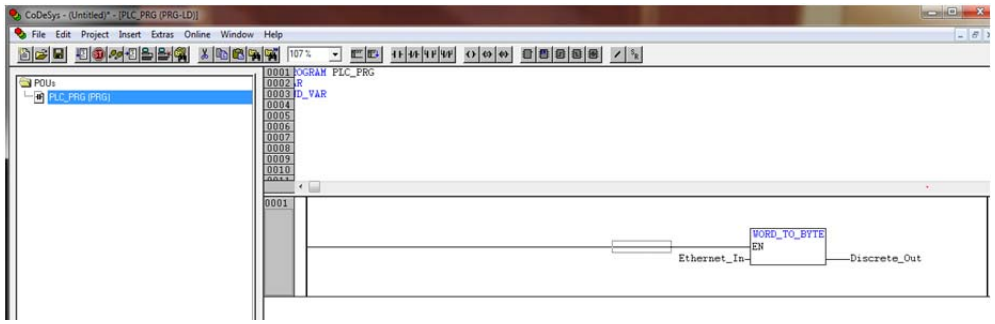


4. Insert a Box with EN by right-clicking on the rung.

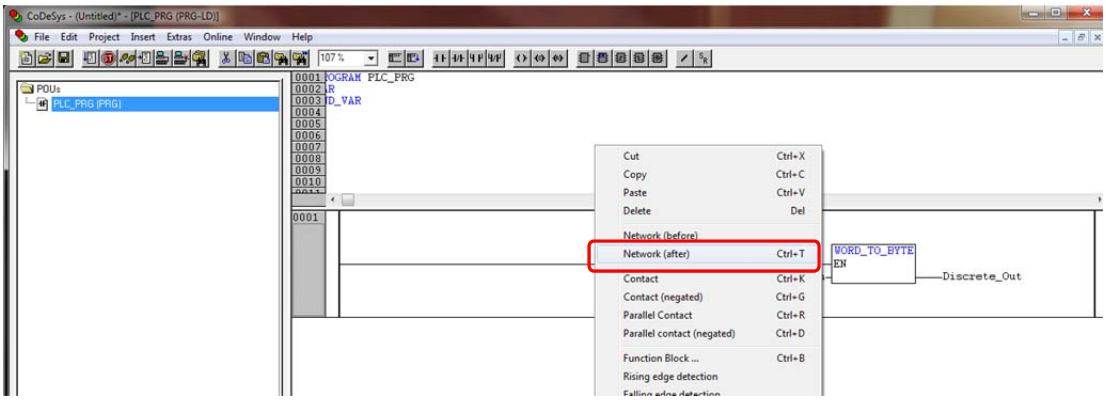


5. Click on the name of the box, “AND”, and rename it to “WORD_TO_BYTE.”

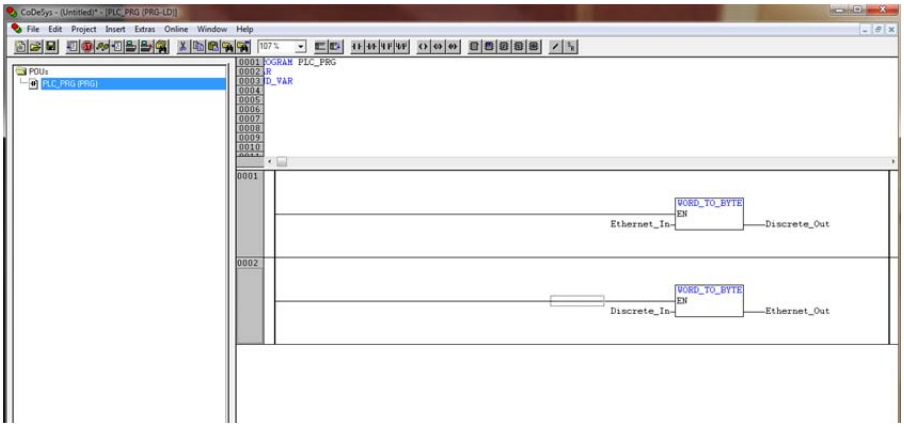
6. Set the input of the “WORD_TO_BYTE” box as EtherNet_In and the output as Discrete_Out.



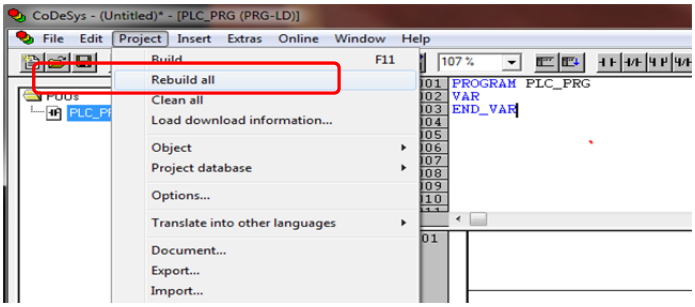
7. Right-click anywhere in the programming window and choose “Network (after)”



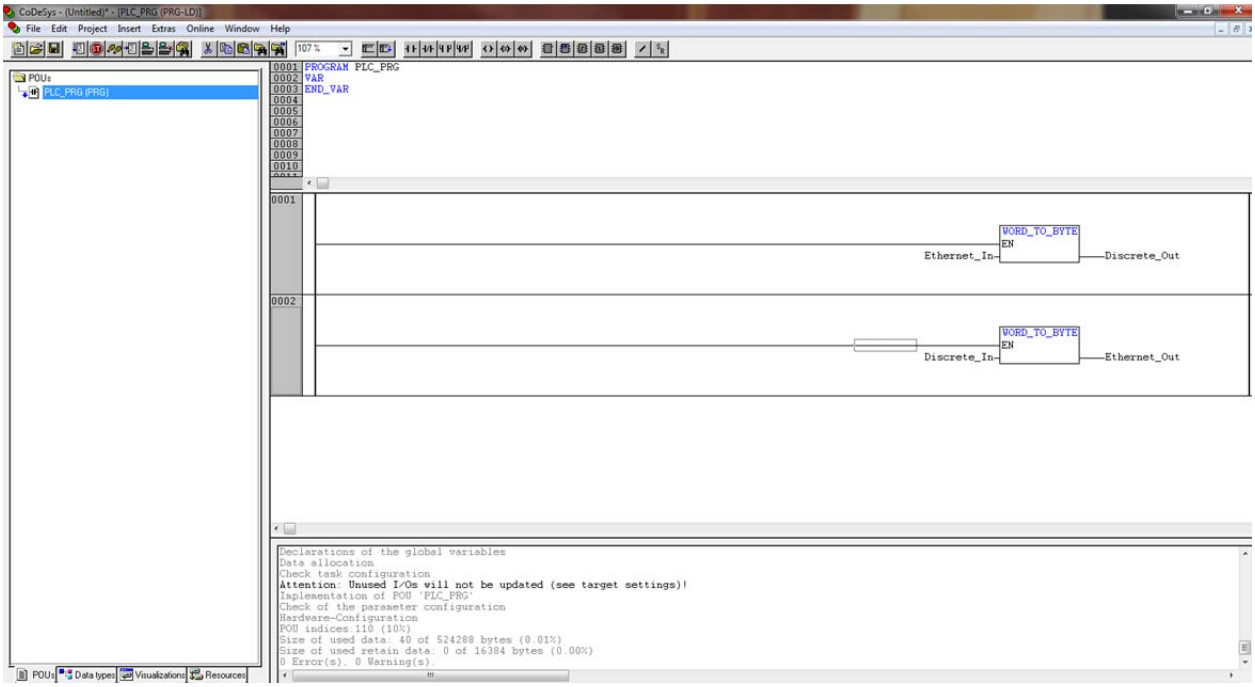
8. Insert a “BYTE_TO_WORD” box with “Discrete_In” as the input and “EtherNet_Out” as the output.



9. Compile the project.
    a. Project >> Rebuild all

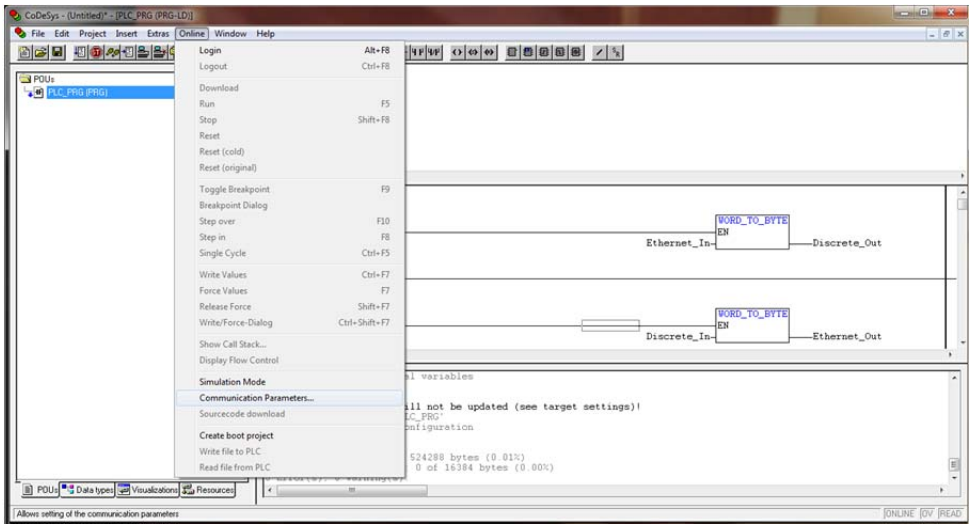


The results of the compilation are displayed in the message screen.

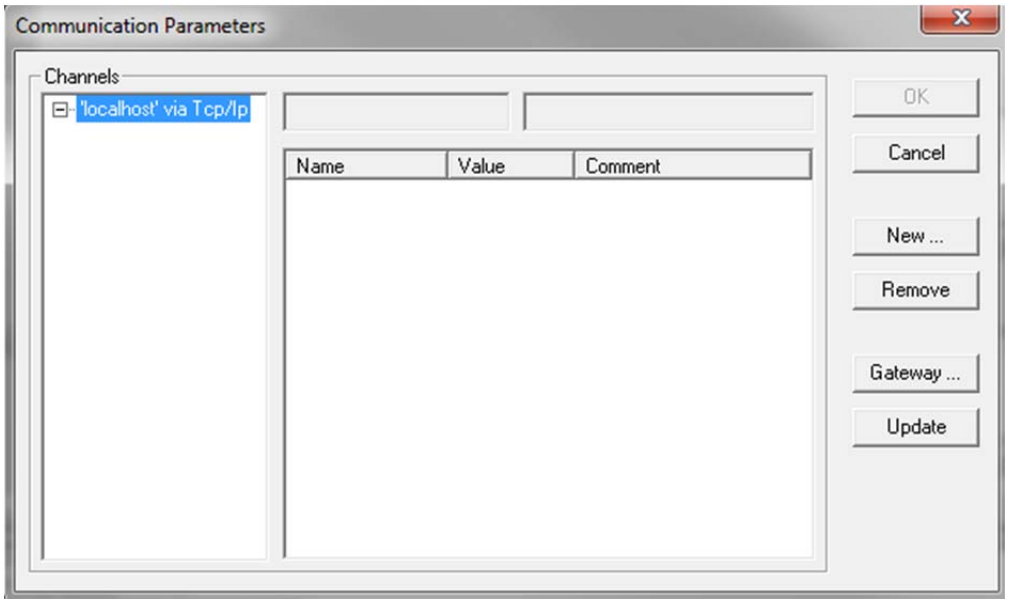


4.4 Configuring the Communication Parameters

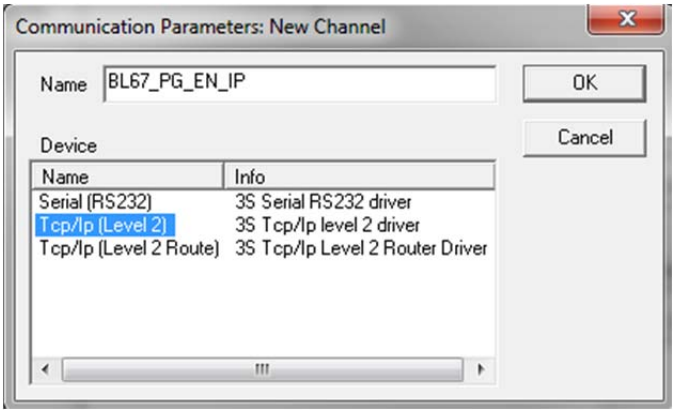
1. Open the "Communication Parameters" dialogue box.
   a. Online >> Communication Parameters



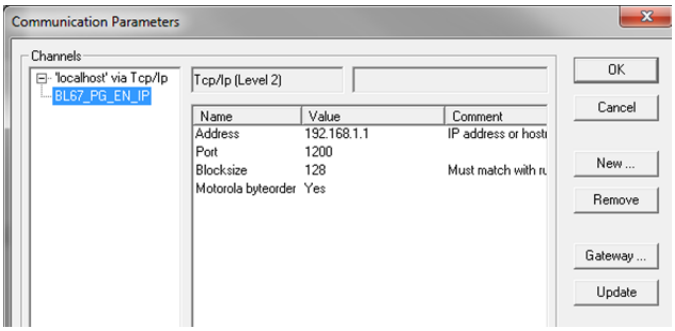
2. Click on "New"



3. Enter a name, select "Tcp/Ip (Level 2)" and click "OK"

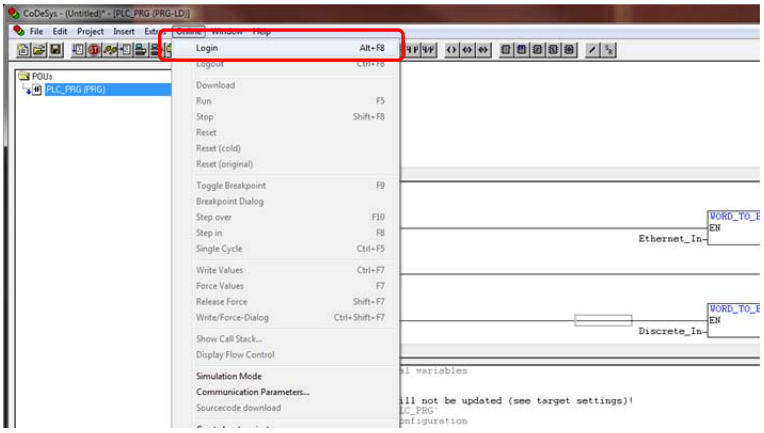


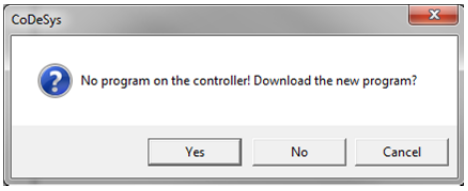
4. Enter the IP Address of the gateway, change the Motorola byteorder to Yes and click "OK"



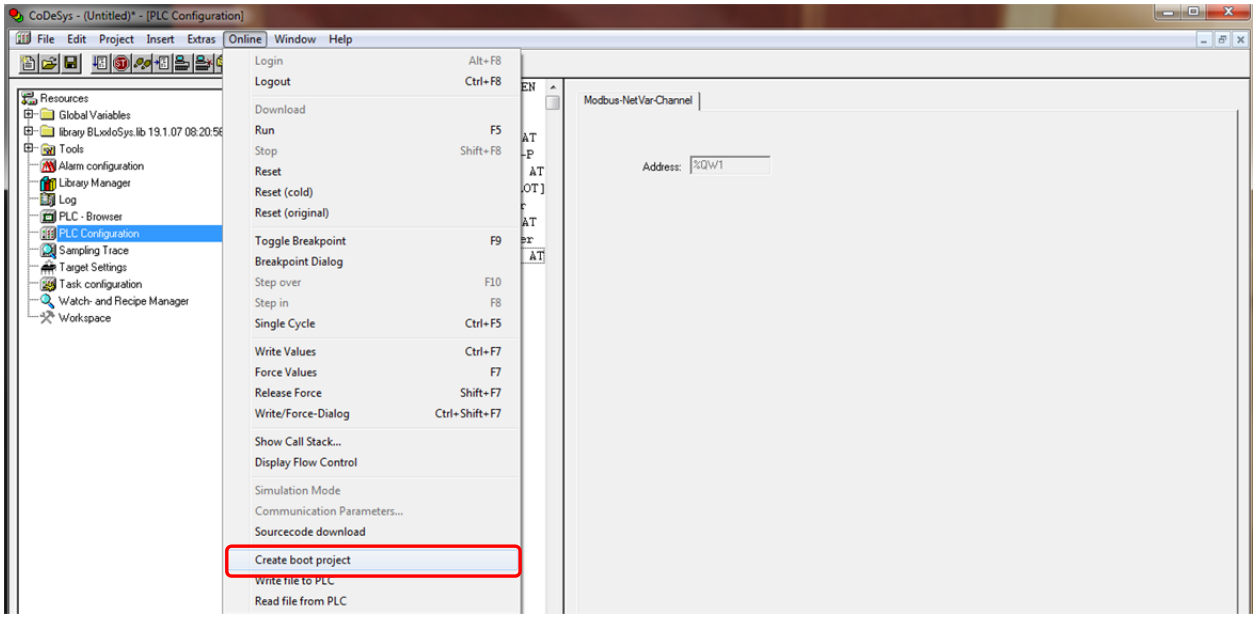
4.5 Download the Project

1. Login to the BL67-PG-EN-IP gateway.
   a. Online >> Login
   b. The first time you login, CoDeSys will bring up a dialogue box that will ask if you want to download the program. Click "Yes."

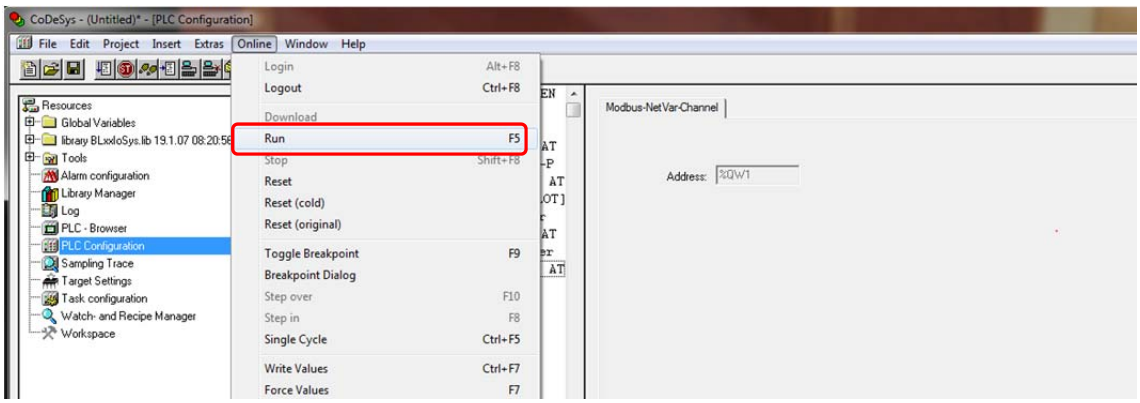




2. The program is now in the PLC. Create a boot project. This will create a project in the gateway that will automatically boot and run when the gateway is powered up.
    a. Online >> Create boot project



3. Switch the gateway to RUN status
    a. Online >> Run or F5



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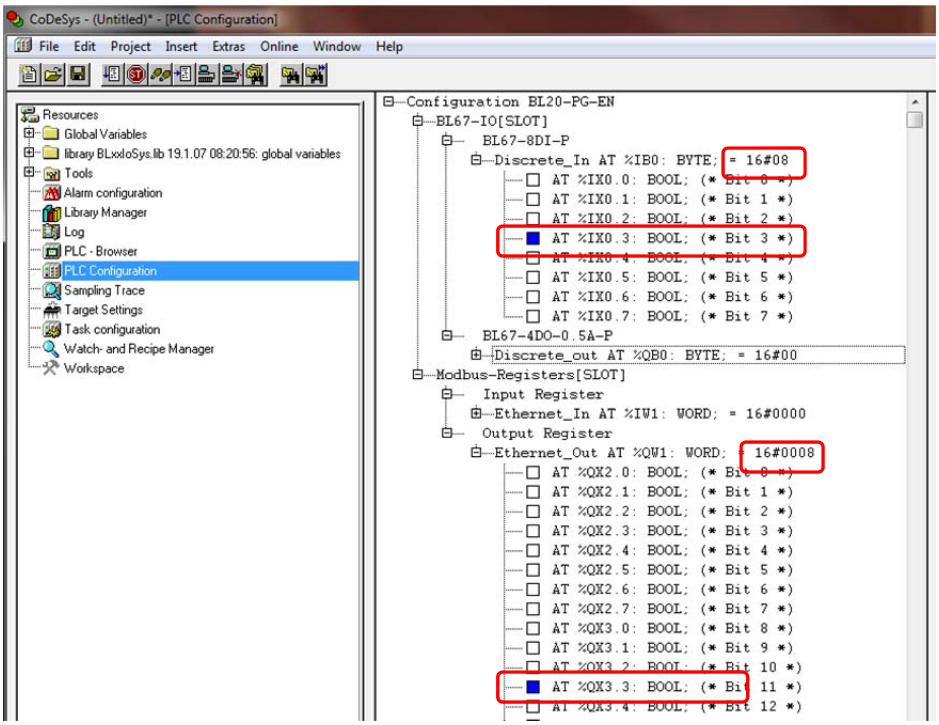
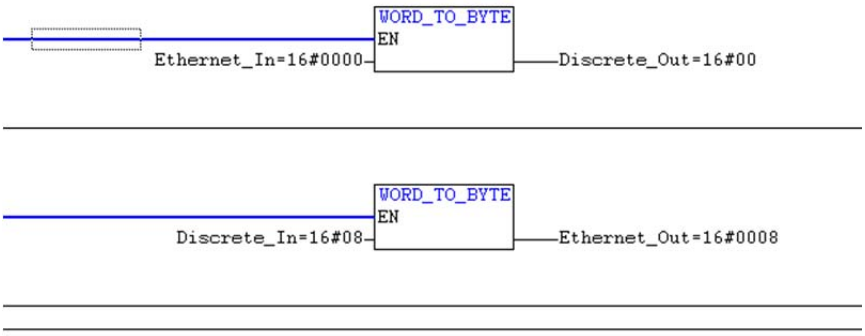
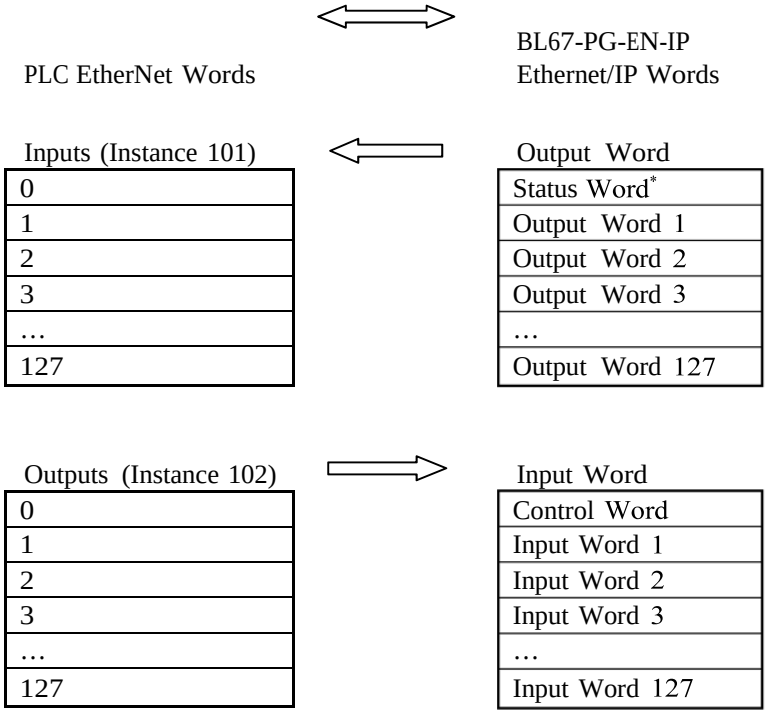
4. The program can be confirmed by connecting some inputs. In this case a discrete input device was connected to channel 3 of the 8-discrete-input module. The following can be observed:





5 Ethernet Communication

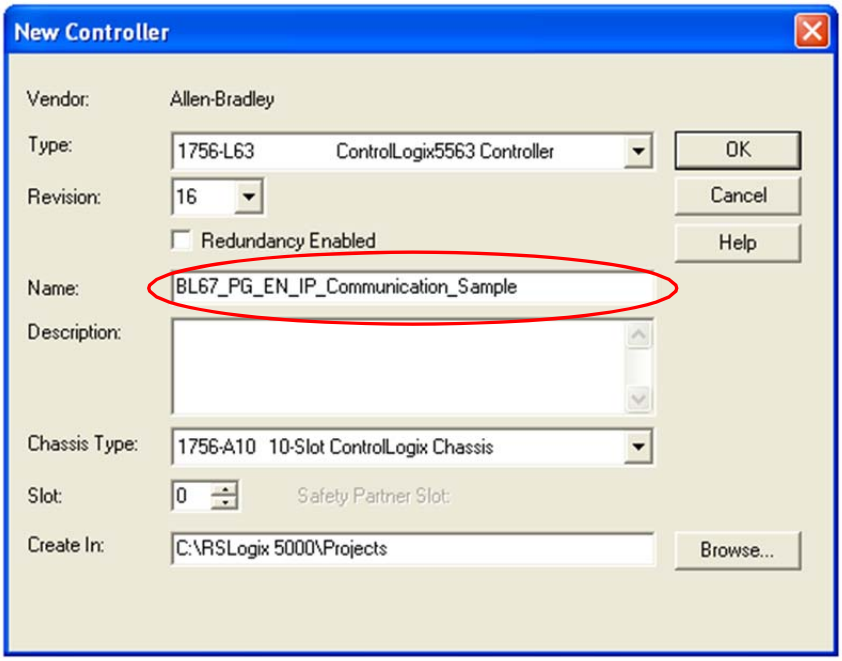
The BL67-PG-EN-IP gateway communicates with a Ethernet master via the Ethernet/IP Words that are created in the PLC configuration. In the previous steps, one input and one output register were created in the configuration. These registers were aliased as Ethernet_In and Ethernet_Out respectively and used in the program. The Ethernet words that are created in the "PLC Configuration" of the BL67-PG-EN-IP are mapped to the Ethernet/IP scanner, i.e. 1756-ENBT/A in an Allen-Bradley ControlLogix rack, etc.



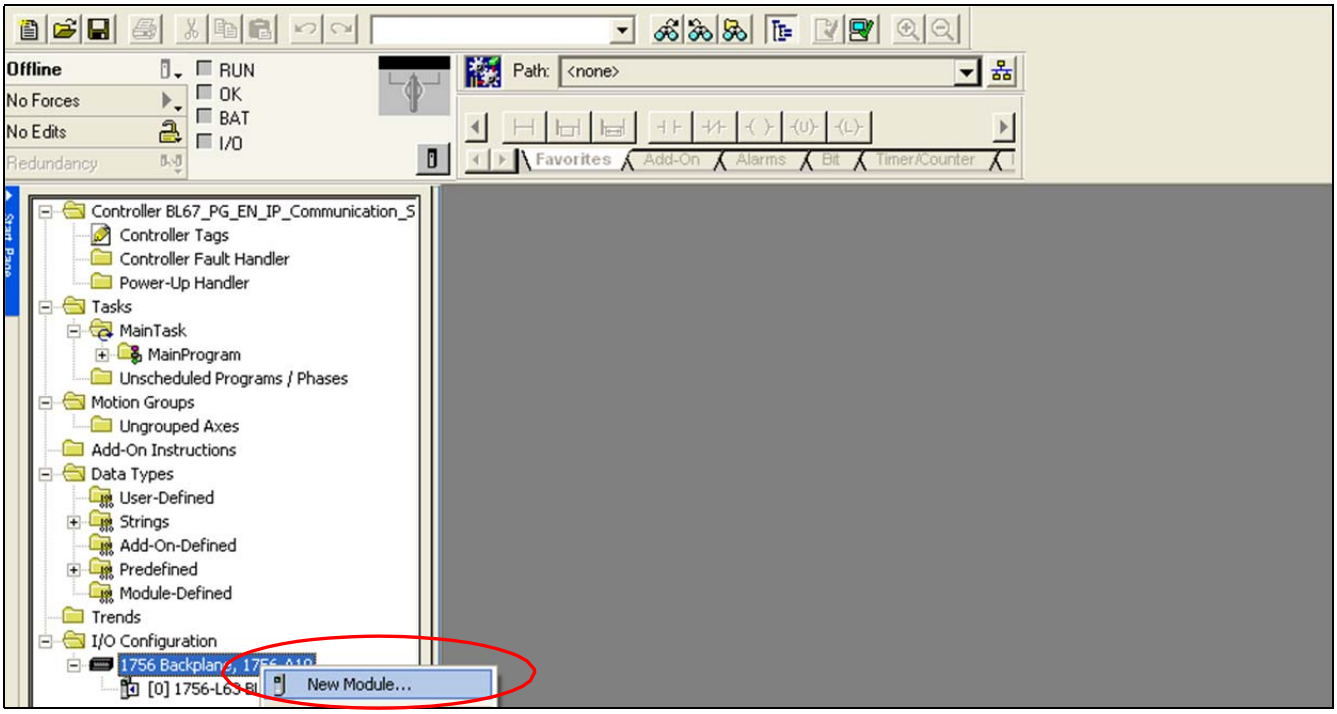
* See Appendix A

In the following steps the Ethernet communication will be confirmed using an Allen-Bradley ControlLogix controller.

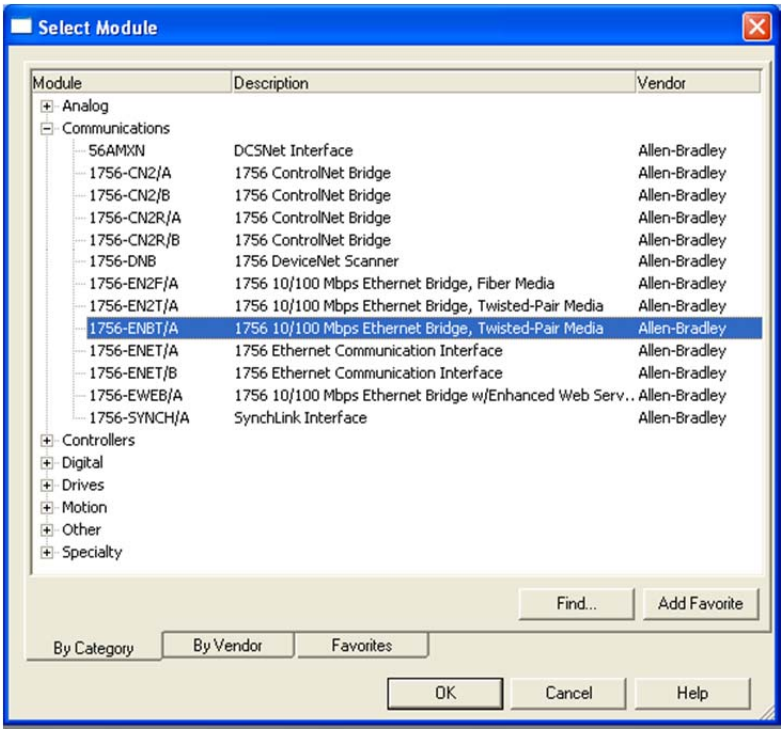
1. Open a new RSLogix5000 program.
    a. Name the Controller and click "OK."



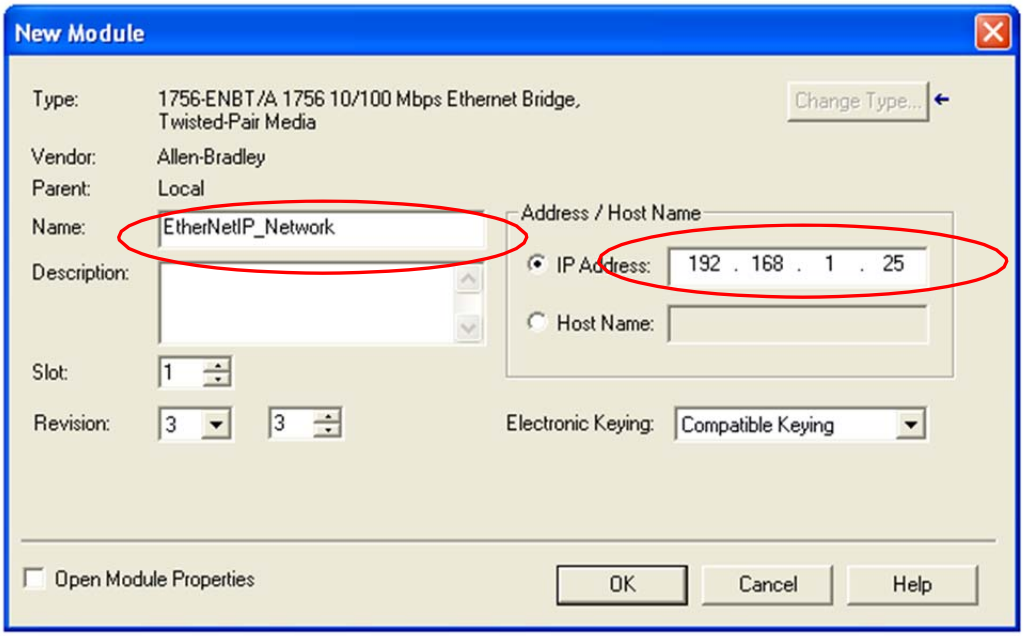
2. Right-click on "1756 Backplane, 1756 A10" and click on "New Module…"



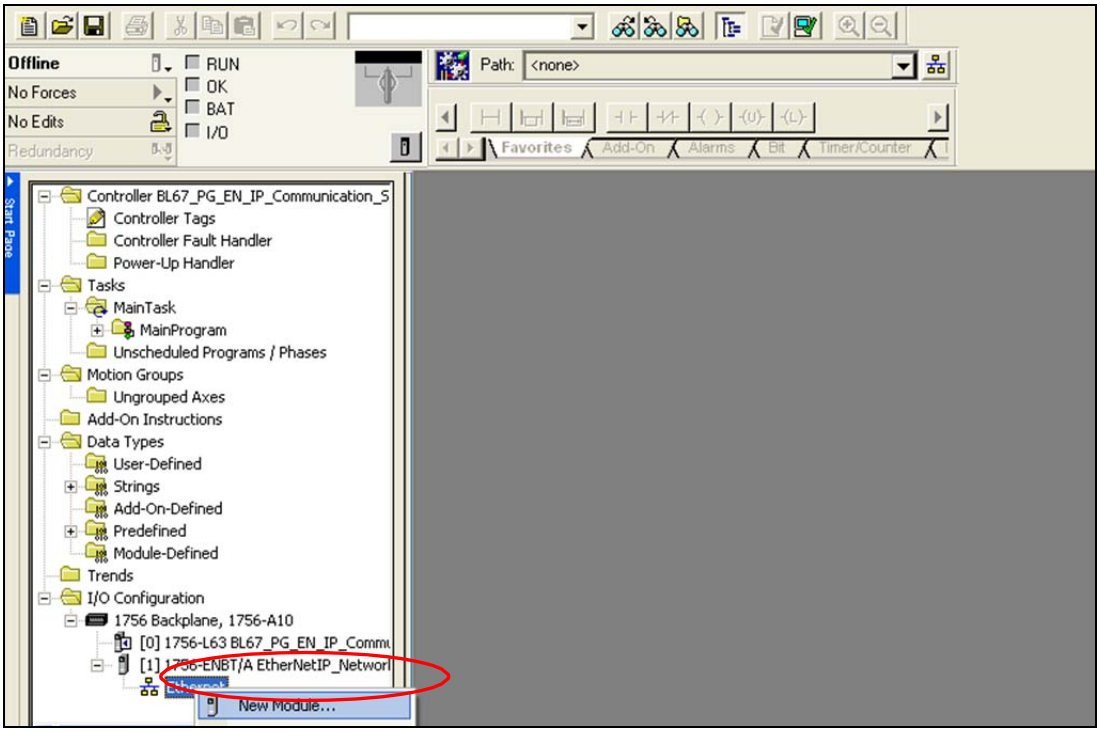
3. Choose the correct EtherNet communication module from the "Select Module" window and click "OK."



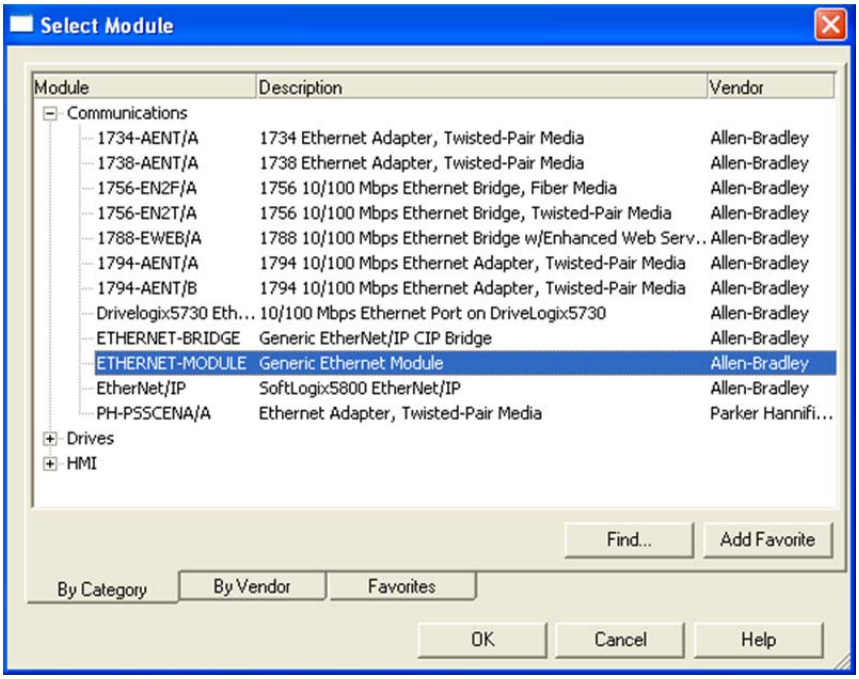
4. Name the module and type in the IP address of the 1756 communication module.
   a. Make sure the communication module's IP address is in the same network (192.168.1.x) as the BL67-PG-EN-IP.



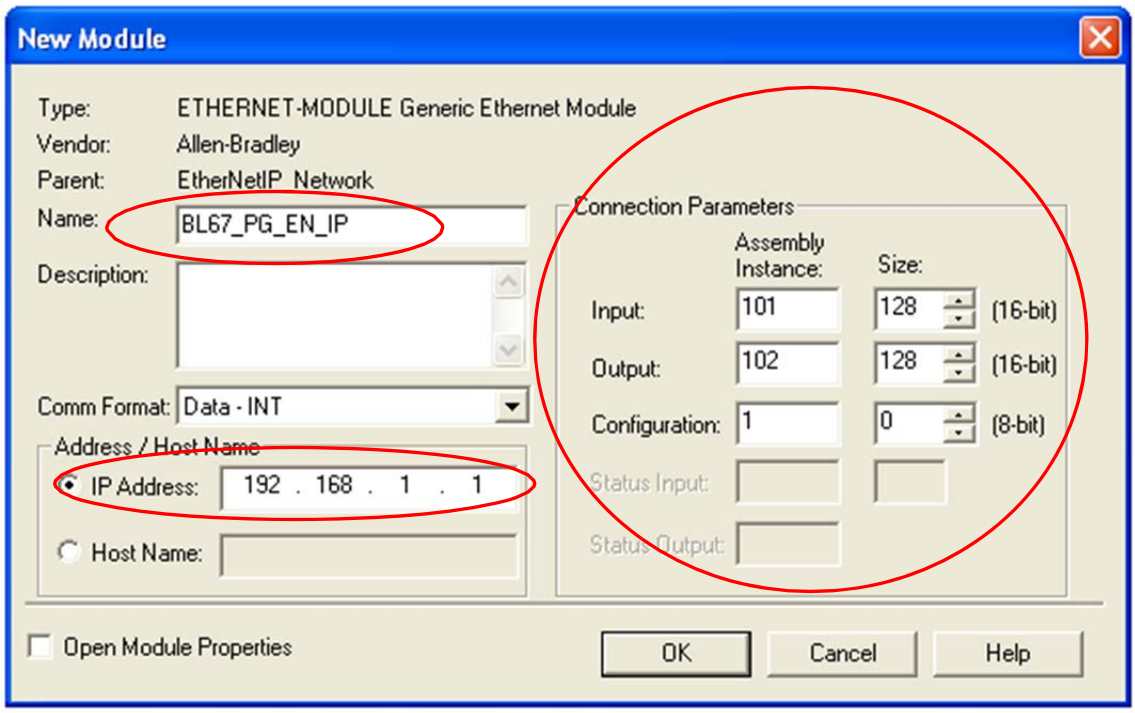
5. Right-click on “Ethernet” and click on “New Module…”



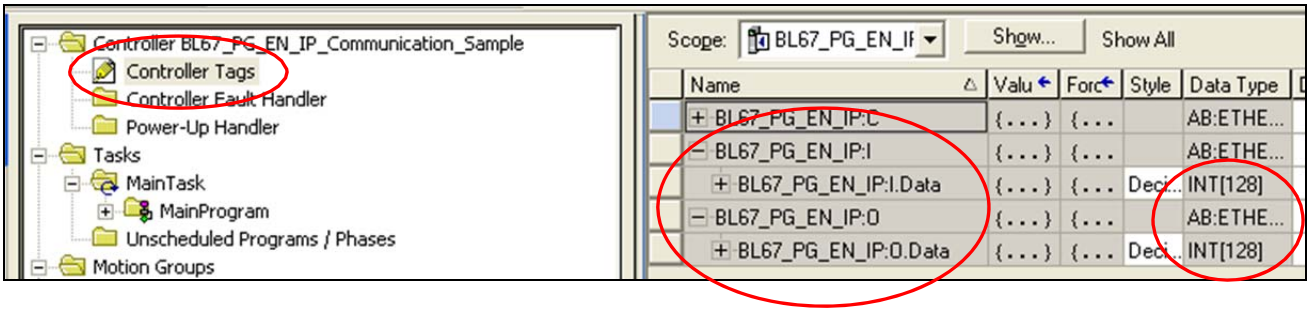
6. Choose the “Generic Etheret Module” for the BL67-PG-EN-IP gateway from the “Select Module” window and click “OK.”



7. Name the module, type in the IP address of the BL67-PG-EN-IP gateway and enter the Connection Parameters and click "OK."
    a. Make sure the Connection Parameters are as follows. These parameters will always be the same for both, the standard, BL67-GW-EN-IP, EtherNet/IP gateway and the programmable, BL67-PG-EN-IP, EtherNet/IP gateway.

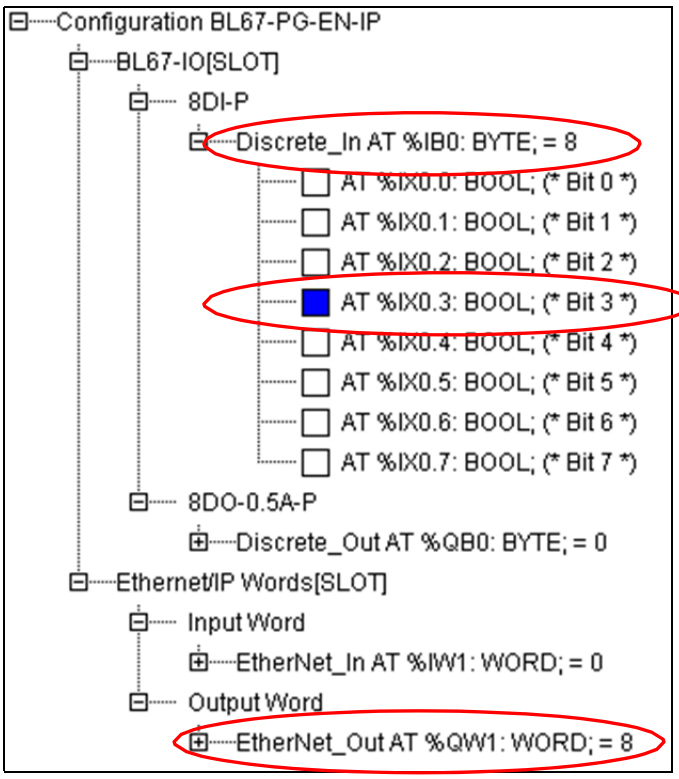


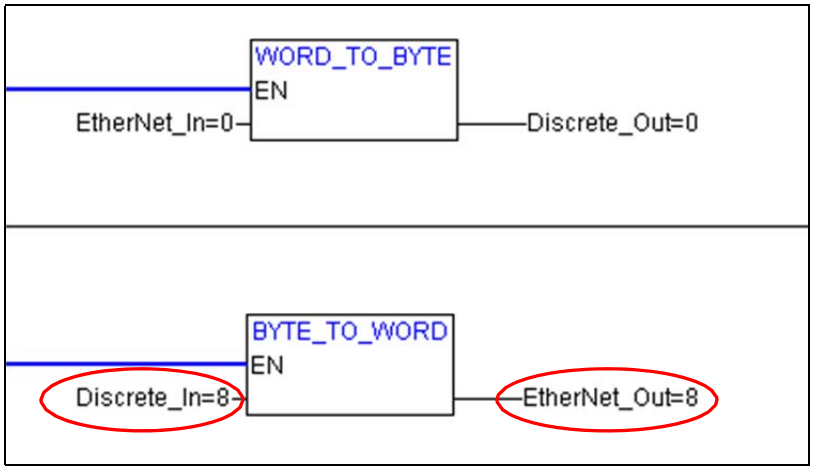
8. RSLogix automatically creates the 128 input and 128 output words in the "Controller Tags." These are the registers referenced in the mapping described on page 21.

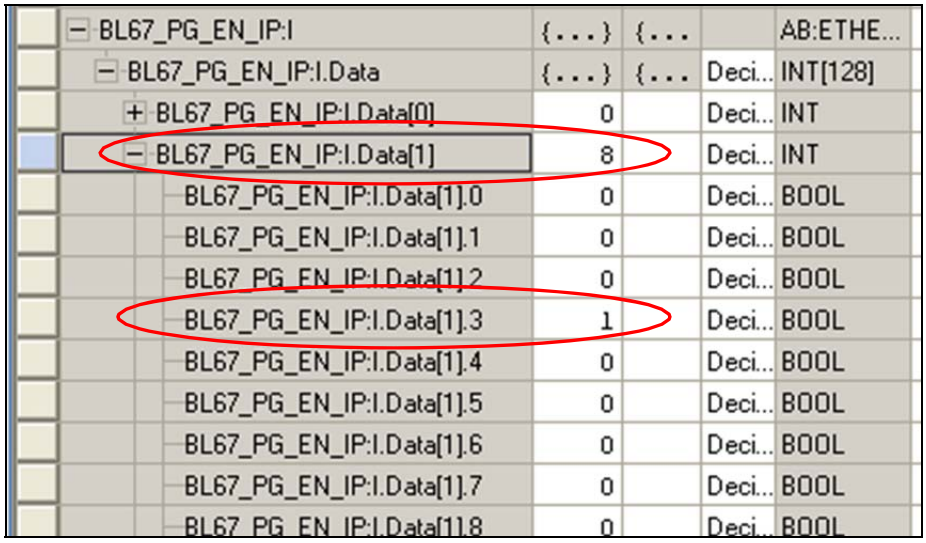


9. Download the program to the controller and go online with the controller.
10. The CoDeSys project created before contains one input word and one output word for the EtherNet/IP communication. According to the mapping on page 21, these words will be available as output 1 and input 1, respectively, in the ControlLogix program. In this case, output 1 and input 1 are BL67_PG_EN_IP:O.Data[1] and BL67_PG_EN_IP:I.Data[1] respectively.

11. To confirm the communication from the BL67-PG-EN-IP to the Allen-Bradley PLC set one of the inputs connected to the 8DI-P module, and observe the input word in the ControlLogix program. In this example a sensor connected to 8DI-P channel 3 is be flagged. The data from the 8DI-P module is moved to the BL67-PG-EN-IP EtherNet/IP Output Word 1 by the ladder logic in the CoDeSys project. This is mapped to BL67_PG_EN_IP:I.Data[1]. This is confirmed by the ControlLogix program.

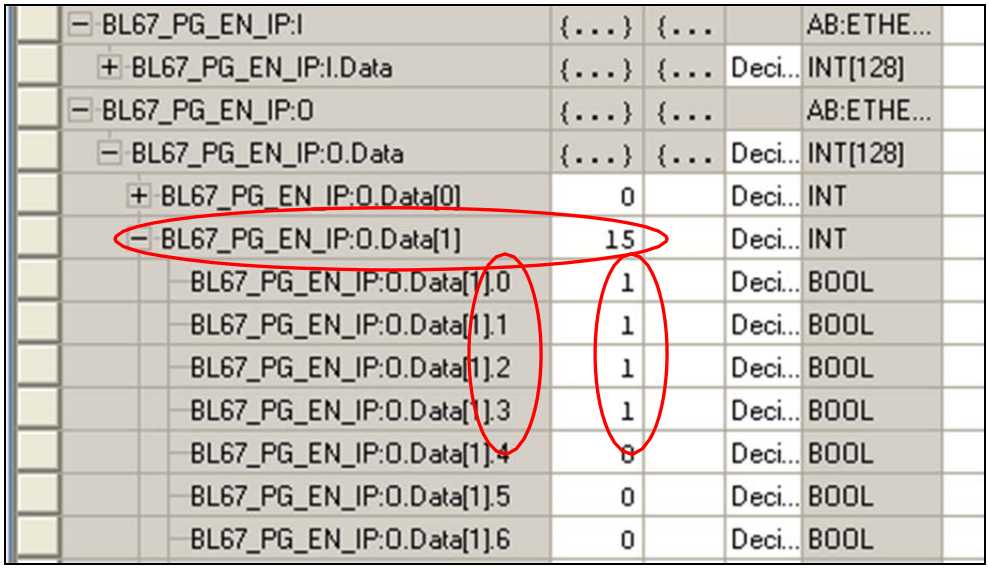




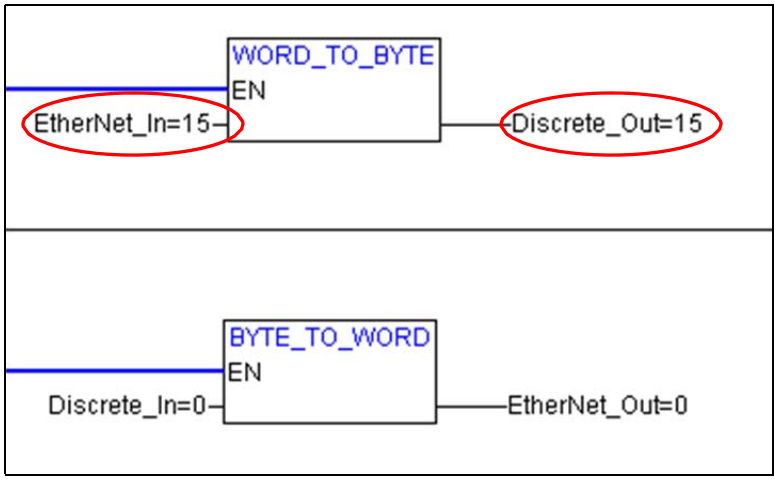


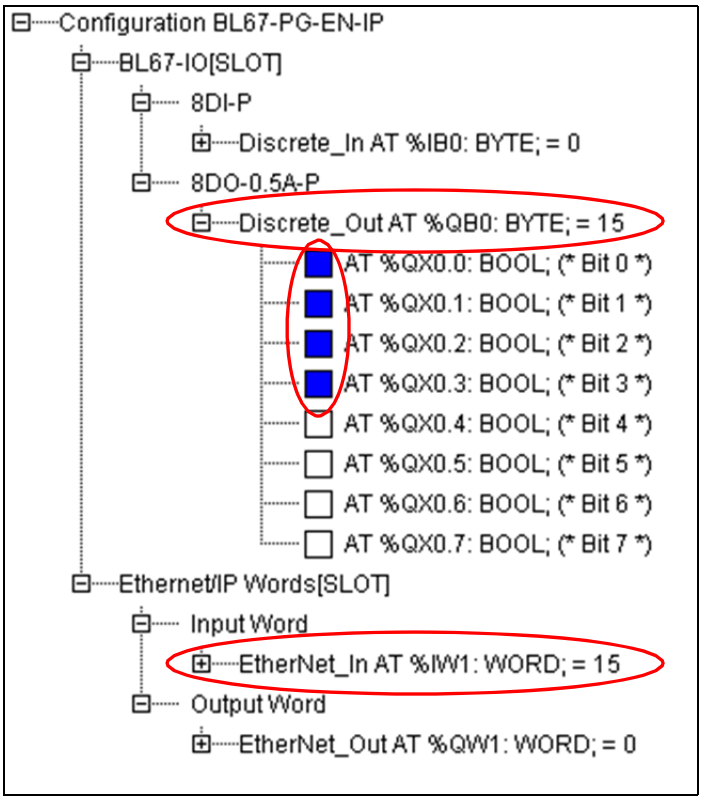
BL67_PG_EN_IP:I	{...}	{...		AB:ETHE...
BL67_PG_EN_IP:I.Data	{...}	{...	Deci...	INT[128]
BL67_PG_EN_IP:I.Data[0]	0		Deci...	INT
BL67_PG_EN_IP:I.Data[1]	8		Deci...	INT
BL67_PG_EN_IP:I.Data[1].0	0		Deci...	BOOL
BL67_PG_EN_IP:I.Data[1].1	0		Deci...	BOOL
BL67_PG_EN_IP:I.Data[1].2	0		Deci...	BOOL
BL67_PG_EN_IP:I.Data[1].3	1		Deci...	BOOL
BL67_PG_EN_IP:I.Data[1].4	0		Deci...	BOOL
BL67_PG_EN_IP:I.Data[1].5	0		Deci...	BOOL
BL67_PG_EN_IP:I.Data[1].6	0		Deci...	BOOL
BL67_PG_EN_IP:I.Data[1].7	0		Deci...	BOOL
BL67_PG_EN_IP:I.Data[1].8	0		Deci...	BOOL

1. To confirm the communication from the Allen-Bradly PLC to the BL67-PG-EN-IP force the output word in the ControlLogix program and observe the LED's on the 8DO-0.5A-P module. Set bits 0 through 3 of BL67_PG_EN_IP:O.Data[1]. The data from BL67_PG_EN_IP:O.Data[1] is mapped to BL67-PG-EN-IP Ether-Net/IP Input Word 1. This data is moved to the 8DO-0.5A-P module by the ladder logic in the CoDeSys project. This is confirmed by the CoDeSys project as well as the LED's 0-3 on the 8DO-0.5A-P module.



BL67_PG_EN_IP:I	{...}	{...		AB:ETHE...
BL67_PG_EN_IP:I.Data	{...}	{...	Deci...	INT[128]
BL67_PG_EN_IP:O	{...}	{...		AB:ETHE...
BL67_PG_EN_IP:O.Data	{...}	{...	Deci...	INT[128]
BL67_PG_EN_IP:O.Data[0]	0		Deci...	INT
BL67_PG_EN_IP:O.Data[1]	15		Deci...	INT
BL67_PG_EN_IP:O.Data[1].0	1		Deci...	BOOL
BL67_PG_EN_IP:O.Data[1].1	1		Deci...	BOOL
BL67_PG_EN_IP:O.Data[1].2	1		Deci...	BOOL
BL67_PG_EN_IP:O.Data[1].3	1		Deci...	BOOL
BL67_PG_EN_IP:O.Data[1].4	0		Deci...	BOOL
BL67_PG_EN_IP:O.Data[1].5	0		Deci...	BOOL
BL67_PG_EN_IP:O.Data[1].6	0		Deci...	BOOL


WORD_TO_BYTE
EN
EtherNet_In=15
Discrete_Out=15
BYTE_TO_WORD
EN
Discrete_In=0
EtherNet_Out=0


Configuration BL67-PG-EN-IP
BL67-IO[SLOT]
8DI-P
Discrete_In AT %IB0: BYTE; = 0
8DO-0.5A-P
Discrete_Out AT %QB0: BYTE; = 15
AT %QX0.0: BOOL; (* Bit 0 *)
AT %QX0.1: BOOL; (* Bit 1 *)
AT %QX0.2: BOOL; (* Bit 2 *)
AT %QX0.3: BOOL; (* Bit 3 *)
AT %QX0.4: BOOL; (* Bit 4 *)
AT %QX0.5: BOOL; (* Bit 5 *)
AT %QX0.6: BOOL; (* Bit 6 *)
AT %QX0.7: BOOL; (* Bit 7 *)
Ethernet/IP Words[SLOT]
Input Word
EtherNet_In AT %IW1: WORD; = 15
Output Word
EtherNet_Out AT %QW1: WORD; = 0

Appendix A – Gateway Status Register

Bit	Name	Description
Gateway		
15	I/O Controller Error	The communication controller for the I/O-system is faulty.
14	Force Mode Active Error	The Force-Mode is activated. The state of the outputs may no longer accord to the settings made via the fieldbus.
13	Reserved	
12	Reserved	
Module bus		
11	I/O Cfg Modified Error	The I/O-configuration has been changed and is now incompatible.
10	I/O Communication Lost Error	No communication on the I/O module bus.
Voltage errors		
9	U_{sys} too low	System supply voltage too low (<18 VDC.)
8	U_{sys} too high	System supply voltage too high (>30 VDC.)
7	U_L too low	Load voltage too low (<18 VDC.)
6	U_L too high	Load voltage too high (>30 VDC.)
5	I_{sys} too high	Overload of the system voltage supply.
4	Reserved	
Warnings		
3	I/O Modified Warning	
2	Reserved	
1	Reserved	
0	I/O Diagnostics Active Warning	At least one I/O-module sends active diagnostics.