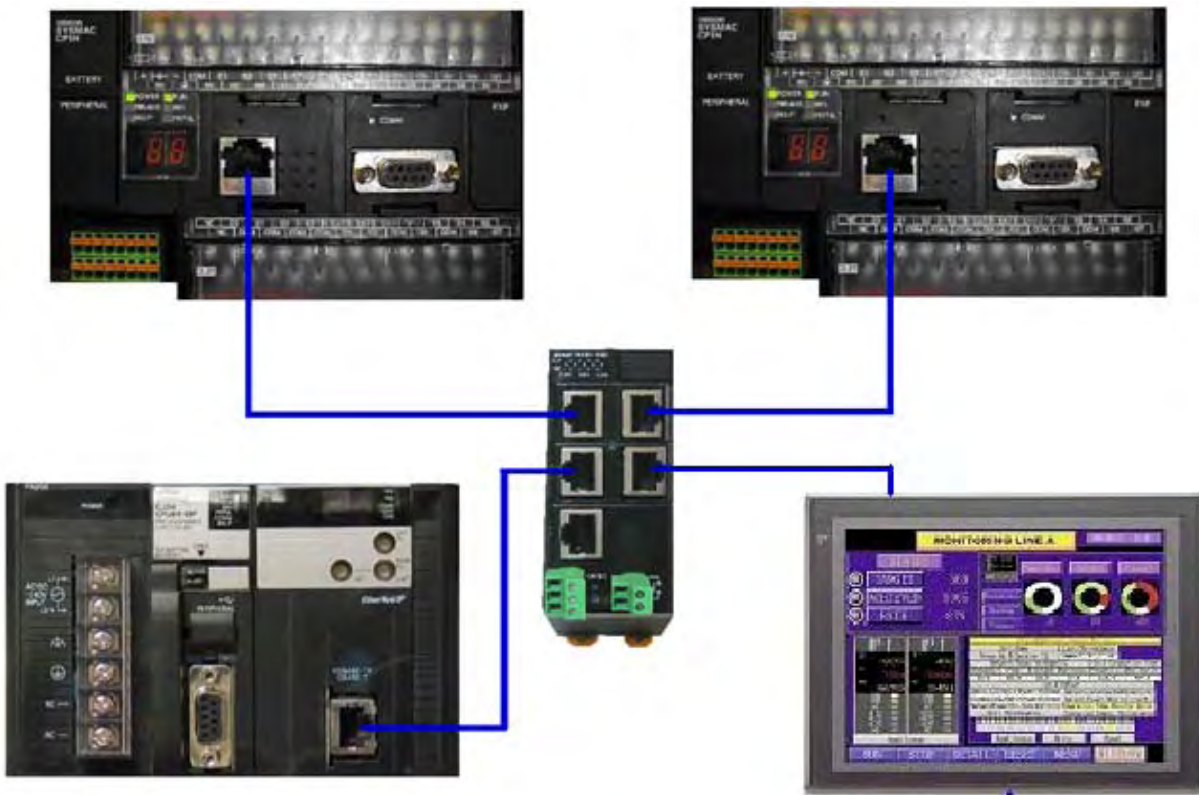


Omron CP1W-EIP61

CP1L / CP1H EtherNet/IP Adapter

Application and Setup Guide



Section 1: Introduction

This document explains the theory, operation, and setup of the Omron CP1W-EIP61 EtherNet/IP and FINS UDP adapter for CP1L and CP1H PLCs.

The CP1W-EIP61 is an EtherNet/IP adapter that allows intelligent devices, such as Omron CJ / CS series PLCs or NSJ hybrid controller with EtherNet/IP modules, to very quickly and easily share data with CP1L and CP1H PLCs. The CP1L or CP1H PLC functions as a programmable I/O module, capable of running a local program. In addition to the local program, the CP1L or CP1H PLC can also exchange data such as positions, status, IO data, etc, with the CJ / CS PLC.

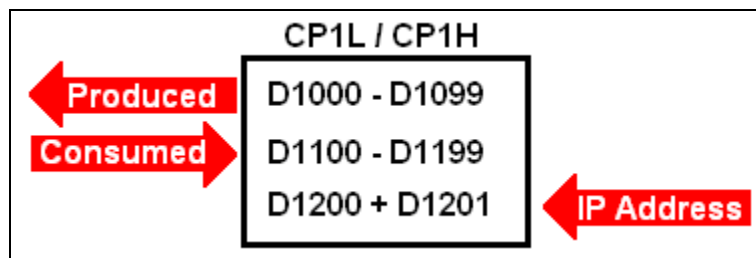
The CP1W-EIP61 supports the Implicit Messaging (Datalink) function of EtherNet/IP, but does not support Explicit Messaging to data areas of the PLC, or to the program area of the PLC. Data areas and program loading can be accomplished via FINS UDP.

The adapter mounts in an Option Board Slot on the front of a CP1L or CP1H PLC, and can be used in all CP1L or CP1H PLCs with an available Option Board Slot. The CP1W-EIP61 is not supported by the CP1E PLC.

Normal Mode:

In normal operation, the CP1W-EIP61 adapter allows other PLCs to connect to an Omron CP1L or CP1H PLC, and share up to 100 words of data in each direction with the Originator PLC. Assemblies are provided to produce and consume 20 bytes (10 words), 40 bytes (20 words) 100 bytes (50 words) or 200 bytes (100 words) of PLC data.

The Produced Data (output from the CP1L or CP1H) starts at D1000. The Consumed Data (input to the CP1L or CP1H) starts at D1100. The size of the Produced and Consumed data will change as a function of the selected assembly, but the starting memory areas will remain the same. The current IP address of the CP1W-EIP61 adapter is stored in D1200 and D1201, as shown in section 3.



CP1W-EIP61 Fixed Addressing

IO Block Mode:

In IO Block Mode, special assemblies have been provided to allow the Originator PLC to directly read the inputs and directly control the outputs of the CP1L or CP1H. The maximum IO configuration of a CP1L or CP1H can be used, and the IO mapped directly over EtherNet/IP, without the need of Omron programming software to program or configure the CP1L or CP1H PLC. In this case, the CP1L or CP1H PLC functions as an IO block.

While this configuration is flexible and easy to configure, it should be used in applications that do not require high speed IO. The typical response time of an input or output on a CP1L or CP1H using the CP1W-EIP61 in IO Block Mode when viewed from the Originator PLC is approximately 175 ms, using a 10 ms RPI for EtherNet/IP.


In IO Block Mode, the user can choose if the CP1L or CP1H PLC outputs should be turned off upon loss of communications to the Originator PLC, or if the output state should be maintained. This is done through the CP1W-CIF61 configuration Web Page.

The IO Assemblies for IO Block Mode are 120 and 121.

The Input and Output connection size for IO Block Mode is fixed at 40 bytes in and 40 bytes out, regardless of the actual amount of IO connected to the CP1L or CP1H. The IO mapping of the CP1L or CP1H IO into the Originator PLC follows the channel IO layout of the CP1L or CP1H PLC, as shown below. Consult the CP1L or CP1H Operations manual for details on the IO mapping for different CP1L or CP1H configurations.

IO Mapping for IO Block Mode

Input Bytes	00 + 01	02 + 03	04 + 05	...	38 + 39
PLC Channel	000	001	002		019

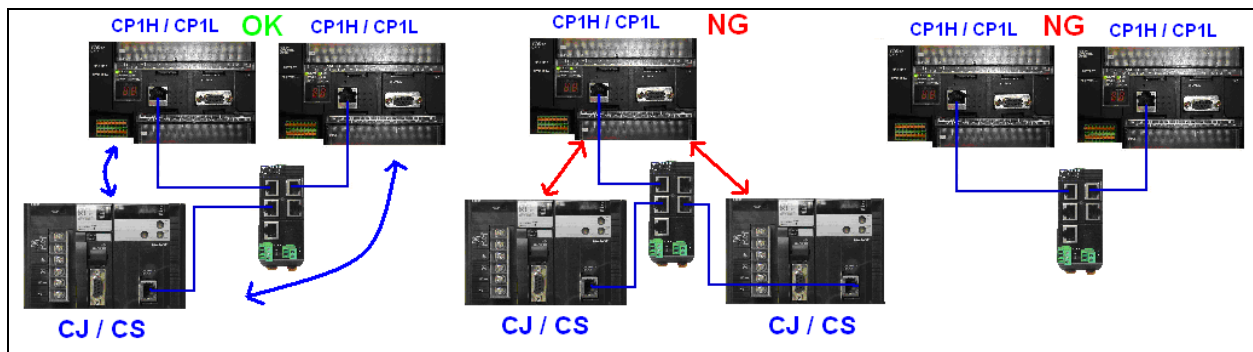


Output Bytes	00 + 01	02 + 03	04 + 05	...	38 + 39
PLC Channel	100	101	102		119

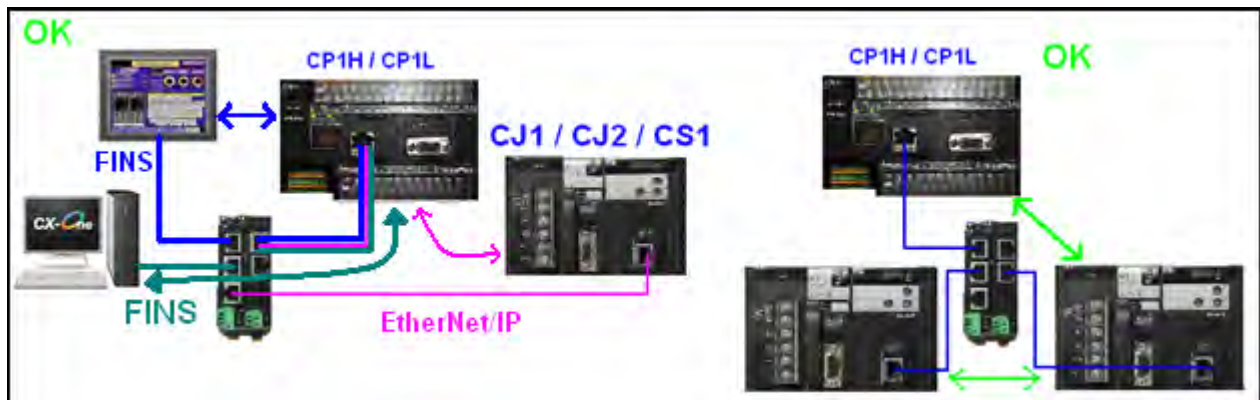
Section 2: Applications

The CP1W-EIP61 has been developed to allow Omron CP1L and CP1H PLCs to function as programmable I/O modules. The adapter is an EtherNet/IP Connection Target, meaning the adapter cannot establish a connection to another device. A device, such as a CJ or CS series PLC or NSJ hybrid controller with an EtherNet/IP module, functioning as a Connection Originator, must be the device used to establish the Datalink (implicit messaging) connection to the CP1W-EIP61. Only 1 Originator can establish a connection to the CP1L or CP1H PLC. The CP1W-EIP61 does not support communications to multiple Originator PLCs.

The CP1W-EIP61 also supports FINS UDP communications, allowing NS series HMIs or CX Programmer programming software to connect via FINS UDP.



CJ or CS Series PLC as Originator (above and below right)



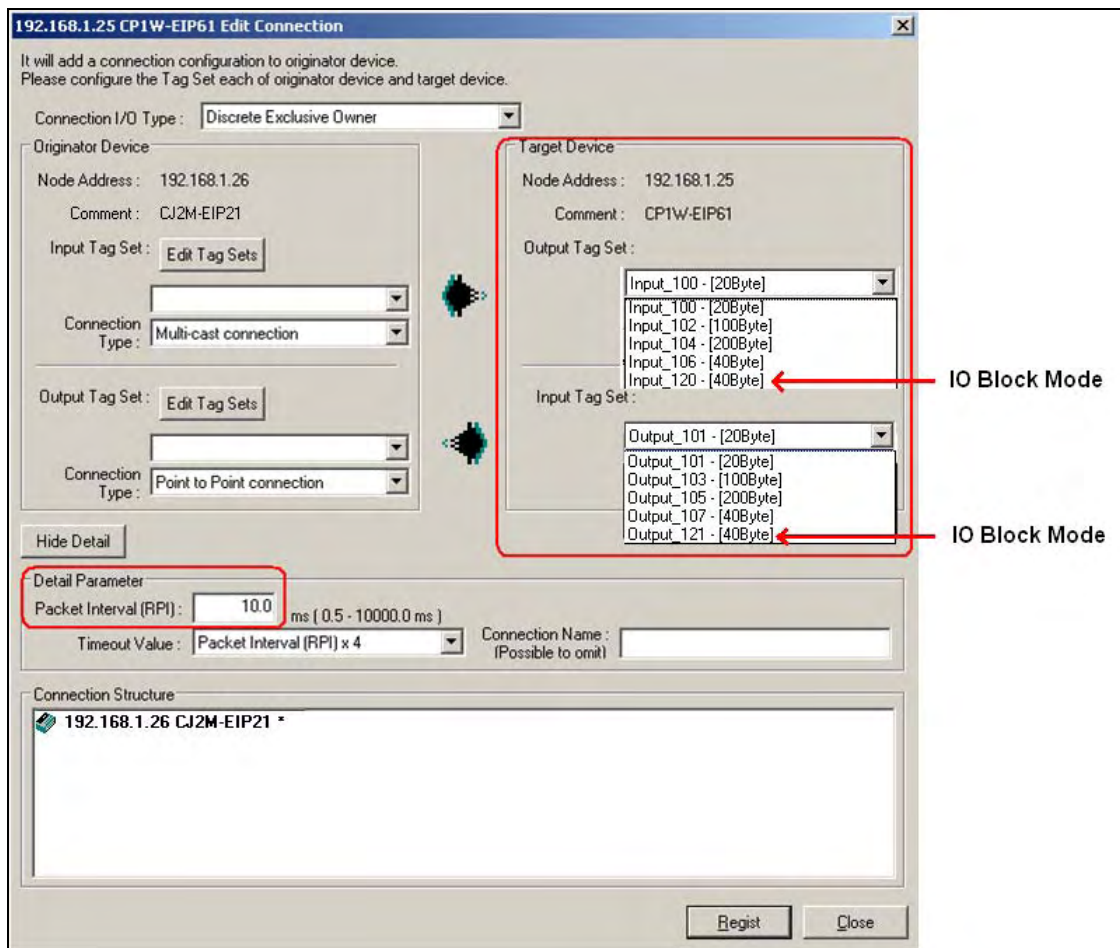
Using CP1W-EIP61 for EtherNet/IP and FINS

The CP1W-EIP61 does not provide diagnostic information to the CP1L or CP1H PLC about the status of the connection to other PLCs. A 'heartbeat' should be programmed into the produced and consumed data areas for this purpose.

When establishing a connection from a CJ or CS or NSJ series PLC, the user configures the Requested Packet Interval (RPI), which is the rate at which the CP1W-EIP61 and CJ or CS series PLCs will produce data. The default rate set by the Network Configurator for EtherNet/IP is 50 ms. This can be reduced to 10 ms for faster data throughput. Setting a value below 10 ms will not increase the network throughput, although it will un-necessarily increase network traffic.

The size of the connection used will affect the data update rate to and from the CP1L or CP1H PLC through the CP1W-EIP61.

RPI and Connection Size Settings



Throughput Benchmark Data:

Shown below are the average response times for produced and consumed data connections between an Omron CS / CJ series PLC and a CP1L / CP1H PLC using a CP1W-EIP61 in Normal Mode.

These values are based upon a 10 ms RPI setting, and an increased Peripheral Servicing time in the CP1L / CP1H. Other factors such as network bandwidth, PLC scan time, FINS communications traffic, etc may affect the actual throughput.

The Datalink function of EtherNet/IP is a Producer / Consumer model function, as opposed to a Command and Response model. This makes the throughput from a single node not significantly different from the throughput of multiple nodes. Therefore, the data shown below holds true for 1 CP1L / CP1H PLC connected to 1 CS / CJ series PLC, or multiple CP1L / CP1H PLCs connected to 1 CS / CJ series PLC.

Average Response Times

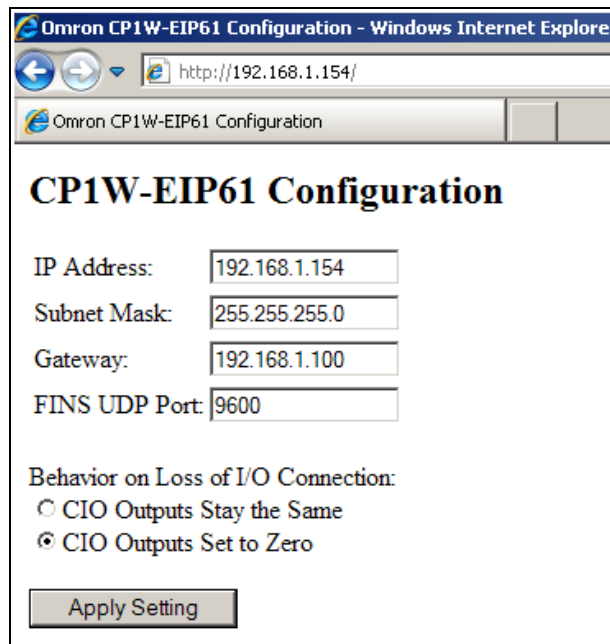
	20 Bytes	40 Bytes	100 Bytes	200 Bytes
Produced	25 ms	30 ms	35 ms	45 ms
Consumed	25 ms	30 ms	35 ms	45 ms

Section 3: EtherNet/IP Adapter Setup

The CP1W-EIP61 is assigned a default IP address of 192.168.250.11. The IP address can be changed using a web browser pointed to the IP address of the adapter. A static IP address must be assigned to the PC's Ethernet card for this purpose. Simply enter the IP address of the adapter (192.168.250.11) in the web browser's address field to access the configuration page. Enter the desired new IP address (192.168.1.154 shown as an example), subnet mask, and default gateway (if applicable).

When using the CP1W-EIP61 in 'IO Block Mode', select the state of the outputs if the IO Connection to the Originator PLC is lost.

When finished, click **Apply Setting**.



If the IP address is forgotten, use CX Programmer to view the IP address in D1200 + D1201 in the following format:

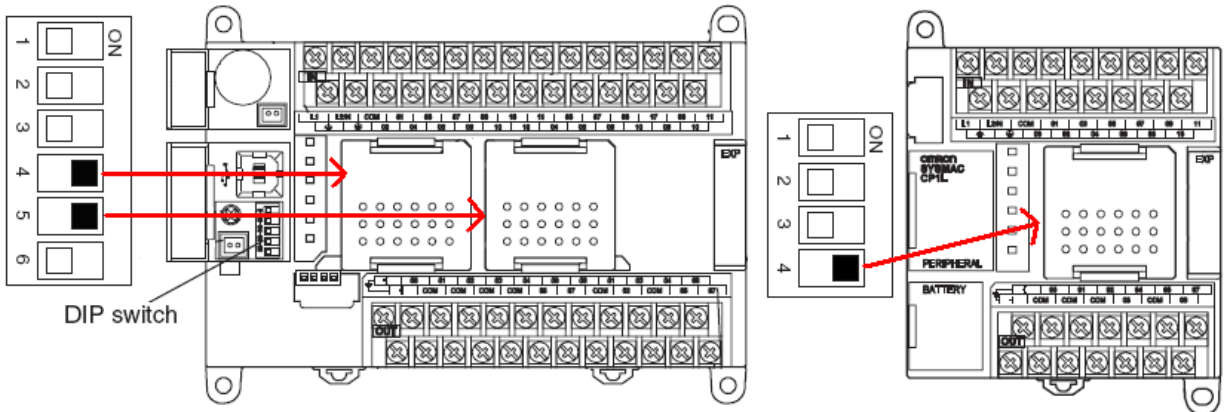
D1200 1st and 2nd Octets in Hexadecimal: EX D1200 = C0A8 = 192.168

D1201 3rd and 4th Octets in Hexadecimal: Ex. D1201 = 019A = 1.154

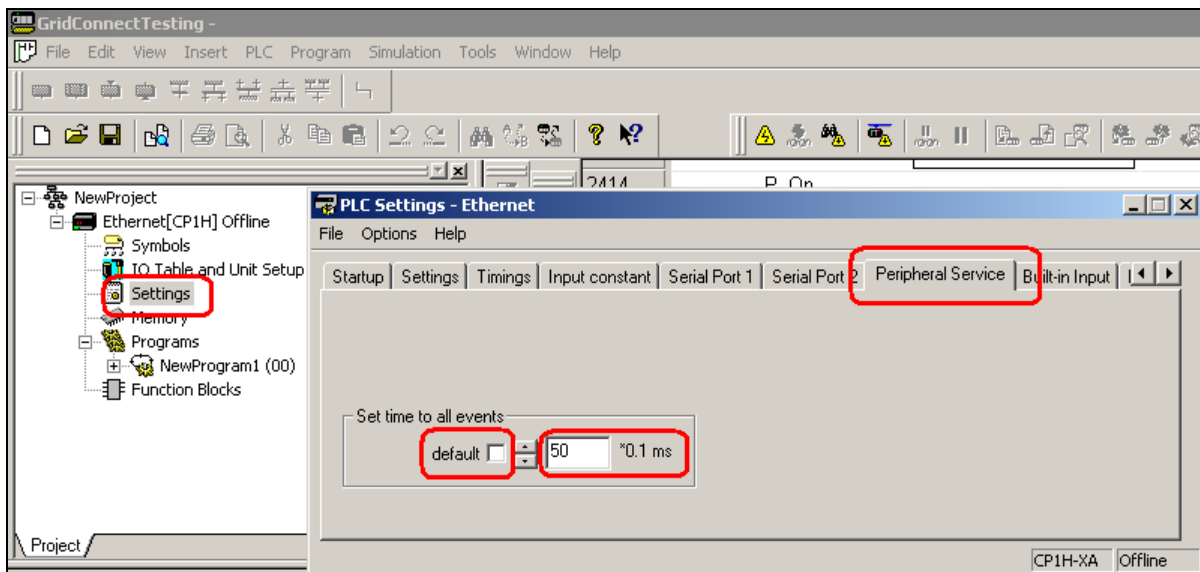
So, the IP address would be 192.168.1.154 based on the above values.

Section 4: PLC Setup

The CP1W-EIP61 adapter uses the Toolbus (high speed binary) protocol. To configure the PLC port, simply turn ON the appropriate DIP switch on the CP1L or CP1H PLC. For CP1L PLCs with 1 Option Board, use DIP Switch 4. For CP1L PLCs with 2 Option Board Slots, or CP1H PLCs, use DIP Switch 4 for Slot 1 and DIP Switch 5 for Slot 2.

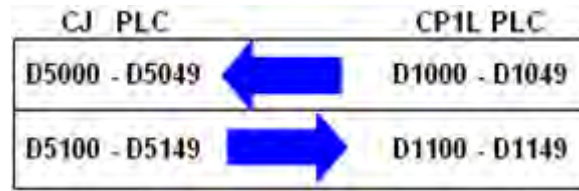


To maximize the throughput of the CP1W-EIP61, the amount of time per PLC scan that is allowed for servicing communications ports should be increased. This is accessed through the PLC Settings in CX Programmer. On the Peripheral Service tab, uncheck the 'default' option, and enter 50 (5.0 ms). Transfer these settings to the PLC and cycle power to apply the changes.

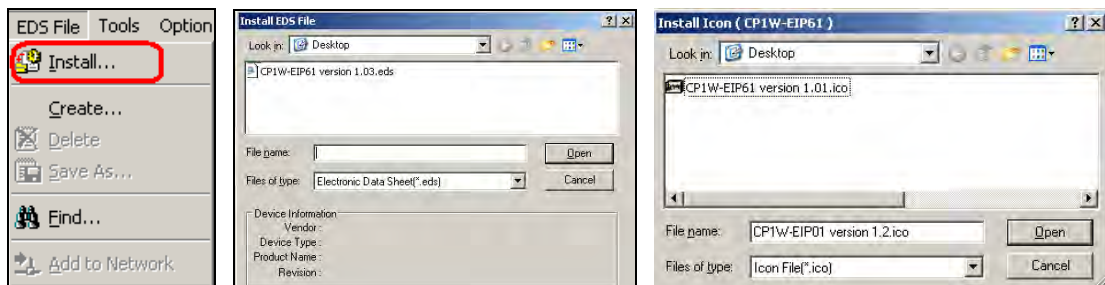


Section 5: Establishing a Connection: Example

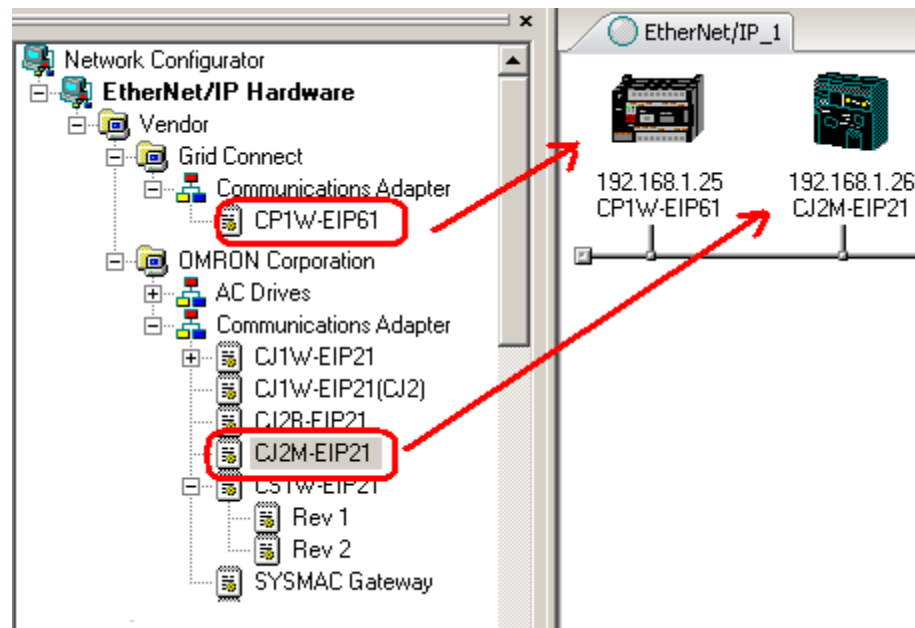
A 100 byte (50 word) produced and consumed connection will be established between a CJ2M PLC and a CP1L PLC, as shown.



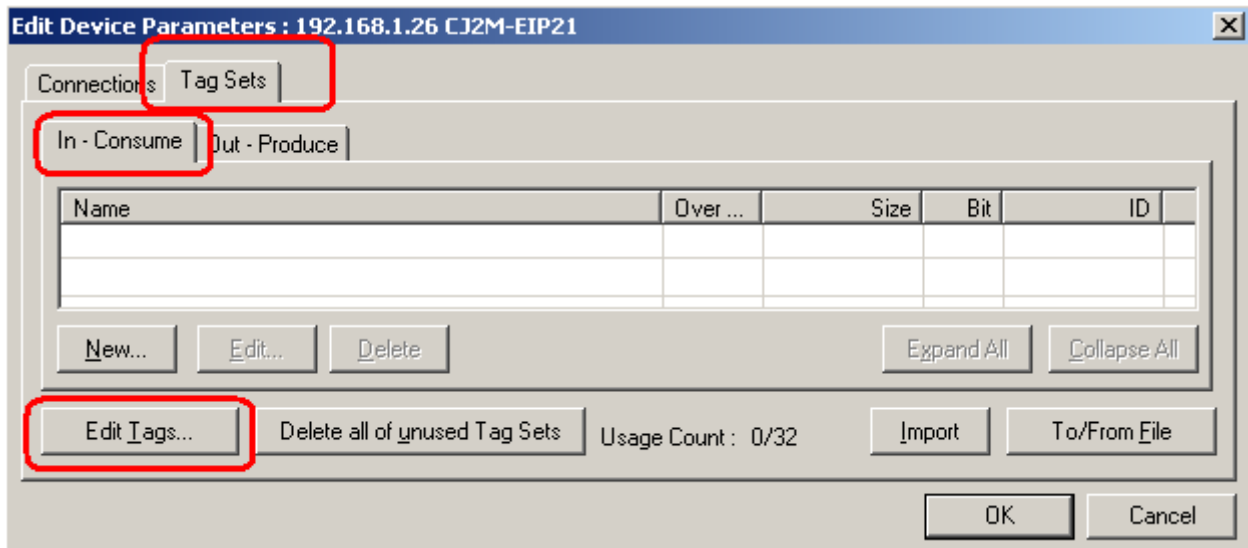
1. Plug the CP1W-EIP61 adapter into the left most Option Board Slot, turn on DIP switch 4, and apply power to the CP1L.
2. Connect the CJ2M, CP1W-EIP61, and PC to an Ethernet Switch.
3. Configure the IP address of the CJ2M as 192.168.1.26 using CX Programmer.
4. Configure the IP address of the CP1W-EIP61 as 192.168.1.25 as shown in **Section 4**.
5. Launch the Network Configurator for EtherNet/IP from **Start / Programs / Omron / CX-One / Network Configurator for EthernetIP / Network Configurator**.
6. Install the .eds file (available from Omron) and the associated icon by clicking the **EDS File / Install** menus, and browsing for the .eds file and the .ico file.



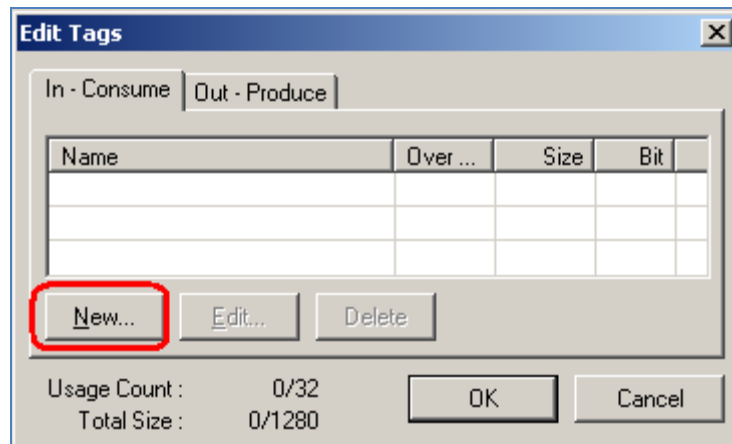
7. Drag a CP1W-EIP61 device and a CJ2M-EIP21 onto the network diagram as shown. Change the IP addresses of the devices to 192.168.1.25 and 192.168.1.26 as shown, by right clicking on each device, and selecting **Change Node Address**.



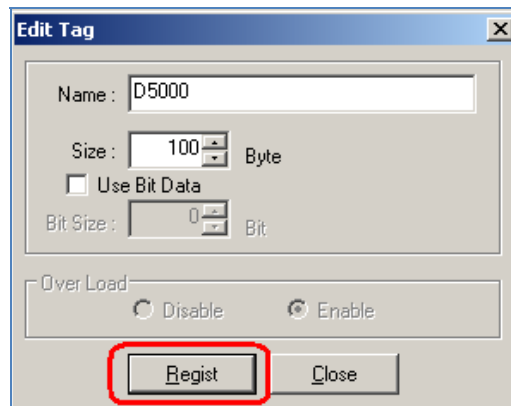
8. Double click on the CJ2M-EIP21 in the network diagram.
9. Click on the **Tag Sets** tab, **In - Consume**, and click **Edit Tags**.



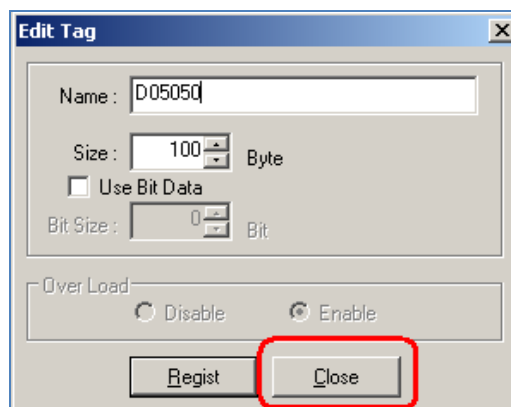
10. Click **New** to create a new tag.



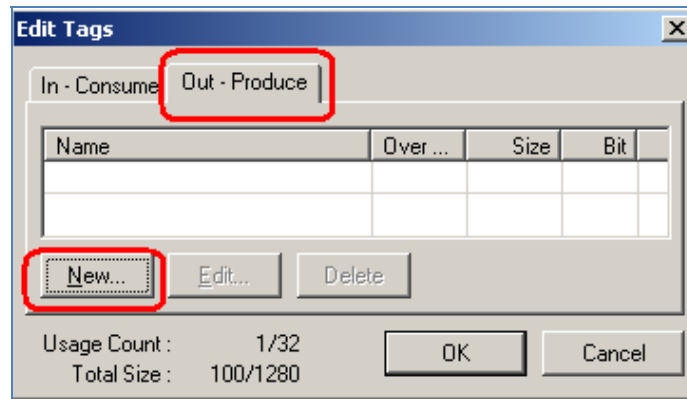
11. Enter **D5000** as the tag name (this is also the PLC memory address), and a size of **100 bytes**. Click **Register** to create the tag.



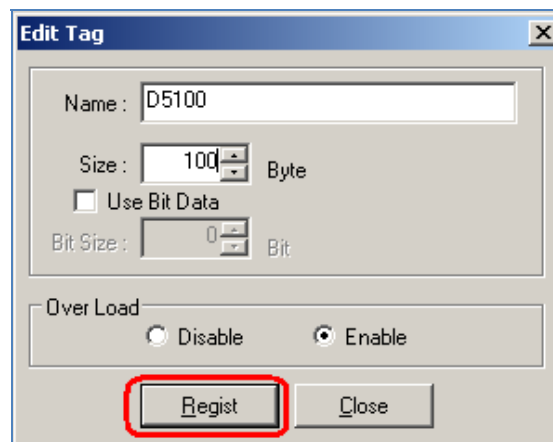
12. Click **Close** after creating the D5000 tag, as the software assumes that another tag will be created.



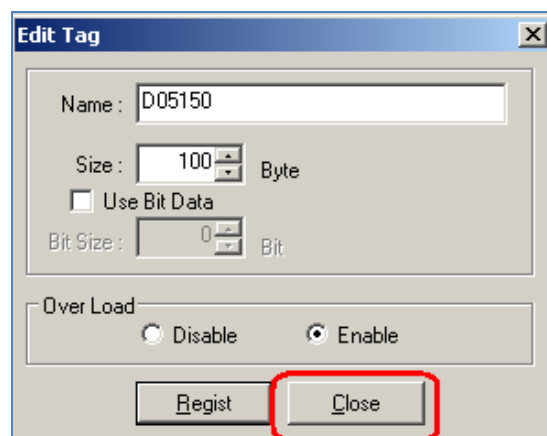
13. Click on the **Out – Produce** tab, and then click New to create a Produced Tag.



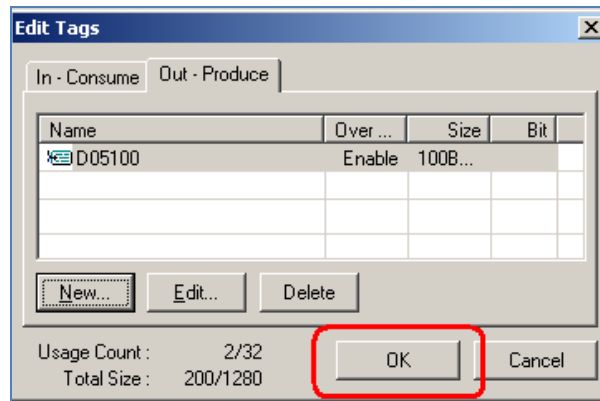
14. Enter **D5100** as the tag name (this is also the PLC memory address), and a size of **100 bytes**. Click **Register** to create the tag



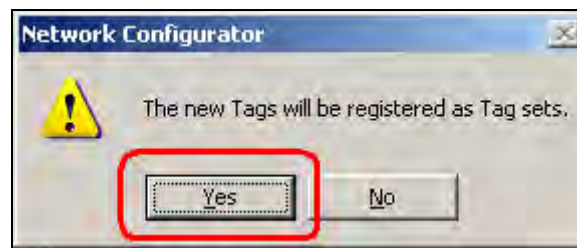
15. Click **Close** after creating the D5100 tag, as the software assumes that another tag will be created.



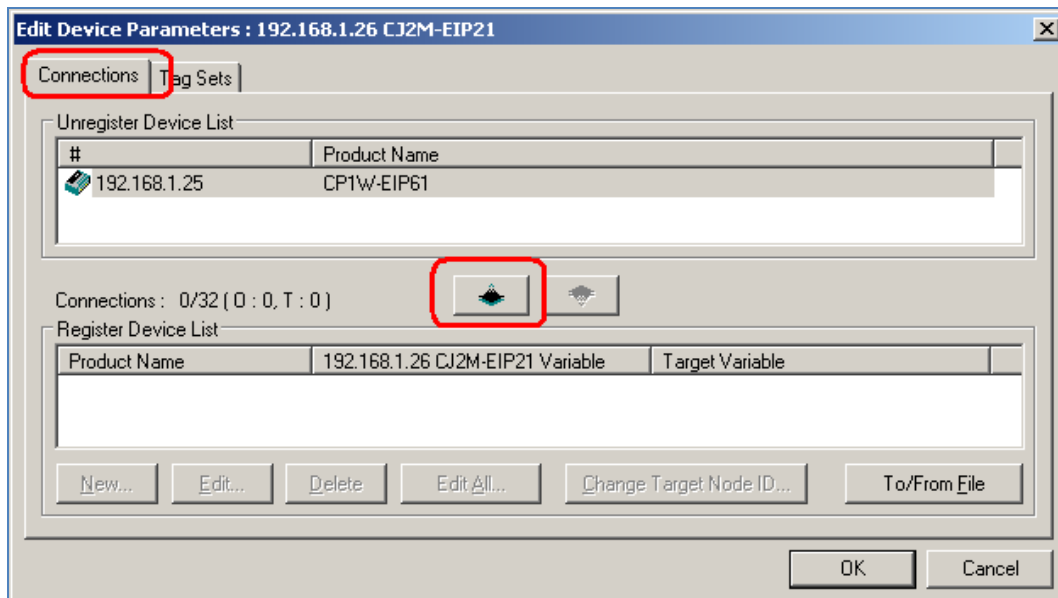
16. Click **OK** to complete the creation of the tags.



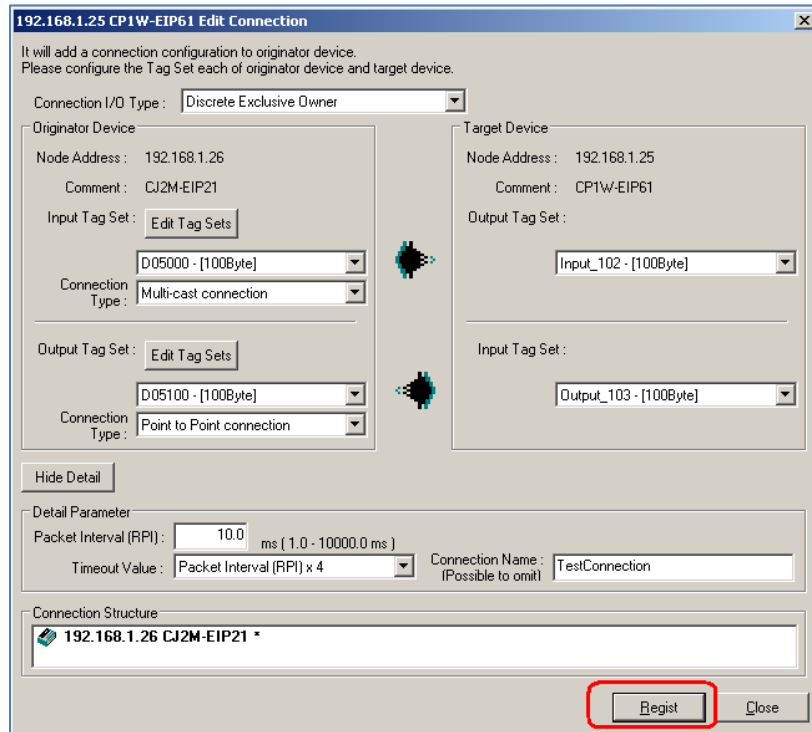
17. When prompted, click **Yes** to create Tag Sets with the same name as the Tags that they contain.



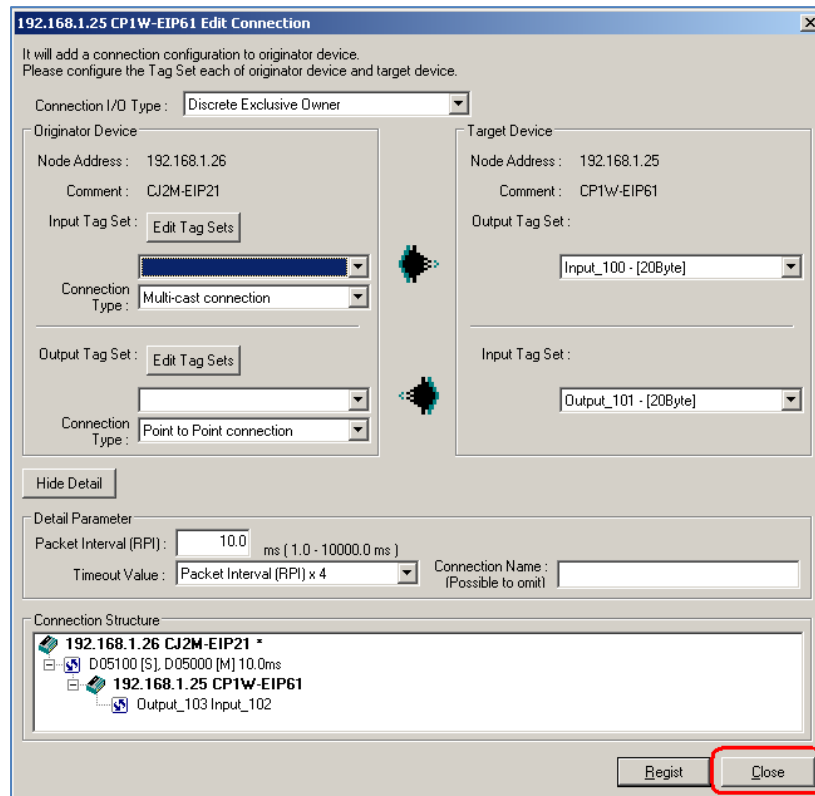
18. Click on the **Connections** tab, highlight the CP1W-EIP61 and click the **Down Arrow** as shown to move the device from the Unregistered Device List to the Registered Device List.



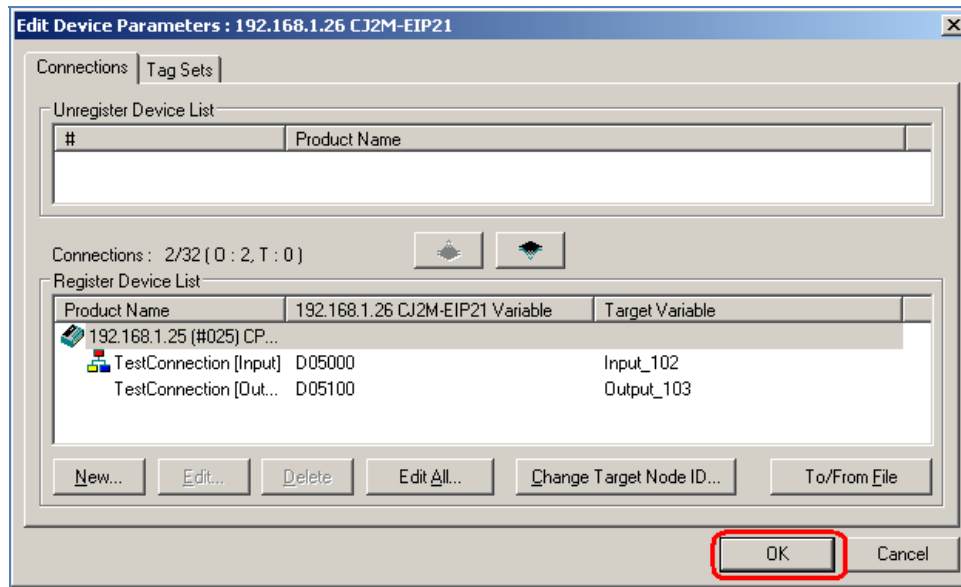
19. Double click on the device in the Registered Device List. Create a new connection as shown. Click **Register** when finished.



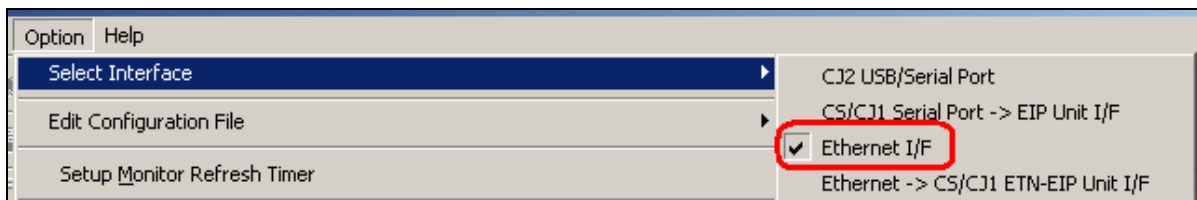
20. Click **Close** after creating the connection, as the software assumes that another connection will be created.



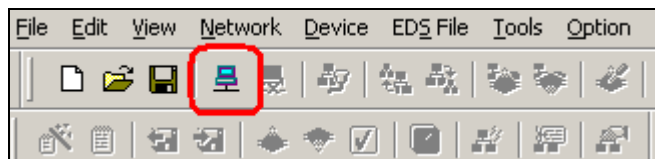
21. Click **OK** to close the Edit Device Parameters window.



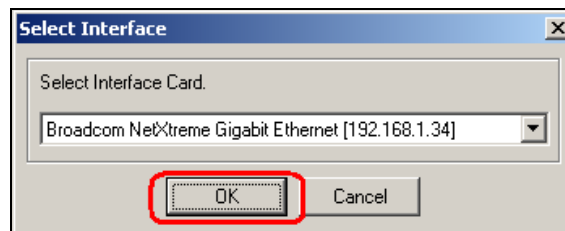
22. To select the connection method to connect to the EtherNet/IP network, click on the **Options / Select Interface** menus. **Select Ethernet I/F.**



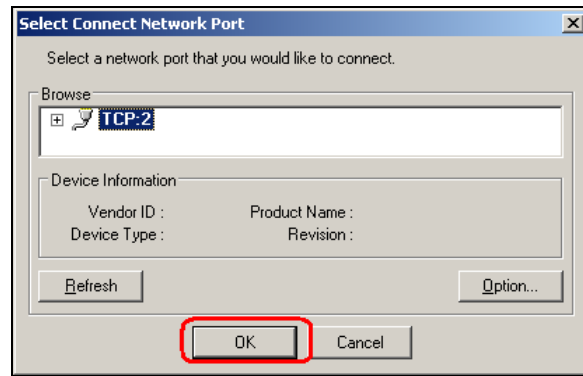
23. Click the **Connect** icon as shown.



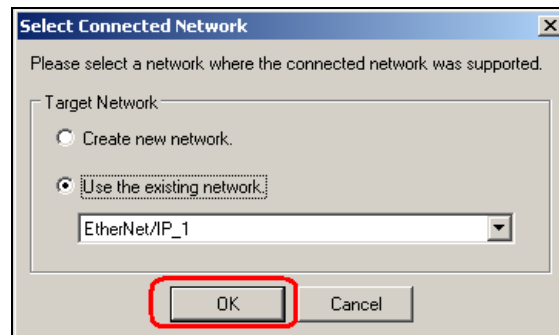
24. Select the appropriate network adapter, and click **OK**.



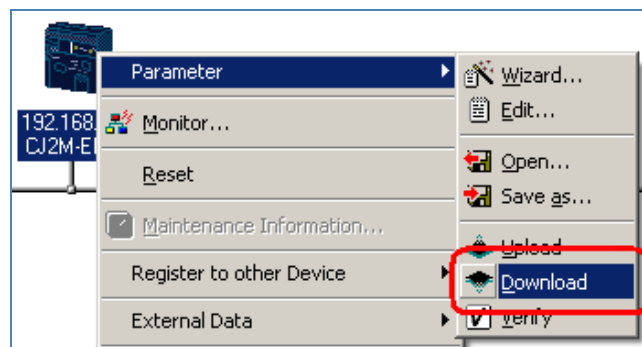
25. Click **OK** to select TCP port 2 to connect to the network directly.



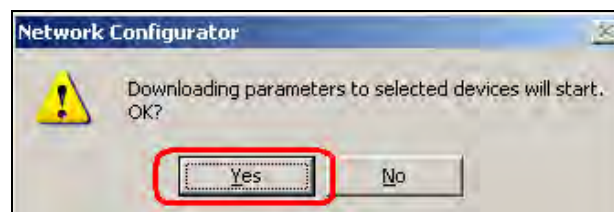
26. Select **Use the existing network**, and click **OK**.



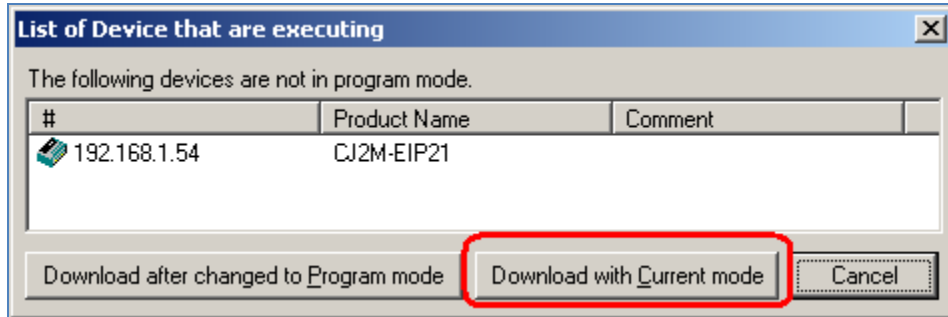
27. Right click on the CJ2M-EIP21 module in the network diagram, and select **Download**.



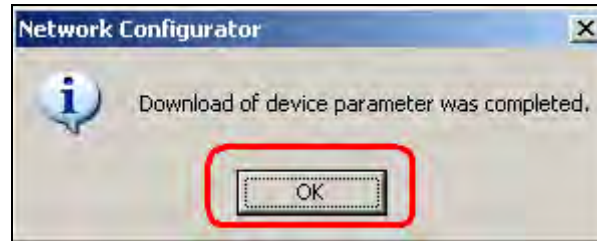
28. Click **Yes** to download the parameters.



29. To download to the EIP module without changing the PLC to Program mode, click **Download with Current mode**.



30. When the download completes, click **OK**.

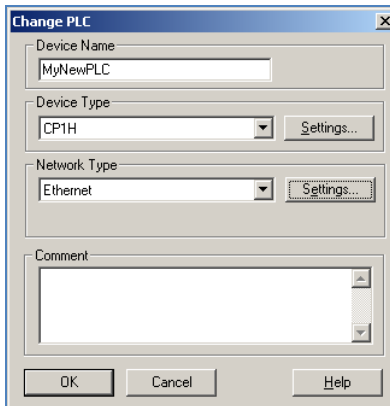


31. Using CX Programmer, verify that the data is exchanged as shown. Once the data is verified, the connection process is complete.

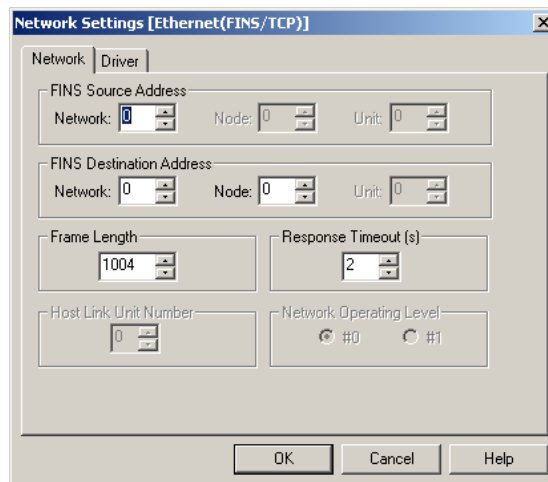


Section 6: Using CX Programmer with the CP1W-EIP61

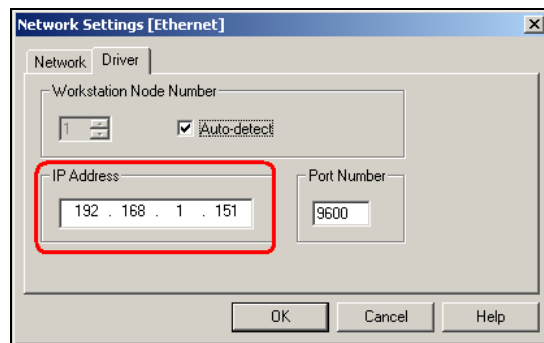
To use CX Programmer with a CP1H or CP1L PLC, select **Ethernet** as the Network Type, and click **Settings** for Network Type.



Leave all the settings on the Network tab at the default values.

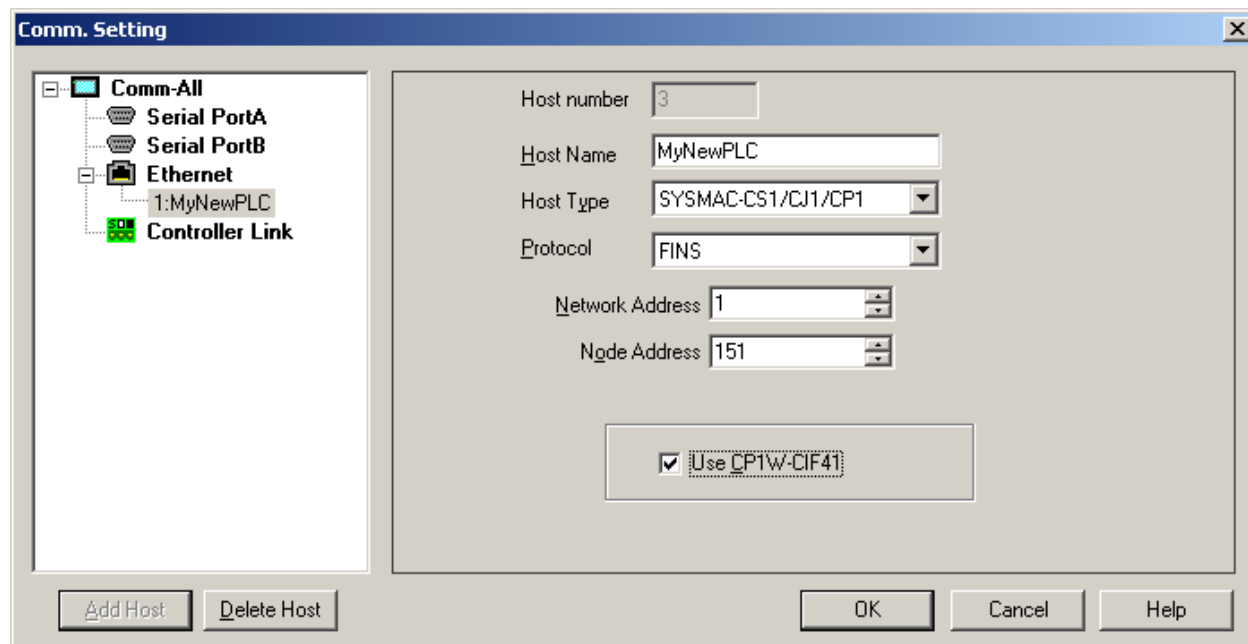


On the Driver tab, specify the IP address of the CP1W-EIP61. 192.168.1.151 is shown as an example. Set the UDP Port Number to match that configured on the CP1W-EIP61. 9600 (default) is shown as an example.



Section 7: Using an NS Series HMI with a CP1W-EIP61

When adding the CP1H or CP1L PLC as a Host in CX Designer, specify the Host Type as Sysmac-CS1/CJ1/CP1, the Network Address as 1, and the Node Address as the last octet of the IP address of the CP1W-EIP61. **151** would be the Node Address if the IP address were 192.168.1.**151**. Select '**Use CP1W-CIF41**' as shown below. This limits the Frame Length of the packets sent to the CP1W-EIP61 to the appropriate size.



Additional literature can be obtained from www.omron247.com.

R081 CP1 Series Brochure

W450 CP1H Operation Manual

W451 CP1L / CP1H Programming Manual

W462 CP1L Operation Manual

W465 CJ / CS EtherNet/IP Operation Manual

W472 CJ2 Hardware Manual

W473 CJ2 Software Manual

W452 NSJ Operation Manual

V227 W4S Ethernet Switch Brochure

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