

PLC132 LAB 2.1: ASSIGNING IP ADDRESS USING BOOTP/DHCP SERVER

Student Name: _____

Student ID: _____

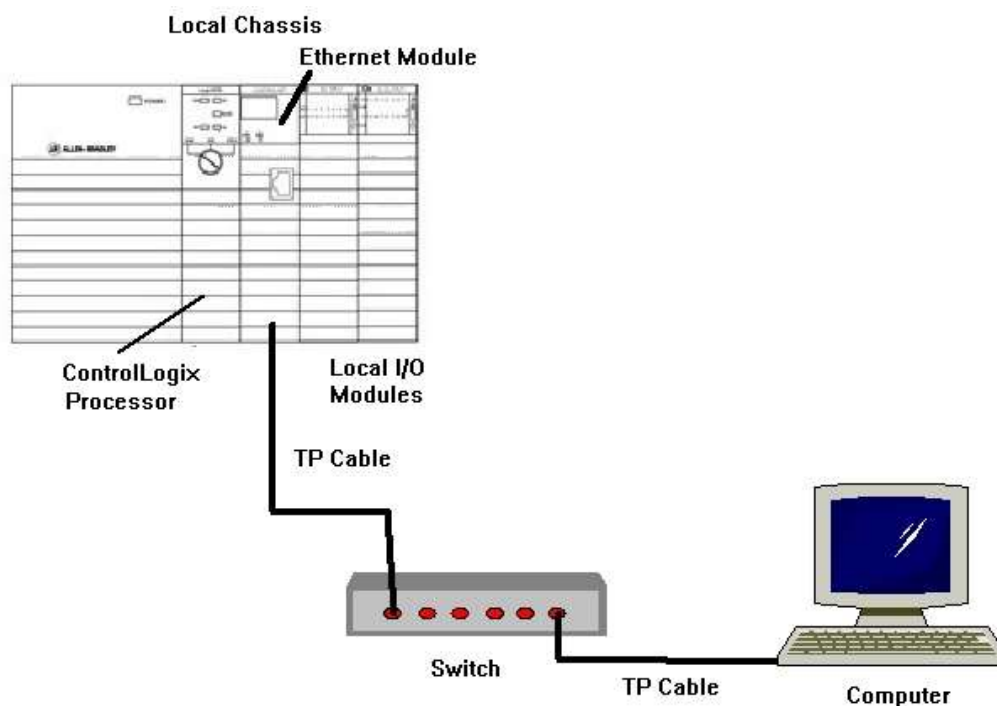
LAB OUTCOMES:

1. Explain the basic set-up of Ethernet communication modules
2. Demonstrate how to use BOOTP/DHCP server to assign IP Addresses
3. Demonstrate how to use the PING command line utility

LAB PROCESS:

When using an Ethernet device for the first time, typically an IP Address and Subnet Mask must be assigned to the device to allow it to be used on an Ethernet network. This exercise will cover the basic set-up of a ControlLogix 1756 Ethernet module to allow Ethernet communications between a computer running RSLinx and a 1756 Ethernet module

Part 1



Hardware Layout – Assigning IP Address to 1756 Ethernet Module

Local Chassis – Chassis with ControlLogix processor, Communication Modules, Power Supply and I/O Modules (Local I/O)

Switch – Ethernet connection point for Computer, Local Chassis Ethernet Module

Note: A Twisted Pair (TP) cable could go directly from Computer to Ethernet Module

Computer – Studio 5000 software, RSLinx software, Rockwell Automation
BOOTP/DHCP Server Ethernet Port, Windows 7 OS

Cabling - twisted-pair (TP)

Note: Computer and the Ethernet modules must have the same Network ID
Computer and the Ethernet modules must have different Device (Host) IDs

Demo units - 1756-L71 processors version 24
1756-EN2TR or 1756-ENBT Ethernet communication modules
Discrete I/O Modules

Assigning IP Address to 1756 Ethernet Module

1. Determine the IP Address and Subnet Mask information for the computer

IP Address:

Subnet Mask:

IP Address scrolling across Ethernet Module display.

IP Address:

2. With RSLinx - verify that there is a connection to the Ethernet Module

Note: Ethernet modules must have the same Network ID as the computer
Ethernet modules must have the same Network (Subnet) Mask as the computer

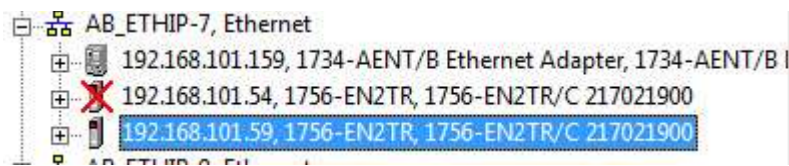


Figure 2-A - RSLinx RSWho Screen

Ethernet Connection

In this example the chassis contain a 1756-EN2TR module with the IP address of 192.168.101.59 is the local chassis.

IP Address of Ethernet Module showing in RSLinx

IP Address:

Note: AB_ETHIP RSLinx driver being used.

Configuration of RSLinx Ethernet drivers covered in Module 1 Lessons

3. Right click on the IP address of the Ethernet module.

On the context menu – select Module Configuration.

See Figure 3-A.

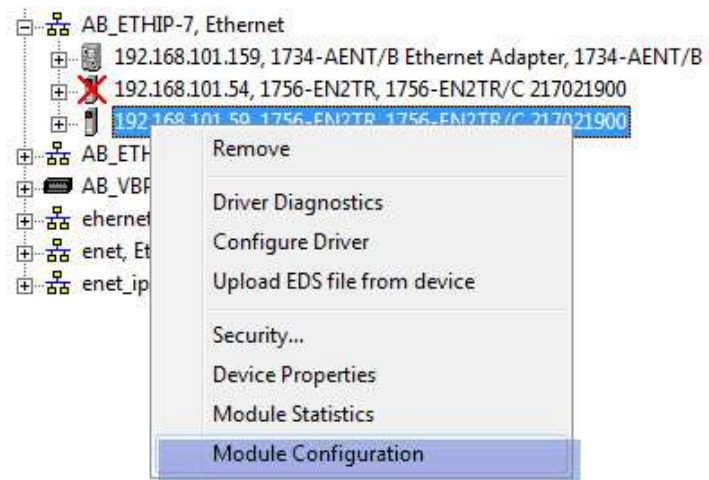


Figure 3-A

4. Navigate to Port Configuration Tab.

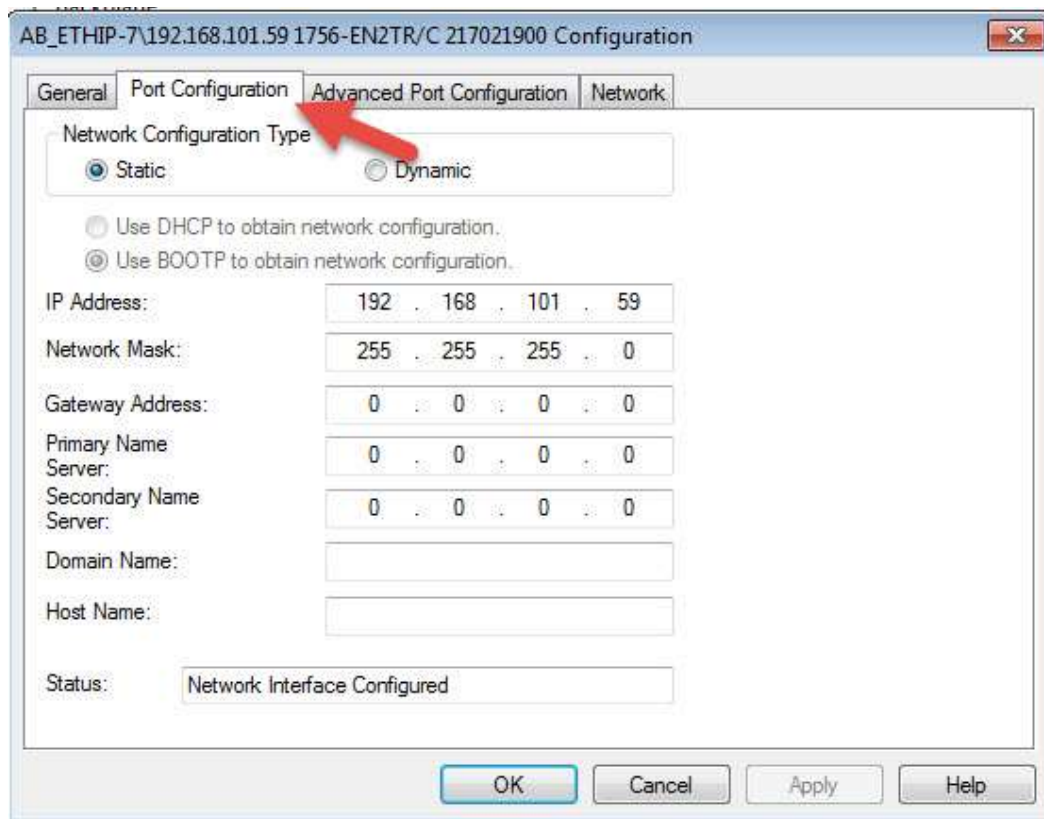


Figure 4-A

1756-EN2TR Ethernet Module Port Configuration Tab

Ethernet Module's Configuration Setting

IP Address:

Network (Subnet) Mask:

Network Configuration Type:

Note: Network Configuration Type Settings

Static – the Ethernet Module will use IP Address and Network Mask settings on power-up.

Using Figure 4-A – Every time the 1756-EN2TR module is power-up, the IP Address will be 192.168.101.59 and the Network Mask will be 255.255.255.0

Note: Network Mask performs same function as a Subnet Mask

5. Click Dynamic and Use BOOTP to obtain network configuration Radio Buttons to change 1756-EN2TR module's settings.

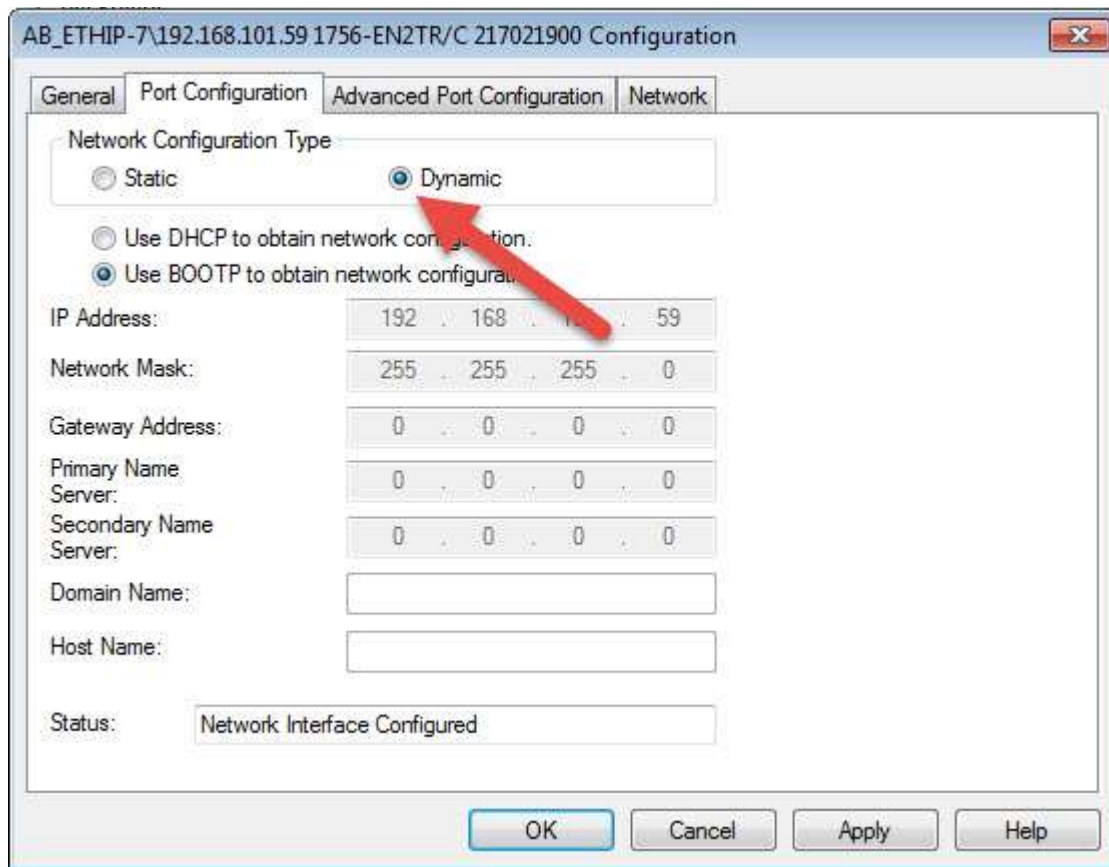


Figure 5-A
Dynamic Setting ControlLogix Ethernet Module

Note: IP address and Network Mask values are greyed-out - no longer being used

Note: Network Configuration Type Settings

Dynamic – the Ethernet Module will request IP Address and Network Mask settings every power-up.

Use DHCP to obtain network configuration – uses DHCP protocol for IP Address and Network Mask during power-up request

Use BOOTP to obtain network configuration - uses BOOTP protocol for IP Address and Network Mask during power-up request

6. Click the Apply or OK button to accept Module configuration change.

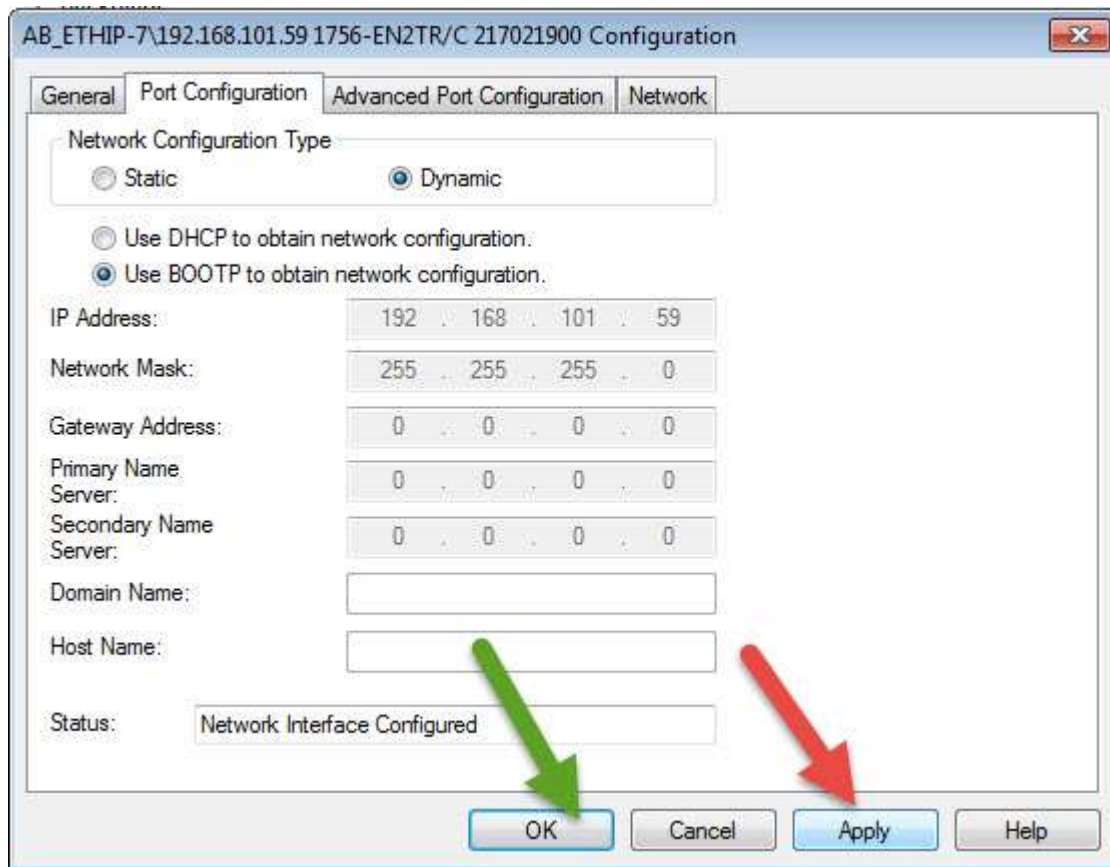


Figure 6-A
Accept Change- ControlLogix Ethernet Module

Note; some version of Ethernet modules may show an addition window(s) to confirm to changes.

The window will be similar to Figure 7-A.

Click Yes button to confirm changes

Some device the power may need to be cycled for changes to take effect.

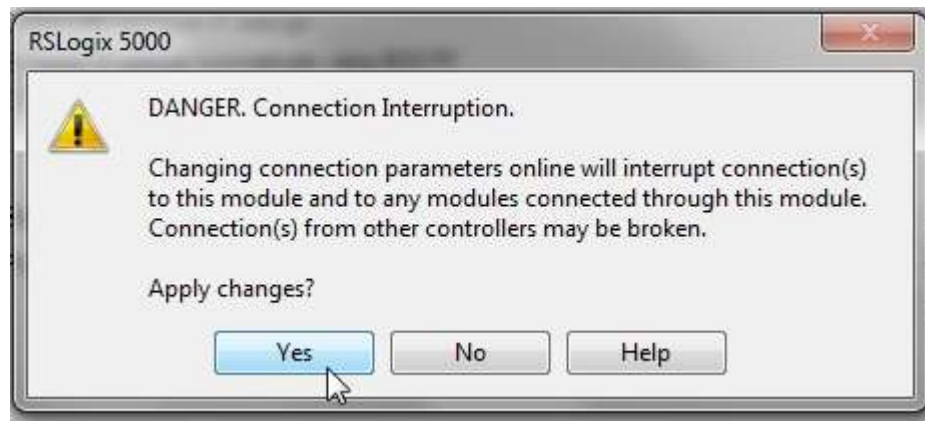


Figure 7-A

Accept Change- ControlLogix Ethernet Module

7. After confirming Network Configuration Type - Dynamic what information is scrolling across the Ethernet Module's display?

BOOTP - uses BOOTP protocol for IP Address and Network Mask during power-up request

100/Full – Network speed -100 Mbps

Network Duplex – Full, i.e. device can send and receive data at the same time.

The value in the format similar to 00:1D:9C:C9:95:2B is the Ethernet (MAC) Address of the module. This is a 48-bit value shown in a Hexadecimal format

Note: In RSLinx a red X now appears on the module.

Since the Ethernet Module no longer has a IP Address and Network Mask, RSLinx can no longer communicate to the module.

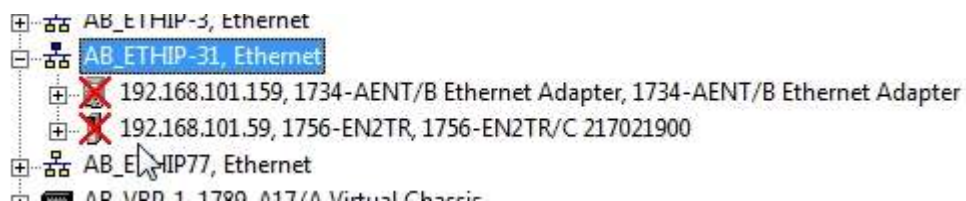


Figure 8-A

Red X on Ethernet Module

Note: Dynamic Network Configuration Type is the default setting of Allen Bradley Ethernet devices.

When installing new modules or replacing non-functioning / damaged Ethernet modules an IP Address and Network (Subnet) Mask need to be assigned to the a new (never used) module.

Rockwell Automation BOOTP/DHCP Server is a utility that can configure Ethernet device that do not have an IP address assigned.

Note: There are other utilities that perform the same function as the Rockwell Automation BOOTP/DHCP Server

The Rockwell Automation BOOTP/DHCP Server comes on the same disc as RSLogix / Studio 5000 software

The Rockwell Automation BOOTP/DHCP Server can be downloaded from Rockwell Automation / Allen Bradley web site.

8. Open / Run the Rockwell Automation BOOTP/DHCP Server

Note: Module 2 Handout Assigning an IP Address using BOOTP/DHCP Server contain additional information on configuring and running the Rockwell Automation BOOTP/DHCP Server utility.

Ensure the computer is connected to the Ethernet module with the Dynamic Network Configuration Type setting.

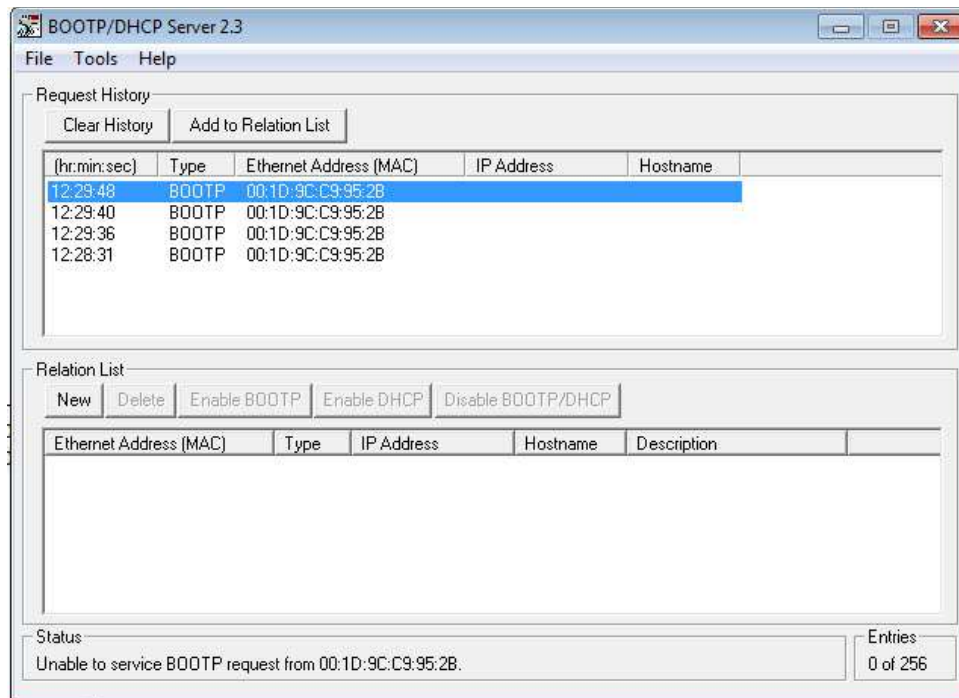


Figure 9-A
BOOTP/DHCP Server

Request History shows the 1756 Ethernet module asking for (requesting) an IP Address.

Type – matches Use BOOTP to obtain network configuration radio button –

See Figure 5-A and information scrolling on Module's display

Ethernet Address (MAC) – matches hexadecimal value scrolling on Module's display

9. Select Tool -. Network Settings from the BOOTP/DHCP Server Menu Bar

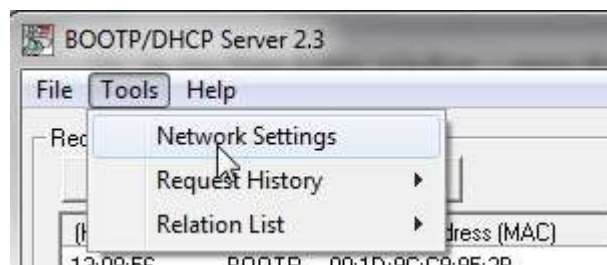


Figure 10-A
Menu Bar Tools Network Settings

The Subnet Mask setting for the utility is shown on the Network Setting window

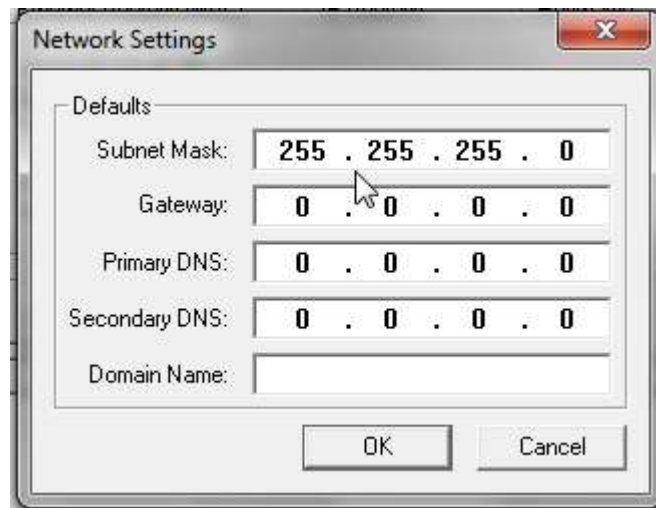


Figure 11-A
Network Settings Window

This will be the Subnet Mask setting for the receiving device.

Modify Subnet Mask Setting if required.

The Subnet Mask value will be Network Mask value for a 1756 Ethernet Module

10. Double click a line in the Request History box to open the New Entry window.

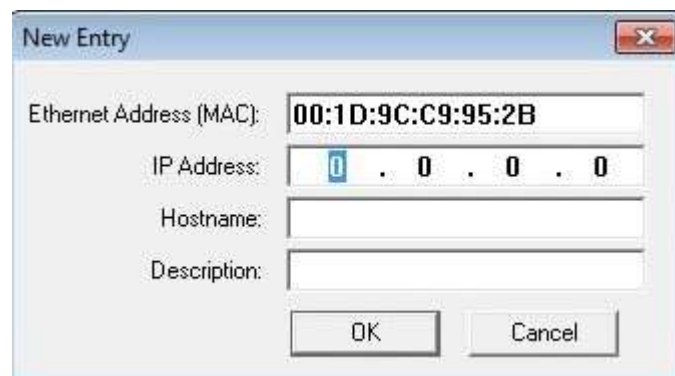
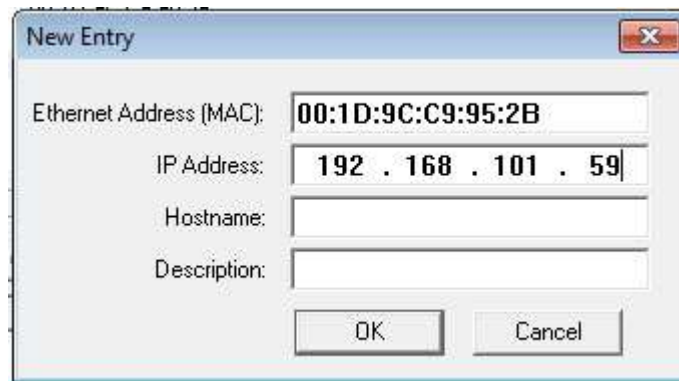


Figure 12-A
New Entry Window - BOOTP/DHCP Server

Note: the Ethernet Module will continually request an IP Address until an address is

assigned.

11. In the New Entry window – enter the IP Address to be assigned the 1756 Ethernet Module



The image shows a 'New Entry' dialog box with the following fields and values:

Field	Value
Ethernet Address (MAC):	00:1D:9C:C9:95:2B
IP Address:	192 . 168 . 101 . 59
Hostname:	
Description:	

Buttons: OK, Cancel

Figure 13-A
New Entry Window – IP Address

Note: Network ID for Ethernet module must match computer's Network ID

Device (Host) ID for Ethernet module must be different than computer's Device ID.

Click the OK button on the New Entry window

The IP Address to be assigned to the device along with the with Ethernet Address (MAC) is shown in the Relation List box.

See Figure 14-A

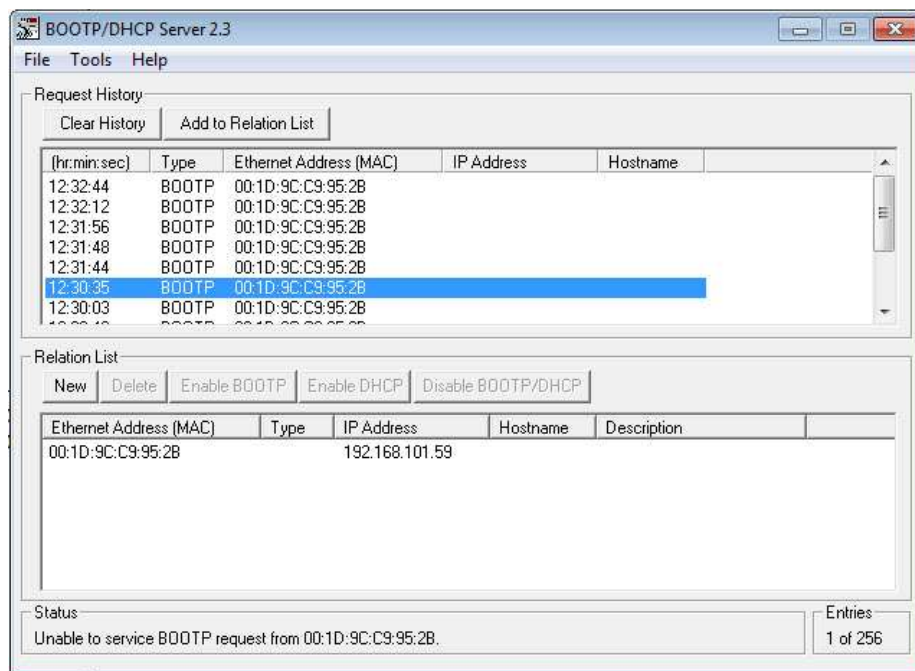


Figure 14-A - Relation List Information

- The next time the 1756 Ethernet Modules requests an IP Address, the IP Address column on the top line of the Request History box will show the assigned IP Address.

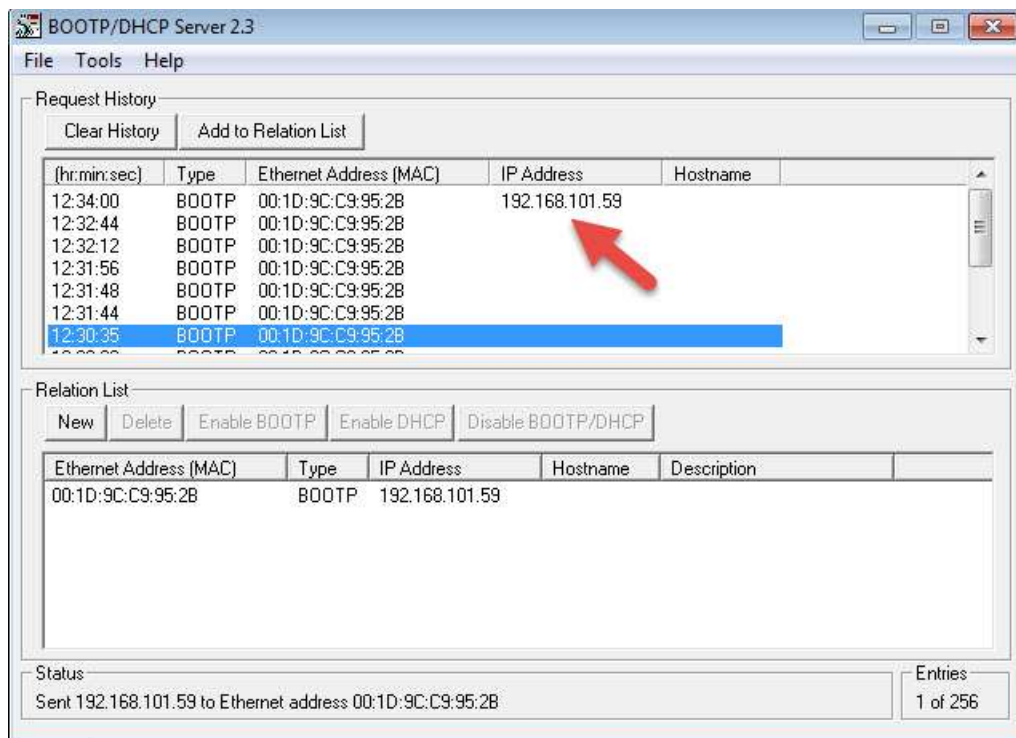


Figure 15-A - IP Address Assigned

13. View the display on the 156-EN2TR (or similar). What is the address shown on the module's display?

The 1756 Module's display will now show the IP Address assigned from the BOOTP/DHCP Server

14. Test Ethernet Connection.

Open the Command Prompt on the computer.

Click the computer's Start button

Type CMD in the Search programs and files box.

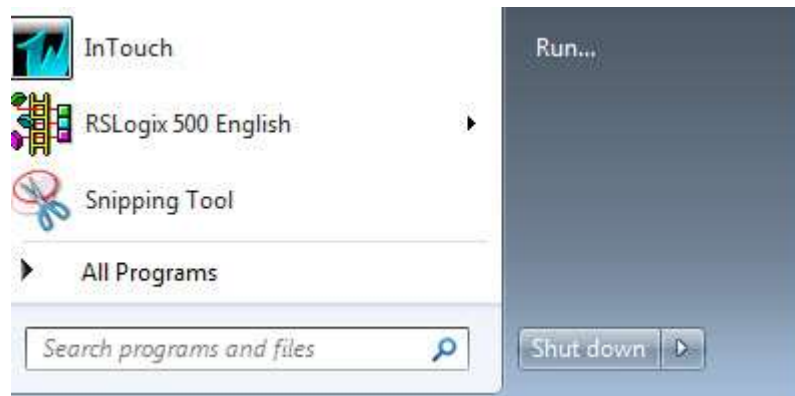


Figure 16-A

Click cmd.exe file name in Program list to run the Command Prompt application.



Figure 17-A

The Command Prompt can also be run from Start Menu -> Accessories folder.
See Figure 18-A.

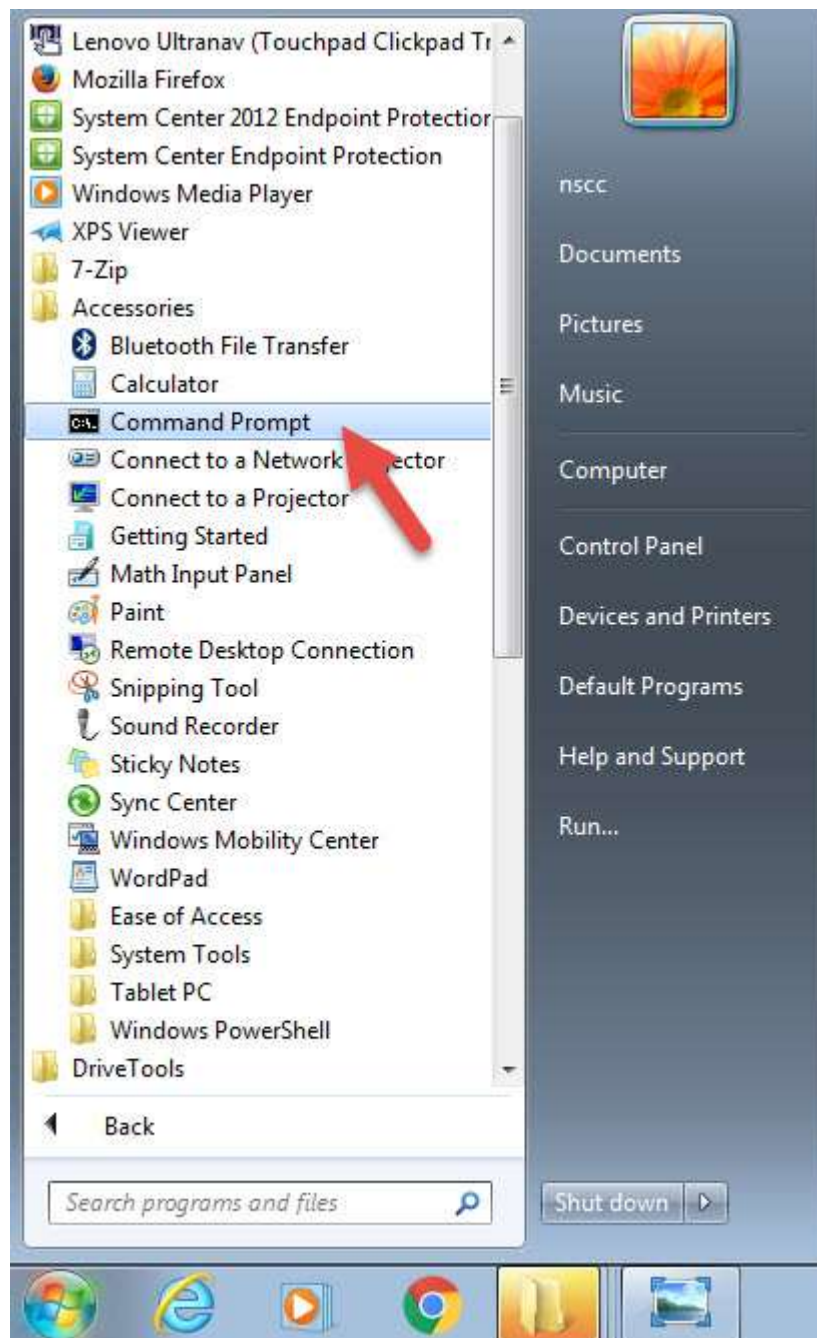
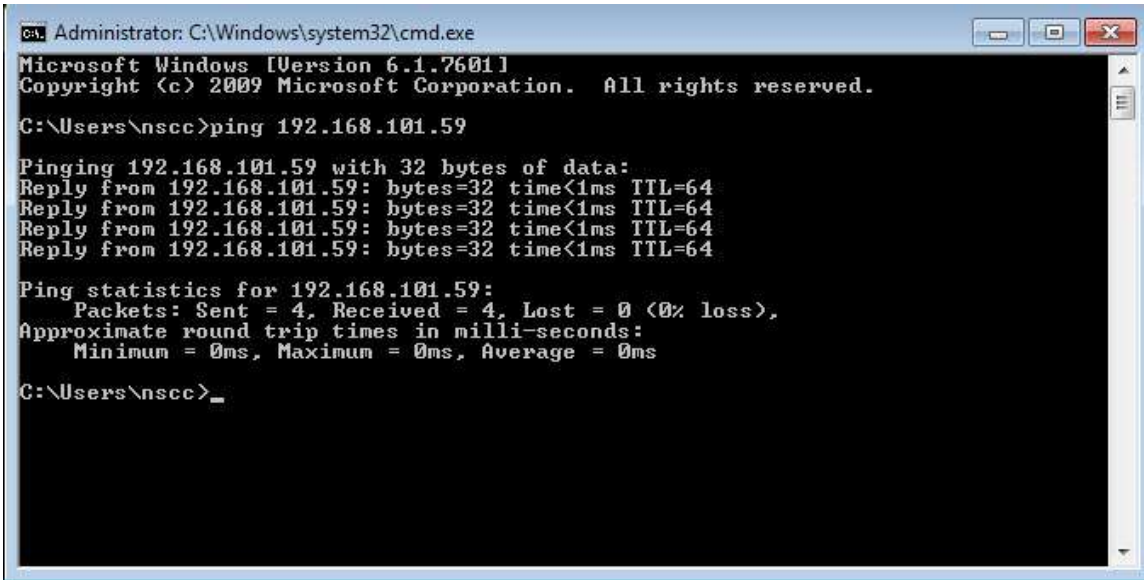


Figure 18-A
Accessories – Command Prompt

15. On the Command Prompt window type Ping xxx.xxx.xxx.xxx
Where xxx.xxx.xxx.xxx is the IP address assigned to the 1756 Ethernet Module
For example, from the IP Address in Figure 13 – A, the type
Ping 192.168.101.59 in the Command Prompt

If Ethernet module is communicating to the computer via the Ethernet connection, the Ping command will receive Replies from the 1756 Ethernet Module.



```
Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\nscc>ping 192.168.101.59

Pinging 192.168.101.59 with 32 bytes of data:
Reply from 192.168.101.59: bytes=32 time<1ms TTL=64
Reply from 192.168.101.59: bytes=32 time<1ms TTL=64
Reply from 192.168.101.59: bytes=32 time<1ms TTL=64
Reply from 192.168.101.59: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.101.59:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\nscc>
```

Figure 19 – A
Ping Command Successful – 4 Replies

16. Navigate back to The RSWho screen in RSLinx.

Note: No Red X on Ethernet module being configured.

Right click the 1756 Ethernet module and select Module Configuration

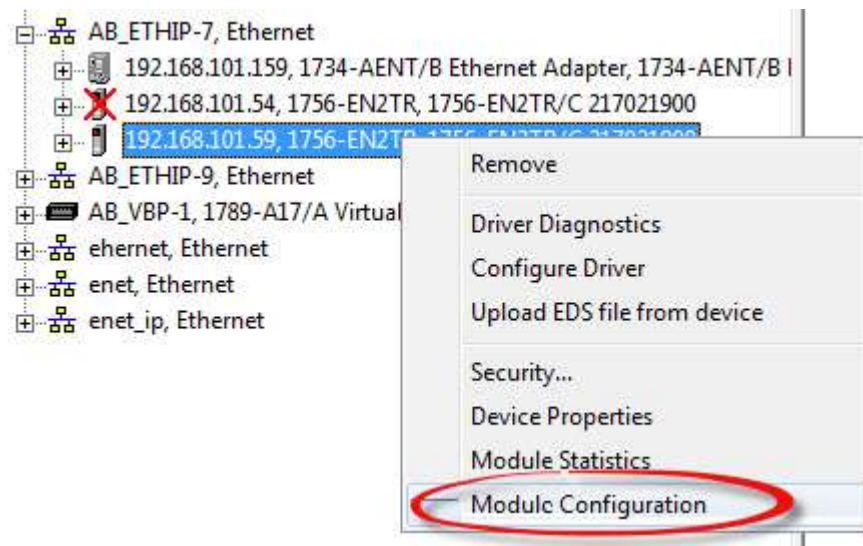


Figure 20 – A
RSLinx – RSWho Window

Click Module Configuration to open the 1756_EN2TR Configuration window.

17. On the 1756_EN2TR Configuration window – Select the Port Configuration tab.

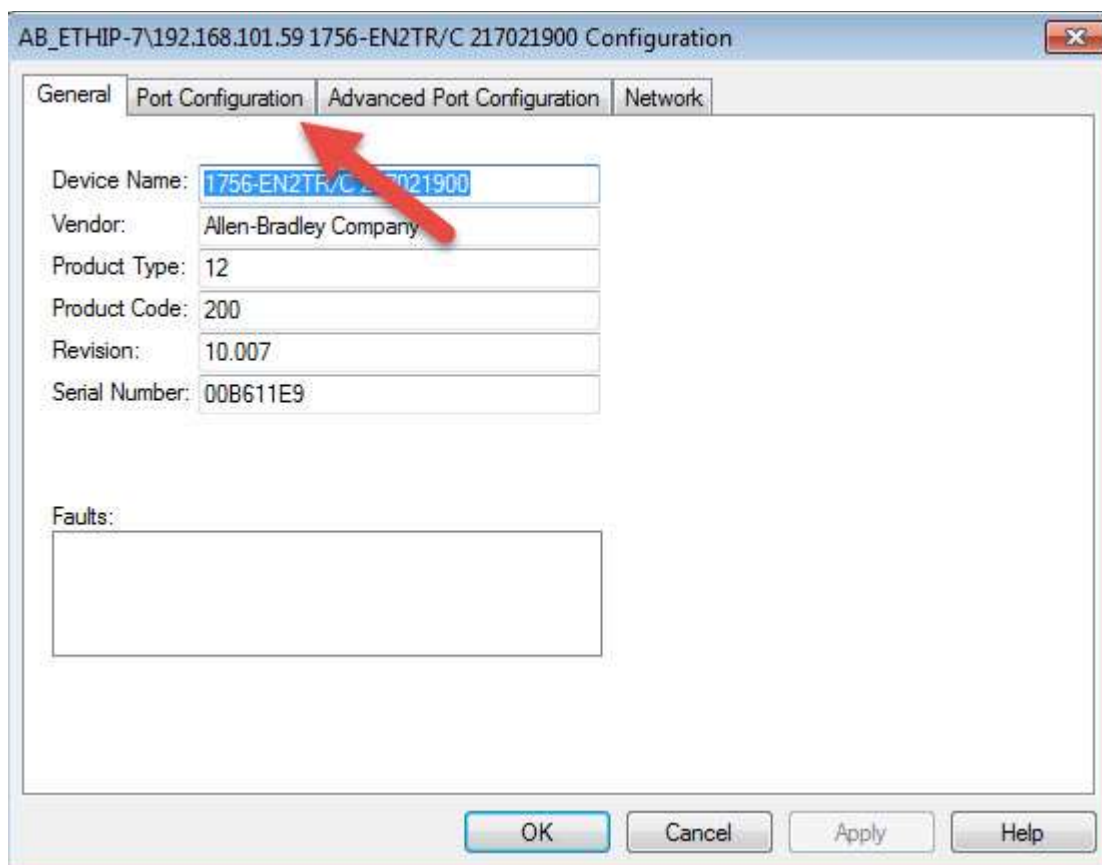


Figure 21 – A
1756_EN2TR Configuration window

18. From the Port Configuration tab - Network Configuration Type is still configured for Dynamic.

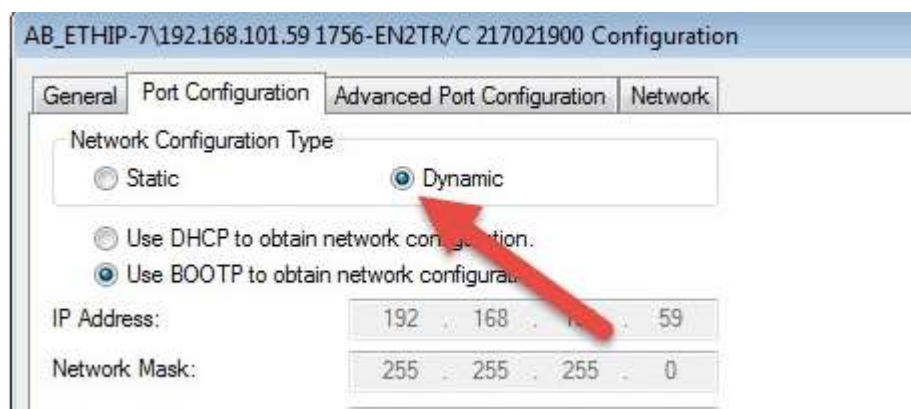


Figure 22 –A

Note: Assigned IP Address and Network Mask are greyed-out

19. Change the Network Configuration Type to Static by clicking the Static radio button.
IP Address and Network Mask no longer greyed-out.

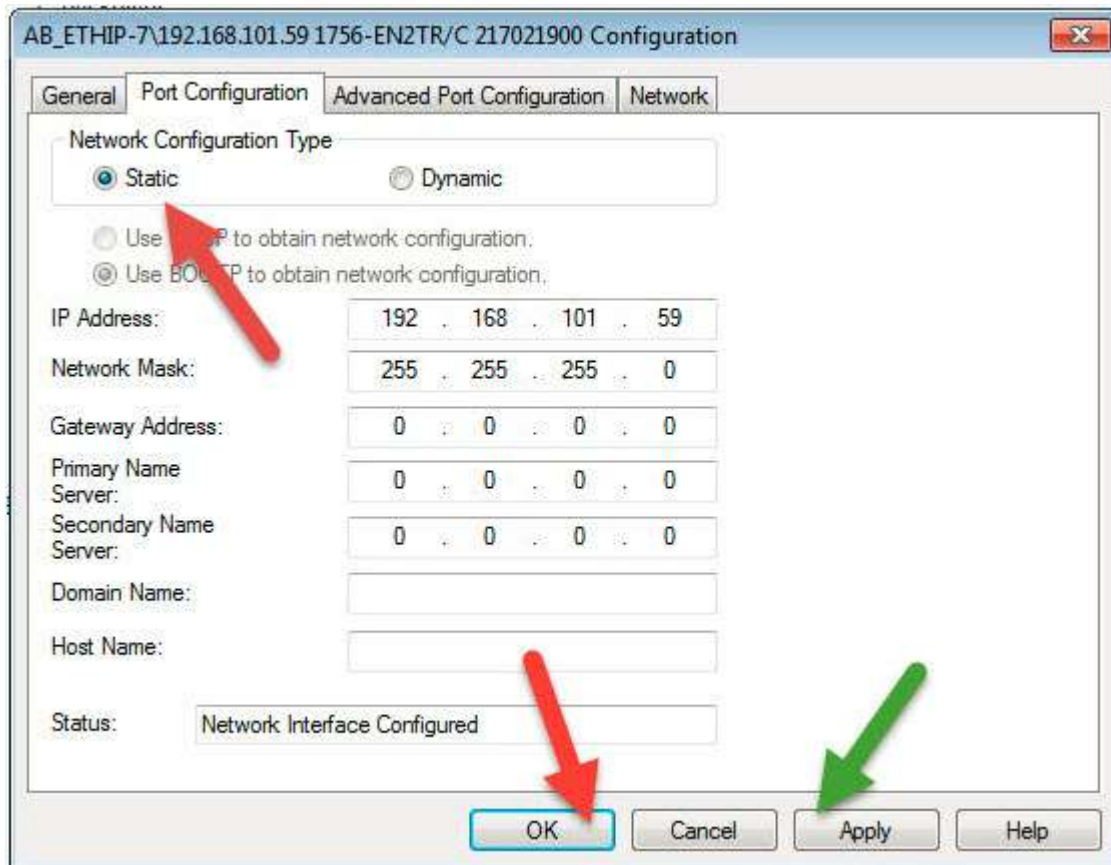


Figure 23 – A

Click OK or Apply button to except Static setting.

Note: For Industrial equipment, typically devices are configured with the Static (or similar) setting.

This ensures device will have the same IP Address and Network (Subnet) Mask on power-up.

This is important since instructions and / or configuration setting downloaded to devices, i.e. PLCs, reference Ethernet Module / Port's IP Address.

Figure 24 – A shows the Properties window for a 1756-EN2TR Ethernet Modules from RSLogix 5000 / Studio 5000 software.

Note: IP Address setting must match the actual's module's IP address.

The screenshot shows the 'General' tab of the '1756-EN2TR Properties' dialog box. The 'Type' is '1756-EN2TR 1756 10/100 Mbps Ethernet Bridge, 2-Port, Twisted-Pair Media'. The 'Vendor' is 'Allen-Bradley'. The 'Parent' is 'Local'. The 'Name' is 'local_enet'. The 'Description' is empty. The 'Module Definition' section shows 'Revision: 10.7', 'Electronic Keying: Compatible Module', 'Connection: None', and 'Time Sync Connection: None'. The 'Ethernet Address' section has three radio buttons: 'Private Network' (192.168.1.), 'IP Address' (192.168.101.122), and 'Host Name'. The 'Slot' is set to '1'. The 'Status' at the bottom is 'Offline'. Buttons for 'OK', 'Cancel', 'Apply', and 'Help' are at the bottom right.

Figure 24-A

1756-EN2TR Properties – General Tab from Studio 5000 Software

Review Questions

1. T F RSLinx can assign MAC addresses to a 1756-EN2TR Module.
2. The setting that allows a 1756 Ethernet module to have the same IP Address and Network Mask on power-up is:
 - a) Active
 - b) Fixed
 - c) Dynamic
 - d) Static

3. A new (never used) 1756 Ethernet communication module has which Network Configuration Type Setting
 - a) Static
 - b) Active
 - c) Dynamic
 - d) Fixed

4. Which software application can modify IP Addresses to an Ethernet device with Static configuration.
 - a) Tracert
 - b) RSLinx
 - c) Ping
 - d) IPConfig

5. Which utility can be used to test an Ethernet connection?
 - a) IPConfig
 - b) ARP
 - c) Enet
 - d) Ping

6. T F BOOTP/DHCP Server can assign MAC addresses to a 1756-EN2TR Module

7. A device has an IP Address of 192.168.1.56 and a Network (Subnet) Mask of 255.255.0.0. What is the device's Network ID?
 - a) 255.255.0.0
 - b) 192.168.1
 - c) 56
 - d) 192.168

8. A Network Mask is the same as a Subnet Mask:
 - a) True
 - b) False

9. MAC addresses are show in what format on the 1756-EN2TR display?

- a) Decimal
- b) Octal
- c) Binary
- d) Hexadecimal

Figure 3 - A

The outcomes of this exercise (listed on page 1) specifies the skills that the Student must demonstrate to the Instructor. Once the Instructor is satisfied with the demonstration of Knowledge & Skills by the individual student, they will sign this document (for the student), then enter a 100% into the Hands-On Lab grade in Sakai.

I verify that this student has completed all of the requirements of this Hands-On Assessment:

Student Name: _____

Faculty Signature: _____ Date: _____

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