

## Module 2

### Ethernet



**Assigning IP Addresses**

using

**BOOTP/DHCP Server**

**Student Materials**

## Student Materials for Module2: Assigning IP Addresses using BootP/DHCP

### Lesson Objective

1. Assign IP addresses to devices using either BOOTP or DHCP using the Allen Bradley BOOTP/DHCP Server
2. Configure a computer to use DHCP.
3. Configure ControlLogix Ethernet module to use BootP
4. Configure ControlLogix Ethernet module For Static Configuration
5. IP version Ethernet Addresses

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## **Introduction:**

. This lesson will cover set-up of the Allen-Bradley BootP/DHCP Server and assigning IP addresses to BootP/DHCP devices.

- DHCP – Computer
- BootP – 1756-ENBT Module

BootP – Bootstrap Protocol

DHCP- Dynamic Host Configuration Protocol

These two protocols allow devices to receive an IP address at start-up.

## **Configuring Allen-Bradley BootP/DHCP Server:**

Run the Rockwell BOOTP-DHCP server. The BOOTP-DHCP server will provide an IP address and Subnet mask to an Ethernet device.

This server can be downloaded from the Allen-Bradley's web site – <http://www.ab.com> or can be installed from the RSLogix 5000 / Studio 5000 disc.

Start > Programs > Rockwell Software > BOOTP-DHCP Server > BOOTP-DHCP Server

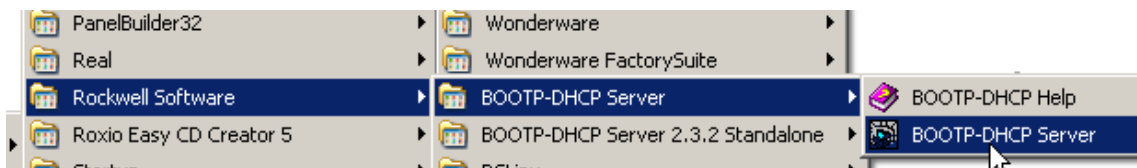


Figure 1-A  
Open BOOTP-DHCP Server

Or

Open the server using a short-cut from the computer's desktop.

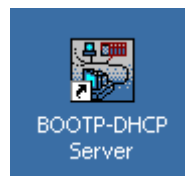


Figure 2-A  
Desktop Shortcut

Note: Computer's Ethernet port must be powered (cable connected to powered device)  
on the computer running the BootP/ DHCP Server software  
If the BOOTP/DHCP Server is run without the Computer's Ethernet Port being powered,  
the following message screen will be displayed:



Figure 3-A

Message Screen when Computer's Ethernet Port is not powered.

The first time the BOOTP/DHCP Server is run, the following message screen will be displayed:

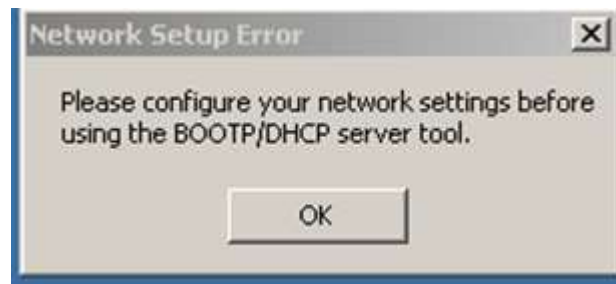


Figure 3-A

There is no Subnet Mask configured for the BOOTP/DHCP Server utility.  
Click the OK button on the Network Setup Error screen.

The Network Setting screen will be displayed

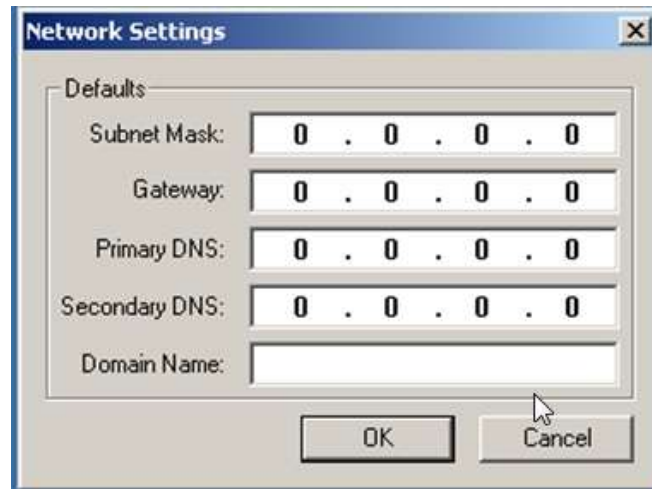


Figure 4-A  
Network Setting Screen

At a minimum the Subnet Mask the will be assigned to devices must be configured.

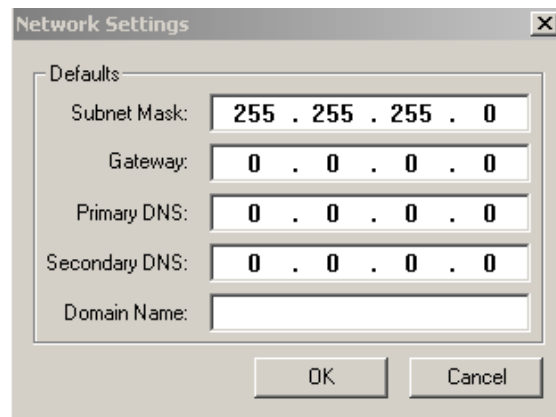


Figure 5-A  
Subnet Mask Values Entered

Click the OK button on the Network Setting screen.

With the cable plugged into the device requiring an IP address, the Ethernet Address (MAC) will appear in the Request History portion of the Bootp/DHCP Server screen.

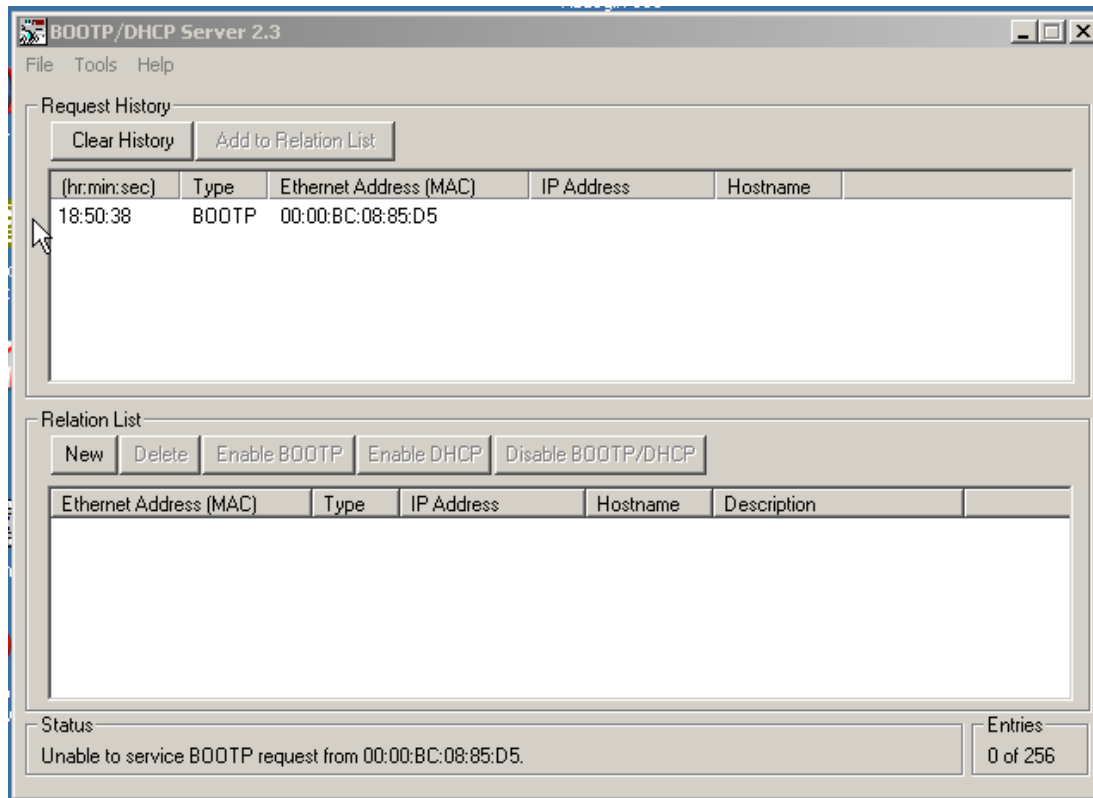


Figure 6-A  
BOOTP-DHCP Server –Device Request  
To verify Subnet Mask setting of the Server. Click Tools > Network Settings.

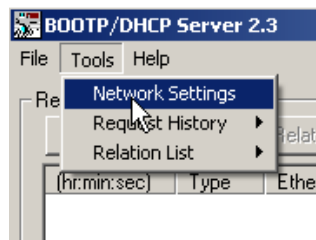


Figure 7-A - Configure BOOTP/DHCP Server Network Settings

On the Network Settings windows, verify the Subnet Mask value matches the Subnet Mask of the computer and other network devices.

Network Settings

Defaults

Subnet Mask: 255 . 255 . 255 . 0

Gateway: 0 . 0 . 0 . 0

Primary DNS: 0 . 0 . 0 . 0

Secondary DNS: 0 . 0 . 0 . 0

Domain Name:

OK Cancel

Figure 8-A

### Configure Subnet Mask of BOOTP-DHCP Server

Click the OK button.

On the BOOTP/DHCP Server's main screen, double click on an entry in the Request History area of the screen.

BOOTP/DHCP Server 2.3

File Tools Help

Request History

Clear History Add to Relation List

(hr:min:sec)	Type	Ethernet Address (MAC)	IP Address	Hostname
14:17:06	BOOTP	00:00:BC:08:85:D5		
14:17:00	BOOTP	00:00:BC:08:85:D5		
14:16:55	BOOTP	00:00:BC:08:85:D5		

Relation List

New Delete Enable BOOTP Enable DHCP Disable BOOTP/DHCP

Ethernet Address (MAC)	Type	IP Address	Hostname	Description
------------------------	------	------------	----------	-------------

Status: Unable to service BOOTP request from 00:00:BC:08:85:D5.

Entries: 0 of 256

Figure 9-A

### BOOTP/DHCP Server's Main Screen

The New Entry screen will open. The Ethernet Address (MAC) of the device that was selected from the Request History is displayed on the New Entry screen

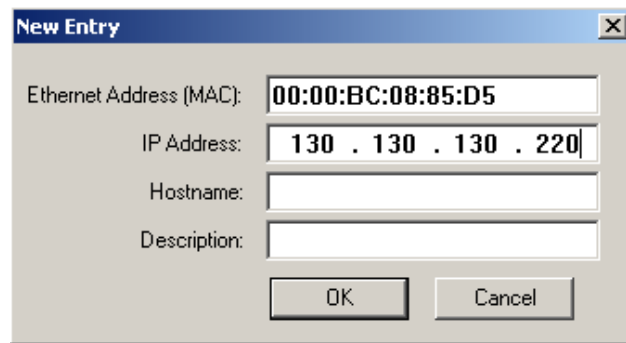


Figure 10-A  
New Entry screen

Note: Having only one requesting device connected to the network at a time will make it easier to manage assigning IP addresses

Enter an IP Address for the requesting device.

For example: Using a Subnet Mask of 255.255.255.0

The three left-most values (network-ID) must be the same as the computer's IP address.

The right-most value,(host-ID) must be different for the computer's value and must be between the values (1-254).

Based on Router on the network:

For communication to take place the Network ID and Subnet Mask of connected devices must match.

Device ID values must be different on the connect devices

The Request History area of the server shows network devices requesting an IP address. The type column shows the protocol a device is using to request an IP address, either BootP or DHCP.

The Ethernet Address (MAC) column shows the MAC address of the requesting device.

Once the Entry Screen is completed, click the OK button on the New Entry screen

The IP Address and Ethernet Address (MAC) information from the New Entry screen appears in the Relation List area of the Bootp/DHCP Sever screen.



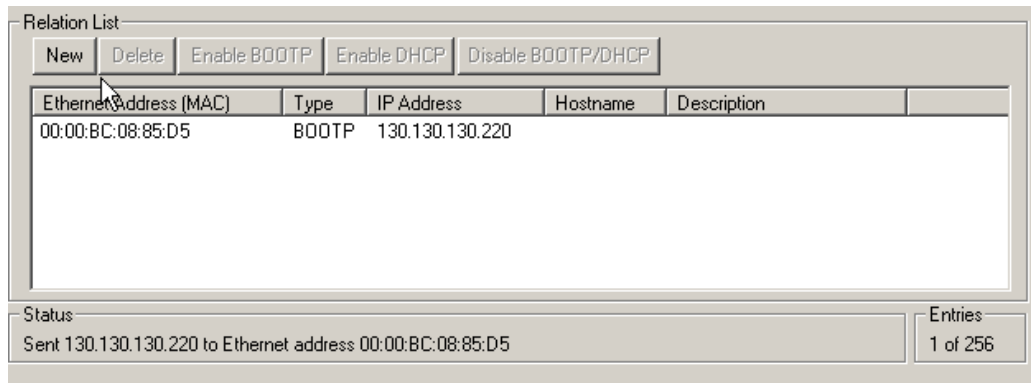


Figure 11-A  
Relation List Area BOOTP/DHCP Server

Once an entry is in the Relation List, the next time that device requests an address the IP address and Subnet Mask will be assigned to the device.

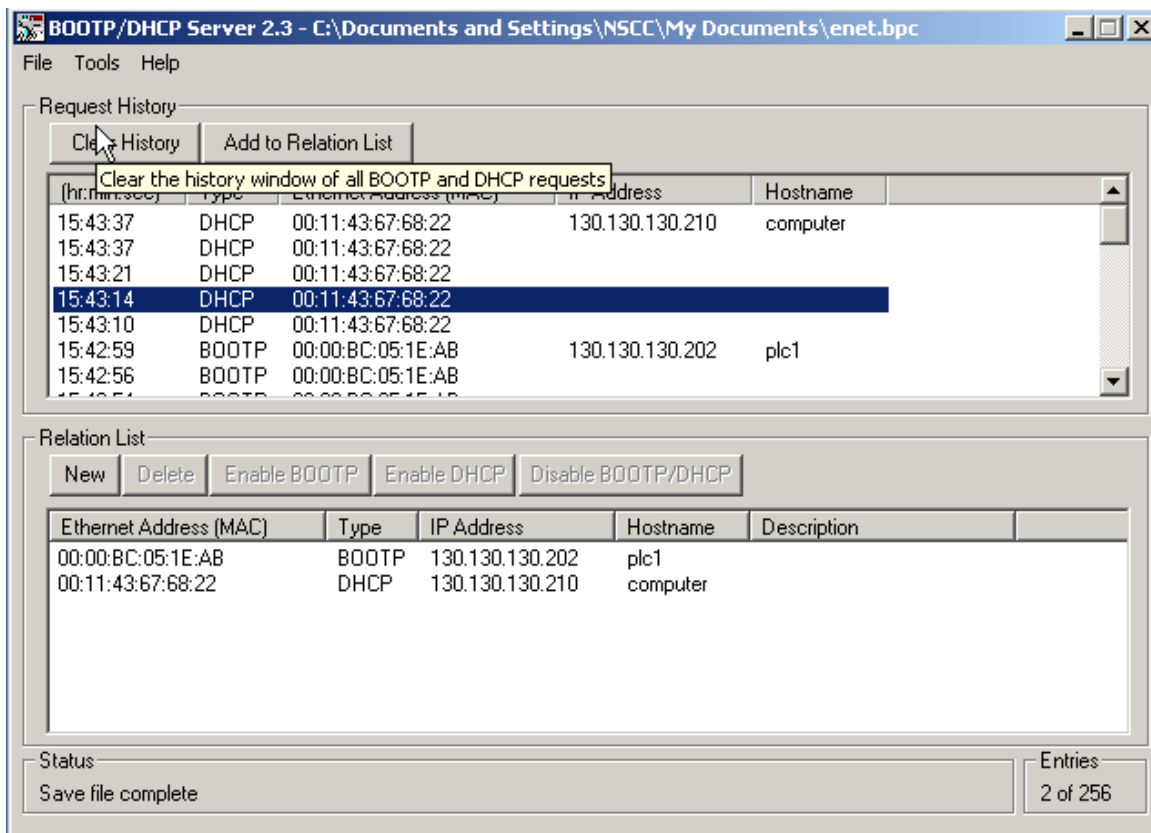


Figure 12-A  
Assigning IP Addresses using BOOTP/DHCP Server

Once an IP address appears in the IP Address column of the Request History area, the IP address has been assigned to the device.

Note: Hostnames are optional (generally not used for Industrial networks)

Test the receiving device addressing by using using the PING utility.

### **Set-up A Computer to use DHCP:**

Navigate to the Internet Protocol (TCP/IP) Properties screen.

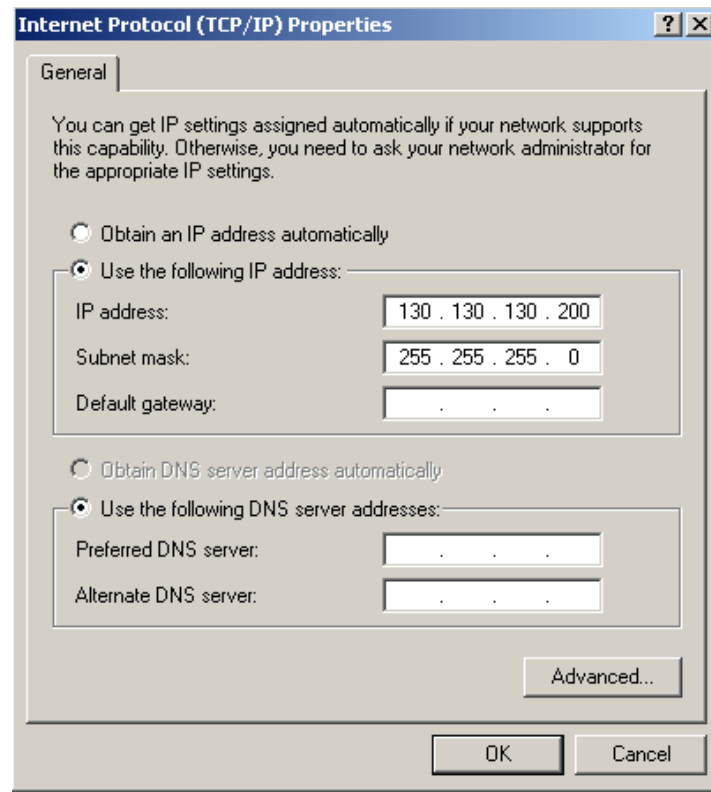


Figure 13-A

Click Obtain an IP address automatically radio button.

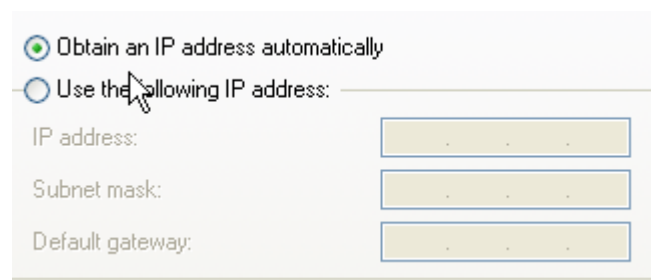


Figure 14-A

Click OK button on Internet Protocol (TCP/IP) Properties screen. See Figure 13-A.

Click OK button on Local Area Connections Properties screen to save settings.

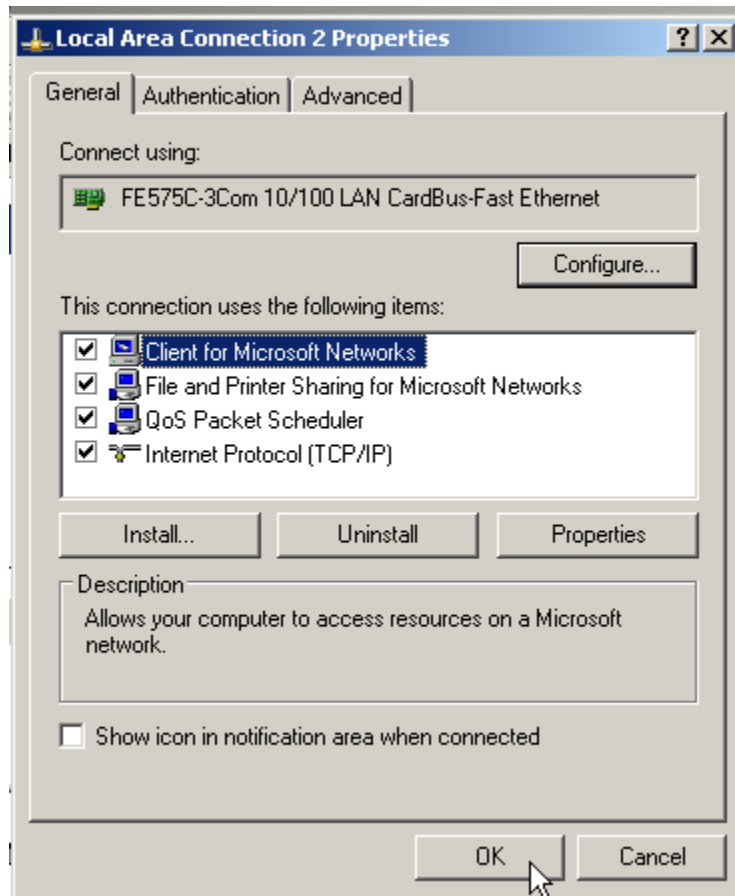


Figure 15-A

### **ControlLogix Ethernet Module Configuration:**

Navigate to the RS-Who Screen in RSLinx.

Select the ControlLogix Ethernet module to view the module's configuration.

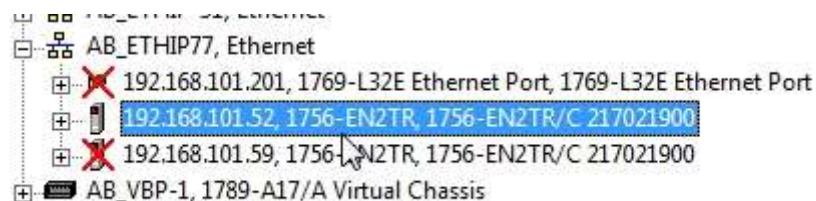


Figure 16-A- Ethernet Module Selected  
RSWho screen RSLinx

Right click on the module's IP address and choose Module Configuration

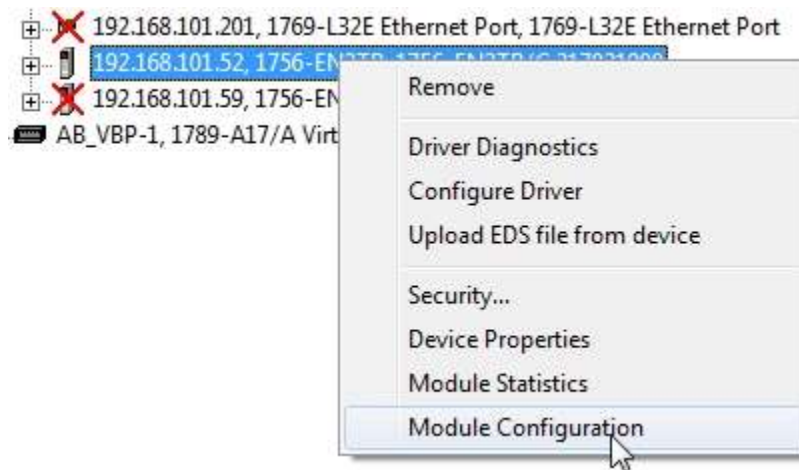


Figure 17-A

This will open the Configuration screen for the selected module.

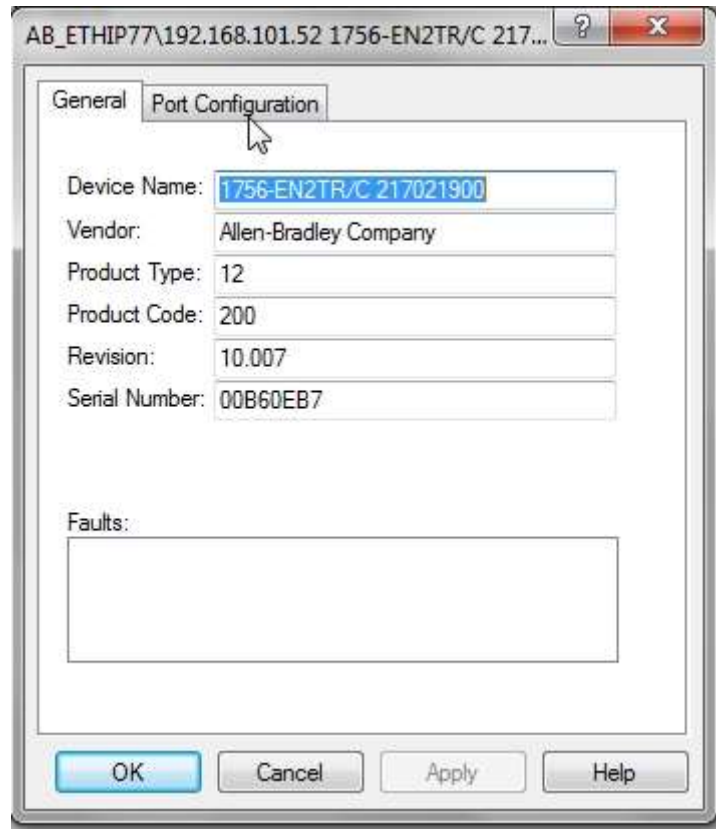


Figure 18-A  
Module Configuration Screen

Note: Depending on the Ethernet module's Part Number and Revision number the Configuration Screen may appear different.

Click the Port Configuration Tab.

**1756-ENBT Configuration**

General | **Port Configuration**

Network Configuration Type

☐ Static ☒ Dynamic

☐ Use DHCP to obtain network configuration.

☒ Use BOOTP to obtain network configuration.

IP Address: 130 . 130 . 130 . 177

Network Mask: 255 . 255 . 255 . 0

Gateway Address: 0 . 0 . 0 . 0

Primary Name Server: 0 . 0 . 0 . 0

Secondary Name Server: 0 . 0 . 0 . 0

Domain Name:

Host Name: 130.130.130.177

Status: Network Interface Configured

OK Cancel Apply Help

Figure 19-A  
Ethernet Module - Port Configuration Tab

Note: Network Mask setting is the same as a Subnet Mask setting.

Note: Depending on the Ethernet module's Part Number and Revision number the Port Configuration tab information may appear different.

If the Dynamic radio button is selected, whenever the Ethernet module is powered-up, it will request an IP address.

If the Dynamic radio button is selected, whenever the Ethernet module is powered-up it will display its Ethernet Address (MAC) on the module's scrolling display.

If the Static radio button is selected, whenever the Ethernet module is powered-up, it will use the IP Address and Network Mask settings assigned on the Port Configuration tab .

If the Static radio button is selected, whenever the Ethernet module is powered-up it will display its IP address on the module's scrolling display.

To save any configuration changes, click the OK button.

The default setting for a ControlLogix Ethernet module's Network Configuration Type is Dynamic, i.e. the module does not have an IP Address assigned. Use the BOOTP/DHCP Server utility or some other method to assign an IP Address to the module.

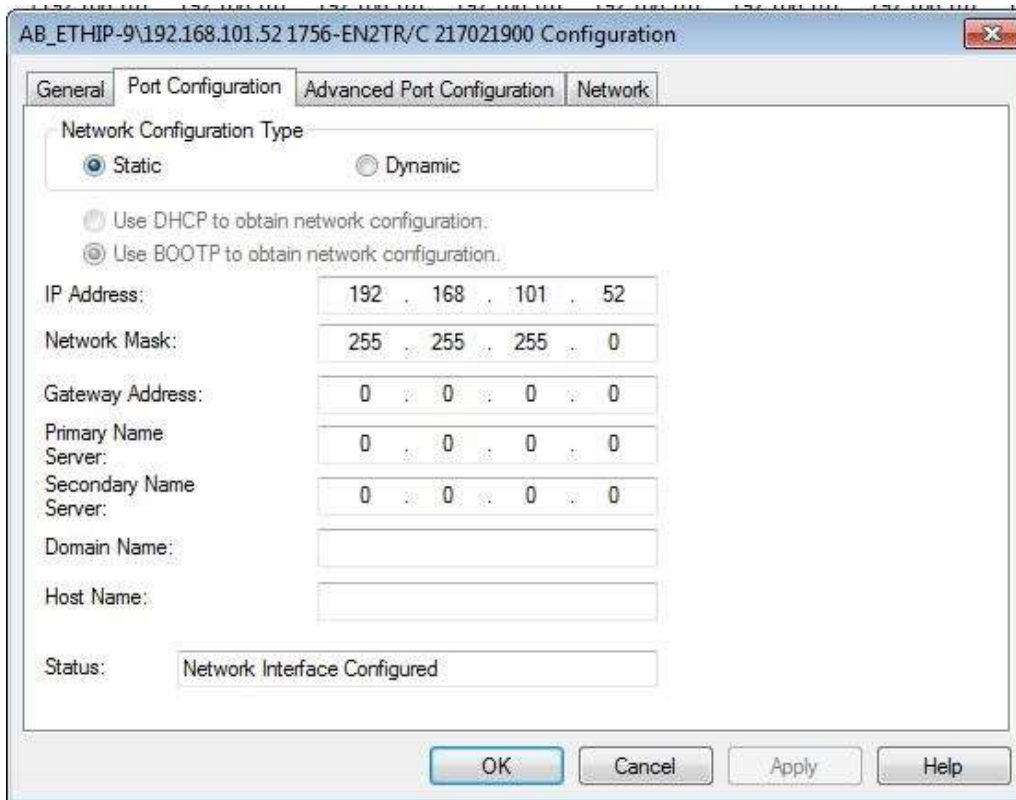
Note: An Ethernet module requires an IP Address and Subnet (Network) Mask to function on a network.

Typically on industrial networks addresses are hard-coded (Static) so the device will have the same address on a power-up.

To configure an Ethernet Module for Static, select the Static radio button from the module's Network Configuration Type settings.

On Power-up the module will use the IP Address and Network Mask (Subnet Mask) settings that are configured on the Port Configuration tab.

For settings in Figure 20-A  
IP Address 192.168.101.52  
Network Mask 255.255.255.0



AB\_ETHIP-9\192.168.101.52 1756-EN2TR/C 217021900 Configuration

General Port Configuration Advanced Port Configuration Network

Network Configuration Type

☒ Static ☐ Dynamic

☐ Use DHCP to obtain network configuration.

☒ Use BOOTP to obtain network configuration.

IP Address: 192 . 168 . 101 . 52

Network Mask: 255 . 255 . 255 . 0

Gateway Address: 0 . 0 . 0 . 0

Primary Name Server: 0 . 0 . 0 . 0

Secondary Name Server: 0 . 0 . 0 . 0

Domain Name:

Host Name:

Status: Network Interface Configured

OK Cancel Apply Help

Figure 20-A  
Static Configuration for ControlLogix Ethernet Module – 1756-EN2TR

Click the Apply or OK button to save setting changes.

If a static address is required and there is no BOOTP/DHCP Server on the network, an IP address and Subnet (Network) mask can be assigned by connecting to the ControlLogix processor using the AB\_DF1 driver and a 1756-CP3 cable (RS-232) or using an USB connection on a processor (1756-L7x) or communication modules (1756-EN2TR) .

See RSLinx Lessons for information on communication configurations

Note: Some version of ControlLogix Ethernet Modules can manually be configured using rotary switches on the module.  
Example 1756-EN2TR modules



Figure 21-A – Rotary Switches used for manual module configuration



## Ethernet Addresses

The Ethernet address is a hard-coded address assigned to a device by the manufacturer and is specific to that device.

Typically Allen Bradley devices with Ethernet ports will have a label that shows the Ethernet (MAC) address of the device.

Note: Ethernet (MAC) Addresses are assigned to devices by the manufacturer

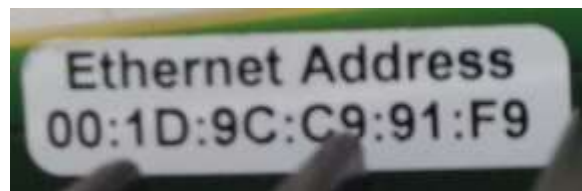


Figure 22-A

Label on ControlLogix Ethernet Module showing Ethernet Address

Ethernet Address is also known as – MAC Addresses  
Physical Addresses  
Hardware Addresses

Ethernet (MAC) Addresses are 48 bit numbers that are displayed in a Hexadecimal format.

Note: IP Addresses are sometimes referred to as Logical Addresses and are 32 bits numbers for version 4 addressing.

Typically Version 4 IP addresses are displayed in a dotted decimal format.

Note: Version 6 IP addresses are 128 bit values displayed in a hexadecimal format

Allen Bradley ControlLogix Ethernet modules use version 4 IP Addressing

## Review Questions

1.    T     F     A Ethernet Address is assigned to a device using the Allen Bradley BOOTP / DHCP Server Utility.
2.    What setting on a ControlLogix Ethernet Module requires an IP address to be assigned on power-up.
  - a)   Active
  - b)   Static
  - c)   Dynamic
  - d)   Hardware
3.    T     F     An Ethernet device does not require a Subnet Mask
4.    T     F     Version 4 IP Addresses are 16 bit values
5.    T     F     An IP Address is assigned to an Ethernet device by the manufacturer and cannot be changed by the user.
6.    T     F     Assigning an IP Address to a ControlLogix Ethernet module must be done with the BOOTP / DHCP Server Utility.
7.    A Ethernet device has a Network ID of 192.168.1, its Subnet Mask is:
  - a)   255.0.255
  - b)   255.255.255.0

- c) 0.0.0.255
  - d) Cannot determine
8. A computer is assigned a IP address of 172.52.32.22 and a Subnet Mask of 255.255.0.0. Which of the addresses could be assign to a ControlLogix Ethernet Module so that the computer can communicate to the Ethernet Module.
- a) 172.52.32.22
  - b) 172.1. 100.5
  - c) 173.52.32.56
  - d) 172.52.15.16
9. A MAC address is also know as \_\_\_\_\_ adresses
- a) Logical
  - b) Hardware
  - c) IP
  - d) Ethernet
10. T F The BOOTP / DHCP Server Utility cannot assign a Network Mask to a ControlLogix Ethernet Module.
- .
11. T F Allen Bradley's Ethernet modules can use version 6 IP Addressing.

12. The BOOTP / DHCP Server Utility can assign which configuration settings to a Ethernet device?
- a) Speed
  - b) IP Address
  - c) Hardware Address.
  - d) SubnetMask
13. Which communication bridge module would be used to connect Ethernet to the ControlLogix chassis?
- a) 1756-DNB
  - b) 1756-ENBT
  - c) 1756-EN2TR
  - d) 1756-CCB
14. A computer is assigned a IP address of 192.168.1.55 and a Subnet Mask of 255.255.255.0. Which of the addresses could be assign to a ControlLogix Ethernet Module so that the computer can communicate to the Ethernet Module.
- a) 192.168.1.45
  - b) 192.168.1.55
  - c) 192.168.101.36
  - d) 192.168.1.22

**Review Question Answers:**

- 1) F
- 2) c
- 3) F
- 4) F
- 5) F
- 6) F
- 7) b
- 8) d
- 9) b and d
- 10) F
- 11) F
- 12) b and d
- 13) b and c
- 14) a, and d

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