PLC220

Lab Exercise 4

Assigning IP Address

using BOOTP/DHCP Server
Student Materials for Lab Exercise 4: Assigning IP Address

Lesson Objective
By the end of this session, students should be able to:

1. Explain basic set-up of Ethernet Communication Modules
2. Use BOOTP/DHCP Server to assign IP Addresses.
3. Use PING Utility.

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Introduction:
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.

![Diagram of Ethernet setup](image)

Figure 1-A
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

   AB_ETHIP-7, Ethernet
   192.168.101.159, 1734-AENT/B Ethernet Adapter; 1734-AENT/B
   192.168.101.54, 1756-EN2TR, 1756-EN2TR/C 217021900

   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.
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](image)
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 sent 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 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
I AM iSTAR, A DOL funded project

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.

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

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 Ethernet Address (MAC) is shown in the Relation List box.

See Figure 14-A
12. 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.
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. The search window in Windows.](image)
   Click cmd.exe file name in Program list to run the Command Prompt application.

   ![Figure 17-A. The Command Prompt executable file.](image)
   The Command Prompt can also be run from Start Menu -> Accessories folder. See Figure 18-A.
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.

![Ping Command Successful](image)

**Figure 19 – A**
Ping Command Successful – 4 Replies


Note: No Red X on Ethernet module being configured.

Right click the 1756 Ethernet module and select Module Configuration.

![Module Configuration](image)

**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.

![1756_EN2TR Configuration window](image)

18. From the Port Configuration tab - Network Configuration Type is still configured for Dynamic.
19. Change the Network Configuration Type to Static by clicking the Static radio button. IP Address and Network Mask no longer greyed-out.

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.

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) IPCconfig
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 shown in what format on the 1756-EN2TR display?
   a) Decimal
   b) Octal
   c) Binary
Review Question Answers

1) F
2) d
3) c
4) b
5) d
6) F
7) d
8) T
9) d

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