

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.



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



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.



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Figure 3-A. Module Configuration for the Ethernet module.

4. Navigate to Port Configuration Tab.

Network Configuration Typ	pe	-						
 Static 	0	Dyna	amic					
 Use DHCP to obtain Use BOOTP to obtain 	network co in network (onfig	uratio igurat	n. ion.				
IP Address:	192		168	10	101	•	59	
Network Mask:	255	•	255	8:	255	•	0	
Gateway Address:	0		0	82	0	22	0	
Primary Name Server:	0	133	0	83	0	8	0	
Secondary Name Server:	0		0	٥.	0		0	
Domain Name:								
Host Name:								
Status: Network Int	erface Conf	gure	ed					

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.

Port Configuration	n Advanced	d Po	rt Con	figu	ration	N	etwork		
Network Configuration T	ype								
Static	۲	Dyn	amic						
Use DHCP to obta	in network co	n.	, tio	n.					
Use BOOTP to ob	tain network (conf	igura.						
P Address:	192		168			1	59		
Network Mask:	255	•	255		255		0		
Gateway Address:	0	1	0	1	0		0		
Primary Name Server:	0		0		0	÷	0		
Secondary Name Server:	0	÷	0		0		0		
Domain Name:									
Host Name:									
Status: Network Ir	nterface Confi	gure	ed						

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.

eneral Port Configuration	Advanced	l Po	rt Cor	nfigu	ration	N	etwork	
Network Configuration Ty	pe							
Static	۲	Dyn	amic					
Use DHCP to obtain Use BOOTP to obtain Use	n network co ain network o	onfig conf	juratio igurat	n. ion.				
P Address:	192	2	168	61	101	2	59	
letwork Mask:	255	•	255		255	•	0	
iateway Address:	0	1	0	1	0		0	
rimary Name erver:	0		0		0	-	0	
econdary Name erver:	0		0		0		0	
omain Name:								
lost Name:				_				
tatus: Network Int	terface Confi	gure	ed		1			

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.

RSLogix 5	000
	DANGER. Connection Interruption.
	Changing connection parameters online will interrupt connection(s) to this module and to any modules connected through this module. Connection(s) from other controllers may be broken.
	Apply changes?
	Yes No Help

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 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 / damanged 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.



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(nr:min:sec)	Туре	Ethernet Addr	ess (MAC)	IP Address	Hostname		
12:29:48 12:29:40 12:29:36 12:28:31	BOOTP BOOTP BOOTP BOOTP	00:1D:9C:C9: 00:1D:9C:C9: 00:1D:9C:C9: 00:1D:9C:C9:	30128 95:28 95:28 95:28				
New Delet	e Enable ess (MAC)	BOOTP En	able DHCP	Disable BOOTP/DHO	Description	1	

Figure 9-A BOOTP/DHCP Server

Request History shows the1756 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

BOOT	TP/DHCP Server 2.3	
File To	ools Help	
Rec	Network Settings	
	Request History	•
L (t	Relation List	Iress (MAC)
12.00	Figure 10-	-A
Μ	enu Bar Tools Netv	work Settings

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



Netw	ork Settings						×
D	efaults				 		
	Subnet Mask:	25	5.	255	255	•	0
	Gateway:	0		30	0		0
	Primary DNS:	0		0	0		0
Se	econdary DNS:	0		0	0		0
	Domain Name:						
				OK		Ca	ancel

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.

thernet Address (MAC):	00:1D	:9C:C	9:95	5:2B		
IP Address:	0	. 0	•	0	•	0
Hostname:						
Description:						_

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

ry	-
Address (MAC):	00:1D:9C:C9:95:2B
IP Address:	192 . 168 . 101 . 59
Hostname:	
Description:	
	OK Cancel
	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



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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	*
12:32:44 BOOTP 12:32:12 BOOTP 12:31:56 BOOTP 12:31:48 BOOTP	00:1D:9C:C9:95:2B 00:1D:9C:C9:95:2B 00:1D:9C:C9:95:2B 00:1D:9C:C9:95:2B 00:1D:9C:C9:95:2B			E
12:31:44 BOOTP	00:1D:9C:C9:95:2B			
12:30:03 BOOTP	00:1D:9C:C9:95:2B			-
Relation List	ole BOOTP Enable DHCP D	isable BOOTP/DHCP]	
Ethernet Address (MAC)	Type IP Address	Hostname	Description	1
00:1D:9C:C9:95:2B	192.168.101	.59		
Status Unable to service BOOTP	request from 00:1D:9C:C9:95:2E	3.		Entries 1 of 256

Figure 14-A - Relation List Information

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.

Intimitiesecj Type Externet Address (MAC) IP Address Hostname 12:34:00 BOOTP 00:1D:9C:C9:95:28 192.168.101.59 12:32:12 BOOTP 00:1D:9C:C9:95:28 192.168.101.59 12:31:56 BOOTP 00:1D:9C:C9:95:28 192.168.101.59 12:31:48 BOOTP 00:1D:9C:C9:95:28 192.112 12:31:48 BOOTP 00:1D:9C:C9:95:28 192.112	
12:30:35 BOOTP 00:1D:90:09:95:2B	
Ist Delete Enable BOOTP Enable DHCP Disable BOOTP/DHCP Ethermet Address (MAC) Type IP Address Hostname Description 00:1D:9C:C9:95:2B BOOTP 192.168.101.59 IPAddress IPAddress	

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. The search window in Windows.

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

Programs (1)	
cmd.exe	

Figure 17-A. The Command Prompt executable file.

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 Where 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.	Â
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.

FOILC	onfiguration Advanced Port Configuration	Network		
Device Name:	1756-EN2TR/C> 7921900			
Vendor:	Allen-Bradley Company			
Product Type:	12			
Product Code:	200			
Revision:	10.007			
Serial Number:	00B611E9			
Faults:				

Figure 21 – A 1756 EN2TR Configuration window

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



eneral Port Configurati	on Advanced Port Configuration Network
Network Configuration	Туре
Static	Oynamic
Use DHCP to obt	ain network con Junition.
 Use DHCP to obt Use BOOTP to of Address: 	tain network configuration. btain network configuration 192 . 168 . 1

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.

General Port Configuration	n Advanced	d Po	ort Cor	figu	ration	N	letwork		
Network Configuration 1	уре								
Static	0	Dyn	amic						
O Use	ain network co	onfig	uratio	n.					
() Use BOC TP to ob	tain network o	conf	igurat	ion.					
IP Address:	192		168		101		59		
Network Mask:	255		255		255		0		
Gateway Address:	0	0	0		0	12	0		
Primary Name Server:	0	-	0	1.20	0	10	0		
Secondary Name Server:	0	14	0		0	(c	0		
Domain Name:									
Host Name:									
Status: Network I	nterface Confi	iaure	ed		-		_		
		301	1.15						
			_						

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 RSLogx 5000 / Studio 5000 software.

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

General Connection	on RSNetWorx Module Info Internet Protocol Port Configuration Network Time Sync
Type: 1 Vendor: A Parent: La Name: Description: Module Definition Revision: Electronic Keying Connection: Time Sync Conn	756-EN2TR 1756 10/100 Mbps Ethemet Bridge, 2-Port, Twisted-Pair Media Change Type ← llen-Bradley ocal enet Dcal enet Dcal enet Change Change 10.7 g: Compatible Module None nection: None
Status: Offline	OK Cancel Apply Help 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 a 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

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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