

# **DHCP IP Assignment**



## **APPLICATION NOTE**

How to use Xena as a DHCP server

**NOTE:** To use this method you need to <u>download a zip</u> <u>folder</u> containing 2 text documents.



When a Device Under Test (DUT) relies on the Dynamic Host Configuration Protocol (DHCP) to obtain an IP address prior to testing, it may not be desirable to add an additional device into the test environment to act as a DHCP server. This could be due to costs, space, heat or power usage or IT management restrictions.

You can download a script from the Teledyne LeCroy Xena web site that enables your Xena traffic generator to function as a basic DHCP server.

### The DHCP Process

DHCP IP assignment follows 4-step DORA (Discovery, Offer, Request, Acknowledgment) process as below:

### 1. DHCP Discover

The client sends broadcast messages on the network subnet using the destination address 255.255.255 or the specific subnet broadcast address.

#### 2. DHCP Offer

When a DHCP server receives a DHCPDISCOVER message from a client (which is an IP address lease request), the server reserves an IP address for the client and makes a lease offer by sending a DHCPOFFER message to the client. This message contains the client's MAC address, the IP address that the server is offering, the subnet mask, the lease duration, and the IP address of the DHCP server making the offer.

#### 3. DHCP Request

In response to the DHCP offer, the client replies with a DHCP request, broadcast to the server, requesting the offered address.

#### 4. DHCP Acknowledgment

This stage involves sending a DHCPACK packet to the client. The packet includes the lease duration and any other configuration information that the client might have requested. At this point, the IP configuration process is completed.



Here is an illustration of the DHCP DORA process:





### The Teledyne LeCroy Xena Script

- The Teledyne LeCroy Xena script **dhcp\_server.py** loads the **dhcp\_server.xpc** file to configure the port that will act as DHCP server.
- It then configures two streams, one for the DHCP offer and another for the DHCP acknowledgment on this port.
- It sends a DHCP offer with IP address, subnet mask and GW (see dhcp\_server.py line number 173 177) to the DUT as soon as it receives the DHCP discovery request on the connected test port. The scripts fetch the MAC address of the source out of DHCP discovery message.
- And finally, in order to assign an IP address to the DUT, it sends a DHCP acknowledgment in response to the DHCP request message (as per the DORA process).

### How to implement:

First, download this <u>zipped folder</u>, which contains the two text file below (or go to https://xenanetworks.com/wp-content/uploads/xena-dhcp-server-v2.zip):

- dhcp\_server.py
- dhcp\_server.xpc

Please keep both the dhcp\_server.py script and dhcp\_server.xpc files in the same directory folder

- 1) Change the Xena chassis management IP address in script dhcp\_server.py line 166 (which is located close to the end of the file).
- Edit script dhcp\_server.py line 172 the to use the Xena test port of your choice. Default content of line 172 is: "0/0"

The first "0" is the module number, while the second "0" is the port number.

164		
165	Edef	run all():
166		<pre>chassis = "192.168.1.200" #IP address of chassis running the DHCP server</pre>
167		<pre>server_config = "dhcp_server.xpc"</pre>
168		
169	白	<pre>with DHCPServer(chassis, server_config, log_level = logging.INFO) as dhcp:</pre>
170		# each call of dhcp.act will run in separate Thread
171	白	dhep.act(
172		"0/0", # Number of module / number of port running the DHCP server
173		'11.11.11.138', # DHCP server IP
174		'11.11.11.10', # Client IP
175		'255.255.255.0',# Subnet mask
176		'11.11.138', # Router IP
177	-	'11.11.11.138' # DSN IP
178	L	)

Lines 166 and 172 in dhcp\_server.py are shown below:

Hint: If you use Notepad++ as editor you will get line numbers shown as indicated above.

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Save the script file after editing.

3) Download Python (version 3.10.2) from

https://www.python.org/downloads/release/python-3102/

To install Python make sure that the "Add Python to PATH box has been checked and then select "Customize installation".



In the page that opens make sure that the boxes below are checked and press "Next"



Python 3.10.1 (64-bit) Setup	- 🗆 X	
	Optional Features	
	☑ Documentation	
	Installs the Python documentation file.	
	⊠ <u>p</u> ip	
	Installs pip, which can download and install other Python packages.	
	☑ tcl/tk and <u>I</u> DLE	
	Installs tkinter and the IDLE development environment.	
	☑ Python <u>t</u> est suite	
and the second	Installs the standard library test suite.	
	py launcher in for all users (requires elevation)	
	Installs the global 'py' launcher to make it easier to start Python.	
python		
for		
	<u>B</u> ack <u>N</u> ext <u>C</u> ancel	,

In the page that now opens make sure that the boxes below are checked and press "Install"

Python 3.10.1 (64-bit) Setup	-			×
	Advanced Options			
	Install for <u>a</u> ll users			
	Associate files with Python (requires the py launcher)			
	Create shortcuts for installed applications			
	Add Python to environment variables			
	Precompile standard library			
	Download debugging symbols			
	Download debug binaries (requires VS 2017 or later)			
	Customize install location	_		
	C:\Users\OleSørensen\AppData\Local\Programs\Python\Pyt	tl	B <u>r</u> ows	e
python				
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4) Use the following procedure to run Teledyne LeCroy Xena DHCP script to assign an IP address to your DUT interface:

Open the Windows Command prompt: Right-click on the Windows Start icon, select "Run" in th pop-up, make sure that the resulting screen shows "Open cmd" and click "OK". PAGE 5

### **DHCP IP Assignment**



Task Manager	
Settings	
File Explorer	Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
Run	Open: cmd ~
Shut down or sign out Desktop	OK Cancel Browse

- 5) Use the "cd" command at the command prompt to navigate to the folder where the dhcp\_server.py script and dhcp\_server.xpc files are saved.
- 6) Install the Teledyne LeCroy Xena package by entering the following lines at the command prompt:

python -m pip install xenavalkyrie==3.0.1 python -m pip uninstall pypacker -y python -m pip install pypacker==4.3

7) Run the dhcp\_server.py script by entering the following line at the command prompt:

python dhcp\_server.py

You will now see some status lines from the dhcp\_server.py script ending with

Ready to receive DHCP request

When the script has assigned one IP address it will stop, but can of course be restarted to assign the IP address again.

### How to verify the implementation:

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1) Choose a port on your Xena traffic generator connected to the one running the dhcp\_server.py script, and then activate the DHCP Wizard in the port properties page:

#### IPv4/IPv6 Properties

IPv4 Properties		
IPv4 Address:	0.0.0.0	
IPv4 Subnet Mask:	0.0.0.0	
IPv4 Gateway:	0.0.0.0	
Reply to ARP Requests:		
Reply to PINGv4 Requests:		
ARP/PINGv4 Address Wildcard:		
DHCPv4 Client:	🕰 Wizard	

#### 2) In the pop-up window, select "Get IP Address for Port":

DHCP Client Wizard Configure Address Acquisition
This wizard will attempt to dynamically acquire IP addresses for this port and/or the streams created on it using DHCP.
Note: The function will use the capture function while it is running.
Select Acquisition Target(s):
<ul> <li>Get IP Address for Port</li> <li>Get IP Address for Streams on Port</li> </ul>
Insert Results in Port ARP Table
Port Configuration Validation
Ready to start address acquisition. Press 'Next' to start acquisition.
Next > Cancel



3) When you press **Next** in the above screen the IP you can follow the process in the screen below:

	Timestamp
ering DHCP servers	11:22:24.537
dress offer 11.11.11.10 for 04:F4:BC:8B:22:42 from se	11:22:26.746
ting offered IP addresses	11:22:26.750
Idress ACK for 11.11.11.10	11:22:29.095
ss acquisition succeeded!	11:22:29.096
Idress ACK for 11.11.11.10 ss acquisition succeeded!	11:22:29.095 11:22:29.096

You will also see that the "IPv4 Properties" section in the port properties page has been updated with information from the dhcp\_server.py file.

This will lets you verify that the DHCP DORA sequence has been successful.