DHCP IP Assignment

APPLICATION NOTE

How to use Xena as a DHCP server

NOTE: To use this method you need to download a zip folder 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 255.255.255.255 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:

For further information please visit http://www.xenanetworks.com
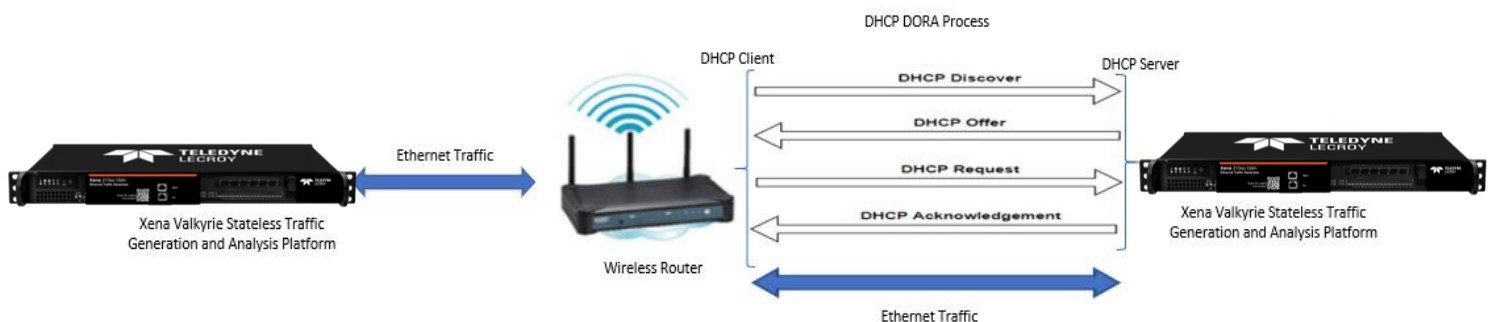
The Teledyne LeCroy Xena Script

- 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 [zipped folder](#), 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).

2) 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.

Lines 166 and 172 in dhcp_server.py are shown below:

```
164
165  def run_all():
166      chassis = "192.168.1.200" #IP address of chassis running the DHCP server
167      server_config = "dhcp_server.xpc"
168
169      with DHCPServer(chassis, server_config, log_level = logging.INFO) as dhcp:
170          # each call of dhcp.act will run in separate Thread
171          dhcp.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              '11.11.11.138', # Router IP
177              '11.11.11.138'  # DSN IP
178          )
```

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

For further information please visit http://www.xenanetworks.com

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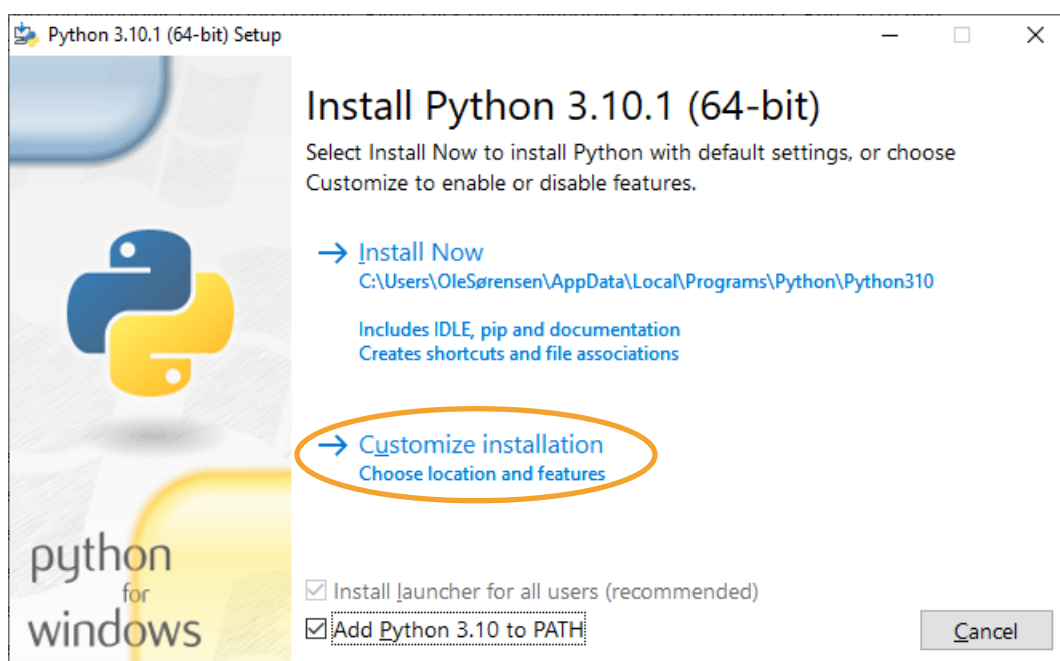
In the page that opens make sure that the boxes below are checked and press "Next"

For further information please visit http://www.xenanetworks.com
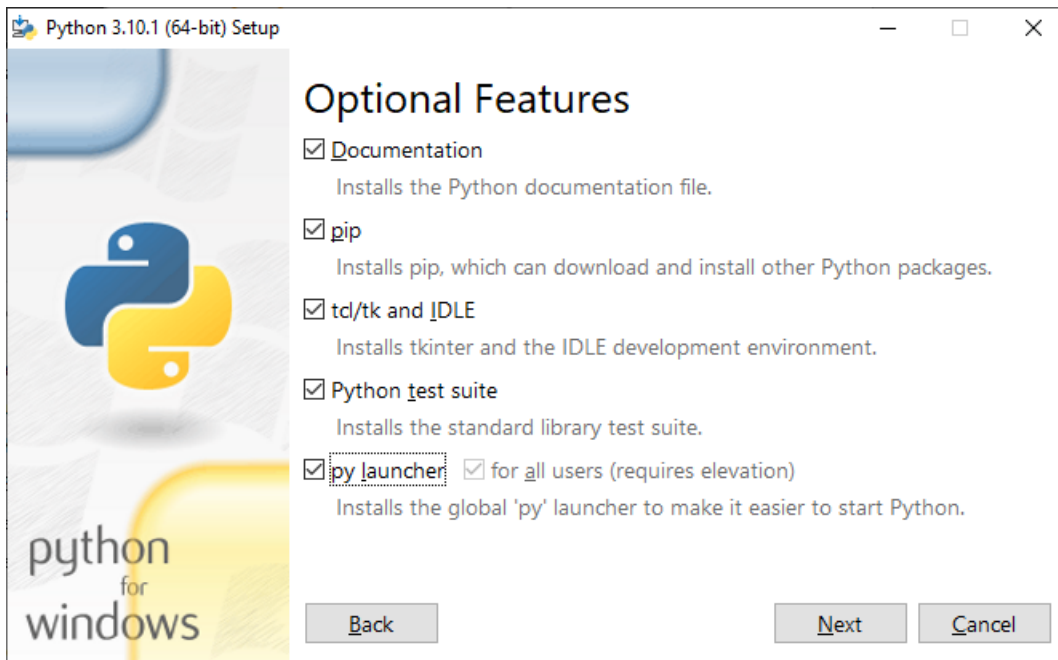
In the page that now opens make sure that the boxes below are checked and press "Install"
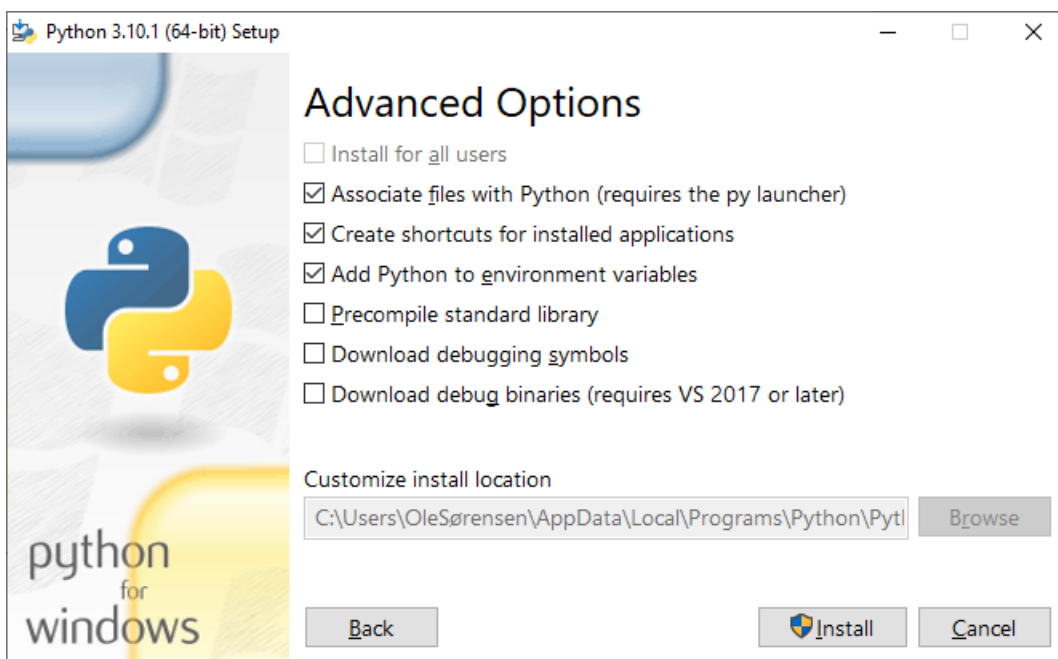
4) Use the following procedure to run Teledyne LeCroy Xena DHCP script to assign an IP address to your DUT interface:

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".

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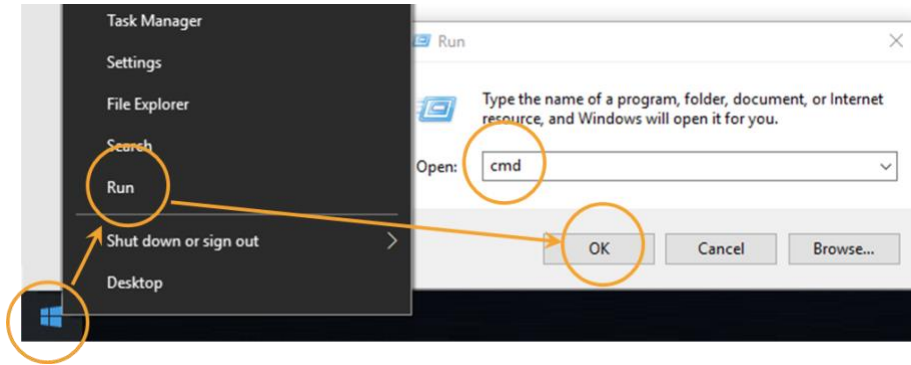
5) Use the "cd" command at the command prompt to navigate to the folder where the dhcp_server.py script and dhcp_server.xpc files are saved.

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:

For further information please visit http://www.xenanetworks.com

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:

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

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

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.

For further information please visit http://www.xenanetworks.com