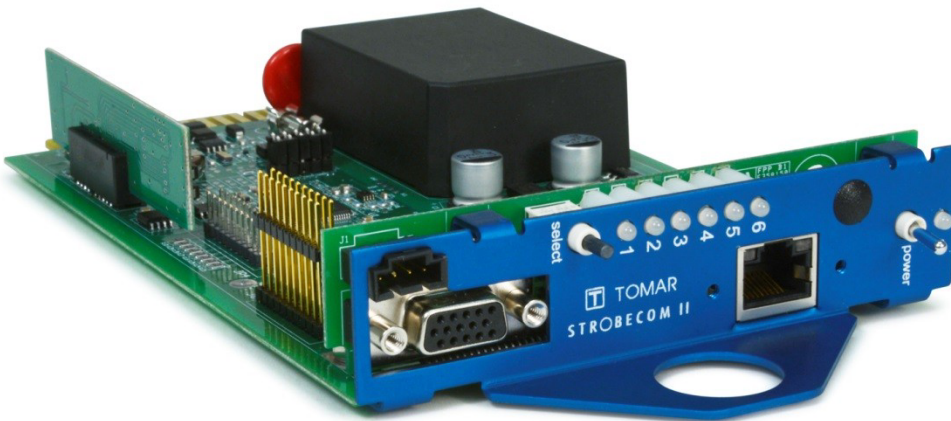


TOMAR

Instruction



Strobecom II 4140 and OSPOC: Getting Started

Information is provided on how to initially discover the 4140 and OSPOC on a network and re-configure it for custom network applications.

IS0592-03
2/3/2016

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ATTENTION

THE STROBECOM II SYSTEM IS DESIGNED TO AID IN THE TRANSIT OF DESIGNATED VEHICLES THROUGH THE TRAFFIC CONTROL SYSTEM, TO THEIR DESTINATIONS.

IT IS IMPERATIVE THAT THE DRIVERS OF EACH TYPE OF VEHICLE THAT USES THE STROBECOM II SYSTEM BE MADE AWARE OF THE RESPONSE HE CAN EXPECT FROM THE TRAFFIC CONTROL SYSTEM.

IT IS THE RESPONSIBILITY OF THE CUSTOMER TO CONFIGURE THE SYSTEM'S RESPONSE TO EACH VEHICLE TYPE AND TO EDUCATE EACH DRIVER TO EXPECT THE APPROPRIATE RESPONSE FROM THE SYSTEM.

AT NO TIME SHOULD A DRIVER OF A VEHICLE EXPECT THAT HE IS GUARANTEED TO RECEIVE PROTECTED RIGHT-OF-WAY THROUGH TRAFFIC INTERSECTIONS. DRIVERS OF VEHICLES THAT WILL OPERATE OUTSIDE OF THE NORMAL TRAFFIC LAWS AND CONVENTIONS MUST ALWAYS TAKE RESPONSIBILITY FOR ENSURING THE SAFE PASSAGE OF HIS VEHICLE THROUGH AN INTERSECTION REGARDLESS OF THE OPERATION OR NON-OPERATION OF THE STROBECOM II SYSTEM.

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April 2013

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Strobecom II 4140 and OSPOC

Getting Started

1 Introduction

The Strobecom II 4140 and OSPOC are delivered in a default configuration. Prior to installation there are some steps that are necessary for proper operations. At a minimum, the real-time clock should be synchronized with the local time to enable accurate timestamps on log entries. If the Strobecom II 4140 or OSPOC is to be integrated into a network, the device should be properly configured to work within the network. The tools and procedures to perform these actions are described within this guide.

2 Networking Module

The Strobecom II 4140 and OSPOC contain the XPort Pro embedded Ethernet module from Lantronix. It provides a full featured TCP/IP stack with enterprise grade security features and management features. In the default condition, the network is configured as a DHCP client – dynamically obtaining an IP address. In order to configure the networking parameters, free tools from Lantronix are utilized.

The steps for configuring the Strobecom II 4140 or OSPOC are outlined as follows and discussed in more detail in subsequent sections.

1. Download and install the Device Installer software from Lantronix (www.lantronix.com).
2. Run Device Installer.
3. Select the appropriate network adapter under the Tools->Options menu.
4. Using Device Installer, search for connected Lantronix modules.
 - a. When found, the window will show the XPort Pro device, its MAC address, and its IP address.
5. Select the desired XPort Pro device and configure the networking parameters of the device.
 - a. If not configuring the device for a network installation, the IP address should be noted for use with OSPsoft.
 - b. If assigning a static IP address, use the 'Assign IP' link shown in the window.

Note: It is highly recommended that the user read the Lantronix document titled “Device Installer User Guide” or review this information via the help provided within the program. This provides more detailed information on the proper use of the program.

Note: By default, a Lantronix device is configured as a DHCP client, dynamically obtaining an IP address from a device such as a router or other DHCP server process. It is possible for an IP address to change after some period, depending upon the DHCP server settings.

Note: To ensure a device is always reachable at the same IP address, the user should assign a static IP address to each 4140 or OSPOC Lantronix module.

2.1 Network Discovery

Lantronix provides a free tool to discover, manage, and configure their Ethernet devices. The program is called Device Installer. It can be downloaded from their website at <http://www.lantronix.com/device-networking/utilities-tools/device-installer.html>.

Connect a StrobeCom II 4140 or OSPOC to either your local network or directly to a computer. Start the Device Installer program. Before starting a search, it is recommended that the user verify that the proper network adapter is selected for the search process. This is done by selecting Tools->Options from the menu. An example of the network adapter selection process is shown for the case where the PC has two different network adapters. Only one network adapter can be selected at a time.

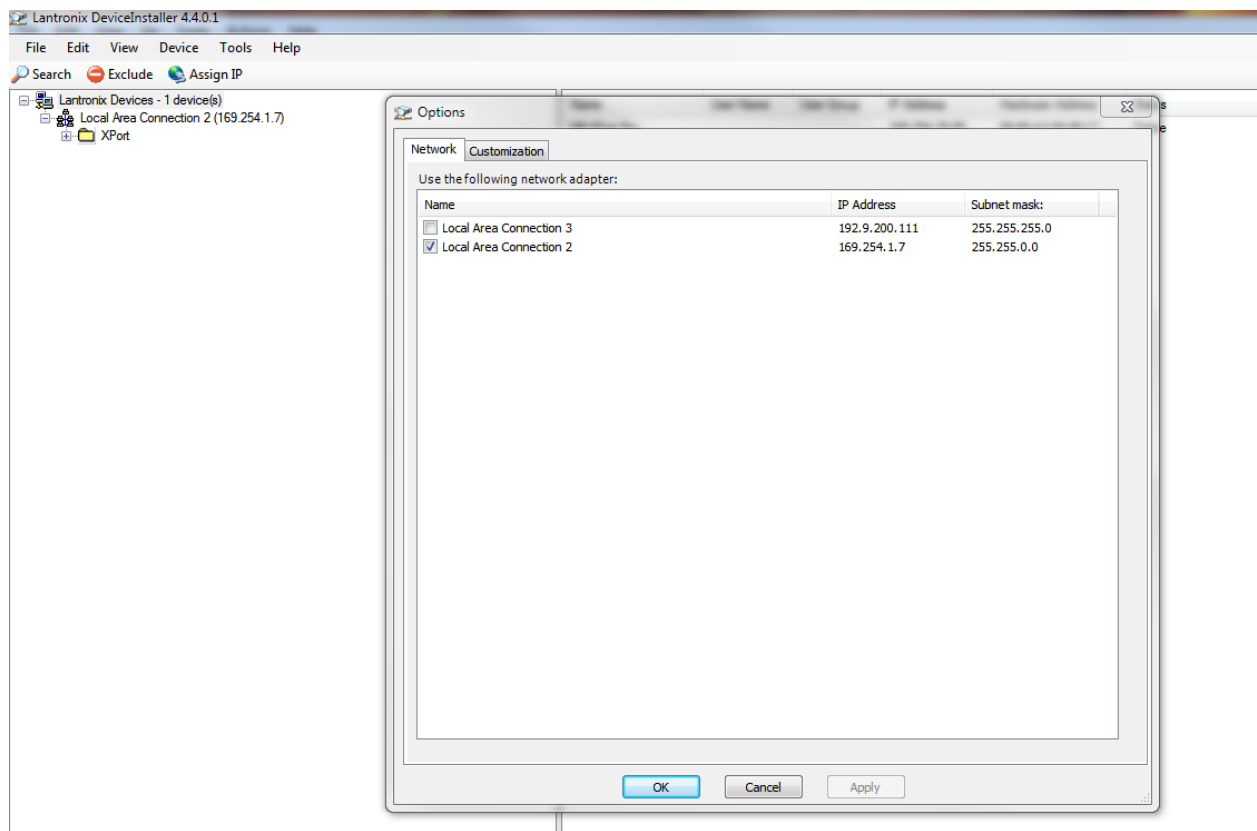


Figure 1: Example Window for Network Adapter Selection on PC with 2 Network Adapters

Note: Ensure the desired network adapter is configured for proper discovery of the StrobeCom II 4140 or OSPOC. Use Tools->Options to verify that the desired network adapter has been selected.

Begin a search process by selecting the search button. The active search process will be shown via a progress bar at the bottom right of the program. When the Lantronix device on the Strobecom II 4140 or OSPOC is discovered, it should show in the window. An example of the Device Installer search result is shown in the following figure.

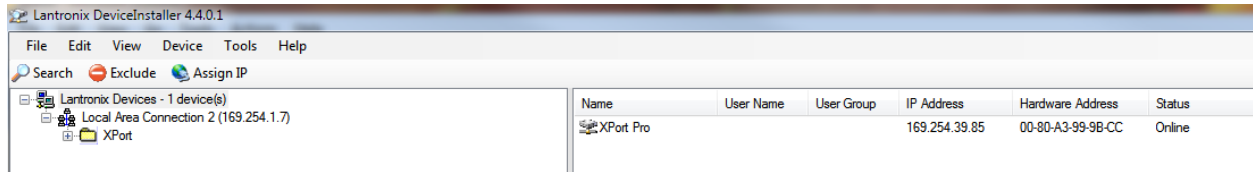


Figure 2: Example of a Search Result using Device Installer

Note: Device Installer will detect any Lantronix devices on the network. It is possible that your network may have other Lantronix devices connected that do not belong to the Strobecom II 4140 or OSPOC product line.

Note: The Strobecom II 4140 and OSPOC contain a Lantronix XPort Pro device. This should be listed within the Device Installer program search results.

Note: The MAC address (or hardware address) is unique to each Lantronix device and is included on the label affixed to the Lantronix device on the 4140 or OSPOC. This MAC address should be referenced to verify the correct IP address for the target 4140 or OSPOC.

2.1.1 Connecting Directly to a Computer

As noted previously, by default the Lantronix device is configured to dynamically obtain an IP address. When connecting directly to a PC or laptop, the PC or laptop typically will not assign the Lantronix an IP address. After a period, if the Lantronix device does not obtain an IP address it will assign itself an IP address in the range of 169.254.x.x.

To discover the Lantronix device who auto-assigned an IP address of 169.254.x.x, the user can set the IP address of the PC or laptop to an address on the same network (i.e. 169.254.1.100).

Note: If the user is frequently connecting directly between the Lantronix device and a laptop, a USB-to-Ethernet dongle is recommended. This can be configured once for the proper IP address and subnet mask, leaving the main laptop network adapter settings alone. The user could select this adapter from Device Installer (Tools->Options) and perform a search.

2.2 Network Configuration

Device Installer provides a simple process for assigning a static IP address to the StrobeCom II 4140 or OSPOC. Select the device to configure by clicking on it from the view in Device Installer (it will be highlighted). Click on the 'Assign IP' link in the window. The software will then guide the user in the process of assigning a static IP address to the device.

Note: In order to change the IP address, the user name and password must be known. Contact Tomar Electronics if the default user name and password have not been provided.

The Device Installer software provides a TCP/IP and Subnetting Tutorial. This should be referenced to resolve any problems experienced. A few key items from the Device Installer User Manual are shown below.

For Device Installer to assign an IP address to your Lantronix device successfully:

- Your PC's IP address and the address you want to assign to your Lantronix device must be on the same subnet.
- No routers or gateways can exist between your PC and your Lantronix device. Device Installer does not support assigning an IP address across a router or gateway.

Note: It is possible to assign an IP address in conflict with the previous two statements. However, once a static IP address has been assigned to a Lantronix device, unless it is on the same subnet as the network adapter it will become unreachable when performing another search. In order to reach the Lantronix device at this point, the network adapter settings must be configured such that it is on the same subnet on which the Lantronix device was configured.

It is possible that Device Installer will also detect Lantronix devices that are not configured for the current network. In this case, the device will be listed with red text and the status will be unreachable. An example of this is shown below. This may occur when performing a search right after configuring a Lantronix device onto a different network, but is not guaranteed.

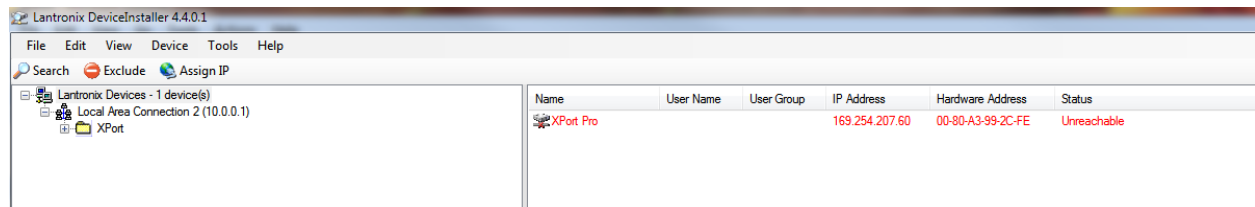
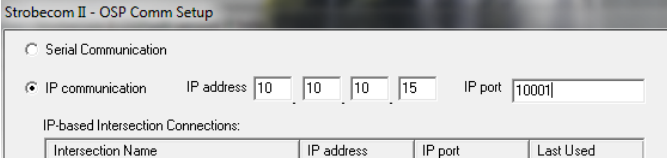


Figure 3: Example of an Unreachable Lantronix Device

Note: Device Installer cannot be relied upon to detect all improperly configured and unreachable Lantronix devices. For more robust detection of such devices, see the section titled 'Recovering an Unknown Device'.

2.3 Connecting to the Strobecom II 4140 or OSPOC Using OSPsoft

When connecting to the Strobecom II 4140 or OSPOC using OSPsoft, the network configuration must be known. In particular, the IP address is needed. For communications via OSPsoft on the network, the port to use is 10001. This is shown in the figure.



Strobecom II - OSP Comm Setup

Serial Communication

IP communication IP address 10 10 10 15 IP port 10001

IP-based Intersection Connections:

Intersection Name	IP address	IP port	Last Used
-------------------	------------	---------	-----------

Note: The IP Port must be 10001 for communications using OSPsoft

Note: The IP address shown is for illustration purposes only. The correct IP address should be obtained via the search results from Device Installer corresponding to the desired MAC address (hardware address) or a set of user configured static IP addresses.

3 Troubleshooting

When troubleshooting connection issues with a Lantronix device or the 4140 and OSPOC devices, it is recommended that the device is physically accessible. Attempting to troubleshoot a remotely located device has reduced potential. The table below provides some basic troubleshooting support.

Symptom	Description	Resolution	Notes
Green light on Lantronix device is off	The Lantronix unit is not connected to an Ethernet	Ensure a working Ethernet cable is plugged into the Lantronix device and the system routing device	Physical access to device required
Cannot communicate with 4140 or OSPOC using OSPsoft	OSPsoft shows a message error "Took too long to establish connection/Retry?"	Using Device Installer, search for devices. Verify the IP address of the desired unit using the MAC address on the label of the 4140 or OSPOC Lantronix module	Remote access may be sufficient
Network configuration is good, but cannot communicate with 4140 or OSPOC using OSPsoft	OSPsoft shows a message error "Took too long to establish connection/Retry?"	Verify the IP port in OSPsoft has been properly set to 10001	Remote access sufficient
Network configuration and IP port are good, but cannot communicate with 4140 or OSPOC using OSPsoft	OSPsoft shows a message error "Took too long to establish connection/Retry?"	Using Device Installer, verify the desired Lantronix device can be discovered, is reachable, and the status is online.	Remote access sufficient
Cannot discover Lantronix device using Device Installer	The desired Lantronix device does not show up via a search within Device Installer	Verify the proper network adapter has been selected via Tools->Options	Remote access sufficient
Cannot discover Lantronix device using Device Installer and proper network adapter has been selected	The desired Lantronix device does not show up via a search within Device Installer. The proper network adapter has been selected.	Verify the network adapter settings are properly configured for the network on which the Lantronix device is installed.	Remote access sufficient
Cannot discover Lantronix device using Device Installer and a properly configured network adapter has been selected	The Lantronix device may either be disconnected from the Ethernet or has an invalid network configuration.	Verify green light on Lantronix unit is on. If it is on, the device network configuration may be invalid. See 'Recovering an Unknown Device'.	Physical access to device required

3.1 Recovering an Unknown Device

Recovering a Lantronix device with an unknown configuration cannot reliably be done via Device Installer. However, tools and methods are available that will help discover sufficient information to reach this device and configure it properly. A packet sniffer program such as Wireshark must be installed on the PC or laptop to perform this procedure.

Steps To Recover an Unknown Lantronix Configuration

1. Configure the network adapter to a static IP address and subnet mask.
 - a. An example would be 10.0.0.1 with a subnet mask of 255.255.255.0
2. Start a live capture via Wireshark using the network adapter configured in the previous step.
3. Power-up the 4140 or OSPOC.
 - a. Upon power-up, the Lantronix device will broadcast information, which usually includes a portion of the MAC address and the IP address.
4. Obtain the IP address from a broadcast issued via the Lantronix device.
 - a. An example of this is highlighted in the figure below. Note that the source column contains Lantroni_99:9b:cc. This identifies the Lantronix device along with the last few octets of the MAC address for this unit. The IP address can be seen under the info column to the right (Gratuitous ARP for 142.77.33.8).
5. Reconfigure the network adapter using the first two portions of the IP address and a subnet mask of 255.255.0.0.
 - a. In the example provided, the IP address was found to be 142.77.33.8.
 - b. Configure the network adapter to an IP address of 142.77.1.100 and a subnet mask of 255.255.0.0.
6. Start Device Installer and select the newly configured network adapter via Tools->Options.
7. Perform a search. The Lantronix device should now be reachable and ready for the IP address and network parameters to be properly configured.

The screenshot shows a Wireshark capture of network traffic. The packet list pane shows several ARP requests and broadcasts. Two packets are highlighted in yellow, corresponding to the steps in the text above. These packets are ARP requests for 142.77.33.8, with source MAC addresses Lantroni_99:9b:cc and Lantroni_99:9b:cc. The packet details pane for the selected packet shows the ARP request structure, including the target IP address 142.77.33.8 and the source MAC address 99:9b:cc.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.00000000	Rosewil11_12:01:68	Broadcast	ARP	42	who has 10.0.0.1? Tell 0.0.0.0
2	0.68921800	10.0.0.1	224.0.0.22	IGMPv3	54	Membership Report / Join group 224.0.0.252 for any sources
3	0.68975000	10.0.0.1	224.0.0.252	LLMNR	69	Standard query 0x33ed ANY ENG-w7-E2
4	0.79585000	10.0.0.1	224.0.0.252	LLMNR	69	Standard query 0x33ed ANY ENG-w7-E2
5	0.99841900	Rosewil11_12:01:68	Broadcast	ARP	42	who has 10.0.0.1? Tell 0.0.0.0
6	0.99845400	10.0.0.1	224.0.0.22	IGMPv3	54	Membership Report / Join group 224.0.0.252 for any sources
7	2.01240000	Rosewil11_12:01:68	Broadcast	ARP	42	who has 10.0.0.1? Tell 0.0.0.0
8	3.50999300	Rosewil11_12:01:68	Broadcast	ARP	42	who has 10.0.0.1? Tell 0.0.0.0
9	3.51005100	10.0.0.1	224.0.0.22	IGMPv3	54	Membership Report / Join group 224.0.0.252 for any sources
10	4.00921100	10.0.0.1	224.0.0.22	IGMPv3	54	Membership Report / Join group 224.0.0.252 for any sources
11	4.51037100	Rosewil11_12:01:68	Broadcast	ARP	42	who has 10.0.0.1? Tell 0.0.0.0
12	5.50417800	Rosewil11_12:01:68	Broadcast	ARP	42	who has 10.0.0.1? Tell 0.0.0.0
13	6.01848200	10.0.0.1	224.0.0.252	LLMNR	66	Standard query 0x454d A 1satap
14	6.11271300	10.0.0.1	224.0.0.252	LLMNR	66	Standard query 0x454d A 1satap
15	6.36609700	Lantroni_99:9b:cc	Broadcast	ARP	60	Gratuitous ARP for 142.77.33.8 (Request)
16	6.46610300	Lantroni_99:9b:cc	Broadcast	ARP	60	Gratuitous ARP for 142.77.33.8 (Request)
17	6.50257500	Rosewil11_12:01:68	Broadcast	ARP	42	Gratuitous ARP for 10.0.0.1 (Request)
18	6.50462000	10.0.0.1	224.0.0.22	IGMPv3	54	Membership Report / Leave group 224.0.0.252
19	6.51425900	10.0.0.1	224.0.0.22	IGMPv3	54	Membership Report / Join group 224.0.0.252 for any sources
20	6.51471200	10.0.0.1	224.0.0.252	LLMNR	69	Standard query 0x3001 ANY ENG-w7-E2
21	6.51675300	10.0.0.1	224.0.0.22	IGMPv3	54	Membership Report / Join group 239.255.255.250 for any sources
22	6.51716300	10.0.0.1	239.255.255.250	UDP	1035	Source port: 49152 Destination port: 3702
23	6.58120300	10.0.0.1	10.0.0.255	NBNS	110	Registration NB HQ<00>
24	6.58123600	10.0.0.1	10.0.0.255	NBNS	110	Registration NB ENG-w7-E2<00>
25	6.58128100	10.0.0.1	10.0.0.255	NBNS	110	Registration NB ENG-w7-E2<20>
26	6.61191000	10.0.0.1	224.0.0.252	LLMNR	69	Standard query 0x3001 ANY ENG-w7-E2
27	6.62752500	10.0.0.1	239.255.255.250	UDP	1035	Source port: 49152 Destination port: 3702

Figure 4: Example of Lantronix Recovery via Wireshark

4 Examples of Assigning a Static IP Address to a Lantronix Module

4.1 Preferred Methods of Assigning Static IP Addresses to Lantronix Devices

There are two preferred methods for assigning a static IP address to a Lantronix device. These are preferred since they allow the device to be fully reachable once the new configuration has been applied. Both involve a DHCP server process that is configured to the final network configuration.

One method of assigning an IP address to a Lantronix device is when using a router on the same subnet as the final configuration. In this case, upon power-up a default Lantronix unit will automatically obtain an IP address from the router since the router typically contains a DHCP server process. Using Device Installer with the appropriate network adapter, the search process should discover the Lantronix device. Once a static IP address and proper network parameters are assigned, since the Lantronix is configured for the same network as the router a search will bring up the device showing its newly set static IP address.

Note: The router will assign the Lantronix an IP address. The subnet mask and default gateway will also be set to a valid configuration for the current network. Assuming the subnet mask and default gateway match the final target configuration, the user needs only to set the desired static IP address.

If a router is not available, then a simple DHCP server program along with proper network adapter settings can be used. Configure the DHCP server and the network adapter to the same subnet as the final configuration. Upon power-up a default Lantronix unit will automatically obtain an IP address from the DHCP server program. Using Device Installer with the correct network adapter, the search process should discover the Lantronix device. Once a static IP address and proper network parameters are assigned, since the Lantronix is configured for the same network as the router a search will bring up the device showing its newly set static IP address.

Note: The DHCP server will assign the Lantronix an IP address. The subnet mask and default gateway will also be set to a valid configuration for the current network. Assuming the subnet mask and default gateway match the final target configuration, the user needs only to set the desired static IP address.

Note: When using a DHCP server program, a USB-to-Ethernet adapter is recommended as this allows the user to configure this with a static IP address and subnet mask, leaving the main PC or laptop network adapter alone.

4.2 Configuring the Static IP Address from a Direct Connection to a PC

When connecting directly to a PC or laptop, if the network adapter is configured to obtain an IP address automatically, as shown below, then a default Lantronix device should be discoverable. The reason is that both devices are waiting for an IP address. After a timeout period, both the PC and Lantronix device typically assign themselves an IP address in the range of 169.254.x.x.

Note: For a direct PC connection to a Lantronix device configured to automatically obtain an IP address, Lantronix recommends setting the network adapter to an IP address of 169.254.1.100 with a subnet mask of 255.255.0.0. This is the same subnet on which the Lantronix device will auto-assign itself an IP address.

Note: If the PC or laptop has been assigned a static IP address and does not have a DHCP server configured for the same subnet, then discovery of a Lantronix device may not be possible.

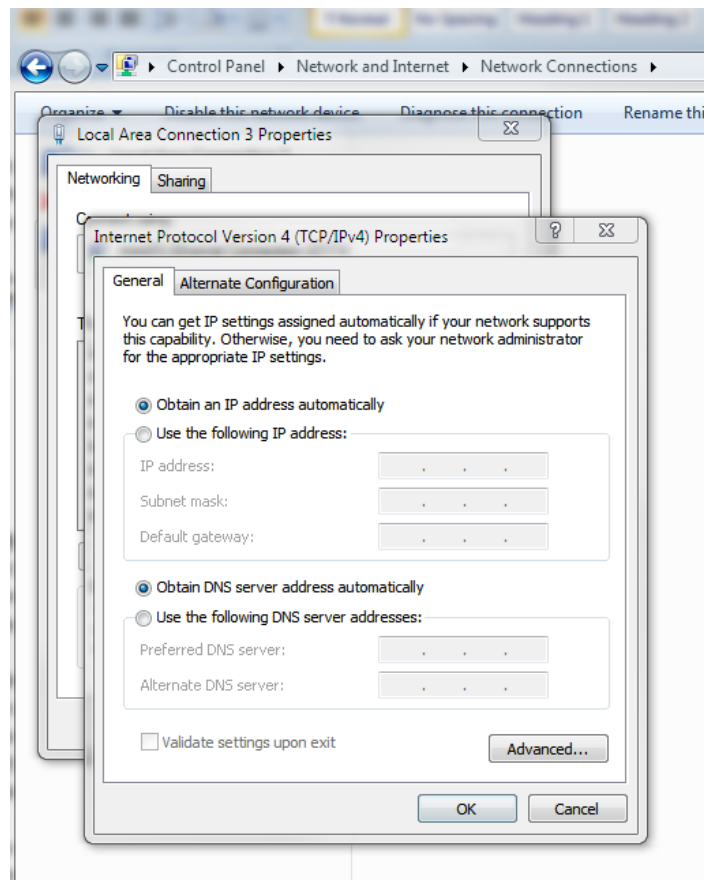


Figure 5: Network Adapter Set to Obtain IP Address Automatically

From a search process within Device Installer, the network adapter screen (Tools->Options) should look like the following figure. In this case, the Lantronix device should be both discoverable and reachable since both are on the same subnet (i.e. 169.254.x.x).

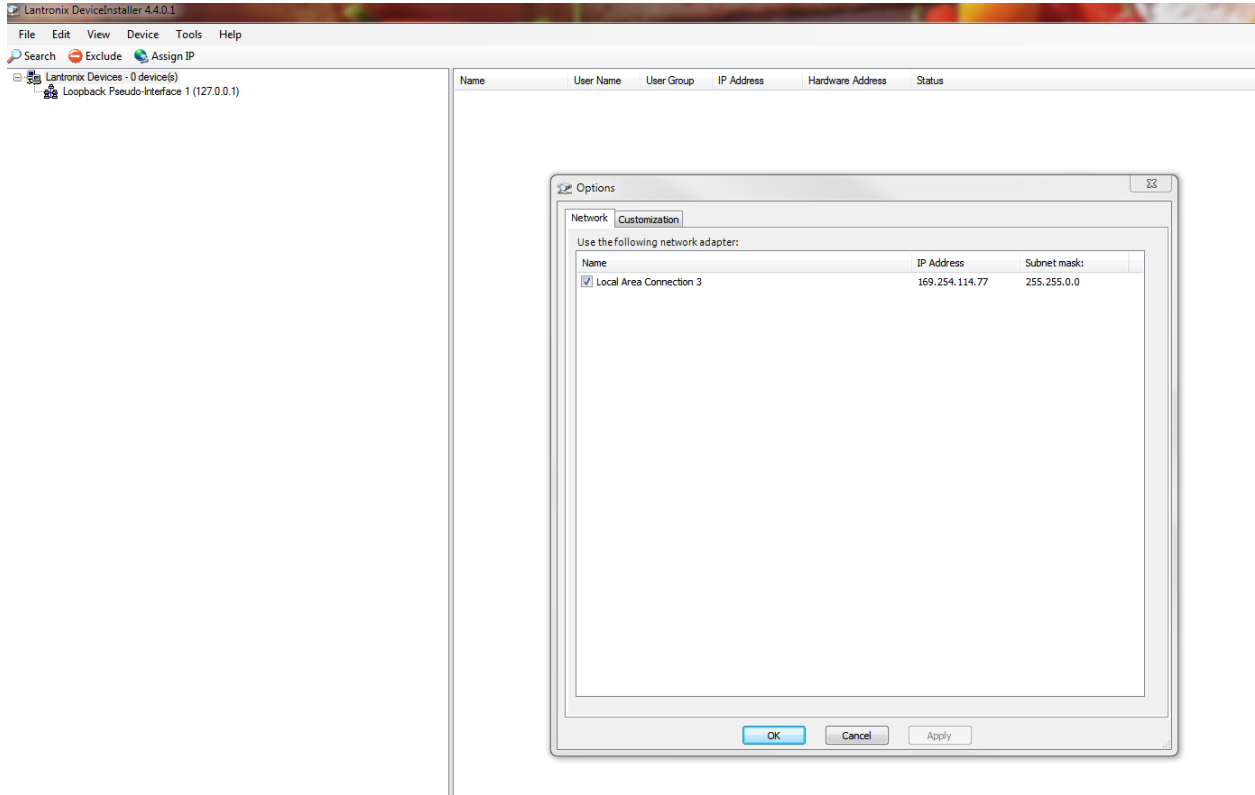


Figure 6: Network Adapter IP Address for PC Set to Automatically Obtain One

Since the Lantronix device is reachable, the IP address, subnet mask, and default gateway may be configured via Device Installer. An example is shown below for a random configuration.

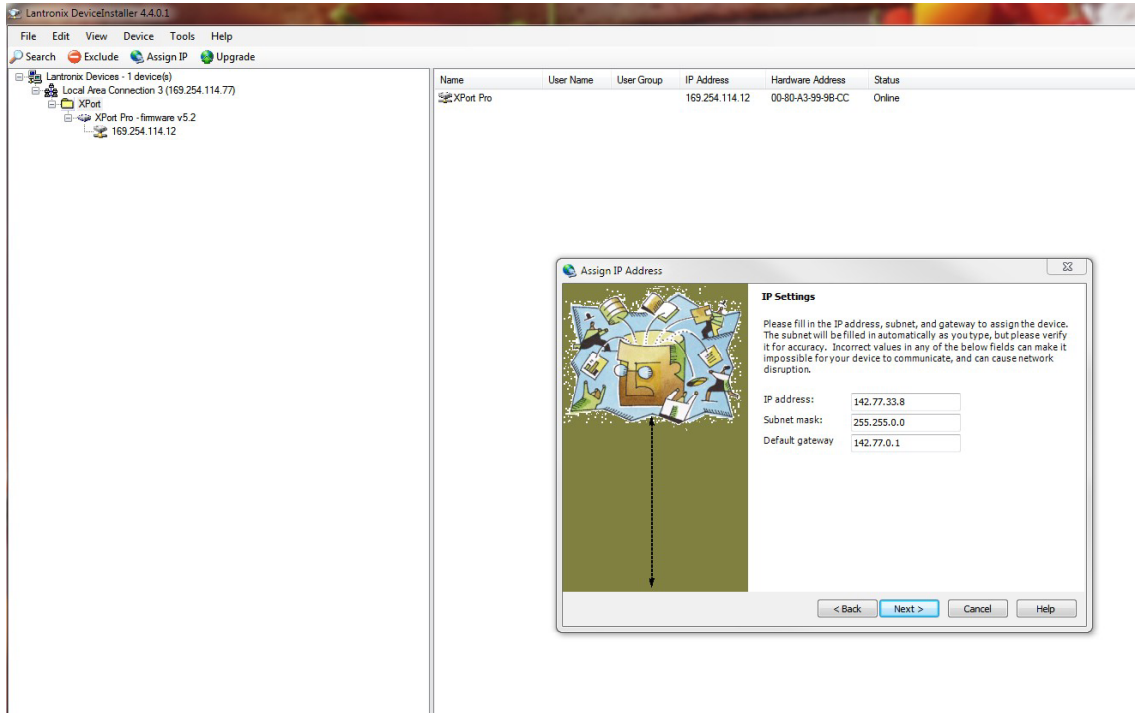


Figure 7: Example Random Lantronix Network Configuration

Select next to assign the network configuration to the Lantronix device. A warning will pop-up stating the desired address is not on the same subnet as the PC. This means the device will not be reachable from the PC using the current network adapter, but it is okay to continue assigning the static IP address.

Note: The user is responsible for ensuring that the network configuration assigned to the Lantronix device is valid. An invalid configuration may render the device unreachable.

Device Installer will assign the Lantronix the new IP address and network configuration, then begin a search process. Since the PC and Lantronix are no longer on the same subnet, the most likely outcome is that the Lantronix device will not be found.

To discover the Lantronix device, Device Installer must be connected to a network adapter configured to the same subnet. An example of this process is shown. The network adapter is first configured to the same subnet of the Lantronix device (or a superset of this), as shown in the following figure.

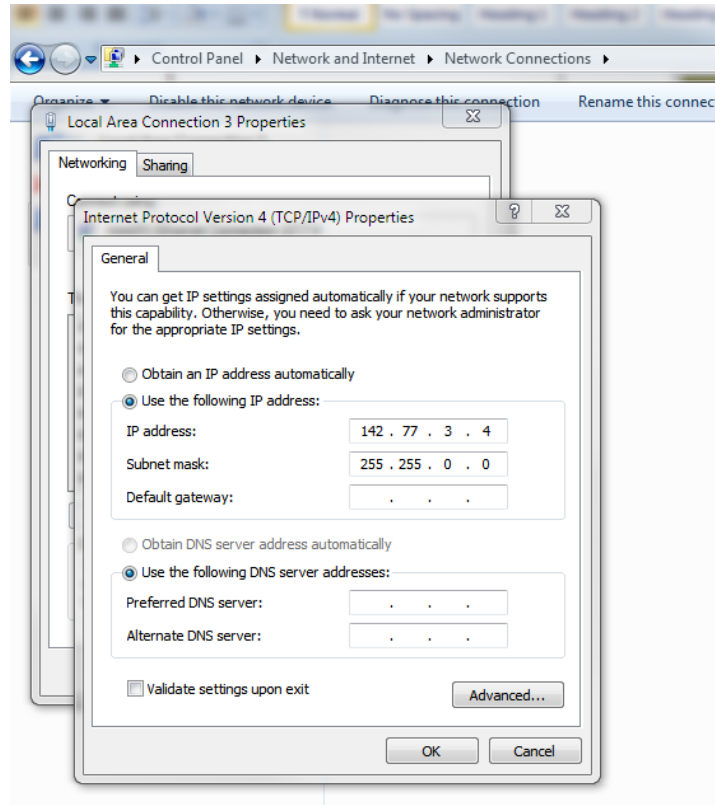


Figure 8: Configuring the Network Adapter to the Example Lantronix Subnet

Select the newly configured network adapter from the Tools->Options menu in Device Installer. Cycle power on the 4140 or OSPOC unit and perform a search via Device Installer. The Lantronix device should now be discovered.

Note: *Setting a static IP address across a router will follow a similar process. However, after assigning the static IP address, the Lantronix device will not be discoverable across the router. The user must connect to either a properly configured router or directly to a network adapter configured properly.*

5 References

The Lantronix website provides numerous support documents for the XPort Pro. A list of tools and documentation pertinent to this document are listed.

Lantronix. (November 2014). Device Installer Software version 4.4.0.2RC3. In Lantronix. Retrieved January 2015, from <http://www.lantronix.com/device-networking/utilities-tools/device-installer.html>.

Lantronix. (Dec 2008). Device Installer User Guide. In Lantronix. Retrieved January 2015, from http://www.lantronix.com/pdf/DeviceInstaller_UG.pdf.

A useful tool for monitoring Ethernet packets as well as recovering unknown device configurations is a program called Wireshark.

Wireshark. (December 29, 2015). Stable Release (2.0.1). Retrieved February 2016, from <https://www.wireshark.org/>.