

## Using a VPN Connection to Remotely Access Lutron® Systems

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### Contents

<b>Overview</b> . . . . .	2
<b>Key Terms</b> . . . . .	2
<b>Before You Begin...</b> . . . . .	3
<b>Configuring a Luxul Router</b> . . . . .	4
Set up a Private Network . . . . .	4
Verify Router Firmware . . . . .	4
Configure Remote Access. . . . .	5
Configure Local Network Settings . . . . .	5
Configure Internet Connection Settings . . . . .	6
Configure VPN Users . . . . .	8
Configure VPN Access . . . . .	9
<b>Configuring a D-Link® Router</b> . . . . .	10
Set up a Private Network . . . . .	10
Verify Router Firmware . . . . .	10
Configure Remote Access. . . . .	11
Configure Local Network Settings . . . . .	11
Configure Internet Connection Settings . . . . .	12
Configure User Groups . . . . .	14
Configure VPN Access . . . . .	15
<b>Addressing a Lutron® System with a Static IP</b> . . . . .	17
For HomeWorks® QS Systems . . . . .	17
For HomeWorks® Illumination Systems . . . . .	18
For RadioRA® 2 Systems . . . . .	18
<b>Configuring Your PC to Connect to the VPN Router</b> . . . . .	19
Instructions for Windows XP® . . . . .	19
Instructions for Windows® Vista® and Windows® 7 . . . . .	23
Instructions for Apple iPhone/iPod Touch . . . . .	26
Instructions for Android® Devices . . . . .	29
<b>Using a VPN Connection to Remotely Connect to Lutron® Systems</b> . . . . .	32
HomeWorks® QS Software . . . . .	32
HomeWorks® Illumination Software . . . . .	32
RadioRA® 2 Software . . . . .	32
<b>Lutron® Contact Information</b> . . . . .	33

## Overview

This application note describes a method of configuring remote access to a Lutron® system using an Internet connection to a Virtual Private Network (VPN) router. This application note covers configuring a router to use Point-to-Point Tunneling Protocol (PPTP) for VPN access. D-Link® and Luxus® routers are used in this document as examples but the steps described may be applied to various VPN compatible routers; Microsoft® Windows XP®, Windows Vista®, and Windows® 7 have native client support for this type of VPN.

Unlike port forwarding, a VPN adds a layer of security before the homeowner's system is connected to the Internet. It should be noted that any time remote access is provided for a homeowner's site there is a risk of having the network and equipment compromised by unauthorized access.

## Key Terms

<b>VPN</b>	Virtual Private Network
<b>VPN Router</b>	A piece of hardware or software that provides a virtual connection through a public network (such as the internet) to a private network
<b>VPN Client</b>	Hardware or software that connects to a VPN router over a public network connection and provides an additional network connection to the private network to which the VPN router is connected
<b>ISP</b>	Internet Service Provider
<b>Static IP</b>	An IP address assigned to a network computer or device which does NOT change at a given time interval or during the network connection process
<b>Dynamic IP</b>	An IP address assigned to a network computer or device which DOES change at a predetermined time interval or during the network connection process
<b>URL</b>	Universal Resource Locator: a readable name that represents a network IP address (e.g., google.com or myname.dyndns.org). A URL is often referred to as a host name or web address
<b>DNS Server</b>	A server on a public or private network that translates URLs into network IP addresses
<b>Dynamic DNS</b>	A service that maps static or dynamic IP address to a URL

## Before You Begin...

- I. In order to connect to a VPN router, the VPN client must be able to find the VPN router using one of the following two options:
  - A. A static IP address from the client's ISP. This address must be known in order to complete the setup and will be provided by the ISP.
  - B. An account with a dynamic DNS service. This application note uses DynDNS.org. This will allow the use of a host name (URL) instead of an IP address.
- II. Acquire a VPN router and its accompanying manual. This application note covers the use of the D-Link® DIR-130 (wired) and the D-Link® DIR-330 (wired/wireless) routers. Please note that all screenshots within this application note may differ in appearance from the screens rendered on your computer. **This application note also assumes that the router is beginning these procedures in its "default" or "out-of-box" state.** If this is NOT the case, there is a risk of running an untested VPN router environment incompatible with Lutron® systems. See the "Appendix C—Technical Specifications" subsection in the "Default Factory Settings" of the router's product manual for instructions on performing a reset.
- III. Ensure that each HomeWorks® Illumination/QS processor or RadioRA® 2 main repeater is using a static IP address and that those addresses are readily available. Static IP addresses are required to ensure that devices using the VPN remotely can locate the system.
- IV. Confirm that the PC you will be using to configure the VPN router is set to obtain an IP address dynamically. Please refer to the following Microsoft® Windows® articles for support:
  - A. Windows XP®: [www.support.microsoft.com/kb/305553](http://www.support.microsoft.com/kb/305553)
  - B. Windows Vista®: [www.windows.microsoft.com/en-US/windows-vista/Change-TCP-IP-settings](http://www.windows.microsoft.com/en-US/windows-vista/Change-TCP-IP-settings)
  - C. Windows® 7: [www.windows.microsoft.com/en-US/windows7/Change-TCP-IP-settings](http://www.windows.microsoft.com/en-US/windows7/Change-TCP-IP-settings)
- V. In order to use the Lutron® Home Control+ application for Android®, the lighting control system must be either a HomeWorks® QS system or a RadioRA® 2 system.

## Configuring a Luxul Router

- I. **Set up a private network with the VPN router:** Follow the manufacturer's instructions included with the router to connect computers and other network devices to the router.
  - A. The manufacturer's instructions can be found online at [www.luxul.com/wp-content/documents/LUX-UG-XBR-2300.pdf](http://www.luxul.com/wp-content/documents/LUX-UG-XBR-2300.pdf). Follow the instructions under "Section 1: Product Overview", "Section 3: Preparing for Installation", and "Section 4: Installation" of the manual.
  - B. Locate the router's internal configuration pages. To gain access these pages, open a web-browser and enter the IP address of the Luxul VPN router (192.168.0.1).
  - C. Enter **admin** as the **User Name** and **Password**.
- II. **Verify that the VPN router has the latest firmware:** Once logged into the router's configuration pages, ensure that the firmware version is Version 1.0.5.7 or higher (XBR-2300). If it is lower, do not proceed before upgrading the firmware by following the manufacturer's instructions. The current firmware version information can be found by selecting the **Status** link from the left-hand side menu and clicking on the **System** tab, as shown in Figure 1.

Figure 1

The screenshot displays the Luxul router's web interface. At the top left is the Luxul logo with the tagline "Simply Connected". A left-hand navigation menu includes links for Status, Network, Internet Access, Security, Advanced, VPN, Monitor, System Tools, and Logout. The main content area has tabs for WAN1, WAN2, LAN, and System (which is selected). Below the tabs is a table of system status information. To the right of the table are "Refresh" and "Help" buttons.

System	
CPU Usage	0%
Memory Usage	60%
Uptime	1day 00:36:50
System Time	2012-05-30 09:06:59
Connected Clients	2
Firmware Version	1.0.5.7_lux
Bootcore Version	1.0.0.0
Hardware Version	1.0.0.0

III. **Configure the VPN router for remote access:** Changes need to be made to the router's default configuration in order to set up the router for remote access. Each change is listed below.

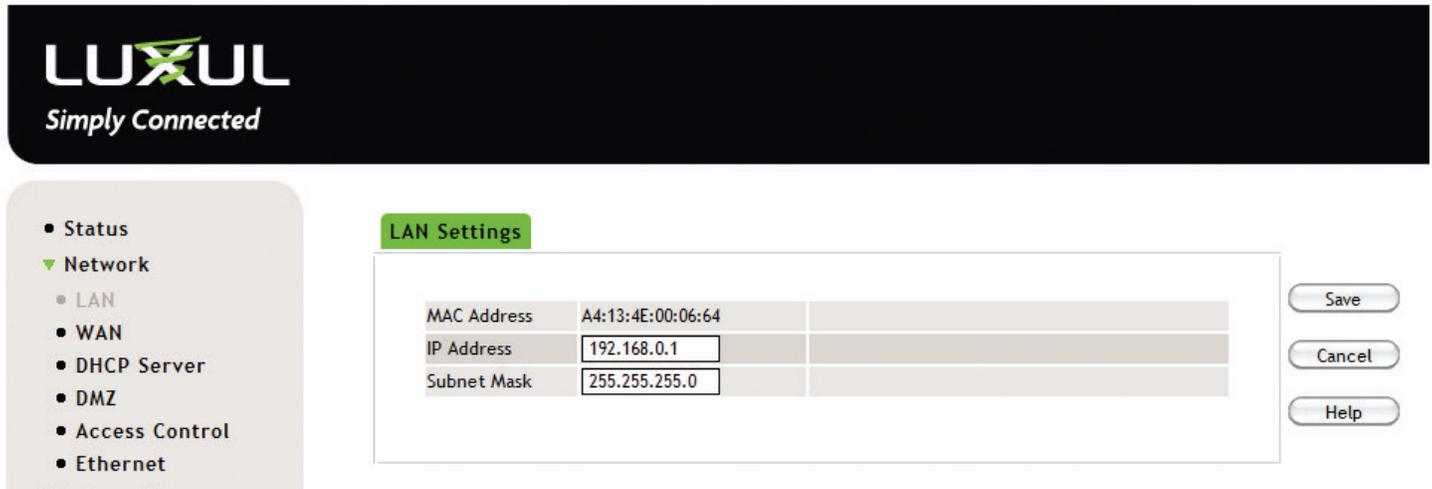
**Note:** Be sure to press the **Save Settings** button at the top of every configuration screen, when indicated, in the following steps. Otherwise the changes that have been made will NOT be saved. After pressing the **Save Settings** button, it may take a few moments until the **Continue** button is enabled.

A. Configure the VPN router's local network settings:

**Note:** The default LAN IP address is set to 192.168.0.1. If the VPN client's local network uses IP addresses in the same range as the VPN router's network (192.168.0.XXX), an address conflict may occur and the connection between the VPN client and the VPN router will NOT operate properly. To reduce the possibility of address conflicts, Lutron recommends changing the default (VPN) LAN IP address to something less likely to be used as default addresses on other local networks. In this example, we will use 192.168.100.1 as the (VPN) LAN IP address.

1. Select the **Network** link from the left-hand side menu, and then select **LAN** from the submenu.
2. Modify the network address as shown in Figure 2.
  - a. Set the router **IP Address** to **192.168.100.1**
  - b. Ensure that the default **Subnet Mask** is **255.255.255.0**
  - c. Press the **Save** button at the top right-hand side (once **Save** is clicked the router will reboot).

**Figure 2**



3. Restart the computer that is connected to the router in order for it to acquire its new IP address. Then re-open a web browser and enter the new IP address of the VPN router (192.168.100.1).

B. Configure the VPN router's internet connection settings, as shown in Figure 3:

1. **If the ISP provides a static IP address**, the VPN router must be configured with a static internet IP address:
  - a. Go to the VPN router's internal configuration pages at its address: **192.168.100.1**
  - b. Select **Network** from the left-hand side menu.
  - c. Select **WAN** from the submenu.
  - d. Under the **WAN Settings** tab, select the **WAN1 Edit** button.
  - e. Change **WAN Port Type** to **Static IP**.
  - f. Enter the **IP Address**, **Subnet Mask**, **Default Gateway**, and **DNS Servers** your ISP has provided.
  - g. Press the **Save** button at the top right-hand side.

Figure 3

**LUXUL**  
Simply Connected

- Status
- ▼ Network
  - LAN
  - WAN
  - DHCP Server
  - DMZ
  - Access Control
  - Ethernet
  - ▶ Internet Access
  - ▶ Security
  - ▶ Advanced
  - ▶ VPN
  - ▶ Monitor
  - ▶ System Tools
  - Logout

WAN Settings Dual WAN Policy

WAN Port Type: Static IP

IP Address:

Subnet Mask:

Default Gateway:

Preferred DNS Server:

Alternate DNS Server:

Bandwidth Upstream : 100000 KB/s Downstream : 100000 KB/s

MTU setting  Auto  Manual 1450

NOTE: Requires Router Restart

Save Cancel Help

2. **If the ISP provides a dynamic IP address**, a dynamic DNS service must be used. Dynamic DNS services can also be used with static IP addresses to utilize a custom web address instead of a static IP address when directing the VPN client device to the VPN router over the Internet. This can be done using a dynamic DNS hosting service such as DynDNS.org, freedns.afraid.org, or no-ip.com. This application note uses a DynDNS.org free account. To configure a dynamic DNS service as shown in Figure 4:
  - a. Go to the VPN router's internal configuration pages at its address: **192.168.100.1**
  - b. Select the **Advanced** option in the left-hand side menu.
  - c. Click **DDNS** from the submenu.
  - d. Check **Enable DDNS WAN 1 Port Configuration**.
  - e. Select **www.DynDns.org** (Free).
  - f. Provide the correct **User Name**, **Password**, and **Host Name** for the DynDNS.org account being used.
  - g. Press the **Save** button at the top right-hand side.

Figure 4

**LUXUL**  
Simply Connected

- Status
- ▶ Network
- ▶ Internet Access
- ▶ Security
- ▼ Advanced
  - Port Forwarding
  - UPnP
  - One-to-One NAT
  - DDNS
  - Route Table
- ▶ VPN
- ▶ Monitor
- ▶ System Tools

**DDNS**

Enable DDNS WAN1 Port Configuration

Service Provider: freedns.afraid.org [Go to register](#)

User Name:

Password:

Domain Information:  (optional)

Connection Status: Disconnected

Note: 1.If using freedns.afraid.org, please refer to Help.  
2.Router must be rebooted for changes to take effect.

Save Cancel Help

## C. Configure VPN Users as shown in Figure 5

1. Select **VPN > PPTP Server** from the left-hand side menu.
2. Click **PPTP Users** tab at the top.
3. Under PPTP Users, click the **Add** button. For client devices (e.g., laptops, PCs, tablets, smart phones), enter the desired **User Name**, **Password**, **Confirm Password**, and **Remark**. Then check the **Client in Local Network** checkbox. (Net Segment and Mask are used only when connecting one XBR-2300 to another XBR-2300.)
4. Press the **Apply** button at the top right-hand side.

**Note:** The VPN router supports up to eight simultaneous connections. Each User Name may be used to open only one connection to the router.

Figure 5

The screenshot displays the LUXUL web interface. On the left is a navigation menu with the following items: Status, Network, Internet Access, Security, Advanced, VPN (expanded), PPTP Client, PPTP Server (selected), Monitor, System Tools, and Logout. The main content area has three tabs: PPTP Server, PPTP Users (active), and Connected Clients. The PPTP Users tab contains a form with the following fields: User Name, Password, Confirm Password, Client in Local Network (checkbox), Net Segment, Mask, and Remark. To the right of the form are three buttons: Apply, Restore, and Help. The LUXUL logo and tagline 'Simply Connected' are visible at the top left of the interface.

## D. Configure VPN Access as shown in Figures 6 and 7:

1. Click **VPN** from the left-hand side menu.
2. Click **PPTP Server** from the submenu.
  - a. Check the box labeled **Enable PPTP**.
  - b. Select the **PPTP Server Interface** (will typically be **WAN1**).
  - c. Assign an IP Address for the **PPTP Server Address** (this will be a virtual address for the PPTP Server that's an unused address in your local network).
  - d. Configure the **Client DHCP Address Range** (this will be outside the normal DHCP range of the router but still within the private network). You must configure only eight available addresses.
  - e. Check the "Enable" box in **128-bit Encryption**.
  - f. Press the **Save** button at the top right-hand side.
  - g. Select **System Tools** then **Reboot** from the submenu and reboot the XBR-2300.

Figure 6

**LUXUL**  
Simply Connected

- Status
- ▶ Network
- ▶ Internet Access
- ▶ Security
- ▶ Advanced
- ▼ VPN
  - PPTP Client
  - PPTP Server
- ▶ Monitor
- ▶ System Tools
- Logout

**PPTP Server** PPTP Users Connected Clients

<input type="checkbox"/> Enable PPTP	
Max Connections	8
PPTP Server Interface	WAN1 ▼
PPTP Server Address	
Client DHCP Address Range	
128-bit Encryption	<input type="checkbox"/> Enable

Save Cancel Help

Figure 7

**LUXUL**  
Simply Connected

- Status
- ▶ Network
- ▶ Internet Access
- ▶ Security
- ▶ Advanced
- ▼ VPN
  - PPTP Client
  - PPTP Server
- ▶ Monitor
- ▶ System Tools
- Logout

**PPTP Server** PPTP Users Connected Clients

<input checked="" type="checkbox"/> Enable PPTP	
Max Connections	8
PPTP Server Interface	WAN1 ▼
PPTP Server Address	192.168.100.254
Client DHCP Address Range	192.168.100.201 - 192.168.100.208
128-bit Encryption	<input checked="" type="checkbox"/> Enable

Save Cancel Help

## Configuring a D-Link® Router

- I. **Set up a private network with the VPN router:** Follow the manufacturer's instructions included with the router to connect computers and other network devices to the router.
  - A. The manufacturer's instructions can be found on the CD included with the VPN router. Insert the CD into your PC and select "View Manual". Follow the instructions in "Section 1: Product Overview" and "Section 2: Installation" of the manual.
  - B. Locate the router's internal configuration pages. To gain access to these pages, open a web-browser and enter the IP address of the D-Link® VPN router (192.168.0.1).
  - C. Enter **admin** as the **User Name**. Leave the **Password** field blank.
- II. **Verify that the VPN router has the latest firmware:** Once logged into the router's configuration pages, ensure that the Firmware Version is 1.12 or higher (D-Link® DIR-330) or 1.23 or higher (D-Link® DIR-130). If it is lower, follow the manufacturer's instructions to upgrade the firmware before proceeding. The current firmware version information can be found in the top right-hand corner of any router configuration page, as shown in Figure 8.

**Figure 8**

Product Page: DIR-330 Firmware Version: 1.12

**D-Link**

DIR-330 // SETUP ADVANCED MAINTENANCE STATUS HELP

Internet  
Wireless Settings  
Network Settings  
VPN Settings

**INTERNET CONNECTION :**

There are 2 ways to setup your Internet connection. You can use the Web-based Internet Connection Setup Wizard or you can manually configure the connection.

**Helpful Hints..**

If you are new to networking and have never configured a router before, click on **Setup Wizard** and

III. **Configure the VPN router for remote access:** Changes need to be made to the router's default configuration in order to set up the router for remote access. Each change is listed below.

**Note:** Be sure to press the **Save Settings** button at the top of every configuration screen, when indicated, in the following steps. Otherwise the changes that have been made will NOT be saved. After pressing the **Save Settings** button, it may take a few moments until the **Continue** button is enabled.

A. Configure the VPN router's local network settings:

**Note:** The default LAN IP address is set to 192.168.0.1. If the VPN client's local network uses IP addresses in the same range as the VPN router's network (192.168.0.XXX), an address conflict may occur and the connection between the VPN client and the VPN router will NOT operate properly. To reduce the possibility of address conflicts, Lutron recommends changing the default (VPN) LAN IP address to something less likely to be used as default addresses on other local networks. In this example, we will use 192.168.100.1 as the (VPN) LAN IP address.

1. Select the **Setup** tab from the top menu, and then select **Network Settings** from the left-hand side menu.
2. Modify the network address, as shown in Figure 9.
  - a. Set the Router **IP Address** to **192.168.100.1**
  - b. Ensure that the default **Subnet Mask** is **255.255.255.0**
  - c. Leave the **Local Domain Name** blank.
  - d. Check **Enable DNS Relay**.
  - e. Press the **Save Settings** button at the top.
3. Restart the computer that is connected to the router in order for it to acquire its new IP address. Then, reopen a web browser and enter the new IP address of the VPN router (192.168.100.1).

**Figure 9**

Product Page: DIR-330		Firmware Version: 1.12			
<b>D-Link</b>					
<b>DIR-330</b> //	<b>SETUP</b>	<b>ADVANCED</b>	<b>MAINTENANCE</b>	<b>STATUS</b>	<b>HELP</b>
Internet	<p><b>NETWORK SETTINGS :</b></p> <p>Use this section to configure the internal network settings of your router and also to configure the built-in DHCP Server to assign IP addresses to the computers on your network. The IP Address that is configured here is the IP Address that you use to access the Web-based management interface. If you change the IP Address here, you may need to adjust your PC's network settings to access the network again.</p> <p><input type="button" value="Save Settings"/> <input type="button" value="Don't Save Settings"/></p>				<p><b>Helpful Hints..</b></p> <p>If you already have a DHCP server on your network or are using static IP addresses on all the devices on your network, uncheck <b>Enable DHCP Server</b> to disable this feature.</p> <p>In order to ensure that devices on your network are always assigned the same IP address, add a <b>DHCP Reservation</b> for each device.</p>
Wireless Settings					
Network Settings					
VPN Settings					
	<p><b>ROUTER SETTINGS :</b></p> <p>Use this section to configure the internal network settings of your router. The IP Address that is configured here is the IP Address that you use to access the Web-based management interface. If you change the IP Address here, you may need to adjust your PC's network settings to access the network again.</p> <p>Router IP Address : <input type="text" value="192.168.100.1"/></p> <p>Default Subnet Mask : <input type="text" value="255.255.255.0"/></p> <p>Local Domain Name : <input type="text"/></p> <p>Enable DNS Relay : <input checked="" type="checkbox"/></p>				

## B. Configure the VPN router's internet connection settings:

1. **If the ISP provides a static IP address**, the VPN router must be configured with a static internet IP address.
  - a. Go to the VPN router's internal configuration pages at its address: **192.168.100.1**
  - b. Select the **Setup** tab.
  - c. Select **Internet** from the left-hand side menu.
  - d. Under **Manual Internet Connection Options**, select the **Manual Configure** button.
  - e. Change **My Internet Connection is** to **Static IP**. A screen similar to Figure 10 should appear.
  - f. Fill in the **IP Address**, **Subnet Mask**, **ISP Default Gateway Address**, **MAC Address**, and **DNS Servers** your ISP has provided.
  - g. Press the **Save Settings** button at the top.

Figure 10

Product Page: DIR-330		Firmware Version: 1.12			
D-Link					
DIR-330	SETUP	ADVANCED	MAINTENANCE	STATUS	HELP
<ul style="list-style-type: none"> <li>Internet</li> <li>Wireless Settings</li> <li>Network Settings</li> <li>VPN Settings</li> </ul>	<div style="background-color: #f4a460; padding: 5px;"><b>INTERNET CONNECTION</b></div> <p>Use this section to configure your Internet Connection type. There are several connection types to choose from: Static IP, DHCP, PPPoE, PPTP, L2TP, BigPond, Russian PPPoE and Russian PPTP. If you are unsure of your connection method, please contact your Internet Service Provider.</p> <p><b>Note:</b> If using the PPPoE option, you will need to remove or disable any PPPoE client software on your computers.</p> <p style="text-align: center;"> <input type="button" value="Save Settings"/> <input type="button" value="Don't Save Settings"/> </p> <hr/> <div style="background-color: #333; color: white; padding: 5px;"><b>INTERNET CONNECTION TYPE :</b></div> <p>Choose the mode to be used by the router to connect to the Internet.</p> <p>My Internet Connection is : <input type="text" value="Static IP"/> ▼</p> <hr/> <div style="background-color: #333; color: white; padding: 5px;"><b>STATIC IP ADDRESS INTERNET CONNECTION TYPE :</b></div> <p>Enter the static address information provided by your Internet Service Provider (ISP).</p> <p style="text-align: center;">       IP Address : <input type="text" value="0.0.0.0"/> (assigned by your ISP)        Subnet Mask : <input type="text" value="0.0.0.0"/>        ISP Gateway Address : <input type="text" value="0.0.0.0"/>        MAC Address : <input type="text" value="00"/> - <input type="text" value="00"/> (optional)  <input type="button" value="Clone MAC Address"/>        Primary DNS Address : <input type="text"/>        Secondary DNS Address : <input type="text"/> (optional)        MTU : <input type="text" value="1500"/> </p>				<p><b>Helpful Hints..</b></p> <p>When configuring the router to access the Internet, be sure to choose the <b>correct Internet Connection Type</b> from the drop down menu. If you are unsure of which option to choose, please contact your <b>Internet Service Provider (ISP)</b>.</p> <p>If you are having trouble accessing the Internet through the router, double check any settings you have entered on this page and verify them with your ISP if needed.</p>

2. **If the ISP provides a Dynamic IP address**, a dynamic DNS service must be used. Dynamic DNS services can be used with static IP addresses as well to operate a custom web address instead of a static IP address when directing the VPN client device to the VPN router over the Internet. This can be done by using a dynamic DNS hosting service such as DynDNS.org. This application note uses a free DynDNS.org account. To configure a dynamic DNS service:
  - a. Locate the VPN router's internal configuration pages at its address: **192.168.100.1**
  - b. Select the **Maintenance** tab.
  - c. Click **Dynamic DNS** from the left-hand side menu.
  - d. Check **Enable Dynamic DNS** to enable. A screen similar to Figure 11 should appear.
  - e. Select **www.DynDns.org (Free)** and click the << button to populate **Server Address**.
  - f. Provide the correct **Host Name**, **User Name**, and **Password** for the DynDNS.org account being used.
  - g. Leave **Timeout** at **240**.
  - h. Press the **Save Settings** button at the top.

Figure 11

Product Page: DIR-330		Firmware Version: 1.12			
D-Link					
DIR-330	SETUP	ADVANCED	MAINTENANCE	STATUS	HELP
<ul style="list-style-type: none"> <li>Admin Setup</li> <li>Time And Date</li> <li>System</li> <li>Firmware</li> <li><b>Dynamic DNS</b></li> <li>System Check</li> <li>Schedules</li> <li>Log Settings</li> </ul>	<div style="background-color: #f4a460; padding: 5px;"><b>DYNAMIC DNS :</b></div> <p>Dynamic DNS (Domain Name Service) is a method of keeping a domain name linked to a dynamic IP address. With most Cable and DSL connections, you are assigned a dynamic IP address and that address is used only for the duration of that specific connection.</p> <p>With the DIR-330, you can setup your DDNS service and the DIR-330 will automatically update your DDNS server every time it receives a new WAN IP address.</p> <p style="text-align: center;"> <input type="button" value="Save Settings"/> <input type="button" value="Don't Save Settings"/> </p>				<b>Helpful Hints..</b> In order to use this feature you must first have a DDNS account from one of the providers in the drop down menu.
	<div style="background-color: #333; color: white; padding: 5px;"><b>DDNS SETTINGS :</b></div> <p>Enable Dynamic DNS : <input type="checkbox"/></p> <p>Server Address : <input type="text" value="www.DynDns.org (Free)"/> <input type="button" value="&lt;&lt;"/></p> <p style="margin-left: 100px;"> <input type="text" value="www.DynDns.org (Free)"/> <input type="button" value="v"/> </p> <p>Host Name : <input type="text" value="myuser.dyndns.org"/></p> <p>Username or Key : <input type="text" value="myuser"/></p> <p>Password or Key : <input type="password" value="....."/></p> <p>Verify Password or Key : <input type="password" value="....."/></p> <p>Timeout : <input type="text" value="240"/> (hours)</p> <p>Status : Disconnect</p>				

## C. Configure User Groups:

1. Select the **Advanced** tab.
2. Click **User Group** from the left-hand side menu. A screen similar to Figure 12 should appear.
3. Under **User Settings**, replace the first **User Name** ("admin") with a VPN user. Also, assign a **Password** for that user. (If "admin" does NOT appear in the username list, just begin adding users in position number "1"). Repeat this step for any additional users of the VPN.
4. Press the **Save Settings** button at the top.

Figure 12

Product Page: DIR-330 Firmware Version: 1.12

**DIR-330** // SETUP **ADVANCED** MAINTENANCE STATUS HELP

**USER GROUP SETTINGS :**

This section allows you to easily create user names and passwords for different groups of users. These groups can access your router through a VPN tunnel.

**USER SETTINGS :**

Group Name :

	User Name	Password
1.	<input type="text" value="myuser"/>	<input type="text" value="password"/>
2.	<input type="text"/>	<input type="text"/>
3.	<input type="text"/>	<input type="text"/>
4.	<input type="text"/>	<input type="text"/>

**Helpful Hints..**

Choose a User Group in the Authentication database menu and click the Edit button. A list of 25 users will then appear for the User Group that you just chose. You can edit the name of each User Group and the User Name and Password of each user.

**Note:** The VPN router supports up to 25 simultaneous connections. Each **User Name** may be used to open multiple connections before the simultaneous-connection limit is reached.

## D. Configure VPN Access:

1. Select the **Setup** tab.
2. Click **VPN Settings** from the left-hand side menu.
3. If prompted, press the **Manual VPN Setup** button.
4. Under **Add VPN Profile**, select **PPTP/L2TP** from the dropdown menu and click **Add**, as shown in Figure 13.

Figure 13

Product Page: DIR-330
Firmware Version: 1.12

D-Link

DIR-330	SETUP	ADVANCED	MAINTENANCE	STATUS	HELP						
<ul style="list-style-type: none"> <li>Internet</li> <li>Wireless Settings</li> <li>Network Settings</li> <li style="background-color: #333; color: white; padding: 2px;">VPN Settings</li> </ul>	<div style="background-color: #e67e22; color: white; padding: 5px; font-weight: bold;">VPN SETTINGS</div> <div style="background-color: #ccc; padding: 5px; margin-top: 5px;">Use this section to create and configure your VPN settings.</div> <div style="background-color: #333; color: white; padding: 5px; margin-top: 5px; font-weight: bold;">ADD VPN PROFILE :</div> <div style="margin-top: 5px;"> <div style="border: 1px solid #ccc; padding: 2px; display: flex; align-items: center;"> <div style="border: 1px solid #ccc; padding: 2px; flex-grow: 1;"> PPTP/L2TP </div> <div style="border: 1px solid #ccc; padding: 2px; margin-left: 5px;">Add</div> </div> <div style="margin-top: 2px; font-size: 8px;"> Select a type  IPSec - Internet Protocol Security  PPTP/L2TP </div> </div> <div style="margin-top: 5px; border: 1px solid #ccc;"> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #333; color: white;"> <th style="width: 30%; padding: 5px;">Enable</th> <th style="width: 40%; padding: 5px;">Name</th> <th style="width: 30%; padding: 5px;">Type</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"></td> <td></td> <td></td> </tr> </tbody> </table> </div>				Enable	Name	Type				<div style="background-color: #333; color: white; padding: 5px; font-weight: bold;">Helpful Hints..</div> <div style="font-size: 8px; padding: 5px;"> The DIR-330 supports IPSec, PPTP, and L2TP VPN as the Server Endpoint. For more details information about configuring VPN Endpoint Server in your DIR-330, please visit the help menu. </div>
Enable	Name	Type									

5. Change the following settings in the **PPTP/L2TP Setting**, as shown in Figure 14.
  - a. Check the box labeled **Enable Setting**.
  - b. Provide a name for the VPN connection appropriate to the location.
  - c. Ensure that **PPTP** is selected for **Connection Type**.
  - d. Enter the router's LAN IP Address (**192.168.100.1**) into the **VPN Server IP** field.
  - e. Assign a **Remote IP Range** of **192.168.100.200** in the first field and 225 in the second field (**192.168.100.200-225**).
  - f. Ensure that **MSCHAP v2** is selected for **Authentication Protocol**.
  - g. Ensure that **128 bit** is selected for **MPPE Encryption Mode**.
  - h. Ensure that **Group 1** is selected for **Authentication Database**.

Figure 14

Product Page: DIR-330		Firmware Version: 1.12			
<b>D-Link</b>					
<b>DIR-330</b> //	<b>SETUP</b>	<b>ADVANCED</b>	<b>MAINTENANCE</b>	<b>STATUS</b>	<b>HELP</b>
Internet	<b>VPN - PPTP/L2TP SERVER</b>				<b>Helpful Hints..</b> PPTP uses TCP port 1723 for it's control connection and uses GRE (IP protocol 47) for the PPP data. PPTP supports data encryption by using MPPE.  L2TP uses UDP to transport the PPP data, this is often encapsulated in IPSec for encryption instead of using MPPE.  For more details information about configuring VPN Endpoint Server in your DIR-330, please visit the support menu.
Wireless Settings	Use this section to configure your VPN-PPTP/L2TP Server settings.				
Network Settings	<input type="button" value="Save Settings"/> <input type="button" value="Don't Save Settings"/>				
VPN Settings	<b>PPTP/L2TP SETTING :</b>				
	Enable setting :	<input checked="" type="checkbox"/>			
	Name :	<input type="text" value="myuserVPN"/>			
	Connection type :	<input checked="" type="radio"/> PPTP <input type="radio"/> L2TP <input type="radio"/> L2TP over IPSec			
	VPN Server IP :	<input type="text" value="192.168.100.1"/>			
	Remote IP range :	<input type="text" value="192.168.100.200"/> - <input type="text" value="250"/>			
	Authentication Protocol :	<input type="radio"/> PAP <input type="radio"/> CHAP <input checked="" type="radio"/> MSCHAP v2			
	MPPE Encryption Mode :	RC4 <input type="radio"/> None <input type="radio"/> 40 bit <input checked="" type="radio"/> 128 bit			
	Authentication database :	<input type="text" value="Group1"/>			

## Addressing a Lutron® System with a Static IP

The HomeWorks® QS processor(s), HomeWorks® Illumination processor(s), and RadioRA® 2 main repeater(s) must have a static IP address to ensure functionality of the Lutron® Home Control+ application on iOS and Android® devices using the VPN from a remote location. If static IP addressing was already assigned to system devices connected to an old router, it may be required to re-address the assigned devices to connect with the new VPN router's subnet (192.168.100.XXX).

### I. For HomeWorks® QS Systems:

A. Connect the PC to the HomeWorks® QS processor and open the project file in the HomeWorks® QS application.

B. Select the **Activate** tab.

1. Within the **Activate Processors** task view, deactivate each processor on the system.
2. For every processor:
  - a. Uncheck the **DHCP** option.
  - b. Assign a unique IP address outside the DHCP range of the router:
    - i. For Luxul, use an address within the range 192.168.100.51 – 192.168.100.99 for the processor(s) in the IP Address field (e.g., processor 1: 192.168.100.51; processor 2: 192.168.100.52).
    - ii. For D-Link®, use an address within the range 192.168.100.151 – 192.168.100.199 for the processor(s) in the IP Address field (e.g., processor 1: 192.168.100.151; processor 2: 192.168.100.152).
  - c. Set the **Subnet Mask** to **255.255.255.0**.
  - d. Set the **Gateway Address** to **192.168.100.1** (or other VPN router address as set up in step 3.a.ii.1).
  - e. Press the **Done** button.
3. Press the **Refresh** button to re-identify processors on the system.
4. **Reactivate** each processor.

## II. For HomeWorks® Illumination Systems:

- A. Connect the PC to the HomeWorks® Illumination processor and open the project file in the HomeWorks® Illumination application.
  1. In the Illumination software, open the **Terminal** screen.
  2. In the **File** menu of the Terminal screen, select the **TCP/IP Setup Wizard**.
  3. On the **Overview** screen, press the **Next** button.
  4. On the **Connecting Your Ethernet Cables** screen, press the **Next** button.
  5. On the **Processors Discovered** screen, select the network adapter that matches the connection to the processor(s).
  6. In the lower half of the same window, select the processor(s) from the list of discovered processors.
  7. Press the **Next** button.
  8. Ensure that the checkbox for **DHCP Enabled** is NOT checked.
  9. Assign a unique IP address outside the DHCP range of the router:
    - a. For Luxul, use an address within the range 192.168.100.51 – 192.168.100.99 for the processor(s) in the IP Address field (e.g., processor 1: 192.168.100.51; processor 2: 192.168.100.52).
    - b. For D-Link®, use an address within the range 192.168.100.151 – 192.168.100.199 for the processor(s) in the IP Address field (e.g., processor 1: 192.168.100.151; processor 2: 192.168.100.152).
  10. Ensure that the **Subnet Mask** is **255.255.255.0**.
  11. Ensure that the **Gateway Address** matches the IP address of the router (as set up in step 3.a.ii.1).
  12. Click **Next**.
  13. Ensure that the port numbers are correct for the site. Most sites will use the default ports, which are 80 for Web access, 21 for FTP, and 23 for Telnet.
  14. Click **Next**.
  15. The Setup Wizard should connect to the processor and apply any necessary configuration changes.
  16. A message window should appear indicating that the TCP/IP configuration was completed successfully.
  17. Press the **OK** button on the message window.
  18. Press the **Close** button on the Terminal screen.

## III. For RadioRA® 2 Systems:

- A. Connect the PC to the RadioRA® 2 system and open the project file in the RadioRA® 2 PC application.
  1. Navigate to the Main Repeater in the area tree and press the **Find Main Repeater** button.
  2. Under the **DHCP** column, select **Disabled** from the drop-down list.
  3. Assign a unique IP address outside the DHCP range of the router:
    - a. For Luxul, use an address within the range 192.168.100.51 – 192.168.100.99 for the processor(s) in the IP Address field (e.g., processor 1: 192.168.100.51; processor 2: 192.168.100.52).
    - b. For D-Link®, use an address within the range 192.168.100.151 – 192.168.100.199 for the processor(s) in the IP Address field (e.g., processor 1: 192.168.100.151; processor 2: 192.168.100.152).
  4. Press the **Save Settings** button.

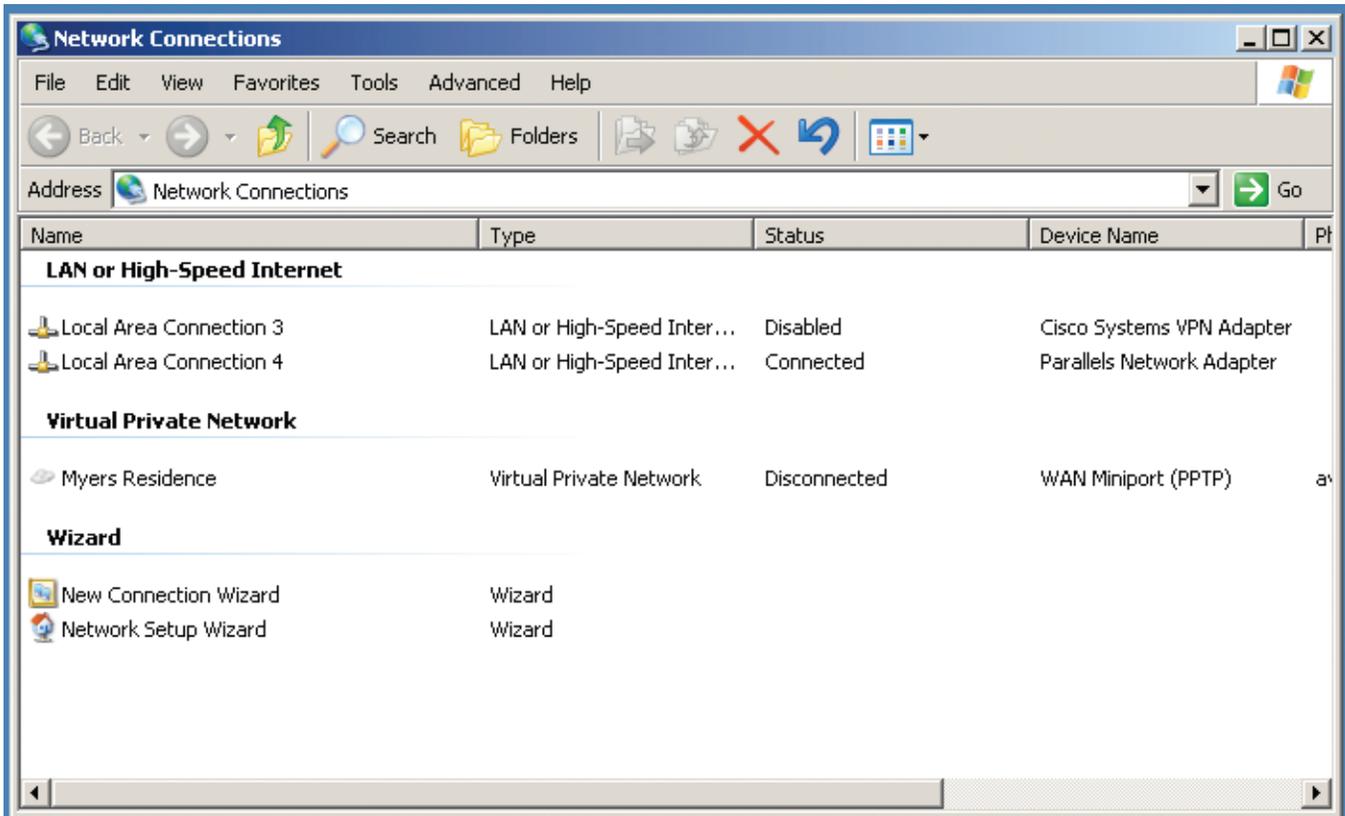
## Configuring Your PC to Connect to the VPN Router

After the VPN router is successfully configured, you will need to create a Virtual Private Network (VPN) connection within Microsoft® Windows®. This connection can then be enabled anytime you need to connect to the client's network.

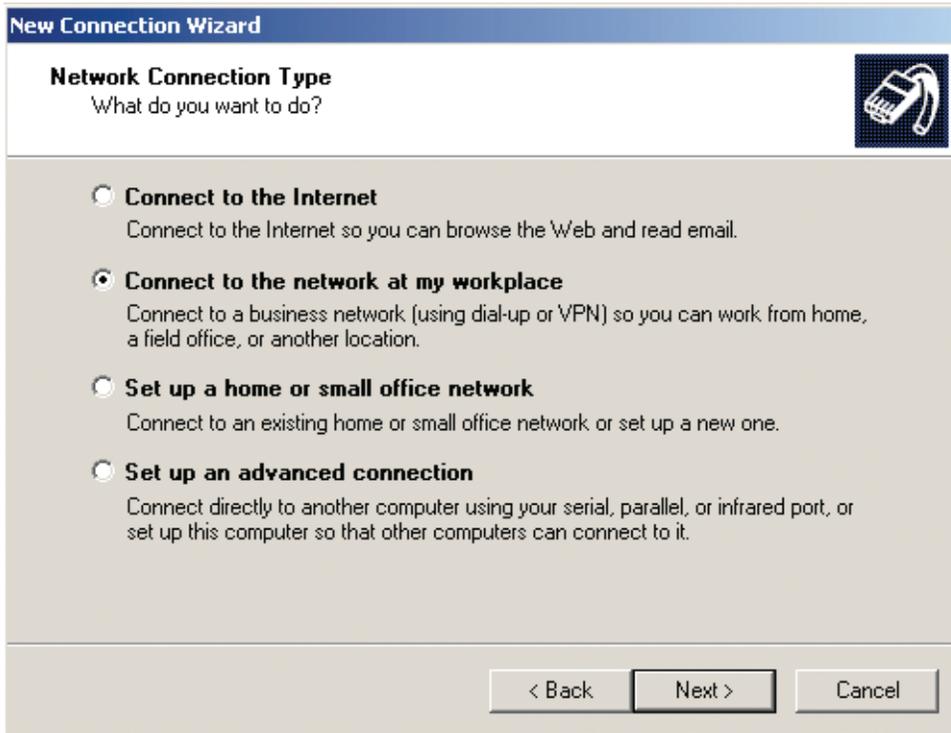
### Instructions for Windows XP®

- I. On the Windows® desktop, right click the **My Network Places** icon and select **Properties**. (Alternatively, open the **Control Panel** and open **Network Connections**.)
- II. In the **Network Connections** window, as shown in Figure 15, click **File** and then click **New Connection**.

**Figure 15**



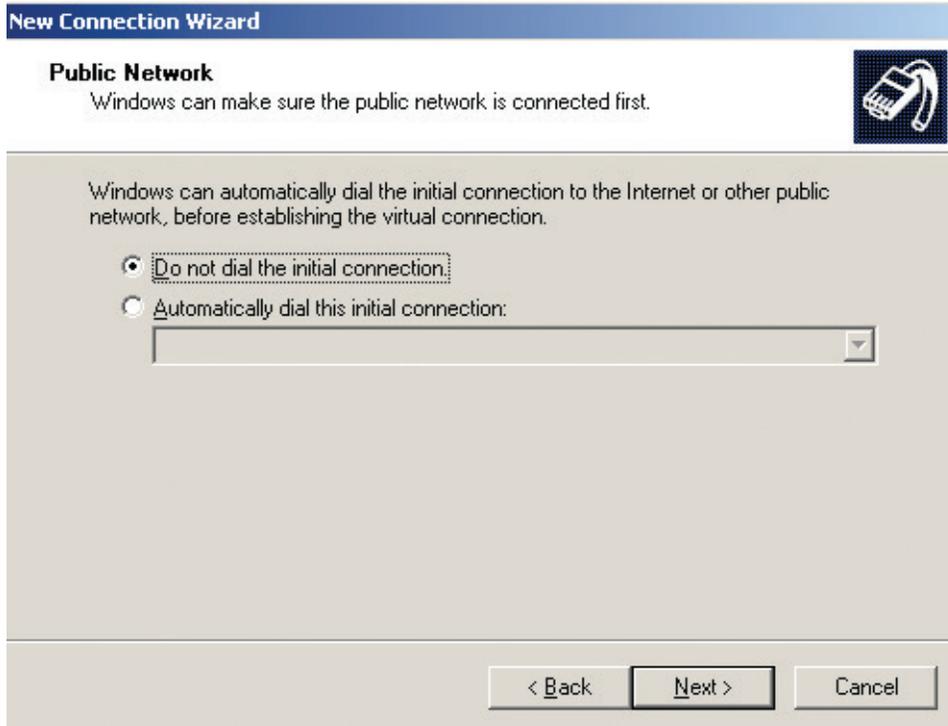
- III. In the **New Connection Wizard**, advance to the **Network Connection Type** screen by clicking **Next >**.
- IV. Select **Connect to the Network at My Workplace**, as shown in Figure 16, and click **Next >**.

**Figure 16**

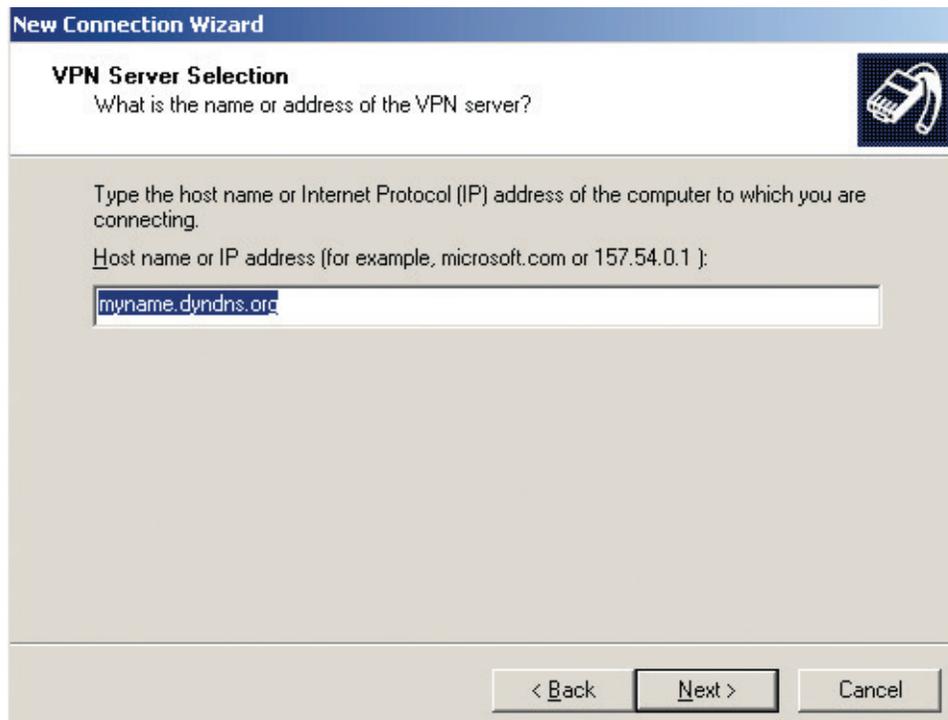
- V. On the **Network Connection** screen, as shown in Figure 17, select **Virtual Private Network Connection** and then click **Next >**.

**Figure 17**

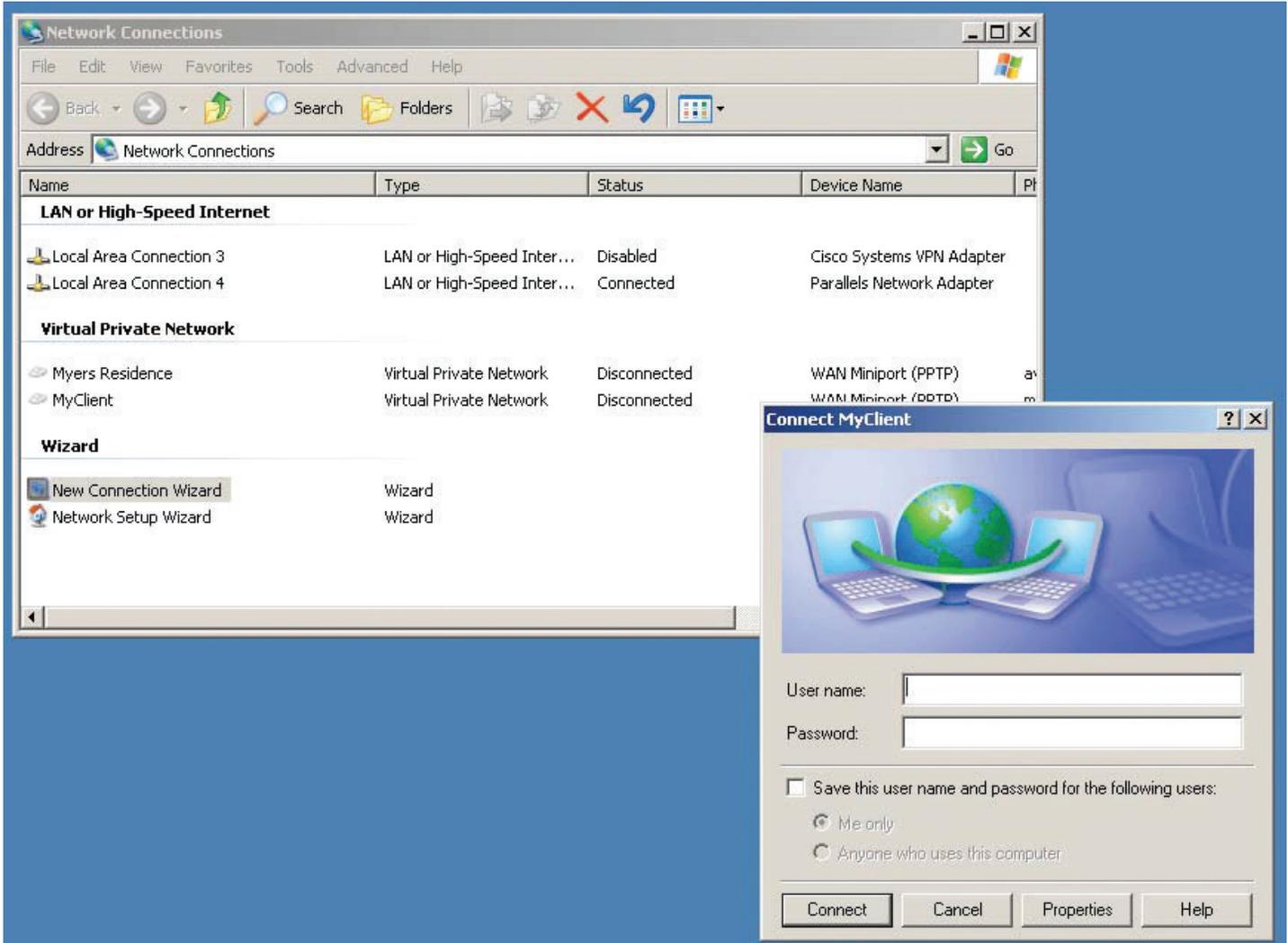
- VI. On the **Connection Name** screen, type in your client's name in the **Company Name** text field, then click **Next >**.
- VII. If the **Public Network** screen appears (some network configurations skip this screen), select the option **Do NOT Dial the Initial Connection**, as shown in Figure 18, then click **Next >**.

**Figure 18**

- VIII. On the **VPN Server Selection** screen, type in the static IP address of your client's network or the DynDNS host name, as shown in Figure 19, then click **Next >**.

**Figure 19**

- IX. If the **Connection Availability** screen appears (some PC configurations skip this screen), select the desired availability then click **Next >**.
- X. Click **Finish** to complete the setup.
- XI. After finishing the **Connection Wizard**, you will be prompted to enter a **User Name** and **Password**, as shown in Figure 20. This is the same username and password that you created in the “Configuring a Luxul Router” and “Configuring a D-Link® Router” sections. You will also notice that in the **Network Connections** box a new connection has been created. Use this connection the next time that you need to connect to this VPN router.

**Figure 20**

## Instructions for Windows® Vista® and Windows® 7

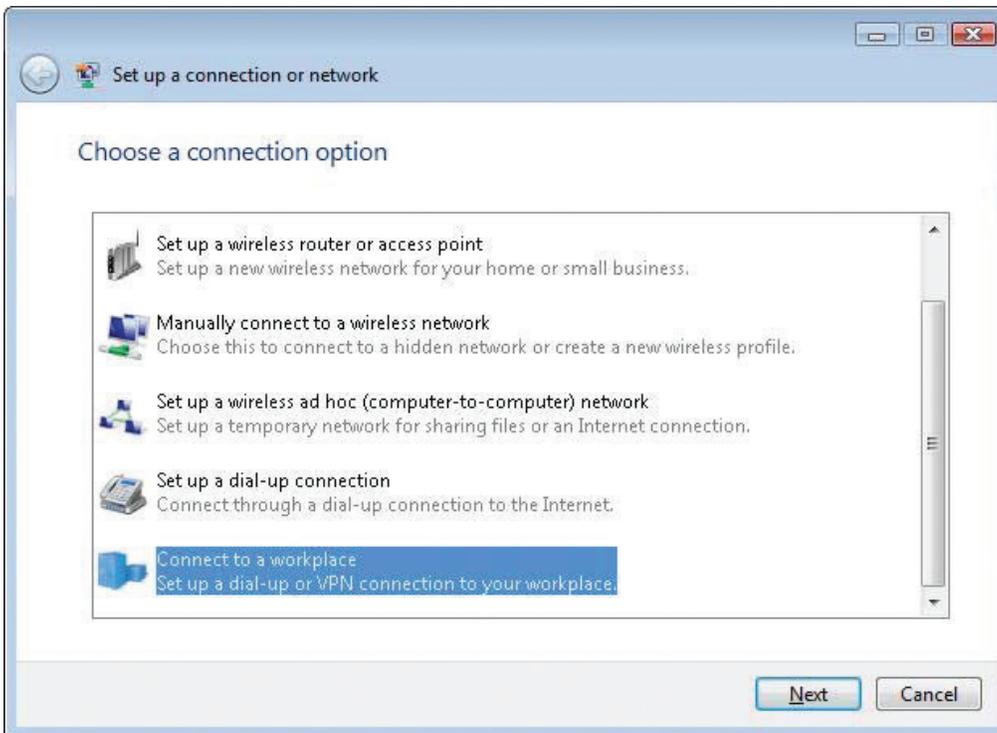
- I. Open the **Control Panel** and click on **Network and Internet** and then click on **Network and Sharing Center**.
- II. In the **Network and Sharing Center**, click **Set up a Connection or Network**, as shown in Figure 21.

**Figure 21**



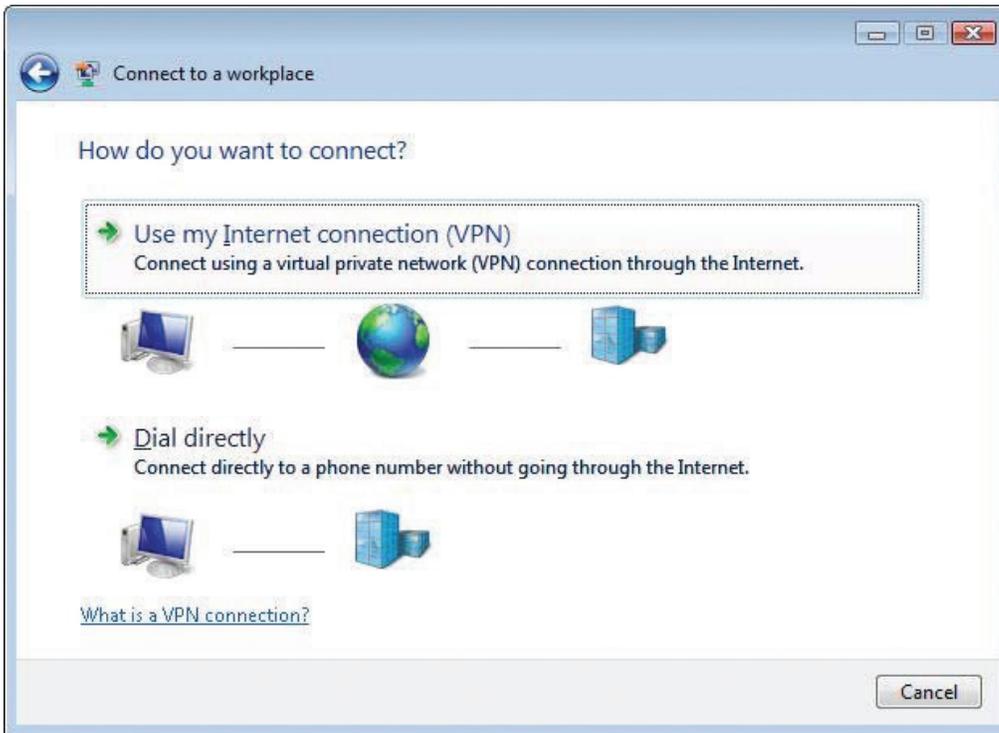
- III. On the **Choose a Connection Option** screen, as shown in Figure 22, click **Connect to a Workplace** and click **Next**.

**Figure 22**



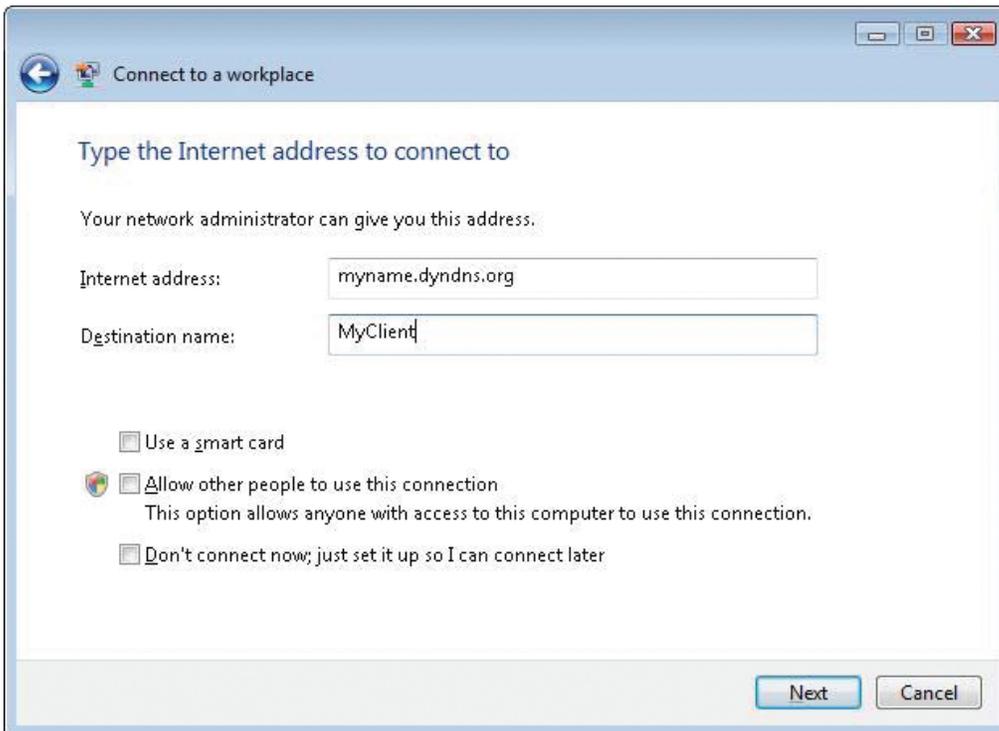
- VI. On the **How Do you Want to Connect?** screen, as shown in Figure 23, select **Use Internet Connection (VPN)**.

**Figure 23**

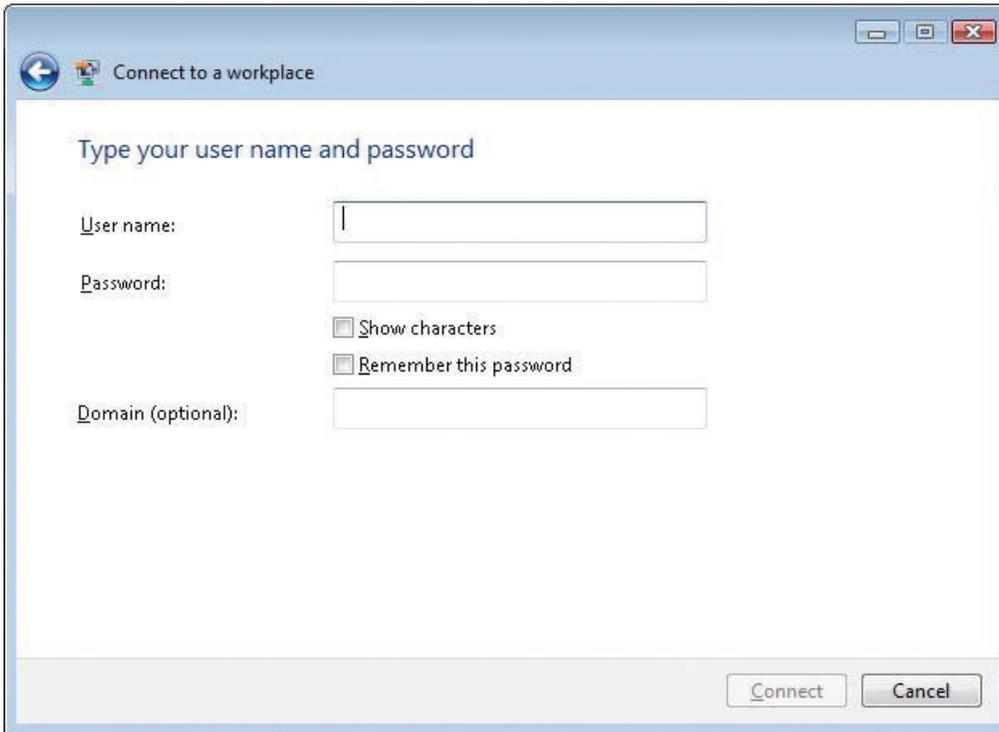


- V. On the **Type the Internet Address to Connect to** screen, as shown in Figure 24, type in the static IP address of your client's network or the DynDNS host name into the **Internet Address** box. Type the name of the client into the **Destination** box. Ensure that the checkboxes are NOT checked and click **Next**.

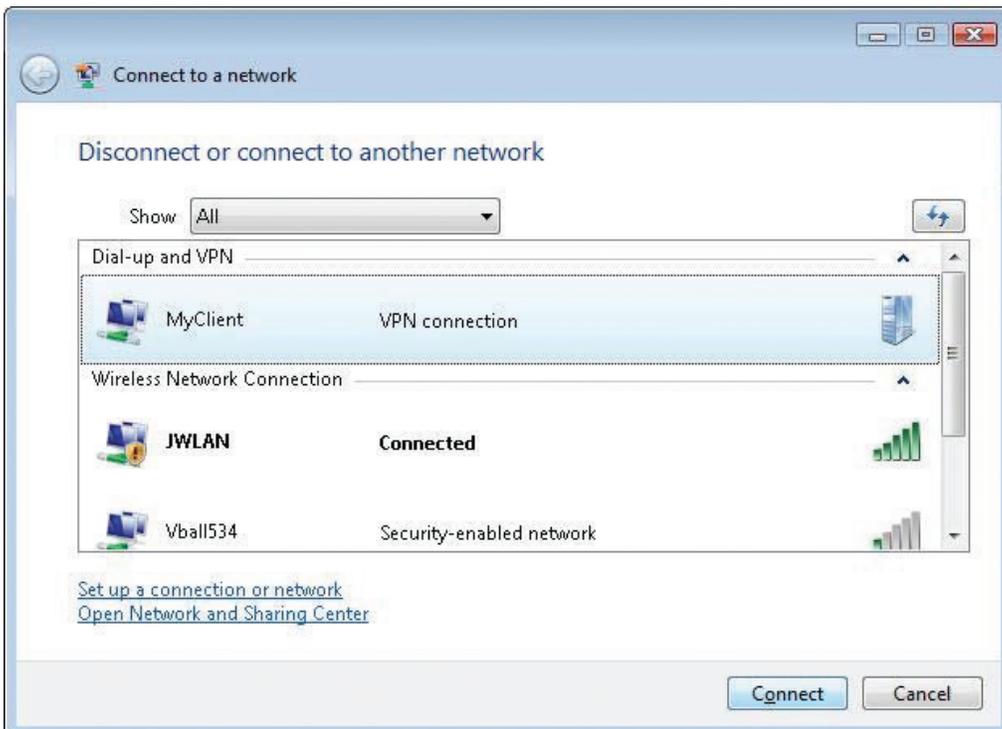
**Figure 24**



- VI. On the **Connect to a Workplace** screen, as shown in Figure 25, type in the **User Name** and **Password** that you created in the router to log into the VPN. Click **Connect** to complete the setup.

**Figure 25**

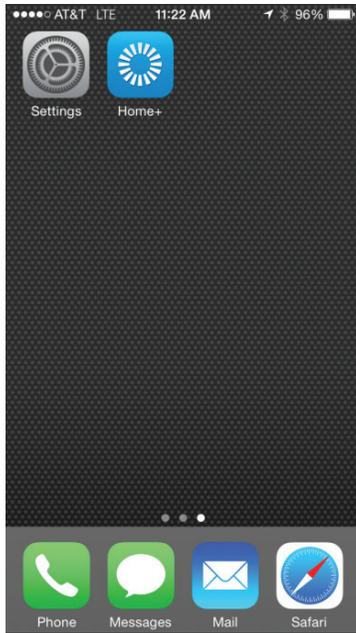
- VII. A new connection will have been created for the VPN. In the **Network and Sharing Center**, click **Connect to a Network**, select the client's VPN and then click **Connect** to establish the VPN connection to the client's network, as shown in Figure 26.

**Figure 26**

## Instructions for Apple iPhone / iPod Touch

- I. Open the **Settings** App (refer to Figure 27).
- II. Tap **General** (refer to Figure 28).
- III. Tap **VPN** (refer to Figure 29).

**Figure 27**



**Figure 28**

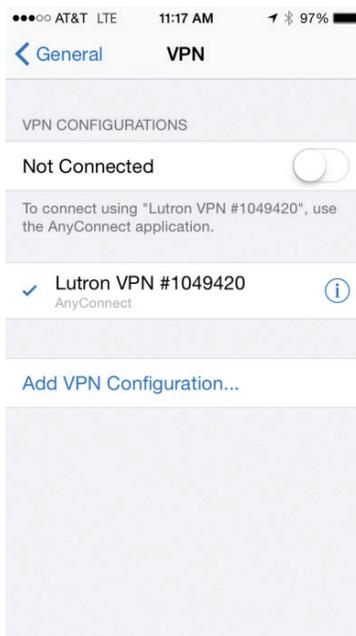


**Figure 29**

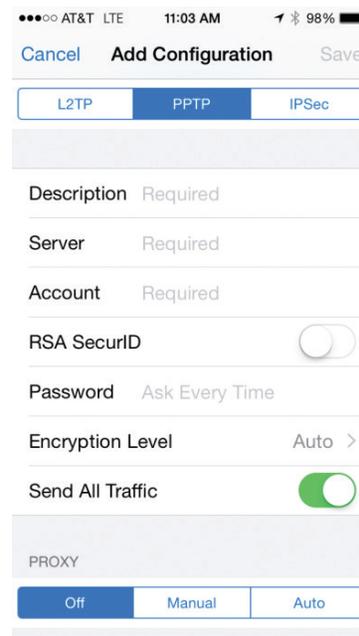


- IV. Tap **Add VPN Configuration** (refer to Figure 30).
- V. Select the **PPTP** tab (refer to Figure 31).

**Figure 30**

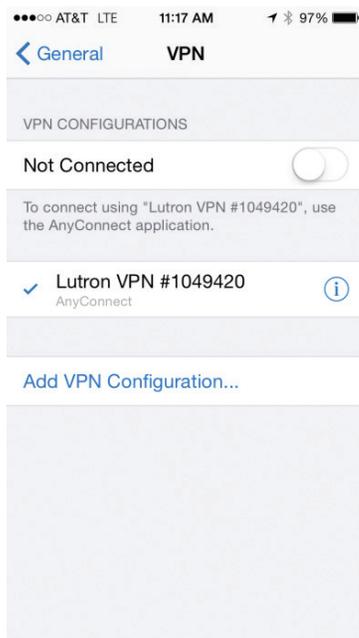


**Figure 31**



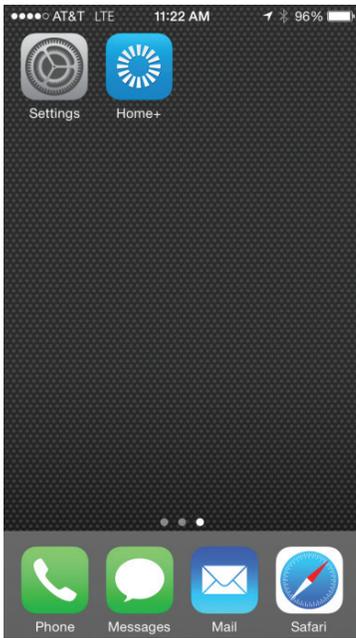
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- VI. Enter the appropriate information, based on how you configured the VPN router.
- A. **Description** is a user-friendly, arbitrary name given to the VPN connection.
  - B. **Server** is the IP address or Dynamic DNS name to gain access to the router from the Internet.
  - C. **Account** is the user name set up for the PPTP server on the VPN router.
  - D. **RSA SecurID** should remain set to **OFF**.
  - E. **Password** is the password set up for the account/user name used to gain access to the VPN router (created in “Configuring a Luxul Router” and “Configuring a D-Link® Router” sections, Step III.C.3).
  - F. **Encryption Level** should remain set to **Auto**.
  - G. **Send All Traffic** should remain set to **ON**.
- VII. **Save the VPN Configuration.**
- VIII. Slide the “**VPN**” switch to the **ON** position, as shown in Figure 32 (this establishes the connection with the VPN, if available). Once connected, there will be an icon at the top of the screen indicating that the VPN session is active.

**Figure 32**

IX. Launch the Lutron® application, as shown in Figures 33 and 34.

**Figure 33**



**Figure 34**



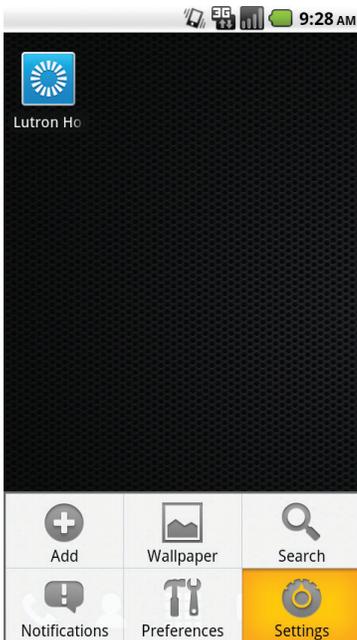
## Instructions for Android® devices

**Note:** Visual elements across devices using Android® OS can vary. Your device's screen output may differ in appearance from the screenshots below.

- I. From the **Home** screen, press the **Menu** button on the device. Tap **Settings** (refer to Figure 35).
- II. Tap **More Networks** (refer to Figure 36).
- III. Tap **VPN** (refer to Figure 37).

**Note:** Some devices may prompt the user to select between “Basic VPN” and “Advanced IPsec VPN”. Select **Basic VPN**.

**Figure 35**



**Figure 36**



**Figure 37**



- IV. Tap **Add VPN** (refer to Figure 38).
- V. Tap **Add PPTP VPN** (refer to Figure 39).
- VI. Enter the appropriate information, based on how you configured the VPN router (refer to Figure 40).
  - A. **VPN Name** is a user-friendly, arbitrary name given to the VPN connection.
  - B. **Set VPN Server** should be set as the IP address or Dynamic DNS name to gain access to the router from the Internet.
  - C. Ensure that **Enable Encryption** is checked.
  - D. **DNS Search Domains** do NOT need to be set.

Figure 38

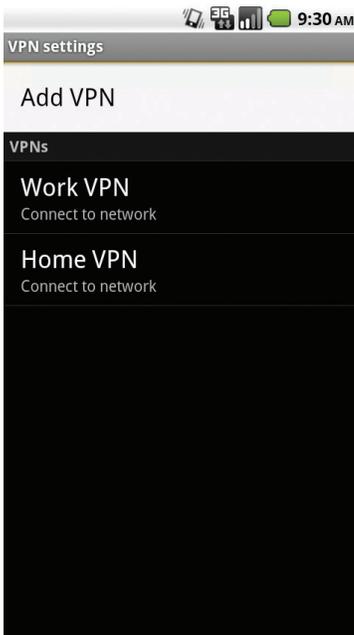


Figure 39

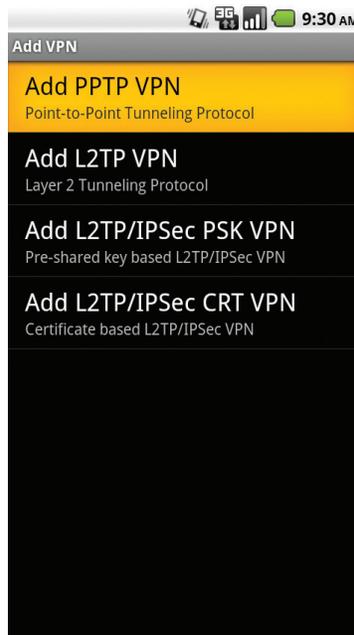
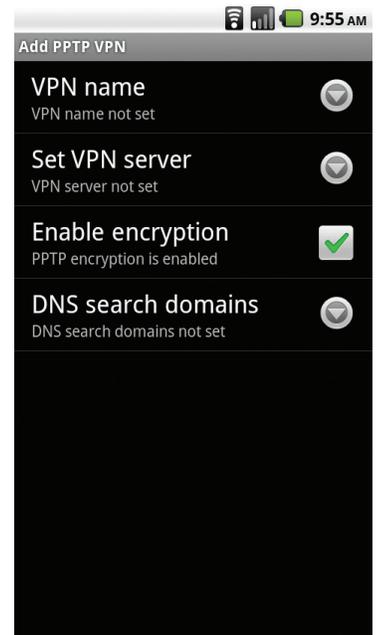


Figure 40



- VII. Press the **Back** button on the device. Tap the **Add VPN** connection (refer to Figure 41).
- VIII. **Username** and **Password** should be set as the user name and password set up for the PPTP server on the VPN router created in “Configuring a Luxul Router” and “Configuring a D-Link® Router” sections, Step III.C.3 (refer to Figure 42).
- IX. Check **Remember Username**, if desired. Tap **Connect**. If a connection is successful, a message will appear in the notification area indicating connection status (refer to Figure 43).

Figure 41

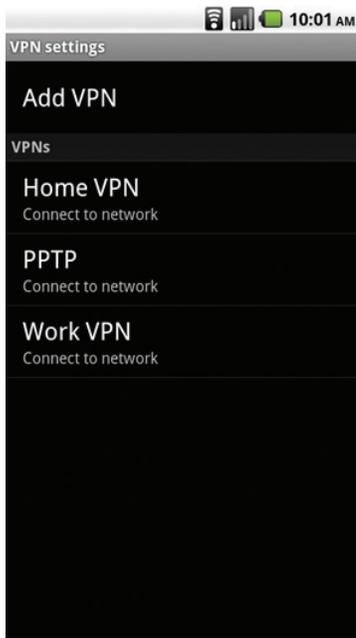
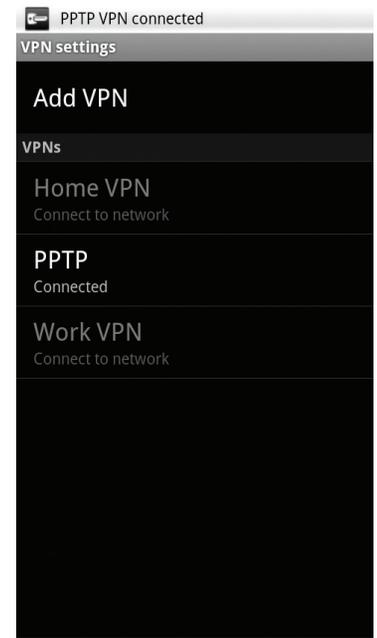


Figure 42



Figure 43



- X. Press the **Home** button on the device (refer to Figure 44).
- XI. Launch the Lutron® application (refer to Figure 45).

Figure 44

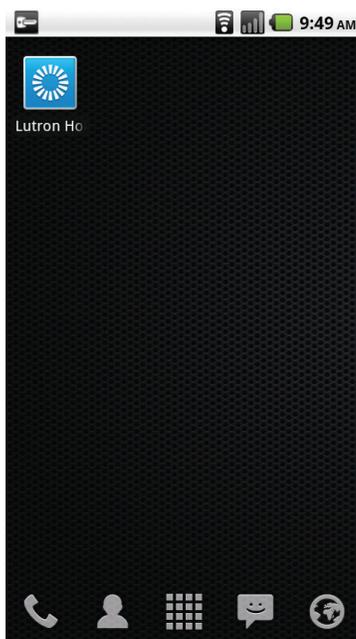


Figure 45



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## Using a VPN Connection to Remotely Connect to Lutron® Systems

Once you have the VPN router configured and a VPN client connection set up within Microsoft® Windows®, you can use the VPN along with the HomeWorks® QS, HomeWorks® Illumination and RadioRA® 2 Inclusive software to connect to the client's system remotely. The software will work just as if you were plugged into the processor through the network at the client's site. This method should only be used to connect with sites that have already undergone at least one local transfer. Processors/main repeaters shipped from the factory may require a firmware update. It is NOT recommended to upgrade firmware remotely.

### I. HomeWorks® QS software

- A. Connect to the client VPN by using the connection that you set up in the previous steps. Enter your **Username** and **Password** when you are prompted for them.
- B. Once you are connected to the VPN, launch the HomeWorks® QS software.
- C. Within the **Activate** tab, ensure that the static IP address of the processors (as set in the "Configuring a Luxul Router" and "Configuring a D-Link® Router" sections) is accurate.
- D. Under Remote Access, ensure that the port is set correctly. In most situations, this will be set to **Port 51023**.
- E. Press the **Save and Apply** button and use the software as you normally would if you were at the client's site.

### II. HomeWorks® Illumination software

- A. Connect to the client VPN by using the connection that you set up in the previous steps. Enter your **Username** and **Password** when you are prompted for them.
- B. Once you are connected to the VPN, launch the HomeWorks® Illumination software and use it as you normally would if you were at the client's site.

### III. RadioRA® 2 software

- A. Connect to the client VPN by using the connection that you set up in the previous steps. Enter your **Username** and **Password** when you are prompted for them.
- B. Once you are connected to the VPN, launch the RadioRA® 2 software and use it as you normally would if you were at the client's site.
- C. In the **Design** tab, select the **Room** that has the main repeater, and press the **Find Main Repeater** button.
- D. In the **Find Main Repeater** screen, enter the main repeater's **Static IP Address** (as set in the "Configuring a Luxul Router" and "Configuring a D-Link® Router" sections) in the **Remote Access Address** field.
- E. Ensure that the port matches the main repeater settings. In most situations, this will be set to **Port 51023**.
- F. Press the **Save Settings** button and use the software as you normally would if you were at the client's site.

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