VERITAS

Encryption of VVR Replication Data Over-the-Wire Using L2TP/IPsec VPN

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Problem statement

In a VVR environment, the replication data that is transferred over a public network, is not secured. Such data needs to be encrypted during an over-the-wire transmission.

Solution

A virtual private network (VPN) configuration extends a private network across a public network so that the data being transmitted can be remotely accessed through the public network in a secure manner. You can also use a VPN to secure your internet activity by using the VPN server as a proxy server.

You can configure an L2TP/IPsec VPN on a Windows network and use it to access your business network. This VPN is configured by using the built-in Routing and Remote Access (RRAS) feature of Microsoft Windows Server. Then, a VPN tunnel is created from the VVR primary to the VVR secondary. Finally, the replication data is encrypted by using the IPsec VPN before it is sent over the wire.

What is IPsec?

IPsec is a set of protocols that are used together to configure encrypted connections between devices. It helps keep data sent over public networks secure. IPsec is often used to set up VPNs, and it works by encrypting IP packets along with authenticating the origin of the packets.

How does IPsec work?

Configuring IPsec connections includes the following steps:

- **Key exchange**: Keys are necessary for encryption; a key is a string of random characters that can be used to lock (or encrypt) and unlock (or decrypt) messages. IPsec sets up keys with a key exchange between the connected devices, so that each device can decrypt the messages from the other device.
- **Addition of packet headers and trailers**: All data that is sent over a network is broken down into smaller pieces called packets. Packets contain both, a payload, or the actual data being sent, and headers, or information about that data, so that computers receiving the packets know what to do with them. IPsec adds several headers to data packets containing authentication and encryption information. It also adds trailers, which are sent after the payload of each packet, instead of before.
- **Authentication**: IPsec provides authentication for each packet, like a stamp of authenticity on a collectible item, which ensures that the packets are from a trusted source and not from an attacker.
- **Encryption**: IPsec encrypts the payloads within each packet and the IP header of each packet unless the transport mode is used instead of the tunnel mode—refer to the details further in this document. This encryption keeps the data sent over IPsec secure and private.

- **Transmission**: Encrypted IPsec packets travel across one or more networks to their destination using a transport protocol. At this stage, IPsec traffic differs from regular IP traffic in that it most often uses UDP as its transport protocol, rather than TCP, sets up dedicated connections between devices, and ensures that all the packets have arrived. UDP does not set up these dedicated connections. IPsec uses UDP because it allows IPsec packets to get through firewalls.
- **Decryption**: At the other end of the communication, the packets are decrypted, and applications (for example, browsers) can now use the delivered data.

Which protocols does IPsec use?

A networking protocol is a specified way of formatting data so that any networked computer can interpret it. The IPsec suite of protocols comprises the following:

- **Authentication Header (AH)**: The AH protocol ensures that the data packets are from a trusted source and that the data has not been tampered with, like a tamper-proof seal on a consumer product. These headers do not provide any encryption and so they do not help conceal the data from attackers.
- **Encapsulating Security Protocol (ESP)**: ESP encrypts the IP header and the payload for each packet unless transport mode is used, in which case it only encrypts the payload. ESP adds its own header and a trailer to each data packet.
- **Security Association (SA)**: SA refers to a group of protocols used for negotiating encryption keys and algorithms. One of the most common SA protocols is Internet Key Exchange (IKE).

Finally, while the Internet Protocol (IP) is not part of the IPsec suite, IPsec runs directly on top of IP.

Which port does IPsec use?

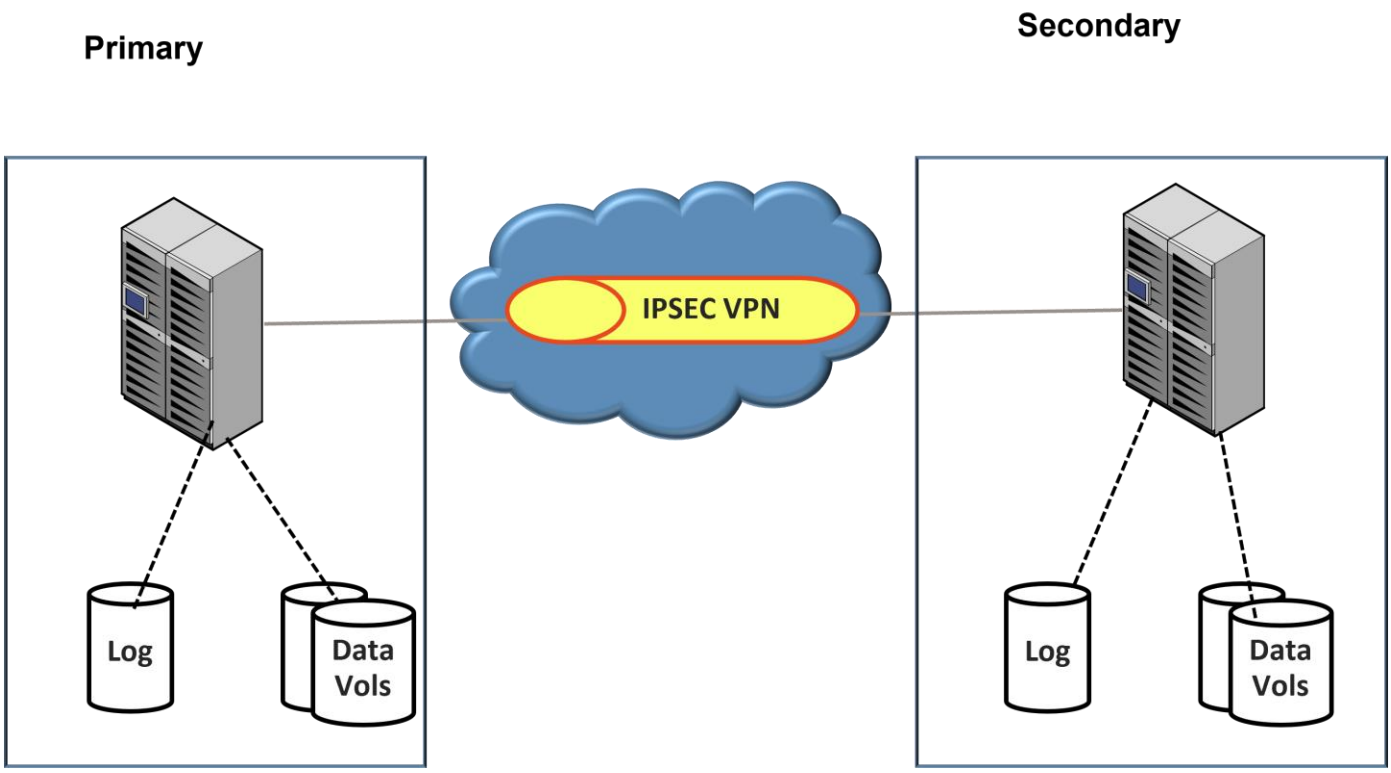
IPsec usually uses port 500.

Operating system supported with InfoScale

Windows Server 2016

Deployment Diagram

The proposed configuration has been validated on 1 primary and 1 secondary in DR scenario.



Setting up the IPsec VPN

Step 1

Log in to both the InfoScale servers—the VVR primary and the VVR secondary—and make sure that they have the latest updates installed.

Step 2

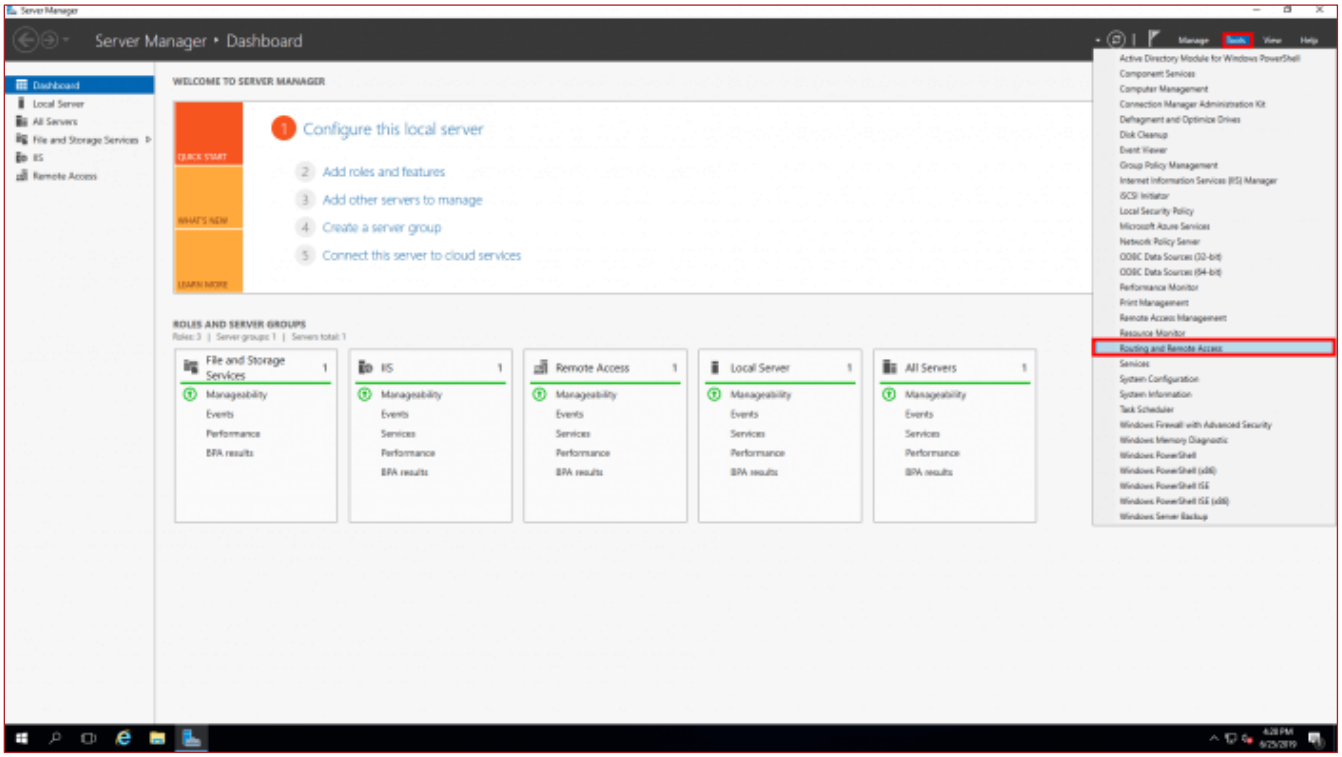
Install the Remote Access role on both the servers.

1. Open the Server Manager window.
2. Click **Manage** > **Add Roles and Features**.

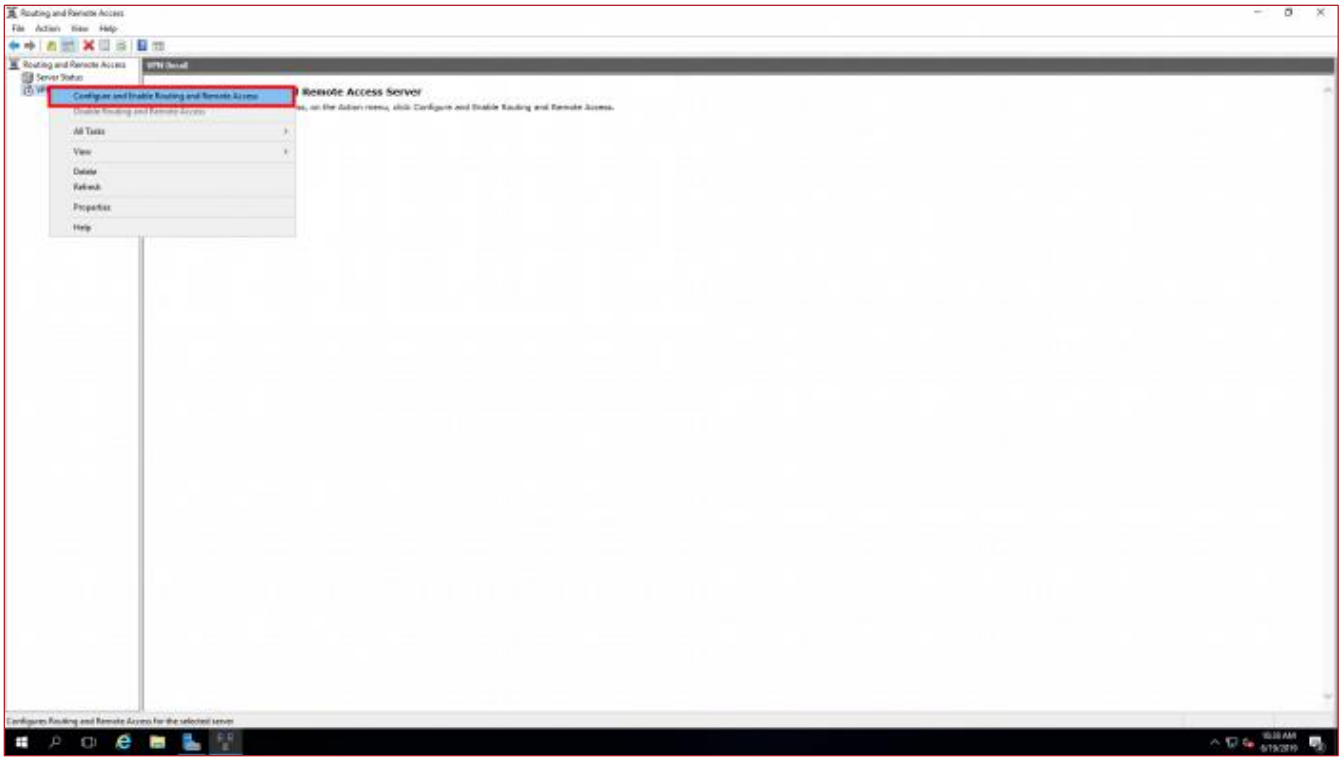
3. Select the server from server pool, select **Remote Access** in the **Server Role** section, and click **Next**.
4. On the Remote Access wizard, select **DirectAccess and VPN (RAS)** and **Routing**.
5. On the popup that appears, click **Add Features** and the click **Next**.
6. Make sure that **DirectAccess and VPN (RAS)** and **Routing** are selected in the **Role services** section, and then click **Next**. Accept the defaults on the further pages and click **Next**.
7. On the Confirmation page, select **Restart the destination server automatically if required** checkbox, and the click **Install**.

Step 3

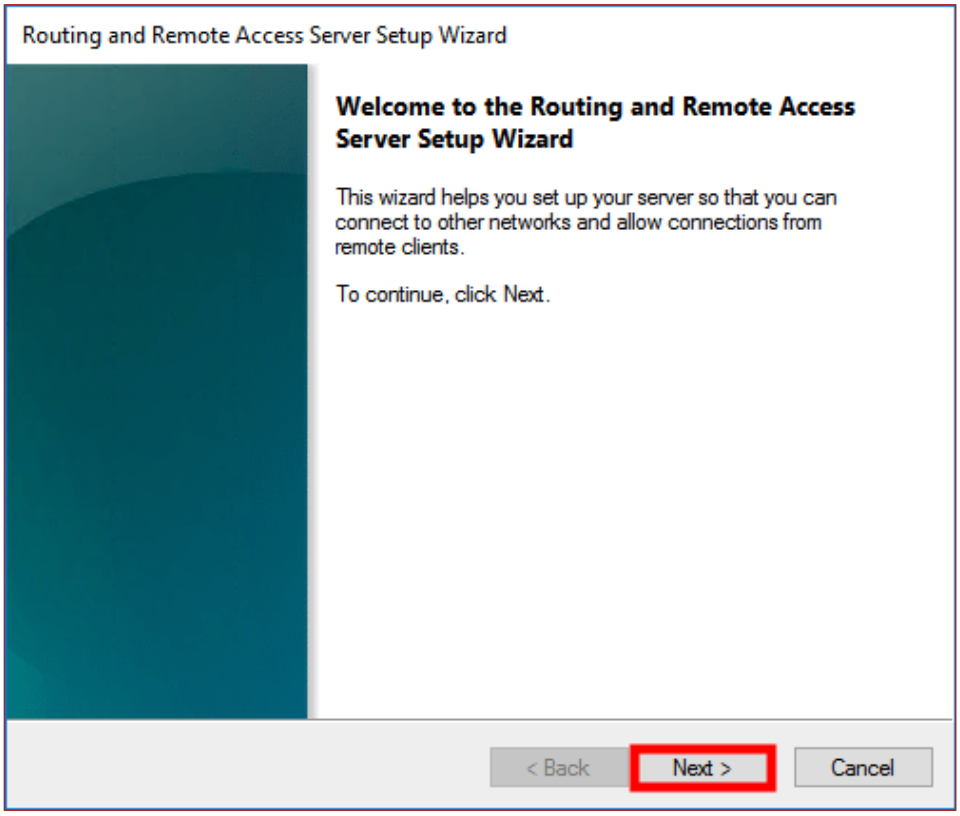
1. Open Server Manager > Tools > Routing and Remote Access.



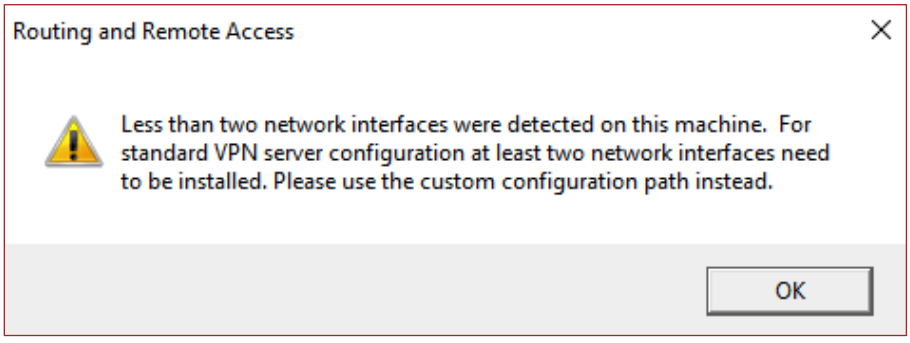
2. On the new screen that appears, right-click the server name and click **Configure Routing and Remote Access**.



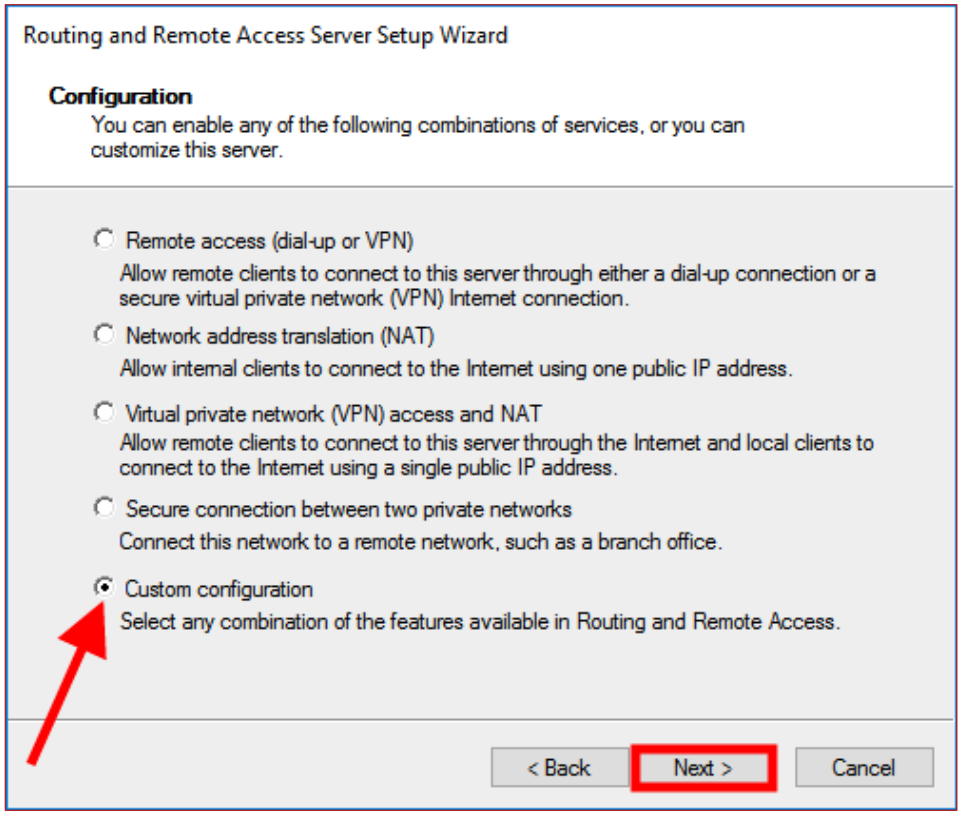
3. On the Routing and Remote Access Server Setup Wizard, click **Next**.



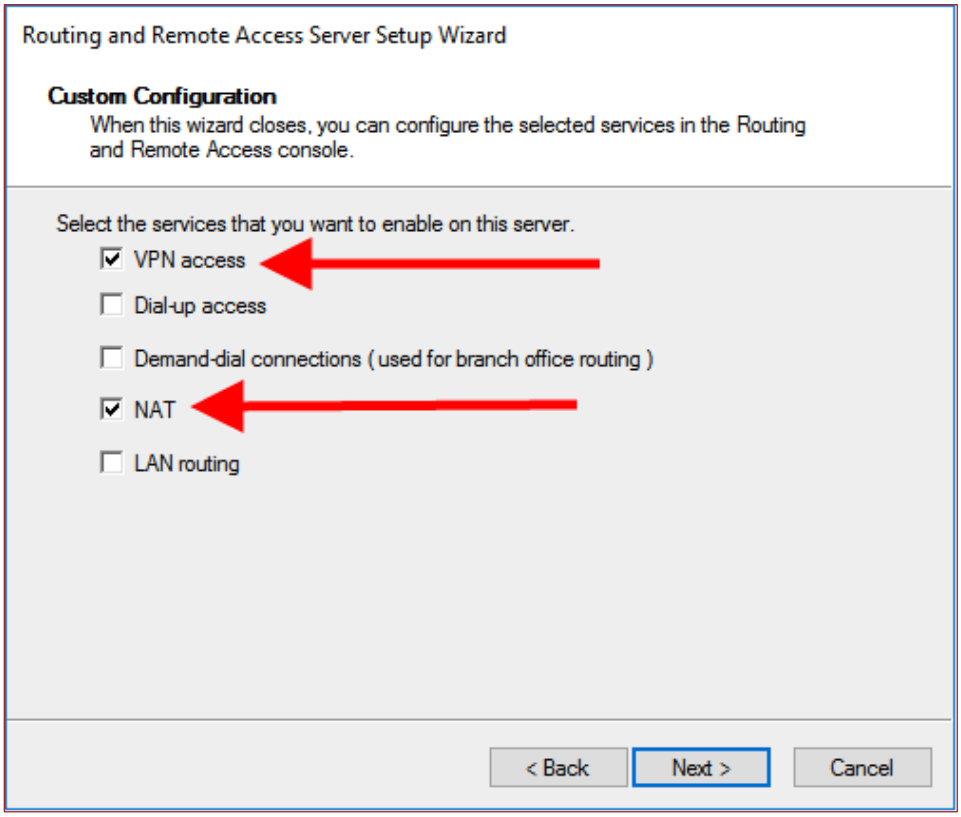
4. Use a custom configuration because the VPN access and NAT require two or more network interfaces.



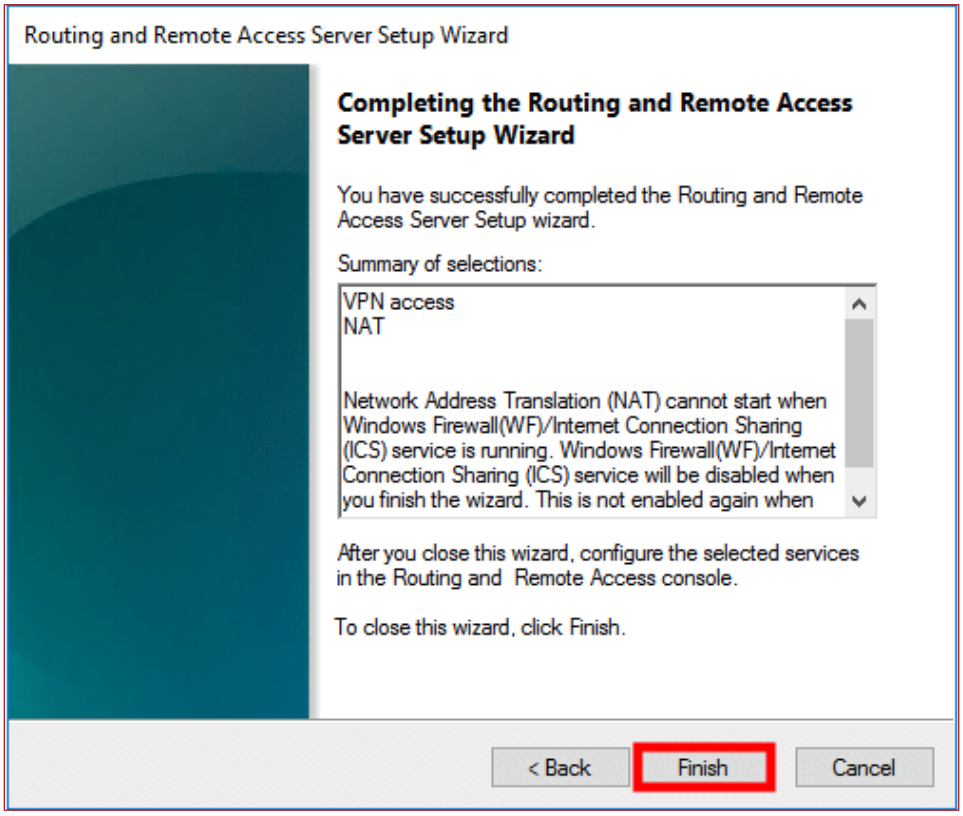
5. Select **Custom configuration** and click **Next**.



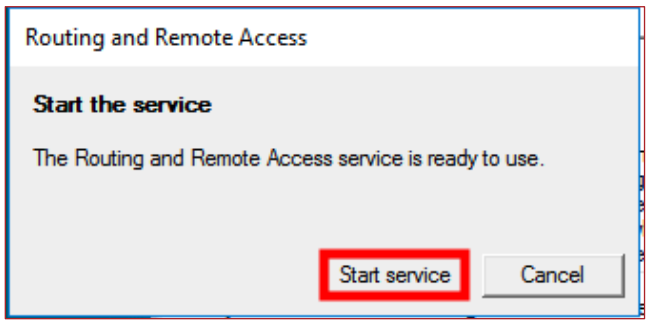
6. Select **VPN access** and **NAT** and click on **Next**.



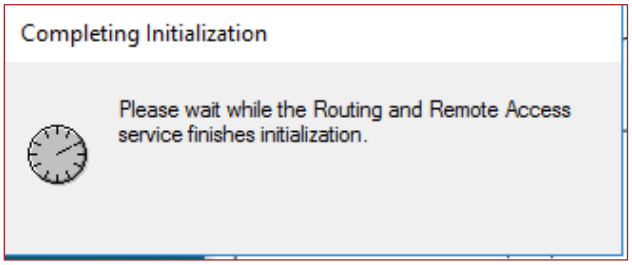
7. Review the summary and click **Finish**.



8. On the Routing and Remote Access confirmation box, click **Start service**.



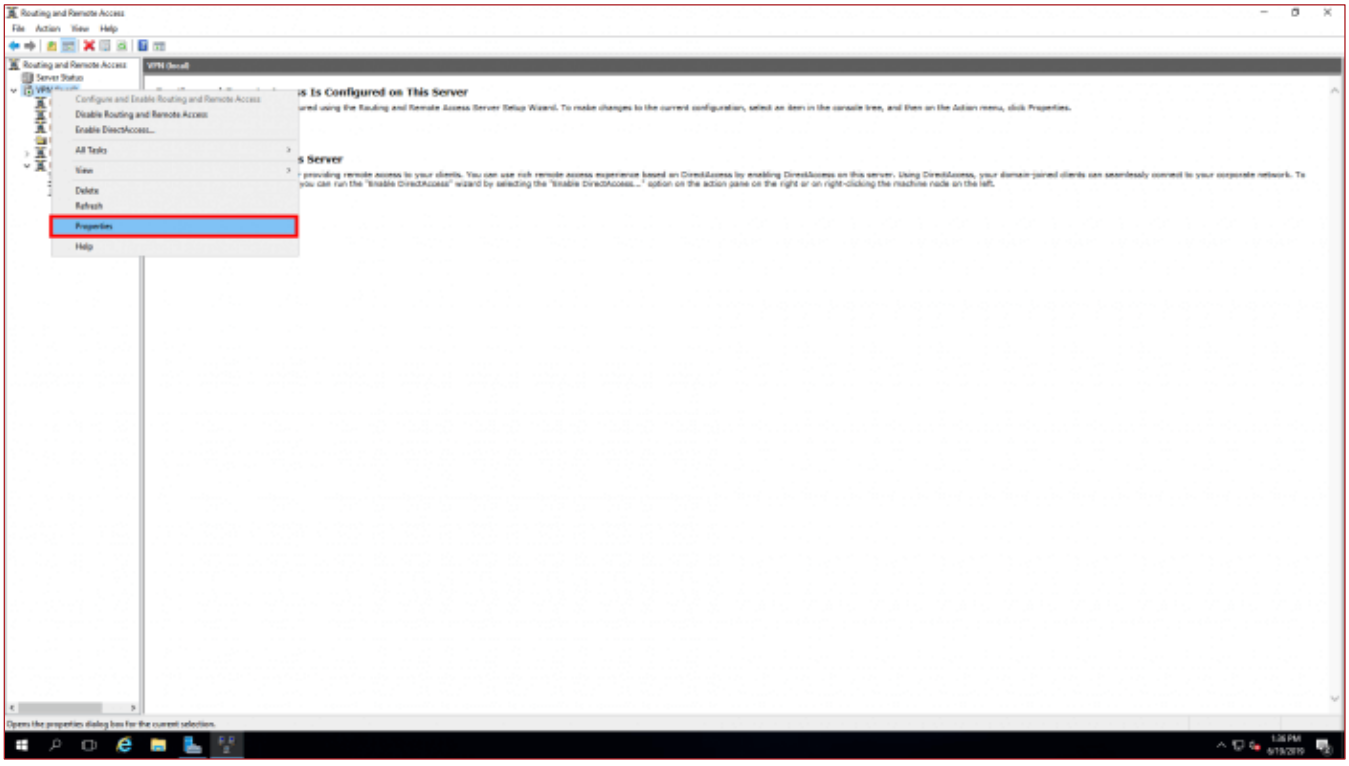
A message box indicates that the initialization is in progress.



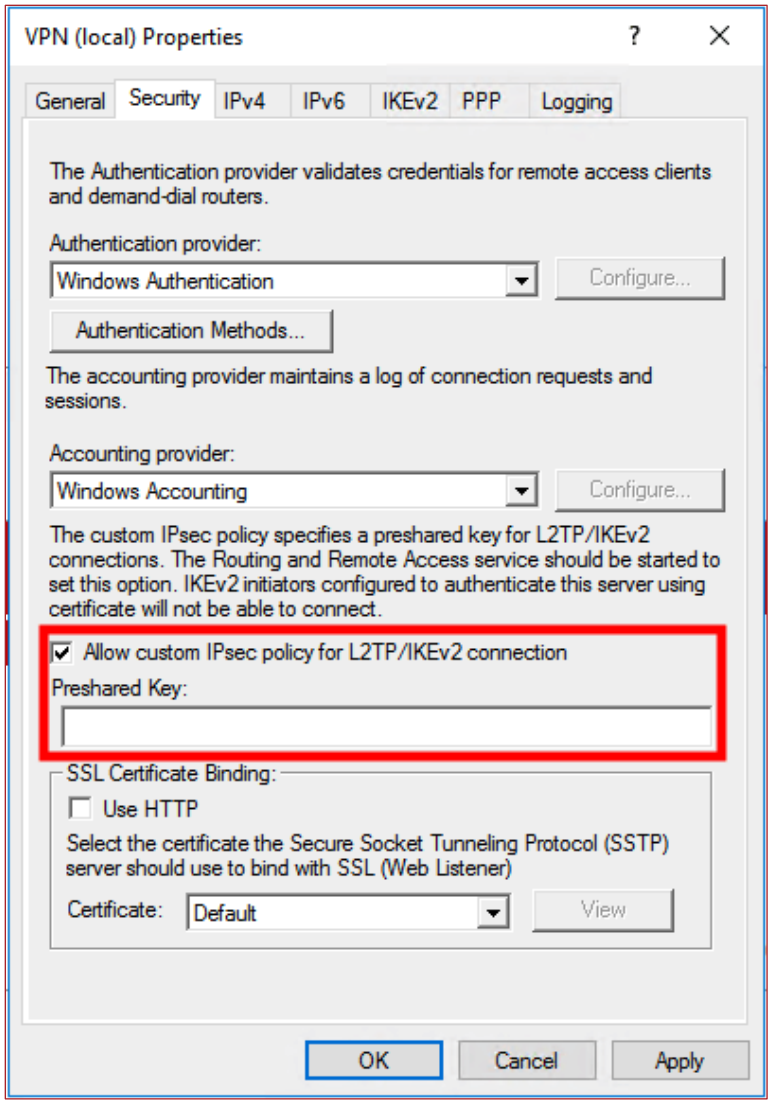
Step 4

Configure Routing and Remote Access.

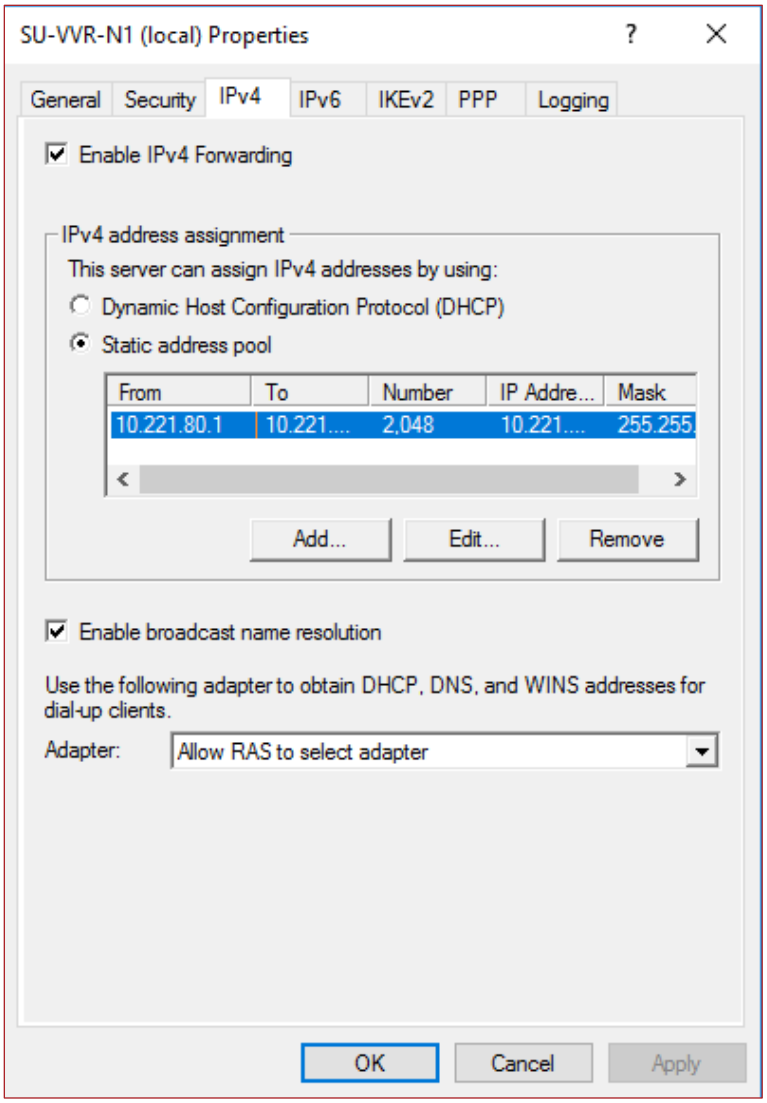
1. Right-click the server name (VPN) and click **Properties**.



2. Navigate to the Security tab and select **Allow custom IPsec policy for L2TP/IKev2 connection**. Provide a strong password as the **Preshared Key** value.

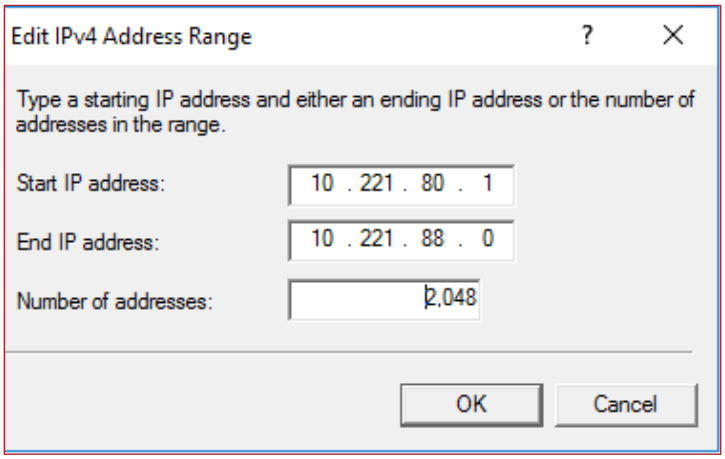


3. Navigate to the IPv4 tab. This sample configuration does not use a DHCP server but uses the **Static address pool** option instead. Click **Add…** to enter your IP address range.



4. Use the following values and click **OK** to save them:

   - **Start IP address**: 10.221.80.1
   - **End IP address**: 10.221.88.0
   - **Number of addresses**: 2048

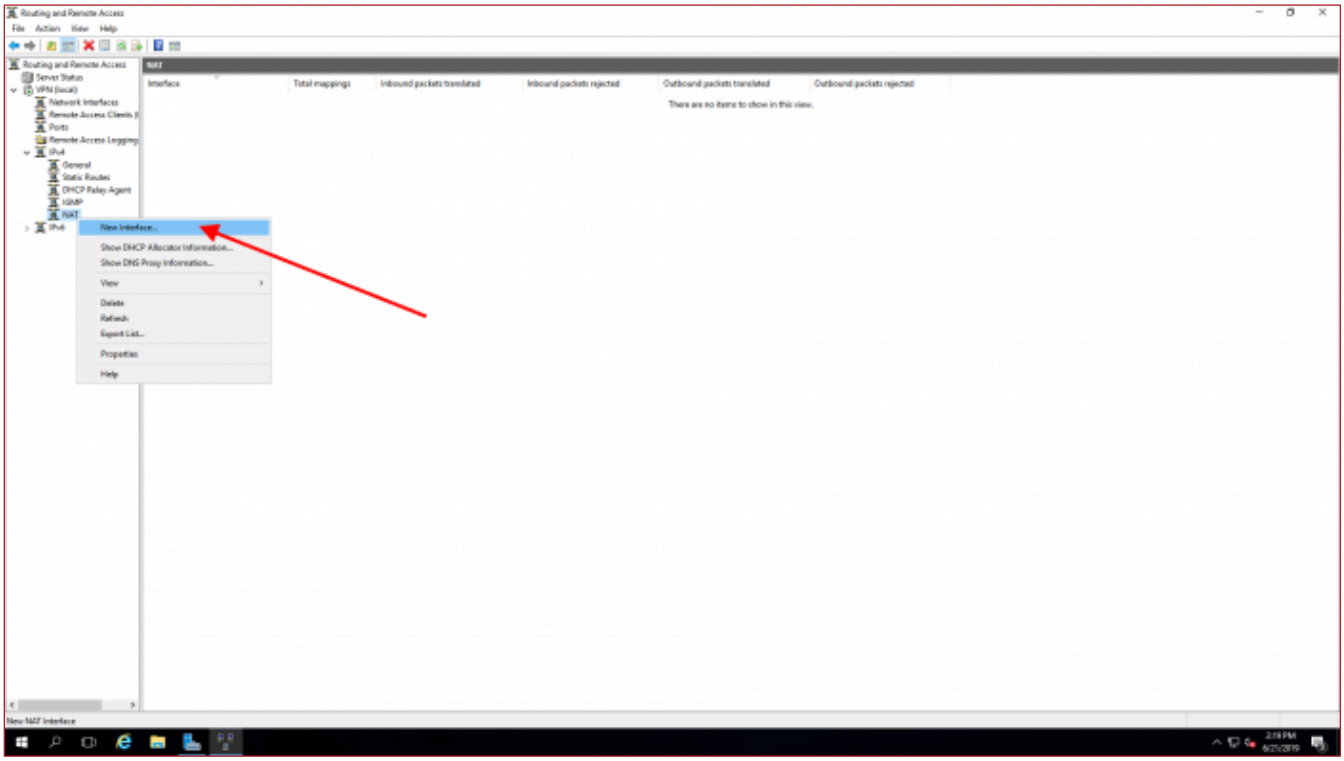


5. Click **OK** to apply the changes made to the Routing and Remote Access service properties. A message box appears to inform you about the required service restart; click **OK**.

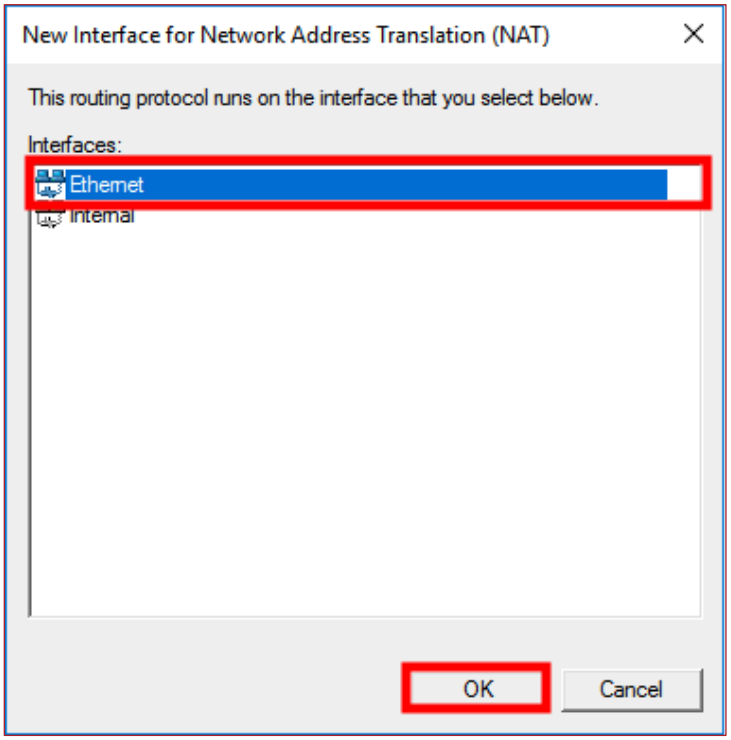
Step 5

Configure NAT.

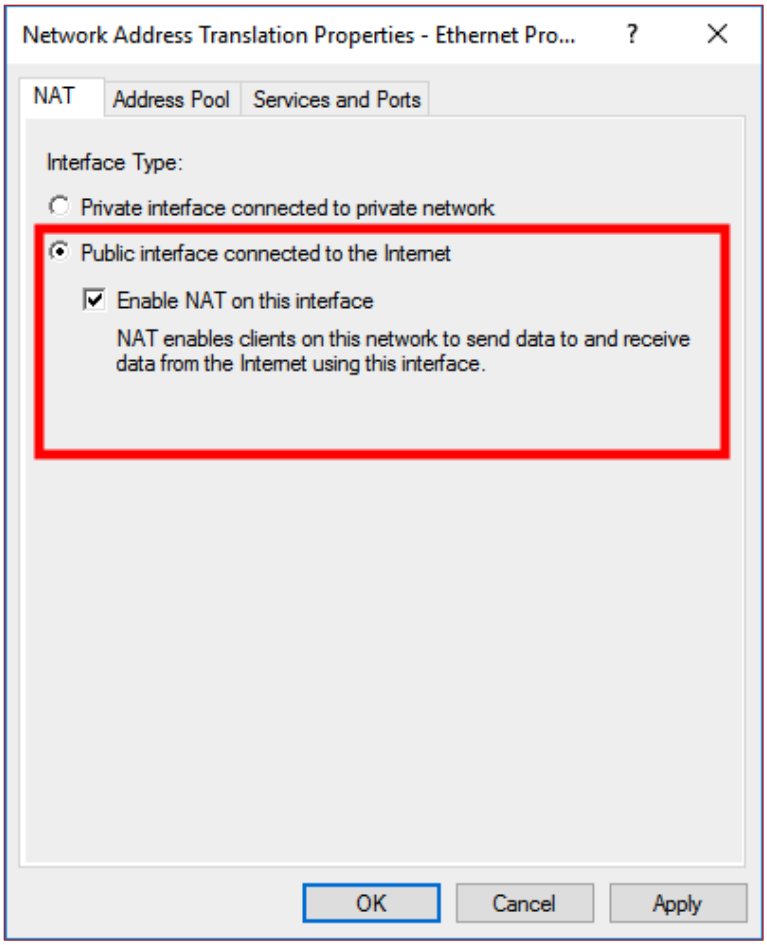
1. Navigate to **Routing and Remote Access** > VPN (server name) > **IPv4** > **NAT** and click **New Interface...** from the context menu.



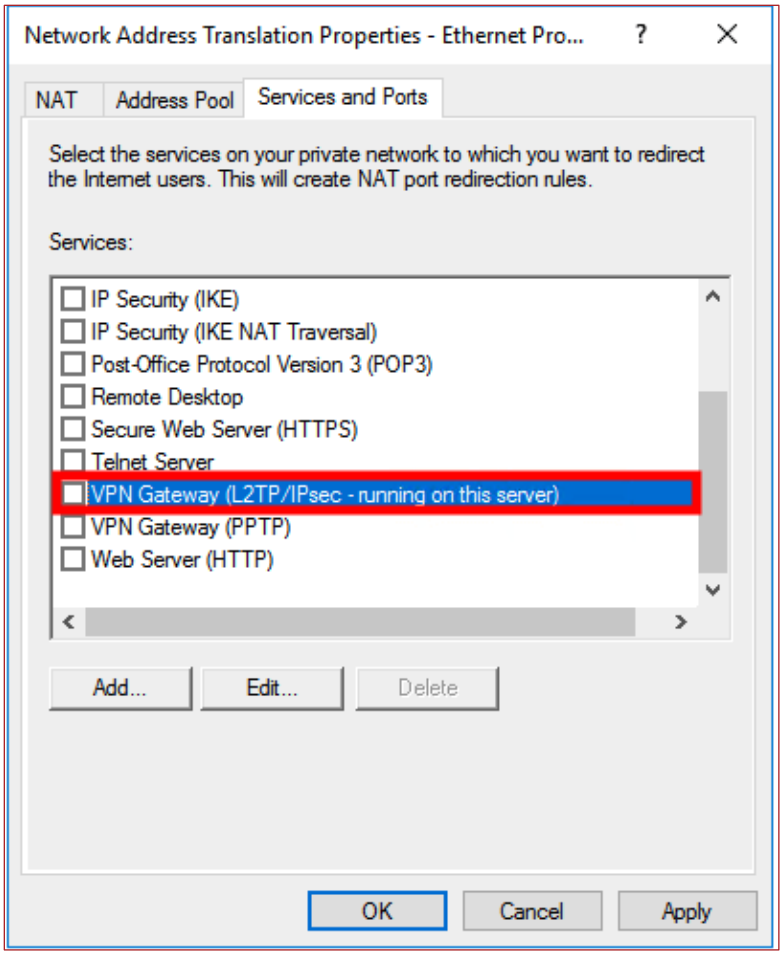
2. On the New Interface for Network Address Translation (NAT) dialog box, select **Ethernet** and click **OK**.



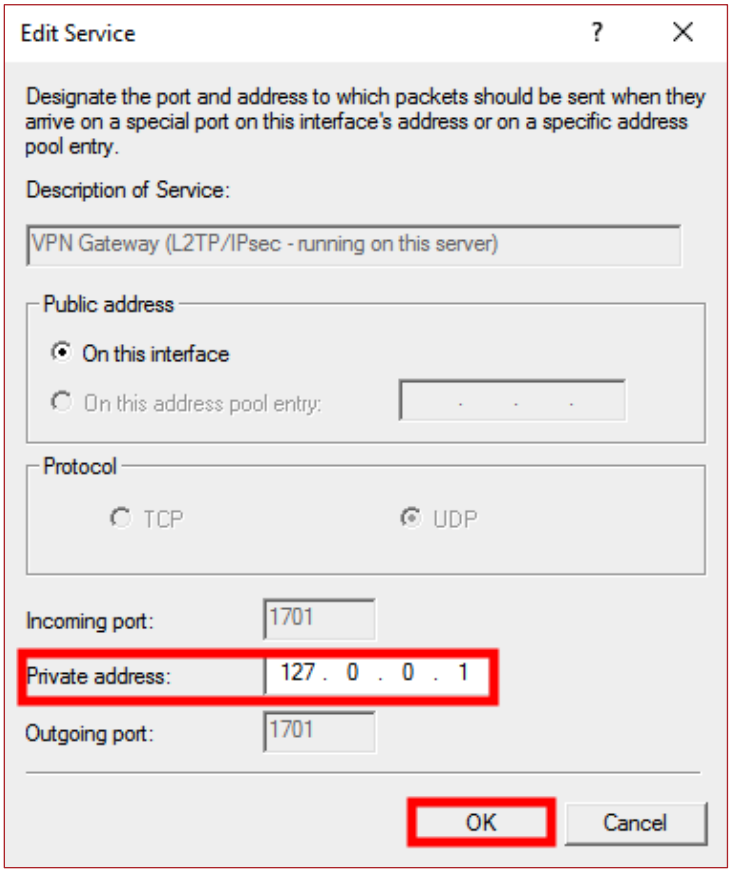
3. On the NAT tab of the Network Address Translation Properties screen, select **Public interface connected to the Internet** and **Enable NAT on this interface**.



4. On the Services and Ports tab, select **VPN Gateway (L2TP/IPsec - running on this server)** from the list of services.



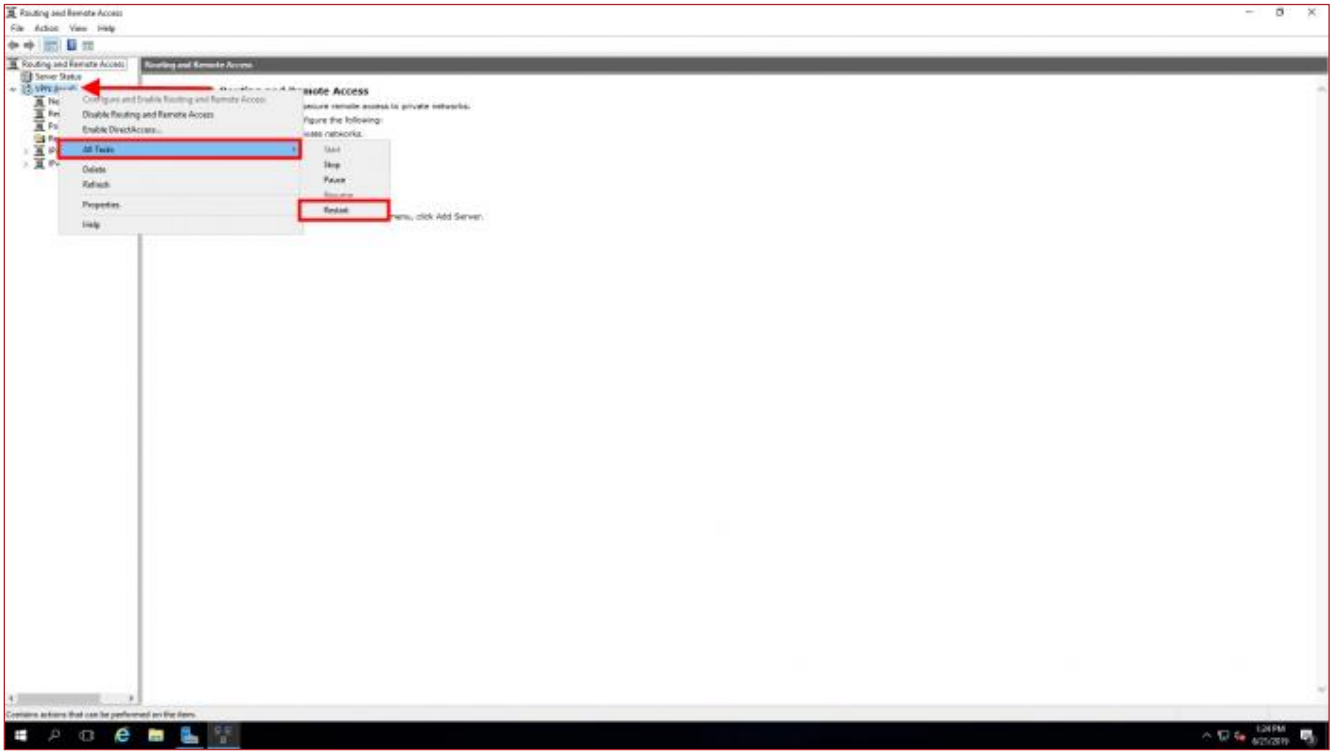
5. On the Edit Service dialog box, edit the **Private address** from **0.0.0.0** to **127.0.0.1** and click **OK**.



6. Click **OK** to close the NAT properties screen.

Step 6

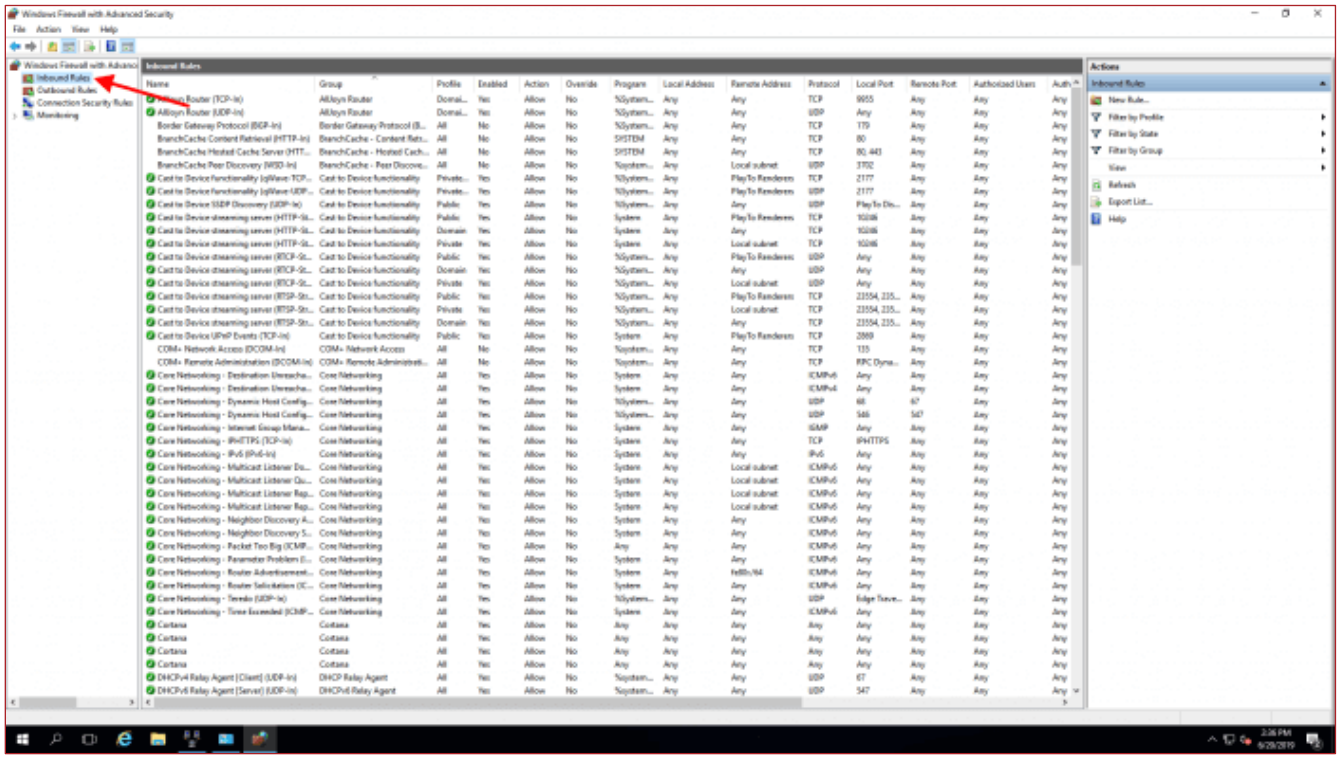
Restart the Routing and Remote Access service—right-click the server name (VPN) and select **All Tasks** > **Restart**.



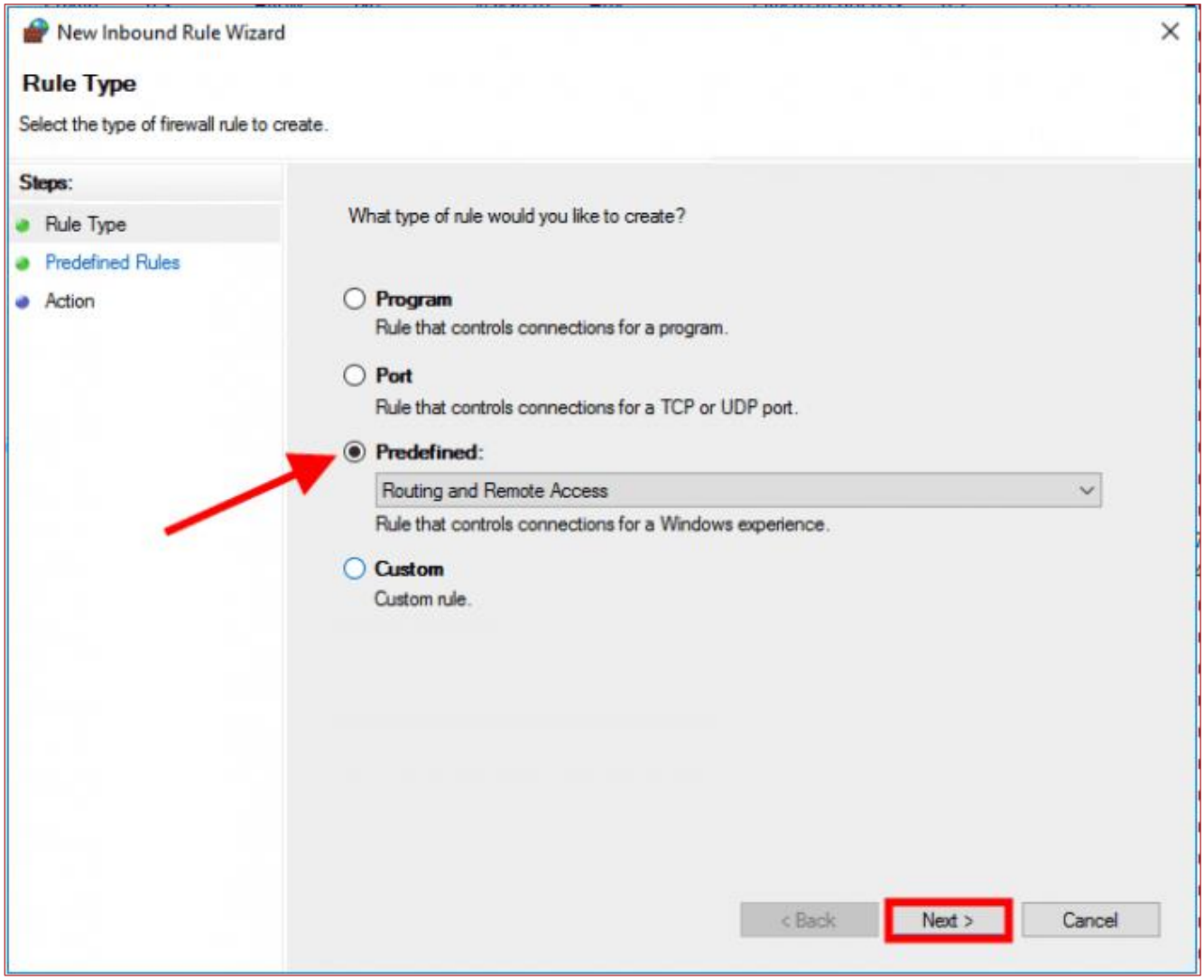
Step 7

Set the Windows firewall rules.

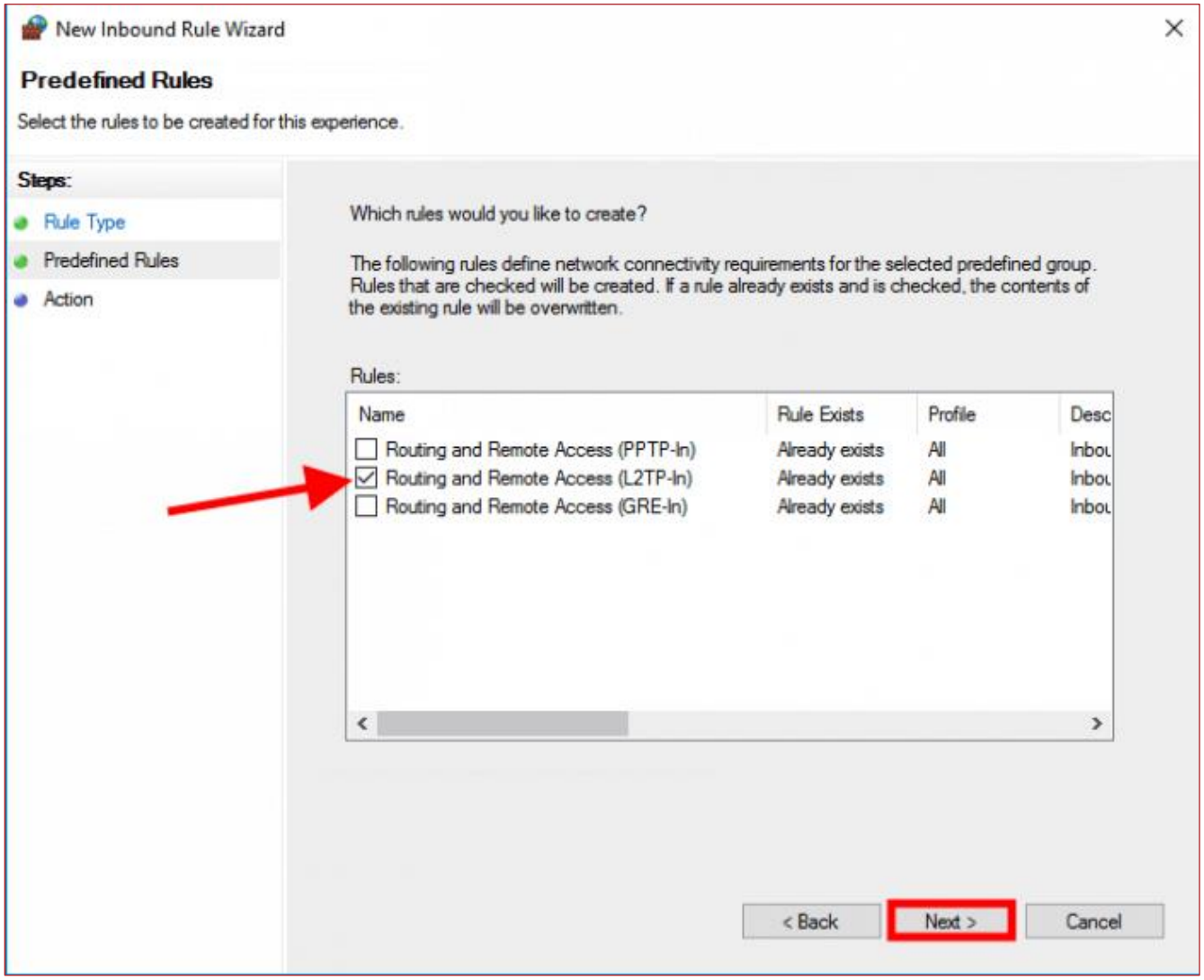
1. Open the Windows firewall settings page, select **Advanced Settings** > **Inbound Rules** > **New Rule…**.



2. On the New Inbound Rule Wizard, select **Predefined**: > **Routing and Remote Access** and click **Next**.



3. Select **Routing and Remote Access (L2TP-In)** and click **Next**.

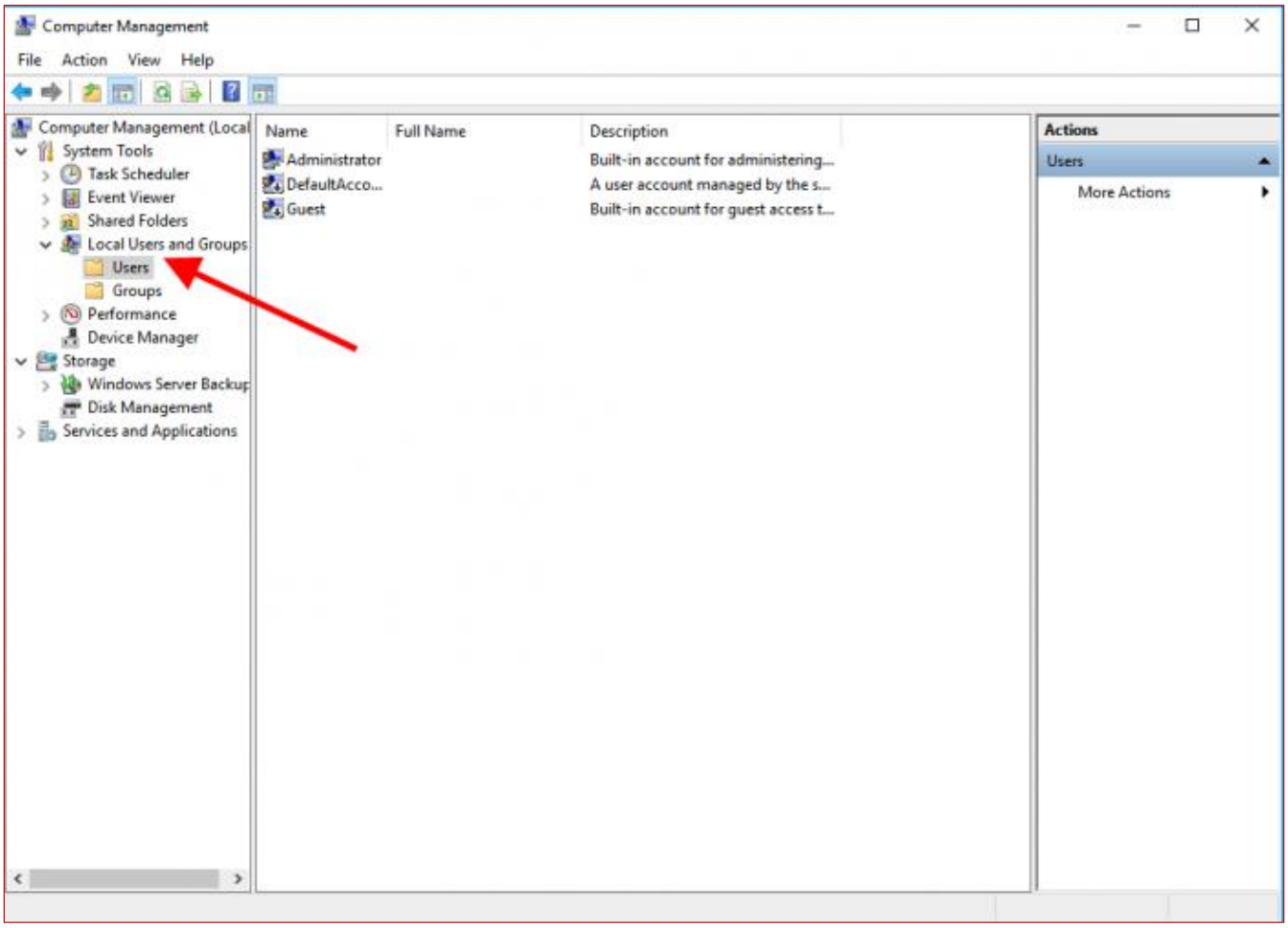


4. Click **Finish** and then verify that the rule is created.

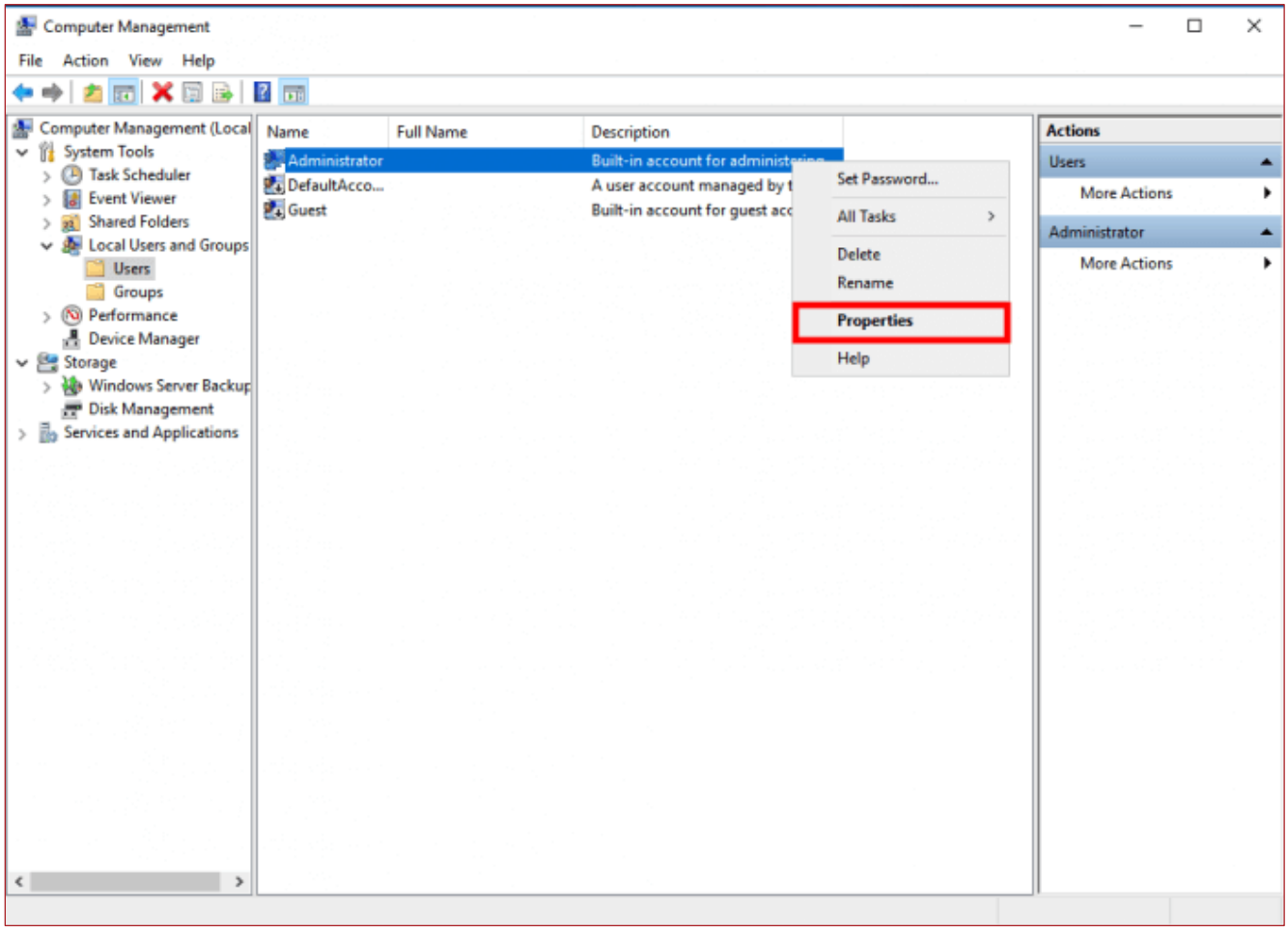
Step 8

Assign network permissions to the appropriate users so that they can start using the VPN.

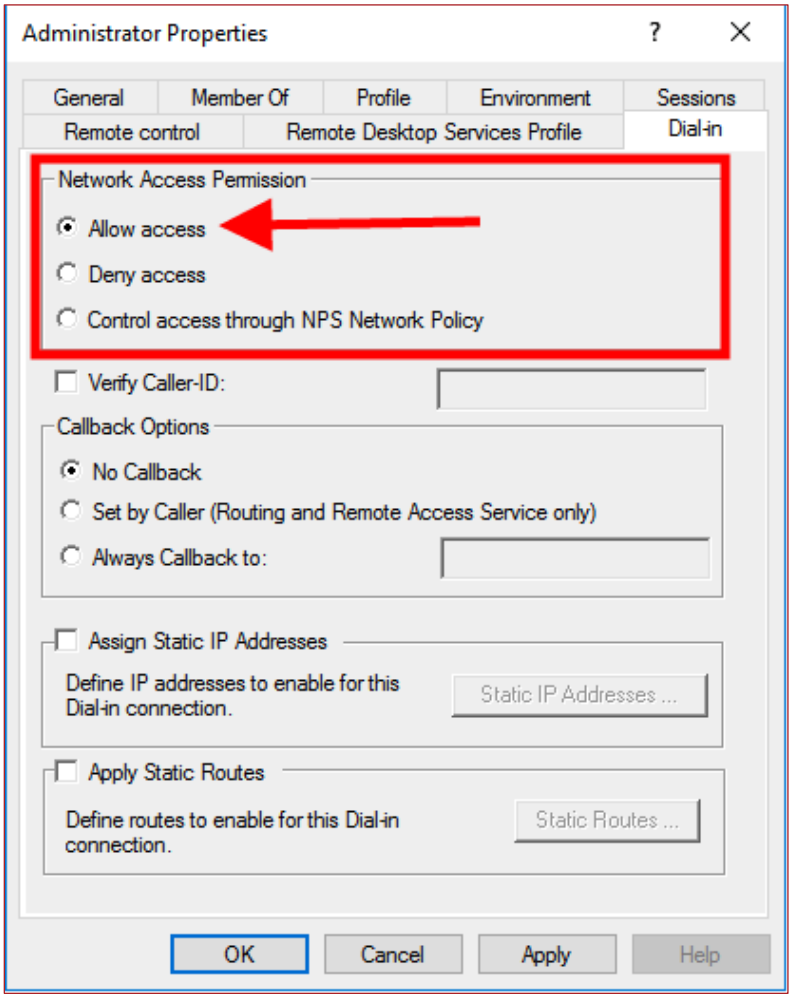
1. Open the Computer Management window and expand **Local Users and Groups** > **Users**.



2. Right-click each user account for which you want to enable VPN access and click **Properties**.



3. On the properties screen that appears for a user account, provide the required values. For this sample configuration, on the Dial-in tab of the Administrator Properties screen, select **Allow access** in the **Network Access Permission** section.

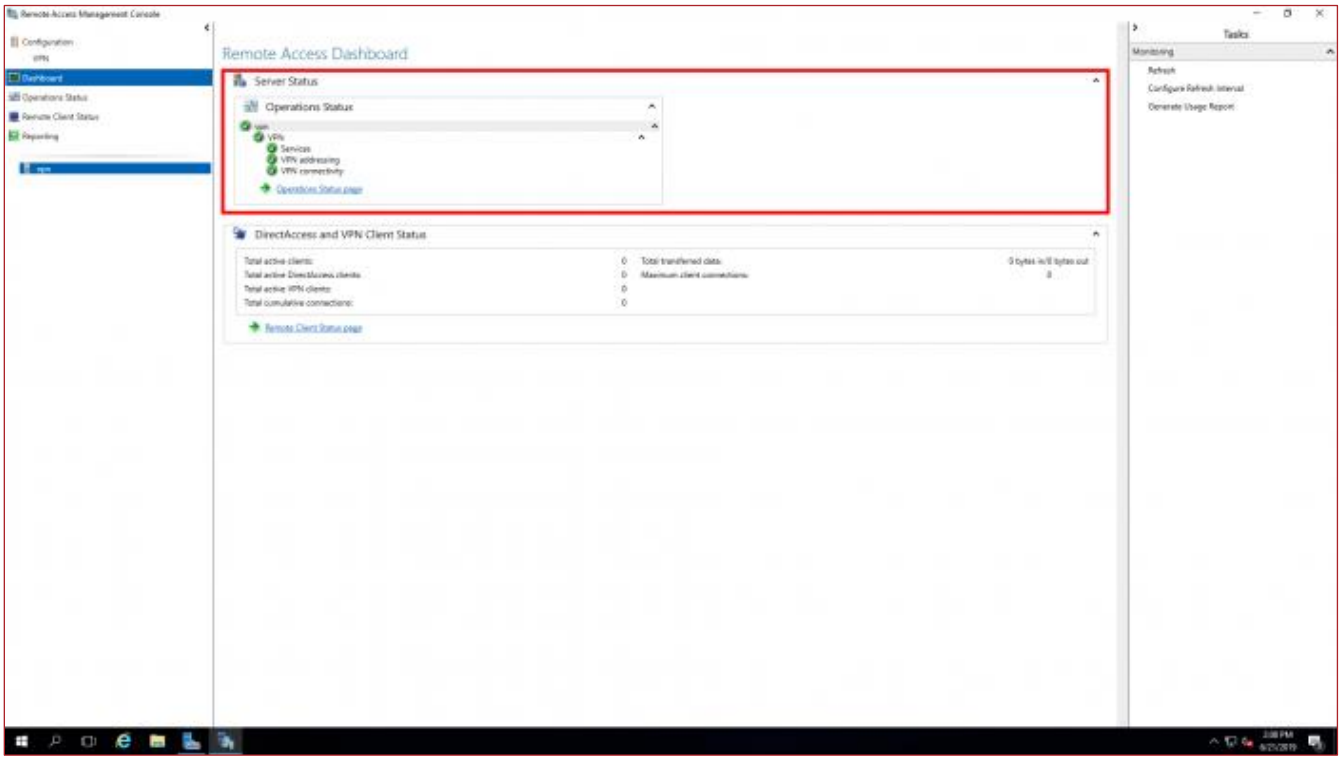


4. Click **OK** and close the Computer Management window. The Administrator user now has the permission to connect to the server via the L2TP/IPsec VPN connection.

Step 9

View and manage remote access information.

1. Open the Server Manager window and click **Tools** > **Remote Access Management**.



2. On the Remote Access Management Console, the Remote Access Dashboard indicates that the services are running without any warnings.

Step 10

Restart the server.

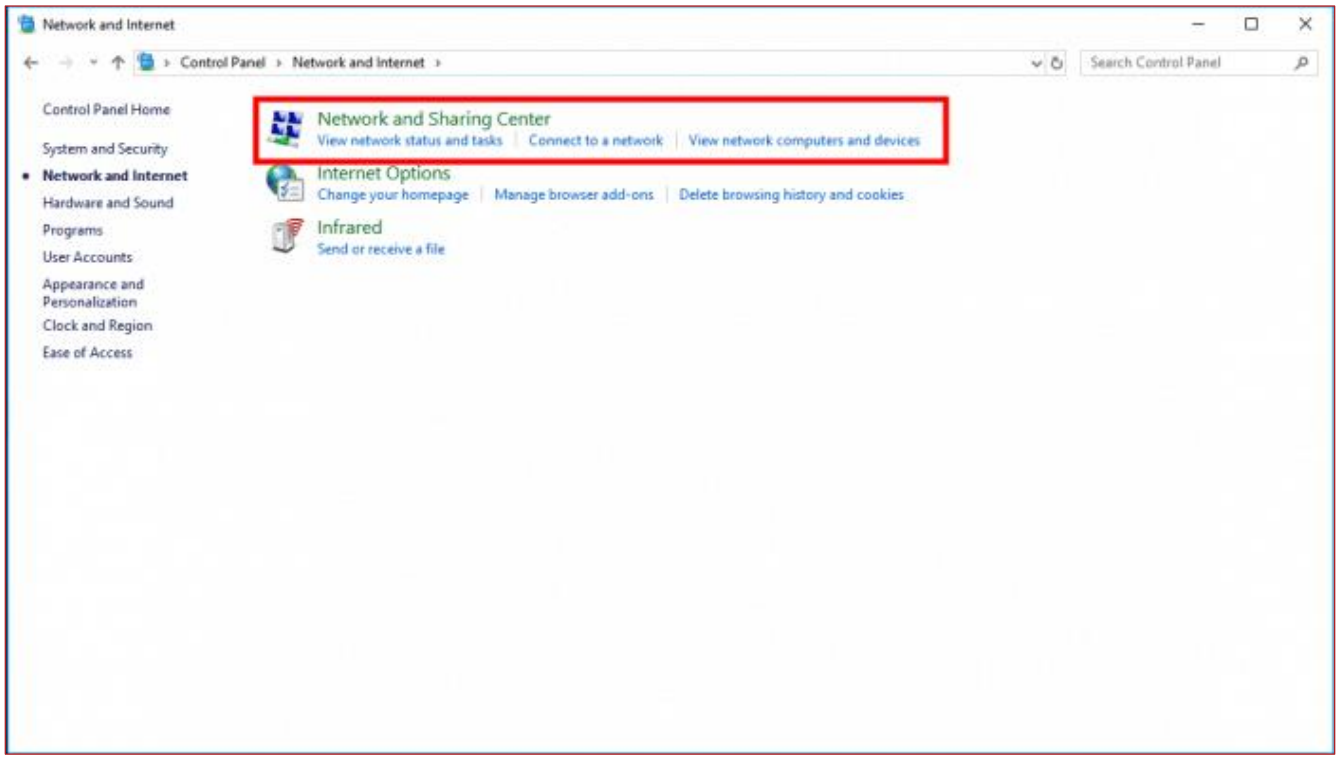
Step 11

Repeat all the previous steps in this procedure to configure the secondary server as well.

Connecting the L2TP/IPsec VPN

Step 1

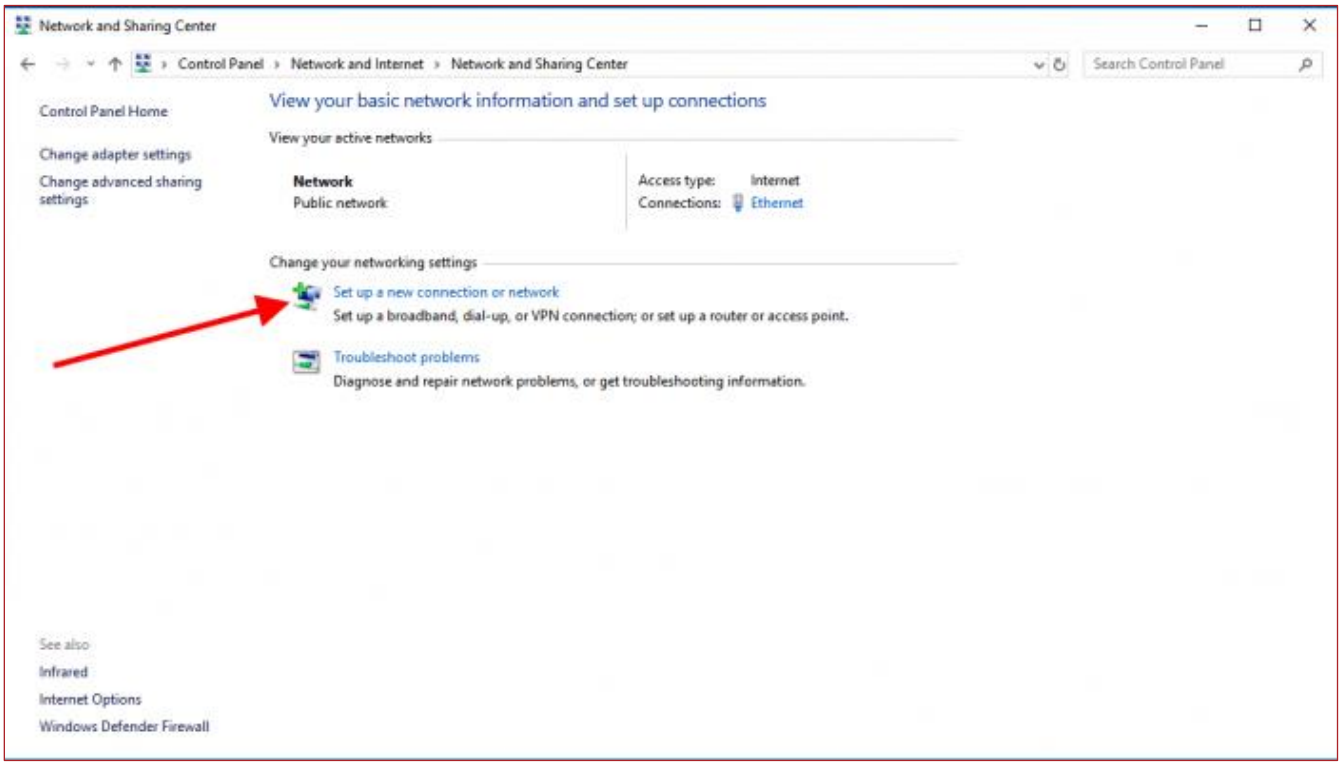
Log in to the primary server, open the Control Panel window, and click **Network and Internet**.



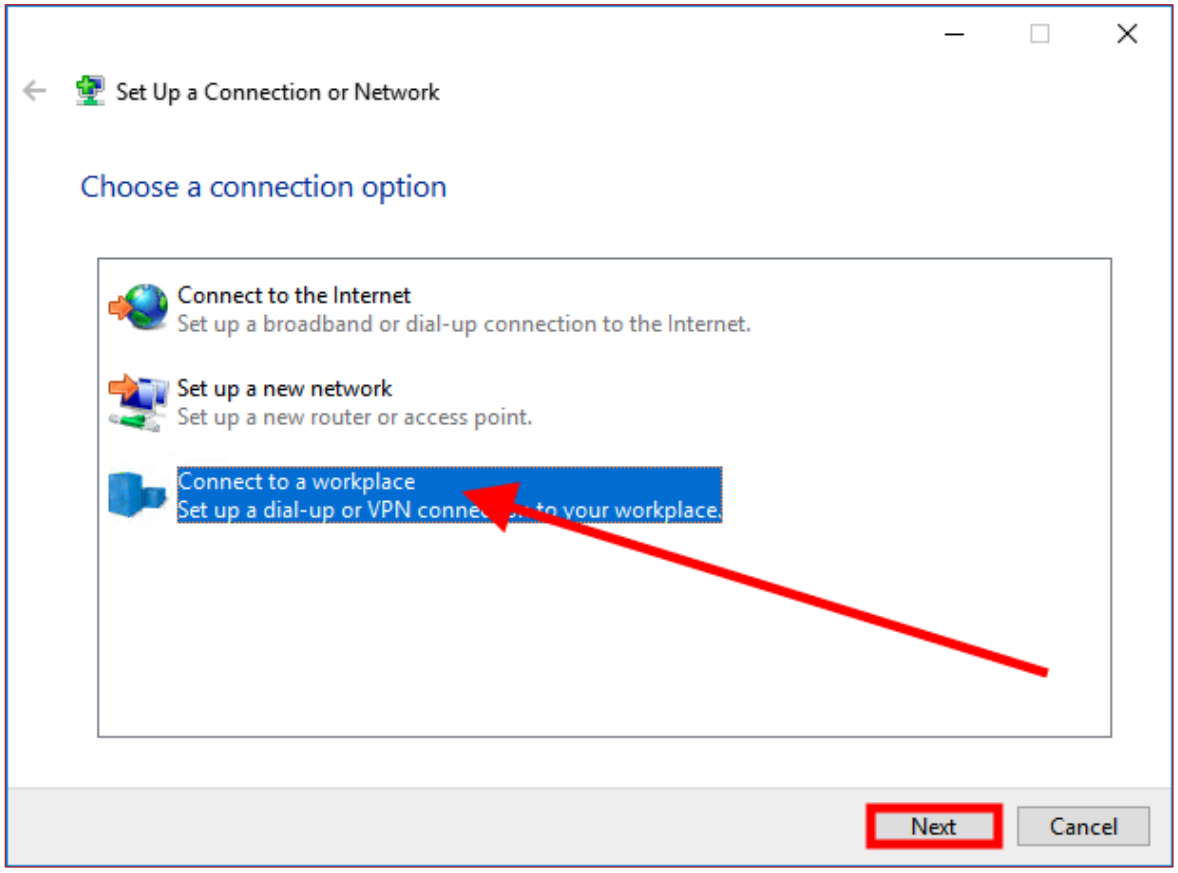
Step 2

Configure the VPN.

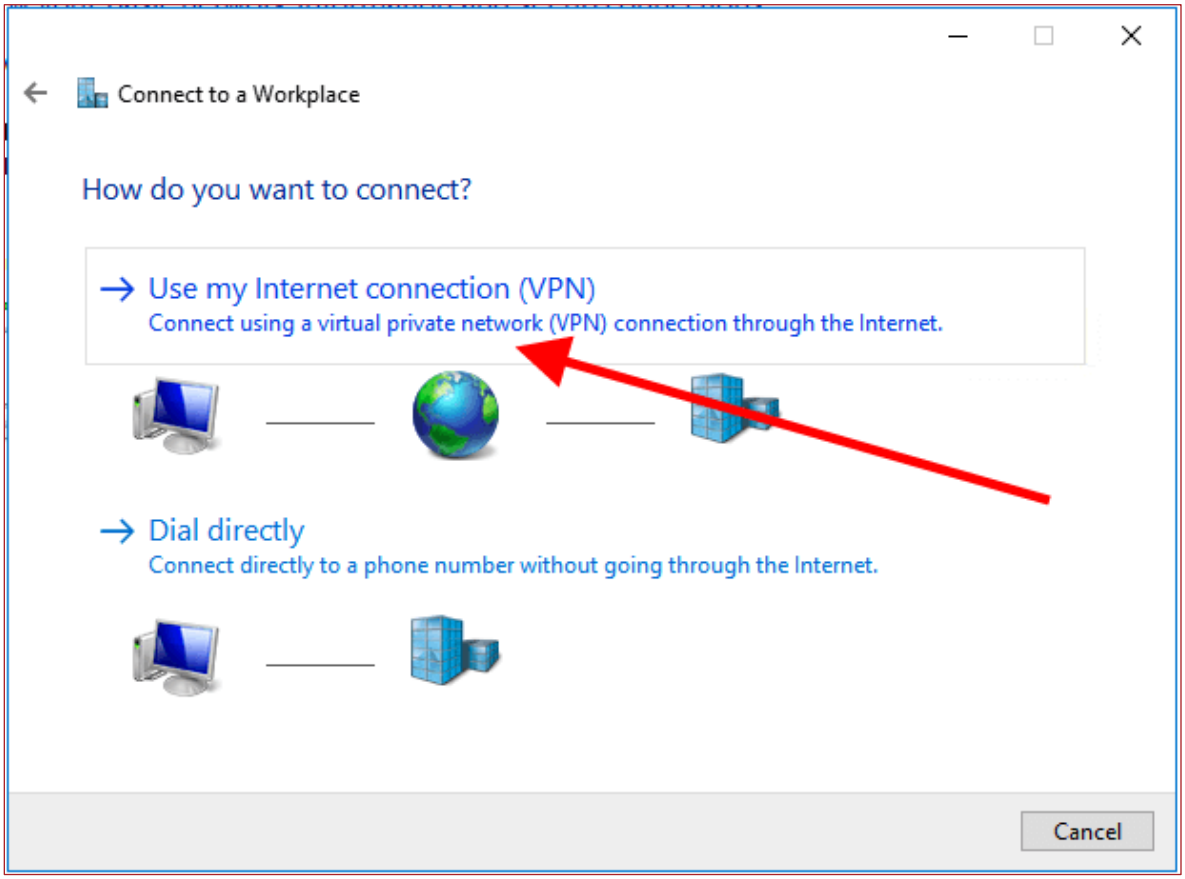
1. On the Network and Sharing Center screen, click **Set up a new connection on a network**.



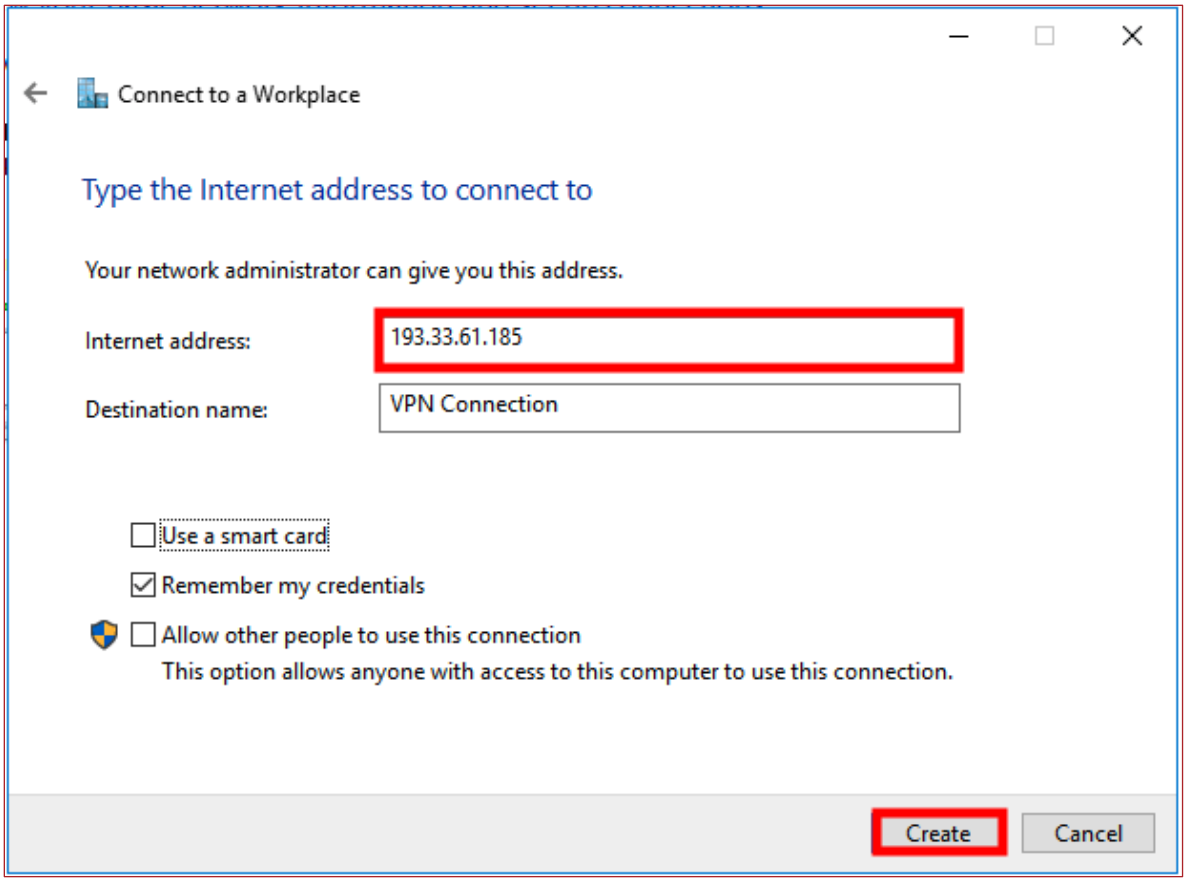
2. On the Set Up a Connection or Network wizard, select **Connect to a workplace** and click **Next**.



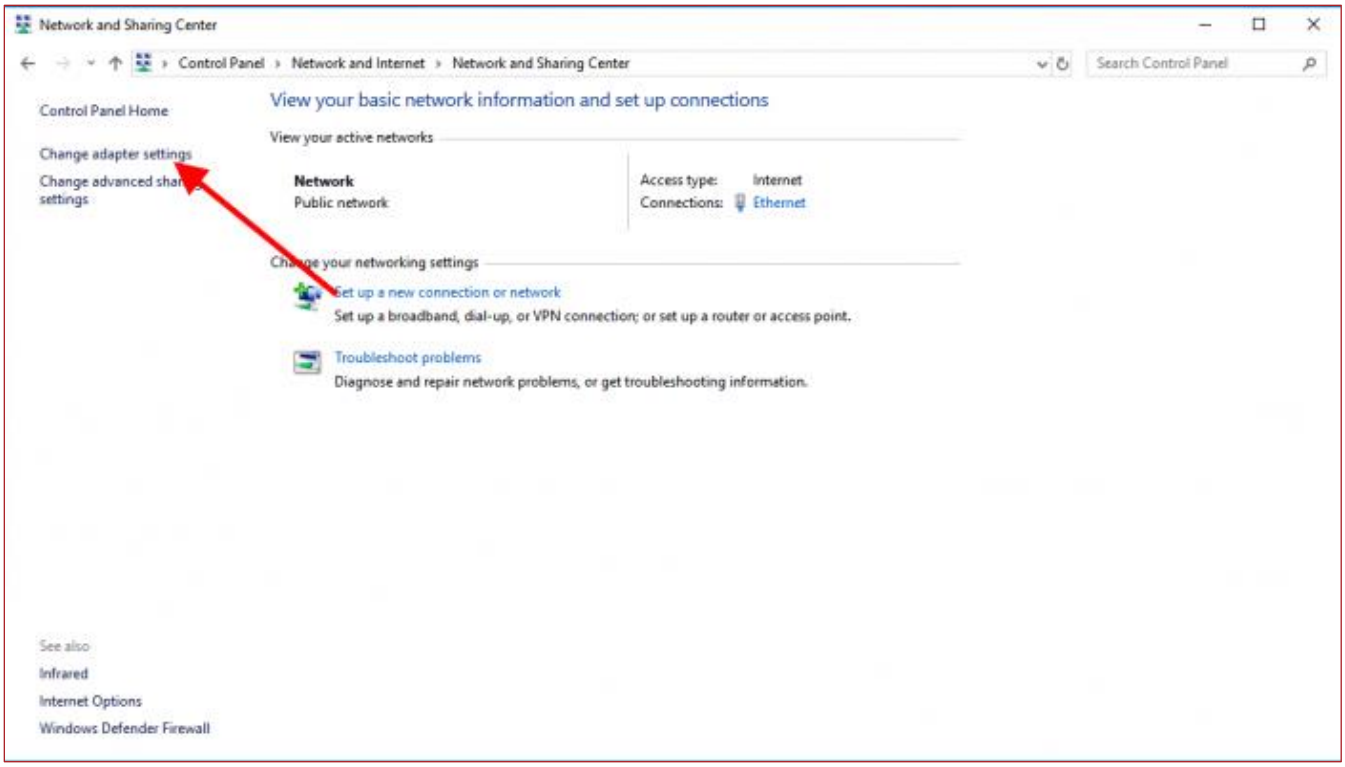
3. On the Connect to a Workplace screen, click **Use my Internet connection (VPN)**.



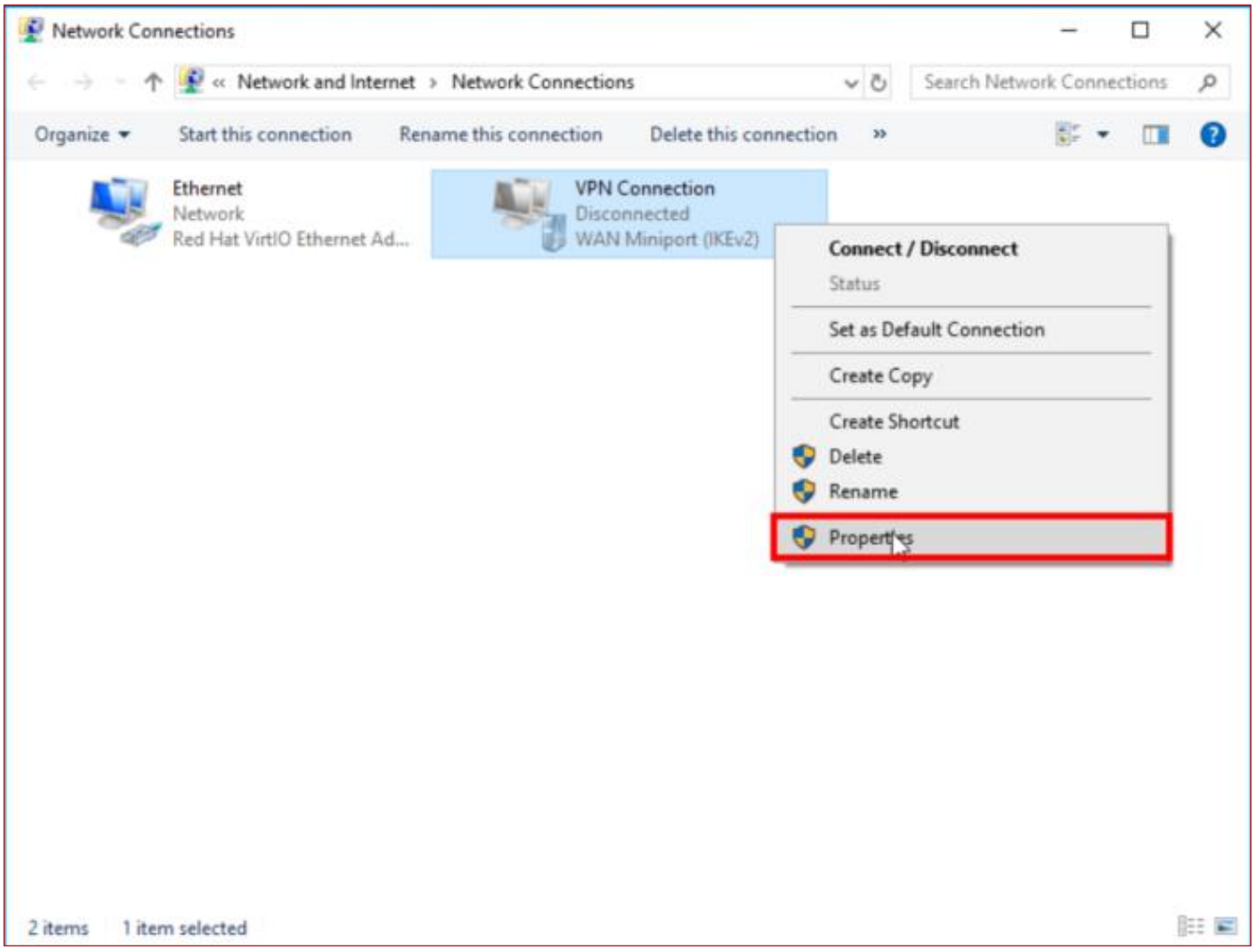
4. On the Connect to a Workplace screen, enter your IP address in the **Internet address:** field, and click **Create**. In this sample configuration, the IP address of the secondary server, 193.33.61.185, is used.



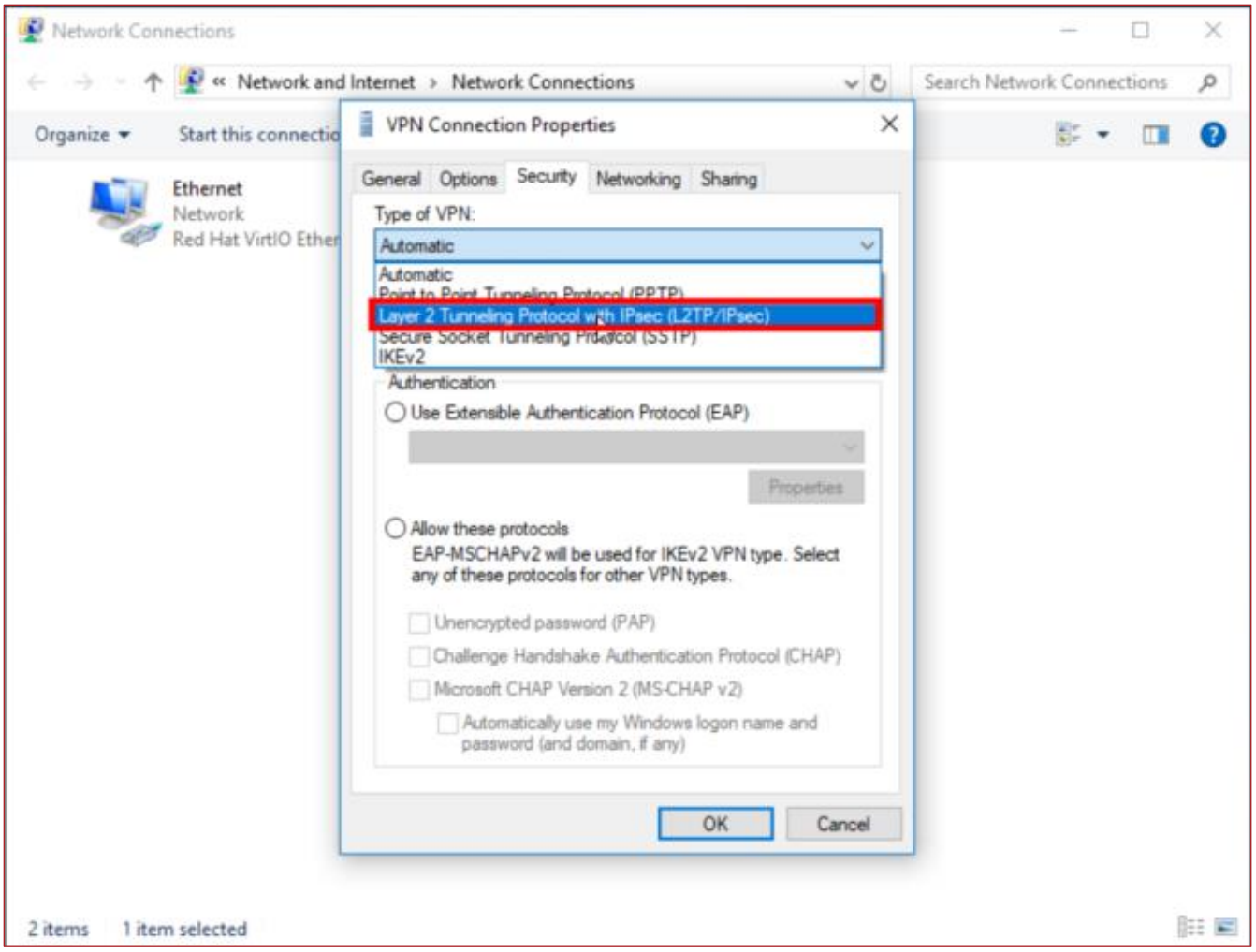
5. On the Network and Sharing Center screen, click **Change adapter settings** in the navigation menu on the left.



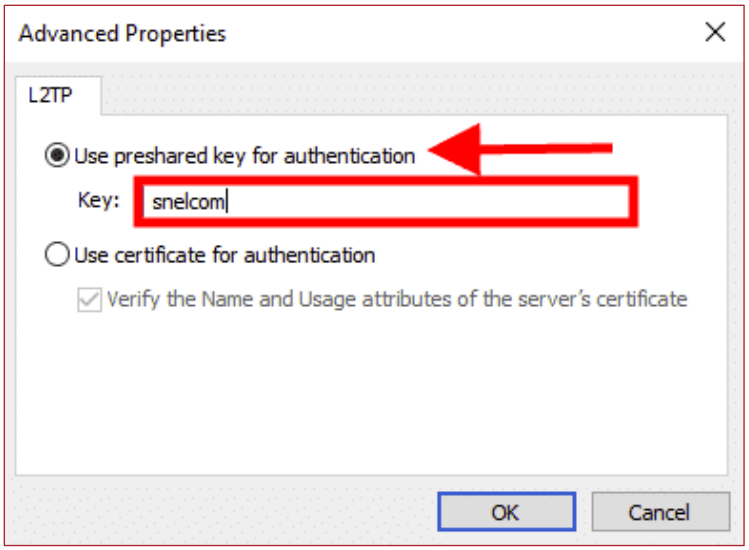
6. On the Network Connections screen, the VPN connection that you created earlier appears among all the available interfaces. Right-click the **VPN Connection** interface and click **Properties**.



7. On the VPN Connection Properties screen, open the Security tab, select **Layer 2 Tunneling Protocol with IPsec (L2TP/IPsec)** from the **Type of VPN:** dropdown, and click **Advanced settings**.

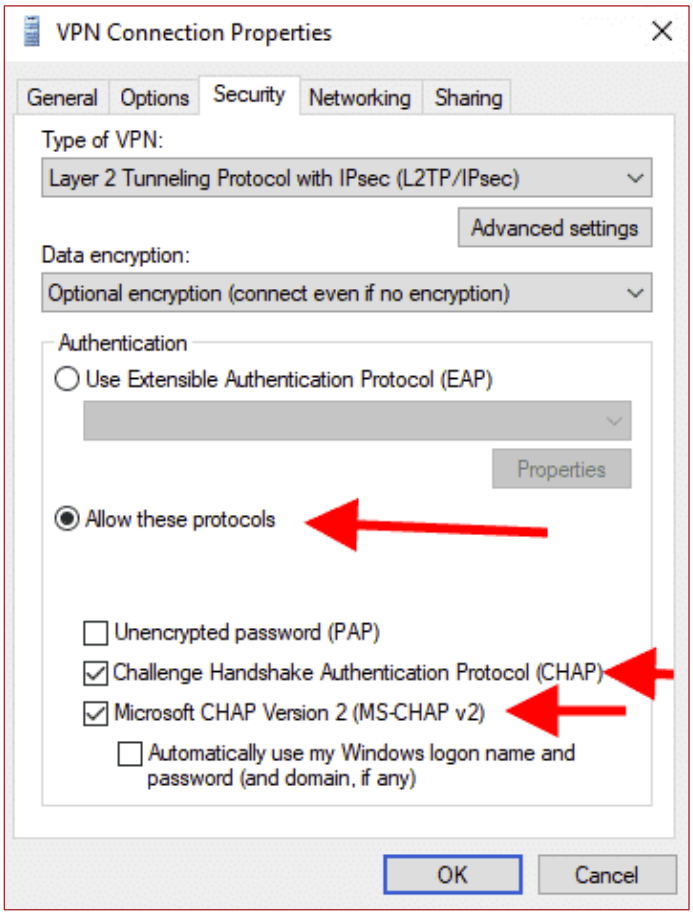


8. On the Advanced Properties dialog box, select **Use preshared key for authentication**, enter the preshared key that you created on the Windows Server, and click **OK**.



9. On the Security tab, select **Allow these protocols**, select the following options, and then click **OK**:

- Challenge Handshake Authentication Protocol (CHAP)
- Microsoft CHAP Version 2 (MS-CHAP v2)



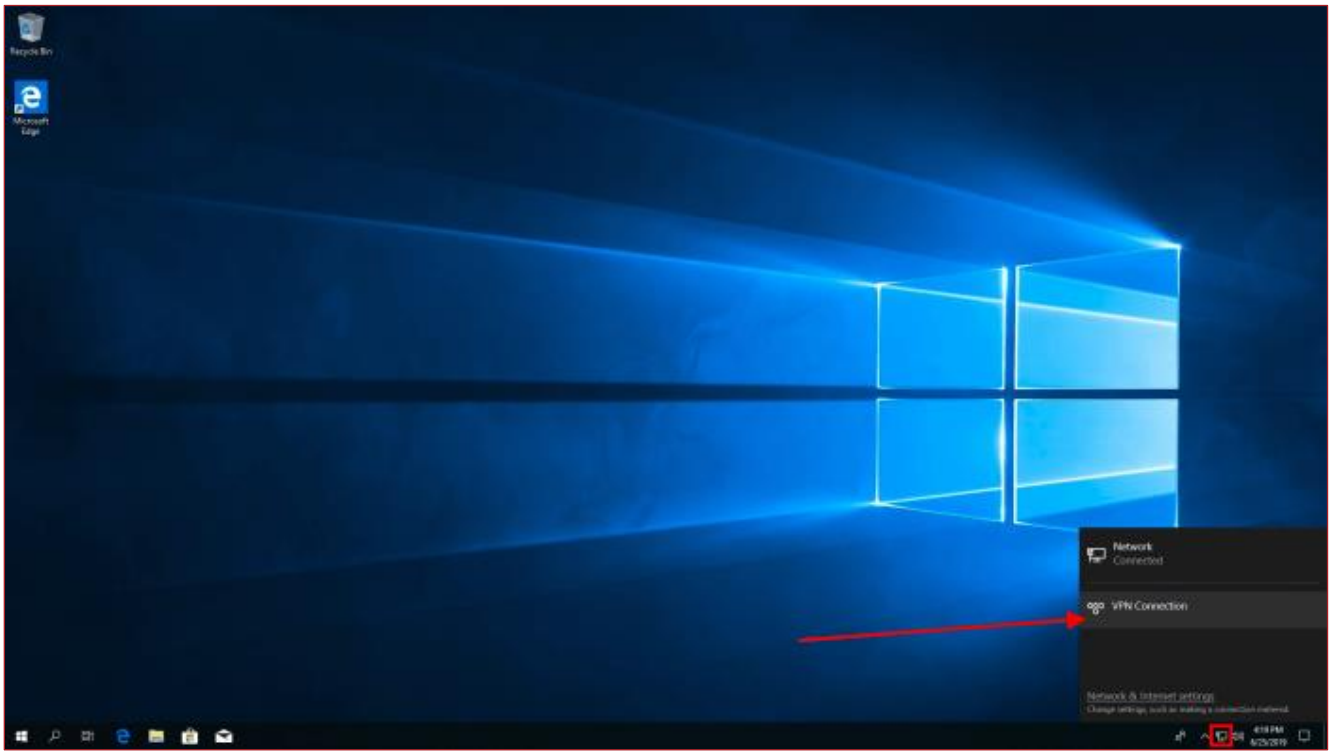
Step 3

Configure the same settings on the secondary server. Use the internet address of the primary server while creating the VPN on the secondary server.

Step 4

Connect to the VPN server

1. Click the Network icon in the system tray, click **VPN Connection**, and click **Connect**.



2. When prompted for credentials, enter the Administrator username and password.

The IPsec VPN connection is now established between the primary and the secondary, and the replication data being transmitted between the servers will be encrypted.

About Veritas

Veritas Technologies is a global leader in data protection and availability. Over 80,000 customers— including 87 percent of the Fortune Global 500—rely on us to abstract IT complexity and simplify data management. The Veritas Enterprise Data Services Platform automates the protection and orchestrates the recovery of data everywhere it lives, ensures 24/7 availability of business-critical applications, and provides enterprises with the insights they need to comply with evolving data regulations. With a reputation for reliability at scale and a deployment model to fit any need, Veritas Enterprise Data Services Platform supports more than 800 different data sources, over 100 different operating systems, more than 1,400 storage targets, and more than 60 different cloud platforms. Learn more at www.veritas.com. Follow us on Twitter at @veritastechllc.

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