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## Introduction

This document describes how to configure an Layer 2 Tunneling Protocol (L2TP) Tunnel between a windows machine and a Cisco router.

## Prerequisites

### Requirements

Cisco recommends that you have knowledge that windows machine can ping the physical interface IP address on the router.

### Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

## Configure

### Network Diagram

This document uses this network setup:



# Configurations

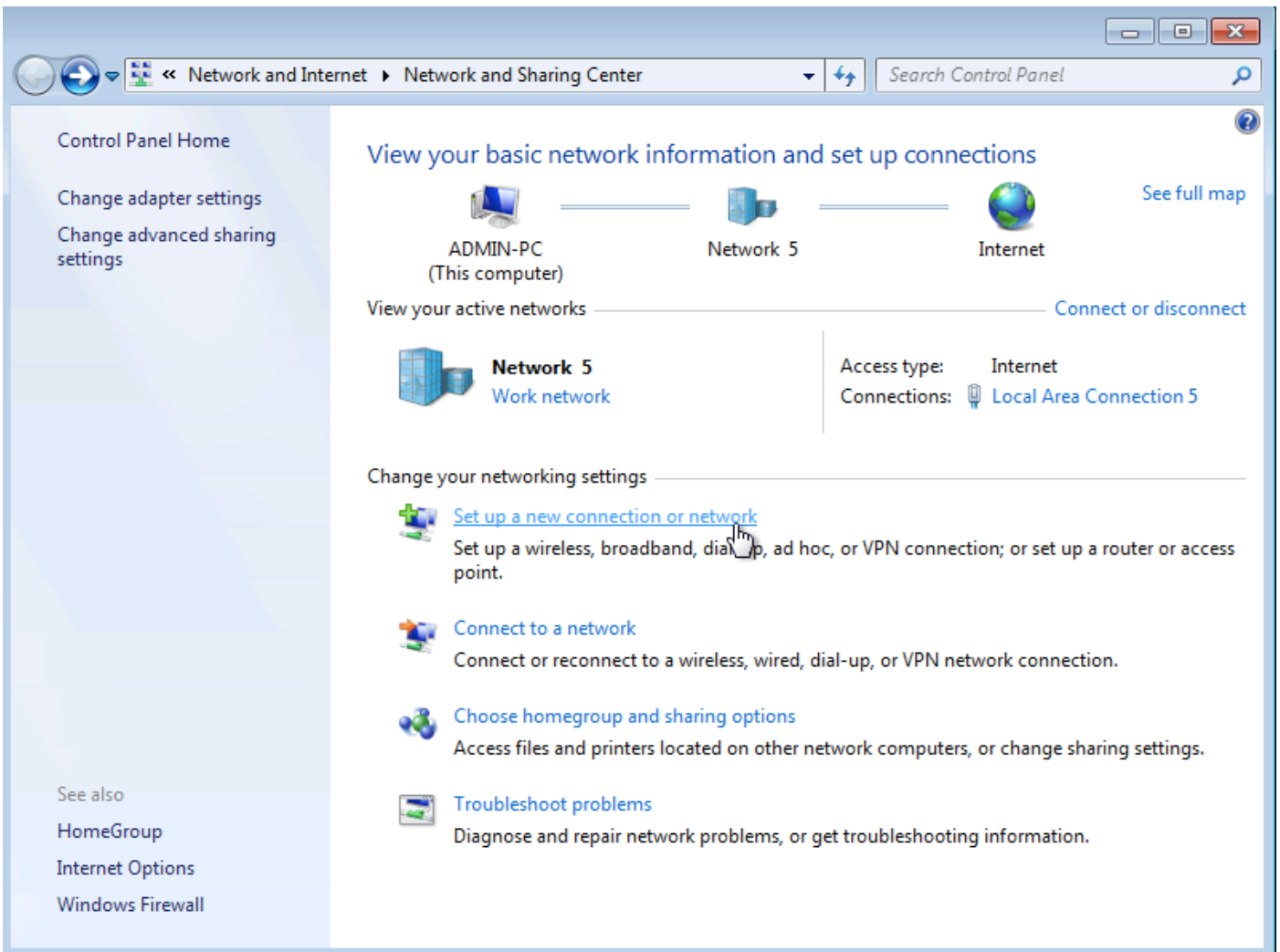
## Aggregator Configuration:

An example of the configuration on the Aggregator is shown:

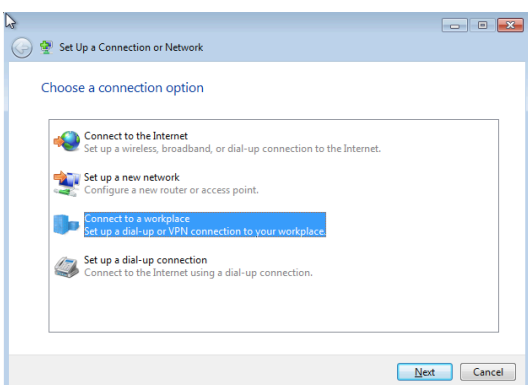
## Windows Machine Configurartions and Settings

Complete these steps:

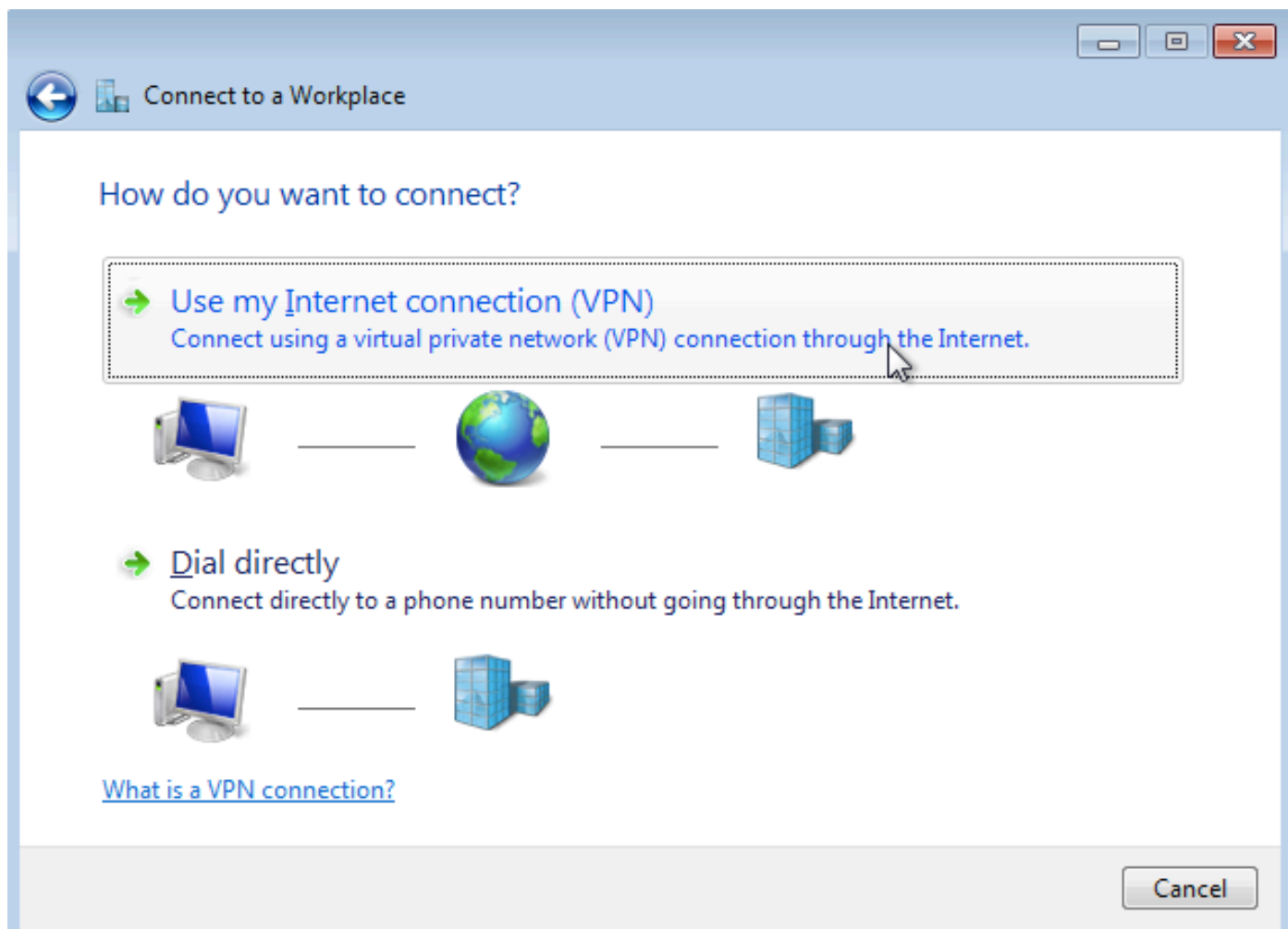
Step 1. Open **Network and Sharing Center** and click **Set up a new connection or network** as shown in this image.



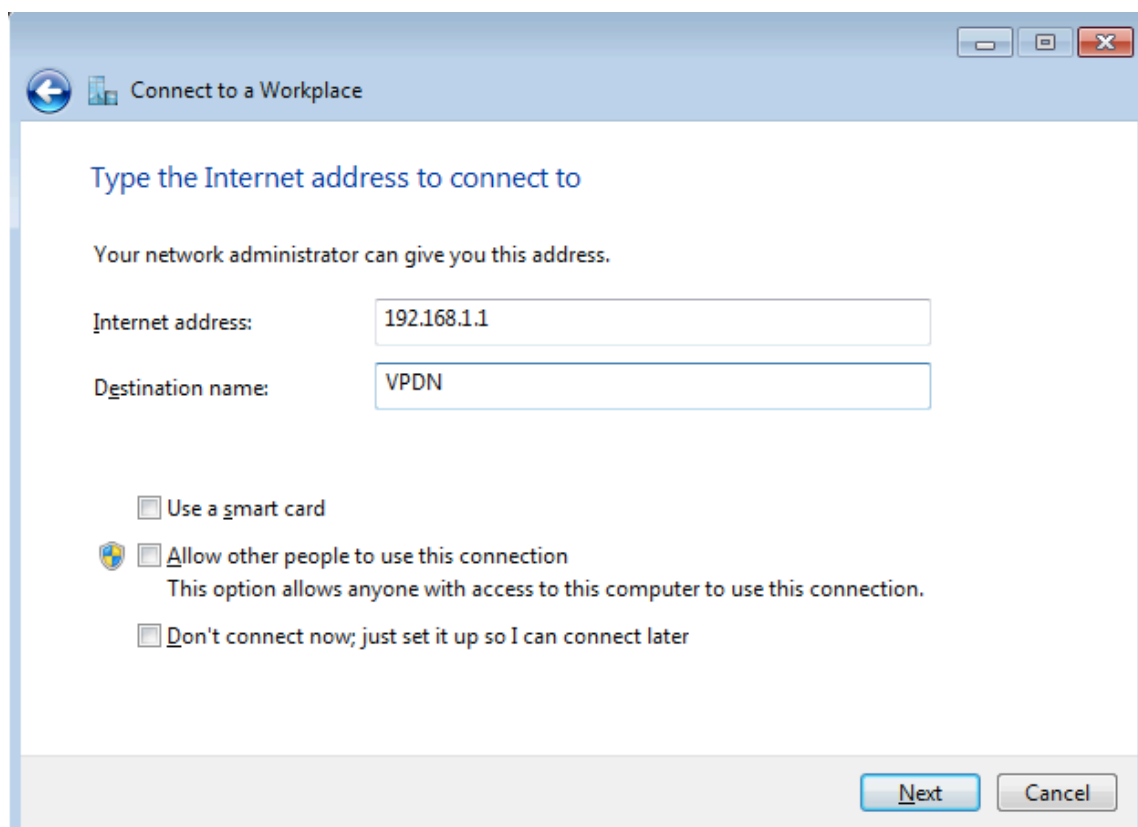
Step 2. Select **Connect to a Workplace** and click **Next**



### Step 3. Select **Use my Internet Connection (VPN)**



### Step 4. Enter the IP Address of the Aggregator (in this case 192.168.1.1), give a name to the connection (in this case giving the name as VPDN) and click **Next**.



Step 5. Enter the username and password, and click **Connect**

Connect to a Workplace

Type your user name and password

User name: cisco

Password: ●●●●●

Show characters

Remember this password

Domain (optional):

Connect Cancel

Step 6. Verify the username and password

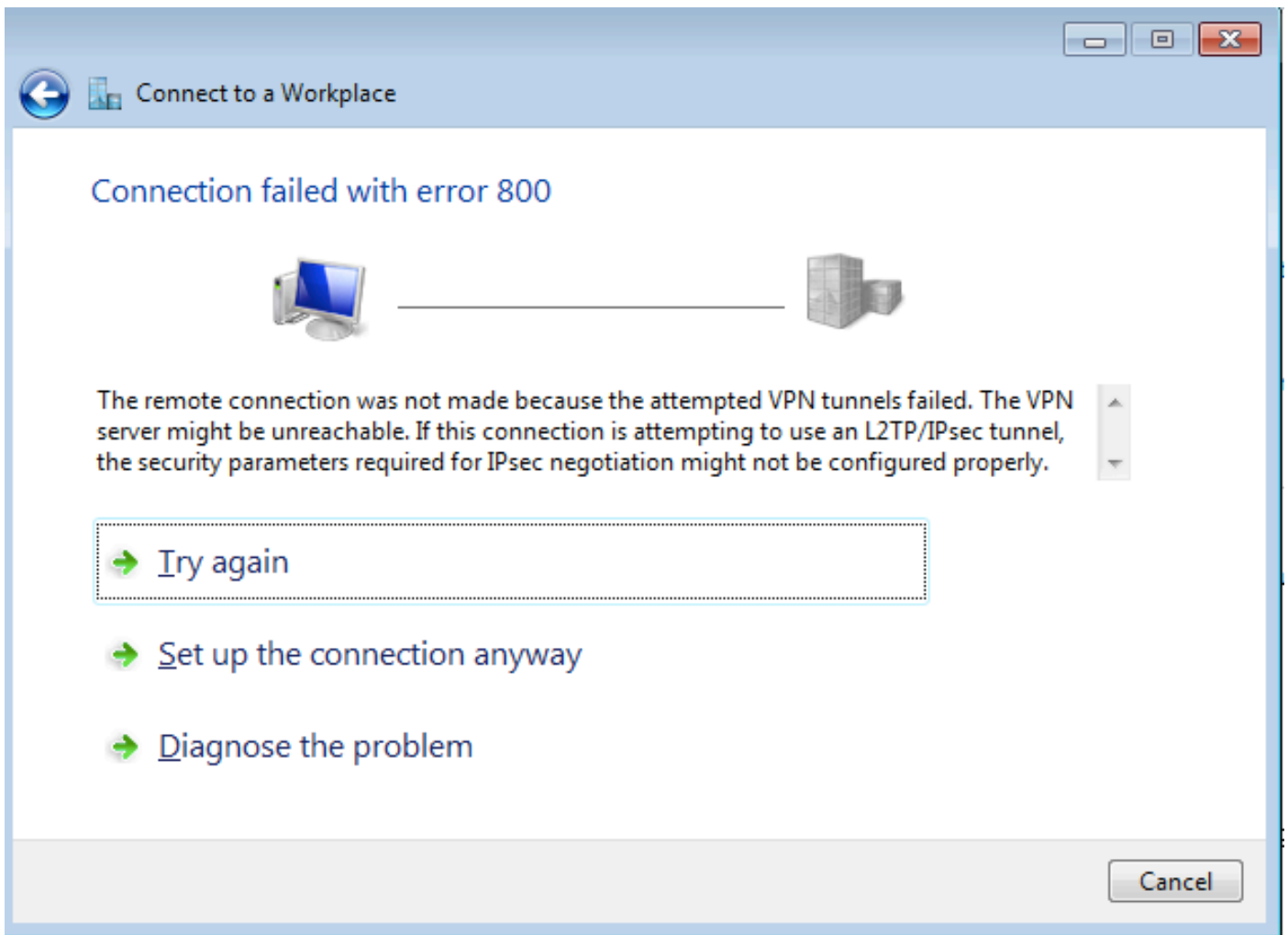
Connect to a Workplace

Connecting to L2TP...

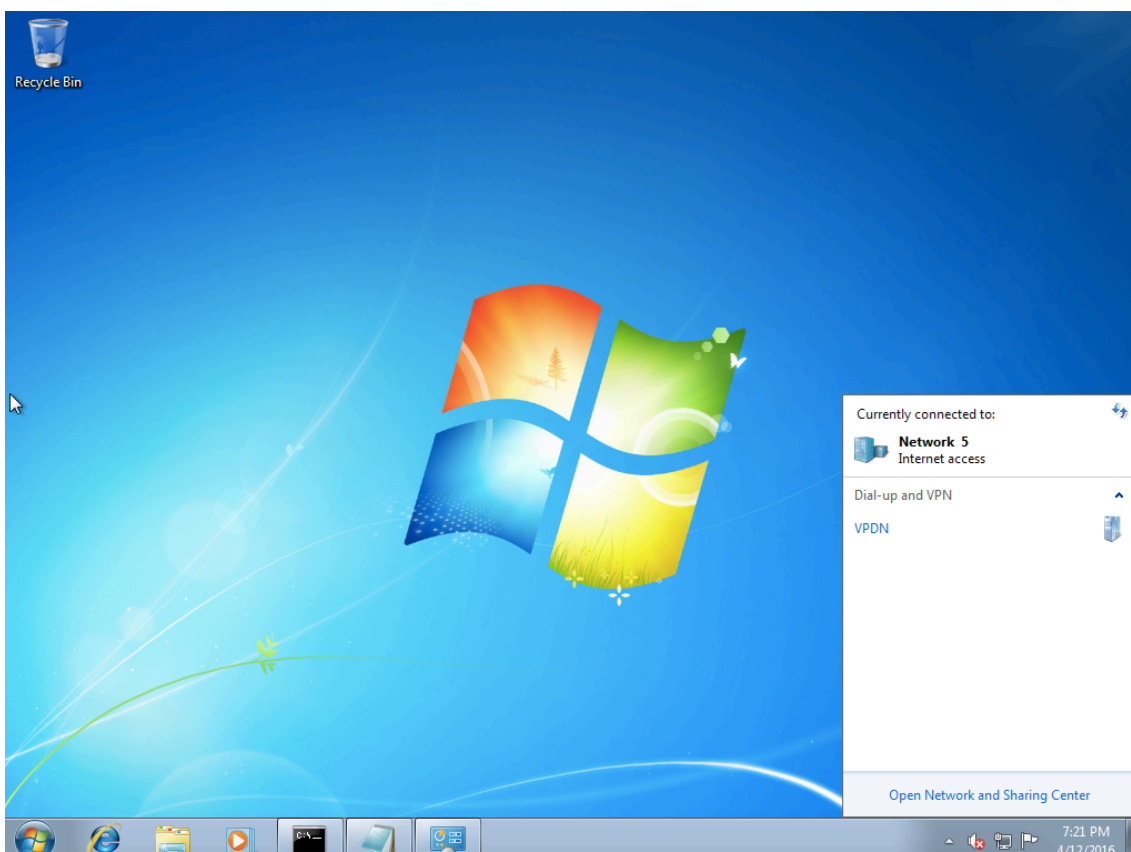
Verifying user name and password...

Skip Cancel

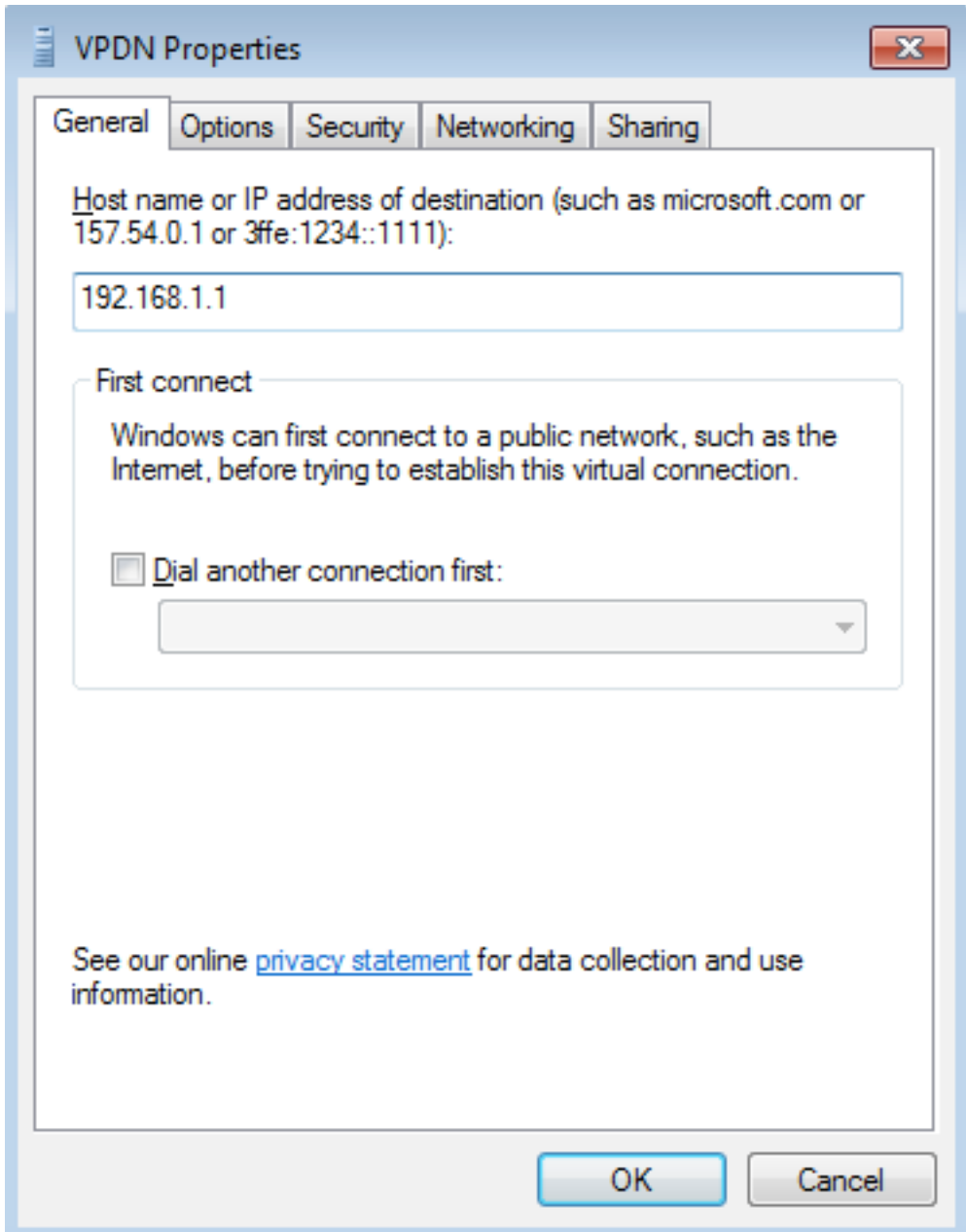
Step 7. It might fail for the first time as shown in this image.



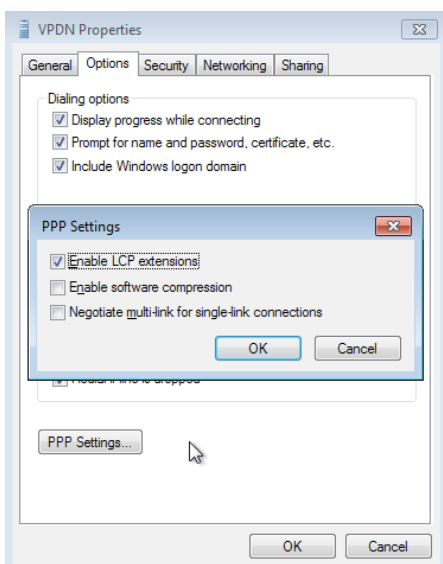
Step 8. Click **Set up the connection anyway** and open **Networks** tab.



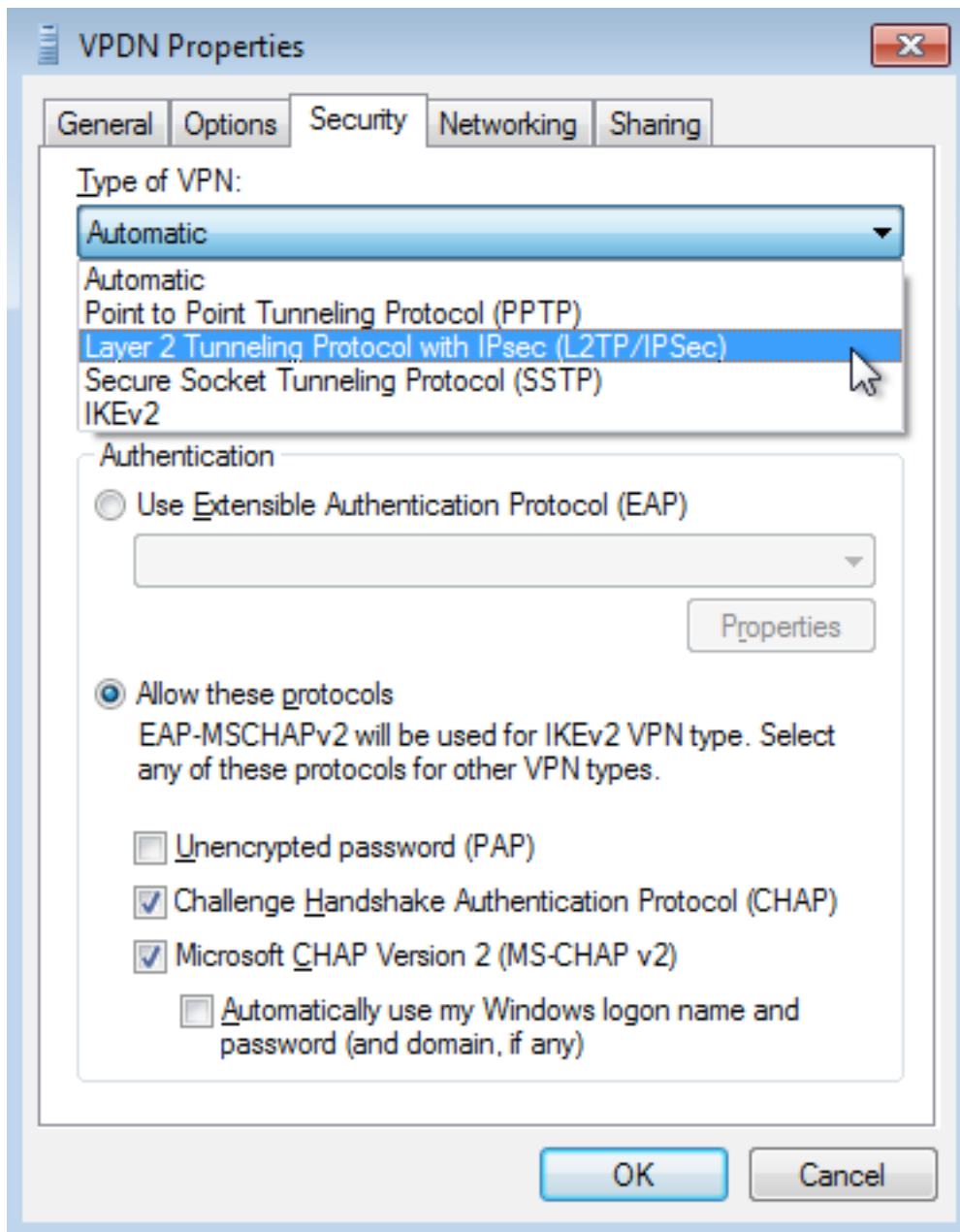
Step 9. Right click the connection (here VPDN) and click **Properties**. Verify the IP address of the Aggregator (here 192.168.1.1)



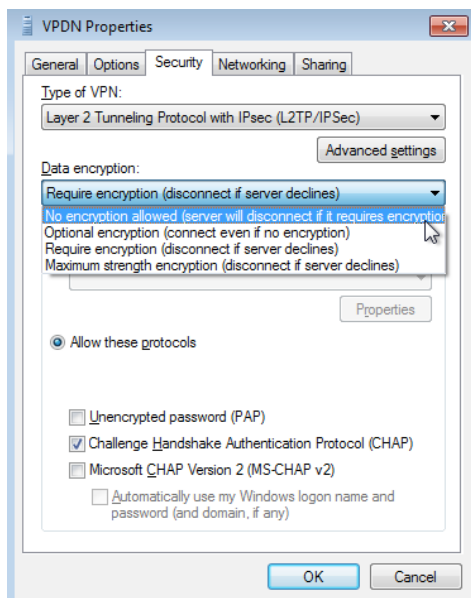
Step 10. Navigate to **Options** and verify the settings, as shown in this image.



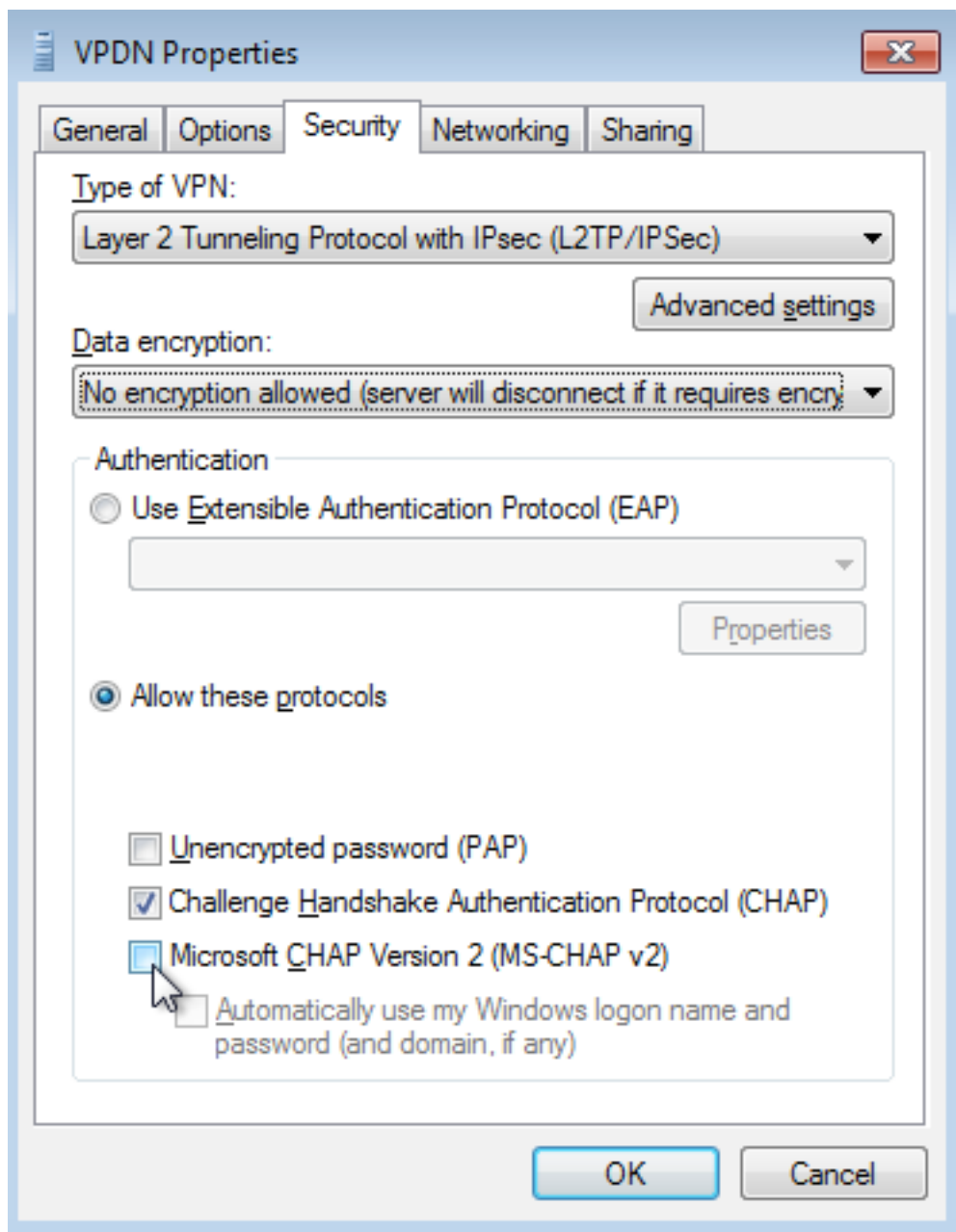
Step 11. Navigate to **Security** > as shown in this image.



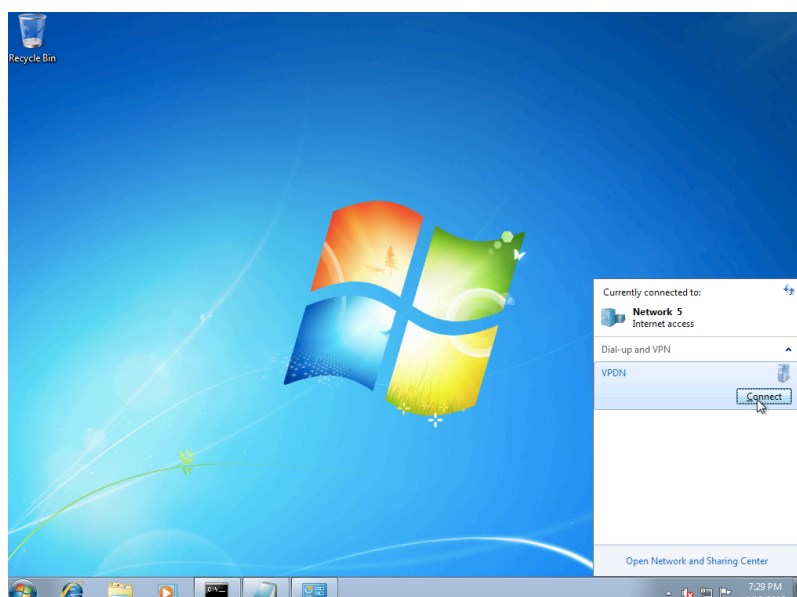
Step 12. Select **No encryption allowed** option under Data encryption dropdown menu:



Step 13. Uncheck **Microsoft CHAP Version 2** and click **OK**.

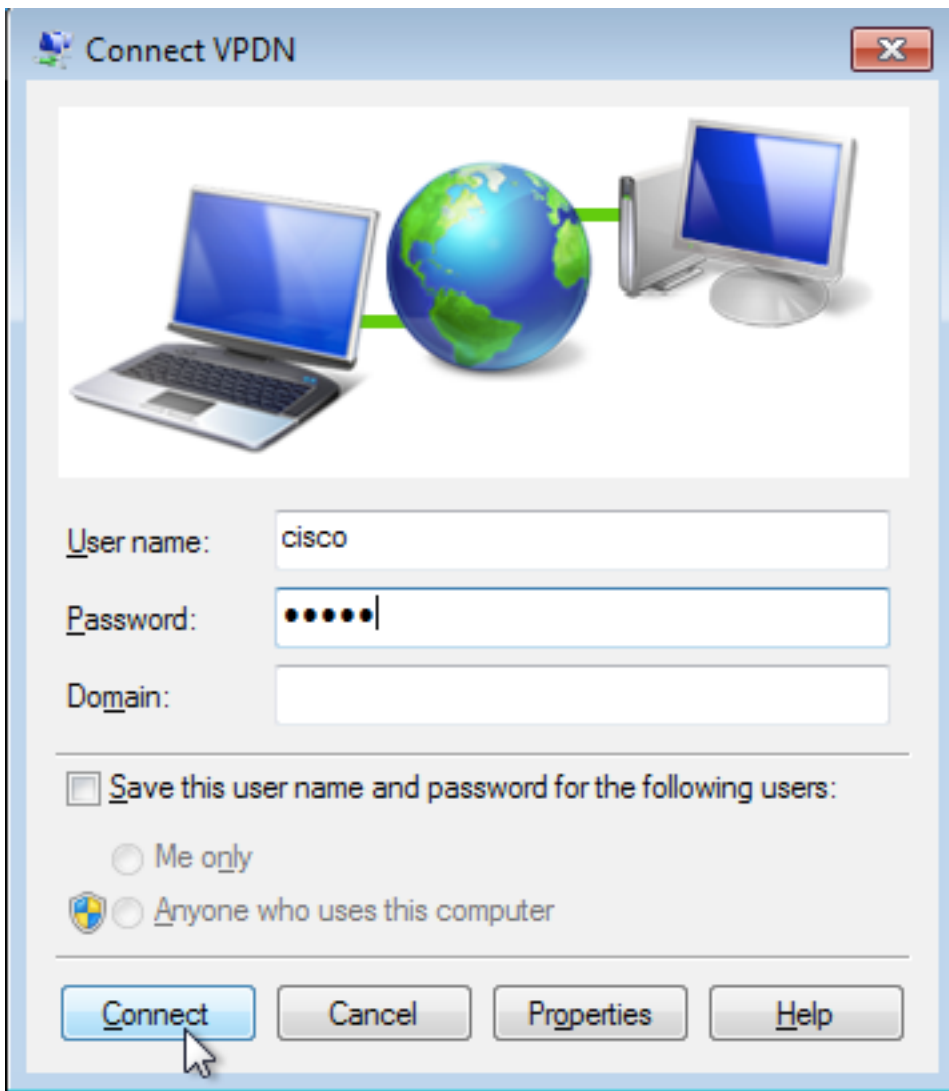


Step 14. Open network (here VPDN) and click **Connect**.



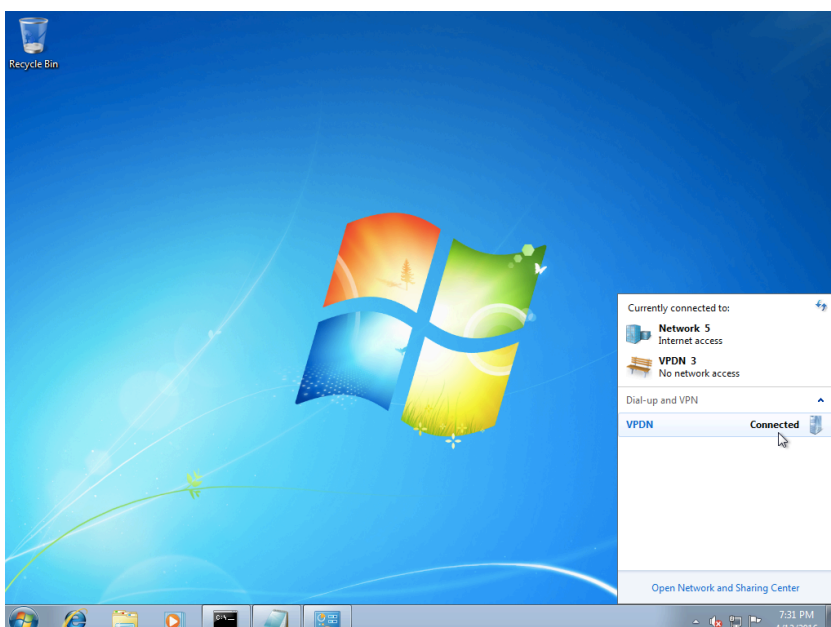


Step 15. Enter Username and Password and click **Connect**



## Verify

Step 1. Open **Networks** tab again, select the network (named VPDN in this example) and verify that the status is Connected.



Step 2. Open command prompt and run **ipconfig /all** command.

```
PPP adapter UPDN:

Connection-specific DNS Suffix . : 
Description . . . . . : UPDN
Physical Address . . . . . : 
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes
IPv4 Address. . . . . : 10.1.1.9(Preferred)
Subnet Mask . . . . . : 255.255.255.255
Default Gateway . . . . . : 0.0.0.0
DNS Servers . . . . . : 4.2.2.1
                       4.2.2.2
NetBIOS over Tcpip. . . . . : Enabled
```

IPv4 address and Domain Name Server (DNS) are assigned by the Aggregator after completing PPP Internet Protocol Control Protocol (IPCP) phase.

Step 3. Run **debug ppp negotiation** command and the other show commands on Aggregator:

```
Aggregator#
*Apr 12 06:17:38.148: PPP: Alloc Context [38726D0C]
*Apr 12 06:17:38.148: ppp11 PPP: Phase is ESTABLISHING
*Apr 12 06:17:38.148: ppp11 PPP: Using vpn set call direction
*Apr 12 06:17:38.148: ppp11 PPP: Treating connection as a callin
*Apr 12 06:17:38.148: ppp11 PPP: Session handle[A600000B] Session id[11]
*Apr 12 06:17:38.148: ppp11 LCP: Event[OPEN] State[Initial to Starting]
*Apr 12 06:17:38.148: ppp11 PPP: No remote authentication for call-in
*Apr 12 06:17:38.148: ppp11 PPP LCP: Enter passive mode, state[Stopped]
*Apr 12 06:17:38.607: ppp11 LCP: I CONFREQ [Stopped] id 0 len 21
*Apr 12 06:17:38.607: ppp11 LCP: MRU 1400 (0x01040578)
*Apr 12 06:17:38.607: ppp11 LCP: MagicNumber 0x795C7CD1 (0x0506795C7CD1)
*Apr 12 06:17:38.607: ppp11 LCP: PFC (0x0702)
*Apr 12 06:17:38.607: ppp11 LCP: ACFC (0x0802)
*Apr 12 06:17:38.607: ppp11 LCP: Callback 6 (0x0D0306)
*Apr 12 06:17:38.608: ppp11 LCP: O CONFREQ [Stopped] id 1 len 10
*Apr 12 06:17:38.608: ppp11 LCP: MagicNumber 0xF7C3D2B9 (0x0506F7C3D2B9)
*Apr 12 06:17:38.608: ppp11 LCP: O CONFREQ [Stopped] id 0 len 7
*Apr 12 06:17:38.608: ppp11 LCP: Callback 6 (0x0D0306)
*Apr 12 06:17:38.608: ppp11 LCP: Event[Receive ConfReq-] State[Stopped to REQsent]
*Apr 12 06:17:38.615: ppp11 LCP: I CONFACK [REQsent] id 1 len 10
*Apr 12 06:17:38.615: ppp11 LCP: MagicNumber 0xF7C3D2B9 (0x0506F7C3D2B9)
*Apr 12 06:17:38.615: ppp11 LCP: Event[Receive ConfAck] State[REQsent to ACKrcvd]
*Apr 12 06:17:38.615: ppp11 LCP: I CONFREQ [ACKrcvd] id 1 len 18
*Apr 12 06:17:38.615: ppp11 LCP: MRU 1400 (0x01040578)
*Apr 12 06:17:38.615: ppp11 LCP: MagicNumber 0x795C7CD1 (0x0506795C7CD1)
*Apr 12 06:17:38.616: ppp11 LCP: PFC (0x0702)
*Apr 12 06:17:38.616: ppp11 LCP: ACFC (0x0802)
*Apr 12 06:17:38.616: ppp11 LCP: O CONFNAK [ACKrcvd] id 1 len 8
*Apr 12 06:17:38.616: ppp11 LCP: MRU 1500 (0x010405DC)
*Apr 12 06:17:38.616: ppp11 LCP: Event[Receive ConfReq-] State[ACKrcvd to ACKrcvd]
*Apr 12 06:17:38.617: ppp11 LCP: I CONFREQ [ACKrcvd] id 2 len 18
*Apr 12 06:17:38.617: ppp11 LCP: MRU 1400 (0x01040578)
*Apr 12 06:17:38.617: ppp11 LCP: MagicNumber 0x795C7CD1 (0x0506795C7CD1)
*Apr 12 06:17:38.617: ppp11 LCP: PFC (0x0702)
*Apr 12 06:17:38.617: ppp11 LCP: ACFC (0x0802)
*Apr 12 06:17:38.617: ppp11 LCP: O CONFNAK [ACKrcvd] id 2 len 8
*Apr 12 06:17:38.617: ppp11 LCP: MRU 1500 (0x010405DC)
*Apr 12 06:17:38.617: ppp11 LCP: Event[Receive ConfReq-] State[ACKrcvd to ACKrcvd]
*Apr 12 06:17:38.618: ppp11 LCP: I CONFREQ [ACKrcvd] id 3 len 18
```

\*Apr 12 06:17:38.618: ppp11 LCP: MRU 1500 (0x010405DC)  
\*Apr 12 06:17:38.618: ppp11 LCP: MagicNumber 0x795C7CD1 (0x0506795C7CD1)  
\*Apr 12 06:17:38.618: ppp11 LCP: PFC (0x0702)  
\*Apr 12 06:17:38.618: ppp11 LCP: ACFC (0x0802)  
\*Apr 12 06:17:38.618: ppp11 LCP: O CONFACK [ACKrcvd] id 3 len 18  
\*Apr 12 06:17:38.618: ppp11 LCP: MRU 1500 (0x010405DC)  
\*Apr 12 06:17:38.618: ppp11 LCP: MagicNumber 0x795C7CD1 (0x0506795C7CD1)  
\*Apr 12 06:17:38.618: ppp11 LCP: PFC (0x0702)  
\*Apr 12 06:17:38.619: ppp11 LCP: ACFC (0x0802)  
\*Apr 12 06:17:38.619: ppp11 LCP: Event[Receive ConfReq+] State[ACKrcvd to Open]  
\*Apr 12 06:17:38.621: ppp11 LCP: I IDENTIFY [Open] id 4 len 18 magic 0x795C7CD1MSRASV5.20  
\*Apr 12 06:17:38.621: ppp11 LCP: I IDENTIFY [Open] id 5 len 24 magic 0x795C7CD1MSRAS-0-ADMIN-PC  
\*Apr 12 06:17:38.621: ppp11 LCP: I IDENTIFY [Open] id 6 len 24 magic 0x795C7CD1Z8Of(U3G.cIwR<#!  
\*Apr 12 06:17:38.626: ppp11 PPP: Queue IPV6CP code[1] id[7]  
\*Apr 12 06:17:38.626: ppp11 PPP: Queue IPCP code[1] id[8]  
\*Apr 12 06:17:38.640: ppp11 PPP: Phase is FORWARDING, Attempting Forward  
\*Apr 12 06:17:38.640: ppp11 LCP: State is Open  
\*Apr 12 06:17:38.657: Vi3.1 PPP: Phase is ESTABLISHING, Finish LCP  
\*Apr 12 06:17:38.657: Vi3.1 PPP: Phase is UP  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: Protocol configured, start CP. state[Initial]  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: Event[OPEN] State[Initial to Starting]  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: O CONFREQ [Starting] id 1 len 10  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: Address 172.16.1.1 (0x0306AC100101)  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: Event[UP] State[Starting to REQsent]  
\*Apr 12 06:17:38.657: Vi3.1 PPP: Process pending ncp packets  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: Redirect packet to Vi3.1  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: I CONFREQ [REQsent] id 8 len 34  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: Address 0.0.0.0 (0x030600000000)  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: PrimaryDNS 0.0.0.0 (0x810600000000)  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: PrimaryWINS 0.0.0.0 (0x820600000000)  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: SecondaryDNS 0.0.0.0 (0x830600000000)  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: SecondaryWINS 0.0.0.0 (0x840600000000)  
\*Apr 12 06:17:38.657: Vi3.1 IPCP AUTHOR: Done. Her address 0.0.0.0, we want 0.0.0.0  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: Pool returned 10.1.1.9  
\*Apr 12 06:17:38.657: Vi3.1 IPCP: O CONFREQ [REQsent] id 8 len 16  
\*Apr 12 06:17:38.658: Vi3.1 IPCP: PrimaryWINS 0.0.0.0 (0x820600000000)  
\*Apr 12 06:17:38.658: Vi3.1 IPCP: SecondaryWINS 0.0.0.0 (0x840600000000)  
\*Apr 12 06:17:38.658: Vi3.1 IPCP: Event[Receive ConfReq-] State[REQsent to REQsent]  
\*Apr 12 06:17:38.658: Vi3.1 IPV6CP: Redirect packet to Vi3.1  
\*Apr 12 06:17:38.658: Vi3.1 IPV6CP: I CONFREQ [UNKNOWN] id 7 len 14  
\*Apr 12 06:17:38.658: Vi3.1 IPV6CP: Interface-Id F0AA:D7A4:5750:D93E (0x010AF0AAD7A45750D93E)  
\*Apr 12 06:17:38.658: Vi3.1 LCP: O PROTREJ [Open] id 2 len 20 protocol IPV6CP  
(0x0107000E010AF0AAD7A45750D93E)  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: I CONFACK [REQsent] id 1 len 10  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: Address 172.16.1.1 (0x0306AC100101)  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: Event[Receive ConfAck] State[REQsent to ACKrcvd]  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: I CONFREQ [ACKrcvd] id 9 len 22  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: Address 0.0.0.0 (0x030600000000)  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: PrimaryDNS 0.0.0.0 (0x810600000000)  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: SecondaryDNS 0.0.0.0 (0x830600000000)  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: O CONFNAK [ACKrcvd] id 9 len 22  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: Address 10.1.1.9 (0x03060A010109)  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: PrimaryDNS 4.2.2.1 (0x810604020201)  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: SecondaryDNS 4.2.2.2 (0x830604020202)  
\*Apr 12 06:17:38.672: Vi3.1 IPCP: Event[Receive ConfReq-] State[ACKrcvd to ACKrcvd]  
\*Apr 12 06:17:38.747: Vi3.1 IPCP: I CONFREQ [ACKrcvd] id 10 len 22  
\*Apr 12 06:17:38.747: Vi3.1 IPCP: Address 10.1.1.9 (0x03060A010109)  
\*Apr 12 06:17:38.747: Vi3.1 IPCP: PrimaryDNS 4.2.2.1 (0x810604020201)  
\*Apr 12 06:17:38.747: Vi3.1 IPCP: SecondaryDNS 4.2.2.2 (0x830604020202)  
\*Apr 12 06:17:38.747: Vi3.1 IPCP: O CONFACK [ACKrcvd] id 10 len 22  
\*Apr 12 06:17:38.748: Vi3.1 IPCP: Address 10.1.1.9 (0x03060A010109)  
**\*Apr 12 06:17:38.748: Vi3.1 IPCP: PrimaryDNS 4.2.2.1 (0x810604020201)**  
**\*Apr 12 06:17:38.748: Vi3.1 IPCP: SecondaryDNS 4.2.2.2 (0x830604020202)**  
\*Apr 12 06:17:38.748: Vi3.1 IPCP: Event[Receive ConfReq+] State[ACKrcvd to Open]

```
*Apr 12 06:17:38.768: Vi3.1 IPCP: State is Open
*Apr 12 06:17:38.769: Vi3.1 Added to neighbor route AVL tree: topoid 0, address 10.1.1.9
*Apr 12 06:17:38.769: Vi3.1 IPCP: Install route to 10.1.1.9
```

```
Aggregator#show caller ip
```

Line	User	IP Address	Local Number	Remote Number	<->
Vi3.1	-	10.1.1.9	-	-	in

```
Aggregator#show ip interface brief | exclude un
```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0/1	192.168.1.1	YES	manual	up	up
Loopback100	172.16.1.1	YES	manual	up	up

Step 4. Verify whether the Windows machine can reach the remote network behind Aggregator (in this case Loopback 100 interface)

```
C:\Users\admin>ping 172.16.1.1

Pinging 172.16.1.1 with 32 bytes of data:
Reply from 172.16.1.1: bytes=32 time=1ms TTL=255
Reply from 172.16.1.1: bytes=32 time<1ms TTL=255
Reply from 172.16.1.1: bytes=32 time<1ms TTL=255
Reply from 172.16.1.1: bytes=32 time<1ms TTL=255

Ping statistics for 172.16.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

## Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

## Related Information

- [Understanding VPDN](#)
- [Technical Support & Documentation - Cisco Systems](#)