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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)

.

🚱 🜆 Connect to a Workplace	
How do you want to connect?	
Use my Internet connection (VPN) Connect using a virtual private network (VPN) connection through the Internet.	
in the second se	
Dial directly Connect directly to a phone number without going through the Internet.	
What is a VPN connection?	
	Cancel

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**.

Connect to a Workplace		- • •
Type the Internet add	ress to connect to	
Your network administrator	can give you this address.	
Internet address:	192.168.1.1	
Destination name:	VPDN	
Use a <u>s</u> mart card		
🚱 回 <u>A</u> llow other people t This option allows a	o use this connection nyone with access to this computer to use this connection.	
Don't connect now;	just set it up so I can connect later	
	Nex	t Cancel

Step 5. Enter the username and password, and click $\ensuremath{\textbf{Connect}}$

Connect to a Workplac	e	
Type your user name	and password	
<u>U</u> ser name:	cisco]
<u>P</u> assword:	•••••]
	Show characters Remember this password	
<u>D</u> omain (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)

VPDN Properties
General Options Security Networking Sharing
Host name or IP address of destination (such as microsoft.com or 157.54.0.1 or 3ffe:1234::1111):
192.168.1.1
First connect
Windows can first connect to a public network, such as the Internet, before trying to establish this virtual connection.
Dial another connection first:
See our online <u>privacy statement</u> for data collection and use information.
OK Cancel

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

VPDN Properties
Dialing options Ø Display progress while connecting Ø Prompt for name and password, certificate, etc. Ø Include Windows logon domain
PPP Settings Imable LCP extensions Enable software compression Negotiate multi-link for single-link connections
OK Cancel
OK Cancel

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

VPDN Properties
General Options Security Networking Sharing
Type of VPN:
Automatic
Automatic Point to Point Tunneling Protocol (PPTP) Layer 2 Tunneling Protocol with IPsec (L2TP/IPSec)
IKEv2
Authentication
Use Extensible Authentication Protocol (EAP)
Allow these protocols EAP-MSCHAPv2 will be used for IKEv2 VPN type. Select any of these protocols for other VPN types.
Unencrypted password (PAP)
Challenge Handshake Authentication Protocol (CHAP)
Microsoft CHAP Version 2 (MS-CHAP v2)
Automatically use my Windows logon name and password (and domain, if any)
OK Cancel

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

VPDN Properties
General Options Security Networking Sharing
Type of VPN:
Layer 2 Tunneling Protocol with IPsec (L2TP/IPSec)
Data encryption:
Require encryption (disconnect if server declines)
Optional encryption (connect even if no encryption) Require encryption (disconnect if server declines) Maximum strength encryption (disconnect if server declines)
Properties
Allow these Borocols
Unencrypted password (PAP)
Challenge Handshake Authentication Protocol (CHAP)
Microsoft CHAP Version 2 (MS-CHAP v2)
Automatically use my Windows logon name and password (and domain, if any)
OK Cancel

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

VPDN Properties
General Options Security Networking Sharing
Type of VPN:
Layer 2 Tunneling Protocol with IPsec (L2TP/IPSec)
<u>D</u> ata encryption:
No encryption allowed (server will disconnect if it requires encry
Authentication
Use Extensible Authentication Protocol (EAP)
Properties
Allow these protocols
Unencrypted password (PAP)
Challenge Handshake Authentication Protocol (CHAP)
Microsoft CHAP Version 2 (MS-CHAP v2)
Automatically use my Windows logon name and password (and domain, if any)
OK Cancel

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



Step 15. Enter Username and Password and click Connect

Seconnect VPDN
User name: Cisco
Password:
Do <u>m</u> ain:
Save this user name and password for the following users:
─ Me o <u>nly</u>
🛞 🔿 <u>A</u> nyone who uses this computer
Connect Cancel Properties Help

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 VPDN:
  Connection-specific DNS Suffix
                                  UPDN
  Description . . . . . . . . .
                                Physical Address. . . . . . . .
                                DHČP Enabled. . .
                                No
                         . . . .
  Autoconfiguration Enabled . . . .
                                Yes
                                : 10.1.1.9(Preferred)
  IPv4 Address. . . . . . . .
  : 255.255.255.255
  DNS Servers . . . . . . . . . . .
                                  4.2.2.1
                                4.2.2.
                                       2
  NetBIOS over Tcpip. . . . . . . : Enabled
```

IPv4 address and Domian 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 CONFREJ [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 (0x03060000000)

 *Apr 12 06:17:38.657: Vi3.1 IPCP:
 PrimaryDNS 0.0.0.0 (0x81060000000)

 *Apr 12 06:17:38.657: Vi3.1 IPCP:
 PrimaryWINS 0.0.0.0 (0x82060000000)

 *Apr 12 06:17:38.657: Vi3.1 IPCP: SecondaryDNS 0.0.0.0 (0x83060000000) *Apr 12 06:17:38.657: Vi3.1 IPCP: SecondaryWINS 0.0.0.0 (0x84060000000) *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 CONFREJ [REQsent] id 8 len 16 *Apr 12 06:17:38.658: Vi3.1 IPCP: PrimaryWINS 0.0.0.0 (0x82060000000) *Apr 12 06:17:38.658: Vi3.1 IPCP: SecondaryWINS 0.0.0.0 (0x84060000000) *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 (0x03060000000) *Apr 12 06:17:38.672: Vi3.1 IPCP: PrimaryDNS 0.0.0.0 (0x81060000000) *Apr 12 06:17:38.672: Vi3.1 IPCP: SecondaryDNS 0.0.0.0 (0x83060000000) *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

```
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

- <u>Understanding VPDN</u>
- Technical Support & Documentation Cisco Systems