配置 L2TP 多跳以实现从 NAS 到 LNS 的多次跳转

目录

简介

多跳虚拟专用拨号网络(VPDN)允许您配置从L2TP接入集中器(LAC)到L2TP网络服务器(LNS)的几跳。最多支持四跳。隧道在每一跳(LNS)中终止，并重新发起到下一跳目的地。此过程允许隧道交换。ISP之间可使用多跳来提供批发接入虚拟专用网络(VPN)服务。

此场景同时支持第2层转发(L2F)和第2层隧道协议(L2TP)。但是，由于L2TP正在成为行业标准，因此本文档重点介绍L2TP。

先决条件

规则

有关文档规则的详细信息，请参阅 Cisco 技术提示规则。

要求

本文档没有任何特定的前提条件。

有关VPDN流程的说明，请参阅了解VPDN。

使用的组件

本文档中的信息基于以下软件和硬件版本。

- 思科IOS®软件版本12.3(6)
- L2TP接入集中器(LAC):思科AS5400接入服务器
- L2TP网络服务器(LNS):Cisco 7200 路由器

本文档中的信息都是基于特定实验室环境中的设备创建的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您是在真实网络上操作，请确保您在使用任何命令前已经了解其潜在影响。

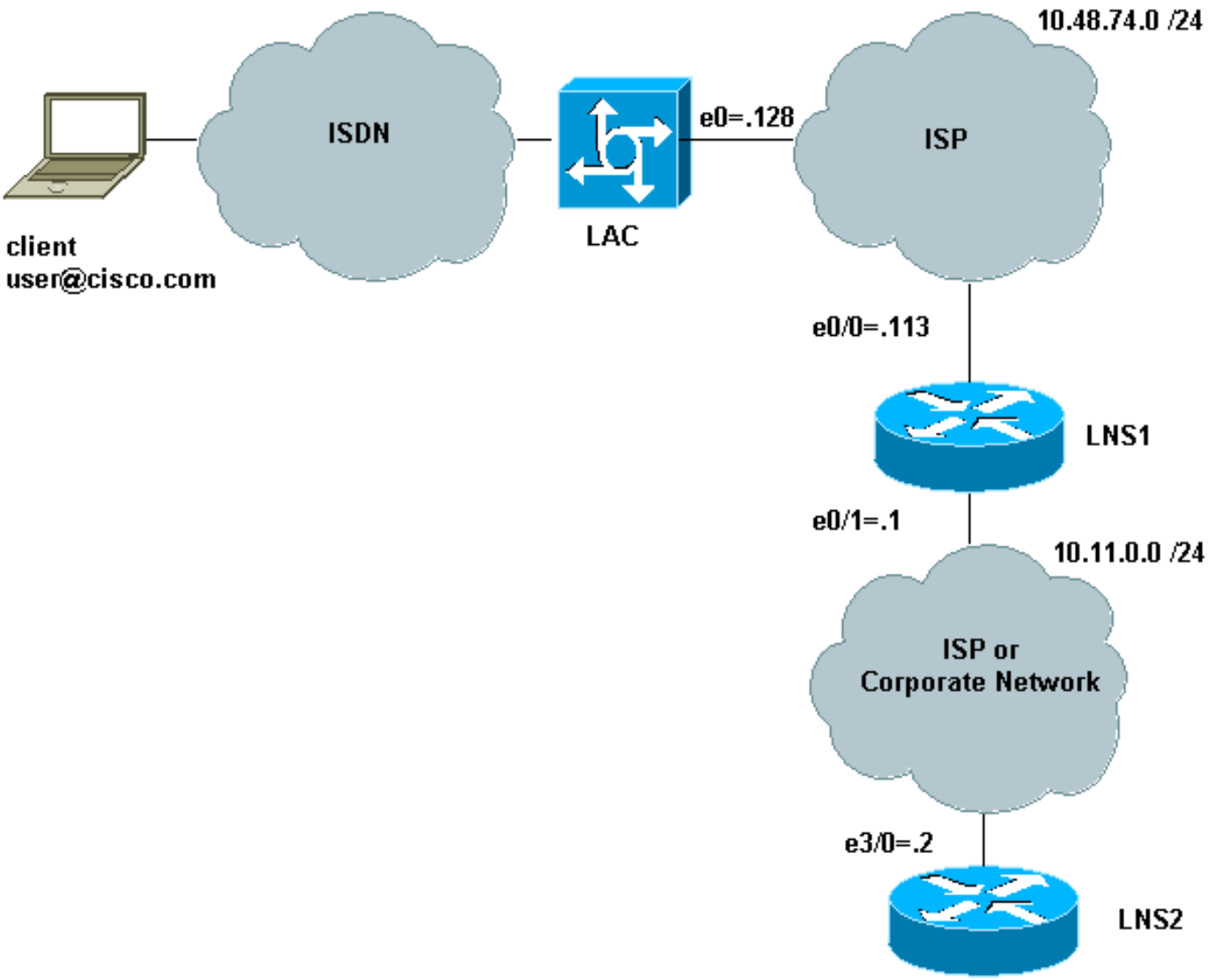
配置

本部分提供有关如何配置本文档所述功能的信息。

注：要查找有关本文档中使用的命令的其他信息，请使用命令查找工具(仅注册客户)。

网络图

本文档使用下图所示的网络设置。



在此设置中：

- 客户端使用ISDN在LAC中拨号（例如，它可以改用DSL）。
- LAC使用E1主速率接口(PRI)接受呼叫。
- L2TP设备之间尚未打开隧道。
- 隧道和会话设置基于域名。没有用于身份验证或授权的AAA服务器。
- 它使用两个LNS。

具体如下：

1. 客户端拨入LAC。客户端和LAC协商LCP选项。身份验证阶段执行，LAC获取用户名(user@cisco.com)和密码。根据域名（本例中为cisco.com），它会打开一个隧道，然后打开到LNS1的会话。
2. 在LAC和LNS1之间打开L2TP会话后，LNS1将获取LAC和客户端之间协商的LCP选项以及用户名和密码(user@cisco.com，密码)。
3. LNS1的配置中有一个具有相同域(cisco.com)的VPDN组。它会打开到LNS2的隧道和会话。如果它没有此类配置，它将通过对客户端进行身份验证、协商IP地址并安装路由来终止PPP会话。
4. 在LNS1和LNS2之间打开L2TP会话后，LNS2将获取LAC和客户端之间协商的LCP选项以及用户和密码(user@cisco.com，密码)。 它对用户进行身份验证、协商IPCP并安装路由。

配置

本文档使用如下所示的配置。此处使用的命令数量最小。例如，LAC不会终止任何会话，因此无需在Dialer1或Group-async1接口中配置IP地址。LNS1不会终止任何PPP会话，因此virtual-template1下没有IP地址。

- LAC
- LNS1
- LNS2

LAC

```
version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname LAC
!
boot-start-marker
no boot startup-test
boot-end-marker
!
enable password 7 02050D480809
!
!
!
resource-pool disable
spe default-firmware spe-firmware-2
no aaa new-model
ip subnet-zero
no ip domain lookup
!
ip cef
! -- Enables VPDN. vpdn enable ! -- VPDN tunnel
authorization is based first on the domain name ! --
```

```
(the default is DNIS). ! vpdn search-order domain ! ! -- The LAC opens an L2TP tunnel and session to 10.48.74.113 (LNS1) ! -- using the password LACLNS1 for users whose domain-name is cisco.com. vpdn-group 1 request-dialin protocol l2tp domain cisco.com initiate-to ip 10.48.74.113 l2tp tunnel password LACLNS1 ! isdn switch-type primary-net5 ! ! no voice hpi capture buffer no voice hpi capture destination ! ! controller E1 7/0 pri-group timeslots 1-31 ! interface FastEthernet0/0 ip address 10.48.74.128 255.255.255.0 duplex auto speed auto ! interface Serial7/0:15 no ip address encapsulation ppp dialer rotary-group 1 isdn switch-type primary-net5 ! interface Group-Async1 no ip address encapsulation ppp async mode interactive ppp authentication chap callin group-range 1/00 3/107 ! interface Dialer1 no ip address encapsulation ppp ppp authentication chap callin ! ip classless no ip http server ! ! voice-port 7/0:D ! line con 0 exec-timeout 0 0 line aux 0 line vty 0 4 line 1/00 1/107 modem InOut transport input all line 3/00 3/107 modem InOut transport input all ! scheduler allocate 10000 400 ! end
```

LNS1

```
version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname LNS1
!
boot-start-marker
boot-end-marker
!
enable password cisco
!
clock timezone CET 1
no aaa new-model
ip subnet-zero
ip cef
!
!
no ip domain lookup
!
! -- Enables VPDN. vpdn enable ! -- Enables VPDN multihop. vpdn multihop ! !-- LNS1 accepts L2TP tunnel/session from the router named LAC. !-- The password LACLNS1 is used between LAC and LNS1 for authentication. !-- The virtual-template 1 is used for the PPP phase. vpdn-group FromLAC accept-dialin protocol l2tp virtual-template 1 terminate-from hostname LAC l2tp tunnel password 0 LACLNS1 ! ! -- The LNS1 opens a L2TP tunnel and session to 10.11.0.2 (LNS2) ! -- using the password LNS1LNS2 for users whose domain-name is cisco.com. vpdn-group TowardsLNS2 request-dialin protocol l2tp domain cisco.com initiate-to ip 10.11.0.2 l2tp tunnel password 0 LNS1LNS2 ! ! interface Ethernet0/0 ip address 10.48.74.113 255.255.255.0 no ip proxy-arp half-duplex ! interface Ethernet0/1 ip address 10.11.0.1 255.255.255.0 half-duplex ! interface Virtual-Template1 no ip address ppp authentication chap callin ! no ip http server ip classless ! ! dial-peer cor custom
```

```
! line con 0 exec-timeout 0 0 line aux 0 line vty 0 4
exec-timeout 0 0 password ww login ! ntp clock-period
17208915 ntp server 10.48.75.134 ! ! end
```

LNS2

```
version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname LNS2
!
boot-start-marker
boot-end-marker
!
enable password cisco
!
username user@cisco.com password 0 cisco
no aaa new-model
ip subnet-zero
!
!
ip cef
!
!-- Enables VPDN. vpdn enable ! !-- LNS2 accepts L2TP
tunnel/session from the router named LNS1. !-- The
password LNS1LNS2 is used between LNS1 and LNS2 for
authentication. !-- The virtual-template 1 is used for
the PPP phase. vpdn-group FromLNS1 ! Default L2TP VPDN
group accept-dialin protocol l2tp virtual-template 1
l2tp tunnel password 0 LNS1LNS2 ! ! interface Loopback0
ip address 192.168.1.1 255.255.255.0 ! interface
Ethernet3/0 ip address 10.11.0.2 255.255.255.0 duplex
half ! interface Virtual-Template1 ip unnumbered
Loopback0 peer default ip address pool VpdnUsers ppp
authentication chap callin ! ip local pool VpdnUsers
192.168.1.2 192.168.1.254 ip classless no ip http server
! ! line con 0 exec-timeout 0 0 transport preferred all
transport output all stopbits 1 line aux 0 transport
preferred all transport output all stopbits 1 line vty 0
4 login transport preferred all transport input all
transport output all ! ! ! end
```

验证

本部分所提供的信息可用于确认您的配置是否正常工作。

命令输出解释程序工具（仅限注册用户）支持某些 **show 命令，使用此工具可以查看对 show 命令输出的分析。**

- **show vpdn** — 显示有关VPDN中活动L2TP或L2F协议隧道和消息标识符的信息。
- **show caller user user detail — 显示呼叫**者信息。

在LAC、LNS1和LNS2上使用这些命令的输出如下所示：

```
LAC#show vpdn
```

```
L2TP Tunnel and Session Information Total tunnels 1 sessions 1

LocID RemID Remote Name   State  Remote Address  Port  Sessions VPDN Group
18693 28416 LNS1          est    10.48.74.113    1701  1        1

LocID RemID TunID Intf          Username             State  Last Chg Uniq ID
19    21    18693 Se7/0:3       user@cisco.com       est    00:02:04 28

%No active L2F tunnels

%No active PPTP tunnels
LAC#
```

我们看到LNS1有两个隧道，每个隧道有一个会话。

```
LNS1#show vpdn

L2TP Tunnel and Session Information Total tunnels 2 sessions 2

LocID RemID Remote Name   State  Remote Address  Port  Sessions VPDN Group
28416 18693 LAC           est    10.48.74.128    1701  1        FromLAC

LocID RemID TunID Intf          Username             State  Last Chg Uniq ID
21    19    28416 SSS Circuit   user@cisco.com       est    00:02:25 13

LocID RemID Remote Name   State  Remote Address  Port  Sessions VPDN Group
30255 35837 LNS2          est    10.11.0.2       1701  1        TowardsLNS2

LocID RemID TunID Intf          Username             State  Last Chg Uniq ID
22    9     30255 SSS Circuit   user@cisco.com       est    00:02:25 13

%No active L2F tunnels

%No active PPTP tunnels
LNS1#


LNS2#show vpdn

L2TP Tunnel and Session Information Total tunnels 1 sessions 1

LocID RemID Remote Name   State  Remote Address  Port  Sessions VPDN Group
35837 30255 LNS1          est    10.11.0.1       1701  1        FromLNS1

LocID RemID TunID Intf          Username             State  Last Chg Uniq ID
9     22    35837 Vi2.1         user@cisco.com       est    00:03:22 8

%No active L2F tunnels

%No active PPTP tunnels
LNS2#

LNS2#show caller user user@cisco.com detail

  User: user@cisco.com, line Vi2.1, service PPPoVPDN
        Connected for 00:03:33, Idle for 00:00:58
  Timeouts:    Limit     Remaining Timer Type
               -         -         -
  PPP: LCP Open, CHAP (<-), IPCP
  LCP: -> peer, AuthProto, MagicNumber
       <- peer, MagicNumber, EndpointDisc
  NCP: Open IPCP
  IPCP: <- peer, Address
```

```
       -> peer, Address
  IP: Local 192.168.1.1, remote 192.168.1.2
  Counts: 56 packets input, 2562 bytes
          57 packets output, 2570 bytes

LNS2#
```

故障排除

本部分提供的信息可用于对配置进行故障排除。

故障排除命令

命令输出解释程序工具（仅限注册用户）支持某些 **show 命令，使用此工具可以查看对 show 命令输出的分析。**

注意：在发出debug**命**令之前，请参阅有关Debug命令的重要信息。

LAC上的命令故障排除

- **debug isdn q931 - 显示关于呼叫建立及拆线、本地路由器(用户端)和网络之间的ISDN网络连接(第三层)断开的信息。**
- **debug vpdn event** — 显示L2TP错误和事件，这些错误和事件是VPDN正常隧道建立或关闭的一部分。
- **debug vpdn error** — 排除第2层隧道协议第3版(L2TPv3)和周围第2层隧道基础设施故障。
- **debug vpdn l2x-events** — 显示由协议特定条件导致的事件。
- **vpdn l2x-errors** — 显示协议特定条件中发生的错误。
- **debug ppp negotiation** — 显示客户端是否正在传递PPP协商。您可以看到正在协商的选项（例如回叫或MLP）和协议（例如IP和IPX）。

LNS1上的命令故障排除

- **debug vpdn event**
- **debug vpdn error**
- **debug vpdn l2x event**
- **vpdn l2x-erro**
- **debug ppp negotiation**
- **debug vtemplate error** — 显示从从虚拟模板克隆虚拟访问接口到呼叫结束时虚拟访问接口关闭时的虚拟访问接口的克隆信息。
- **debug vtemplate event** — 显示从从虚拟模板克隆虚拟访问接口到呼叫结束时虚拟访问接口关闭时的虚拟访问接口的克隆信息。

LNS2上的命令故障排除

与LNS1相同，但使用一个附加命令：

- **debug ip peer — 显**示地址活动，并在定义池组时包含其他输出。

调试输出 — LAC

LAC上的调试输出如下：

```
LAC#
*Apr 23 08:55:23.579: ISDN Se7/0:15 Q931: RX <- SETUP pd = 8  callref = 0x256F
        Sending Complete
        Bearer Capability i = 0x8890
                Standard = CCITT
                Transer Capability = Unrestricted Digital
                Transfer Mode = Circuit
                Transfer Rate = 64 kbit/s
        Channel ID i = 0xA18384
                Preferred, Channel 4
        Calling Party Number i = 0xA1, '8101'
                Plan:ISDN, Type:National
        Called Party Number i = 0x81, '7070'
                Plan:ISDN, Type:Unknown
        Locking Shift to Codeset 6
        Codeset 6 IE 0x28  i = 'TAC BRI 8101'
*Apr 23 08:55:23.583: ISDN Se7/0:15 Q931: TX -> CALL_PROC pd = 8  callref = 0xA56F
        Channel ID i = 0xA98384
                Exclusive, Channel 4
*Apr 23 08:55:23.583: ISDN Se7/0:15 Q931: TX -> CONNECT pd = 8  callref = 0xA56F
        Channel ID i = 0xA98384
                Exclusive, Channel 4
*Apr 23 08:55:23.583: Se7/0:3 PPP: Using dialer call direction
*Apr 23 08:55:23.583: Se7/0:3 PPP: Treating connection as a callin
*Apr 23 08:55:23.583: Se7/0:3 PPP: Phase is ESTABLISHING, Passive Open
*Apr 23 08:55:23.583: Se7/0:3 LCP: State is Listen
*Apr 23 08:55:23.607: ISDN Se7/0:15 Q931: RX <- CONNECT_ACK pd = 8
callref = 0x256F
*Apr 23 08:55:23.695: Se7/0:3 LCP: I CONFREQ [Listen] id 180 len 31
*Apr 23 08:55:23.695: Se7/0:3 LCP:    MagicNumber 0x9028FFED (0x05069028FFED)
*Apr 23 08:55:23.695: Se7/0:3 LCP:    MRRU 1524 (0x110405F4)
*Apr 23 08:55:23.695: Se7/0:3 LCP:    EndpointDisc 1 user@cisco.com
*Apr 23 08:55:23.695: Se7/0:3 LCP:     (0x131101757365724063697363F2E636F)
*Apr 23 08:55:23.695: Se7/0:3 LCP:     (0x6D)
*Apr 23 08:55:23.695: Se7/0:3 LCP: O CONFREQ [Listen] id 1 len 15
*Apr 23 08:55:23.695: Se7/0:3 LCP:    AuthProto CHAP (0x0305C22305)
*Apr 23 08:55:23.695: Se7/0:3 LCP:    MagicNumber 0x050E44FB (0x0506050E44FB)
*Apr 23 08:55:23.695: Se7/0:3 LCP: O CONFREJ [Listen] id 180 len 8
*Apr 23 08:55:23.695: Se7/0:3 LCP:    MRRU 1524 (0x110405F4)
*Apr 23 08:55:23.727: Se7/0:3 LCP: I CONFACK [REQsent] id 1 len 15
*Apr 23 08:55:23.727: Se7/0:3 LCP:    AuthProto CHAP (0x0305C22305)
*Apr 23 08:55:23.727: Se7/0:3 LCP:    MagicNumber 0x050E44FB (0x0506050E44FB)
*Apr 23 08:55:23.751: Se7/0:3 LCP: I CONFREQ [ACKrcvd] id 181 len 27
*Apr 23 08:55:23.751: Se7/0:3 LCP:    MagicNumber 0x9028FFED (0x05069028FFED)
*Apr 23 08:55:23.751: Se7/0:3 LCP:    EndpointDisc 1 user@cisco.com
*Apr 23 08:55:23.751: Se7/0:3 LCP:     (0x131101757365724063697363F2E636F)
*Apr 23 08:55:23.751: Se7/0:3 LCP:     (0x6D)
*Apr 23 08:55:23.751: Se7/0:3 LCP: O CONFACK [ACKrcvd] id 181 len 27
*Apr 23 08:55:23.751: Se7/0:3 LCP:    MagicNumber 0x9028FFED (0x05069028FFED)
*Apr 23 08:55:23.751: Se7/0:3 LCP:    EndpointDisc 1 user@cisco.com
*Apr 23 08:55:23.751: Se7/0:3 LCP:     (0x131101757365724063697363F2E636F)
*Apr 23 08:55:23.751: Se7/0:3 LCP:     (0x6D)
*Apr 23 08:55:23.751: Se7/0:3 LCP: State is Open
*Apr 23 08:55:23.751: Se7/0:3 PPP: Phase is AUTHENTICATING, by this end
*Apr 23 08:55:23.751: Se7/0:3 CHAP: O CHALLENGE id 1 len 24 from "LAC"
*Apr 23 08:55:23.803: Se7/0:3 CHAP: I RESPONSE id 1 len 35 from "user@cisco.com"
*Apr 23 08:55:23.803: Se7/0:3 PPP: Phase is FORWARDING, Attempting Forward
```

```
*Apr 23 08:55:23.807:  Tnl/Sn 18693/19 L2TP: Session FS enabled
*Apr 23 08:55:23.807:  Tnl/Sn 18693/19 L2TP: Session state change
from idle to wait-for-tunnel
*Apr 23 08:55:23.807: Se7/0:3 Tnl/Sn 18693/19 L2TP: Create session
*Apr 23 08:55:23.807:  Tnl 18693 L2TP: SM State idle
*Apr 23 08:55:23.807:  Tnl 18693 L2TP: O SCCRQ
*Apr 23 08:55:23.807:  Tnl 18693 L2TP: Control channel retransmit delay
set to 1 seconds
*Apr 23 08:55:23.807:  Tnl 18693 L2TP: Tunnel state change from idle to
wait-ctl-reply
*Apr 23 08:55:23.807:  Tnl 18693 L2TP: SM State wait-ctl-reply
*Apr 23 08:55:23.815:  Tnl 18693 L2TP: I SCCRP from LNS1
*Apr 23 08:55:23.815:  Tnl 18693 L2TP: Got a challenge from remote peer, LNS1
*Apr 23 08:55:23.815:  Tnl 18693 L2TP: Got a response from remote peer, LNS1
*Apr 23 08:55:23.815:  Tnl 18693 L2TP: Tunnel Authentication success
*Apr 23 08:55:23.815:  Tnl 18693 L2TP: Tunnel state change from
wait-ctl-reply to established
*Apr 23 08:55:23.815:  Tnl 18693 L2TP: O SCCCN  to LNS1 tnlid 28416
*Apr 23 08:55:23.815:  Tnl 18693 L2TP: Control channel retransmit
delay set to 1 seconds
*Apr 23 08:55:23.815:  Tnl 18693 L2TP: SM State established
*Apr 23 08:55:23.815: Se7/0:3 Tnl/Sn 18693/19 L2TP: O ICRQ to LNS1 28416/0
*Apr 23 08:55:23.815: Se7/0:3 Tnl/Sn 18693/19 L2TP: Session state change
from wait-for-tunnel to wai
t-reply
*Apr 23 08:55:23.831: Se7/0:3 Tnl/Sn 18693/19 L2TP: O ICCN to LNS1 28416/21
*Apr 23 08:55:23.831:  Tnl 18693 L2TP: Control channel retransmit delay
set to 1 seconds
*Apr 23 08:55:23.831: Se7/0:3 Tnl/Sn 18693/19 L2TP: Session state change
from wait-reply to establis
hed
*Apr 23 08:55:23.831: Se7/0:3 Tnl/Sn 18693/19 L2TP: VPDN session up
*Apr 23 08:55:23.831: Se7/0:3 PPP: Phase is FORWARDED, Session Forwarded
*Apr 23 08:55:23.831: Se7/0:3 PPP: Process pending packets
LAC#
```

调试输出 — LNS1

LNS1的调试输出如下：

```
LNS1#
.Apr 23 08:57:08.900: L2TP: I SCCRQ from LAC tnl 18693
.Apr 23 08:57:08.900:  Tnl 28416 L2TP: Got a challenge in SCCRQ, LAC
.Apr 23 08:57:08.900:  Tnl 28416 L2TP: New tunnel created for remote LAC,
address 10.48.74.128
.Apr 23 08:57:08.904:  Tnl 28416 L2TP: O SCCRP  to LAC tnlid 18693
.Apr 23 08:57:08.904:  Tnl 28416 L2TP: Control channel retransmit delay
set to 1 seconds
.Apr 23 08:57:08.904:  Tnl 28416 L2TP: Tunnel state change from idle to
wait-ctl-reply
.Apr 23 08:57:08.908:  Tnl 28416 L2TP: I SCCCN from LAC tnl 18693
.Apr 23 08:57:08.908:  Tnl 28416 L2TP: Got a Challenge Response in
SCCCN from LAC
.Apr 23 08:57:08.912:  Tnl 28416 L2TP: Tunnel Authentication success
.Apr 23 08:57:08.912:  Tnl 28416 L2TP: Tunnel state change from
wait-ctl-reply to established
.Apr 23 08:57:08.912:  Tnl 28416 L2TP: SM State established
.Apr 23 08:57:08.912:  Tnl 28416 L2TP: I ICRQ from LAC tnl 18693
.Apr 23 08:57:08.916:  Tnl/Sn 28416/21 L2TP: Session FS enabled
.Apr 23 08:57:08.916:  Tnl/Sn 28416/21 L2TP: Session state change
from idle to wait-connect
```

```
.Apr 23 08:57:08.916:  Tnl/Sn 28416/21 L2TP: New session created
.Apr 23 08:57:08.916:  Tnl/Sn 28416/21 L2TP: O ICRP to LAC 18693/19
.Apr 23 08:57:08.920:  Tnl 28416 L2TP: Control channel retransmit
delay set to 1 seconds
.Apr 23 08:57:08.924:  Tnl/Sn 28416/21 L2TP:
I ICCN from LAC tnl 18693, cl 19
.Apr 23 08:57:08.924: user@cisco.com Tnl/Sn 28416/21 L2TP:
Session state change from wait-connect to wait-for-service-selection
.Apr 23 08:57:08.932: ppp13 PPP: Phase is ESTABLISHING
.Apr 23 08:57:08.932: ppp13 LCP: I FORCED rcvd CONFACK len 11
.Apr 23 08:57:08.932: ppp13 LCP:    AuthProto CHAP (0x0305C22305)
.Apr 23 08:57:08.936: ppp13 LCP:    MagicNumber 0x050E44FB (0x0506050E44FB)
.Apr 23 08:57:08.936: ppp13 LCP: I FORCED sent CONFACK len 23
.Apr 23 08:57:08.936: ppp13 LCP:    MagicNumber 0x9028FFED (0x05069028FFED)
.Apr 23 08:57:08.936: ppp13 LCP:    EndpointDisc 1 user@cisco.com
.Apr 23 08:57:08.936: ppp13 LCP:     (0x131101757365724063697363 6F2E636F)
.Apr 23 08:57:08.936: ppp13 LCP:     (0x6D)
.Apr 23 08:57:08.940: ppp13 PPP: Phase is FORWARDING, Attempting Forward
.Apr 23 08:57:08.948:  Tnl/Sn 30255/22 L2TP: Session FS enabled
.Apr 23 08:57:08.952:  Tnl/Sn 30255/22 L2TP: Session state change
from idle to wait-for-tunnel
.Apr 23 08:57:08.952: uid:13 Tnl/Sn 30255/22 L2TP: Create session
.Apr 23 08:57:08.952:  Tnl 30255 L2TP: SM State idle
.Apr 23 08:57:08.952:  Tnl 30255 L2TP: O SCCRQ
.Apr 23 08:57:08.956:  Tnl 30255 L2TP: Control channel retransmit
delay set to 1 seconds
.Apr 23 08:57:08.956:  Tnl 30255 L2TP: Tunnel state change from
idle to wait-ctl-reply
.Apr 23 08:57:08.956:  Tnl 30255 L2TP: SM State wait-ctl-reply
.Apr 23 08:57:08.960:  Tnl 30255 L2TP: I SCCRP from LNS2
.Apr 23 08:57:08.960:  Tnl 30255 L2TP: Got a challenge from remote peer, LNS2
.Apr 23 08:57:08.964:  Tnl 30255 L2TP: Got a response from remote peer, LNS2
.Apr 23 08:57:08.964:  Tnl 30255 L2TP: Tunnel Authentication success
.Apr 23 08:57:08.964:  Tnl 30255 L2TP: Tunnel state change from
wait-ctl-reply to established
.Apr 23 08:57:08.964:  Tnl 30255 L2TP: O SCCCN  to LNS2 tnlid 35837
.Apr 23 08:57:08.968:  Tnl 30255 L2TP: Control channel retransmit
delay set to 1 seconds
.Apr 23 08:57:08.968:  Tnl 30255 L2TP: SM State established
.Apr 23 08:57:08.968: uid:13 Tnl/Sn 30255/22 L2TP: O ICRQ to LNS2 35837/0
.Apr 23 08:57:08.968: uid:13 Tnl/Sn 30255/22 L2TP: Session state
change from wait-for-tunnel to wait-reply
.Apr 23 08:57:08.972: uid:13 Tnl/Sn 30255/22 L2TP: O ICCN to LNS2 35837/9
.Apr 23 08:57:08.976:  Tnl 30255 L2TP: Control channel retransmit
delay set to 1 seconds
.Apr 23 08:57:08.976: uid:13 Tnl/Sn 30255/22 L2TP: Session state
change from wait-reply to established
.Apr 23 08:57:08.976: uid:13 Tnl/Sn 30255/22 L2TP: VPDN session up
.Apr 23 08:57:08.980: ppp13 PPP: Phase is FORWARDED, Session Forwarded
.Apr 23 08:57:08.984: user@cisco.com Tnl/Sn 28416/21 L2TP:
Session state change from wait-for-service-selection to established
.Apr 23 08:57:08.984: user@cisco.com Tnl/Sn 28416/21 L2TP: VPDN session up
.Apr 23 08:57:08.984: ppp13 PPP: Process pending ncp packets
LNS1#
```

调试输出 — LNS2

LNS2的调试输出如下：

```
LNS2#
*Apr 23 08:57:59.615: L2TP: I SCCRQ from LNS1 tnl 30255
```

```
*Apr 23 08:57:59.615:  Tnl 35837 L2TP: Got a challenge in SCCRQ, LNS1
*Apr 23 08:57:59.615:  Tnl 35837 L2TP: New tunnel created for remote LNS1,
address 10.11
.0.1
*Apr 23 08:57:59.615:  Tnl 35837 L2TP: O SCCRP  to LNS1 tnlid 30255
*Apr 23 08:57:59.615:  Tnl 35837 L2TP: Control channel retransmit delay
set to 1 seconds
*Apr 23 08:57:59.615:  Tnl 35837 L2TP: Tunnel state change from idle to
wait-ctl-reply
*Apr 23 08:57:59.623:  Tnl 35837 L2TP: I SCCCN from LNS1 tnl 30255
*Apr 23 08:57:59.623:  Tnl 35837 L2TP: Got a Challenge Response in
SCCCN from LNS1
*Apr 23 08:57:59.623:  Tnl 35837 L2TP: Tunnel Authentication success
*Apr 23 08:57:59.623:  Tnl 35837 L2TP: Tunnel state change from
wait-ctl-reply to establ
ished
*Apr 23 08:57:59.623:  Tnl 35837 L2TP: SM State established
*Apr 23 08:57:59.627:  Tnl 35837 L2TP: I ICRQ from LNS1 tnl 30255
*Apr 23 08:57:59.627:  Tnl/Sn 35837/9 L2TP: Session FS enabled
*Apr 23 08:57:59.627:  Tnl/Sn 35837/9 L2TP: Session state change
from idle to wait-conne
ct
*Apr 23 08:57:59.627:  Tnl/Sn 35837/9 L2TP: New session created
*Apr 23 08:57:59.627:  Tnl/Sn 35837/9 L2TP: O ICRP to LNS1 30255/22
*Apr 23 08:57:59.627:  Tnl 35837 L2TP: Control channel retransmit
delay set to 1 seconds
*Apr 23 08:57:59.635:  Tnl/Sn 35837/9 L2TP: I ICCN from LNS1 tnl 30255, cl 22
*Apr 23 08:57:59.635: user@cisco.com Tnl/Sn 35837/9 L2TP: Session state
change from wait - connect to wait-for-service-selection
*Apr 23 08:57:59.635: ppp8 PPP: Phase is ESTABLISHING
*Apr 23 08:57:59.635: ppp8 LCP: I FORCED rcvd CONFACK len 11
*Apr 23 08:57:59.635: ppp8 LCP:    AuthProto CHAP (0x0305C22305)
*Apr 23 08:57:59.635: ppp8 LCP:    MagicNumber 0x050E44FB (0x0506050E44FB)
*Apr 23 08:57:59.635: ppp8 LCP: I FORCED sent CONFACK len 23
*Apr 23 08:57:59.635: ppp8 LCP:    MagicNumber 0x9028FFED (0x05069028FFED)
*Apr 23 08:57:59.635: ppp8 LCP:    EndpointDisc 1 user@cisco.com
*Apr 23 08:57:59.635: ppp8 LCP:     (0x131101757365724063697363 6F2E636F)
*Apr 23 08:57:59.635: ppp8 LCP:     (0x6D)
*Apr 23 08:57:59.635: ppp8 PPP: Phase is FORWARDING, Attempting Forward
*Apr 23 08:57:59.639: ppp8 PPP: Phase is AUTHENTICATING, Unauthenticated User
*Apr 23 08:57:59.639: ppp8 PPP: Phase is FORWARDING, Attempting Forward
*Apr 23 08:57:59.639: VT[Vi2]:Sending vaccess request, id 0x73000015
*Apr 23 08:57:59.639: VT:Processing vaccess requests, 1 outstanding
*Apr 23 08:57:59.639: VT:Create and clone subif, base Vi2 Vt1
*Apr 23 08:57:59.639: VT[Vi2.1]:Reuse subinterface, recycle queue size 1
*Apr 23 08:57:59.639: VT[Vi2.1]:Recycled subinterface becomes Vi2.1
*Apr 23 08:57:59.639: VT[Vi2.1]:Cloning a recycled vaccess
*Apr 23 08:57:59.639: VT[Vi2.1]:Processing vaccess response,
id 0x73000015, result success (1)
*Apr 23 08:57:59.643: Vi2.1 Tnl/Sn 35837/9 L2TP:
Virtual interface created for user@cisco.com, bandwidth 64 Kbps
*Apr 23 08:57:59.643: Vi2.1 Tnl/Sn 35837/9 L2TP: VPDN session up
*Apr 23 08:57:59.643: Vi2.1 Tnl/Sn 35837/9 L2TP:
Session state change from wait-for-service-selection to established
*Apr 23 08:57:59.643: Vi2.1 PPP: Phase is AUTHENTICATING, Authenticated User
*Apr 23 08:57:59.643: Vi2.1 CHAP: O SUCCESS id 1 len 4
*Apr 23 08:57:59.643: Vi2.1 PPP: Phase is UP
*Apr 23 08:57:59.643: Vi2.1 PPP: Process pending ncp packets
*Apr 23 08:57:59.643: Vi2.1 IPCP: O CONFREQ [Closed] id 1 len 10
*Apr 23 08:57:59.643: Vi2.1 IPCP:    Address 192.168.1.1 (0x0306C0A80101)
*Apr 23 08:57:59.667: Vi2.1 IPCP: I CONFREQ [REQsent] id 125 len 10
*Apr 23 08:57:59.667: Vi2.1 IPCP:    Address 0.0.0.0 (0x030600000000)
*Apr 23 08:57:59.667: Vi2.1 AAA/AUTHOR/IPCP: Start.  Her address 0.0.0.0,
we want 0.0.0.0
```

```
*Apr 23 08:57:59.667: Vi2.1 AAA/AUTHOR/IPCP: Done.  Her address 0.0.0.0,
we want 0.0.0.0
*Apr 23 08:57:59.667: Vi2.1: Pools to search : VpdnUsers
*Apr 23 08:57:59.667: Vi2.1: Pool VpdnUsers returned address = 192.168.1.2
*Apr 23 08:57:59.667: Vi2.1 IPCP: Pool returned 192.168.1.2
*Apr 23 08:57:59.667: Vi2.1 IPCP: O CONFNAK [REQsent] id 125 len 10
*Apr 23 08:57:59.667: Vi2.1 IPCP:    Address 192.168.1.2 (0x0306C0A80102)
*Apr 23 08:57:59.683: Vi2.1 IPCP: I CONFACK [REQsent] id 1 len 10
*Apr 23 08:57:59.683: Vi2.1 IPCP:    Address 192.168.1.1 (0x0306C0A80101)
*Apr 23 08:57:59.699: Vi2.1 IPCP: I CONFREQ [ACKrcvd] id 126 len 10
*Apr 23 08:57:59.699: Vi2.1 IPCP:    Address 192.168.1.2 (0x0306C0A80102)
*Apr 23 08:57:59.699: Vi2.1 IPCP: O CONFACK [ACKrcvd] id 126 len 10
*Apr 23 08:57:59.699: Vi2.1 IPCP:    Address 192.168.1.2 (0x0306C0A80102)
*Apr 23 08:57:59.699: Vi2.1 IPCP: State is Open
*Apr 23 08:57:59.703: Vi2.1 IPCP: Install route to 192.168.1.2
*Apr 23 08:57:59.703: Vi2.1 IPCP: Add link info for cef entry 192.168.1.2
LNS2#
```

相关信息

- 第二层隧道协议
- 多跳VPDN
- 访问拨号技术支持页
- 技术支持 - Cisco Systems