

L2TP通道設定和拆卸

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簡介

本檔案將討論第二層通道通訊協定(L2TP)通道建立與卸除。本文檔還概述了PPP和L2TP。

[必要條件](#)

[需求](#)

本文件沒有特定需求。

[採用元件](#)

本檔案中的資訊是根據Cisco IOS®軟體版本12.0(1)T及更新版本。

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除 (預設) 的組態來啟動。如果您的網路正在作用，請確保您已瞭解任何指令可能造成的影響。

[慣例](#)

如需文件慣例的詳細資訊，請參閱[思科技術提示慣例](#)。

PPP

PPP是一種對稱對等通訊協定，透過點對點連結傳輸L2和L3流量。有三個主要元件：

- 封裝
- 連結控制通訊協定(LCP)
- 網路控制通訊協定(NCP)

資料包以PPP封裝。LCP允許協商配置選項以允許建立鏈路。為鏈路上運行的每個L3協定協商NCP。

在PPP會話期間，鏈路將經歷四個不同的階段：

- 鏈路建立 — 作為鏈路建立階段的一部分，PPP使用LCP功能，該功能必須在鏈路進入身份驗證階段（如果適用）並協商網路層的開啟之前完成並宣告為開啟。LCP還用於終止PPP鏈路。
- 身份驗證 — 身份驗證階段特定於實施，不是從LCP遷移到NCP的強制要求。如果在LCP階段協商並達成一致，則遠端對等體必須在PPP移動到網路層之前標識自身並通過商定的身份驗證方法。
- 網路層 — NCP協商確保兩個對等體都同意L3協定的特徵。若是IP，控制通訊協定稱為IP控制通訊協定(IPCP)。除了對等體之間的協商之外，還有一個分配元素。這常見於Microsoft Windows型別的遠端訪問客戶端，這些客戶端沒有分配的IP地址，並且依靠服務提供商在連線時分配IP地址。
- 鏈路終止 — 可以在呼叫生命週期的任何時間進入鏈路終止階段。LCP用於傳送終止請求。

L2TP

L2TP擴展了PPP的點對點性質。L2TP提供用於傳輸經隧道傳輸的PPP幀的封裝方法，允許通過分組交換網路傳輸PPP終端。L2TP最常部署在遠端訪問型別場景中，這些場景使用Internet提供Intranet型別的服務。其概念為虛擬私人網路(VPN)。

L2TP的兩個主要物理元素是L2TP訪問集中器(LAC)和L2TP網路伺服器(LNS)：

- LAC - LAC是作為隧道端點一側的LNS的對等裝置。LAC終止遠端PPP連線並位於遠端和LNS之間。資料包通過PPP連線轉發到遠端連線或從遠端連線轉發。通過L2TP隧道轉發來往於LNS的資料包。
- LNS - LNS是作為隧道端點一側的LAC的對等裝置。LNS是LAC PPP隧道會話的終止點。這用於匯聚多個LAC隧道化PPP會話和進入專用網路。

L2TP使用兩種不同的消息型別：

- 控制消息 — L2TP通過單獨的控制通道和資料通道傳送控制消息和資料消息。帶內控制通道傳遞順序控制連線管理、呼叫管理、錯誤報告和會話控制消息。控制連線的啟動並不特定於LAC或LNS，而是特定於與控制連線建立相關的隧道發起方和接收方。在隧道端點之間使用共用金鑰質詢身份驗證方法。
- 資料消息 — 資料消息用於封裝傳送到L2TP隧道的PPP幀。

L2TP使用註冊的使用者資料包協定(UDP)埠1701，整個L2TP資料包將封裝在UDP資料包中。根據正常的UDP操作，隧道發起方選擇一個可用的UDP埠，並將埠號1701傳送到UDP目標。在應答中，目標埠號與傳入UDP報頭中使用的源埠號相同。來源連線埠是根據找到的任何自由連線埠設定的。建立來源連線埠和目的地連線埠後，連線埠必須在通道期間保持相同。在Cisco IOS軟體中，源埠號和目的埠號始終設定為UDP埠號1701。

注意：第2層轉發(L2F)協定和L2TP共用相同的UDP埠號。標頭中的Version欄位使您能夠區分兩種協定。值1表示L2F，值2表示L2TP。

PPP和L2TP流量摘要

必須先建立控制連線和會話，然後才能通過隧道轉發PPP幀。

成功建立控制通道後，將為每個PPP連線建立會話。會話建立是定向的，與LAC和LNS相關。對於來電，LAC請求LNS接受會話。對於傳出呼叫，LNS要求LAC接受會話。

[本文檔的PPP/L2TP連線順序](#)部分詳細介紹了遠端訪問使用者向LAC發出呼叫時PPP和L2TP呼叫的設定。此範例使用撥出號碼識別服務(DNIS)來啟動L2TP通道，不過您也可以將網域名稱用於此目的。此順序顯示了從SOHO 2500路由器開始PPP會話、遠端訪問使用者和LAC之間的LCP協商以及部分身份驗證。然後LAC繼續建立L2TP隧道和隧道內的會話。為LAC和LNS之間的每個PPP連線建立會話。L2TP在所有傳出消息中使用對等隧道和會話識別符號，以便對PPP連線進行多路複用和解多路複用。在相應的控制連線和會話建立階段期間分配和交換這些識別符號。通道和作業階段ID僅具有本機意義。通道端點具有同一通道和作業階段的不同識別碼。

注意：值0具有唯一意義，僅在尚未分配隧道和會話識別符號時使用。

建立隧道後，PPP身份驗證過程在遠端訪問使用者和LNS之間完成。LAC繼續接收PPP幀。鏈路成幀和循環冗餘檢查(CRC)被移除，封裝到L2TP中，然後轉發到隧道中到LNS。在該示例中，接收並處理L2TP資料包，就好像它在本地PPP介面上終止一樣。進行PPP NCP協商，然後將IPCP宣告為開啟。連線完成。

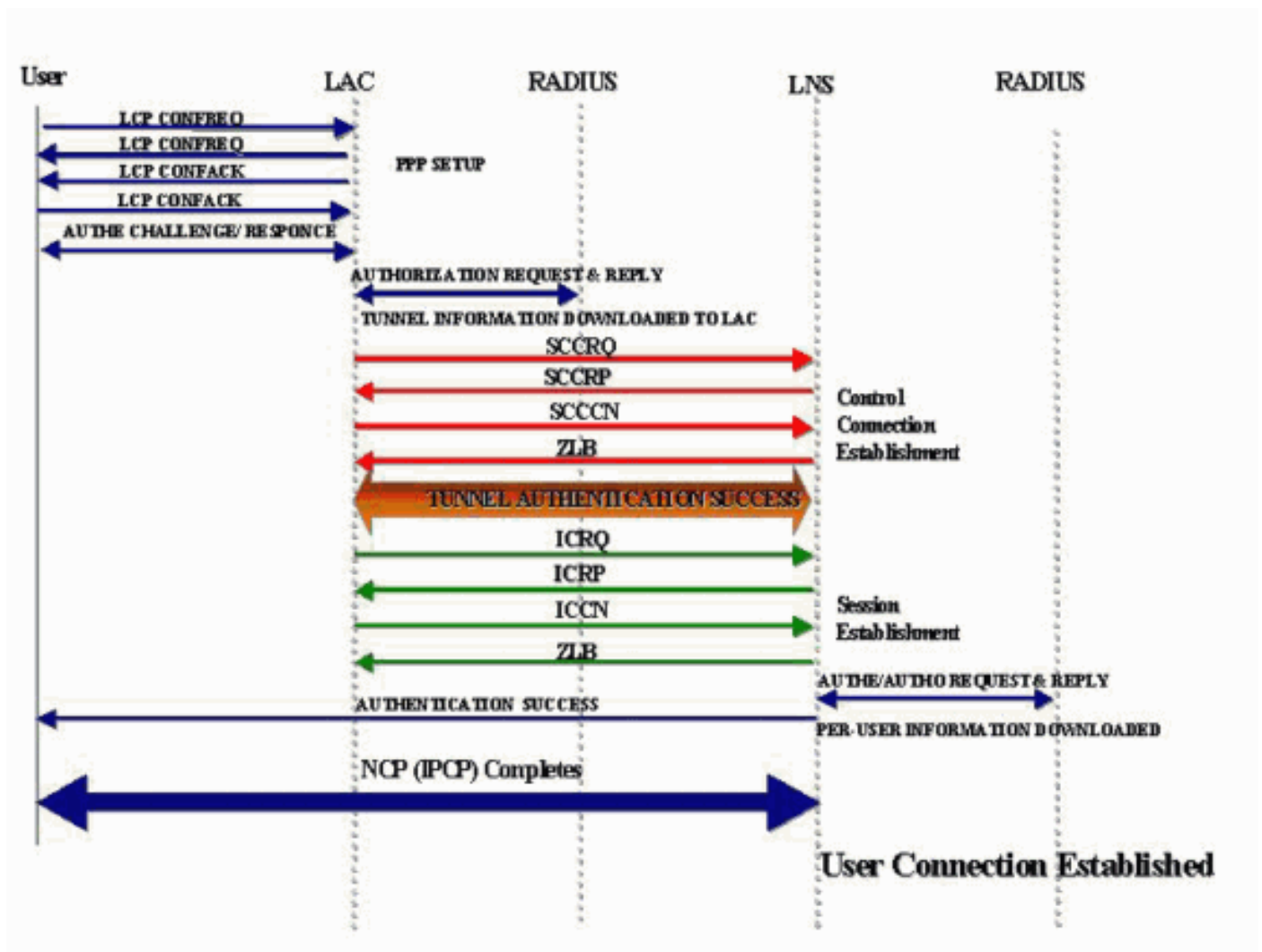
PPP/L2TP連線序列

以下是事件的連線順序：

1. 遠端使用者發起PPP連線。LAC接受連線。建立PPP鏈路。
2. LCP在遠端使用者和LAC之間進行協商。LAC發出質詢握手身份驗證協定(CHAP)質詢，以便執行遠端使用者的部分身份驗證。在會話建立期間將回覆傳送到LNS。在傳入呼叫連線(ICCN)中，回覆作為屬性值對(AVP)33代理身份驗證響應傳送。
3. DNIS用於判斷使用者是否為虛擬私人撥號網路(VPDN)使用者端。
4. 由於撥叫號碼(614629)沒有現有隧道，因此必須建立新的隧道。將查詢RADIUS並將通道資訊下載到LAC。
5. 控制連線已啟動。通道處於IDLE狀態：通道啟動器（在本例中為LAC）向LNS傳送啟動控制連線請求(SCCRQ)。SCCRQ包含一個AVP 11質詢，表明LAC希望使用CHAP樣式的身份驗證對隧道進行身份驗證。兩個通道端點知道相同的密碼。通道現在處於WAIT-CTL-REPLY狀態。LNS可以啟動隧道，因此LNS使用Start-Control-Connection-Reply(SCCRP)進行回覆。SCCRP包含AVP 11挑戰和AVP 13挑戰響應，以響應SCCRQ。通道現在處於WAIT-CTL-REPLY狀態。LAC使用Start-Control-Connection-Connected(SCCN)消息做出響應。SCCN包含回應SCCRP的AVP 13。隧道現在處於「已建立」狀態。LNS向LAC傳送零長度正文(ZLB)消息。ZLB訊息是一種序列化確認。隧道現在處於「已建立」狀態。
6. 通道驗證現在已完成，通道已建立。會話現在處於IDLE狀態。
7. 現在通道存在，就會在通道內執行建立作業階段的三向交換：LAC傳送包含會話引數資訊的傳入呼叫請求(ICRQ)。會話現在處於「等待回覆」狀態。LNS傳送包含會話ID的來話呼叫應答(ICRP)。會話現在處於等待連線狀態。LAC傳送ICCN並向LNS提供已應答呼叫的附加資訊。此資訊包括來自LAC和遠端使用者執行的協商的LCP資訊。會話現在處於「已建立」狀態。

- LNS向LAC傳送一個ZLB消息，該消息是一個順序確認。會話現在處於「已建立」狀態。
8. 建立會話後，將在LNS上建立虛擬訪問介面。在ICCN中傳送的LCP配置資訊被強制到虛擬訪問介面PPP堆疊上。此資訊包括部分身份驗證資訊。
 9. LNS生成身份驗證質詢。在ICCN中傳送的代理認證響應AVP33被重新播放。
 10. 執行正常的身份驗證、授權和記帳(AAA)或PPP身份驗證和授權。
 11. 針對每個使用者的身份驗證和授權傳送RADIUS訪問請求。
 12. 收到RADIUS Access-Accept。**注意**：已將RADIUS配置為允許遠端使用者在傳入IPCP Configure-Request中提供的IP地址。
 13. 將向遠端使用者傳送CHAP成功消息。
 14. PPP IPCP協商完成並宣告為OPEN。主機路由將安裝到遠端介面。遠端使用者現已連線，流量可以開始傳輸。

PPP和L2TP連線呼叫流



從顯示PPP和L2TP呼叫建立的LAC進行的調試

```

Jan 1 00:04:10.235: %LINK-3-UPDOWN: Interface Serial0:0,
changed state to up
Jan 1 00:04:10.455: Se0:0 PPP: Treating connection as a callin
Jan 1 00:04:10.455: Se0:0 PPP: Phase is ESTABLISHING,
Passive Open [0 sess, 0 load]
Jan 1 00:04:10.455: Se0:0 CHAP: Using alternate hostname 5300-1

```

```

Jan 1 00:04:10.455: Se0:0 LCP: State is Listen
Jan 1 00:04:10.455: Se0:0 LCP: I CONFREQ [Listen] id 118 len 10
Jan 1 00:04:10.455: Se0:0 LCP: MagicNumber 0x6EE4E865 (0x05066EE4E865)
Jan 1 00:04:10.455: Se0:0 CHAP: Using alternate hostname 5300-1
Jan 1 00:04:10.455: Se0:0 LCP: O CONFREQ [Listen] id 11 len 28
Jan 1 00:04:10.455: Se0:0 LCP: AuthProto CHAP (0x0305C22305)
Jan 1 00:04:10.455: Se0:0 LCP: MagicNumber 0x109D08F2 (0x0506109D08F2)
Jan 1 00:04:10.455: Se0:0 LCP: MRRU 1524 (0x110405F4)
Jan 1 00:04:10.455: Se0:0 LCP: EndpointDisc 1 Local (0x130901353330302D31)
Jan 1 00:04:10.455: Se0:0 LCP: O CONFACK [Listen] id 118 len 10
Jan 1 00:04:10.455: Se0:0 LCP: MagicNumber 0x6EE4E865 (0x05066EE4E865)
Jan 1 00:04:10.495: Se0:0 LCP: I CONFREQ [ACKsent] id 11 len 17
Jan 1 00:04:10.495: Se0:0 LCP: MRRU 1524 (0x110405F4)
Jan 1 00:04:10.495: Se0:0 LCP: EndpointDisc 1 Local (0x130901353330302D31)
Jan 1 00:04:10.495: Se0:0 LCP: O CONFREQ [ACKsent] id 12 len 15
Jan 1 00:04:10.495: Se0:0 LCP: AuthProto CHAP (0x0305C22305)
Jan 1 00:04:10.495: Se0:0 LCP: MagicNumber 0x109D08F2 (0x0506109D08F2)
Jan 1 00:04:10.527: Se0:0 LCP: I CONFACK [ACKsent] id 12 len 15
Jan 1 00:04:10.527: Se0:0 LCP: AuthProto CHAP (0x0305C22305)
Jan 1 00:04:10.527: Se0:0 LCP: MagicNumber 0x109D08F2 (0x0506109D08F2)
Jan 1 00:04:10.527: Se0:0 LCP: State is Open
Jan 1 00:04:10.527: Se0:0 PPP: Phase is AUTHENTICATING,
by this end [0 sess, 0 load]
Jan 1 00:04:10.527: Se0:0 CHAP: Using alternate hostname 5300-1
Jan 1 00:04:10.527: Se0:0 CHAP: O CHALLENGE id 6 len 27 from "5300-1"
Jan 1 00:04:10.555: Se0:0 CHAP: I RESPONSE id 6 len 27 from "2500-1"
Jan 1 00:04:10.555: Se0:0 PPP: Phase is FORWARDING [0 sess, 0 load]
Jan 1 00:04:10.555: Se0:0 VPDN: Got DNIS string 614629
Jan 1 00:04:10.555: Se0:0 VPDN: Looking for tunnel -- dnis:614629 --
Jan 1 00:04:10.555: Serial0:0 AAA/AUTHOR/VPDN (1692520761): Port='Serial0:0'
list='default' service=NET
Jan 1 00:04:10.555: AAA/AUTHOR/VPDN: Serial0:0 (1692520761) user='dnis:614629'
Jan 1 00:04:10.555: Serial0:0 AAA/AUTHOR/VPDN (1692520761): send AV service=ppp
Jan 1 00:04:10.555: Serial0:0 AAA/AUTHOR/VPDN (1692520761): send AV protocol=vpdn
Jan 1 00:04:10.555: Serial0:0 AAA/AUTHOR/VPDN (1692520761): found list "default"
Jan 1 00:04:10.555: Serial0:0 AAA/AUTHOR/VPDN (1692520761): Method=NSA_LAB (radius)
Jan 1 00:04:10.559: RADIUS: Initial Transmit Serial0:0 id 18 10.51.6.3:1645,
Access-Request, len 112
Jan 1 00:04:10.559: Attribute 4 6 0A330644
Jan 1 00:04:10.559: Attribute 5 6 00000000
Jan 1 00:04:10.559: Attribute 26 17 00000009020B5365
Jan 1 00:04:10.559: Attribute 61 6 00000002
Jan 1 00:04:10.559: Attribute 1 13 646E6973
Jan 1 00:04:10.559: Attribute 30 8 36313436
Jan 1 00:04:10.559: Attribute 31 12 32303835
Jan 1 00:04:10.559: Attribute 2 18 D0A81832
Jan 1 00:04:10.559: Attribute 6 6 00000005
Jan 1 00:04:10.559: RADIUS: Received from id 18 10.51.6.3:1645,
Access-Accept, len 156
Jan 1 00:04:10.559: Attribute 6 6 00000005
Jan 1 00:04:10.559: Attribute 26 29 0000000901177670
Jan 1 00:04:10.559: Attribute 26 26 0000000901147670
Jan 1 00:04:10.559: Attribute 26 36 00000009011E7670
Jan 1 00:04:10.559: Attribute 26 39 0000000901217670
Jan 1 00:04:10.563: RADIUS: saved authorization data
for user 626A0C10 at 62258960
Jan 1 00:04:10.563: RADIUS: cisco AVPair "vpdn:tunnel-type=l2tp"
Jan 1 00:04:10.563: RADIUS: cisco AVPair "vpdn:tunnel-id=hgw"
Jan 1 00:04:10.563: RADIUS: cisco AVPair "vpdn:ip-addresses=10.51.6.82"
Jan 1 00:04:10.563: RADIUS: cisco AVPair "vpdn:l2tp-tunnel-password=hello"
Jan 1 00:04:10.563: AAA/AUTHOR (1692520761):
Post authorization status = PASS_ADD
Jan 1 00:04:10.563: AAA/AUTHOR/VPDN: Processing AV service=ppp
Jan 1 00:04:10.563: AAA/AUTHOR/VPDN: Processing AV protocol=vpdn

```

```

Jan 1 00:04:10.563: AAA/AUTHOR/VPDN: Processing AV tunnel-type=l2tp
Jan 1 00:04:10.563: AAA/AUTHOR/VPDN: Processing AV tunnel-id=hgw
Jan 1 00:04:10.563: AAA/AUTHOR/VPDN: Processing AV ip-addresses=10.51.6.82
Jan 1 00:04:10.563: AAA/AUTHOR/VPDN: Processing AV l2tp-tunnel-password=hello
Jan 1 00:04:10.563: Se0:0 VPDN/RPMS/: Got tunnel info for dnis:614629
Jan 1 00:04:10.563: Se0:0 VPDN/RPMS/: LAC hgw
Jan 1 00:04:10.563: Se0:0 VPDN/RPMS/: l2tp-busy-disconnect yes
Jan 1 00:04:10.563: Se0:0 VPDN/RPMS/: l2tp-tunnel-password xxxxxx
Jan 1 00:04:10.563: Se0:0 VPDN/RPMS/: IP 10.51.6.82
Jan 1 00:04:10.563: Se0:0 VPDN/: curlvl 1 Address 0: 10.51.6.82,
priority 1
Jan 1 00:04:10.563: Se0:0 VPDN/: Select non-active address 10.51.6.82,
priority 1
Jan 1 00:04:10.567: Tnl 17688 L2TP: SM State idle
Jan 1 00:04:10.567: Tnl 17688 L2TP: O SCCRP
Jan 1 00:04:10.567: Tnl 17688 L2TP: O SCCRP, flg TLS, ver 2,
len 128, tnl 0, cl 0, ns 0, nr 0
      C8 02 00 80 00 00 00 00 00 00 00 00 80 08 00 00
      00 00 00 01 80 08 00 00 00 02 01 00 80 0A 00 00
      00 03 00 00 00 03 80 0A 00 00 00 04 00 00 00 ...
Jan 1 00:04:10.567: Tnl 17688 L2TP: Tunnel state change from idle
to wait-ctl-reply
Jan 1 00:04:10.567: Tnl 17688 L2TP: SM State wait-ctl-reply
Jan 1 00:04:10.567: Se0:0 VPDN: Find LNS process created
Jan 1 00:04:10.567: Se0:0 VPDN: Forward to address 10.51.6.82
Jan 1 00:04:10.567: Se0:0 VPDN: Pending
Jan 1 00:04:10.567: Se0:0 VPDN: Process created
Jan 1 00:04:10.655: Tnl 17688 L2TP: Parse AVP 0, len 8, flag 0x8000 (M)
Jan 1 00:04:10.655: Tnl 17688 L2TP: Parse SCCRP
Jan 1 00:04:10.655: Tnl 17688 L2TP: Parse AVP 2, len 8, flag 0x8000 (M)
Jan 1 00:04:10.655: Tnl 17688 L2TP: Protocol Ver 256
Jan 1 00:04:10.655: Tnl 17688 L2TP: Parse AVP 3, len 10, flag 0x8000 (M)
Jan 1 00:04:10.655: Tnl 17688 L2TP: Framing Cap 0x3
Jan 1 00:04:10.655: Tnl 17688 L2TP: Parse AVP 4, len 10, flag 0x8000 (M)
Jan 1 00:04:10.655: Tnl 17688 L2TP: Bearer Cap 0x3
Jan 1 00:04:10.659: Tnl 17688 L2TP: Parse AVP 6, len 8, flag 0x0
Jan 1 00:04:10.659: Tnl 17688 L2TP: Firmware Ver 0x1120
Jan 1 00:04:10.659: Tnl 17688 L2TP: Parse AVP 7, len 13, flag 0x8000 (M)
Jan 1 00:04:10.659: Tnl 17688 L2TP: Hostname l2tp-gw
Jan 1 00:04:10.659: Tnl 17688 L2TP: Parse AVP 8, len 25, flag 0x0
Jan 1 00:04:10.659: Tnl 17688 L2TP: Vendor Name Cisco Systems, Inc.
Jan 1 00:04:10.659: Tnl 17688 L2TP: Parse AVP 9, len 8, flag 0x8000 (M)
Jan 1 00:04:10.659: Tnl 17688 L2TP: Assigned Tunnel ID 55270
Jan 1 00:04:10.659: Tnl 17688 L2TP: Parse AVP 10, len 8, flag 0x8000 (M)
Jan 1 00:04:10.659: Tnl 17688 L2TP: Rx Window Size 300
Jan 1 00:04:10.659: Tnl 17688 L2TP: Parse AVP 11, len 22, flag 0x8000 (M)
Jan 1 00:04:10.659: Tnl 17688 L2TP: Chlng 98B296C28429E7ADC767237A45F31040
Jan 1 00:04:10.659: Tnl 17688 L2TP: Parse AVP 13, len 22, flag 0x8000 (M)
Jan 1 00:04:10.659: Tnl 17688 L2TP: Chlng Resp 7C358F7A7BA21957C07801195DCADFA6
Jan 1 00:04:10.659: Tnl 17688 L2TP: No missing AVPs in SCCRP
Jan 1 00:04:10.659: Tnl 17688 L2TP: I SCCRP, flg TLS, ver 2,
len 154, tnl 17688, cl 0, ns 0, nr 1
      C8 02 00 9A 45 18 00 00 00 00 00 01 80 08 00 00
      00 00 00 02 80 08 00 00 00 02 01 00 80 0A 00 00
      00 03 00 00 00 03 80 0A 00 00 00 04 00 00 00 ...
Jan 1 00:04:10.659: Tnl 17688 L2TP: I SCCRP from l2tp-gw
Jan 1 00:04:10.659: Tnl 17688 L2TP: Got a challenge from remote peer,
l2tp-gw
Jan 1 00:04:10.659: Tnl 17688 L2TP: Got a response from remote peer, l2tp-gw
Jan 1 00:04:10.659: Tnl 17688 L2TP: Tunnel Authentication success
Jan 1 00:04:10.659: Tnl 17688 L2TP: Tunnel state change from wait-ctl-reply
to established
Jan 1 00:04:10.663: Tnl 17688 L2TP: O SCCCN to l2tp-gw tnlid 55270
Jan 1 00:04:10.663: Tnl 17688 L2TP: O SCCCN, flg TLS, ver 2, len 42,

```

```

tnl 55270, cl 0, ns 1, nr 1
    C8 02 00 2A D7 E6 00 00 01 00 01 80 08 00 00
    00 00 00 03 80 16 00 00 00 0D 96 39 53 18 41 AC
    22 E3 10 3E 20 8E F7 D9 09 89
Jan  1 00:04:10.663: Tnl 17688 L2TP: SM State established
Jan  1 00:04:10.663: Tnl/Cl 17688/7 L2TP: Session FS enabled
Jan  1 00:04:10.663: Tnl/Cl 17688/7 L2TP: Session state change from idle
to wait-for-tunnel
Jan  1 00:04:10.663: Se0:0 Tnl/Cl 17688/7 L2TP: Create session
Jan  1 00:04:10.663: Tnl 17688 L2TP: SM State established
Jan  1 00:04:10.663: Se0:0 Tnl/Cl 17688/7 L2TP: O ICRQ to l2tp-gw 55270/0
Jan  1 00:04:10.663: Se0:0 Tnl/Cl 17688/7 L2TP: O ICRQ, flg TLS,
ver 2, len 91, tnl 55270, cl 0, ns 2, nr 1
    C8 02 00 5B D7 E6 00 00 02 00 01 80 08 00 00
    00 00 00 0A 80 08 00 00 00 0E 00 07 80 0A 00 00
    00 0F D1 14 C7 C5 80 0A 00 00 00 12 00 00 00 ...
Jan  1 00:04:10.667: Se0:0 Tnl/Cl 17688/7 L2TP: Session state change from
wait-for-tunnel to wait-reply
Jan  1 00:04:10.703: Tnl 17688 L2TP: I ZLB ctrl ack, flg TLS, ver 2,
len 12, tnl 17688, cl 0, ns 1, nr 2
Jan  1 00:04:10.795: Se0:0 Tnl/Cl 17688/7 L2TP: Parse AVP 0, len 8,
flag 0x8000 (M)
Jan  1 00:04:10.795: Se0:0 Tnl/Cl 17688/7 L2TP: Parse ICRP
Jan  1 00:04:10.795: Se0:0 Tnl/Cl 17688/7 L2TP: Parse AVP 14, len 8,
flag 0x8000 (M)
Jan  1 00:04:10.795: Se0:0 Tnl/Cl 17688/7 L2TP: Assigned Call ID 45
Jan  1 00:04:10.795: Se0:0 Tnl/Cl 17688/7 L2TP: No missing AVPs in ICRP
Jan  1 00:04:10.795: Se0:0 Tnl/Cl 17688/7 L2TP: I ICRP, flg TLS,
ver 2, len 28, tnl 17688, cl 7, ns 1, nr 3
    C8 02 00 1C 45 18 00 07 00 01 00 03 80 08 00 00
    00 00 00 0B 80 08 00 00 00 0E 00 2D
Jan  1 00:04:10.795: Se0:0 Tnl/Cl 17688/7 L2TP: O ICCN to l2tp-gw 55270/45
Jan  1 00:04:10.795: Se0:0 Tnl/Cl 17688/7 L2TP: O ICCN, flg TLS, ver 2,
len 151, tnl 55270, cl 45, ns 3, nr 2
    C8 02 00 97 D7 E6 00 2D 00 03 00 02 80 08 00 00
    00 00 00 0C 80 0A 00 00 00 18 00 00 FA 00 00 0A
    00 00 00 26 00 00 FA 00 80 0A 00 00 00 13 00 ...
Jan  1 00:04:10.795: Se0:0 Tnl/Cl 17688/7 L2TP: Session state change
from wait-reply to established
Jan  1 00:04:10.899: Tnl 17688 L2TP: I ZLB ctrl ack, flg TLS, ver 2,
len 12, tnl 17688, cl 0, ns 2, nr 4
Jan  1 00:04:11.667: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0:0,
changed state to up
Jan  1 00:04:16.239: %ISDN-6-CONNECT: Interface Serial0:0 is now connected to
2085730592 2500-1

```

[從顯示PPP和L2TP呼叫建立的LNS中進行的調試](#)

```

Jan  1 00:04:10.916: L2X: Parse AVP 0, len 8, flag 0x0x8000 (M)
Jan  1 00:04:10.920: L2X: Parse SCCRQ
Jan  1 00:04:10.920: L2X: Parse AVP 2, len 8, flag 0x0x8000 (M)
Jan  1 00:04:10.924: L2X: Protocol Ver 256
Jan  1 00:04:10.924: L2X: Parse AVP 3, len 10, flag 0x0x8000 (M)
Jan  1 00:04:10.928: L2X: Framing Cap 0x0x3
Jan  1 00:04:10.928: L2X: Parse AVP 4, len 10, flag 0x0x8000 (M)
Jan  1 00:04:10.932: L2X: Bearer Cap 0x0x3
Jan  1 00:04:10.932: L2X: Parse AVP 6, len 8, flag 0x0x0
Jan  1 00:04:10.936: L2X: Firmware Ver 0x0x1130
Jan  1 00:04:10.936: L2X: Parse AVP 7, len 9, flag 0x0x8000 (M)
Jan  1 00:04:10.940: L2X: Hostname hgw
Jan  1 00:04:10.940: L2X: Parse AVP 8, len 25, flag 0x0x0
Jan  1 00:04:10.944: L2X: Vendor Name Cisco Systems, Inc.
Jan  1 00:04:10.948: L2X: Parse AVP 9, len 8, flag 0x0x8000 (M)

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Jan 1 00:04:10.952: L2X: Assigned Tunnel ID 17688
Jan 1 00:04:10.952: L2X: Parse AVP 10, len 8, flag 0x0x8000 (M)
Jan 1 00:04:10.956: L2X: Rx Window Size 800
Jan 1 00:04:10.956: L2X: Parse AVP 11, len 22, flag 0x0x8000 (M)
Jan 1 00:04:10.960: L2X: Chlng 545A2343FBE20EA08BCA7B56E4A7D29E
Jan 1 00:04:10.964: L2X: No missing AVPs in SCCRQ
Jan 1 00:04:10.968: L2X: I SCCRQ, flg TLS, ver 2, len 128,
tnl 0, cl 0, ns 0, nr 0 contiguous pak, size 128
C8 02 00 80 00 00 00 00 00 00 00 80 08 00 00
00 00 00 01 80 08 00 00 00 02 01 00 80 0A 00 00
00 03 00 00 00 03 80 0A 00 00 00 04 00 00 00 ...
Jan 1 00:04:10.975: L2TP: I SCCRQ from hgw tnl 17688
Jan 1 00:04:10.983: Tnl 55270 L2TP: Got a challenge in SCCRQ, hgw
Jan 1 00:04:10.983: Tnl 55270 L2TP: New tunnel created for remote hgw,
address 10.51.6.68
Jan 1 00:04:10.987: Tnl 55270 L2TP: O SCCRP to hgw tnlid 17688
Jan 1 00:04:10.991: Tnl 55270 L2TP: O SCCRP, flg TLS, ver 2,
len 154, tnl 17688, cl 0, ns 0, nr 1
Jan 1 00:04:10.999: contiguous buffer, size 154
C8 02 00 9A 45 18 00 00 00 00 01 80 08 00 00
00 00 00 02 80 08 00 00 00 02 01 00 80 0A 00 00
00 03 00 00 00 03 80 0A 00 00 00 04 00 00 00 ...
Jan 1 00:04:11.003: Tnl 55270 L2TP: Tunnel state change from idle
to wait-ctl-reply
Jan 1 00:04:11.019: Tnl 55270 L2TP: Parse AVP 0, len 8, flag 0x0x8000 (M)
Jan 1 00:04:11.019: Tnl 55270 L2TP: Parse SCCCN
Jan 1 00:04:11.023: Tnl 55270 L2TP: Parse AVP 13, len 22, flag 0x0x8000 (M)
Jan 1 00:04:11.023: Tnl 55270 L2TP: Chlng Resp 9639531841AC22E3103E208EF7D90989
Jan 1 00:04:11.031: Tnl 55270 L2TP: No missing AVPs in SCCCN
Jan 1 00:04:11.031: Tnl 55270 L2TP: I SCCCN, flg TLS, ver 2, len 42,
tnl 55270, cl 0, ns 1, nr 1 contiguous pak, size 42
C8 02 00 2A D7 E6 00 00 00 01 00 01 80 08 00 00
00 00 00 03 80 16 00 00 00 0D 96 39 53 18 41 AC
22 E3 10 3E 20 8E F7 D9 09 89
Jan 1 00:04:11.043: Tnl 55270 L2TP: O ZLB ctrl ack, flg TLS, ver 2,
len 12, tnl 17688, cl 0, ns 1, nr 2
Jan 1 00:04:11.047: contiguous buffer, size 12
C8 02 00 0C 45 18 00 00 00 01 00 02
Jan 1 00:04:11.051: Tnl 55270 L2TP: I SCCCN from hgw tnl 17688
Jan 1 00:04:11.055: Tnl 55270 L2TP: Got a Challenge Response in SCCCN from hgw
Jan 1 00:04:11.055: Tnl 55270 L2TP: Tunnel Authentication success
Jan 1 00:04:11.059: Tnl 55270 L2TP: Tunnel state change from wait-ctl-reply
to established
Jan 1 00:04:11.063: Tnl 55270 L2TP: SM State established
Jan 1 00:04:11.067: Tnl 55270 L2TP: Parse AVP 0, len 8, flag 0x0x8000 (M)
Jan 1 00:04:11.071: Tnl 55270 L2TP: Parse ICRQ
Jan 1 00:04:11.071: Tnl 55270 L2TP: Parse AVP 14, len 8, flag 0x0x8000 (M)
Jan 1 00:04:11.075: Tnl 55270 L2TP: Assigned Call ID 7
Jan 1 00:04:11.075: Tnl 55270 L2TP: Parse AVP 15, len 10, flag 0x0x8000 (M)
Jan 1 00:04:11.079: Tnl 55270 L2TP: Serial Number
Jan 1 00:04:11.083: Tnl 55270 L2TP: Parse AVP 18, len 10, flag 0x0x8000 (M)
Jan 1 00:04:11.083: Tnl 55270 L2TP: Bearer Type 1
Jan 1 00:04:11.087: Tnl 55270 L2TP: Parse AVP 22, len 16, flag 0x0x8000 (M)
Jan 1 00:04:11.087: Tnl 55270 L2TP: Calling Number 2085730592
Jan 1 00:04:11.095: Tnl 55270 L2TP: Parse AVP 21, len 12, flag 0x0x8000 (M)
Jan 1 00:04:11.095: Tnl 55270 L2TP: Called Number 614629
Jan 1 00:04:11.099: Tnl 55270 L2TP: Parse Cisco AVP 100, len 15, flag 0x0x0
Jan 1 00:04:11.102: Tnl 55270 L2TP: Client NAS Port Serial0:0
Jan 1 00:04:11.106: Tnl 55270 L2TP: No missing AVPs in ICRQ
Jan 1 00:04:11.106: Tnl 55270 L2TP: I ICRQ, flg TLS, ver 2, len 91,
tnl 55270, cl 0, ns 2, nr 1 contiguous pak, size 91
C8 02 00 5B D7 E6 00 00 00 02 00 01 80 08 00 00
00 00 00 0A 80 08 00 00 00 0E 00 07 80 0A 00 00
00 0F D1 14 C7 C5 80 0A 00 00 00 12 00 00 00 ...

Jan 1 00:04:11.118: Tnl 55270 L2TP: I ICRQ from hgw tnl 17688
Jan 1 00:04:11.122: Tnl/Cl 55270/45 L2TP: Session FS enabled
Jan 1 00:04:11.126: Tnl/Cl 55270/45 L2TP: Session state change
from idle to wait-connect
Jan 1 00:04:11.126: Tnl/Cl 55270/45 L2TP: New session created
Jan 1 00:04:11.130: Tnl/Cl 55270/45 L2TP: O ICRP to hgw 17688/7
**Jan 1 00:04:11.134: Tnl/Cl 55270/45 L2TP: O ICRP, flg TLS, ver 2,
len 28, tnl 17688, cl 7, ns 1, nr 3**
Jan 1 00:04:11.138: contiguous buffer, size 28
C8 02 00 1C 45 18 00 07 00 01 00 03 80 08 00 00
00 00 00 0B 80 08 00 00 00 0E 00 2D
Jan 1 00:04:11.154: Tnl/Cl 55270/45 L2TP: Parse AVP 0, len 8,
flag 0x0x8000 (M)
Jan 1 00:04:11.158: Tnl/Cl 55270/45 L2TP: Parse ICCN
Jan 1 00:04:11.162: Tnl/Cl 55270/45 L2TP: Parse AVP 24, len 10,
flag 0x0x8000 (M)
Jan 1 00:04:11.162: Tnl/Cl 55270/45 L2TP: Connect Speed 64000
Jan 1 00:04:11.166: Tnl/Cl 55270/45 L2TP: Parse AVP 38, len 10, flag 0x0x0
Jan 1 00:04:11.166: Tnl/Cl 55270/45 L2TP: Rx Speed 64000
Jan 1 00:04:11.170: Tnl/Cl 55270/45 L2TP: Parse AVP 19, len 10,
flag 0x0x8000 (M)
Jan 1 00:04:11.174: Tnl/Cl 55270/45 L2TP: Framing Type 2
Jan 1 00:04:11.174: Tnl/Cl 55270/45 L2TP: Parse AVP 27, len 17, flag 0x0x0
Jan 1 00:04:11.178: Tnl/Cl 55270/45 L2TP: Last Sent LCPREQ
0305C223050506109D08F2
Jan 1 00:04:11.182: Tnl/Cl 55270/45 L2TP: Parse AVP 28, len 12, flag 0x0x0
Jan 1 00:04:11.186: Tnl/Cl 55270/45 L2TP: Last Rx LCPREQ 05066EE4E865
Jan 1 00:04:11.190: Tnl/Cl 55270/45 L2TP: Parse AVP 31, len 22, flag 0x0x0
Jan 1 00:04:11.194: Tnl/Cl 55270/45 L2TP: Proxy Auth Chal
5D0D008CB1677CF8BC354556321A7A74
Jan 1 00:04:11.198: Tnl/Cl 55270/45 L2TP: Parse AVP 32, len 8, flag 0x0x0
Jan 1 00:04:11.202: Tnl/Cl 55270/45 L2TP: Proxy Auth ID 6
Jan 1 00:04:11.206: Tnl/Cl 55270/45 L2TP: Parse AVP 30, len 12, flag 0x0x0
Jan 1 00:04:11.206: Tnl/Cl 55270/45 L2TP: Proxy Auth Name 2500-1
Jan 1 00:04:11.210: Tnl/Cl 55270/45 L2TP: Parse AVP 33, len 22,
flag 0x0x8000 (M)
Jan 1 00:04:11.214: Tnl/Cl 55270/45 L2TP: Proxy Auth Resp
CA1CC2E4FA6899E8DF1B695C0A80883E
Jan 1 00:04:11.222: Tnl/Cl 55270/45 L2TP: Parse AVP 29, len 8, flag 0x0x0
Jan 1 00:04:11.222: Tnl/Cl 55270/45 L2TP: Proxy Auth Type 2
Jan 1 00:04:11.225: Tnl/Cl 55270/45 L2TP: No missing AVPs in ICCN
**Jan 1 00:04:11.229: Tnl/Cl 55270/45 L2TP: I ICCN, flg TLS, ver 2,
len 151, tnl 55270, cl 45, ns 3, nr 2 contiguous pak, size 151**
C8 02 00 97 D7 E6 00 2D 00 03 00 02 80 08 00 00
00 00 00 0C 80 0A 00 00 00 18 00 00 FA 00 00 0A
00 00 00 26 00 00 FA 00 80 0A 00 00 00 13 00 ...
**Jan 1 00:04:11.241: Tnl/Cl 55270/45 L2TP: O ZLB ctrl ack, flg TLS,
ver 2, len 12, tnl 17688, cl 0, ns 2, nr 4**
Jan 1 00:04:11.245: contiguous buffer, size 12
C8 02 00 0C 45 18 00 00 00 02 00 04
Jan 1 00:04:11.249: Tnl/Cl 55270/45 L2TP: I ICCN from hgw tnl 17688, cl 7
Jan 1 00:04:11.253: Tnl/Cl 55270/45 L2TP: Session state change from
wait-connect to established
Jan 1 00:04:11.257: Vi4 VTEMPLATE: Hardware address 0030.94fe.1bbf
Jan 1 00:04:11.257: Vi4 VPDN: Virtual interface created for 2500-1
Jan 1 00:04:11.261: Vi4 PPP: Phase is DOWN, Setup
Jan 1 00:04:11.261: Vi4 VPDN: Clone from Vtemplate 1 filterPPP=0 blocking
Jan 1 00:04:11.265: Vi4 VTEMPLATE: Has a new cloneblk vtemplate,
now it has vtemplate
Jan 1 00:04:11.269: Vi4 VTEMPLATE:
***** CLONE VACCESS4 *****
Jan 1 00:04:11.273: Vi4 VTEMPLATE: Clone from Virtual-Templatel
interface Virtual-Access4
default ip address

```
no ip address
encap ppp
ip unnumbered Ethernet0
no peer default ip address
ppp authentication chap vpdn
ppp authorization vpdn
peer default ip address pool default
ppp mu
end
```

```
Jan  1 00:04:12.892: %LINK-3-UPDOWN: Interface Virtual-Access4,
changed state to up
Jan  1 00:04:12.908: Vi4 PPP: Using set call direction
Jan  1 00:04:12.908: Vi4 PPP: Treating connection as a callin
Jan  1 00:04:12.912: Vi4 PPP: Phase is ESTABLISHING, Passive Open
Jan  1 00:04:12.912: Vi4 LCP: State is Listen
Jan  1 00:04:12.920: Vi4 LCP: I FORCED CONFREQ len 11
Jan  1 00:04:12.924: Vi4 LCP:   AuthProto CHAP (0x0305C22305)
Jan  1 00:04:12.924: Vi4 LCP:   MagicNumber 0x109D08F2 (0x0506109D08F2)
Jan  1 00:04:12.928: Vi4 VPDN: PPP LCP accepted rcv CONFACK
Jan  1 00:04:12.928: Vi4 VPDN: PPP LCP accepted sent CONFACK
Jan  1 00:04:12.928: Vi4 PPP: Phase is AUTHENTICATING, by this end
Jan  1 00:04:12.932: Vi4 CHAP: O CHALLENGE id 3 len 27 from "1600-3"
Jan  1 00:04:12.940: Vi4 CHAP: I RESPONSE id 6 len 27 from "2500-1"
Jan  1 00:04:12.967: RADIUS: Initial Transmit Virtual-Access4 id 48
10.51.6.3:1645, Access-Request, len 97
Jan  1 00:04:12.971:   Attribute 4 6 0A330652
Jan  1 00:04:12.975:   Attribute 5 6 00000004
Jan  1 00:04:12.975:   Attribute 61 6 00000005
Jan  1 00:04:12.975:   Attribute 1 8 32353030
Jan  1 00:04:12.979:   Attribute 30 8 36313436
Jan  1 00:04:12.979:   Attribute 31 12 32303835
Jan  1 00:04:12.979:   Attribute 3 19 06CA1CC2
Jan  1 00:04:12.983:   Attribute 6 6 00000002
Jan  1 00:04:12.983:   Attribute 7 6 00000001
Jan  1 00:04:12.987: RADIUS: Received from id 48 10.51.6.3:1645,
Access-Accept, len 38
Jan  1 00:04:12.991:   Attribute 6 6 00000002
Jan  1 00:04:12.991:   Attribute 7 6 00000001
Jan  1 00:04:12.991:   Attribute 8 6 FFFFFFFF
Jan  1 00:04:12.999: AAA/AUTHEN (3530581085): status = PASS
Jan  1 00:04:12.999: Vi4 AAA/AUTHOR/LCP: Authorize LCP
Jan  1 00:04:13.003: Vi4 AAA/AUTHOR/LCP (1947215169): Port='Virtual-Access4'
list='vpdn' service=NET
Jan  1 00:04:13.003: AAA/AUTHOR/LCP: Vi4 (1947215169) user='2500-1'
Jan  1 00:04:13.007: Vi4 AAA/AUTHOR/LCP (1947215169): send AV service=ppp
Jan  1 00:04:13.007: Vi4 AAA/AUTHOR/LCP (1947215169): send AV protocol=lcp
Jan  1 00:04:13.007: Vi4 AAA/AUTHOR/LCP (1947215169): found list "vpdn"
Jan  1 00:04:13.011: Vi4 AAA/AUTHOR/LCP (1947215169): Method=radius (radius)
Jan  1 00:04:13.015: Vi4 AAA/AUTHOR (1947215169):
Post authorization status = PASS_REPL
Jan  1 00:04:13.015: Vi4 AAA/AUTHOR/LCP: Processing AV service=ppp
Jan  1 00:04:13.019: Vi4 CHAP: O SUCCESS id 6 len 4
Jan  1 00:04:13.023: Vi4 PPP: Phase is UP
Jan  1 00:04:13.027: Vi4 AAA/AUTHOR/FSM: (0): Can we start IPCP?
Jan  1 00:04:13.027: Vi4 AAA/AUTHOR/FSM (536495163): Port='Virtual-Access4'
list='vpdn' service=NET
Jan  1 00:04:13.031: AAA/AUTHOR/FSM: Vi4 (536495163) user='2500-1'
Jan  1 00:04:13.031: Vi4 AAA/AUTHOR/FSM (536495163): send AV service=ppp
Jan  1 00:04:13.035: Vi4 AAA/AUTHOR/FSM (536495163): send AV protocol=ip
Jan  1 00:04:13.035: Vi4 AAA/AUTHOR/FSM (536495163): found list "vpdn"
Jan  1 00:04:13.039: Vi4 AAA/AUTHOR/FSM (536495163): Method=radius (radius)
Jan  1 00:04:13.039: RADIUS: allowing negotiated framed address
Jan  1 00:04:13.043: Vi4 AAA/AUTHOR (536495163):
```

```

Post authorization status = PASS_REPL
Jan 1 00:04:13.043: Vi4 AAA/AUTHOR/FSM: We can start IPCP
Jan 1 00:04:13.047: Vi4 IPCP: O CONFREQ [Closed] id 1 len 10
Jan 1 00:04:13.051: Vi4 IPCP:   Address 10.51.6.82 (0x03060A330652)
Jan 1 00:04:13.102: Vi4 IPCP: I CONFREQ [REQsent] id 187 len 16
Jan 1 00:04:13.114: Vi4 IPCP:   CompressType VJ 15 slots (0x0206002D0F00)
Jan 1 00:04:13.118: Vi4 IPCP:   Address 10.10.53.2 (0x03060A0A3502)
Jan 1 00:04:13.118: Vi4 AAA/AUTHOR/IPCP: Start.  Her address 10.10.53.2,
we want 0.0.0.0
Jan 1 00:04:13.122: Vi4 AAA/AUTHOR/IPCP (2669954081): Port='Virtual-Access4'
list='vpdn' service=NET
Jan 1 00:04:13.126: AAA/AUTHOR/IPCP: Vi4 (2669954081) user='2500-1'
Jan 1 00:04:13.126: Vi4 AAA/AUTHOR/IPCP (2669954081): send AV service=ppp
Jan 1 00:04:13.130: Vi4 AAA/AUTHOR/IPCP (2669954081): send AV protocol=ip
Jan 1 00:04:13.130: Vi4 AAA/AUTHOR/IPCP (2669954081): send AV addr*10.10.53.2
Jan 1 00:04:13.134: Vi4 AAA/AUTHOR/IPCP (2669954081): found list "vpdn"
Jan 1 00:04:13.134: Vi4 AAA/AUTHOR/IPCP (2669954081): Method=radius (radius)
Jan 1 00:04:13.138: RADIUS: allowing negotiated framed address 10.10.53.2
Jan 1 00:04:13.142: Vi4 AAA/AUTHOR (2669954081):
Post authorization status = PASS_REPL
Jan 1 00:04:13.146: Vi4 AAA/AUTHOR/IPCP: Processing AV service=ppp
Jan 1 00:04:13.146: Vi4 AAA/AUTHOR/IPCP: Processing AV addr=10.10.53.2
Jan 1 00:04:13.150: Vi4 AAA/AUTHOR/IPCP: Authorization succeeded
Jan 1 00:04:13.150: Vi4 AAA/AUTHOR/IPCP: Done.  Her address 10.10.53.2,
we want 10.10.53.2
Jan 1 00:04:13.154: Vi4 IPCP: O CONFREQ [REQsent] id 187 len 10
Jan 1 00:04:13.154: Vi4 IPCP:   CompressType VJ 15 slots (0x0206002D0F00)
Jan 1 00:04:13.162: Vi4 IPCP: I CONFACK [REQsent] id 1 len 10
Jan 1 00:04:13.162: Vi4 IPCP:   Address 10.51.6.82 (0x03060A330652)
Jan 1 00:04:13.213: Vi4 IPCP: I CONFREQ [ACKrcvd] id 188 len 10
Jan 1 00:04:13.217: Vi4 IPCP:   Address 10.10.53.2 (0x03060A0A3502)
Jan 1 00:04:13.217: Vi4 AAA/AUTHOR/IPCP: Start.  Her address 10.10.53.2,
we want 10.10.53.2
Jan 1 00:04:13.221: Vi4 AAA/AUTHOR/IPCP: Processing AV service=ppp
Jan 1 00:04:13.221: Vi4 AAA/AUTHOR/IPCP: Processing AV addr=10.10.53.2
Jan 1 00:04:13.225: Vi4 AAA/AUTHOR/IPCP: Authorization succeeded
Jan 1 00:04:13.225: Vi4 AAA/AUTHOR/IPCP: Done.  Her address 10.10.53.2,
we want 10.10.53.2
Jan 1 00:04:13.229: Vi4 IPCP: O CONFACK [ACKrcvd] id 188 len 10
Jan 1 00:04:13.233: Vi4 IPCP:   Address 10.10.53.2 (0x03060A0A3502)
Jan 1 00:04:13.233: Vi4 IPCP: State is Open
Jan 1 00:04:13.261: Vi4 IPCP: Install route to 10.10.53.2
Jan 1 00:04:14.015: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Virtual-Access4, changed state to up

```

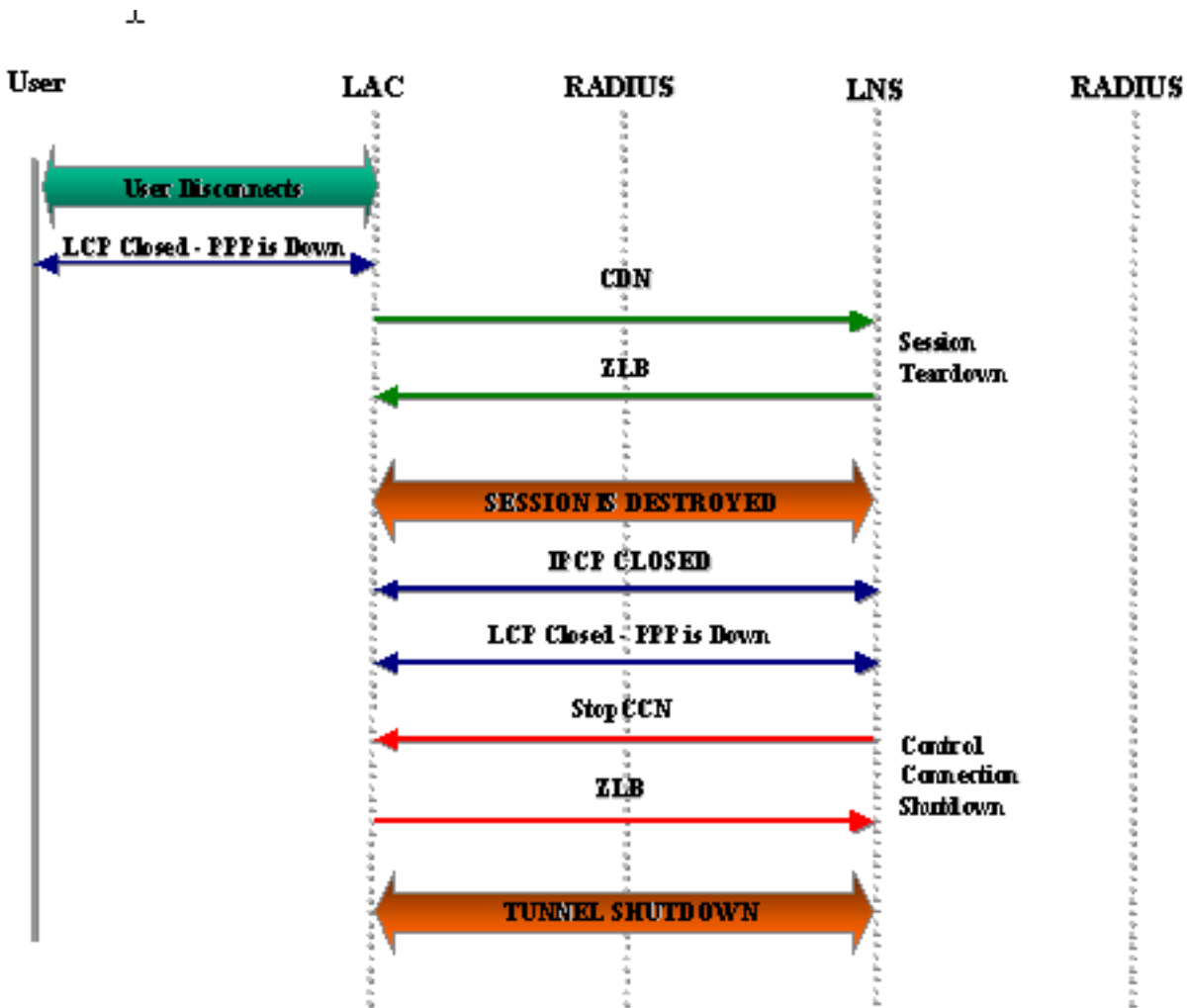
PPP/L2TP斷開序列

1. 遠端使用者丟棄ISDN鏈路以便丟棄對LAC的呼叫。
2. LAC PPP狀態機終止，LCP狀態為Closed。
3. 為了通知LNS會話斷開連線，LAC會傳送呼叫斷開連線通知(CDN)並銷毀會話。CDN包含AVP 1結果代碼，該結果代碼將「載波丟失」作為斷開的原因。會話現在處於IDLE狀態。
4. LNS傳送ZLB消息（順序確認）並銷毀會話。會話現在處於IDLE狀態。
5. LNS關閉本地PPP介面。虛擬訪問介面將狀態更改為Down:IPCP已關閉，LCP已關閉，並且PPP狀態機被宣告為Down。遠端使用者的主機路由將從LNS路由表中刪除。現在，LAC和LNS上的隧道狀態都為No-Sessions-Left。
6. 由於這是通道中的最後一個作業階段，因此現在可以關閉控制連線。通道關閉的預設計時器對於LNS為10秒，對於LAC為15秒。
7. LNS向LAC傳送停止 — 控制 — 連線通知(Stop-CCN)，以關閉控制連線和隧道。Stop-CCN包含通道關閉的原因，即「請求清除控制連線」。通道現在處於IDLE狀態。

8. LAC向LNS傳送一個ZLB消息，該消息是一個順序確認。通道現在處於IDLE狀態。

9. 隧道現在關閉。

注意：LAC或LNS都可以啟動會話並控制連線斷開。在關閉通道之前，無需清除通道中的作業階段。



從顯示PPP和L2TP斷開連線的LAC進行的調試

```
Jan 1 00:04:27.375: %ISDN-6-DISCONNECT: Interface Serial0:0
disconnected from 2085730592 2500-1, call lasted 17 seconds
Jan 1 00:04:27.387: %LINK-3-UPDOWN:
Interface Serial0:0, changed state to down
Jan 1 00:04:27.387: Se0:0 PPP: Phase is TERMINATING [0 sess, 0 load]
Jan 1 00:04:27.387: Se0:0 LCP: State is Closed
Jan 1 00:04:27.387: Se0:0 PPP: Phase is DOWN [0 sess, 0 load]
Jan 1 00:04:27.387: Se0:0 VPDN: Cleanup
Jan 1 00:04:27.387: Se0:0 VPDN: Reset
Jan 1 00:04:27.387: Se0:0 Tn1/C1 17688/7 L2TP: O CDN to l2tp-gw 55270/45
Jan 1 00:04:27.387: Se0:0 Tn1/C1 17688/7 L2TP: O CDN,
flg TLS, ver 2, len 38, tnl 55270, cl 45, ns 4, nr 2
    C8 02 00 26 D7 E6 00 2D 00 04 00 02 80 08 00 00
    00 00 00 0E 80 08 00 00 00 0E 00 07 80 0A 00 00
    00 01 00 01 00 00
Jan 1 00:04:27.387: Se0:0 Tn1/C1 17688/7 L2TP:
Destroying session
Jan 1 00:04:27.387: Se0:0 Tn1/C1 17688/7 L2TP: Session state change
```

```

from established to idle
Jan 1 00:04:27.387: Se0:0 Tnl/Cl 17688/7 L2TP: VPDN:
Releasing idb for LAC/LNS tunnel 17688/55270 session 7 state idle
Jan 1 00:04:27.387: Tnl 17688 L2TP: Tunnel state change from established
to no-sessions-left
Jan 1 00:04:27.387: Tnl 17688 L2TP: No more sessions in tunnel,
shutdown (likely) in 15 seconds
Jan 1 00:04:27.431: Tnl 17688 L2TP: I ZLB ctrl ack, flg TLS, ver 2,
len 12, tnl 17688, cl 0, ns 2, nr 5
Jan 1 00:04:28.387: %LINEPROTO-5-UPDOWN:
Line protocol on Interface Serial0:0, changed state to down
Jan 1 00:04:37.383: Tnl 17688 L2TP: Parse AVP 0, len 8, flag 0x8000 (M)
Jan 1 00:04:37.383: Tnl 17688 L2TP: Parse StopCCN
Jan 1 00:04:37.383: Tnl 17688 L2TP: Parse AVP 9, len 8, flag 0x8000 (M)
Jan 1 00:04:37.383: Tnl 17688 L2TP: Assigned Tunnel ID 55270
Jan 1 00:04:37.383: Tnl 17688 L2TP: Parse AVP 1, len 8, flag 0x8000 (M)
Jan 1 00:04:37.387: L2X: Result code(1): 1:
Request to clear control connection
Jan 1 00:04:37.387: Error code(0): No error
Jan 1 00:04:37.387: Tnl 17688 L2TP: No missing AVPs in StopCCN
Jan 1 00:04:37.387: Tnl 17688 L2TP: I StopCCN, flg TLS, ver 2,
len 36, tnl 17688, cl 0, ns 2, nr 5
      C8 02 00 24 45 18 00 00 00 02 00 05 80 08 00 00
      00 00 00 04 80 08 00 00 00 09 D7 E6 80 08 00 00
      00 01 00 01
Jan 1 00:04:37.387: Tnl 17688 L2TP: O ZLB ctrl ack, flg TLS, ver 2,
len 12, tnl 55270, cl 0, ns 5, nr 3
      C8 02 00 0C D7 E6 00 00 00 05 00 03
Jan 1 00:04:37.387: Tnl 17688 L2TP: I StopCCN from l2tp-gw tnl 55270
Jan 1 00:04:37.387: Tnl 17688 L2TP: Shutdown tunnel
Jan 1 00:04:37.387: Tnl 17688 L2TP: Tunnel state change from no-sessions-left
to idle

```

從顯示PPP和L2TP斷開連線的LNS中進行的調試

```

Jan 1 00:04:27.740: Vi4 Tnl/Cl 55270/45 L2TP:
Parse AVP 0, len 8, flag 0x0x8000 (M)
Jan 1 00:04:27.740: Vi4 Tnl/Cl 55270/45 L2TP: Parse CDN
Jan 1 00:04:27.744: Vi4 Tnl/Cl 55270/45 L2TP:
Parse AVP 14, len 8, flag 0x0x8000 (M)
Jan 1 00:04:27.748: Vi4 Tnl/Cl 55270/45 L2TP: Assigned Call ID 7
Jan 1 00:04:27.752: Vi4 Tnl/Cl 55270/45 L2TP:
Parse AVP 1, len 10, flag 0x0x8000 (M)
Jan 1 00:04:27.752: Vi4 Tnl/Cl 55270/45 L2TP:
Result code(1): 1: Loss of carrier
Jan 1 00:04:27.756: Error code(0): No error
Jan 1 00:04:27.756: Vi4 Tnl/Cl 55270/45 L2TP:
No missing AVPs in CDN
Jan 1 00:04:27.760: Vi4 Tnl/Cl 55270/45 L2TP: I CDN, flg TLS, ver 2,
len 38, tnl 55270, cl 45, ns 4, nr 2 contiguous pak, size 38
      C8 02 00 26 D7 E6 00 2D 00 04 00 02 80 08 00 00
      00 00 00 0E 80 08 00 00 00 0E 00 07 80 0A 00 00
      00 01 00 01 00 00
Jan 1 00:04:27.772: Vi4 Tnl/Cl 55270/45 L2TP: O ZLB ctrl ack, flg TLS,
ver 2, len 12, tnl 17688, cl 0, ns 2, nr 5
Jan 1 00:04:27.776: contiguous buffer, size 12
      C8 02 00 0C 45 18 00 00 00 02 00 05
Jan 1 00:04:27.780: Vi4 Tnl/Cl 55270/45 L2TP: I CDN from hgw tnl 17688, cl 7
Jan 1 00:04:27.780: Vi4 Tnl/Cl 55270/45 L2TP: Destroying session
Jan 1 00:04:27.784: Vi4 Tnl/Cl 55270/45 L2TP:
Session state change from established to idle

```

```
Jan 1 00:04:27.788: Vi4 Tnl/Cl 55270/45 L2TP:
VPDN: Releasing idb for LAC/LNS tunnel 55270/17688 session 45 state idle
Jan 1 00:04:27.792: Vi4 VPDN: Reset
Jan 1 00:04:27.792: Tnl 55270 L2TP:
Tunnel state change from established to no-sessions-left
Jan 1 00:04:27.796: Tnl 55270 L2TP:
No more sessions in tunnel, shutdown (likely) in 10 seconds
Jan 1 00:04:27.800: %LINK-3-UPDOWN: Interface Virtual-Access4,
changed state to down
Jan 1 00:04:27.816: Vi4 IPCP: State is Closed
Jan 1 00:04:27.820: Vi4 PPP: Phase is TERMINATING
Jan 1 00:04:27.820: Vi4 LCP: State is Closed
Jan 1 00:04:27.824: Vi4 PPP: Phase is DOWN
Jan 1 00:04:27.839: Vi4 IPCP: Remove route to 10.10.53.2
Jan 1 00:04:29.022: %LINEPROTO-5-UPDOWN:
Line protocol on Interface Virtual-Access4, changed state to down
Jan 1 00:04:37.720: Tnl 55270 L2TP: O StopCCN to hgw tnlid 17688
Jan 1 00:04:37.724: Tnl 55270 L2TP: O StopCCN, flg TLS, ver 2,
len 36, tnl 17688, cl 0, ns 2, nr 5
Jan 1 00:04:37.728: contiguous buffer, size 36
      C8 02 00 24 45 18 00 00 00 02 00 05 80 08 00 00
      00 00 00 04 80 08 00 00 00 09 D7 E6 80 08 00 00
      00 01 00 01
Jan 1 00:04:37.736: Tnl 55270 L2TP:
Tunnel state change from no-sessions-left to shutting-down
Jan 1 00:04:37.740: Tnl 55270 L2TP: Shutdown tunnel
Jan 1 00:04:37.744: Tnl 55270 L2TP:
Tunnel state change from shutting-down to idle
```

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