寬頻網路閘道中偽線頭端的IPoE作業階段

目錄

簡介

本文檔介紹在ASR9K上配置通過偽線頭端(PWHE)的乙太網IP(IPoE)會話的步驟。

必要條件

需求

思科建議您瞭解以下主題：

- MPLS第2層VPN
- ASR9K上的BNG功能

提示：請參閱Cisco ASR 9000系列思科寬頻網路網關配置指南文章，以便熟悉BNG功能。

提示：請參閱思科的MPLS第2層VPN配置指南文章，以便熟悉MPLS第2層VPN。

採用元件

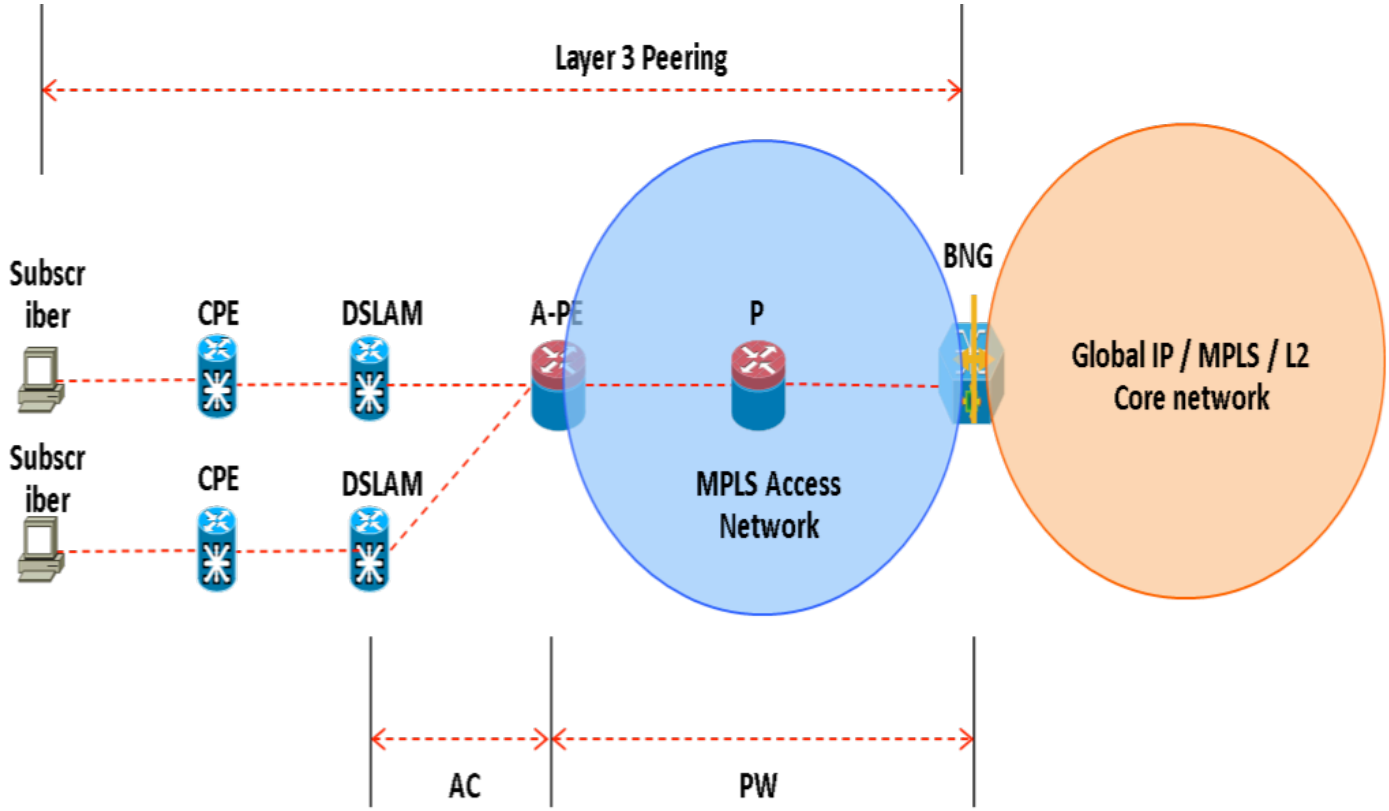
本文檔不限於特定軟體版本，但在ASR9K上使用的線卡是A9K-MPA-20X1GE。

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。

背景資訊

BNG通過PWHE提供使用者支援。PWHE通過偽線連線提供到客戶邊緣節點的第3層連線。PWHE將接入提供邊緣(A-PE)節點之間存在的L2VPN電路終止到虛擬介面，並對本地IP資料包執行路由。 每個虛擬介面都可以使用一個或多個面向接入雲的物理介面，通過A-PE節點到達客戶路由器。

註:PPPoE PTA、PPPoE LAC Subscriber Over PWHE和IPoE使用者支援此功能。



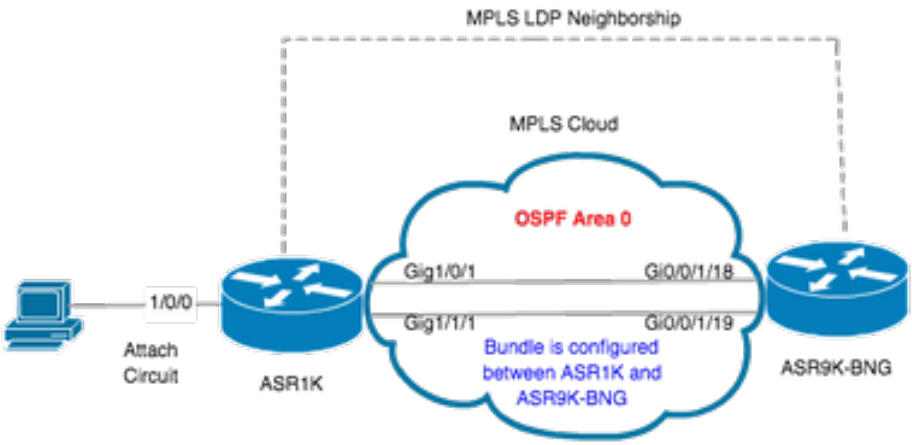
設定

網路圖表

為了執行此測試，使用了版本154-3.S2的ASR1K和版本IOS-XR 5.2.2的ASR9K。OSPF用作路由協定，用於到達彼此的環回地址。

ASR9K環回地址：10.1.1.1/32

ASR1K環回地址：10.2.2.2/32



ASR1K

```
pseudowire-class MPLS
encapsulation mpls

interface GigabitEthernet1/0/0 no ip address media-type rj45 negotiation auto cdp enable
xconnect 10.1.1.1 2020 encapsulation mpls pw-class MPLS end

ASR1K#show etherchannel summary
Flags:  D - down        P/bndl - bundled in port-channel
        I - stand-alone s/susp - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator

        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 1
Number of aggregators:           1

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
20Po20(RU)LACP Gi1/0/1(bndl) Gi1/1/1(bndl)

RU - L3 port-channel UP State
SU - L2 port-channel UP state
P/bndl -  Bundled
S/susp  - Suspended


interface Port-channel20
ip address 192.168.20.2 255.255.255.0
```

```
no negotiation auto
mpls ip
end
```

ASR9K

以下是ASR9K的配置，它充當BNG PWHE。

```
RP/0/RSP0/CPU0:ACDC-ASR9000-1#show bundle bundle-ether 20 Thu May 21 06:35:39.294 UTC Bundle-Ether20 Status: Up
Local links
```

現在，在ASR1K和ASR9K之間配置xconnect。將ASR1K(10.2.2.2/32)的環回地址指定為xconnect neighbor。

```
l2vpn router-id 10.1.1.1 pw-class ASR1K encapsulation mpls transport-mode ethernet ! ! xconnect group PWHE p2p ASR1K
interface PW-Ether20 neighbor ipv4 10.2.2.2 pw-id 2020
    pw-class ASR1K
   !
  !
 !
!
generic-interface-list BE20_ONLY
 interface Bundle-Ether20
 interface GigabitEthernet0/0/1/18
 interface GigabitEthernet0/0/1/19
!

interface PW-Ether20
 ipv4 address 192.168.1.1 255.255.255.0
 attach generic-interface-list BE20_ONLY
!
```

現在，配置使用者控制策略並應用於使用者終止的PW乙太網介面。

```
dynamic-template
 type ipsubscriber WDAAR_PWHE_DT
  ipv4 verify unicast source reachable-via rx
  ipv4 unnumbered Loopback44
  ipv4 unreachables disable
 !
!

policy-map type control subscriber IPoE_WDAAR_PWHE
 event session-start match-first
  class type control subscriber DHCPv4 do-until-failure
   5 authorize aaa list WDAAR identifier source-address-mac password cisco
   10 activate dynamic-template WDAAR_PWHE_DT
  !
 !
 end-policy-map


interface PW-Ether20.250
 ipv4 address 192.168.10.1 255.255.255.252
 service-policy type control subscriber IPoE_WDAAR_PWHE
 encapsulation dot1q 250
 ipsubscriber ipv4 l2-connected
  initiator dhcp
 !
!
```

驗證

本節提供的資訊可用於驗證您的組態是否正常運作。以下是可用於檢驗ASR9K上xconnect是否為UP/UP的命令。

```
RP/0/RSP0/CPU0:ACDC-ASR9000-1#show l2vpn xconnect
Legend: ST = State, UP = Up, DN = Down, AD = Admin Down, UR = Unresolved,
        SB = Standby, SR = Standby Ready, (PP) = Partially Programmed

XConnect                   Segment 1                       Segment 2
Group      Name       ST   Description            ST       Description            ST
------------------------   ------------------------------  ------------------------------
PWHE       ASR1K      UP   PE20                   UP       10.2.2.2         2020  UP
------------------------------------------------------------------------------------------

RP/0/RSP0/CPU0:ACDC-ASR9000-1#show l2vpn xconnect brief
AToM
  Like-to-Like                        UP       DOWN        UNR
    PW-Ether                           1          0          0
    Total                              1          0          0

  Total                                1          0          0

Total: 1 UP, 0 DOWN, 0 UNRESOLVED

RP/0/RSP0/CPU0:ACDC-ASR9000-1#show subscriber session filter ipv4-address 192.168.44.254
Codes: IN - Initialize, CN - Connecting, CD - Connected, AC - Activated,
       ID - Idle, DN - Disconnecting, ED - End

Type         Interface               State     IP Address (Vrf)

-------------------------------------------------------------------------------
IP:DHCP      PE20.250.ip1            AC        192.168.44.254 (default)
```

在ASR9K上xconnect為UP且IPoE會話聯機後，您可以看到Access-interface為PW-Ether。

```
RP/0/RSP0/CPU0:ACDC-ASR9000-1#show subscriber session filter ipv4-address 192.168.44.254 detail
Interface:               PW-Ether20.250.ip1
Circuit ID:              Unknown
Remote ID:               Unknown
Type:                    IP: DHCP-trigger
IPv4 State:              Up, Mon Apr 20 19:32:51 2015
IPv4 Address:            192.168.44.254, VRF: default
Mac Address:             001f.ca3f.7924
Account-Session Id:      00000068
Nas-Port:                Unknown
User name:               001f.ca3f.7924
Formatted User name:     unknown
Client User name:        unknown
Outer VLAN ID:           250
Subscriber Label:        0x000001db
Created:                 Mon Apr 20 19:32:49 2015
State:                   Activated
Authentication:          unauthenticated
Authorization:           authorized
Access-interface: PW-Ether20.250 Policy Executed:
policy-map type control subscriber IPoE_WDAAR_PWHE
  event Session-Start match-first [at Mon Apr 20 19:32:49 2015]
    class type control subscriber DHCPv4 do-until-failure [Succeeded]
      5 authorize aaa list WDAAR [Succeeded]
      10 activate dynamic-template WDAAR_PWHE_DT [Succeeded]
Session Accounting: disabled
```

```
Last COA request received: unavailable
```

現在，檢驗通過PWHE的BNG使用者的第3層連線。

```
RP/0/RSP0/CPU0:ACDC-ASR9000-1#ping 192.168.44.254
Mon Feb 23 19:37:58.188 UTC
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.44.254, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/2 ms
RP/0/RSP0/CPU0:ACDC-ASR9000-1#
```

疑難排解

本節提供的資訊可用於對配置進行故障排除和驗證ASR9K上的xconnect狀態。

用於驗證ASR9K配置的命令

這些命令可用於檢驗ASR9K上的配置是否正確。

- show running-configuration l2vpn
- show running-configuration int PW-Ether<Interface-Number>
- show running-configuration mpls ldp
- show running-configuration generic-interface-list

支票 L2VPN XC's

檢查xconnect。Xconnect（以及AC和PW）必須開啟。您可以使用這些命令來驗證狀態。

- show l2vpn xconnect summary

```
RP/0/RSP0/CPU0:ACDC-ASR9000-1#show l2vpn xconnect summary
Thu May 21 05:40:05.068 UTC
Number of groups: 1
Number of xconnects: 1
  Up: 1  Down: 0  Unresolved: 0 Partially-programmed: 0
  AC-PW: 1  AC-AC: 0  PW-PW: 0 Monitor-Session-PW: 0
Number of Admin Down segments: 0
Number of MP2MP xconnects: 0
  Up 0 Down 0
  Advertised: 0 Non-Advertised: 0
Number of CE Connections: 0
  Advertised: 0 Non-Advertised: 0
Backup PW:
  Configured   : 0
  UP           : 0
  Down         : 0
  Admin Down   : 0
  Unresolved   : 0
  Standby      : 0
  Standby Ready: 0
Backup Interface:
  Configured   : 0
  UP           : 0
  Down         : 0
  Admin Down   : 0
```

```
  Unresolved   : 0
  Standby      : 0


show l2vpn xconnect interface <Interface> detail
 OR
show l2vpn xconnect detai

RP/0/RSP0/CPU0:ACDC-ASR9000-1#show l2vpn xconnect interface pw-eth20 detail
Thu May 21 05:40:55.789 UTC

Group PWHE, XC ASR1K, state is up; Interworking none
  AC: PW-Ether20, state is up
    Type PW-Ether
    Interface-list: BE20_ONLY
    Replicate status:
    BE20: success
    Gi0/0/1/18: success
    Gi0/0/1/19: success
    MTU 1500; interworking none
    Internal label: 16001
    Statistics:
      packets: received 52970, sent 0
      bytes: received 3485714, sent 0
  PW: neighbor 10.2.2.2, PW ID 2020, state is up ( established )
    PW class asr1k, XC ID 0xc0000001
    Encapsulation MPLS, protocol LDP
    Source address 10.1.1.1
    PW type Ethernet, control word disabled, interworking none
    PW backup disable delay 0 sec
    Sequencing not set

    PW Status TLV in use
      MPLS         Local                          Remote
      ------------ ------------------------------ ------------------------------
      Label        16002                          17
      Group ID     0x920                          unknown
      Interface    PW-Ether20                     unknown
      MTU          1500                           1500
      Control word disabled                       disabled
      PW type      Ethernet                       Ethernet
      VCCV CV type 0x2                            0x2
                   (LSP ping verification)        (LSP ping verification)
      VCCV CC type 0x6                            0x6
                   (router alert label)           (router alert label)
                   (TTL expiry)                   (TTL expiry)
      ------------ ------------------------------ ------------------------------
    Incoming Status (PW Status TLV):
      Status code: 0x0 (Up) in Notification message
    Outgoing Status (PW Status TLV):
      Status code: 0x0 (Up) in Notification message
    MIB cpwVcIndex: 3221225473
    Create time: 21/05/2015 02:52:43 (02:48:12 ago)
    Last time status changed: 21/05/2015 05:21:17 (00:19:38 ago)
    Last time PW went down: 21/05/2015 03:10:45 (02:30:10 ago)
    Statistics:
      packets: received 52970, sent 0
      bytes: received 3485714, sent 0
```

檢查介面清單

顯示PWHE使用的介面清單：它應存在並具有相應的介面。

- show generic-interface-list name <NAME>

```
RP/0/RSP0/CPU0:ACDC-ASR9000-1#show generic-interface-list name BE20_ONLY
Thu May 21 05:43:26.649 UTC
generic-interface-list: BE20_ONLY (ID: 1, interfaces: 3)
   Bundle-Ether20 - items pending 0, downloaded to FIB
   GigabitEthernet0/0/1/18 - items pending 0, downloaded to FIB
   GigabitEthernet0/0/1/19 - items pending 0, downloaded to FIB
 Number of items: 1
 List is downloaded to FIB
```

檢查介面清單使用的PWHE

以下專用輸出指示哪些成員介面處於「活動」狀態，即哪些成員介面已下載到FIB。

- show l2vpn generic-interface-list name <NAME>
- show l2vpn generic-interface-list private

```
RP/0/RSP0/CPU0:ACDC-ASR9000-1#show l2vpn generic-interface-list name BE20_ONLY detail
Thu May 21 05:39:04.983 UTC
Generic-interface-list: BE20_ONLY (ID: 1, interfaces: 3)
   Bundle-Ether20 - items pending 0
   GigabitEthernet0/0/1/18 - items pending 0
   GigabitEthernet0/0/1/19 - items pending 0
 Number of items: 1
    PW-Ether: 20
```

檢查MA是否具有包含正確資訊的PWHE

介面清單資訊、CW、VC型別等必須在MA中正確設定。

```
RP/0/RSP0/CPU0:ACDC-ASR9000-1#show l2vpn ma pwhe interface PW-Ether 20 private
Thu May 21 05:36:28.170 UTC
Interface: PW-Ether20   Interface State: Up, Admin state: Up
  Interface handle 0x920
  MTU:  1514
  BW:   10000 Kbit
  Interface MAC addresses (1 address):
      10f3.1172.02c5
  IDB is not in Replicate Linked List
  IDB is not in Create Linked List
  IDB is not in Attr Linked List
  Opaque flags: 0xe
  Flags: 0x3c
    Valid  : IFH, MTU, MAC, BW
  MA trace history [Num events: 32]
  ------------------------------------------------
  Time                Event                     Value      Sticky Many
  ====                =====                     ========== ====== ====
  05/21/2015 02:56:05 Remove retry list         0x3        No     No
  05/21/2015 02:56:05 IDB Set flag              0x3c       No     No
  05/21/2015 03:08:26 IDB Set State             0x1        No     No
  05/21/2015 03:08:26 IM publish attr           0x45       No     No
  05/21/2015 03:08:26 IM update init-data       0x1e       No     No
  05/21/2015 03:08:26 IDB Set flag              0x3c       No     No
  05/21/2015 03:08:26 Remove retry list         0x3        No     No
  05/21/2015 03:08:26 IDB Set flag              0x3c       No     No
  05/21/2015 03:09:54 IDB Set State             0          No     No
```

```
05/21/2015 03:09:54 IM publish attr           0x45       No     No
05/21/2015 03:09:54 IM publish attr           0x52       No     No
05/21/2015 03:09:54 IM update init-data       0x1e       No     No
05/21/2015 03:09:54 IDB Set flag              0x3c       No     No
05/21/2015 03:09:54 Remove retry list         0x3        No     No
05/21/2015 03:09:54 IDB Set flag              0x3c       No     No
05/21/2015 03:09:54 Remove retry list         0x3        No     No
05/21/2015 03:09:54 IDB Set flag              0x3c       No     No
05/21/2015 03:10:45 IDB Set State             0x1        No     No
05/21/2015 03:10:45 IM publish attr           0x45       No     No
05/21/2015 03:10:45 IM update init-data       0x1e       No     No
05/21/2015 03:10:45 IDB Set flag              0x3c       No     No
05/21/2015 03:10:45 Remove retry list         0x3        No     No
05/21/2015 03:10:45 IDB Set flag              0x3c       No     No
05/21/2015 05:21:17 IDB Set State             0          No     No
05/21/2015 05:21:17 IM publish attr           0x45       No     No
05/21/2015 05:21:17 IM publish attr           0x52       No     No
05/21/2015 05:21:17 IM update init-data       0x1e       No     No
05/21/2015 05:21:17 IDB Set flag              0x3c       No     No
05/21/2015 05:21:17 Remove retry list         0x3        No     No
05/21/2015 05:21:17 IDB Set flag              0x3c       No     No
05/21/2015 05:21:17 Remove retry list         0x3        No     No
05/21/2015 05:21:17 IDB Set flag              0x3c       No     No

CLIENT MA trace history [Num events: 27]
----------------------------------------------------
Time                 Event                    Value      Sticky Many
====                 =====                    ==========  ====== ====
05/21/2015 02:54:01 IM Notify Up              0x50049e10 No     No
05/21/2015 02:54:01 FSM state change          0x200      No     No
05/21/2015 02:54:01 FSM state change          0x2030d    No     No
05/21/2015 02:54:02 Double restart detected   0x5        No     No
05/21/2015 02:55:00 I/f created/added         0x4000540  No     No
05/21/2015 02:55:00 I/f created/added         0x4000580  No     No
05/21/2015 02:55:00 I/f created/added         0x4000540  No     No
05/21/2015 02:55:00 I/f created/added         0x4000580  No     No
05/21/2015 02:55:00 Intf list change          0x3000300  No     No
05/21/2015 02:55:00 Intf add error            0x4000540  No     No
05/21/2015 02:55:00 Intf add error            0x4000580  No     No
05/21/2015 02:55:00 FSM state change          0x30505    No     No
05/21/2015 02:55:01 Replicate result          0x13fe     No     No
05/21/2015 02:55:01 FSM state change          0x5060b    No     No
05/21/2015 02:55:01 I/f up                    0x4000580  No     No
05/21/2015 02:55:01 I/f up                    0x4000580  No     No
05/21/2015 02:55:02 I/f up                    0x4000540  No     No
05/21/2015 02:55:02 I/f up                    0x4000540  No     No
05/21/2015 02:56:05 Added to peer             0x6060606  No     No
05/21/2015 02:56:05 FSM state change          0x60704    No     No
05/21/2015 02:56:05 Fill VIMI attr            0x20002    No     No
05/21/2015 03:08:26 FSM state change          0x70605    No     No
05/21/2015 03:09:54 FSM state change          0x60704    No     No
05/21/2015 03:09:54 Fill VIMI attr            0x20002    No     No
05/21/2015 03:10:45 FSM state change          0x70605    No     No
05/21/2015 05:21:17 FSM state change          0x60704    No     No
05/21/2015 05:21:17 Fill VIMI attr            0x20002    No     No

PW-HE IDB client data
---------------------
IDB handle 0x5016db2c
Dot1q vlan: 0x81000000
Label: 16001
Remote VC label: 17
Remote PE: 10.2.2.2
Use flow-label on tx: N
```

```
  L2-overhead: 0
  VC-type: 5
  CW: N
  FSM state: 'Up'(7)
  Fwding is up: Y, got route update: Y
  Use OWNED_RESOURCE fwding: N
  OWNED_RESOURCE fwding is up: N
  OWNED_RESOURCE data&colon; 0
  Replication error msg has been printed: N
  VIF MA reg_handle: 50049e10
  PIC array:
    (nil)
  Replicate retry count: 0
  Configured i/f list name: 'BE20_ONLY'
  From L2VPN i/f list name: 'BE20_ONLY', i/f list id: 1
    L3 i/f:'Bundle-Ether20', idx=0, repl_status 1, fwding up:N, active:Y
    L3 i/f:'GigabitEthernet0/0/1/18', idx=1, repl_status 1, fwding up:Y, active:Y
    L3 i/f:'GigabitEthernet0/0/1/19', idx=2, repl_status 1, fwding up:Y, active:Y
  List intf: 0x5016e154, PLs size:4, num in use:2
    I/f:'Gi0/0/1/18', ifh:0x4000540, bundle: 0xb20, ifl idx:1, in-use:Y, misconfig:Y, in peer
route:Y, VIMI active:Y
      Repl:Y pending:N failed:N not supp:N, unrepl pending:N failed:N, up:Y us:3
    I/f:'Gi0/0/1/19', ifh:0x4000580, bundle: 0xb20, ifl idx:2, in-use:Y, misconfig:Y, in peer
route:Y, VIMI active:Y
      Repl:Y pending:N failed:N not supp:N, unrepl pending:N failed:N, up:Y us:3
    I/f:'', ifh:0x0, bundle: 0x0, ifl idx:0, in-use:N, misconfig:N, in peer route:N, VIMI
active:N
      Repl:N pending:N failed:N not supp:N, unrepl pending:N failed:N, up:N us:0
    I/f:'', ifh:0x0, bundle: 0x0, ifl idx:0, in-use:N, misconfig:N, in peer route:N, VIMI
active:N
      Repl:N pending:N failed:N not supp:N, unrepl pending:N failed:N, up:N us:0

----------------------------------------------------
```

檢查PWHE摘要資訊

檢查輸出中的計數器是否正確：

- show l2vpn pwhe summary

```
RP/0/RSP0/CPU0:ACDC-ASR9000-1#show l2vpn pwhe summary
Thu May 21 05:35:59.381 UTC
Number of PW-HE interfaces: 1
  Up: 1  Down: 0  Admindown: 0
 PW-Ether: 1
  Up: 1  Down: 0  Admindown: 0
 PW-IW: 0
  Up: 0  Down: 0  Admindown: 0
```

檢查標籤

檢查標籤表中的標籤。您需要首先使用此命令從xconnect資訊獲取內部標籤。

- show l2vpn xconnect detail

然後在輸出中搜尋internal Label，然後執行此show命令以驗證ASR9K上的標籤和介面關聯。

- show mpls label table label <internal_label> detail

```
RP/0/RSP0/CPU0:ACDC-ASR9000-1#show l2vpn xconnect detail
Thu May 21 05:27:11.762 UTC

Group PWHE, XC ASR1K, state is up; Interworking none
  AC: PW-Ether20, state is up
    Type PW-Ether
    Interface-list: BE20_ONLY
    Replicate status:
    BE20: success
    Gi0/0/1/18: success
    Gi0/0/1/19: success
    MTU 1500; interworking none
    Internal label: 16001
    Statistics:
      packets: received 27293, sent 0
      bytes: received 1996176, sent 0
  PW: neighbor 10.2.2.2, PW ID 2020, state is up ( established )
    PW class asr1k, XC ID 0xc0000001
    Encapsulation MPLS, protocol LDP
    Source address 10.1.1.1
    PW type Ethernet, control word disabled, interworking none
    PW backup disable delay 0 sec
    Sequencing not set


RP/0/RSP0/CPU0:ACDC-ASR9000-1#show mpls label table label 16001 detail
Thu May 21 05:27:55.760 UTC
Table Label   Owner                       State  Rewrite
----- ------- --------------------------- ------ -------
0     16001   L2VPN:Active                InUse  Yes
  (PW-HE, vers:0, intf=PE20)
```

流量丟棄/會話未啟動

如果會話沒有啟動，請檢查資料包是否在NP中丟棄。您可以使用這些命令檢視ASR9K上NP中的資料包丟棄。

- **清除計數器**
- show l2vpn xconnect detail | include packet
- clear controllers np counters all
- show controller np counters all

與BNG相關的Show命令

使用以下命令檢查ASR9K上的BNG相關資訊。

- show subscriber session all summary
- show subscriber manager disconnect-history unique summary
- show subscriber manager statistics**調試總計**
- show subscriber manager statistics summary total
- show subscriber manager trace event/error

要啟用的調試

如果ASR9K上未啟動會話，並且您在NP上未找到任何丟棄的資料包，則可以在ASR9K上啟用這些調試，以檢視ASR9K中會話未啟動的原因。

- debug l2vpn ea pwhe platform verbose
- debug l2vpn forwarding platform common all
- debug pm api location <location>
- debug pm error location <location>
- **調試**uidb api**錯誤位置**<location>

升級

如果您仍有問題，請聯絡Cisco TAC並從ASR9K收集Show tech。

- show tech-support**使用者**
- show tech-support l2vpn

關於此翻譯

思科已使用電腦和人工技術翻譯本文件，讓全世界的使用者能夠以自己的語言理解支援內容。請注意，即使是最佳機器翻譯，也不如專業譯者翻譯的內容準確。Cisco Systems, Inc. 對這些翻譯的準確度概不負責，並建議一律查看原始英文文件（提供連結）。