宽带网络网关中伪线头端的IPoE会话

目录

简介

本文档介绍在ASR9K上通过伪线头端(PWHE)配置以太网IP(IPoE)会话的步骤。

先决条件

要求

Cisco 建议您了解以下主题：

- MPLS第2层VPN
- ASR9K上的BNG功能

提示：请参阅Cisco ASR 9000系列的宽带网络网关配置指南思科文章，以便熟悉BNG功能。

提示：请参阅MPLS第2层VPN配置指南思科文章，以便熟悉MPLS第2层VPN。

使用的组件

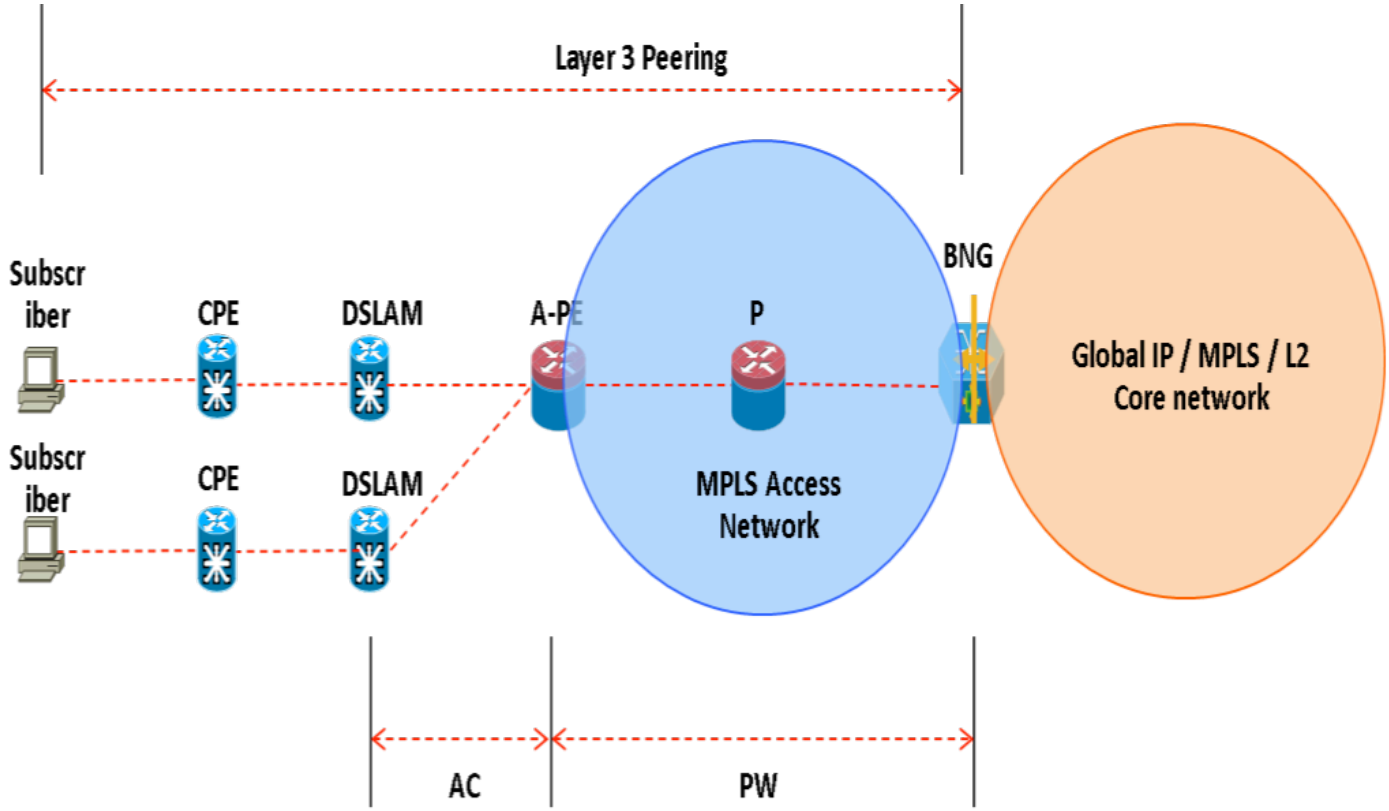
本文档不限于特定的软件版本，但在ASR9K上使用的线卡是A9K-MPA-20X1GE。

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

背景信息

BNG通过PWHE提供用户支持。PWHE通过伪线连接提供到客户边缘节点的第3层连接。PWHE将接入提供边缘(A-PE)节点之间存在的L2VPN电路终止到虚拟接口，并对本地IP数据包执行路由。 每个虚拟接口都可以使用一个或多个通往接入云的物理接口，通过A-PE节点到达客户路由器。

注：此功能受PPPoE PTA、PPPoE LAC Subscriber Over PWHE和IPoE用户支持。



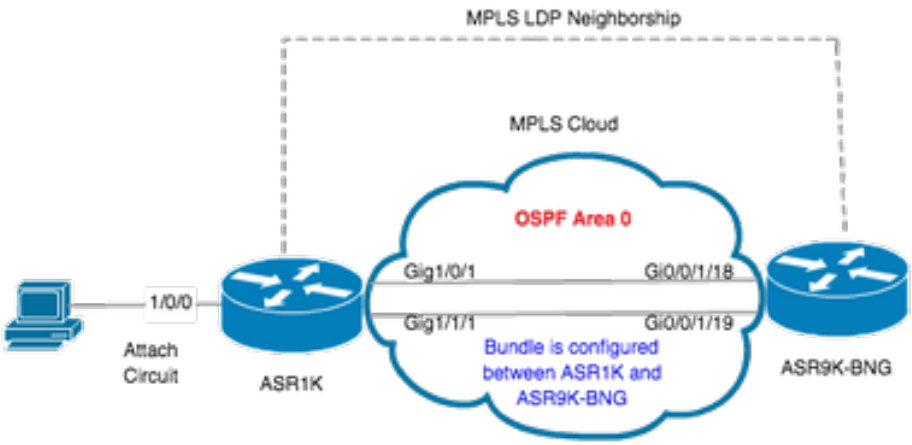
配置

网络图

为了执行此测试，使用的是一个版本为154-3.S2的ASR1K，以及版本为IOS-XR 5.2.2的ASR9K。OSPF用作路由协议，用于到达其它环回地址。

ASR9K环回地址：10.1.1.1/32

ASR1K环回地址：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，它充当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
```

现在，在ASR1K和ASR9K之间配置xconnect。将ASR1K(10.2.2.2/32)的环回地址指定为xconnect邻居。

```
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
!
```

现在，配置用户控制策略并应用到用户终止的PW-Ethernet接口。

```
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
 !
!
```

验证

本部分提供可用于验证配置是否正常运行的信息。以下命令可用于验证ASR9K上的xconnect是否为UP/UP。

```
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启用且IPoE会话联机后，您可以看到Access-interface为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
```

现在，检验BNG用户在PWHE上的第3层连接。

```
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#
```

故障排除

本节提供可用于对配置进行故障排除和验证ASR9K上的xconnect状态的信息。

用于验证ASR9K配置的命令

这些命令可用于验证ASR9K上的配置是否正确。

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

检查 L2VPN XC's

检查xconnect。Xconnect（以及AC和PW）必须启用。您可以使用这些命令来检验状态。

- 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
```

检查接口列表

显示PWHE使用的接口列表：它应存在并具有适当的接口。

- show general-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
```

检查接口列表使用的PWHE

以下专用输出指示哪些成员接口处于“活动”状态，即哪些成员接口已下载到FIB。

- show l2vpn generic-interface-list name <名称>
- 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
```

检查MA是否具有包含正确信息的PWHE

必须在MA中正确设置接口列表信息、CW、VC类型等。

```
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

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

检查PWHE摘要信息

检查输出中的计数器是否正确：

- 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
```

检查标签

检查标签表中的标签。您需要首先使用此命令从xconnect信息获取内部标签。

- show l2vpn xconnect detail

然后在输出中搜索internal Label，然后执行此show命令以验证ASR9K上的标签和接口关联。

- 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)
```

流量丢弃/会话未启动

如果会话未启动，请检查数据包是否在NP中丢弃。您可以使用这些命令查看ASR9K上NP中的数据包丢弃。

- clear counters
- show l2vpn xconnect detail | include packet
- clear controllers np counters all
- show controller np counters all

BNG相关的show命令

使用这些命令检查ASR9K上的BNG相关信息。

- show subscriber session all summary
- show subscriber manager disconnect-history unique summary
- show subscriber manager statistics调试总计
- show subscriber manager statistics summary total
- show subscriber manager trace event/error

要启用的调试

如果ASR9K上未启动会话，并且您在NP上未找到任何丢弃的数据包，则可以在ASR9K上启用这些调试，以查看为什么在ASR9K中会话没有启动。

- debug l2vpn ea pwhe platform verbose
- debug l2vpn forwarding platform common all
- debug pm api location <位置>
- debug pm error location <位置>
- debug uidb api errors location <location>

升级

如果您仍有问题，请联系Cisco TAC并从ASR9K收集Show tech。

- show tech-support subscriber
- show tech-support l2vpn

关于此翻译
思科采用人工翻译与机器翻译相结合的方式将此文档翻译成不同语言，希望全球的用户都能通过各自的语言得到支持性的内容。

请注意：即使是最好的机器翻译，其准确度也不及专业翻译人员的水平。

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