Sessão IPoE sobre Headend Pseudowire no gateway de rede de banda larga

Contents

Introduction

Este documento descreve as etapas para configurar sessões IP over Ethernet (IPoE) sobre Pseudowire Headend (PWHE) no ASR9K.

Prerequisites

Requirements

A Cisco recomenda que você tenha conhecimento destes tópicos:

- VPN de Camada 2 MPLS
- Funcionalidade BNG no ASR9K

Dica: consulte o artigo Guia de Configuração do Gateway de Rede de Banda Larga para Cisco ASR 9000 Series Cisco para obter familiaridade com a funcionalidade do BNG.

Dica: consulte o artigo MPLS Layer 2 VPNs Configuration Guide da Cisco para obter familiaridade com VPNs de Camada 2 do MPLS.

Componentes Utilizados

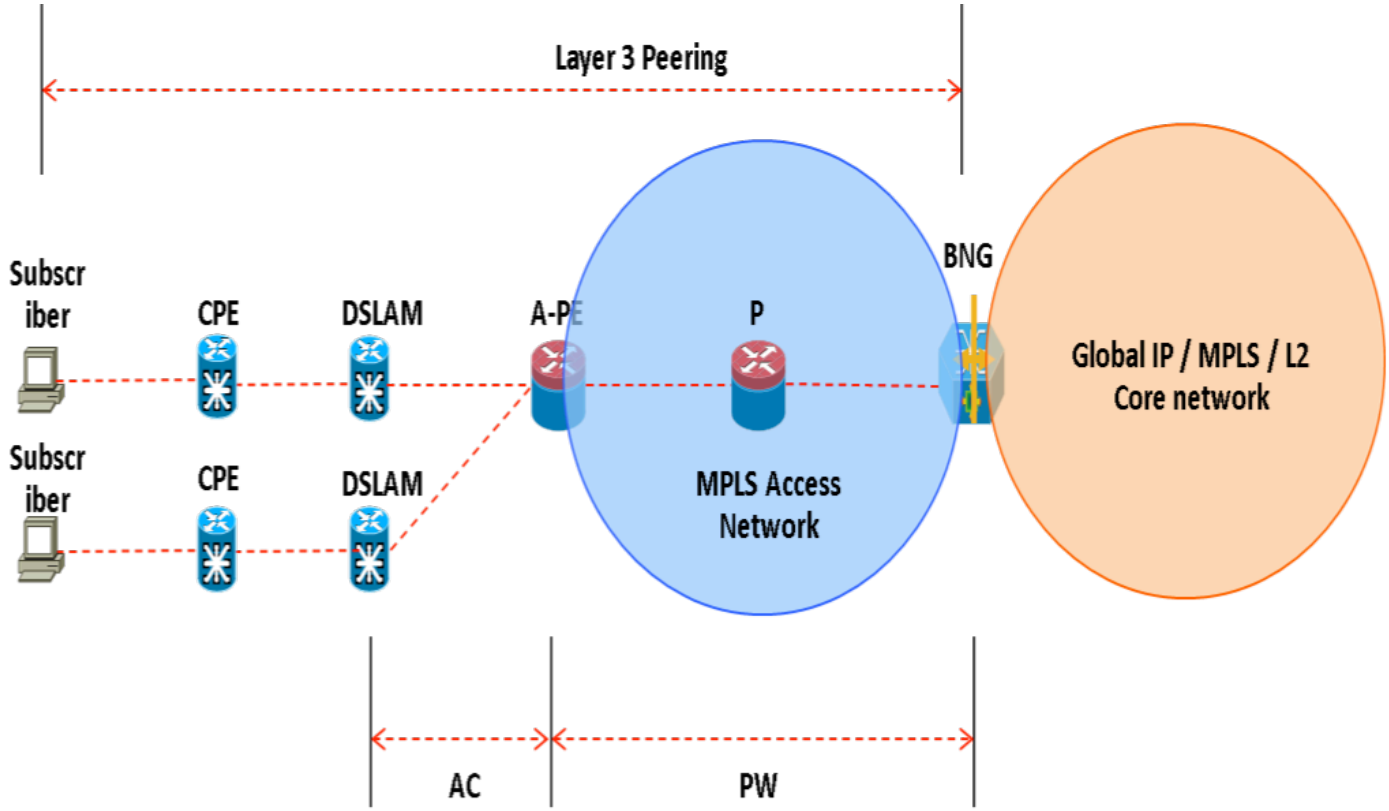
Este documento não está restrito à versão de software específica, mas a placa de linha que usamos no ASR9K é A9K-MPA-20X1GE.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Informações de Apoio

O BNG fornece suporte ao assinante sobre PWHE. O PWHE fornece conectividade de L3 para nós de borda do cliente através de uma conexão pseudofio. O PWHE termina os circuitos L2VPN que existem entre os nós de borda do provedor de acesso (A-PE), para uma interface virtual e executa o roteamento no pacote IP nativo. Cada interface virtual pode usar uma ou mais interfaces físicas em direção à nuvem de acesso para acessar os roteadores do cliente através dos nós A-PE.

Observação: esse recurso é suportado para assinantes PPPoE PTA, PPPoE LAC Subscriber Over PWHE e IPoE.



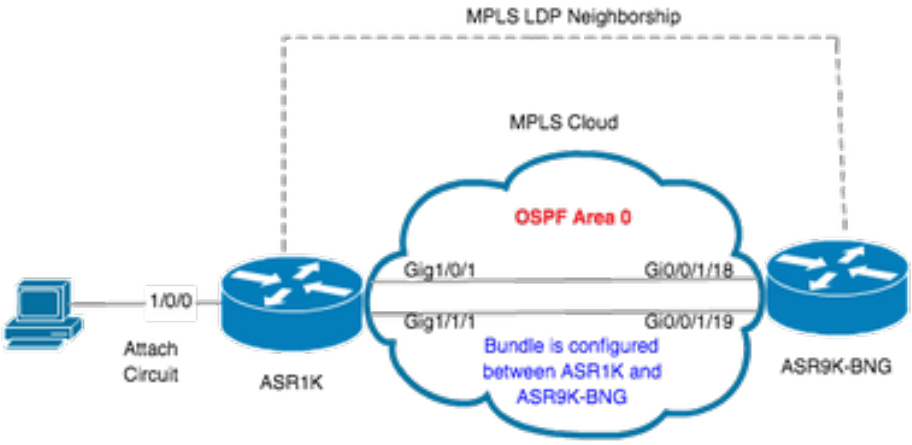
Configurar

Diagrama de Rede

Para realizar este teste, um ASR1K com a versão 154-3.S2 é empregado e o ASR9K com a versão IOS-XR 5.2.2. O OSPF é usado como protocolo de roteamento para acessar os endereços de loopback um do outro.

Endereço de loopback ASR9K: 10.1.1.1/32

Endereço de loopback ASR1K: 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

Aqui está a configuração do ASR9K, que atua como 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
```

Agora, configure o xconnect entre ASR1K e ASR9K. Especifique o endereço de loopback de ASR1K (10.2.2.2/32) como vizinho xconnect.

```
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
!
```

Agora, configure a política de controle do assinante e aplique na interface PW-Ethernet onde o assinante é terminado.

```
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
 !
!
```

Verificar

Esta seção fornece informações que você pode usar para verificar se sua configuração funciona corretamente. Estes são os comandos que você pode empregar para verificar se o xconnect está UP/UP no ASR9K.

```
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)
```

Uma vez que o xconnect é UP e a sessão IPoE fica on-line no ASR9K, você pode ver que a interface de acesso é 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
```

Agora, verifique a conectividade da camada 3 do assinante BNG sobre PWHE.

```
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#
```

Troubleshoot

Esta seção fornece informações que você pode usar para solucionar problemas de sua configuração e verificar o status do xconnect no ASR9K.

Comando para Verificar a Configuração do ASR9K

Esses comandos podem ser usados para verificar se a configuração está correta no ASR9K.

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

Verificar L2VPN XCs

Verifique o xconnect. O xconnect (e, portanto, o AC e o PW) deve estar ativo. Você pode empregar esses comandos para verificar o status.

- **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
```

Verifique a lista de interface

Exiba a lista de interface usada pelo PWHE: ela deve existir e ter as interfaces apropriadas.

- **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
```

Verificar PWHE usado por uma lista de interface

A saída privada abaixo indica quais interfaces de membro estão "ativas", ou seja, quais foram baixadas para a 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
```

Verifique se o MA tem o PWHE com informações corretas

As informações da lista de interface, CW, VC-type etc. devem ser definidas corretamente em MA.

```
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

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

Verificar informações de resumo PWHE

Verifique se os contadores na saída estão corretos:

- **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
```

Verificar Rótulos

Verifique o rótulo na tabela de rótulos. Você precisa primeiro obter os rótulos internos das informações do xconnect com este comando.

- **show l2vpn xconnect detail**

em seguida, procure **internal Label** na saída e execute este comando show para verificar a associação de rótulo e interface no ASR9K.

- **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)
```

Queda de tráfego/Sessões não surgem

Se a sessão não aparecer, verifique se os pacotes foram descartados em NP. Você pode usar esses comandos para ver o pacote cair em NP no ASR9K.

- **clear counters**

- show l2vpn xconnect detail pacote de inclusão |
- clear controllers np counters all
- show controller np counters all

Comandos show relacionados ao BNG

Use estes comandos para verificar as informações relacionadas ao BNG no ASR9K.

- show subscriber session all summary
- show subscriber manager disconnect-history unique summary
- total de show subscriber manager statistics debug
- total de show subscriber manager statistics summary
- show subscriber manager trace event/error

Depurações a serem habilitadas

Se a sessão não surgiu no ASR9K e você não encontrou nenhum pacote descartado no NP, então você pode habilitar essas depurações no ASR9K para ver por que a sessão não está surgindo no ASR9K.

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

Escalonamento

Se ainda tiver algum problema, entre em contato com o TAC da Cisco e obtenha o Show tech do ASR9K.

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

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