

IPoE Session over Pseudowire Headend in Broadband Network Gateway

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Introduction

This document describes the steps to configure IP over Ethernet (IPoE) sessions over Pseudowire Headend (PWHE) on ASR9K.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- MPLS Layer 2 VPN
- BNG Functionality on ASR9K

Tip: Refer to the [Broadband Network Gateway Configuration Guide for Cisco ASR 9000 Series](#) Cisco article in order to gain familiarity with BNG functionality.

Tip: Refer to the [MPLS Layer 2 VPNs Configuration Guide](#) Cisco article in order to gain familiarity with MPLS Layer 2 VPNs.

Components Used

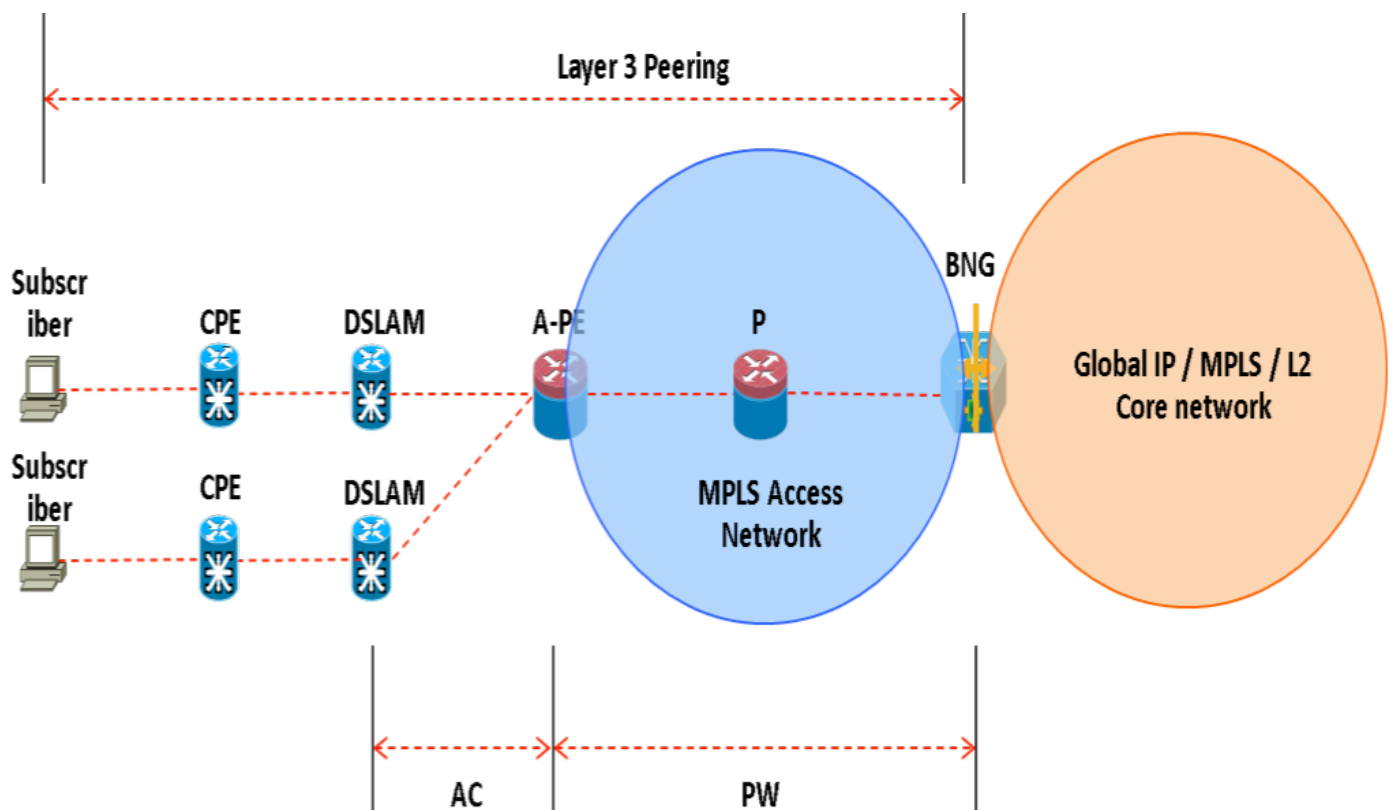
This document is not restricted to specific software version but the line card which we used on ASR9K is A9K-MPA-20X1GE.

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.

Background Information

BNG provides subscriber support over PWHE. PWHE provides L3 connectivity to customer edge nodes through a pseudowire connection. PWHE terminates the L2VPN circuits that exists between the access-provide edge (A-PE) nodes, to a virtual interface, and performs routing on the native IP packet. Each virtual interface can use one or more physical interfaces towards the access cloud to reach customer routers through the A-PE nodes.

Note: This feature is supported for PPPoE PTA, PPPoE LAC Subscriber Over PWHE and IPoE subscribers.



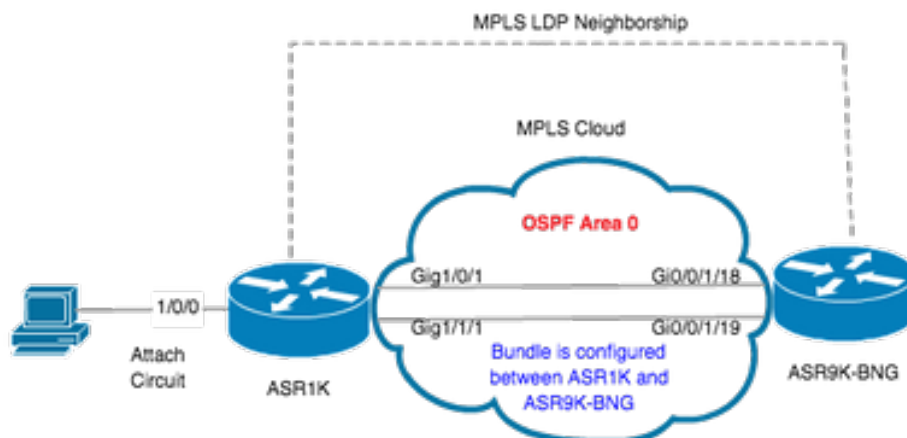
Configure

Network Diagram

In order to perform this test, one ASR1K with version 154-3.S2 is employed and ASR9K with version IOS-XR 5.2.2. OSPF is used as routing protocol to reach each other loopback addresses.

ASR9K Loopback Address: 10.1.1.1/32

ASR1K Loopback Address: 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

Here is the configuration from ASR9K, which acts as BNG PWHE.

```
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
```

Now, configure the xconnect between ASR1K and ASR9K. Specify the loopback address of ASR1K (10.2.2.2/32) as 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
!

```

Now, configure the subscriber control policy and apply on PW-Ethernet interface where subscriber is terminated.

```

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

```

Verify

This section provides information that you can use in order to verify that your configuration works properly. Here are the commands you can employ to verify that xconnect is UP/UP on 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)

Once the xconnect is UP and IPoE session comes online on ASR9K you can see that Access-interface is 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
```

Now, verify the Layer 3 connectivity of BNG subscriber over PWHE.

```
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
```

Troubleshoot

This section provides information that you can use in order to troubleshoot your configuration and verify the xconnect status on ASR9K.

Command to Verify the ASR9K Configuration

These commands can be used to verify the configuration is correct on ASR9K.

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

Check L2VPN XC's

Check the xconnect. The xconnect (and therefore the AC and PW) has to be up. You can employ these commands to verify the 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

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

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

Check the Interface List

Display the interface-list used by the PWHE: it should exist and have the appropriate interfaces.

- **show generic-interface-list name <NAME>**

```
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

```

Check PWHE Used by an Interface List

The private output below indicates which member interfaces are "active" i.e. which ones have been downloaded to FIB.

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

```

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

```

Check that MA has the PWHE with Right Information

Interface-list info, CW, VC-type etc., has to be set properly in 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

```

Check PWHE Summary Info

Check that counters in output are correct:

- **show l2vpn pwhe summary**

```

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: 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

```

Check Labels

Check label in label table. You need to first get the internal labels from xconnect information with this command.

- **show l2vpn xconnect detail**

then search for **internal Label** in the output and then execute this show command to verify the label and interface association on 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 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
```

Traffic Drop/Sessions do not come up

If session does not come up, check if packets dropped in NP. You can use these commands to see the packet drop in NP on ASR9K.

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

BNG Related Show Commands

Use these commands in order check the BNG related information on ASR9K.

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

Debugs to be Enabled

If session did not come up on ASR9K and you did not find any packet dropped on NP then you can enable these debugs on ASR9K to see why session is not coming up in 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>**

Escalation

If you still have an issue please reach out to Cisco TAC and collect the Show tech from ASR9K.

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