Configure PPPoE over BDI on ASR1k Series Routers

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Introduction

This document describes how to configure Point-to-Point Protocol over Ethernet (PPPoE) Server with the Bridge Domain Interface (BDI) and vlan-range.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- End-to-End Layer 1 connectivity is fine
- Basics of PPP and PPPoE are well understood

Components Used

The information in this document is based on these software and hardware versions:

- HOST-1 - CISCO887G
- HOST-2 - CISCO887
- SWITCH - WS-C3560-24TS-S
- PPPoE SERVER - ASR1001-X

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.

Configure
Note: Use the Command Lookup Tool (registered customers only) in order to obtain more information on the commands used in this section.

HOST-1

!
interface FastEthernet0
  switchport access vlan 100
  no ip address
end

!
interface Vlan100
  no ip address
  pppoe enable group global
  pppoe-client dial-pool-number 1
end

!
interface Dialer1
  ip address negotiated
  encapsulation ppp
  dialer pool 1
  ppp chap hostname dsl
  ppp chap password 0 dsl
end

!
HOST-2

!
interface FastEthernet0
  switchport access vlan 200
  no ip address
end

!
interface Vlan200
  no ip address
  pppoe enable group global
  pppoe-client dial-pool-number 1
end

!
interface Dialer1
  ip address negotiated
  encapsulation ppp
  dialer pool 1
  ppp chap hostname dsl
  ppp chap password 0 dsl
end

!
SWITCH
SWITCH#sh cdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
            S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
            D - Remote, C - CVTA, M - Two-port Mac Relay

<table>
<thead>
<tr>
<th>Device ID</th>
<th>Local Intrfce</th>
<th>Holdtme</th>
<th>Capability</th>
<th>Platform</th>
<th>Port ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVER</td>
<td>Gig 0/1</td>
<td>130</td>
<td>R I</td>
<td>ASR1001-X</td>
<td>Gig 0/0/0</td>
</tr>
<tr>
<td>HOST-1</td>
<td>Fas 0/2</td>
<td>141</td>
<td>R B S I</td>
<td>887G</td>
<td>Fas 0</td>
</tr>
<tr>
<td>HOST-2</td>
<td>Fas 0/1</td>
<td>167</td>
<td>R B S I</td>
<td>887</td>
<td>Fas 0</td>
</tr>
</tbody>
</table>

interface FastEthernet0/2
  switchport access vlan 100
end

interface FastEthernet0/1
  switchport access vlan 200
end

interface GigabitEthernet0/1
  switchport trunk encapsulation dot1q
  switchport trunk allowed vlan 100,200
  switchport mode trunk
end

PPPoe SERVER

username dsl password 0 dsl

bba-group pppoe global
  virtual-template 1
  interface GigabitEthernet0/0/0
    no ip address
    negotiation auto
    cdp enable
    service instance 100 ethernet
      encapsulation dot1q 100 etype pppoe-all
      rewrite ingress tag pop 1 symmetric
      bridge-domain 100
    
  service instance 200 ethernet
    encapsulation dot1q 200 etype pppoe-all
    rewrite ingress tag pop 1 symmetric
    bridge-domain 200

interface Virtual-Template1
  ip unnumbered Loopback0
  peer default ip address pool POOL
  ppp authentication chap
interface BDI100
  no ip address
  pppoe enable group global

interface BDI200
  no ip address
  pppoe enable group global

interface Loopback0
  ip address 192.168.10.1 255.255.255.255
end

ip local pool POOL 192.168.1.1 192.168.1.100

Alternatively, you can configure 'vlan-range' as shown:

interface GigabitEthernet0/0/0
  no ip address
  negotiation auto
  service instance 100 ethernet
  encapsulation default
  bridge-domain 1
end

interface BDI1
  no ip address
  vlan-range dot1q 1 4094
  pppoe enable group global
end

Network Diagram

Verify

Use this section in order to confirm that your configuration works properly.

On HOST-1
HOST-1# show pppoe session

1 client session

<table>
<thead>
<tr>
<th>Uniq ID</th>
<th>PPPoE</th>
<th>RemMAC</th>
<th>Port</th>
<th>VID</th>
<th>VA</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>5</td>
<td>00a2.eee6.663f</td>
<td>0100</td>
<td>Di1</td>
<td>Vi2</td>
<td>Up</td>
</tr>
</tbody>
</table>

HOST-1# show ip interface brief | exclude un

<table>
<thead>
<tr>
<th>Interface</th>
<th>IP-Address</th>
<th>OK? Method Status</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialer1</td>
<td>192.168.1.4</td>
<td>YES IPCP up</td>
<td>up</td>
</tr>
</tbody>
</table>

HOST-1# show caller ip

| Line | User    | IP Address | Local Number | Remote Number | <-|>
|------|---------|------------|--------------|---------------|---|---
| Vi2  | SERVER  | 192.168.10.1 | -            | <unknown phone | in |

HOST-1# ping 192.168.10.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.1, timeout is 2 seconds:
!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms

HOST-1# show ppp interface virtual-Access 2

PPP Serial Context Info

<table>
<thead>
<tr>
<th>Interface</th>
<th>PPP Serial Handle</th>
<th>PPP Handle</th>
<th>SSS Handle</th>
<th>AAA ID</th>
<th>Access IE</th>
<th>SHDB Handle</th>
<th>State</th>
<th>Last State</th>
<th>Last Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vi2</td>
<td>0x1F000003</td>
<td>0xB2000003</td>
<td>0x8000004</td>
<td>24</td>
<td>0xA7000003</td>
<td>0x0</td>
<td>Up</td>
<td>Binding</td>
<td>LocalTerm</td>
</tr>
</tbody>
</table>

PPP Session Info

<table>
<thead>
<tr>
<th>Interface</th>
<th>PPP ID</th>
<th>Phase</th>
<th>Stage</th>
<th>Peer Name</th>
<th>Peer Address</th>
<th>Control Protocols</th>
<th>Session ID</th>
<th>AAA Unique ID</th>
<th>SSS Manager ID</th>
<th>SIP ID</th>
<th>PPP_IN_USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vi2</td>
<td>0xB2000003</td>
<td>UP</td>
<td>Local Termination</td>
<td>SERVER</td>
<td>192.168.10.1</td>
<td>LCP[Open] IPCP[Open] CDPCP[Stopped]</td>
<td>3</td>
<td>24</td>
<td>0xB8000004</td>
<td>0x1F000003</td>
<td>0x11</td>
</tr>
</tbody>
</table>

Vi2 LCP: [Open]

Our Negotiated Options

Vi2 LCP: MagicNumber 0x7735647E (0x05067735647E)

Peer's Negotiated Options

Vi2 LCP: MRU 1500 (0x010405DC)

Vi2 LCP: AuthProto CHAP (0x0305c22305)
Vi2 LCP: MagicNumber 0xA7A011AC (0x0506A7A011AC)

Vi2 IPCP: [Open]
Our Negotiated Options
Vi2 IPCP: Address 192.168.1.5 (0x0306C0A80105)
Peer's Negotiated Options
Vi2 IPCP: Address 192.168.10.1 (0x0306C0A80A01)

On HOST-2

HOST-2#show ip interface brief | exclude un

<table>
<thead>
<tr>
<th>Interface</th>
<th>IP-Address</th>
<th>OK? Method</th>
<th>Status</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialer1</td>
<td>192.168.1.6</td>
<td>YES IPCP</td>
<td>up</td>
<td>up</td>
</tr>
</tbody>
</table>

HOST-2#show caller ip

<table>
<thead>
<tr>
<th>Line</th>
<th>User</th>
<th>IP Address</th>
<th>Local Number</th>
<th>Remote Number</th>
<th>&lt;-&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vi2</td>
<td>SERVER</td>
<td>192.168.10.1</td>
<td>-</td>
<td>&lt;unknown phone</td>
<td>in</td>
</tr>
</tbody>
</table>

HOST-2#ping 192.168.10.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms

HOST-2#show ppp interface virtual-Access 2
PPP Serial Context Info

-----------
<table>
<thead>
<tr>
<th>Interface</th>
<th>Vi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPP Serial Handle:</td>
<td>0x7B00000A</td>
</tr>
<tr>
<td>PPP Handle:</td>
<td>0xA000000A</td>
</tr>
<tr>
<td>SSS Handle:</td>
<td>0x4C00000B</td>
</tr>
<tr>
<td>AAA ID:</td>
<td>68</td>
</tr>
<tr>
<td>Access IE:</td>
<td>0x1D00000A</td>
</tr>
<tr>
<td>SHDB Handle:</td>
<td>0x0</td>
</tr>
<tr>
<td>State:</td>
<td>Up</td>
</tr>
<tr>
<td>Last State:</td>
<td>Binding</td>
</tr>
<tr>
<td>Last Event:</td>
<td>LocalTerm</td>
</tr>
</tbody>
</table>

PPP Session Info

-----------
<table>
<thead>
<tr>
<th>Interface</th>
<th>Vi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPP ID:</td>
<td>0xA000000A</td>
</tr>
<tr>
<td>Phase:</td>
<td>UP</td>
</tr>
<tr>
<td>Stage:</td>
<td>Local Termination</td>
</tr>
<tr>
<td>Peer Name:</td>
<td>SERVER</td>
</tr>
<tr>
<td>Peer Address:</td>
<td>192.168.10.1</td>
</tr>
<tr>
<td>Session ID:</td>
<td>10</td>
</tr>
<tr>
<td>AAA Unique ID:</td>
<td>68</td>
</tr>
<tr>
<td>SSS Manager ID:</td>
<td>0x4C00000B</td>
</tr>
<tr>
<td>SIP ID:</td>
<td>0x7B00000A</td>
</tr>
<tr>
<td>PPP_IN_USE:</td>
<td>0x11</td>
</tr>
</tbody>
</table>

Vi2 LCP: [Open]
Our Negotiated Options
Vi2 LCP: MagicNumber 0x421AC8AB (0x0506421AC8AB)
Peer's Negotiated Options
Vi2 LCP: MRU 1500 (0x010405DC)
Vi2 LCP:  AuthProto CHAP (0x0305C22305)
Vi2 LCP:  MagicNumber 0xA7A0942C (0x0506A7A0942C)

Vi2 IPCP: [Open]
Our Negotiated Options
Vi2 IPCP:  Address 192.168.1.6 (0x0306C0A80106)
Peer's Negotiated Options
Vi2 IPCP:  Address 192.168.10.1 (0x0306C0A80A01)

On SWITCH

SWITCH#show vlan brief

<table>
<thead>
<tr>
<th>VLAN</th>
<th>Name</th>
<th>Status</th>
<th>Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>default</td>
<td>active</td>
<td>Fa0/4, Fa0/5, Fa0/6, Fa0/7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fa0/8, Fa0/9, Fa0/10, Fa0/11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fa0/12, Fa0/13, Fa0/14, Fa0/15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fa0/16, Fa0/17, Fa0/18, Fa0/19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fa0/20, Fa0/21, Fa0/22, Fa0/23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fa0/24, Gi0/2</td>
</tr>
<tr>
<td>11</td>
<td>VLAN0011</td>
<td>active</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>VLAN0012</td>
<td>active</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>VLAN0013</td>
<td>active</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>VLAN0100</td>
<td>active</td>
<td>Fa0/2</td>
</tr>
<tr>
<td>200</td>
<td>VLAN0200</td>
<td>active</td>
<td>Fa0/1</td>
</tr>
</tbody>
</table>

SWITCH#Show interface trunk

<table>
<thead>
<tr>
<th>Port</th>
<th>Mode</th>
<th>Encapsulation</th>
<th>Status</th>
<th>Native vlan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gi0/1</td>
<td>on</td>
<td>802.1q</td>
<td>trunking</td>
<td>1</td>
</tr>
</tbody>
</table>

Port Vlans allowed on trunk
Gi0/1 100,200

Port Vlans allowed and active in management domain
Gi0/1 100,200

Port Vlans in spanning tree forwarding state and not pruned
Gi0/1 100,200

On PPPoE SERVER

SERVER#show pppoe session
2 sessions in LOCALLY_TERMINATED (PTA) State
2 sessions total

<table>
<thead>
<tr>
<th>Uniq ID</th>
<th>PPPoE</th>
<th>RemMAC</th>
<th>Port</th>
<th>VT</th>
<th>VA</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SID</td>
<td>LocMAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>c471.fe93.d112</td>
<td>BD100</td>
<td>1</td>
<td>V2.2</td>
<td>PTA</td>
</tr>
<tr>
<td></td>
<td>00a.2.eee6.663f</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>e8b7.4886.b8ea</td>
<td>BD200</td>
<td>1</td>
<td>V2.1</td>
<td>PTA</td>
</tr>
<tr>
<td></td>
<td>00a.2.eee6.663f</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SERVER#show caller ip

<table>
<thead>
<tr>
<th>Line</th>
<th>User</th>
<th>IP Address</th>
<th>Local Number</th>
<th>Remote Number</th>
<th>&lt;-</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2.1</td>
<td>dsl</td>
<td>192.168.1.6</td>
<td>-</td>
<td>-</td>
<td>in</td>
</tr>
<tr>
<td>V2.2</td>
<td>dsl</td>
<td>192.168.1.5</td>
<td>-</td>
<td>-</td>
<td>in</td>
</tr>
</tbody>
</table>
SERVER#show ip local pool POOL

<table>
<thead>
<tr>
<th>Pool</th>
<th>Begin</th>
<th>End</th>
<th>Free</th>
<th>In use</th>
</tr>
</thead>
<tbody>
<tr>
<td>POOL</td>
<td>192.168.1.1</td>
<td>192.168.1.100</td>
<td>98</td>
<td>2</td>
</tr>
</tbody>
</table>

Available addresses:
- 192.168.1.7
- 192.168.1.8
- 192.168.1.9

......

......

When you use 'vlan-range', notice change in 'Port':

SERVER#show pppoe session
2 sessions in LOCALLY_TERMINATED (PTA) State
2 sessions total

<table>
<thead>
<tr>
<th>Uniq ID</th>
<th>PPPoE</th>
<th>RemMAC</th>
<th>Port</th>
<th>VT</th>
<th>VA</th>
<th>VA-st</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>7</td>
<td>c471.fe93.d112 BD1</td>
<td></td>
<td>1</td>
<td>Vi2.1</td>
<td>UP</td>
<td>PTA</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>e8b7.4886.b8ea BD1</td>
<td></td>
<td>1</td>
<td>Vi2.2</td>
<td>UP</td>
<td>PTA</td>
</tr>
</tbody>
</table>

SERVER#show caller ip

<table>
<thead>
<tr>
<th>Line</th>
<th>User</th>
<th>IP Address</th>
<th>Local Number</th>
<th>Remote Number</th>
<th>&lt;-</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vi2.1</td>
<td>dsl</td>
<td>192.168.1.7</td>
<td>-</td>
<td>-</td>
<td>in</td>
<td></td>
</tr>
<tr>
<td>Vi2.2</td>
<td>dsl</td>
<td>192.168.1.8</td>
<td>-</td>
<td>-</td>
<td>in</td>
<td></td>
</tr>
</tbody>
</table>

Troubleshoot

This section provides information you can use in order to troubleshoot your configuration.

These debugs will be helpful to troubleshoot PPP/PPPoE.

- debug pppoe events
- debug pppoe errors
- debug ppp negotiation

Related Information

- PPPoE over BDI on CISCO CSR 1000V
- Enhancement Bug - PPPoE Termination on BDI and vlan-range on ASR1k
- Technical Support & Documentation - Cisco Systems