



BGP-based VPWS Autodiscovery

An important aspect of VPN technologies is the ability of network devices to automatically signal to other devices about an association with a particular VPN. Autodiscovery refers to the process of finding all the provider edge routers that participate in a given VPWS instance.

The two primary functions of the VPWS control plane are: auto-discovery and signaling. Both of these functions are accomplished with a single BGP Update advertisement.

When a VPWS cross-connect is configured with BGP auto-discovery and signaling enabled, BGP needs to distribute NLRI for the xconnect with the PE as the BGP next-hop and appropriate CE-ID. Additionally, the cross-connect is associated with one or more BGP export Route Targets (RTs) that are also distributed (along with NLRI).

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Configuring VPWS with BGP Autodiscovery and Signaling

Perform this task to configure BGP-based autodiscovery and signaling.

Procedure

- | | |
|---------------|--|
| Step 1 | configure

Example:
<pre>RP/0/RP0/CPU0:router# configure</pre>
Enters the global configuration mode. |
| Step 2 | l2vpn

Example:
<pre>RP/0/RP0/CPU0:router(config)# l2vpn</pre>
Enters L2VPN configuration mode. |
| Step 3 | xconnect group <i>group name</i> |

Example:

```
RP/0/RP0/CPU0:router(config-l2vpn)# xconnect group gr1
```

Enters configuration mode for the named xconnect group.

Step 4 **mp2mp *vpws-domain name*****Example:**

```
RP/0/RP0/CPU0:router(config-l2vpn-xc)# mp2mp mp1
```

Enters configuration mode for the named vpws domain.

Step 5 **vpn-id *vpn-id*****Example:**

```
RP/0/RP0/CPU0:router(config-l2vpn-xc-m2mp)# vpn-id 100
```

Specifies the identifier for the VPWS service.

Step 6 **l2 encapsulation *vlan*****Example:**

```
RP/0/RP0/CPU0:router(config-l2vpn-xc-m2mp)# l2-encapsulation vlan
```

Configure the L2 encapsulation for this L2VPN MP2MP Instance.

Step 7 **autodiscovery *bgp*****Example:**

```
RP/0/RP0/CPU0:router(config-l2vpn-xc-m2mp)# autodiscovery bgp
```

Enters BGP autodiscovery configuration mode where all BGP autodiscovery parameters are configured.

Step 8 **rd { *as-number:nn* | *ip-address:nn* | **auto** }****Example:**

```
RP/0/RP0/CPU0:router(config-l2vpn-xc-m2mp-ad)# rd auto
```

Specifies the route distinguisher (RD).

Step 9 **route-target { *as-number:nn* | *ip-address:nn* | **export** | **import** }****Example:**

```
RP/0/RP0/CPU0:router(config-l2vpn-xc-m2mp-ad)# route-target 500:99
```

Specifies the route target (RT).

Step 10 **signaling-protocol bgp****Example:**

```
RP/0/RP0/CPU0:router(config-l2vpn-xc-mp2mp-ad)# signaling-protocol bgp
```

Enables BGP signaling, and enters the BGP signaling configuration submode where BGP signaling parameters are configured.

Step 11 **ce-id { number }****Example:**

```
RP/0/RP0/CPU0:router(config-l2vpn-xc-mp2mp-ad-sig)# ce-id 10
```

Specifies the local Customer Edge Identifier.

Step 12 Use the **commit** or **end** command.

commit - Saves the configuration changes and remains within the configuration session.

end - Prompts user to take one of these actions:

- **Yes** - Saves configuration changes and exits the configuration session.
- **No** - Exits the configuration session without committing the configuration changes.
- **Cancel** - Remains in the configuration mode, without committing the configuration changes.

VPWS with BGP Autodiscovery and BGP Signaling

The following figure illustrates an example of configuring and verifying VPWS with BGP autodiscovery (AD) and BGP Signaling.

Figure 1: VPLS with BGP autodiscovery and BGP signaling

**Configuration at PE1:**

```
l2vpn
  xconnect group gr1
  mp2mp mp1
  vpn-id 100
  l2 encapsulation vlan
  autodiscovery bgp
  rd auto
  route-target 2.2.2.2:100
  ! Signaling attributes
```

```

signaling-protocol bgp
ce-id 1
interface GigabitEthernet0/1/0/1.1 remote-ce-id 2

```

Configuration at PE2:

```

l2vpn
xconnect group gr1
mp2mp mp1
vpn-id 100
l2 encapsulation vlan
autodiscovery bgp
rd auto
route-target 2.2.2.2:100
! Signaling attributes
signaling-protocol bgp
ce-id 2
interface GigabitEthernet0/1/0/2.1 remote-ce-id 1

```

Verification:

PE1:

```
PE1# show l2vpn discovery xconnect
```

```
Service Type: VPWS, Connected
```

```
List of VPNs (1 VPNs):
```

```
XC Group: gr1, MP2MP mp1
```

```
List of Local Edges (1 Edges):
```

```
Local Edge ID: 1, Label Blocks (1 Blocks)
```

Label base Offset	Size	Time Created
-----	----	-----
16030 1	10	01/24/2009 21:23:04
Status Vector: 9f ff		

```
List of Remote Edges (1 Edges):
```

```
Remote Edge ID: 2, NLRIs (1 NLRIs)
```

Label base Offset	Size	Peer ID	Time Created
-----	----	-----	-----
16045 1	10	1.1.1.1	01/24/2009 21:29:35
Status Vector: 7f ff			

```
PE1# show l2vpn xconnect mp2mp detail
```

```
Group gr1, MP2MP mp1, state: up
```

```
VPN ID: 100
```

```
VPN MTU: 1500
```

```

L2 Encapsulation: VLAN

Auto Discovery: BGP, state is Advertised (Service Connected)

    Route Distinguisher: (auto) 3.3.3.3:32770

    Import Route Targets:

        2.2.2.2:100

    Export Route Targets:

        2.2.2.2:100

    Signaling protocol:BGP

    CE Range:10

....

Group gr1, XC mpl.1:2, state is up; Interworking none

Local CE ID: 1, Remote CE ID: 2, Discovery State: Advertised

AC: GigabitEthernet0/1/0/1.1, state is up

    Type VLAN; Num Ranges: 1

    VLAN ranges: [1, 1]

    MTU 1500; XC ID 0x2000013; interworking none

PW: neighbor 1.1.1.1, PW ID 65538, state is up ( established )

    PW class not set, XC ID 0x2000013

    Encapsulation MPLS, Auto-discovered (BGP), protocol BGP

        MPLS          Local                      Remote
        -----
        Label          16031                      16045
        MTU             1500                      1500
        Control word enabled                      enabled
        PW type         Ethernet VLAN              Ethernet VLAN
        CE-ID           1                          2
        -----

...

PE1# show bgp l2vpn vpws

BGP router identifier 3.3.3.3, local AS number 100

BGP generic scan interval 60 secs

```

```

BGP table state: Active

Table ID: 0x0

BGP main routing table version 913

BGP NSR converge version 3

BGP NSR converged

BGP scan interval 60 secs

Status codes: s suppressed, d damped, h history, * valid, > best
                i - internal, S stale

Origin codes: i - IGP, e - EGP, ? - incomplete

      Network          Next Hop      Rcvd Label      Local Label

Route Distinguisher: 1.1.1.1:32775

*>i2:1/32              1.1.1.1          16045           nolabel
*>i3:1/32              1.1.1.1          16060           nolabel

Route Distinguisher: 3.3.3.3:32770 (default for vrf gr1:mp1)

*> 1:1/32              0.0.0.0          nolabel         16030
*>i2:1/32              1.1.1.1          16045           nolabel
*>i3:1/32              1.1.1.1          16060           nolabel

```

Processed 5 prefixes, 5 paths

PE2:

```
PE2# show l2vpn discovery xconnect
```

Service Type: VPWS, Connected

List of VPNs (1 VPNs):

XC Group: gr1, MP2MP mp1

List of Local Edges (2 Edges):

Local Edge ID: 2, Label Blocks (1 Blocks)

Label base Offset	Size	Time Created
-----	-----	-----
16045 1	10	01/24/2009 21:09:14

Status Vector: 7f ff

Local Edge ID: 3, Label Blocks (1 Blocks)

Label base Offset	Size	Time Created
-------------------	------	--------------

```

-----
16060      1      10      01/24/2009 21:09:14

```

Status Vector: 7f ff

List of Remote Edges (1 Edges):

Remote Edge ID: 1, NLRIs (1 NLRIs)

Label base Offset	Size	Peer ID	Time Created
-----	----	-----	-----
16030 1 10		3.3.3.3	01/24/2009 21:09:16

Status Vector: 9f ff

PE2# show l2vpn xconnect mp2mp detail

Group gr1, MP2MP mp1, state: up

VPN ID: 100

VPN MTU: 1500

L2 Encapsulation: VLAN

Auto Discovery: BGP, state is Advertised (Service Connected)

Route Distinguisher: (auto) 1.1.1.1:32775

Import Route Targets:

2.2.2.2:100

Export Route Targets:

2.2.2.2:100

Signaling protocol: BGP

CE Range: 10

...

Group gr1, XC mp1.2:1, state is up; Interworking none

Local CE ID: 2, Remote CE ID: 1, Discovery State: Advertised

AC: GigabitEthernet0/1/0/2.1, state is up

Type VLAN; Num Ranges: 1

VLAN ranges: [1, 1]

MTU 1500; XC ID 0x2000008; interworking none

PW: neighbor 3.3.3.3, PW ID 131073, state is up (established)

PW class not set, XC ID 0x2000008

Encapsulation MPLS, Auto-discovered (BGP), protocol BGP

MPLS	Local	Remote
Label	16045	16031
MTU	1500	1500
Control word enabled		enabled
PW type	Ethernet VLAN	Ethernet VLAN
CE-ID	2	1

...

PE2# show bgp l2vpn vpws

BGP router identifier 1.1.1.1, local AS number 100

BGP generic scan interval 60 secs

BGP table state: Active

Table ID: 0x0

BGP main routing table version 819

BGP NSR converge version 7

BGP NSR converged

BGP scan interval 60 secs

Status codes: s suppressed, d damped, h history, * valid, > best

i - internal, S stale

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	Next Hop	Rcvd Label	Local Label
Route Distinguisher: 1.1.1.1:32775 (default for vrf gr1:mp1)			
*>i1:1/32	3.3.3.3	16030	nolabel
*> 2:1/32	0.0.0.0	nolabel	16045
*> 3:1/32	0.0.0.0	nolabel	16060
Route Distinguisher: 3.3.3.3:32770			
*>i1:1/32	3.3.3.3	16030	nolabel

Processed 4 prefixes, 4 paths