



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:

```
RP/0/RP0/CPU0:router# configure
```

Enters the global configuration mode.

Step 2 **l2vpn**

Example:

```
RP/0/RP0/CPU0:router(config)# l2vpn
```

Enters L2VPN configuration mode.

Step 3 **xconnect group *group name***

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-mp2mp)#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-mp2mp)#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-mp2mp-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-mp2mp-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
```