



## L2VPN over SR-TE Preferred Path

**Table 1: Feature History**

Feature Name	Release Information	Description
L2VPN Traffic Steering Using SR-TE Preferred Path with Flexible Algorithm	Cisco IOS XE Bengaluru 17.6.1	This feature allows you to configure an SR policy with as the preferred path for a VPWS or VPLS pseudowire, with Flexible Algorithm. VPWS or VPLS pseudowires between same PEs can be routed over different SR policies based on the requirements. Prior to this release, you could only steer the traffic using the SR policy for routing IPv4 traffic to a destination pseudowire (over IGP or BGP-LU).

Virtual Private LAN Services (VPLS) enables enterprises to link together multiple Ethernet-based LANs via the infrastructure provided by their service provider.

VPLS uses the service provider core to join multiple attachment circuits of an enterprise to simulate a virtual bridge. From the enterprise point of view, there is no topology for VPLS. All customer edge (CE) devices appear to connect to a logical bridge emulated by the service provider core.

Prior to Cisco IOS XE Bengaluru Release 17.6.1, L2VPN (VPLS or VPWS) traffic over SR policies could not be steered. You could only steer IPv4 traffic using the SR policy for routing IPv4 traffic to a destination pseudowire (over IGP or BGP-LU).

Now you configure an SR policy as the preferred path for a VPWS or VPLS pseudowire, with Flexible Algorithm. VPWS or VPLS pseudowires between same PEs can also be routed over different SR policies.

### Disable Fallback Option

The disable fallback option disables the router from using the default path when the preferred path SR policy goes down.

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## Restrictions

- You cannot add On-Demand (ODN) policies to the preferred path.
- L2VPN over SR-TE preferred path is only supported on SR Per Destination Policy (PDP); and not on the SR Per-Flow Policy (PFP).
- L2VPN over SR-TE preferred path can only be configured using the pseudowire interface.
- This feature is supported only on IS-IS protocol

## Configuring L2VPN Traffic Steering Using SR-TE Preferred Path with Flexible Algorithm

To configure IS-IS with Flex Algo:

```
router isis 1

affinity-map green bit-position 0
affinity-map red bit-position 1
affinity-map yello bit-position 2
flex-algo 128
  advertise-definition
  metric-type delay
  priority 200
  affinity
    exclude-any
    name red
    name yellow
!
flex-algo 129
  advertise-definition
  priority 200
  affinity
    exclude-any
    name green
    name red

interface Tunnel100
isis affinity flex-algo
  name green
!
interface Tunnel101
isis affinity flex-algo
  name yellow
!
interface Tunnel102
isis affinity flex-algo
  name red
```

```

segment-routing traffic-eng
policy p-2000
color 2000 end-point 10.4.4.4
performance-measurement
delay-measurement
candidate-paths
preference 10
constraints
segments
dataplane mpls
algorithm 128
!
!
!
dynamic

```

To create SR static policy for MPLS label:

```

configure terminal segment-routing traffic-eng
segment-list name segment-name
index 1 mpls label first hop label
index 2 mpls label second hop label !
policy policy-name
color color-code end-point destination IP Address candidate-paths
preference preference
explicit segment-list segment-name
constraints
segments dataplane mpls

```

You can also create SR static policy for the following:

- MPLS adjacency
- MPLS prefix

L2VPN over SR-TE preferred path can be configured in the following ways:

- Non-Template based Configuration
- Template-based Configuration

#### Non-template Based Configuration:

- **Create Pseudowire**

To create pseudowire:

```

interface pseudowire 1
encapsulation mpls
neighbor peer-address vc-id

```

- **Attach Policy Using Preferred Path**

To attach a policy using the preferred path:

```

interface pseudowire1
preferred-path segment-routing traffic-eng policy policy-name [disable-fallback]

```

#### Template-based Configuration:

- **Create Template Type Pseudowire**

To create template type pseudowire:

```

template type pseudowire name
  encapsulation mpls
  preferred-path segment-routing traffic-eng policy name [disable-fallback]

```

- **Attach Policy Using Preferred Path**

To attach a policy using the preferred path:

```

interface pseudowire 1
  source template type pseudowire name

```

## Configuration Example 1: VPWS Psuedowire over SR-TE Preferred Path

```

!
interface
  gi0/0/1
  service instance 1000
  ethernet encapsulation
  dot1q 1000 !
  template type pseudowire l2vpntest
  encapsulation mpls
  preferred-path Segment-Routing traffic-eng policy p106
  l2vpn xconnect context l2vpn-test
  member 10.6.6.6 1000 template
  l2vpntest member gi0/0/1
  service-instance 1000 !

```

## Configuration Example 2: VPWS Psuedowire over SR-TE Preferred Path

```

!
!
interface gi0/0/1
  service instance 1000 ethernet
  encapsulation dot1q 1000
  !
  template type pseudowire
  l2vpntest encapsulation mpls
  preferred-path Segment-Routing traffic-eng policy p106 !

interface pseudowire1000
  source template type pseudowire l2vpntest
  encapsulation mpls neighbor 10.1.1.1 1000 !

l2vpn xconnect context l2vpn-test
member pseudowire 1000
member gi0/0/1 service-instance 1000

```

## Configuration Example 3: VPLS Psuedowire over SR-TE Preferred Path

```

interface gi0/0/1

service instance 1000
ethernet encapsulation
dot1q 1000 !

interface pseudowire106
encapsulation mpls
neighbor 10.6.6.6 1000

preferred-path Segment-Routing traffic-eng policy p106 !
interface pseudowire104
encapsulation mpls
neighbor 10.4.4.4 1000

preferred-path Segment-Routing traffic-eng policy p104
!
l2vpn vfi context VC_1000 vpn id 1000 member
pseudowire106 member pseudowire104
!

bridge-domain 1000

member gi0/0/1 service-instance
1000 member vfi VC_1000

```

## Verification of L2VPN over SR-TE Preferred Path Configuration

Use the `show segment-routing traffic-eng policy name policy name detail` command to verify the policy configuration:

```

Router#show segment-routing traffic-eng policy name CE11-PE12 detail

Name: CE11-PE12 (Color: 50 End-point: 10.12.12.12)
Owners : CLI
Status:
Admin: up, Operational: up for 70:04:00 (since 08-17 07:55:36.536)
Candidate-paths:
Preference 100 (CLI):
Explicit: segment-list IntraDomain (active)
Weight: 1, Metric Type: TE
16005
16008
16010
Attributes:
Binding SID: 20
Allocation mode: dynamic
State: Programmed
Tunnel ID: 65538 (Interface Handle: 0x20)
Per owner configs:
CLI
Binding SID: dynamic
Stats:
Packets: 0 Bytes: 0

```

```

Event history:
Timestamp          Client          Event type          Context:
Value
-----:-----
10-28 04:05:37.028 L2VPN           Policy created      Name: L2VPN
10-28 04:05:37.048 L2VPN           BSID allocated      FWD: label
20 10-28 04:05:37.494 L2VPN           Client removed      Owner:
Destroyed
10-28 04:05:37.494 CLI             Set colour          Colour:
230 10-28 04:05:37.494 CLI             Set end point       End-point:
12.12.12.12
10-28 04:05:37.496 CLI             Set explicit path   Path option:
IntraDomain
10-28 04:08:22.873 FH Resolution     Policy state UP     Status:
PATH RESOLVED
10-28 04:08:45.630 FH Resolution     REOPT triggered     Status:
REOPTIMIZED

```

Use **show mpls l2transport vc 1000 detail** command to verify the L2VPN over SR-TE preferred path:

```

Router#show mpls l2transport vc 1000 detail
Local interface: VFI_VC_1000 vfi up
Interworking type is Ethernet
Destination address: 10.12.12.12, VC ID: 1000, VC status: up
  Output interface: tu65538, imposed label stack {16005 16008 16010 32}
  Preferred path: not configured
  Default path: active
  Next hop: 10.168.1.1
Create time: 1w4d, last status change time: 22:50:57
Last label FSM state change time: 22:51:46
Signaling protocol: LDP, peer 10.1.1.1:0 up
Targeted Hello: 10.2.2.2(LDP Id) -> 10.1.1.1, LDP is UP
Graceful restart: not configured and not enabled
Non stop routing: not configured and not enabled
Status TLV support (local/remote)   : enabled/supported
  LDP route watch                    : enabled
  Label/status state machine          : established, LruRru
  Last local dataplane                status rcvd: No fault
  Last BFD dataplane                  status rcvd: Not sent
  Last BFD peer monitor                status rcvd: No fault
  Last local AC circuit                status rcvd: No fault
  Last local AC circuit                status sent: No fault
  Last local PW i/f circ                status rcvd: No fault
  Last local LDP TLV                   status sent: No fault
  Last remote LDP TLV                  status rcvd: No fault
  Last remote LDP ADJ                  status rcvd: No fault
MPLS VC labels: local 26, remote 21
Group ID: local n/a, remote 16
MTU: local 9000, remote 9000
Remote interface description:
MAC Withdraw: sent:0, received:301
Sequencing: receive disabled, send disabled
Control Word: On (configured: autosense

```