

# Exemple d'aperçu et de configuration de la Multidiffusion commuté par étiquette ASR 9000 VPLS (LSM)

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## Introduction

Ce document décrit la Multidiffusion commutée par étiquette privée virtuelle du service réseau local (VPLS) (LSM) pour la gamme 9000 du routeur de services d'agrégation (ASR) qui exécutent le logiciel du Cisco IOS® XR.

## Conditions préalables

## Conditions requises

Aucune spécification déterminée n'est requise pour ce document.

## Composants utilisés

Ce document n'est pas limité à des versions de matériel et de logiciel spécifiques.

Les informations contenues dans ce document ont été créées à partir des périphériques d'un environnement de laboratoire spécifique. Tous les périphériques utilisés dans ce document ont démarré avec une configuration effacée (par défaut). Si votre réseau est opérationnel, assurez-vous que vous comprenez l'effet potentiel de toute commande.

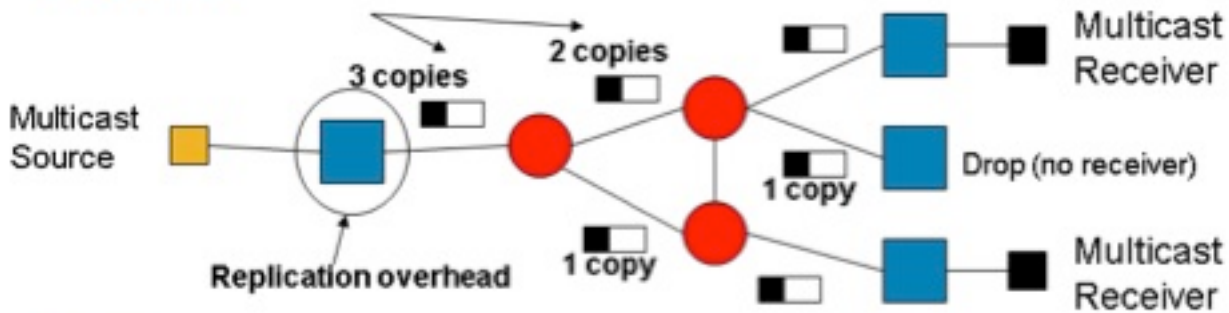
## Aperçu de la Multidiffusion commuté par étiquette VPLS (LSM)

VPLS émule des services de RÉSEAU LOCAL à travers un noyau de Commutation multiprotocole par étiquette (MPLS). Un maillage complet des pseudowires point par point (de P2P) (PWs) est installé entre tous les Routeurs de Provider Edge (PE) qui participent à un domaine VPLS afin de fournir l'émulation VPLS. L'émission, la Multidiffusion, et le trafic unicast inconnu est inondée dans un domaine VPLS à tout le siège potentiel d'explosion. La réplication d'entrée est utilisée afin d'envoyer ce trafic propagé au-dessus de chaque P2P PWs à tous les Routeurs distants de PE qui font partie du même domaine VPLS.

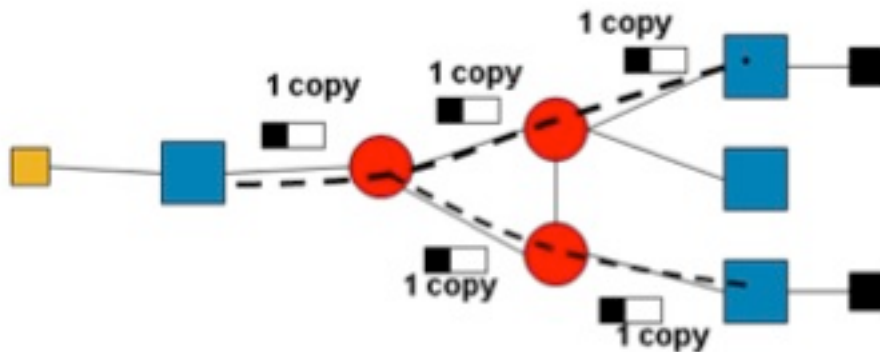
### Inconvénients de réplication d'entrée

- La réplication d'entrée est bande passante inefficace parce que le même paquet pourrait être envoyé de plusieurs périodes au-dessus du même lien pour chaque P2P picowatt.
- La réplication d'entrée peut avoir comme conséquence la bande passante gaspillée significative de lien quand il y a du trafic lourd d'émission et de Multidiffusion VPLS.
- La réplication d'entrée est également ressource-intensive parce que le routeur PE d'entrée soutient la pleine charge de la réplication.

## Problems



## Solution



## Caractéristiques VPLS LSM

VPLS est une technologie large-déployée de L2VPN de fournisseur de services qui est également utilisée pour le transport de Multidiffusion. Bien que la technologie L2 permette pillar à utiliser afin d'optimiser la réplication du trafic de multidiffusion dans les pseudowires L2, le noyau demeure agnostique au trafic de multidiffusion. En conséquence, les plusieurs copies de la même traversée d'écoulement creusent des réseaux. Afin d'atténuer cette inefficacité, paires LSM avec VPLS afin d'introduire des arbres de multicast LSM au-dessus du noyau. Dans le Logiciel Cisco IOS XR libérez 5.1.0, la mise en place de gamme 9000 de Cisco ASR VPLS LSM avec les arborescences incluses point-à-multipoint de l'ingénierie de trafic (P2MP-TE). Des points d'extrémité VPLS sont automatiquement découverts et des arborescences P2MP-TE sont installées avec l'utilisation de l'ingénierie du trafic de protocole de RSVP (RSVP-TE) sans intervention opérationnelle.

- VPLS LSM surmonte les inconvénients de la réplication d'entrée.
- La solution VPLS LSM utilise P2MP LSP dans le noyau MPLS afin de porter l'émission, la Multidiffusion, et le trafic unicast inconnu pour un domaine VPLS.
- P2MP LSP permettent la réplication dans le noeud optimal de réseau MPLS tout au plus et réduisent la quantité de réplication de paquet dans le réseau.
- La solution VPLS LSM envoie seulement le trafic inondé VPLS au-dessus de P2MP LSP.
- Le trafic d'Unicast VPLS est encore envoyé au-dessus du P2P PWs. Le trafic envoyé au-dessus d'Access PWs continue à être envoyé avec la réplication d'entrée.
- P2MP PWs sont unidirectionnels par opposition au P2P PWs, qui sont bidirectionnels.

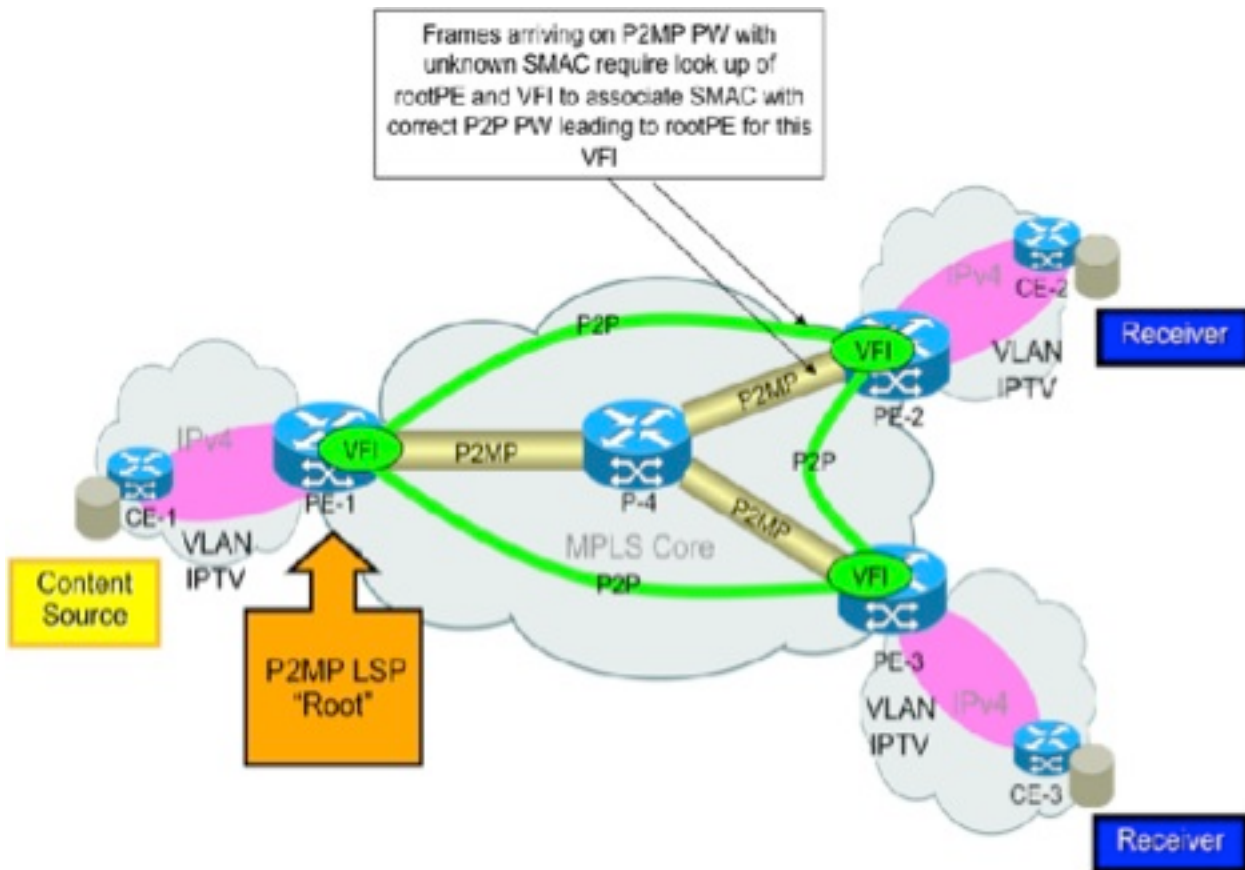
- La solution VPLS LSM comporte la création d'un P2MP picowatt par domaine VPLS afin d'émuler un service VPLS P2MP pour principal PWs dans le domaine VPLS.
- VPLS LSM est pris en charge dans la version 5.1.0 et ultérieures de Cisco IOS XR.

## **Restrictions VPLS LSM**

- La fonctionnalité de la version 5.1.0 VPLS LSM de Cisco IOS XR prend en charge seulement des arborescences de l'Ingénierie de trafic MPLS P2MP-TE installées avec RSVP-TE.
- UN P2MP picowatt peut être signalé avec le protocole BGP seulement dans la version 5.1.0 de Cisco IOS XR. Dans cette première phase, le siège potentiel d'explosion distant qui participent au domaine VPLS automatique-sont découverts avec la détection automatique BGP (BGP-AD).
- La signalisation statique LDP n'est pas prise en charge dans la version 5.1.0 de Cisco IOS XR.

## **Apprendre de Contrôle d'accès au support (MAC)**

Le MAC apprenant sur le PE de feuille d'une trame qui arrive sur P2MP picowatt est fait comme si la trame est reçue sur le P2P picowatt menant au PE de racine pour cela P2MP picowatt. Dans cette image, le MAC apprenant sur PE-2 des trames qui arrivent sur le P2MP LE picowatt LSP enraciné à PE-1 est fait comme si la trame est arrivée sur le P2P picowatt entre PE-1 et PE-2. L'agent de contrôle de L2VPN est responsable de programmer les informations de disposition VPLS avec les informations picowatt de P2P pour le MAC apprenant sur la disposition P2MP LSP.



## Support pillant de protocole de gestion de groupes Internet (IGMP) (IGMPSN)

Le Protocole IGMP (Internet Group Management Protocol) pillant (IGMPSN) est pris en charge sur chacun des deux la circulaire de la P-arborescence P2MP dans un domaine de passerelle qui participe à VPLS LSM. Ceci permet au trafic de multidiffusion IGMPSN au-dessus d'une instance de transfert virtuelle (VFI) PWs pour tirer bénéfice de l'optimisation de ressource fournie par P2MP LSP. S'IGMPSN est activé dans un domaine de passerelle avec un ou plusieurs VFI PWs participant à VPLS LSM, tout les trafic de multidiffusion de la couche deux (L2) est envoyé au-dessus de la tête de P-arborescence P2MP associée avec le domaine de passerelle. Les routes multicasts L2 sont utilisées afin d'expédier le trafic aux récepteurs locaux, des Ethernets circulent les points (EFP), l'accès PWs, et les VFI PWs qui ne participent pas à VPLS LSM.

Quand IGMPSN est activé dans un domaine de passerelle qui est une queue P2MP LSP, la disposition optimisée du trafic de multidiffusion L2 reçue sur le P2MP LSP est faite pour les récepteurs locaux (c'est-à-dire, ports de passerelle de circuit de connexion (courant alternatif) (bps) et l'accès picowatt bps).

Remarque: Le protocole de distribution d'étiquette de Multidiffusion (MLDP) pillant n'est pas pris en charge dans la version 5.1.0 de Cisco IOS XR.

## Échelle prise en charge

La version 5.1.0 de Cisco IOS XR prend en charge un maximum de 1000 tunnels ou de 1000

P2MP PWs P2MP par personne/routeur de queue.

## Configuration VPLS LSM

### Configuration automatique de tunnel P2MP

```
mpls traffic-eng
interface GigabitEthernet0/1/1/0
!
interface GigabitEthernet0/1/1/1
!
auto-tunnel p2mp
tunnel-id min 100 max 200
```

### MPLS TE rapide reroutent la configuration (FRR)

```
mpls traffic-eng
interface GigabitEthernet0/1/1/0
auto-tunnel backup
nhop-only
!
!
interface GigabitEthernet0/1/1/1
auto-tunnel backup
nhop-only
!
!
auto-tunnel p2mp
tunnel-id min 100 max 200
!
auto-tunnel backup
tunnel-id min 1000 max 1500
!
attribute-set p2mp-te set1
bandwidth 10000
fast-reroute
record-route
!
```

### Configuration de L2VPN

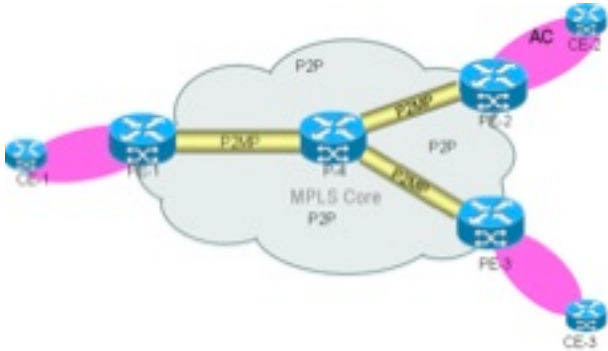
```
l2vpn
bridge group bg1
bridge-domain bg1_bd1
interface GigabitEthernet0/1/1/10.1
!
vfi bg1_bd1_vfi
vpn-id 1
autodiscovery bgp
rd auto
route-target 209.165.201.1:1
signaling-protocol bgp
ve-id 100
!
!
multicast p2mp
```

```

signaling-protocol bgp
!
transport rsvp-te
  attribute-set p2mp-te set1
!

```

## Exemple de topologie et configuration



Les tunnels P2MP sont les tunnels automatique-découverts. Des tunnels statiques P2MP ne sont pas pris en charge.

Des configurations statiques de tunnel ne sont pas utilisées. La configuration de tunnel de l'automatique P2MP doit être activée sur tous les Routeurs de PE et également sur un routeur P si elle agit en tant que noeud de bourgeon. Un noeud de bourgeon est un routeur de point médian et de tailend en même temps.

Un exemple de topologie avec la configuration est affiché ici. Dans cette topologie, P2MP PWs sont créés entre le siège potentiel d'explosion trois et un routeur P qui agit en tant que noeud de bourgeon. Chacun des trois Routeurs de PE agit en tant que tête (pour le trafic entrant) et queue (pour le trafic en sortie).

### Configuration PE1

```

RP/0/RSP0/CPU0:PE1#show run
hostname PE1
!
ipv4 unnumbered mpls traffic-eng Loopback0
!
interface Loopback0
  ipv4 address 209.165.200.225 255.255.255.255
!
interface GigabitEthernet0/1/1/0
  description connected P router
  ipv4 address 209.165.201.1 255.255.255.224
!
interface GigabitEthernet0/1/1/1
  description connected to P router
  ipv4 address 209.165.201.151 255.255.255.224
  transceiver permit pid all
!
interface GigabitEthernet0/1/1/10
  transceiver permit pid all
!
interface GigabitEthernet0/1/1/10.1 l2transport
  encapsulation dot1q 1

```

```

!
router ospf 100
  router-id 209.165.200.225
  area 0
  mpls traffic-eng
  interface Loopback0
  !
  interface GigabitEthernet0/1/1/0
  !
  interface GigabitEthernet0/1/1/1
  !
  !
  mpls traffic-eng router-id 209.165.200.225
!
router bgp 100
  nsr
  bgp router-id 209.165.200.225
  bgp graceful-restart
  address-family l2vpn vpls-vpws
  !
  neighbor 209.165.200.226
  remote-as 100
  update-source Loopback0
  address-family l2vpn vpls-vpws
  !
  !
  neighbor 209.165.200.227
  remote-as 100
  update-source Loopback0
  address-family l2vpn vpls-vpws
  !
  !
  neighbor 209.165.200.228
  remote-as 100
  update-source Loopback0
  address-family l2vpn vpls-vpws
  !
  !
!
l2vpn
  bridge group bg1
  bridge-domain bg1_bd1
  interface GigabitEthernet0/1/1/10.1
  !
  vfi bg1_bd1_vfi
  vpn-id 1
  autodiscovery bgp
  rd auto
  route-target 209.165.201.1:1
  signaling-protocol bgp
  ve-id 100
  !
  !
  multicast p2mp
  signaling-protocol bgp
  !
  transport rsvp-te
  attribute-set p2mp-te set1
  !
  !
  !
  !
  !
  !
  !
  !

```



```

rsvp
 interface GigabitEthernet0/1/1/0
 bandwidth 100000
 !
 interface GigabitEthernet0/1/1/1
 bandwidth 100000
 !
!
mpls traffic-eng
 interface GigabitEthernet0/1/1/0
 auto-tunnel backup
  nhop-only
 !
 !
 interface GigabitEthernet0/1/1/1
 auto-tunnel backup
  nhop-only
 !
 !
 auto-tunnel p2mp
 tunnel-id min 100 max 200
 !
 auto-tunnel backup
 tunnel-id min 1000 max 1500
 !
 attribute-set p2mp-te set1
 bandwidth 10000
 fast-reroute
 record-route
 !
!
mpls ldp
 nsr
 graceful-restart
 router-id 209.165.200.225
 interface GigabitEthernet0/1/1/0
 !
 interface GigabitEthernet0/1/1/1
 !
!
end

```

RP/0/RSP0/CPU0:PE1#

## Configuration P

```

RP/0/RSP0/CPU0:P#show run
hostname P
ipv4 unnumbered mpls traffic-eng Loopback0
interface Loopback0
 ipv4 address 209.165.200.226 255.255.255.255
 !
interface GigabitEthernet0/1/1/0
 description connected to PE1 router
 ipv4 address 209.165.201.2 255.255.255.224
 transceiver permit pid all
 !
interface GigabitEthernet0/1/1/1
 description connected to PE1 router
 ipv4 address 209.165.201.152 255.255.255.224
 transceiver permit pid all
 !
interface GigabitEthernet0/1/1/3

```

```
description connected to PE2 router
ipv4 address 209.165.201.61 255.255.255.224
!
interface GigabitEthernet0/1/1/4
transceiver permit pid all
!
interface GigabitEthernet0/1/1/4.1 l2transport
encapsulation dot1q 1
!
interface GigabitEthernet0/1/1/8
description connected to PE3 router
ipv4 address 209.165.201.101 255.255.255.224
!
router ospf 100
nsr
nsf cisco
area 0
mpls traffic-eng
interface Loopback0
!
interface GigabitEthernet0/1/1/0
!
interface GigabitEthernet0/1/1/1
!
interface GigabitEthernet0/1/1/3
!
interface GigabitEthernet0/1/1/8
!
!
mpls traffic-eng router-id 209.165.200.226
!
router bgp 100
nsr
bgp router-id 209.165.200.226
bgp graceful-restart
address-family l2vpn vpls-vpws
!
neighbor 209.165.200.225
remote-as 100
update-source Loopback0
address-family l2vpn vpls-vpws
!
!
neighbor 209.165.200.227
remote-as 100
update-source Loopback0
address-family l2vpn vpls-vpws
!
!
neighbor 209.165.200.228
remote-as 100
update-source Loopback0
address-family l2vpn vpls-vpws
!
!
!
l2vpn
bridge group bg1
bridge-domain bg1_bd1
interface GigabitEthernet0/1/1/4.1
!
vfi bg1_bd1_vfi
vpn-id 1
autodiscovery bgp
```

```
rd auto
route-target 209.165.201.1:1
signaling-protocol bgp
ve-id 200
!
!
multicast p2mp
signaling-protocol bgp
!
transport rsvp-te
attribute-set p2mp-te set1
!
!
!
!
!
rsvp
interface GigabitEthernet0/1/1/0
bandwidth 100000
!
interface GigabitEthernet0/1/1/1
bandwidth 100000
!
interface GigabitEthernet0/1/1/3
bandwidth 100000
!
interface GigabitEthernet0/1/1/8
bandwidth 100000
!
!
mpls traffic-eng
interface GigabitEthernet0/1/1/0
auto-tunnel backup
nhop-only
!
!
interface GigabitEthernet0/1/1/1
auto-tunnel backup
nhop-only
!
!
interface GigabitEthernet0/1/1/3
!
interface GigabitEthernet0/1/1/8
!
auto-tunnel p2mp
tunnel-id min 100 max 200
!
auto-tunnel backup
tunnel-id min 1000 max 1500
!
attribute-set p2mp-te set1
bandwidth 10000
fast-reroute
record-route
!
!
mpls ldp
nsr
graceful-restart
router-id 209.165.200.226
interface GigabitEthernet0/1/1/0
!
```

```
interface GigabitEthernet0/1/1/1
!  
interface GigabitEthernet0/1/1/3
!  
interface GigabitEthernet0/1/1/8
!  
!  
end
```

RP/0/RSP0/CPU0:P#

## Configuration PE2

```
RP/0/RSP0/CPU0:PE2#show run  
hostname PE2  
ipv4 unnumbered mpls traffic-eng Loopback0  
interface Loopback0  
  ipv4 address 209.165.200.227 255.255.255.255  
!  
interface GigabitEthernet0/3/0/2.1 l2transport  
  encapsulation dot1q 1  
!  
interface GigabitEthernet0/3/0/3  
  description connected to P router  
  ipv4 address 209.165.201.62 255.255.255.224  
  transceiver permit pid all  
!  
router ospf 100  
  nsr  
  router-id 209.165.200.227  
  nsf cisco  
  area 0  
  mpls traffic-eng  
  interface Loopback0  
  !  
  interface GigabitEthernet0/3/0/3  
  !  
  !  
  mpls traffic-eng router-id 209.165.200.227  
!  
router bgp 100  
  nsr  
  bgp router-id 209.165.200.227  
  bgp graceful-restart  
  address-family l2vpn vpls-vpws  
  !  
  neighbor 209.165.200.225  
  remote-as 100  
  update-source Loopback0  
  address-family l2vpn vpls-vpws  
  !  
  !  
  neighbor 209.165.200.226  
  remote-as 100  
  update-source Loopback0  
  address-family l2vpn vpls-vpws  
  !  
  !  
  neighbor 209.165.200.228  
  remote-as 100  
  update-source Loopback0  
  address-family l2vpn vpls-vpws  
  !  
  !
```

```

!
!
l2vpn
  bridge group bg1
  bridge-domain bg1_bd1
  interface GigabitEthernet0/3/0/2.1
  !
  vfi bg1_bd1_vfi
    vpn-id 1
    autodiscovery bgp
      rd auto
      route-target 209.165.201.1:1
      signaling-protocol bgp
      ve-id 300
    !
  !
  multicast p2mp
    signaling-protocol bgp
  !
  transport rsvp-te
    attribute-set p2mp-te set1
  !
!
!
!
!
!
rsvp
  interface GigabitEthernet0/3/0/3
  bandwidth 100000
  !
!
mpls traffic-eng
  interface GigabitEthernet0/3/0/3
  !
  auto-tunnel p2mp
  tunnel-id min 100 max 200
  !
  auto-tunnel backup
  tunnel-id min 1000 max 1500
  !
  attribute-set p2mp-te set1
  bandwidth 10000
  fast-reroute
  record-route
  !
!
mpls ldp
  nsr
  graceful-restart
  router-id 209.165.200.227
  interface GigabitEthernet0/3/0/3
  !
!
end

```

RP/0/RSP0/CPU0:PE2#

## Configuration PE3

```

RP/0/RSP0/CPU0:PE3#show run
hostname PE3
ipv4 unnumbered mpls traffic-eng Loopback0

```

```
interface Loopback0
  ipv4 address 209.165.200.228 255.255.255.255
!
interface GigabitEthernet0/2/1/8
  description connected to P router
  ipv4 address 209.165.201.102 255.255.255.224
  transceiver permit pid all
!
interface GigabitEthernet0/2/1/11
  transceiver permit pid all
!
interface GigabitEthernet0/2/1/11.1 l2transport
  encapsulation dot1q 1
!
router ospf 100
  nsr
  router-id 209.165.200.228
  nsf cisco
  area 0
  mpls traffic-eng
  interface Loopback0
  !
  interface GigabitEthernet0/2/1/8
  !
  !
  mpls traffic-eng router-id 209.165.200.228
!
router bgp 100
  nsr
  bgp router-id 209.165.200.228
  bgp graceful-restart
  address-family l2vpn vpls-vpws
  !
  neighbor 209.165.200.225
  remote-as 100
  update-source Loopback0
  address-family l2vpn vpls-vpws
  !
  !
  neighbor 209.165.200.226
  remote-as 100
  update-source Loopback0
  address-family l2vpn vpls-vpws
  !
  !
  neighbor 209.165.200.227
  remote-as 100
  update-source Loopback0
  address-family l2vpn vpls-vpws
  !
  !
!
l2vpn
  bridge group bg1
  bridge-domain bg1_bd1
  interface GigabitEthernet0/2/1/11.1
  !
  vfi bg1_bd1_vfi
  vpn-id 1
  autodiscovery bgp
  rd auto
  route-target 209.165.201.1:1
  signaling-protocol bgp
```

```

    ve-id 400
    !
    !
multicast p2mp
    signaling-protocol bgp
    !
    transport rsvp-te
        attribute-set p2mp-te set1
    !
    !
    !
    !
    !
rsvp
    interface GigabitEthernet0/2/1/8
    bandwidth 1000000
    !
    !
mpls traffic-eng
    interface GigabitEthernet0/2/1/8
    !
    auto-tunnel p2mp
    tunnel-id min 100 max 200
    !
    auto-tunnel backup
    tunnel-id min 1000 max 1500
    !
    attribute-set p2mp-te set1
    bandwidth 10000
    fast-reroute
    record-route
    !
    !
mpls ldp
    nsr
    graceful-restart
    router-id 209.165.200.228
    interface GigabitEthernet0/2/1/8
    !
    !
end

```

RP/0/RSP0/CPU0:PE3#

## Vérifiez - Commandes show

Ces commandes show sont utiles afin de mettre au point et vérifier l'état des tunnels P2MP picowatt et P2MP MPLS TE.

- affichez le bridge-domain de l2vpn
- affichez le détail de bridge-domain de l2vpn
- show mpls traffic-eng tunnels p2mp
- le show mpls forwarding étiquette le détail de <label>
- show mpls traffic-eng tunnels p2mp tabulaire

Voici quelques exemples :

```
show l2vpn bridge-domain
```

RP/0/RSP0/CPU0:PE1#show l2vpn bridge-domain

Legend: pp = Partially Programmed.

Bridge group: bgl, bridge-domain: bgl\_bd1, id: 0, state: up, ShgId: 0, MSTi: 0

Aging: 300 s, MAC limit: 4000, Action: none, Notification: syslog

Filter MAC addresses: 0

ACs: 1 (1 up), VFIs: 1, PWs: 3 (3 up), PBBs: 0 (0 up)

List of ACs:

GigabitEthernet0/1/1/10.1, state: up, Static MAC addresses: 0

List of Access PWs:

List of VFIs:

VFI bgl\_bd1\_vfi (up)

P2MP: RSVP-TE, BGP, 1, Tunnel Up

Neighbor 209.165.200.226 pw-id 1, state: up, Static MAC addresses: 0

Neighbor 209.165.200.227 pw-id 1, state: up, Static MAC addresses: 0

Neighbor 209.165.200.228 pw-id 1, state: up, Static MAC addresses: 0

RP/0/RSP0/CPU0:PE1#

### show l2vpn bridge-domain detail

RP/0/RSP0/CPU0:PE1#show l2vpn bridge-domain detail

Legend: pp = Partially Programmed.

Bridge group: bgl, bridge-domain: bgl\_bd1, id: 0, state: up, ShgId: 0, MSTi: 0

Coupled state: disabled

MAC learning: enabled

MAC withdraw: enabled

MAC withdraw for Access PW: enabled

MAC withdraw sent on: bridge port up

MAC withdraw relaying (access to access): disabled

Flooding:

Broadcast & Multicast: enabled

Unknown unicast: enabled

MAC aging time: 300 s, Type: inactivity

MAC limit: 4000, Action: none, Notification: syslog

MAC limit reached: no

MAC port down flush: enabled

MAC Secure: disabled, Logging: disabled

Split Horizon Group: none

Dynamic ARP Inspection: disabled, Logging: disabled

IP Source Guard: disabled, Logging: disabled

DHCPv4 snooping: disabled

IGMP Snooping: enabled

IGMP Snooping profile: none

MLD Snooping profile: none

Storm Control: disabled

Bridge MTU: 1500

MIB cvplsConfigIndex: 1

Filter MAC addresses:

P2MP PW: enabled

Create time: 18/02/2014 03:47:59 (00:41:54 ago)

No status change since creation

ACs: 1 (1 up), VFIs: 1, PWs: 3 (3 up), PBBs: 0 (0 up)

List of ACs:

AC: GigabitEthernet0/1/1/10.1, state is up

Type VLAN; Num Ranges: 1

VLAN ranges: [1, 1]

MTU 1504; XC ID 0x8802a7; interworking none

MAC learning: enabled

Flooding:

Broadcast & Multicast: enabled

Unknown unicast: enabled

MAC aging time: 300 s, Type: inactivity

MAC limit: 4000, Action: none, Notification: syslog

MAC limit reached: no



MAC port down flush: enabled  
MAC Secure: disabled, Logging: disabled  
Split Horizon Group: none  
Dynamic ARP Inspection: disabled, Logging: disabled  
IP Source Guard: disabled, Logging: disabled  
DHCPv4 snooping: disabled  
IGMP Snooping: enabled  
IGMP Snooping profile: none  
MLD Snooping profile: none  
Storm Control: disabled  
Static MAC addresses:

Statistics:

packets: received 0, sent 0  
bytes: received 0, sent 0

Storm control drop counters:

packets: broadcast 0, multicast 0, unknown unicast 0  
bytes: broadcast 0, multicast 0, unknown unicast 0

Dynamic ARP inspection drop counters:

packets: 0, bytes: 0

IP source guard drop counters:

packets: 0, bytes: 0

List of Access PWs:

List of VFIs:

VFI bg1\_bd1\_vfi (up)

**P2MP:**

**Type RSVP-TE, BGP signaling, PTree ID 1**

**P2MP Status: Tunnel Up**

**P2MP-TE attribute-set: set1**

**Tunnel tunnel-mte100, Local Label: 289994**

**VPN-ID: 1, Auto Discovery: BGP, state is Provisioned (Service Connected)**

**Route Distinguisher: (auto) 209.165.200.225:32768**

Import Route Targets:

209.165.201.1:1

Export Route Targets:

209.165.201.1:1

Signaling protocol: BGP

Local VE-ID: 100 , Advertised Local VE-ID : 100

VE-Range: 10

PW: neighbor 209.165.200.226, PW ID 1, state is up ( established )

PW class not set, XC ID 0xc0000001

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

Source address 209.165.200.225

PW type VPLS, control word disabled, interworking none

Sequencing not set

| MPLS         | Local    | Remote   |
|--------------|----------|----------|
| Label        | 289959   | 16030    |
| MTU          | 1500     | 1500     |
| Control word | disabled | disabled |
| PW type      | VPLS     | VPLS     |
| VE-ID        | 100      | 200      |

MIB cpwVcIndex: 3221225473

Create time: 18/02/2014 03:58:31 (00:31:23 ago)

Last time status changed: 18/02/2014 03:58:31 (00:31:23 ago)

MAC withdraw messages: sent 0, received 0

Static MAC addresses:

Statistics:

packets: received 0, sent 0  
bytes: received 0, sent 0

Storm control drop counters:

packets: broadcast 0, multicast 0, unknown unicast 0  
bytes: broadcast 0, multicast 0, unknown unicast 0

DHCPv4 snooping: disabled  
IGMP Snooping profile: none  
MLD Snooping profile: none

P2MP-PW:

| FEC            | Local                 | Remote                |
|----------------|-----------------------|-----------------------|
| Label          | NULL (inclusive tree) | NULL (inclusive tree) |
| P2MP ID        | 100                   | 100                   |
| Flags          | 0x00                  | 0x00                  |
| PTree Type     | RSVP-TE               | RSVP-TE               |
| Tunnel ID      | 100                   | 100                   |
| Ext. Tunnel ID | 209.165.200.225       | 209.165.200.226       |

Statistics:

packets: received 0  
bytes: received 0

PW: neighbor 209.165.200.227, PW ID 1, state is up ( established )

PW class not set, XC ID 0xc0000002

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

Source address 209.165.200.225

PW type VPLS, control word disabled, interworking none

Sequencing not set

| MPLS                  | Local  | Remote   |
|-----------------------|--------|----------|
| Label                 | 289944 | 16030    |
| MTU                   | 1500   | 1500     |
| Control word disabled |        | disabled |
| PW type               | VPLS   | VPLS     |
| VE-ID                 | 100    | 300      |

MIB cpwVcIndex: 3221225474

Create time: 18/02/2014 04:05:25 (00:24:29 ago)

Last time status changed: 18/02/2014 04:05:25 (00:24:29 ago)

MAC withdraw messages: sent 0, received 0

Static MAC addresses:

Statistics:

packets: received 0, sent 0  
bytes: received 0, sent 0

Storm control drop counters:

packets: broadcast 0, multicast 0, unknown unicast 0  
bytes: broadcast 0, multicast 0, unknown unicast 0

DHCPv4 snooping: disabled  
IGMP Snooping profile: none  
MLD Snooping profile: none

P2MP-PW:

| FEC            | Local                 | Remote                |
|----------------|-----------------------|-----------------------|
| Label          | NULL (inclusive tree) | NULL (inclusive tree) |
| P2MP ID        | 100                   | 100                   |
| Flags          | 0x00                  | 0x00                  |
| PTree Type     | RSVP-TE               | RSVP-TE               |
| Tunnel ID      | 100                   | 100                   |
| Ext. Tunnel ID | 209.165.200.225       | 209.165.200.227       |

Statistics:

packets: received 0  
bytes: received 0

PW: neighbor 209.165.200.228, PW ID 1, state is up ( established )

PW class not set, XC ID 0xc0000003

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

Source address 209.165.200.225

PW type VPLS, control word disabled, interworking none

Sequencing not set

| MPLS | Local | Remote |
|------|-------|--------|
|------|-------|--------|

```

-----
Label          289929          16045
MTU            1500           1500
Control word disabled          disabled
PW type        VPLS           VPLS
VE-ID          100           400
-----

```

```

MIB cpwVcIndex: 3221225475
Create time: 18/02/2014 04:08:11 (00:21:43 ago)
Last time status changed: 18/02/2014 04:08:11 (00:21:43 ago)
MAC withdraw messages: sent 0, received 0
Static MAC addresses:

```

```

Statistics:
  packets: received 0, sent 0
  bytes: received 0, sent 0
Storm control drop counters:
  packets: broadcast 0, multicast 0, unknown unicast 0
  bytes: broadcast 0, multicast 0, unknown unicast 0

```

```

DHCPv4 snooping: disabled
IGMP Snooping profile: none
MLD Snooping profile: none

```

```

P2MP-PW:
  FEC          Local          Remote
  -----
Label          NULL (inclusive tree)    NULL (inclusive tree)
P2MP ID        100           100
Flags          0x00         0x00
PTree Type     RSVP-TE      RSVP-TE
Tunnel ID      100           100
Ext. Tunnel ID 209.165.200.225      209.165.200.228

```

```

Statistics:
  packets: received 0
  bytes: received 0

```

```

VFI Statistics:
  drops: illegal VLAN 0, illegal length 0

```

```
RP/0/RSP0/CPU0:PE1#
```

```
show mpls traffic-eng tunnels p2mp
```

```
RP/0/RSP0/CPU0:PE1#show mpls traffic-eng tunnels p2mp
```

```
Name: tunnel-mtel00 (auto-tunnel for VPLS (l2vpn))
```

```
Signalled-Name: auto_PE1_mt100
```

```
Status:
```

```
Admin: up Oper: up (Up for 00:32:35)
```

```
Config Parameters:
```

```
Bandwidth: 0 kbps (CT0) Priority: 7 7 Affinity: 0x0/0xffff
```

```
Interface Bandwidth: 10000 kbps
```

```
Metric Type: TE (default)
```

```
Fast Reroute: Enabled, Protection Desired: Any
```

```
Record Route: Enabled
```

```
Reoptimization after affinity failure: Enabled
```

```
Attribute-set: set1 (type p2mp-te)
```

```
Destination summary: (3 up, 0 down, 0 disabled) Affinity: 0x0/0xffff
```

```
Auto-bw: disabled
```

```
Destination: 209.165.200.226
```

```
State: Up for 00:32:35
```

```
Path options:
```

```
path-option 10 dynamic [active]
```

```
Destination: 209.165.200.227
```

State: Up for 00:25:41  
Path options:  
  path-option 10 dynamic       [active]  
Destination: 209.165.200.228  
State: Up for 00:22:55  
Path options:  
  path-option 10 dynamic       [active]

Current LSP:

lsp-id: 10004 p2mp-id: 100 tun-id: 100 src: 209.165.200.225 extid:  
209.165.200.225

LSP up for: 00:32:35 (since Tue Feb 18 03:58:31 UTC 2014)  
Reroute Pending: No  
Inuse Bandwidth: 0 kbps (CT0)  
Number of S2Ls: 3 connected, 0 signaling proceeding, 0 down

S2L Sub LSP: Destination 209.165.200.226 Signaling Status: connected  
S2L up for: 00:32:35 (since Tue Feb 18 03:58:31 UTC 2014)  
Sub Group ID: 1 Sub Group Originator ID: 209.165.200.225  
Path option path-option 10 dynamic   (path weight 1)  
Path info (OSPF 100 area 0)  
  209.165.201.2  
  209.165.200.226

S2L Sub LSP: Destination 209.165.200.227 Signaling Status: connected  
S2L up for: 00:25:41 (since Tue Feb 18 04:05:25 UTC 2014)  
Sub Group ID: 2 Sub Group Originator ID: 209.165.200.225  
Path option path-option 10 dynamic   (path weight 2)  
Path info (OSPF 100 area 0)  
  209.165.201.2  
  209.165.201.61  
  209.165.201.62  
  209.165.200.227

S2L Sub LSP: Destination 209.165.200.228 Signaling Status: connected  
S2L up for: 00:22:55 (since Tue Feb 18 04:08:11 UTC 2014)  
Sub Group ID: 4 Sub Group Originator ID: 209.165.200.225  
Path option path-option 10 dynamic   (path weight 2)  
Path info (OSPF 100 area 0)  
  209.165.201.2  
  209.165.201.101  
  209.165.201.102  
  209.165.200.228

Reoptimized LSP (Install Timer Remaining 0 Seconds):

None

Cleaned LSP (Cleanup Timer Remaining 0 Seconds):

None

LSP Tunnel 209.165.200.226 100 [10005] is signalled, connection is up

Tunnel Name: auto\_P\_mtl100 **Tunnel Role: Tail**

InLabel: GigabitEthernet0/1/1/0, 289995

Signalling Info:

Src 209.165.200.226 Dst 209.165.200.225, Tun ID 100, Tun Inst 10005, Ext ID  
209.165.200.226

Router-IDs: upstream   209.165.200.226  
              local     209.165.200.225

Bandwidth: 0 kbps (CT0) Priority: 7 7 DSTE-class: 0

Soft Preemption: None

Path Info:

Incoming Address: 209.165.201.1

Incoming:

Explicit Route:

  Strict, 209.165.201.1

Strict, 209.165.200.225  
Record Route:  
IPv4 209.165.201.2, flags 0x0  
Tspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits  
Session Attributes: Local Prot: Set, Node Prot: Not Set, BW Prot: Not Set  
Soft Preemption Desired: Not Set

Resv Info: None

Record Route: Empty

Resv Info:

Record Route: Empty

Fspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits

LSP Tunnel 209.165.200.227 100 [10003] is signalled, connection is up

Tunnel Name: auto\_PE2\_mt100 **Tunnel Role: Tail**

InLabel: GigabitEthernet0/1/1/0, 289998

Signalling Info:

Src 209.165.200.227 Dst 209.165.200.225, Tun ID 100, Tun Inst 10003, Ext ID  
209.165.200.227

Router-IDs: upstream 209.165.200.226

local 209.165.200.225

Bandwidth: 0 kbps (CT0) Priority: 7 7 DSTE-class: 0

Soft Preemption: None

Path Info:

Incoming Address: 209.165.201.1

Incoming:

Explicit Route:

Strict, 209.165.201.1

Strict, 209.165.200.225

Record Route:

IPv4 209.165.201.2, flags 0x0

IPv4 209.165.201.62, flags 0x0

Tspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits

Session Attributes: Local Prot: Set, Node Prot: Not Set, BW Prot: Not Set

Soft Preemption Desired: Not Set

Resv Info: None

Record Route: Empty

Resv Info:

Record Route: Empty

Fspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits

LSP Tunnel 209.165.200.228 100 [10004] is signalled, connection is up

Tunnel Name: auto\_PE3\_mt100 **Tunnel Role: Tail**

InLabel: GigabitEthernet0/1/1/0, 289970

Signalling Info:

Src 209.165.200.228 Dst 209.165.200.225, Tun ID 100, Tun Inst 10004, Ext ID  
209.165.200.228

Router-IDs: upstream 209.165.200.226

local 209.165.200.225

Bandwidth: 0 kbps (CT0) Priority: 7 7 DSTE-class: 0

Soft Preemption: None

Path Info:

Incoming Address: 209.165.201.1

Incoming:

Explicit Route:

Strict, 209.165.201.1

Strict, 209.165.200.225

Record Route:

IPv4 209.165.201.2, flags 0x0

IPv4 209.165.201.102, flags 0x0

Tspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits

Session Attributes: Local Prot: Set, Node Prot: Not Set, BW Prot: Not Set

Soft Preemption Desired: Not Set

Resv Info: None

Record Route: Empty

```

Resv Info:
Record Route: Empty
Fspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits
Displayed 1 (of 2) heads, 0 (of 0) midpoints, 3 (of 4) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads
RP/0/RSP0/CPU0:PE1#

```

**show mpls forwarding labels <label> detail**

```

RP/0/RSP0/CPU0:PE1#show mpls forwarding labels 289994 detail
Local   Outgoing   Prefix           Outgoing   Next Hop        Bytes
Label   Label      or ID            Interface  Next Hop        Switched
-----
289994          P2MP TE: 100
Updated Feb 18 03:58:32.360
TE Tunnel Head, tunnel ID: 100, tunnel ifh: 0x8000e20
IPv4 Tableid: 0xe0000000, IPv6 Tableid: 0xe0800000
Flags:IP Lookup:not-set, Expnulv4:not-set, Expnulv6:set
Payload Type v4:set, Payload Type v6:not-set, l2vpn:set
Head:set, Tail:not-set, Bud:not-set, Peek:not-set, inclusive:set
Ingress Drop:not-set, Egress Drop:not-set
Platform Data: {0x2000000, 0x2000000, 0x0, 0x0}, RPF-ID:0x80003
VPLS Disposition: Bridge ID: 0, SHG ID: 0, PW Xconnect ID: 0x0

mpls paths: 1, local mpls paths: 0, protected mpls paths: 1

16005          P2MP TE: 100      Gi0/1/1/0      209.165.201.2  0
Updated Feb 18 03:58:32.360
My Nodeid:65, Interface Nodeid:2065, Backup Interface Nodeid:2065
Packets Switched: 0

```

RP/0/RSP0/CPU0:PE1#

**show mpls traffic-eng tunnels p2mp tabular**

```

RP/0/RSP0/CPU0:PE1#show mpls traffic-eng tunnels p2mp tabular

Tunnel   LSP       Destination      Source           FRR   LSP   Path
Name     ID        Address          Address          State  State Role Prot
-----
^tunnel-mte100 10004 209.165.200.226 209.165.200.225 up Ready Head
^tunnel-mte100 10004 209.165.200.227 209.165.200.225 up Ready Head
^tunnel-mte100 10004 209.165.200.228 209.165.200.225 up Ready Head
 auto_P_mt100 10005 209.165.200.225 209.165.200.226 up Inact Tail
 auto_PE2_mt100 10003 209.165.200.225 209.165.200.227 up Inact Tail
 auto_PE3_mt100 10004 209.165.200.225 209.165.200.228 up Inact Tail
* = automatically created backup tunnel
^ = automatically created P2MP tunnel
RP/0/RSP0/CPU0:PE1#

```

## Dépannez VPLS LSM

### Questions communes de configuration

Les la plupart des causes classiques pour des problèmes P2MP dans le L2VPN sont affichées ici.

- La configuration BGP pour LSM est exactement identique que celle pour BGP-AD. Veillez à exporter/des artères de famille d'adresse de vpls-vpws l2vpn d'importation en configurant des **vpls-vpws d'address-family l2vpn** pour des voisins BGP.
- Il y a MPLS et erreurs de configuration de Multidiffusion.

L'Ingénierie de trafic MPLS doit être activée sur les interfaces où le P2MP PWs passe.

#### **show l2vpn bridge-domain**

```
RP/0/RSP0/CPU0:PE1#show l2vpn bridge-domain
Legend: pp = Partially Programmed.
Bridge group: bg1, bridge-domain: bg1_bdl, id: 0, state: up, ShgId: 0, MSTi: 0
Aging: 300 s, MAC limit: 4000, Action: none, Notification: syslog
Filter MAC addresses: 0
ACs: 1 (1 up), VFIs: 1, PWs: 3 (3 up), PBBs: 0 (0 up)
List of ACs:
  GigabitEthernet0/1/1/10.1, state: up, Static MAC addresses: 0
List of Access PWs:
List of VFIs:
  VFI bg1_bdl_vfi (up)
    P2MP: RSVP-TE, BGP, 1, Tunnel Up
    Neighbor 209.165.200.226 pw-id 1, state: up, Static MAC addresses: 0
    Neighbor 209.165.200.227 pw-id 1, state: up, Static MAC addresses: 0
    Neighbor 209.165.200.228 pw-id 1, state: up, Static MAC addresses: 0
RP/0/RSP0/CPU0:PE1#
```

#### **show l2vpn bridge-domain detail**

```
RP/0/RSP0/CPU0:PE1#show l2vpn bridge-domain detail
Legend: pp = Partially Programmed.
Bridge group: bg1, bridge-domain: bg1_bdl, id: 0, state: up, ShgId: 0, MSTi: 0
Coupled state: disabled
MAC learning: enabled
MAC withdraw: enabled
  MAC withdraw for Access PW: enabled
  MAC withdraw sent on: bridge port up
  MAC withdraw relaying (access to access): disabled
Flooding:
  Broadcast & Multicast: enabled
  Unknown unicast: enabled
MAC aging time: 300 s, Type: inactivity
MAC limit: 4000, Action: none, Notification: syslog
MAC limit reached: no
MAC port down flush: enabled
MAC Secure: disabled, Logging: disabled
Split Horizon Group: none
Dynamic ARP Inspection: disabled, Logging: disabled
IP Source Guard: disabled, Logging: disabled
DHCPv4 snooping: disabled
IGMP Snooping: enabled
  IGMP Snooping profile: none
MLD Snooping profile: none
Storm Control: disabled
Bridge MTU: 1500
MIB cvplsConfigIndex: 1
Filter MAC addresses:
P2MP PW: enabled
Create time: 18/02/2014 03:47:59 (00:41:54 ago)
No status change since creation
```

ACs: 1 (1 up), VFIs: 1, PWs: 3 (3 up), PBBs: 0 (0 up)

List of ACs:

```

AC: GigabitEthernet0/1/1/10.1, state is up
  Type VLAN; Num Ranges: 1
  VLAN ranges: [1, 1]
  MTU 1504; XC ID 0x8802a7; interworking none
  MAC learning: enabled
  Flooding:
    Broadcast & Multicast: enabled
    Unknown unicast: enabled
  MAC aging time: 300 s, Type: inactivity
  MAC limit: 4000, Action: none, Notification: syslog
  MAC limit reached: no
  MAC port down flush: enabled
  MAC Secure: disabled, Logging: disabled
  Split Horizon Group: none
  Dynamic ARP Inspection: disabled, Logging: disabled
  IP Source Guard: disabled, Logging: disabled
  DHCPv4 snooping: disabled
  IGMP Snooping: enabled
  IGMP Snooping profile: none
  MLD Snooping profile: none
  Storm Control: disabled
  Static MAC addresses:
  Statistics:
    packets: received 0, sent 0
    bytes: received 0, sent 0
  Storm control drop counters:
    packets: broadcast 0, multicast 0, unknown unicast 0
    bytes: broadcast 0, multicast 0, unknown unicast 0
  Dynamic ARP inspection drop counters:
    packets: 0, bytes: 0
  IP source guard drop counters:
    packets: 0, bytes: 0

```

List of Access PWs:

List of VFIs:

VFI bg1\_bdl\_vfi (up)

**P2MP:**

```

  Type RSVP-TE, BGP signaling, PTree ID 1
  P2MP Status: Tunnel Up
  P2MP-TE attribute-set: set1
  Tunnel tunnel-mte100, Local Label: 289994
  VPN-ID: 1, Auto Discovery: BGP, state is Provisioned (Service Connected)

```

**Route Distinguisher: (auto) 209.165.200.225:32768**

```

Import Route Targets:
  209.165.201.1:1
Export Route Targets:
  209.165.201.1:1
Signaling protocol: BGP
Local VE-ID: 100 , Advertised Local VE-ID : 100
VE-Range: 10
PW: neighbor 209.165.200.226, PW ID 1, state is up ( established )
  PW class not set, XC ID 0xc0000001
  Encapsulation MPLS, Auto-discovered (BGP), protocol BGP
  Source address 209.165.200.225
  PW type VPLS, control word disabled, interworking none
  Sequencing not set

```

| MPLS         | Local    | Remote   |
|--------------|----------|----------|
| Label        | 289959   | 16030    |
| MTU          | 1500     | 1500     |
| Control word | disabled | disabled |
| PW type      | VPLS     | VPLS     |



VE-ID 100 200

-----  
MIB cpwVcIndex: 3221225473  
Create time: 18/02/2014 03:58:31 (00:31:23 ago)  
Last time status changed: 18/02/2014 03:58:31 (00:31:23 ago)  
MAC withdraw messages: sent 0, received 0  
Static MAC addresses:  
Statistics:  
 packets: received 0, sent 0  
 bytes: received 0, sent 0  
Storm control drop counters:  
 packets: broadcast 0, multicast 0, unknown unicast 0  
 bytes: broadcast 0, multicast 0, unknown unicast 0  
DHCPv4 snooping: disabled  
IGMP Snooping profile: none  
MLD Snooping profile: none

P2MP-PW:

| FEC            | Local                 | Remote                |
|----------------|-----------------------|-----------------------|
| Label          | NULL (inclusive tree) | NULL (inclusive tree) |
| P2MP ID        | 100                   | 100                   |
| Flags          | 0x00                  | 0x00                  |
| PTree Type     | RSVP-TE               | RSVP-TE               |
| Tunnel ID      | 100                   | 100                   |
| Ext. Tunnel ID | 209.165.200.225       | 209.165.200.226       |

Statistics:  
 packets: received 0  
 bytes: received 0

PW: neighbor 209.165.200.227, PW ID 1, state is up ( established )  
PW class not set, XC ID 0xc0000002  
Encapsulation MPLS, Auto-discovered (BGP), protocol BGP  
Source address 209.165.200.225  
PW type VPLS, control word disabled, interworking none  
Sequencing not set

| MPLS         | Local    | Remote   |
|--------------|----------|----------|
| Label        | 289944   | 16030    |
| MTU          | 1500     | 1500     |
| Control word | disabled | disabled |
| PW type      | VPLS     | VPLS     |
| VE-ID        | 100      | 300      |

-----  
MIB cpwVcIndex: 3221225474  
Create time: 18/02/2014 04:05:25 (00:24:29 ago)  
Last time status changed: 18/02/2014 04:05:25 (00:24:29 ago)  
MAC withdraw messages: sent 0, received 0  
Static MAC addresses:  
Statistics:  
 packets: received 0, sent 0  
 bytes: received 0, sent 0  
Storm control drop counters:  
 packets: broadcast 0, multicast 0, unknown unicast 0  
 bytes: broadcast 0, multicast 0, unknown unicast 0  
DHCPv4 snooping: disabled  
IGMP Snooping profile: none  
MLD Snooping profile: none

P2MP-PW:

| FEC        | Local                 | Remote                |
|------------|-----------------------|-----------------------|
| Label      | NULL (inclusive tree) | NULL (inclusive tree) |
| P2MP ID    | 100                   | 100                   |
| Flags      | 0x00                  | 0x00                  |
| PTree Type | RSVP-TE               | RSVP-TE               |

Tunnel ID 100 100  
Ext. Tunnel ID 209.165.200.225 209.165.200.227

Statistics:

packets: received 0  
bytes: received 0

PW: neighbor 209.165.200.228, PW ID 1, state is up ( established )

PW class not set, XC ID 0xc0000003

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

Source address 209.165.200.225

PW type VPLS, control word disabled, interworking none

Sequencing not set

| MPLS         | Local    | Remote   |
|--------------|----------|----------|
| Label        | 289929   | 16045    |
| MTU          | 1500     | 1500     |
| Control word | disabled | disabled |
| PW type      | VPLS     | VPLS     |
| VE-ID        | 100      | 400      |

MIB cpwVcIndex: 3221225475

Create time: 18/02/2014 04:08:11 (00:21:43 ago)

Last time status changed: 18/02/2014 04:08:11 (00:21:43 ago)

MAC withdraw messages: sent 0, received 0

Static MAC addresses:

Statistics:

packets: received 0, sent 0  
bytes: received 0, sent 0

Storm control drop counters:

packets: broadcast 0, multicast 0, unknown unicast 0  
bytes: broadcast 0, multicast 0, unknown unicast 0

DHCPv4 snooping: disabled

IGMP Snooping profile: none

MLD Snooping profile: none

P2MP-PW:

| FEC            | Local                 | Remote                |
|----------------|-----------------------|-----------------------|
| Label          | NULL (inclusive tree) | NULL (inclusive tree) |
| P2MP ID        | 100                   | 100                   |
| Flags          | 0x00                  | 0x00                  |
| PTree Type     | RSVP-TE               | RSVP-TE               |
| Tunnel ID      | 100                   | 100                   |
| Ext. Tunnel ID | 209.165.200.225       | 209.165.200.228       |

Statistics:

packets: received 0  
bytes: received 0

VFI Statistics:

drops: illegal VLAN 0, illegal length 0

RP/0/RSP0/CPU0:PE1#

**show mpls traffic-eng tunnels p2mp**

RP/0/RSP0/CPU0:PE1#**show mpls traffic-eng tunnels p2mp**

Name: tunnel-mte100 (auto-tunnel for VPLS (l2vpn))

Signalled-Name: auto\_PE1\_mt100

Status:

Admin: up Oper: up (Up for 00:32:35)

Config Parameters:

Bandwidth: 0 kbps (CT0) Priority: 7 7 Affinity: 0x0/0xffff

Interface Bandwidth: 10000 kbps

Metric Type: TE (default)  
Fast Reroute: Enabled, Protection Desired: Any  
Record Route: Enabled  
Reoptimization after affinity failure: Enabled

Attribute-set: set1 (type p2mp-te)  
Destination summary: (3 up, 0 down, 0 disabled) Affinity: 0x0/0xffff  
Auto-bw: disabled  
Destination: 209.165.200.226  
State: Up for 00:32:35  
Path options:  
  path-option 10 dynamic [active]  
Destination: 209.165.200.227  
State: Up for 00:25:41  
Path options:  
  path-option 10 dynamic [active]  
Destination: 209.165.200.228  
State: Up for 00:22:55  
Path options:  
  path-option 10 dynamic [active]

Current LSP:

lsp-id: 10004 p2mp-id: 100 tun-id: 100 src: 209.165.200.225 extid:  
209.165.200.225

LSP up for: 00:32:35 (since Tue Feb 18 03:58:31 UTC 2014)  
Reroute Pending: No  
Inuse Bandwidth: 0 kbps (CT0)  
Number of S2Ls: 3 connected, 0 signaling proceeding, 0 down

S2L Sub LSP: Destination 209.165.200.226 Signaling Status: connected  
S2L up for: 00:32:35 (since Tue Feb 18 03:58:31 UTC 2014)  
Sub Group ID: 1 Sub Group Originator ID: 209.165.200.225  
Path option path-option 10 dynamic (path weight 1)  
Path info (OSPF 100 area 0)  
  209.165.201.2  
  209.165.200.226

S2L Sub LSP: Destination 209.165.200.227 Signaling Status: connected  
S2L up for: 00:25:41 (since Tue Feb 18 04:05:25 UTC 2014)  
Sub Group ID: 2 Sub Group Originator ID: 209.165.200.225  
Path option path-option 10 dynamic (path weight 2)  
Path info (OSPF 100 area 0)  
  209.165.201.2  
  209.165.201.61  
  209.165.201.62  
  209.165.200.227

S2L Sub LSP: Destination 209.165.200.228 Signaling Status: connected  
S2L up for: 00:22:55 (since Tue Feb 18 04:08:11 UTC 2014)  
Sub Group ID: 4 Sub Group Originator ID: 209.165.200.225  
Path option path-option 10 dynamic (path weight 2)  
Path info (OSPF 100 area 0)  
  209.165.201.2  
  209.165.201.101  
  209.165.201.102  
  209.165.200.228

Reoptimized LSP (Install Timer Remaining 0 Seconds):

None

Cleaned LSP (Cleanup Timer Remaining 0 Seconds):

None

LSP Tunnel 209.165.200.226 100 [10005] is signalled, connection is up  
Tunnel Name: auto\_P\_mt100 **Tunnel Role: Tail**

InLabel: GigabitEthernet0/1/1/0, 289995

Signalling Info:

Src 209.165.200.226 Dst 209.165.200.225, Tun ID 100, Tun Inst 10005, Ext ID 209.165.200.226

Router-IDs: upstream 209.165.200.226  
                  local 209.165.200.225

Bandwidth: 0 kbps (CT0) Priority: 7 7 DSTE-class: 0

Soft Preemption: None

Path Info:

Incoming Address: 209.165.201.1

Incoming:

Explicit Route:

Strict, 209.165.201.1

Strict, 209.165.200.225

Record Route:

IPv4 209.165.201.2, flags 0x0

Tspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits

Session Attributes: Local Prot: Set, Node Prot: Not Set, BW Prot: Not Set

Soft Preemption Desired: Not Set

Resv Info: None

Record Route: Empty

Resv Info:

Record Route: Empty

Fspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits

LSP Tunnel 209.165.200.227 100 [10003] is signalled, connection is up

Tunnel Name: auto\_PE2\_mt100 **Tunnel Role: Tail**

InLabel: GigabitEthernet0/1/1/0, 289998

Signalling Info:

Src 209.165.200.227 Dst 209.165.200.225, Tun ID 100, Tun Inst 10003, Ext ID 209.165.200.227

Router-IDs: upstream 209.165.200.226  
                  local 209.165.200.225

Bandwidth: 0 kbps (CT0) Priority: 7 7 DSTE-class: 0

Soft Preemption: None

Path Info:

Incoming Address: 209.165.201.1

Incoming:

Explicit Route:

Strict, 209.165.201.1

Strict, 209.165.200.225

Record Route:

IPv4 209.165.201.2, flags 0x0

IPv4 209.165.201.62, flags 0x0

Tspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits

Session Attributes: Local Prot: Set, Node Prot: Not Set, BW Prot: Not Set

Soft Preemption Desired: Not Set

Resv Info: None

Record Route: Empty

Resv Info:

Record Route: Empty

Fspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits

LSP Tunnel 209.165.200.228 100 [10004] is signalled, connection is up

Tunnel Name: auto\_PE3\_mt100 **Tunnel Role: Tail**

InLabel: GigabitEthernet0/1/1/0, 289970

Signalling Info:

Src 209.165.200.228 Dst 209.165.200.225, Tun ID 100, Tun Inst 10004, Ext ID 209.165.200.228

Router-IDs: upstream 209.165.200.226  
                  local 209.165.200.225

Bandwidth: 0 kbps (CT0) Priority: 7 7 DSTE-class: 0

Soft Preemption: None

Path Info:

```

Incoming Address: 209.165.201.1
Incoming:
Explicit Route:
  Strict, 209.165.201.1
  Strict, 209.165.200.225
Record Route:
  IPv4 209.165.201.2, flags 0x0
  IPv4 209.165.201.102, flags 0x0
Tspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits
Session Attributes: Local Prot: Set, Node Prot: Not Set, BW Prot: Not Set
                   Soft Preemption Desired: Not Set

Resv Info: None
Record Route: Empty
Resv Info:
  Record Route: Empty
  Fspec: avg rate=0 kbits, burst=1000 bytes, peak rate=0 kbits
Displayed 1 (of 2) heads, 0 (of 0) midpoints, 3 (of 4) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads
RP/0/RSP0/CPU0:PE1#

```

**show mpls forwarding labels <label> detail**

```

RP/0/RSP0/CPU0:PE1#show mpls forwarding labels 289994 detail
Local   Outgoing   Prefix           Outgoing         Next Hop         Bytes
Label   Label       or ID           Interface        Interface        Switched
-----
289994          P2MP TE: 100
Updated Feb 18 03:58:32.360
TE Tunnel Head, tunnel ID: 100, tunnel ifh: 0x8000e20
IPv4 Tableid: 0xe0000000, IPv6 Tableid: 0xe0800000
Flags:IP Lookup:not-set, Expnullv4:not-set, Expnullv6:set
  Payload Type v4:set, Payload Type v6:not-set, l2vpn:set
  Head:set, Tail:not-set, Bud:not-set, Peek:not-set, inclusive:set
  Ingress Drop:not-set, Egress Drop:not-set
Platform Data: {0x2000000, 0x2000000, 0x0, 0x0}, RPF-ID:0x80003
VPLS Disposition: Bridge ID: 0, SHG ID: 0, PW Xconnect ID: 0x0

mpls paths: 1, local mpls paths: 0, protected mpls paths: 1

16005          P2MP TE: 100          Gi0/1/1/0        209.165.201.2    0
Updated Feb 18 03:58:32.360
My Nodeid:65, Interface Nodeid:2065, Backup Interface Nodeid:2065
Packets Switched: 0

RP/0/RSP0/CPU0:PE1#

```

**show mpls traffic-eng tunnels p2mp tabular**

```

RP/0/RSP0/CPU0:PE1#show mpls traffic-eng tunnels p2mp tabular

Tunnel   LSP       Destination      Source           FRR   LSP   Path
Name     ID        Address          Address         State  State Role Prot
-----
^tunnel-mte100 10004 209.165.200.226 209.165.200.225 up    Ready Head
^tunnel-mte100 10004 209.165.200.227 209.165.200.225 up    Ready Head
^tunnel-mte100 10004 209.165.200.228 209.165.200.225 up    Ready Head
  auto_P_mt100 10005 209.165.200.225 209.165.200.226 up    Inact Tail
  auto_PE2_mt100 10003 209.165.200.225 209.165.200.227 up    Inact Tail
  auto_PE3_mt100 10004 209.165.200.225 209.165.200.228 up    Inact Tail
* = automatically created backup tunnel
^ = automatically created P2MP tunnel

```

- La configuration de L2VPN pour LSM dans la version 5.1.0 de Cisco IOS XR exige que vous :

Configurez la configuration de VPN ID pour le VFIConfigurez la Multidiffusion P2MP pour le VFI. Configure le protocole de transport et le protocole de signalisation, configuration de comme indiqué dans cet exemple :

```

:12vpn
bridge group bg
  bridge-domain bd1
  vfi vf1
    vpn-id 1
    autodiscovery bgp
    rd auto
    route-target 209.165.201.7:1
    signaling-protocol bgp
    ve-id 1
  multicast p2mp
    signaling-protocol bgp
    transport rsvp-te
  
```

- La tête/queue LSM doit être placée correctement. Dans le Cisco IOS XR libéré 5.1.0, chaque queue LSM est également une tête LSM et vice-versa. Puisqu'il n'y a aucun échange explicite de **capacité LSM** parmi des Routeurs, tous les Routeurs dans un domaine de passerelle activé par LSM doivent participer à LSM.

## Les commandes show de L2VPN et L2FIB et dépannent

- Le processus maître de L2VPN (l2vpn\_mgr) communique avec le processus de contrôle de l'Ingénierie de trafic MPLS (TE) (te\_control) et demande la création de tunnel. Assurez-vous que le te\_control et les processus l2vpn\_mgr sont dans l'état courant avec ces commandes : **affichez l2vpn\_mgr de processus affichez le te\_control de processus**
- Vérifiez que le processus l2vpn\_mgr a demandé la création de tunnel. Une entrée pour le tunnel devrait être dans cette commande show :

```

RP/0/RSP0/CPU0:PE1#show l2vpn atom-db preferred-path
Tunnel          BW Tot/Avail/Resv    Peer ID          VC ID
-----
tunnel-mtel 0/0/0          209.165.200.226   1
                                     209.165.200.227   1
                                     209.165.200.228   1
  
```

- Le L2VPN doit recevoir les informations de tunnel du processus de te\_control. Vérifiez que cette commande show a les détails différents de zéro tels que le tunnel-id, l'Ext.tunnel-id, le tunnel-ifh, et le p2mp-id :

```

RP/0/RSP0/CPU0:PE1#show l2vpn atom-db preferred-path private
Tunnel tunnel-mtel 0/0/0:
  Peer ID: 209.165.200.226, VC-ID 1
  Peer ID: 209.165.200.227, VC-ID 1
  Peer ID: 209.165.200.228, VC-ID 1
MTE details:
  tunnel-ifh: 0x08000e20
  local-label: 289994
  
```

```
p2mp-id: 100
tunnel-id: 100
Ext.tunnel-id: 209.165.200.225
```

- Le L2VPN doit annoncer le service instance de Multidiffusion de fournisseur (PMSI) à tous autres Routeurs de PE. Vérifiez que l2vpn\_mgr a envoyé le PMSI pour le VFI configuré. **La tête de l'événement LSM : envoyez PMSI** devrait être en cas l'historique actuel pour le VFI.

```
RP/0/0/CPU0:one#show l2vpn bridge-domain p2mp private
```

```
[...]
```

```
Object: VFI
```

```
Base info: version=0x0, flags=0x0, type=0, reserved=0
```

```
VFI event trace history [Num events: 5]
```

```
-----
Time          Event          Flags          Flags
====          =====          =====          =====
Dec  3 08:52:37.504 LSM Head: P2MP Provision 00000001, 00000000 - -
Dec  3 08:52:37.504 BD VPN Add          00000000, 00000000 M -
Dec  3 08:55:56.672 LSM Head: MTE updated 00000001, 00000000 - -
Dec  3 08:55:56.672 LSM Head: send PMSI 00000480, 00002710 - -
-----
```

```
[...]
```

- Le L2VPN sur les autres Routeurs devrait recevoir le PMSI qui a été juste envoyé. Assurez-vous que **queue LSM : PMSI reçu** est affiché en cas l'historique du côté réception :

```
RP/0/0/CPU0:two#show l2vpn bridge-domain p2mp private
```

```
[...]
```

```
VFI event trace history [Num events: 7]
```

```
-----
Time          Event          Flags          Flags
====          =====          =====          =====
Dec  3 08:42:49.216 LSM Head: P2MP Provision 00000001, 00000000 - -
Dec  3 08:42:50.240 LSM Head: MTE updated 00000001, 00000070 - -
Dec  3 08:42:50.240 LSM Head: send PMSI 00000480, 00002710 - -
Dec  3 08:43:51.680 BD VPN Add          00000000, 00000000 - -
Dec  3 08:44:59.776 LSM Tail: PMSI received 0100a8c0, 00002710 - -
Dec  3 08:45:00.288 LSM Head: MTE updated 00000001, 00000000 - -
-----
```

```
[...]
```

- Chaque routeur est une circulaire LSM et devrait envoyer le PMSI et recevoir PMSIs de chacun des autres Routeurs. Le premier routeur vérifié devrait recevoir PMSIs de chacun des autres Noeuds.
- Le Forwarding Information Base de la couche deux (L2FIB) doit recevoir les informations PRINCIPALES du L2VPN et doit les télécharger au linecard.

```
RP/0/RSP0/CPU0:PE1#show l2vpn forwarding bridge-domain detail location 0/1/CPU0
```

```
Bridge-domain name: bg1:bg1_bd1, id: 0, state: up
```

```
MAC learning: enabled
```

```
MAC port down flush: enabled
```

```
Flooding:
```

```
Broadcast & Multicast: enabled
```

```
Unknown unicast: enabled
```

```
MAC aging time: 300 s, Type: inactivity
```

```
MAC limit: 4000, Action: none, Notification: syslog
```

```
MAC limit reached: no
MAC Secure: disabled, Logging: disabled
DHCPv4 snooping: profile not known on this node
Dynamic ARP Inspection: disabled, Logging: disabled
IP Source Guard: disabled, Logging: disabled
IGMP snooping: disabled, flooding: enabled
MLD snooping: disabled, flooding: disabled
Storm control: disabled
P2MP PW: enabled
Ptree type: RSVP-TE, TE i/f: tunnel-mte100,
nhop valid: TRUE, Status: Bound, Label: 289994
Bridge MTU: 1500 bytes
Number of bridge ports: 4
Number of MAC addresses: 0
Multi-spanning tree instance: 0
```

- L2FIB doit recevoir les informations de QUEUE du L2VPN pour chaque picowatt et doit les télécharger à la plate-forme.

```
RP/0/RSP0/CPU0:PE1#show l2vpn forwarding bridge-domain hardware ingress detail
location 0/1/CPU0
```

```
Bridge-domain name: bg1:bg1_bd1, id: 0, state: up
MAC learning: enabled
MAC port down flush: enabled
Flooding:
  Broadcast & Multicast: enabled
  Unknown unicast: enabled
MAC aging time: 300 s, Type: inactivity
MAC limit: 4000, Action: none, Notification: syslog
MAC limit reached: no
MAC Secure: disabled, Logging: disabled
DHCPv4 snooping: profile not known on this node
Dynamic ARP Inspection: disabled, Logging: disabled
IP Source Guard: disabled, Logging: disabled
IGMP snooping: disabled, flooding: enabled
MLD snooping: disabled, flooding: disabled
Storm control: disabled
P2MP PW: enabled
Ptree type: RSVP-TE, TE i/f: tunnel-mte100,
  nhop valid: TRUE, Status: Bound, Label: 289994
Bridge MTU: 1500 bytes
Number of bridge ports: 4
Number of MAC addresses: 0
Multi-spanning tree instance: 0
```

```
Platform Bridge context:
  Last notification sent at: 02/18/2014 21:58:55
  Ingress Bridge Domain: 0, State: Created
  static MACs: 0, port level static MACs: 0, MAC limit: 4000, current MAC limit:
4000, MTU: 1500, MAC limit action: 0
  Rack 0 FGIDs:shg0: 0x00000000, shg1: 0x00000002, shg2: 0x00000002
  Rack 1 FGIDs:shg0: 0x00000000, shg1: 0x00000000, shg2: 0x00000000
  Flags: Virtual Table ID Disable, P2MP Enable, CorePW Attach
  P2MP Head-end Info: Head end bound
  Tunnel ifhandle: 0x08000e20, Internal Label: 289994, Local LC NP mask: 0x0,
  Head-end Local LC NP mask: 0x0, All L2 Mcast routes local LC NP mask: 0x0
  Rack: 0, Physical slot: 1, shg 0 members: 1, shg 1 members: 0, shg 2 members: 0
```

```
Platform Bridge HAL context:
  Number of NPs: 4, NP mask: 0x0008, mgid index: 513, learn key: 0
```



NP: 3, shg 0 members: 1, shg 1 members: 0, shg 2 members: 0  
MAC limit counter index: 0x00ec1e60

Platform Bridge Domain Hardware Information:

Bridge Domain: 0 NP 0

Flags: Virtual Table, Learn Enable, P2MP Tree Enabled  
Head-end P-Tree Int Label: 289994  
Num Members: 0, Learn Key: 0x00, Half Age: 5  
fgid shg0: 0x0000, fgid shg1: 0x0002, fgid shg2: 0x0002, mgid index: 513  
BD learn cntr: 0x00ec1e60

Bridge Domain: 0 NP 1

Flags: Virtual Table, Learn Enable, P2MP Tree Enabled  
Head-end P-Tree Int Label: 289994  
Num Members: 0, Learn Key: 0x00, Half Age: 5  
fgid shg0: 0x0000, fgid shg1: 0x0002, fgid shg2: 0x0002, mgid index: 513  
BD learn cntr: 0x00ec1e60

Bridge Domain: 0 NP 2

Flags: Virtual Table, Learn Enable, P2MP Tree Enabled  
Head-end P-Tree Int Label: 289994  
Num Members: 0, Learn Key: 0x00, Half Age: 5  
fgid shg0: 0x0000, fgid shg1: 0x0002, fgid shg2: 0x0002, mgid index: 513  
BD learn cntr: 0x00ec1e60

Bridge Domain: 0 NP 3

Flags: Virtual Table, Learn Enable, P2MP Tree Enabled  
Head-end P-Tree Int Label: 289994  
Num Members: 1, Learn Key: 0x00, Half Age: 5  
fgid shg0: 0x0000, fgid shg1: 0x0002, fgid shg2: 0x0002, mgid index: 513  
BD learn cntr: 0x00ec1e60

Bridge Member 0, copy 0

Flags: Active, XID: 0x06c002a7

Bridge Member 0, copy 1

Flags: Active, XID: 0x06c002a7

GigabitEthernet0/1/1/10.1, state: oper up

Number of MAC: 0

Statistics:

packets: received 0, sent 0

bytes: received 0, sent 0

Storm control drop counters:

packets: broadcast 0, multicast 0, unknown unicast 0

bytes: broadcast 0, multicast 0, unknown unicast 0

Dynamic arp inspection drop counters:

packets: 0, bytes: 0

IP source guard drop counters:

packets: 0, bytes: 0

Platform Bridge Port context:

Last notification sent at: 02/18/2014 21:58:56

Ingress State: Bound

Flags: None

Platform AC context:

Ingress AC: VPLS, State: Bound

Flags: Port Level MAC Limit

XID: 0x06c002a7, SHG: None

uIDB: 0x001a, NP: 3, Port Learn Key: 0

Slot flood mask rack 0: 0x200000 rack 1: 0x0 NP flood mask: 0x0008

NP3

Ingress uIDB:

Flags: L2, Status, Racetrack Eligible, VPLS

Stats Ptr: 0x5302c9, uIDB index: 0x001a, Wire Exp Tag: 1

BVI Bridge Domain: 0, BVI Source XID: 0x00000000

VLAN1: 0, VLAN1 etype: 0x0000, VLAN2: 0, VLAN2 etype: 0x0000

L2 ACL Format: 0, L2 ACL ID: 0, IPV4 ACL ID: 0, IPV6 ACL ID: 0

QOS ID: 0, QOS Format ID: 0  
Local Switch dest XID: 0x06c002a7  
UIDB IF Handle: 0x02001042, Source Port: 0, Num VLANs: 0  
Xconnect ID: 0x06c002a7, NP: 3  
Type: AC  
Flags: Learn enable, VPLS  
uIDB Index: 0x001a  
Bridge Domain ID: 0, Stats Pointer: 0xec1e62  
Split Horizon Group: None  
Bridge Port : Bridge 0 Port 0  
Flags: Active Member  
XID: 0x06c002a7  
Bridge Port Virt: Bridge 0 Port 0  
Flags: Active Member  
XID: 0x06c002a7  
Storm Control not enabled

Nbor 209.165.200.226 pw-id 1

Number of MAC: 0

Statistics:

packets: received 0, sent 2

bytes: received 0, sent 192

Storm control drop counters:

packets: broadcast 2, multicast 0, unknown unicast 0

bytes: broadcast 192, multicast 0, unknown unicast 0

Dynamic arp inspection drop counters:

packets: 0, bytes: 0

IP source guard drop counters:

packets: 0, bytes: 0

Statistics P2MP:

packets: received 0

bytes: received 0

Platform Bridge Port context:

Last notification sent at: 02/18/2014 21:58:55

Ingress State: Bound

Flags: None

**P2MP PW enabled, P2MP Role: tail**

**Platform PW context:**

**Ingress PW: VPLS, State: Bound**

XID: 0xc0008000, bridge: 0, MAC limit: 4000, l2vpn ldi index: 0x0001, vc label:  
16030, nr\_ldi\_hash: 0xab, r\_ldi\_hash: 0xbd, lag\_hash: 0x17, SHG: VFI Enabled

Flags: MAC Limit Port Level

Port Learn Key: 0

Trident Layer Flags: None

Slot flood mask rack 0: 0x0 rack 1: 0x0 NP flood mask: 0x0000

Primary L3 path: ifhandle: 0x02000100, sfp\_or\_lagid: 0x00d2

Backup L3 path: Not set

NP0

Xconnect ID: 0xc0008000, NP: 0

Type: Pseudowire (no control word)

Flags: Learn enable, Type 5, Local replication, VPLS

VC label hash, nR-LDI Hash: 0xab, R-LDI Hash: 0xb7, LAG Hash: 0x17,

VC output label: 0x03e9e (16030), LDI: 0x0001, stats ptr: 0x00530258

Bridge Domain ID: 0, Stats Pointer: 0xec1e62

Split Horizon Group: VFI Enabled

NP1

Xconnect ID: 0xc0008000, NP: 1

Type: Pseudowire (no control word)

Flags: Learn enable, Type 5, Local replication, VPLS

VC label hash, nR-LDI Hash: 0xab, R-LDI Hash: 0xb7, LAG Hash: 0x17,

VC output label: 0x03e9e (16030), LDI: 0x0001, stats ptr: 0x00530258

Bridge Domain ID: 0, Stats Pointer: 0xec1e62

Split Horizon Group: VFI Enabled

NP2

Xconnect ID: 0xc0008000, NP: 2  
Type: Pseudowire (no control word)  
Flags: Learn enable, Type 5, Local replication, VPLS  
VC label hash, nR-LDI Hash: 0xab, R-LDI Hash: 0xb7, LAG Hash: 0x17,  
VC output label: 0x03e9e (16030), LDI: 0x0001, stats ptr: 0x00530300  
Bridge Domain ID: 0, Stats Pointer: 0xec1e62  
Split Horizon Group: VFI Enabled

NP3

Xconnect ID: 0xc0008000, NP: 3  
Type: Pseudowire (no control word)  
Flags: Learn enable, Type 5, Local replication, VPLS  
VC label hash, nR-LDI Hash: 0xab, R-LDI Hash: 0xb7, LAG Hash: 0x17,  
VC output label: 0x03e9e (16030), LDI: 0x0001, stats ptr: 0x00530488  
Bridge Domain ID: 0, Stats Pointer: 0xec1e64  
Split Horizon Group: VFI Enabled

Nbor 209.165.200.227 pw-id 1

Number of MAC: 0  
Statistics:  
  packets: received 0, sent 1  
  bytes: received 0, sent 96  
Storm control drop counters:  
  packets: broadcast 0, multicast 0, unknown unicast 0  
  bytes: broadcast 0, multicast 0, unknown unicast 0  
Dynamic arp inspection drop counters:  
  packets: 0, bytes: 0  
IP source guard drop counters:  
  packets: 0, bytes: 0  
Statistics P2MP:  
  packets: received 0  
  bytes: received 0

Platform Bridge Port context:

Last notification sent at: 02/18/2014 21:58:55

Ingress State: Bound

Flags: None

**P2MP PW enabled, P2MP Role: tail**

**Platform PW context:**

**Ingress PW: VPLS, State: Bound**

XID: 0xc0008001, bridge: 0, MAC limit: 4000, l2vpn ldi index: 0x0002, vc label:  
16030, nr\_ldi\_hash: 0xab, r\_ldi\_hash: 0xbd, lag\_hash: 0x17, SHG: VFI Enabled

Flags: MAC Limit Port Level

Port Learn Key: 0

Trident Layer Flags: None

Slot flood mask rack 0: 0x0 rack 1: 0x0 NP flood mask: 0x0000

Primary L3 path: ifhandle: 0x02000100, sfp\_or\_lagid: 0x00d2

Backup L3 path: Not set

NP0

Xconnect ID: 0xc0008001, NP: 0  
Type: Pseudowire (no control word)  
Flags: Learn enable, Type 5, Local replication, VPLS  
VC label hash, nR-LDI Hash: 0xab, R-LDI Hash: 0xb7, LAG Hash: 0x17,  
VC output label: 0x03e9e (16030), LDI: 0x0002, stats ptr: 0x0053025e  
Bridge Domain ID: 0, Stats Pointer: 0xec1e64  
Split Horizon Group: VFI Enabled

NP1

Xconnect ID: 0xc0008001, NP: 1  
Type: Pseudowire (no control word)  
Flags: Learn enable, Type 5, Local replication, VPLS  
VC label hash, nR-LDI Hash: 0xab, R-LDI Hash: 0xb7, LAG Hash: 0x17,  
VC output label: 0x03e9e (16030), LDI: 0x0002, stats ptr: 0x0053025e  
Bridge Domain ID: 0, Stats Pointer: 0xec1e64  
Split Horizon Group: VFI Enabled

NP2

Xconnect ID: 0xc0008001, NP: 2  
Type: Pseudowire (no control word)  
Flags: Learn enable, Type 5, Local replication, VPLS  
VC label hash, nR-LDI Hash: 0xab, R-LDI Hash: 0xb7, LAG Hash: 0x17,  
VC output label: 0x03e9e (16030), LDI: 0x0002, stats ptr: 0x00530306  
Bridge Domain ID: 0, Stats Pointer: 0xec1e64  
Split Horizon Group: VFI Enabled

NP3

Xconnect ID: 0xc0008001, NP: 3  
Type: Pseudowire (no control word)  
Flags: Learn enable, Type 5, Local replication, VPLS  
VC label hash, nR-LDI Hash: 0xab, R-LDI Hash: 0xb7, LAG Hash: 0x17,  
VC output label: 0x03e9e (16030), LDI: 0x0002, stats ptr: 0x0053048e  
Bridge Domain ID: 0, Stats Pointer: 0xec1e66  
Split Horizon Group: VFI Enabled

Nbor 209.165.200.228 pw-id 1

Number of MAC: 0

Statistics:

packets: received 0, sent 0

bytes: received 0, sent 0

Storm control drop counters:

packets: broadcast 0, multicast 0, unknown unicast 0

bytes: broadcast 0, multicast 0, unknown unicast 0

Dynamic arp inspection drop counters:

packets: 0, bytes: 0

IP source guard drop counters:

packets: 0, bytes: 0

Statistics P2MP:

packets: received 0

bytes: received 0

Platform Bridge Port context:

Last notification sent at: 02/18/2014 21:58:55

Ingress State: Bound

Flags: None

**P2MP PW enabled, P2MP Role: tail**

**Platform PW context:**

**Ingress PW: VPLS, State: Bound**

XID: 0xc0008002, bridge: 0, MAC limit: 4000, l2vpn ldi index: 0x0003, vc label:  
16045, nr\_ldi\_hash: 0x7b, r\_ldi\_hash: 0xb3, lag\_hash: 0xa8, SHG: VFI Enabled

Flags: MAC Limit Port Level

Port Learn Key: 0

Trident Layer Flags: None

Slot flood mask rack 0: 0x0 rack 1: 0x0 NP flood mask: 0x0000

Primary L3 path: ifhandle: 0x02000100, sfp\_or\_lagid: 0x00d2

Backup L3 path: Not set

NP0

Xconnect ID: 0xc0008002, NP: 0  
Type: Pseudowire (no control word)  
Flags: Learn enable, Type 5, Local replication, VPLS  
VC label hash, nR-LDI Hash: 0x7b, R-LDI Hash: 0xd6, LAG Hash: 0xa8,  
VC output label: 0x03ead (16045), LDI: 0x0003, stats ptr: 0x00530264  
Bridge Domain ID: 0, Stats Pointer: 0xec1e66  
Split Horizon Group: VFI Enabled

NP1

Xconnect ID: 0xc0008002, NP: 1  
Type: Pseudowire (no control word)  
Flags: Learn enable, Type 5, Local replication, VPLS  
VC label hash, nR-LDI Hash: 0x7b, R-LDI Hash: 0xd6, LAG Hash: 0xa8,  
VC output label: 0x03ead (16045), LDI: 0x0003, stats ptr: 0x00530264  
Bridge Domain ID: 0, Stats Pointer: 0xec1e66  
Split Horizon Group: VFI Enabled

NP2

Xconnect ID: 0xc0008002, NP: 2

Type: Pseudowire (no control word)

Flags: Learn enable, Type 5, Local replication, VPLS

VC label hash, nR-LDI Hash: 0x7b, R-LDI Hash: 0xd6, LAG Hash: 0xa8,

VC output label: 0x03ead (16045), LDI: 0x0003, stats ptr: 0x0053030c

Bridge Domain ID: 0, Stats Pointer: 0xec1e66

Split Horizon Group: VFI Enabled

NP3

Xconnect ID: 0xc0008002, NP: 3

Type: Pseudowire (no control word)

Flags: Learn enable, Type 5, Local replication, VPLS

VC label hash, nR-LDI Hash: 0x7b, R-LDI Hash: 0xd6, LAG Hash: 0xa8,

VC output label: 0x03ead (16045), LDI: 0x0003, stats ptr: 0x00530494

Bridge Domain ID: 0, Stats Pointer: 0xec1e68

Split Horizon Group: VFI Enabled

RP/0/RSP0/CPU0:PE1#