远程接收器触发mLDP树的加入时的5秒延迟

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简介

本文档介绍当远程接收器加入组播组以及入口PE路由器运行Cisco IOS® XR时，在多点标签分发协议(mLDP)树上转发组播流量的5秒延迟。

背景信息

远程接收器是从源的角度跨mLDP主干的接收器。

由于Cisco Bug ID CSCvb50266，故意引入了5秒的延迟　当存在现有MVPN接收器时，5秒MLDP向本地接收器转发延迟

创建此CDETS是为了解决Cisco Bug ID CSCtg68851的问题 对于LC多路径，从默认状态切换到数据MDT不会无中断

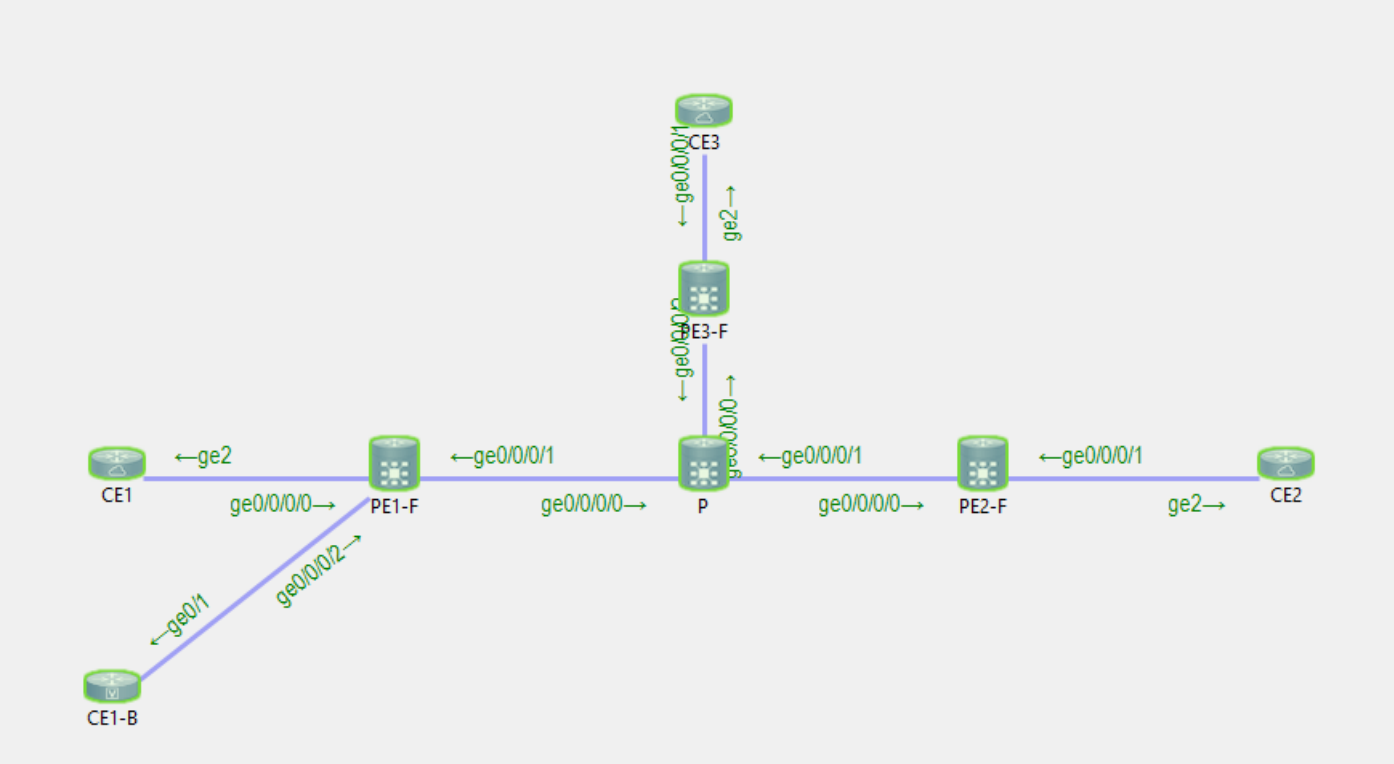
更改

- 如果入口PE路由器在Cisco Bug ID CSCtg68851之后运行IOS®-XR版本 5秒的延迟存在。
- 如果入口PE路由器在Cisco Bug ID CSCvb50266之后运行IOS®-XR版本 ，默认情况下5秒延迟。

如果不需要，可通过隐藏的配置命令加快组播流的转发。

下面是一个示例。

有关测试拓扑，请参阅图1。



CE1是组播流232.1.1.1的源10.100.1.5。

CE2和CE1-B是组播流232.1.1.1的接收方。

测试1.远程接收器加入，无本地接收器

已启用调试：

```
RP/0/0/CPU0:PE1#debug mrib vrf one route
RP/0/0/CPU0:PE1#debug mfib vrf one ipv4 encap
RP/0/0/CPU0:PE1#show debug
```

```
####  debug flags set from tty 'con0_0_CPU0'  ####
ipv4 mfwd encap flag is ON with value '0x1##one'
ipv4 mrib route flag is ON with value 'one#'
```

入口PE路由器PE1上没有本地接收器：

```
RP/0/0/CPU0:PE1#sh mrib vrf one route 232.1.1.1 10.100.1.5
No matching route in MRIB route-DB
RP/0/0/CPU0:PE1#
```

远程接收器CE1联机：

```
RP/0/0/CPU0:PE1#RP/0/0/CPU0:Feb 13 10:26:33.280 : mrib[1149]:   [  6] TID: 0xe0000010
(10.100.1.5,232.1.1.1) Added RPF* EID*, #A=1, #F=1, #MDT_A=0, RPF=10.2.1.5 [Lm F* LMI* TR*]
[Gi0/0/0/0 A*], Route Ver = 0x7ca
RP/0/0/CPU0:Feb 13 10:26:33.290 : ipv4_mfwd_partner[263]: Encap: encap id set  eid: 1
(10.100.1.5,232.1.1.1)
RP/0/0/CPU0:Feb 13 10:26:33.300 : mrib[1149]:   [  6] TID: 0xe0000010 (10.100.1.5,232.1.1.1)
```

```
Updated RPF EID*, #A=1, #F=1, #MDT_A=0 [Lm F LMI* MA* TR], Route Ver = 0x7cc
RP/0/0/CPU0:Feb 13 10:26:33.310 : ipv4_mfwd_partner[263]: Encap:
ip_mfwd_mrib_pre_process_encapid_update: encapid: 2, te_ole_cnt: 0,lsmid_ole_cnt: 1,
gre_ole_cnt: 0 ti_mofrr_ole_cnt: 0 flags: 0x0
RP/0/0/CPU0:Feb 13 10:26:33.310 : ipv4_mfwd_partner[263]: Encap: [2482] Encap entry created
(0xa10cb414) for eid 2 (stale N) flags 0x0
RP/0/0/CPU0:Feb 13 10:26:33.310 : ipv4_mfwd_partner[263]: Encap: [3039] RegDB entry 0xa08fd084
for LSMID 0x1d turnaround TRUE(new: Y ifh_changed N) ifhandle: b0
RP/0/0/CPU0:Feb 13 10:26:33.310 : ipv4_mfwd_partner[263]: Encap: [3533] Encap entry for eid 2
(0xa10cb414) proc done
RP/0/0/CPU0:Feb 13 10:26:33.310 : ipv4_mfwd_partner[263]: Encap: encap id update eid: 2
(10.100.1.5,232.1.1.1)
```

在入口PE路由器上设置encap-ID没有延迟。

这是在入口PE路由器上创建的组播转发条目：

```
RP/0/0/CPU0:PE1#show mrib vrf one route 232.1.1.1 10.100.1.5

IP Multicast Routing Information Base
Entry flags: L - Domain-Local Source, E - External Source to the Domain,
   C - Directly-Connected Check, S - Signal, IA - Inherit Accept,
   IF - Inherit From, D - Drop, ME - MDT Encap, EID - Encap ID,
   MD - MDT Decap, MT - MDT Threshold Crossed, MH - MDT interface handle
   CD - Conditional Decap, MPLS - MPLS Decap, EX - Extranet
   MoFE - MoFRR Enabled, MoFS - MoFRR State, MoFP - MoFRR Primary
   MoFB - MoFRR Backup, RPFID - RPF ID Set, X - VXLAN
Interface flags: F - Forward, A - Accept, IC - Internal Copy,
   NS - Negate Signal, DP - Don't Preserve, SP - Signal Present,
   II - Internal Interest, ID - Internal Disinterest, LI - Local Interest,
   LD - Local Disinterest, DI - Decapsulation Interface
   EI - Encapsulation Interface, MI - MDT Interface, LVIF - MPLS Encap,
   EX - Extranet, A2 - Secondary Accept, MT - MDT Threshold Crossed,
   MA - Data MDT Assigned, LMI - mLDP MDT Interface, TMI - P2MP-TE MDT Interface
   IRMI - IR MDT Interface

(10.100.1.5,232.1.1.1) RPF nbr: 10.2.1.5 Flags: RPF
 Up: 00:02:29
 Incoming Interface List
   GigabitEthernet0/0/0/0 Flags: A, Up: 00:02:2
 Outgoing Interface List
   Lmdtone Flags: F LMI MA TR, Up: 00:02:29

RP/0/0/CPU0:PE1#show mfib vrf one route 232.1.1.1 10.100.1.5 detail

IP Multicast Forwarding Information Base
Entry flags: C - Directly-Connected Check, S - Signal, D - Drop,
 IA - Inherit Accept, IF - Inherit From, EID - Encap ID,
 ME - MDT Encap, MD - MDT Decap, MT - MDT Threshold Crossed,
 MH - MDT interface handle, CD - Conditional Decap,
 DT - MDT Decap True, EX - Extranet, RPFID - RPF ID Set,
 MoFE - MoFRR Enabled, MoFS - MoFRR State, X - VXLAN
Interface flags: F - Forward, A - Accept, IC - Internal Copy,
 NS - Negate Signal, DP - Don't Preserve, SP - Signal Present,
 EG - Egress, EI - Encapsulation Interface, MI - MDT Interface,
 EX - Extranet, A2 - Secondary Accept
Forwarding/Replication Counts: Packets in/Packets out/Bytes out
Failure Counts: RPF / TTL / Empty Olist / Encap RL / Other

(10.100.1.5,232.1.1.1),  Flags:  EID , FMA: 0x10000 ,
 Up: 00:02:48
 Last Used: 00:00:01
```

```
 SW Forwarding Counts: 168/168/16800
 SW Replication Counts: 168/0/0
 SW Failure Counts: 0/0/0/0/0
 Route ver: 0x7d0
 MVPN Info :-
   Associated Table ID : 0xe0000000
   MDT Handle: 0x0, MDT Probe:Y [Y], Rate:Y, Acc:Y
   MDT SW Ingress Encap V4/V6, Egress decap: 0 / 0, 0
   Encap ID: 2, RPF ID: 0
   Local Receiver: False, Turnaround: False
 Lmdtone Flags:  F LMI TR, Up:00:02:48
 GigabitEthernet0/0/0/0 Flags:  A, Up:00:02:48
```

测试2.远程接收器与本地接收器连接

入口PE PE1处有一个本地接收器：

```
RP/0/0/CPU0:PE1#show mrib vrf one route 232.1.1.1 10.100.1.5


IP Multicast Routing Information Base
Entry flags: L - Domain-Local Source, E - External Source to the Domain,
   C - Directly-Connected Check, S - Signal, IA - Inherit Accept,
   IF - Inherit From, D - Drop, ME - MDT Encap, EID - Encap ID,
   MD - MDT Decap, MT - MDT Threshold Crossed, MH - MDT interface handle
   CD - Conditional Decap, MPLS - MPLS Decap, EX - Extranet
   MoFE - MoFRR Enabled, MoFS - MoFRR State, MoFP - MoFRR Primary
   MoFB - MoFRR Backup, RPFID - RPF ID Set, X - VXLAN
Interface flags: F - Forward, A - Accept, IC - Internal Copy,
   NS - Negate Signal, DP - Don't Preserve, SP - Signal Present,
   II - Internal Interest, ID - Internal Disinterest, LI - Local Interest,
   LD - Local Disinterest, DI - Decapsulation Interface
   EI - Encapsulation Interface, MI - MDT Interface, LVIF - MPLS Encap,
   EX - Extranet, A2 - Secondary Accept, MT - MDT Threshold Crossed,
   MA - Data MDT Assigned, LMI - mLDP MDT Interface, TMI - P2MP-TE MDT Interface
   IRMI - IR MDT Interface

(10.100.1.5,232.1.1.1) RPF nbr: 10.2.1.5 Flags: RPF
 Up: 00:57:15
 Incoming Interface List
   GigabitEthernet0/0/0/0 Flags: A, Up: 00:57:15
 Outgoing Interface List
   GigabitEthernet0/0/0/2 Flags: F NS, Up: 00:57:15
```

已启用调试：

```
RP/0/0/CPU0:PE1#debug mrib vrf one route
RP/0/0/CPU0:PE1#debug mfib vrf one ipv4 encap

RP/0/0/CPU0:PE1#show debug

####  debug flags set from tty 'con0_0_CPU0'  ####
ipv4 mfwd encap flag is ON with value '0x1##one'
ipv4 mrib route flag is ON with value 'one#'

RP/0/0/CPU0:PE1#show mfib vrf one route 232.1.1.1 10.100.1.5 detail

IP Multicast Forwarding Information Base
Entry flags: C - Directly-Connected Check, S - Signal, D - Drop,
 IA - Inherit Accept, IF - Inherit From, EID - Encap ID,
```

```
 ME - MDT Encap, MD - MDT Decap, MT - MDT Threshold Crossed,
 MH - MDT interface handle, CD - Conditional Decap,
 DT - MDT Decap True, EX - Extranet, RPFID - RPF ID Set,
 MoFE - MoFRR Enabled, MoFS - MoFRR State, X - VXLAN
Interface flags: F - Forward, A - Accept, IC - Internal Copy,
 NS - Negate Signal, DP - Don't Preserve, SP - Signal Present,
 EG - Egress, EI - Encapsulation Interface, MI - MDT Interface,
 EX - Extranet, A2 - Secondary Accept
Forwarding/Replication Counts: Packets in/Packets out/Bytes out
Failure Counts: RPF / TTL / Empty Olist / Encap RL / Other

(10.100.1.5,232.1.1.1),  Flags:  , FMA: 0x10001 ,
 Up: 00:59:35
 Last Used: 00:00:01
 SW Forwarding Counts: 3566/3566/356600
 SW Replication Counts: 3566/3566/356600
 SW Failure Counts: 0/0/0/0/0
 Route ver: 0x3410
 MVPN Info :-
   MDT Handle: 0x0, MDT Probe:N [N], Rate:Y, Acc:Y
   MDT SW Ingress Encap V4/V6, Egress decap: 0 / 0, 0
   EG count: 1
   Encap ID: 0, RPF ID: 0
   Local Receiver: True, Turnaround: False
 GigabitEthernet0/0/0/0 Flags:  A, Up:00:59:35
 GigabitEthernet0/0/0/2 Flags:  NS EG, Up:00:59:35
```

encap-ID为0，因为还没有远程接收器。

CE2，远程接收器联机：

```
RP/0/0/CPU0:PE1#RP/0/0/CPU0:Feb 13 09:13:34.390 : mrib[1149]:   [  6] TID: 0xe0000010
(10.100.1.5,232.1.1.1) Updated RPF EID*, #A=1, #F=2, #MDT_A=0 [Lm F* LMI* TR*], Route Ver =
0x3412
RP/0/0/CPU0:Feb 13 09:13:34.390 : mrib[1149]:   [ 22] Redistributed
RP/0/0/CPU0:Feb 13 09:13:34.390 : ipv4_mfwd_partner[263]: Encap:
ip_mfwd_mrib_pre_process_encapid_update: encapid: 6, te_ole_cnt: 0,lsmid_ole_cnt: 1,
gre_ole_cnt: 0 ti_mofrr_ole_cnt: 0 flags: 0x1
RP/0/0/CPU0:Feb 13 09:13:34.390 : ipv4_mfwd_partner[263]: Encap: [2482] Encap entry created
(0xa08fd9d0) for eid 6 (stale N) flags 0x1
RP/0/0/CPU0:Feb 13 09:13:34.390 : ipv4_mfwd_partner[263]: Encap: [3039] RegDB entry 0xa10b5404
for LSMID 0x1 turnaround TRUE(new: N ifh_changed N) ifhandle: b0
RP/0/0/CPU0:Feb 13 09:13:34.390 : ipv4_mfwd_partner[263]: Encap: [3533] Encap entry for eid 6
(0xa08fd9d0) proc done
RP/0/0/CPU0:Feb 13 09:13:34.410 : mrib[1149]:   [  6] TID: 0xe0000010 (10.100.1.5,232.1.1.1)
Updated RPF EID*, #A=1, #F=2, #MDT_A=0 [Lm F LMI* MA* TR], Route Ver = 0x3414
RP/0/0/CPU0:Feb 13 09:13:34.410 : mrib[1149]:   [  6] TID: 0xe0000010 (10.100.1.5,232.1.1.1)
Updated RPF EID, #A=1, #F=2, #MDT_A=0 [Lm F LMI* MA TR], Route Ver = 0x3415
RP/0/0/CPU0:Feb 13 09:13:34.410 : ipv4_mfwd_partner[263]: Encap:
ip_mfwd_mrib_pre_process_encapid_update: encapid: 7, te_ole_cnt: 0,lsmid_ole_cnt: 1,
gre_ole_cnt: 0 ti_mofrr_ole_cnt: 0 flags: 0x1
RP/0/0/CPU0:Feb 13 09:13:34.410 : ipv4_mfwd_partner[263]: Encap: [2482] Encap entry created
(0xa08fd8a8) for eid 7 (stale N) flags 0x1
RP/0/0/CPU0:Feb 13 09:13:34.410 : ipv4_mfwd_partner[263]: Encap: [3039] RegDB entry 0xa08fd824
for LSMID 0x1c turnaround TRUE(new: Y ifh_changed N) ifhandle: b0
RP/0/0/CPU0:Feb 13 09:13:34.410 : ipv4_mfwd_partner[263]: Encap: [3533] Encap entry for eid 7
(0xa08fd8a8) proc done
RP/0/0/CPU0:Feb 13 09:13:34.500 : mrib[1149]:   [  6] TID: 0xe0000010 (10.100.1.5,232.1.1.1)
Updated RPF EID, #A=1, #F=2, #MDT_A=0 [Lm F LMI* MA TR], Route Ver = 0x3416
RP/0/0/CPU0:Feb 13 09:13:34.620 : mrib[1149]:   [ 22] Redistributed
RP/0/0/CPU0:Feb 13 09:13:34.620 : mrib[1149]:   [  6] TID: 0xe0000010 (10.100.1.5,232.1.1.1)
Updated RPF EID, #A=1, #F=2, #MDT_A=0 [Lm F LMI* MA TR], Route Ver = 0x3417
RP/0/0/CPU0:Feb 13 09:13:34.620 : ipv4_mfwd_partner[263]: Encap:
```

```
ip_mfwd_mrib_pre_process_encapid_update: encapid: 7, te_ole_cnt: 0,lsmid_ole_cnt: 1,
gre_ole_cnt: 0 ti_mofrr_ole_cnt: 0 flags: 0x1
RP/0/0/CPU0:Feb 13 09:13:34.620 : ipv4_mfwd_partner[263]: Encap: [2482] Encap entry existing
(0xa08fd8a8) for eid 7 (stale N) flags 0x1
RP/0/0/CPU0:Feb 13 09:13:34.620 : ipv4_mfwd_partner[263]: Encap: [3533] Encap entry for eid 7
(0xa08fd8a8) proc done
RP/0/0/CPU0:Feb 13 09:13:39.570 : ipv4_mfwd_partner[263]: Encap: encap id set  eid: 7
(10.100.1.5,232.1.1.1)
```

encap-ID设置为7，即在encap-ID创建后5秒，并且组播路由信息库(MRIB)使用传出接口列表(OIL)中的虚拟路由和转发(VRF)的标记MDT(LMDT)接口进行更新。

```
RP/0/0/CPU0:PE1#show mrib vrf one route 232.1.1.1 10.100.1.5

IP Multicast Routing Information Base
Entry flags: L - Domain-Local Source, E - External Source to the Domain,
   C - Directly-Connected Check, S - Signal, IA - Inherit Accept,
   IF - Inherit From, D - Drop, ME - MDT Encap, EID - Encap ID,
   MD - MDT Decap, MT - MDT Threshold Crossed, MH - MDT interface handle
   CD - Conditional Decap, MPLS - MPLS Decap, EX - Extranet
   MoFE - MoFRR Enabled, MoFS - MoFRR State, MoFP - MoFRR Primary
   MoFB - MoFRR Backup, RPFID - RPF ID Set, X - VXLAN
Interface flags: F - Forward, A - Accept, IC - Internal Copy,
   NS - Negate Signal, DP - Don't Preserve, SP - Signal Present,
   II - Internal Interest, ID - Internal Disinterest, LI - Local Interest,
   LD - Local Disinterest, DI - Decapsulation Interface
   EI - Encapsulation Interface, MI - MDT Interface, LVIF - MPLS Encap,
   EX - Extranet, A2 - Secondary Accept, MT - MDT Threshold Crossed,
   MA - Data MDT Assigned, LMI - mLDP MDT Interface, TMI - P2MP-TE MDT Interface
   IRMI - IR MDT Interface

(10.100.1.5,232.1.1.1) RPF nbr: 10.2.1.5 Flags: RPF
 Up: 01:04:11
 Incoming Interface List
   GigabitEthernet0/0/0/0 Flags: A, Up: 01:04:11
 Outgoing Interface List
   Lmdtone Flags: F LMI MA TR, Up: 00:03:33
   GigabitEthernet0/0/0/2 Flags: F NS, Up: 01:04:11

RP/0/0/CPU0:PE1#show mfib vrf one route 232.1.1.1 10.100.1.5 detail

IP Multicast Forwarding Information Base
Entry flags: C - Directly-Connected Check, S - Signal, D - Drop,
 IA - Inherit Accept, IF - Inherit From, EID - Encap ID,
 ME - MDT Encap, MD - MDT Decap, MT - MDT Threshold Crossed,
 MH - MDT interface handle, CD - Conditional Decap,
 DT - MDT Decap True, EX - Extranet, RPFID - RPF ID Set,
 MoFE - MoFRR Enabled, MoFS - MoFRR State, X - VXLAN
Interface flags: F - Forward, A - Accept, IC - Internal Copy,
 NS - Negate Signal, DP - Don't Preserve, SP - Signal Present,
 EG - Egress, EI - Encapsulation Interface, MI - MDT Interface,
 EX - Extranet, A2 - Secondary Accept
Forwarding/Replication Counts: Packets in/Packets out/Bytes out
Failure Counts: RPF / TTL / Empty Olist / Encap RL / Other

(10.100.1.5,232.1.1.1),  Flags:  EID , FMA: 0x10001 ,
 Up: 01:04:25
 Last Used: 00:00:00
 SW Forwarding Counts: 3856/3856/385600
 SW Replication Counts: 3856/3856/385600
 SW Failure Counts: 0/0/0/0/0
 Route ver: 0x3417
 MVPN Info :-
```

```
   Associated Table ID : 0xe0000000
   MDT Handle: 0x0, MDT Probe:Y [Y], Rate:Y, Acc:Y
   MDT SW Ingress Encap V4/V6, Egress decap: 0 / 0, 0
   EG count: 1
   Encap ID: 7, RPF ID: 0
   Local Receiver: True, Turnaround: False
 Lmdtone Flags:  F LMI TR, Up:00:03:47
 GigabitEthernet0/0/0/0 Flags:  A, Up:01:04:25
 GigabitEthernet0/0/0/2 Flags:  NS EG, Up:01:04:25
```

因此，远程接收方在接收此组播流时有5秒的额外延迟。

注意：LMDT接口立即添加到MRIB中，LMDT接口也立即添加到MFIB中，并带有F标志，但未设置encap ID。

在5秒延迟后设置了MFIB中的encap ID。

在Cisco Bug ID CSCvb50266之后 ,**当远程接收器加入时，编程encap-ID**的延迟为5秒。这是新的默认行为。

运行命令**show pim vrf <> context**以验证行为：

```
RP/0/0/CPU0:PE1#show pim vrf one context

PIM context information for VRF one (0x12b70184)

VRF ID: 0x60000001
Table ID: 0xe0000010
Remote Table ID: 0xe0800010
MDT Default Group : 0.0.0.0
MDT Source : (10.100.1.1, Loopback0) Per-VRF
MDT Immediate Switch Not Configured
MDT handle: 0x0(Null)
Context Active, ITAL Active
Routing Enabled
Registered with MRIB
Not owner of MDT Interface
Raw socket req: T, act: T, LPTS filter req: T, act: T
UDP socket req: T, act: T, UDP vbind req: T, act: T
Reg Inj socket req: T, act: T, Reg Inj LPTS filter req: T, act: T
Mhost Default Interface : GigabitEthernet0/0/0/0 (publish pending: F)
Remote MDT Default Group : 0.0.0.0
Backup MLC virtual interface: Null
Neighbor-filter: -
MDT Neighbor-filter: -
```

运行此隐藏命令**mdt immediate-switch**以删除5秒的延迟。

```
RP/0/0/CPU0:PE1#conf t
RP/0/0/CPU0:PE1(config)#multicast-routing vrf one
RP/0/0/CPU0:PE1(config-mcast-one)#address-family ipv4
RP/0/0/CPU0:PE1(config-mcast-one-ipv4)#mdt immediate-switch
RP/0/0/CPU0:PE1(config-mcast-one-ipv4)#commit
```

注意：从7.4.1开始，该命令不再隐藏。

```
RP/0/0/CPU0:PE1#show pim vrf one context

PIM context information for VRF one (0x12b70184)

VRF ID: 0x60000001
Table ID: 0xe0000010
Remote Table ID: 0xe0800010
MDT Default Group : 0.0.0.0
MDT Source : (10.100.1.1, Loopback0) Per-VRF
MDT Immediate Switch Configured
MDT handle: 0x0(Null)
Context Active, ITAL Active
Routing Enabled
Registered with MRIB
Not owner of MDT Interface
Raw socket req: T, act: T, LPTS filter req: T, act: T
UDP socket req: T, act: T, UDP vbind req: T, act: T
Reg Inj socket req: T, act: T, Reg Inj LPTS filter req: T, act: T
Mhost Default Interface : GigabitEthernet0/0/0/0 (publish pending: F)
Remote MDT Default Group : 0.0.0.0
Backup MLC virtual interface: Null
Neighbor-filter: -
MDT Neighbor-filter: -
```

运行配置中不显示此命令：

```
RP/0/0/CPU0:PE1#show running-config multicast-routing vrf one

multicast-routing
 vrf one
 address-family ipv4
  interface GigabitEthernet0/0/0/0
   enable
  !
  interface GigabitEthernet0/0/0/2
   enable
  !
  mdt source Loopback0
  rate-per-route
  accounting per-prefix
  bgp auto-discovery mldp
  !
  mdt partitioned mldp ipv4 p2mp
  mdt data mldp 100 immediate-switch
 !
```

不支持使用*immediate-switch*关键字*配置mdt immediate-switch*和*mdt data*命令。
以下是此类配置的示例：

```
RP/0/RP0/CPU0:PE1#conf t
RP/0/RP0/CPU0:PE1(config)#multicast-routing
RP/0/RP0/CPU0:PE1(config-mcast)#vrf one
RP/0/RP0/CPU0:PE1(config-mcast-one)#address-family ipv4
RP/0/RP0/CPU0:PE1(config-mcast-one-ipv4)#mdt data mldp 100 immediate-switch
RP/0/RP0/CPU0:PE1(config-mcast-one-ipv4)#mdt immediate-switch
RP/0/RP0/CPU0:PE1(config-mcast-one-ipv4)#commit
RP/0/RP0/CPU0:PE1(config-mcast-one-ipv4)#end
RP/0/RP0/CPU0:PE1#
```