

排除RIB错误消息故障"ROUTING-RIB-3-LABEL_ERR_ADD : 添加本地标签"

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简介

本文档介绍如何对Cisco IOS® XR路由信息库(RIB)消息"%ROUTING-RIB-3-LABEL_ERR_ADD: Add local-label"进行故障排除。

消息说明

为了明确其原因和目的，使用了一个示例，并将其划分为不同的组成部分：

```
RP/0/0/CPU0:Feb 17 11:46:25.663 : ipv4_rib[1148]: %ROUTING-RIB-3-LABEL_ERR_ADD : Add local-label 16111
```

发起人	ipv4_rib
分类	路由
组	RIB
严重级别	3 (错误条件)
助记符	LABEL_ERROR_ADD
消息文本	为表0xe0000000的前缀10.0.0.111/32添加local-label 16111(2)，由proto isis client 17 isis node0_0_CPU0 — 由proto-id 2 client 16添加现有标签24005

16111根据消息详细信息过程，ipv4_rib在尝试从协议中间系统到中间系统(IS-IS)- rib客户端17为前缀10.0.0.111/32添加本地标签时，生成了一个错误。RIB数据24005中已经存在另一个协议rib客户端16以前添加的相同前缀的标签。总之，两个不同的协议在RIB数据库中为相同前缀添加了不同的本地标签。这是一个错误条件，必须更正并解决标签冲突。

了解消息来源

当多个协议交换标签时(例如同时使用边界网关协议 — 标记的单播(BGP-LU)和分段路由(SR))，可能会发生错误情况。

请考虑以下场景：在同一自治系统(AS)内的主机之间使用BGP-LU来通告所选前缀和相关标签。通过IS-IS获知的前缀10.0.0.111/32有一个由BGP分配的本地标签，如下所示：

<#root>

```
RP/0/0/CPU0:XR4#show route 10.0.0.111/32 detail private
Routing entry for 10.0.0.111/32
  Known via "isis core", distance 115, metric 30, type level-2
  Installed Feb 17 10:56:08.900 for 00:34:45
  Routing Descriptor Blocks
    10.3.4.3, from 10.0.0.111, via GigabitEthernet0/0/0/0
      Route metric is 30

      Label: None

      Tunnel ID: None
      Binding Label: None
      Extended communities count: 0
      Path id:1      Path ref count:0
      NHID:0x1(Ref:8)
      Path flags: 0x0 ( )
      Private flags: 0x40 (rib_encap_id)
  Route version is 0x17 (23)
  Local Label: 0x5dc5 (24005)
  IP Precedence: Not Set
  QoS Group ID: Not Set
  Flow-tag: Not Set
  Fwd-class: Not Set
  Route Priority: RIB_PRIORITY_NON_RECURSIVE_MEDIUM (7) SVD Type RIB_SVD_TYPE_LOCAL
  Download Priority 1, Download Version 287
  Client-id: 17
  Route flags: 0x0 ( )
  Route Extended flags: 0x0 ( )
  Route private flags: 0x20 (priority_promotion)
  Route head pointer: 0x1201f5bc
  Local Label List

B 24005 (Client ID: 16, Distance: 200,)

  No advertising protos.
```

可以从MPLS标签表确认和24005证分配的本地标签地址的协议所有者：

<#root>

```
RP/0/0/CPU0:XR4#show mpls label table label 24005 detail private
```

```
Table Label Owner State Rewrite
```

```
-----
```

0

24005

```
LDP(A) InUse Yes
```

```
BGP-VPNv4(A):bgp-default
```

```
InUse No
```

```
(IPv4, vers:0, 'default':4U, 10.0.0.111/32)
```

当网络中启用SR时，IS-IS在RIB数据库中添加自己的标签时，就会触发错误条件。这会导致标签与来自BGP-LU的现有和以前分配的标签冲突。在此阶段，此错误消息由进程ipv4_rib生成，并警告尝试从协议IS-IS - rib客户端17 — 为前缀10.0.0.111/32添加本地标签16111，该前缀已经有一个先前由协议BGP - rib客户端16添加的本地标签24005:

```
RP/0/0/CPU0:Feb 17 11:46:25.663 : ipv4_rib[1148]: %ROUTING-RIB-3-LABEL_ERR_ADD : Add local-label 16111
```

标签冲突条件可以从前缀路由本地标签列表详细信息中查看和确认，如下所示：

<#root>

```
RP/0/0/CPU0:XR4#show route 10.0.0.111/32 detail private
```

```
Routing entry for 10.0.0.111/32
```

```
Known via "isis core", distance 115, metric 30, labeled SR, type level-2
```

```
Installed Feb 17 11:46:25.663 for 00:21:45
```

```
Routing Descriptor Blocks
```

```
10.3.4.3, from 10.0.0.111, via GigabitEthernet0/0/0/0
```

```
Route metric is 30
```

```
Label: 0x3eef (16111)
```

```
Tunnel ID: None
```

```
Binding Label: None
```

```
Extended communities count: 0
```

```
Path id:1 Path ref count:0
```

```
NHID:0x1(Ref:8)
```

```
Path flags: 0x0 ()
```

```
Private flags: 0x42 (has_vpn_data, rib_encap_id)
```

```
Route version is 0x1e (30)
```

```
Local Label: 0x3eef (16111)
```

```
IP Precedence: Not Set
```

```
QoS Group ID: Not Set
```

```
Flow-tag: Not Set
```

```
Fwd-class: Not Set
```

```
Route Priority: RIB_PRIORITY_NON_RECURSIVE_MEDIUM (7) SVD Type RIB_SVD_TYPE_LOCAL
```

```
Download Priority 1, Download Version 309
```

```
Client-id: 17
Route flags: 0x8800000 (ldp_sr_merge_request, label_sr)
Route Extended flags: 0x8 (ldp_sr_merge_request)
Route private flags: 0x20 (priority_promotion)
Route head pointer: 0x1201f5bc
Local Label List
```

```
  i 16111 (Client ID: 17, Distance: 115,)
```

```
  B 24005 (Client ID: 16, Distance: 200,)
```

```
No advertising protos.
```

标签冲突发生后，BGP-LU和IS-IS相关输出都会提供每个特定协议分配的本地标签的更多详细信息。接下来的输出将突出显示有关前缀和分配标签的每种协议具体信息。

在标签冲突场景中，记录前缀和标签详细信息，如协议BGP-LU所示：

```
<#root>
```

```
RP/0/0/CPU0:XR4#show bgp ipv4 labeled-unicast 10.0.0.111/32 detail
BGP routing table entry for 10.0.0.111/32
```

```
Versions:
```

```
  Process          bRIB/RIB  SendTblVer
  Speaker          69        69
```

```
Local Label: 24005
```

```
(no rewrite);
```

```
  Flags: 0x01003001+0x00000200;
```

```
Last Modified: Feb 17 11:46:31.984 for 00:22:30
```

```
Paths: (1 available, best #1)
```

```
  Not advertised to any peer
```

```
  Path #1: Received by speaker 0
```

```
  Flags: 0x4080000009060005, import: 0x20
```

```
  Not advertised to any peer
```

```
Local
```

```
  10.0.0.111 (metric 30) from 10.0.0.111 (10.0.0.111)
```

```
Received Label 3
```

```
  Origin IGP, metric 0, localpref 100, valid, internal, best, group-best, labeled-unicast
```

```
  Received Path ID 0, Local Path ID 0, version 69
```

```
  Prefix SID Attribute Size: 10
```

```
  Label Index: 111
```

```
RP/0/0/CPU0:XR4#show bgp ipv4 labeled-unicast labels
```

```
<snip>
```

```
  Network          Next Hop          Rcvd Label          Local Label
*> 10.0.0.4/32      0.0.0.0           noLabel             3
*>i10.0.0.111/32    10.0.0.111       3
```

```
24005
```

Processed 2 prefixes, 2 paths

```
RP/0/0/CPU0:XR4#show mpls label table label 24005 detail internal
Table Label      Owner                               State Rewrite
-----
0
24005
    LDP(A)                               InUse Yes
        BGP-VPNv4(A):bgp-default         InUse No
        (IPv4, vers:0, 'default':4U, 10.0.0.111/32)
```

在标签冲突场景中，记录前缀和标签详细信息，如协议IS-IS所示：

<#root>

```
RP/0/0/CPU0:XR4#show isis ipv4 route 10.0.0.111/32 detail
L2 10.0.0.111/32 [30/115] medium priority
    via 10.3.4.3, GigabitEthernet0/0/0/0, XR3, SRGB Base: 16000, Weight: 0
    src XR111.00-00, 10.0.0.111,
```

prefix-SID index 111

, R:0 N:1 P:0 E:0 V:0 L:0

```
RP/0/0/CPU0:XR4#show isis segment-routing label 16111
IS-IS core IS Label Table
Label      Prefix/Interface
-----
```

```
16111
    10.0.0.111/32
```

```
RP/0/0/CPU0:XR4#show mpls label table label 16111 detail internal
Table Label      Owner                               State Rewrite
-----
0
16111
    ISIS(A):core                               InUse No
    (Lb1-b1k SRGB, vers:0, (start_label=16000, size=8000))
```

协议和相关标签现在都已编程，可以从MPLS转发详细信息中观察到：

<#root>

```
RP/0/0/CPU0:XR4#show mpls forwarding labels 24005 detail private
Local  Outgoing  Prefix          Outgoing  Next Hop      Bytes
Label  Label     or ID           Interface  Next Hop      Switched
-----
24005
```

```

24004      10.0.0.111/32      Gi0/0/0/0      10.3.4.3      3055
  Updated: Feb 17 11:46:25.703
  Version: 217, Priority: 3
  Label Stack (Top -> Bottom): { 24004 }
  NHID: 0x0, Encap-ID: N/A, Path idx: 0, Backup path idx: 0, Weight: 0
  MAC/Encaps: 14/18, MTU: 1500
  Outgoing Interface: GigabitEthernet0/0/0/0 (ifhandle 0x00000040)
  Packets Switched: 56
  Traffic-Matrix Packets/Bytes Switched: 0/0
  Traffic-Matrix Packets/Bytes Switched: 0/0

```

```
RP/0/0/CPU0:XR4#show mpls forwarding labels 16111 detail private
```

Local Label	Outgoing Label	Prefix or ID	Outgoing Interface	Next Hop	Bytes Switched
-------------	----------------	--------------	--------------------	----------	----------------

```
16111
```

```

16111      SR Pfx (idx 111)  Gi0/0/0/0      10.3.4.3      0
  Updated: Feb 17 11:46:25.703
  Version: 309, Priority: 15
  Label Stack (Top -> Bottom): { 16111 }
  NHID: 0x0, Encap-ID: N/A, Path idx: 0, Backup path idx: 0, Weight: 0
  MAC/Encaps: 14/18, MTU: 1500
  Outgoing Interface: GigabitEthernet0/0/0/0 (ifhandle 0x00000040)
  Packets Switched: 0
  Traffic-Matrix Packets/Bytes Switched: 0/0
  Traffic-Matrix Packets/Bytes Switched: 0/0

```

但是，从前缀10.0.0.111/32的转发详细信息中，您可以观察到初始分配的标签24005仍在被使用，如下所示：

```
<#root>
```

```
RP/0/0/CPU0:XR4#show mpls forwarding prefix 10.0.0.111/32 detail private
```

Local Label	Outgoing Label	Prefix or ID	Outgoing Interface	Next Hop	Bytes Switched
-------------	----------------	--------------	--------------------	----------	----------------

```
24005
```

```

24004      10.0.0.111/32      Gi0/0/0/0      10.3.4.3      3225
  Updated: Feb 17 11:46:25.703
  Version: 217, Priority: 3
  Label Stack (Top -> Bottom): { 24004 }
  NHID: 0x0, Encap-ID: N/A, Path idx: 0, Backup path idx: 0, Weight: 0
  MAC/Encaps: 14/18, MTU: 1500
  Outgoing Interface: GigabitEthernet0/0/0/0 (ifhandle 0x00000040)
  Packets Switched: 59
  Traffic-Matrix Packets/Bytes Switched: 0/0

```

```
RP/0/0/CPU0:XR4#show cef 10.0.0.111/32 detail
```

```
10.0.0.111/32, version 217,
```

```
labeled SR
```

```
, internal 0x1000001 0x81 (ptr 0xa12dc0ec) [1], 0x0 (0xa12c1638), 0xa28 (0xa1527348)
```

```
Updated Feb 17 11:46:31.652
```

```
local adjacency 10.3.4.3
```

```
Prefix Len 32, traffic index 0, precedence n/a, priority 3
```

Extensions:

context-label:16111

```
gateway array (0xa12264f0) reference count 9, flags 0x68, source lsd (5), 1 backups
      [4 type 5 flags 0x8401 (0xa154153c) ext 0x0 (0x0)]
LW-LDI[type=5, refc=3, ptr=0xa12c1638, sh-ldi=0xa154153c]
gateway array update type-time 1 Feb 17 11:46:25.702
LDI Update time Feb 17 11:46:25.702
LW-LDI-TS Feb 17 11:46:25.702
  via 10.3.4.3/32, GigabitEthernet0/0/0/0, 11 dependencies, weight 0, class 0 [flags 0x0]
    path-idx 0 NHID 0x0 [0xa168816c 0x0]
    next hop 10.3.4.3/32
    local adjacency
```

local label 24005

labels imposed {24004}

Load distribution: 0 (refcount 4)

Hash	OK	Interface	Address
0	Y	GigabitEthernet0/0/0/0	10.3.4.3

在上述方案中，“%ROUTING-RIB-3-LABEL_ERR_ADD: Add local-label”可以通过配置BGP分段路由(SR-BGP)并使用BGP Prefix-SID来避免。

有关SR-BGP的详细信息，请参阅[Cisco ASR 9000系列路由器的分段路由配置指南](#)。所需步骤的快速参考如下。

在所有节点上配置全局分段路由全局块(SRGB)，它将自动启用SR-BGP:

```
!
segment-routing
  global-block 16000 23999
!
```

配置后，BGP将使用全局SRGB进行标签分配，如“show mpls label table detail”命令输出所示：

<#root>

```
!
! Note: If SR BGP was enabled after configuring BGP then you may need to process restart BGP for global
!
RP/0/0/CPU0:XRv111#show mpls label table detail
Table Label  Owner                               State  Rewrite
-----
<snip>
0      16000
ISIS(A):core
```

InUse No

```
BGP-VPNv4(A):bgp-default
```

```
    InUse No
    (Lb1-b1k SRGB, vers:0, (
start_label=16000, size=8000
)
<snip>
```

在发起路由的BGP节点上，通过路由策略配置BGP前缀SID。通告前缀10.0.0.111/32的节点的配置示例如下所示：

```
<#root>
!
route-policy
SID($SID)

    set label-index $SID
end-policy
!
router bgp 65000
address-family ipv4 unicast
    network 10.0.0.111/32 route-policy
SID(111)

    allocate-label all
!
```

如果部署了SR-BGP，将不再出现“ROUTING-RIB-3-LABEL_ERR_ADD: Add local-label”情况。如下所示，BGP将使用收到的带有前缀通告的BGP-Prefix SID索引作为从全局SRGB分配本地标签的提示。

```
<#root>
RP/0/0/CPU0:XR4#show route 10.0.0.111/32 detail private
Routing entry for 10.0.0.111/32
  Known via "isis core", distance 115, metric 30, labeled SR, type level-2
  Installed Feb 17 14:48:26.512 for 02:59:18
Routing Descriptor Blocks
  10.3.4.3, from 10.0.0.111, via GigabitEthernet0/0/0/0
    Route metric is 30

    Label: 0x3eef (16111)

Tunnel ID: None
Binding Label: None
```



```

Extended communities count: 0
Path id:1          Path ref count:0
NHID:0x2(Ref:8)
Path flags: 0x0 ( )
Private flags: 0x42 (has_vpn_data, rib_encap_id)
Route version is 0xd (13)
Local Label: 0x3eef (16111)
IP Precedence: Not Set
QoS Group ID: Not Set
Flow-tag: Not Set
Fwd-class: Not Set
Route Priority: RIB_PRIORITY_NON_RECURSIVE_MEDIUM (7) SVD Type RIB_SVD_TYPE_LOCAL
Download Priority 1, Download Version 438
Client-id: 19
Route flags: 0x9800000 (ldp_sr_merge_request, rib_precedence_over_ldp, label_sr)
Route Extended flags: 0x48 (ldp_sr_merge_request, rib_precedence_over_ldp)
Route private flags: 0x0 ( )
Route head pointer: 0x1201f32c
Local Label List

    i 16111 (Client ID: 19, Distance: 115,)

    B 16111 (Client ID: 18, Distance: 200,)

No advertising protos.

```

结论

当两个不同的协议在RIB数据库中为相同前缀添加不同的本地标签时，触发该消息，而要保留的一个重要方面是必须避免此标签冲突错误情况，并且必须了解并纠正其根源。

使用SR-BGP和BGP Prefix-SID可以避免此行为。

有关继续分类并了解消息“%ROUTING-RIB-3-LABEL_ERR_ADD: Add local-label”出现的有用输出，请参阅显示的命令列表：

```

show rib clients
show rib clients redistribution history all
show route <prefix> detail private
show isis ipv4 route <prefix> detail
show bgp ipv4 labeled-unicast <prefix> detail
show bgp ipv4 labeled-unicast labels
show cef <> detail
show mpls label table label <prefix> detail private
show mpls label table label <prefix> history
show mpls forwarding labels <prefix> detail private
show mpls forwarding prefix <prefix> detail private
show mpls lsd forwarding labels <prefix> detail
show mpls ldp forwarding detail
show isis segment-routing label table
show isis database verbose detail internal

```

关于此翻译

思科采用人工翻译与机器翻译相结合的方式将此文档翻译成不同语言，希望全球的用户都能通过各自的语言得到支持性的内容。

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