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## 简介

本文描述什么IPv6 traceroute在6PE或6VPE网络返回。

这些示例从运行6PE的网络采取。结果是相同的为运行6VPE的网络。一旦6PE和6VPE网络，P路由器收到Traceroute信息包用在标签栈的两个MPLS标签。如果P路由器生成说的互联网控制消息协议(ICMP)错误消息超时的存活时间(TTL)，它使用原始Traceroute信息包的标签栈并且转发往出口服务商边缘路由器的ICMP错误信息。那时，ICMP错误信息转发回到traceroute的创建人。

**注意：**此条款只适用于运行Cisco IOS的P路由器。

## 例 1

- P路由器是IPv6-capable。
- P路由器有启用的IPv6单播路由和IPv6 CEF。
- P路由器没有IPv6地址。

```
CE1#trace
```

```
Protocol [ip]: ipv6
```

```
Target IPv6 address: 2001:10:100:1::7
```

```
Source address: 2001:10:100:1::5
```

```
Insert source routing header? [no]:
```

```
Numeric display? [no]:
```

```
Timeout in seconds [3]:
```

```
Probe count [3]:
```

```
Minimum Time to Live [1]:
```

```
Maximum Time to Live [30]:
```

```
Priority [0]:
```

```
Port Number [0]:
```

```
Type escape sequence to abort.
```

```
Tracing the route to 2001:10:100:1::7
```

```
1 2001:10:1:5::1 1 msec 1 msec 0 msec
```

```
2 ::FFFF:10.1.2.4 [MPLS: Labels 17/23 Exp 0] 2 msec 2 msec 1 msec
```

```
3 2001:10:1:7::2 [AS 1] [MPLS: Label 23 Exp 0] 2 msec 1 msec 1 msec
```

```
4 2001:10:1:7::7 [AS 1] 2 msec 1 msec 2 msec
```

- 与IPv4-mapped IPv6地址的P路由器回复：：：FFFF:10.1.2.4.

- 10.1.2.4是流入接口的IPv4地址在P路由器的。

## 案例 2

- P路由器是IPv6-capable。
- P路由器有启用的IPv6单播路由和IPv6 CEF。
- P路由器有IPv6地址。

CE1#**trace**

```
Protocol [ip]: ipv6
Target IPv6 address: 2001:10:100:1::7
Source address: 2001:10:100:1::5
Insert source routing header? [no]:
Numeric display? [no]:
Timeout in seconds [3]:
Probe count [3]:
Minimum Time to Live [1]:
Maximum Time to Live [30]:
Priority [0]:
Port Number [0]:
Type escape sequence to abort.
Tracing the route to 2001:10:100:1::7
```

```
 1 2001:10:1:5::1 1 msec 1 msec 0 msec
 2 2001:2001::1 [MPLS: Labels 17/23 Exp 0] 2 msec 1 msec 1 msec
 3 2001:10:1:7::2 [AS 1] [MPLS: Label 23 Exp 0] 1 msec 1 msec 1 msec
 4 2001:10:1:7::7 [AS 1] 2 msec 2 msec 1 msec
```

- 与IPv6地址的P路由器回复在流入接口。
- 如果没有在该接口的IPv6地址，设法查找从另一个接口的一个IPv6地址。

然而，用更新的代码与IPv4-mapped IPv6的P路由器回复寻址。

CE1#**trace**

```
Protocol [ip]: ipv6
Target IPv6 address: 2001:10:100:1::7
Source address: 2001:10:100:1::5
Insert source routing header? [no]:
Numeric display? [no]:
Timeout in seconds [3]:
Probe count [3]:
Minimum Time to Live [1]:
Maximum Time to Live [30]:
Priority [0]:
Port Number [0]:
Type escape sequence to abort.
Tracing the route to 2001:10:100:1::7
```

```
 1 2001:10:1:5::1 1 msec 0 msec 1 msec
 2 ::FFFF:10.1.2.4 [MPLS: Labels 17/23 Exp 0] 2 msec 1 msec 2 msec
 3 2001:10:1:7::2 [AS 1] [MPLS: Label 23 Exp 0] 1 msec 2 msec 2 msec
 4 2001:10:1:7::7 [AS 1] 2 msec 2 msec 2 msec
```

- 与IPv4-mapped IPv6地址的P路由器回复 :: : FFFF:10.1.2.4.
- 10.1.2.4是流入接口的IPv4地址在P路由器的。

## 案例 3

- P路由器是IPv6-capable。
- P路由器没有启用的IPv6单播路由和IPv6 CEF。
- P路由器没有IPv6地址。

```
CE1#trace
Protocol [ip]: ipv6
Target IPv6 address: 2001:10:100:1::7
Source address: 2001:10:100:1::5
Insert source routing header? [no]:
Numeric display? [no]:
Timeout in seconds [3]:
Probe count [3]:
Minimum Time to Live [1]:
Maximum Time to Live [30]:
Priority [0]:
Port Number [0]:
Type escape sequence to abort.
Tracing the route to 2001:10:100:1::7

 1 2001:10:1:5::1 1 msec 1 msec 1 msec
 2 ::FFFF:10.1.2.4 [MPLS: Labels 17/23 Exp 0] 2 msec 2 msec 2 msec
 3 2001:10:1:7::2 [AS 1] [MPLS: Label 23 Exp 0] 2 msec 1 msec 1 msec
 4 2001:10:1:7::7 [AS 1] 2 msec 1 msec 2 msec
```

- 与IPv4-mapped IPv6地址的P路由器回复：：：FFFF:10.1.2.4。
- 10.1.2.4是流入接口的IPv4地址在P路由器的。

## 案例4

P路由器不是IPv6-capable。

```
CE1#trace
Protocol [ip]: ipv6
Target IPv6 address: 2001:10:100:1::7
Source address: 2001:10:100:1::5
Insert source routing header? [no]:
Numeric display? [no]:
Timeout in seconds [3]:
Probe count [3]:
Minimum Time to Live [1]:
Maximum Time to Live [30]:
Priority [0]:
Port Number [0]:
Type escape sequence to abort.
Tracing the route to 2001:10:100:1::7

 1 2001:10:1:5::1 1 msec 0 msec 1 msec
 2 * * *
 3 2001:10:1:7::2 [AS 1] [MPLS: Label 23 Exp 0] 2 msec 1 msec 1 msec
 4 2001:10:1:7::7 [AS 1] 1 msec 2 msec 1 msec
```

- P路由器不回复(您在输出的traceroute看到“\*\* \*)”。
- P路由器不能生成ICMPv6错误消息。

## 案例5

- P路由器是PREMFI代码(Cisco IOS)。
- P路由器是IPv6-capable。

```
CE1#trace
Protocol [ip]: ipv6
Target IPv6 address: 2001:10:100:1::7
Source address: 2001:10:100:1::5
Insert source routing header? [no]:
Numeric display? [no]:
Timeout in seconds [3]:
Probe count [3]:
Minimum Time to Live [1]:
Maximum Time to Live [30]:
Priority [0]:
Port Number [0]:
Type escape sequence to abort.
Tracing the route to 2001:10:100:1::7

 1 2001:10:1:5::1 1 msec 0 msec 1 msec
 2 * * *
 3 2001:10:1:7::2 [AS 1] [MPLS: Label 23 Exp 0] 2 msec 1 msec 1 msec
 4 2001:10:1:7::7 [AS 1] 1 msec 2 msec 1 msec
```

- P路由器不回复(您在输出的traceroute看到“\*\* \*)”。
- 运行PREMFI代码的P路由器(Cisco IOS)不检查发现IPv6是否跟随标签栈。

## 结论

- 如果P路由器不是IPv6-capable不会应答。
- 如果P路由器是IPv6-capable，但是P路由器有PREMFI代码(Cisco IOS)，不会应答。
- 如果P路由器是IPv6-capable并且没有IPv6地址，将回复以IPv4-mapped IPv6地址，IPv4地址是那个在Traceroute信息包的流入接口。
- 如果P路由器是IPv6-capable并且有IPv6地址，与IPv4-mapped IPv6地址的任一回复，IPv4地址是那个在Traceroute信息包的流入接口，否则将回复以在路由器配置的IPv6地址。