

CAT9000上与GIADDR和选项82的DHCP监听交互

目录

[简介](#)

[先决条件](#)

[要求](#)

[使用的组件](#)

[背景信息](#)

[网络图](#)

[测试案例](#)

[已启用核心交换机DHCP监听](#)

[禁用接入交换机选项82](#)

[接入交换机选项82已启用](#)

[禁用核心交换机DHCP监听](#)

[接入交换机选项82已启用](#)

[禁用接入交换机选项82](#)

[摘要](#)

简介

本文档介绍与CAT9000上的GIADDR和选项82的DHCP监听交互。

先决条件

要求

Cisco 建议您了解以下主题：

- Cisco IOS® XE在配置和操作命令方面的熟练程度。
- 熟悉Cisco Catalyst 9000系列交换机硬件和架构。
- 深入了解DHCP协议操作和DHCP监听机制。
- 对DHCP选项82和中继代理的作用的概念性理解。

使用的组件

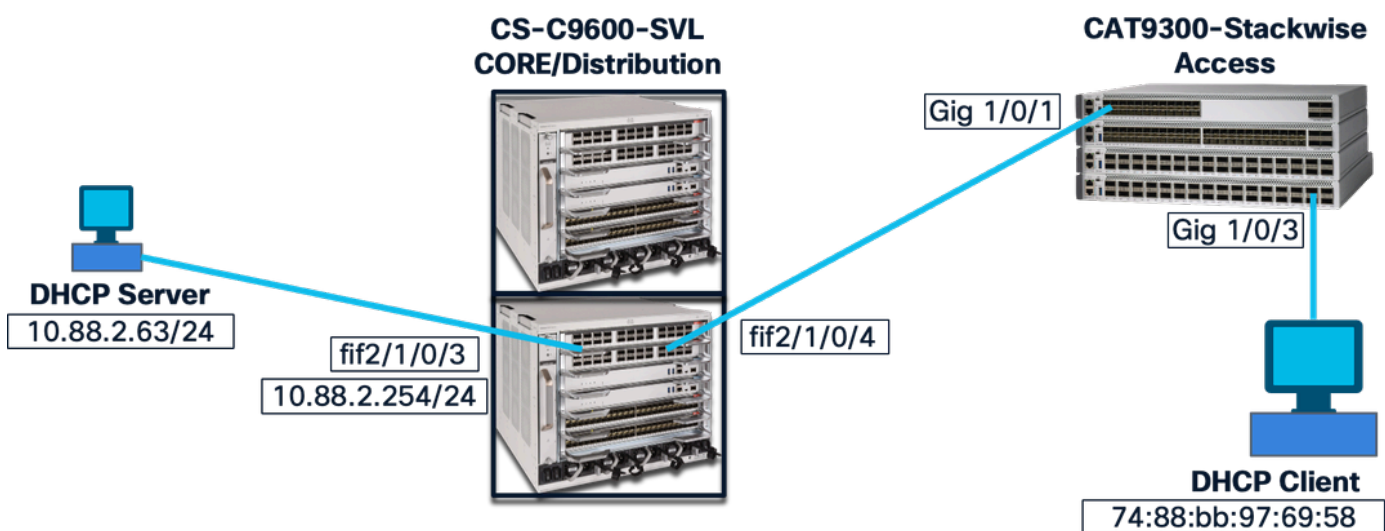
本文档中的信息基于以下软件和硬件版本：

- 核心/分布层交换机：Cisco Catalyst 9600X系列
- 接入交换机：Cisco Catalyst 9300系列
- DHCP客户端：终端主机设备
- DHCP服务器：集中式网络服务提供商

背景信息

本文档探讨核心/分布交换机上与DHCP选项82集成的DHCP监听的各种配置。本指南通过实际配置示例和对相应数据包捕获的分析，说明了Cisco Catalyst 9000系列环境中这些功能之间的交互。

网络图



测试案例

已启用核心交换机DHCP监听

禁用接入交换机选项82

核心交换机：

<#root>

```
!  
int f1f2/1/0/4 --> Downlink to Access Switch  
ip dhcp snooping trust  
!  
ip dhcp snooping vlan 1-2048
```

```
ip dhcp snooping
```

```
!
```

接入层交换机:

```
<#root>
```

```
!  
int gig1/0/1 -> uplink to Core  
ip dhcp snooping trust  
switchport mode trunk  
!  
ip dhcp snooping vlan 1-1400  
  
no ip dhcp snooping information option
```

```
ip dhcp snooping  
!  
int gig1/0/3 ----> End device connected port  
switchport mode access  
switchport access vlan 287  
!
```

结果：

成功。

终端设备获取IP地址时不会出现问题。

说明:

禁用接入交换机选项82，它将数据包发送到核心层，而不使用选项82。默认情况下启用核心层交换机选项82，并在数据包中添加带有中继代理IP地址的选项82，并将其发送到DHCP服务器。

客户端和接入交换机之间的链路上的数据包：

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0.0.0.0	255.255.255.255	DHCP	379	DHCP Discover - Transaction ID 0x1604
2	0.000156	0.0.0.0	255.255.255.255	DHCP	379	DHCP Discover - Transaction ID 0x1604
3	2.002663	10.88.39.254	255.255.255.255	DHCP	363	DHCP Offer - Transaction ID 0x1604
4	2.002977	10.88.39.254	255.255.255.255	DHCP	359	DHCP Offer - Transaction ID 0x1604
5	2.004966	0.0.0.0	255.255.255.255	DHCP	397	DHCP Request - Transaction ID 0x1604
6	2.005228	0.0.0.0	255.255.255.255	DHCP	397	DHCP Request - Transaction ID 0x1604
7	2.007080	10.88.39.254	255.255.255.255	DHCP	363	DHCP ACK - Transaction ID 0x1604

```

> Frame 1: Packet, 379 bytes on wire (3032 bits), 379 bytes captured (3032 bits) on interface /tmp/epc_v
> Ethernet II, Src: Cisco_97:69:58 (74:88:bb:97:69:58), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
v Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x00001604
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 0.0.0.0
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  > Option: (255) End

```



注意：同一客户端的数据包捕获多次并在多个捕获点进行；因此忽略事务id。

接入交换机和分布层/核心层交换机之间的链路上的数据包：

接入交换机没有监听信息选项插入，因此来自客户端的相同数据包被转发到分布交换机。

No.	Time	Source	Destination	Protocol	Length	Info
5	11.360258	0.0.0.0	255.255.255.255	DHCP	379	DHCP Discover - Transaction ID 0x1147
6	12.858224	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x8478fad8
7	12.858519	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x8478fad8
8	13.362861	10.88.39.254	255.255.255.255	DHCP	359	DHCP Offer - Transaction ID 0x1147
9	13.364854	0.0.0.0	255.255.255.255	DHCP	397	DHCP Request - Transaction ID 0x1147
10	13.469795	10.88.39.254	255.255.255.255	DHCP	359	DHCP ACK - Transaction ID 0x1147

```

> Frame 5: Packet, 379 bytes on wire (3032 bits), 379 bytes captured (3032 bits) on interface /tmp/epc_ws
> Ethernet II, Src: Cisco_97:69:58 (74:88:bb:97:69:58), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
> Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x00001147
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 0.0.0.0
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  > Option: (255) End

```

CORE交换机和DHCP服务器之间的数据包：

当启用DHCP监听并配置中继时，CORE交换机将数据包单播到具有中继代理IP的DHCP服务器10.88.2.63时会插入其自己的IP。

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	10.88.39.254	10.88.2.63	DHCP	379	DHCP Discover - Transaction ID 0x5df
2	0.000069	10.88.2.63	10.88.39.254	DHCP	359	DHCP Offer - Transaction ID 0x5df
3	0.128743	10.88.39.254	10.88.2.63	DHCP	397	DHCP Request - Transaction ID 0x5df
4	0.128997	10.88.2.63	10.88.39.254	DHCP	359	DHCP ACK - Transaction ID 0x5df


```

> Frame 1: Packet, 379 bytes on wire (3032 bits), 379 bytes captured (3032 bits) on interface /tmp/epc_
> Ethernet II, Src: Cisco_de:46:05 (08:f3:fb:de:46:05), Dst: Cisco_f3:6c:e4 (00:aa:6e:f3:6c:e4)
> Internet Protocol Version 4, Src: 10.88.39.254, Dst: 10.88.2.63
> User Datagram Protocol, Src Port: 67, Dst Port: 67
v Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 1
  Transaction ID: 0x000005df
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 10.88.39.254
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  > Option: (255) End

```

接入交换机选项82已启用

核心交换机：

<#root>

```

!
int fif2/1/0/4 --> Downlink to Access Switch
ip dhcp snooping trust
!
ip dhcp snooping vlan 1-2048

ip dhcp snooping
!

```

接入层交换机:

<#root>

```
!  
int gig1/0/1 -> uplink to Core  
ip dhcp snooping trust  
switchport mode trunk  
!  
ip dhcp snooping vlan 1-1400  
  
ip dhcp snooping information option  
  
ip dhcp snooping  
!  
int gig1/0/3  
switchport mode access  
switchport access vlan 287  
!
```

结果：

成功。

终端设备获取IP地址时不会出现问题。

说明：

已启用接入交换机选项82，但此交换机未创建SVI，它会将数据包发送到核心层，而不使用选项82。核心层交换机选项82默认启用，它会在数据包中添加选项82和中继代理的IP地址，并将其发送到DHCP服务器。

从客户端到接入交换机的数据包：

Time	Source	Destination	Protocol	Length	Info
1 0.000000	0.0.0.0	255.255.255.255	DHCP	379	DHCP Discover - Transaction ID
2 0.000161	0.0.0.0	255.255.255.255	DHCP	399	DHCP Discover - Transaction ID
3 1.110008	Cisco_9e:c8:c6	Broadcast	ARP	64	Who has 10.88.0.254? Tell 10.88
4 2.002486	10.88.39.254	255.255.255.255	DHCP	383	DHCP Offer - Transaction ID
5 2.002871	10.88.39.254	255.255.255.255	DHCP	379	DHCP Offer - Transaction ID
6 2.004750	0.0.0.0	255.255.255.255	DHCP	397	DHCP Request - Transaction ID
7 2.004994	0.0.0.0	255.255.255.255	DHCP	417	DHCP Request - Transaction ID
8 2.006887	10.88.39.254	255.255.255.255	DHCP	383	DHCP ACK - Transaction ID
9 2.108976	10.88.39.254	255.255.255.255	DHCP	379	DHCP ACK - Transaction ID

```

> Frame 1: Packet, 379 bytes on wire (3032 bits), 379 bytes captured (3032 bits) on interface
> Ethernet II, Src: Cisco_97:69:58 (74:88:bb:97:69:58), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
> Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x00000121
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 0.0.0.0
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  > Option: (255) End

```

从接入交换机到CORE/Distribution交换机的数据包：

由于在接入交换机上默认启用“ip dhcp snooping information option”，接入交换机插入选项82，其中中继IP为0.0.0.0。

根据DHCP监听环境，这是一个非法数据包，必须被CORE交换机丢弃。但是，由于CORE交换机具有可信接口，因此数据包将被处理以中继到DHCP服务器。

Time	Source	Destination	Protocol	Length	Info
2 0.000129	0.0.0.0	255.255.255.255	DHCP	399	DHCP Discover - Transaction I
3 0.002398	10.88.39.254	255.255.255.255	DHCP	379	DHCP Offer - Transaction I
4 0.005010	0.0.0.0	255.255.255.255	DHCP	397	DHCP Request - Transaction I

```

> Frame 2: Packet, 399 bytes on wire (3192 bits), 399 bytes captured (3192 bits) on interface
> Ethernet II, Src: Cisco_97:69:58 (74:88:bb:97:69:58), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
v Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x000026a5
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 0.0.0.0
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  v Option: (82) Agent Information Option
    Length: 18
    v Option 82 Suboption: (1) Agent Circuit ID
      Length: 6
      Agent Circuit ID: 0004011f0103
    v Option 82 Suboption: (2) Agent Remote ID
      Length: 8
      Agent Remote ID: 000690eb5000eb80
  v Option: (255) End
    Option End: 255

```

CORE交换机和DHCP服务器之间的数据包：

由于下行链路接口受信任，CORE交换机将中继代理从0.0.0.0替换为10.88.39.254，并将其发送到上行链路。

此外，DORA进程完成合法操作，客户端获得IP地址。

Time	Source	Destination	Protocol	Length	Info
1 0.000000	10.88.39.254	10.88.2.63	DHCP	399	DHCP Discover - Transaction ID 0x9fc
2 2.000064	10.88.2.63	10.88.39.254	DHCP	379	DHCP Offer - Transaction ID 0x9fc
3 2.003716	10.88.39.254	10.88.2.63	DHCP	417	DHCP Request - Transaction ID 0x9fc
4 2.003963	10.88.2.63	10.88.39.254	DHCP	379	DHCP ACK - Transaction ID 0x9fc

```

> Frame 1: Packet, 399 bytes on wire (3192 bits), 399 bytes captured (3192 bits) on interface /t
> Ethernet II, Src: Cisco_de:46:05 (08:f3:fb:de:46:05), Dst: Cisco_f3:6c:e4 (00:aa:6e:f3:6c:e4)
> Internet Protocol Version 4, Src: 10.88.39.254, Dst: 10.88.2.63
> User Datagram Protocol, Src Port: 67, Dst Port: 67
< Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 1
  Transaction ID: 0x000009fc
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 10.88.39.254
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  < Option: (82) Agent Information Option
    Length: 18
    < Option 82 Suboption: (1) Agent Circuit ID
      Length: 6
      Agent Circuit ID: 0004011f0103
    < Option 82 Suboption: (2) Agent Remote ID
      Length: 8
      Agent Remote ID: 000690eb5000eb80
    > Option: (255) End

```

禁用核心交换机DHCP监听

接入交换机选项82已启用

核心交换机：

```
<#root>
```

```
!
Int fif2/1/0/4 --> Downlink to Access Switch
no Ip dhcp snooping trust
!
```

```
no ip dhcp snooping vlan 1-2048
```

```
no ip dhcp snooping
```

```
!
```

接入层交换机:

```
<#root>
```

```
!  
int gig1/0/1 -> uplink to Core  
ip dhcp snooping trust  
switchport mode trunk  
!  
ip dhcp snooping vlan 1-1400
```

```
ip dhcp snooping information option
```

```
ip dhcp snooping  
!  
int gig1/0/3  
switchport mode access  
switchport access vlan 287  
!
```

结果：

失败。

终端设备无法获取IP地址。

说明:

接入交换机选项82已启用，但此交换机没有SVI或中继代理。因此，它使用选项82将数据包发送到CORE，并将Relay IP设置为0.0.0.0。因为CORE交换机上禁用了DHCP监听；在该处禁用了选项82的验证、编辑和插入。因此，CORE交换机无法添加中继并丢弃数据包。

客户端DHCP发现来自客户端并进入接入交换机的数据包：

	Time	Source	Destination	Protoco	Lengt	Info
1	0.000000	0.0.0.0	255.255.255.255	DHCP	379	DHCP Discover - Transaction ID
2	0.000187	0.0.0.0	255.255.255.255	DHCP	399	DHCP Discover - Transaction ID
3	3.223897	0.0.0.0	255.255.255.255	DHCP	399	DHCP Discover - Transaction ID
4	7.224730	0.0.0.0	255.255.255.255	DHCP	399	DHCP Discover - Transaction ID

```

> Frame 1: Packet, 379 bytes on wire (3032 bits), 379 bytes captured (3032 bits) on interfa
> Ethernet II, Src: Cisco_97:69:58 (74:88:bb:97:69:58), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
√ Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x00001617
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 0.0.0.0
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  > Option: (255) End

```

从接入交换机到CORE/分布交换机的数据包流：

·接入交换机启用了命令ip dhcp snooping information option，这会导致它将选项82插入DHCP数据包。在这种情况下，选项82中的中继代理IP地址设置为0.0.0.0。

·对于vLAN 287，接入交换机仅在第2层运行。

·从CORE交换机的角度来看，具有接入交换机插入的选项82的数据包被视为非法。但是，由于CORE交换机上的下行链路接口配置为trusted，因此CORE交换机处理数据包，而不是在接口级别丢弃数据包。

·CORE交换机禁用了DHCP监听，因此它不转发包含选项82的数据包。

使用DHCP发现数据包的核心交换机行为：

- CORE交换机尝试将DHCP发现数据包单播到已配置的帮助地址10.88.2.63。
- 为此，CORE交换机必须在DHCP数据包中设置中继IP地址(GIADDR)。
- 由于选项82已存在于接入交换机插入的数据中，因此CORE交换机必须在设置中继IP之前检验

选项82。

- 由于CORE交换机上禁用了DHCP监听，因此它无法验证选项82。
- 由于无法验证和修改选项82,CORE交换机别无选择，只能丢弃DHCP发现数据包。

Time	Source	Destination	Protocol	Length	Info
1	0.0.0.0	255.255.255.255	DHCP	399	DHCP Discover - Transaction ID 0
2	0.0.0.0	255.255.255.255	DHCP	399	DHCP Discover - Transaction ID 0
3	0.0.0.0	255.255.255.255	DHCP	399	DHCP Discover - Transaction ID 0

```
> Frame 1: Packet, 399 bytes on wire (3192 bits), 399 bytes captured (3192 bits) on interface
> Ethernet II, Src: Cisco_97:69:58 (74:88:bb:97:69:58), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
> Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x000018b1
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 0.0.0.0
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  > Option: (82) Agent Information Option
    Length: 18
    > Option 82 Suboption: (1) Agent Circuit ID
      Length: 6
      Agent Circuit ID: 0004011f0103
    > Option 82 Suboption: (2) Agent Remote ID
      Length: 8
      Agent Remote ID: 000690eb5000eb80
  > Option: (255) End
```

发现数据包不会从CORE交换机中继到DHCP服务器。

CORE交换机上非工作场景的调试：

```
DHCPD: Reload workspace interface Vlan287 tableid 0.
DHCPD: tableid for 10.88.39.254 on Vlan287 is 0
DHCPD: client's VPN is .
```

```
DHCPD: No option 125
DHCPD: Option 124: Vendor Class Information
DHCPD: Enterprise ID: 9
DHCPD: Vendor-class-data-len: 13
DHCPD: Data: 43~~~~58
DHCPD: inconsistent relay information.
DHCPD: relay information option exists, but giaddr is zero.
```

禁用接入交换机选项82

核心交换机：

```
<#root>
```

```
!
int f1f2/1/0/4 --> Downlink to Access Switch
no ip dhcp snooping trust
!
no ip dhcp snooping vlan 1-2048

no ip dhcp snooping
```

```
!
```

接入层交换机:

```
!
int gig1/0/1 -> uplink to Core
ip dhcp snooping trust
switchport mode trunk
!
ip dhcp snooping vlan 1-1400
no ip dhcp snooping information option
ip dhcp snooping
!
int gig1/0/3
switchport mode access
switchport access vlan 287
!
```

结果：

成功。

终端设备获取IP地址。

观察：

禁用接入交换机选项82，它将数据包发送到核心层，而不使用选项82，并且CORE交换机具有配置了中继的SVI。CORE交换机将中继代理IP地址添加到数据包并将其发送到DHCP服务器。

客户端DHCP发现到达接入交换机的数据包：

Time	Source	Destination	Protocol	Length	Info
6	11.127914	0.0.0.0	255.255.255.255	DHCP	379 DHCP Discover - Transaction ID
7	12.467192	0.0.0.0	255.255.255.255	DHCP	342 DHCP Discover - Transaction ID
8	12.467511	0.0.0.0	255.255.255.255	DHCP	342 DHCP Discover - Transaction ID
9	13.130633	10.88.39.254	255.255.255.255	DHCP	359 DHCP Offer - Transaction ID
10	13.132841	0.0.0.0	255.255.255.255	DHCP	397 DHCP Request - Transaction ID
11	13.236938	10.88.39.254	255.255.255.255	DHCP	359 DHCP ACK - Transaction ID

```
> Frame 6: Packet, 379 bytes on wire (3032 bits), 379 bytes captured (3032 bits) on interface
> Ethernet II, Src: Cisco_97:69:58 (74:88:bb:97:69:58), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
< Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x00002336
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 0.0.0.0
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  > Option: (255) End
```

从接入交换机到CORE交换机的数据包：

由于选项82插入在接入交换机上禁用，接入交换机将转发广播数据包，因为它在上行链路中继上。

Time	Source	Destination	Protocol	Length	Info
6 10.652455	0.0.0.0	255.255.255.255	DHCP	379	DHCP Discover - Transaction ID
7 11.292839	Cisco_9e:c8:c6	Broadcast	ARP	64	Who has 10.88.0.254? Tell 10.8
8 12.653654	10.88.39.254	255.255.255.255	DHCP	359	DHCP Offer - Transaction ID
9 12.655561	0.0.0.0	255.255.255.255	DHCP	397	DHCP Request - Transaction ID
10 12.655730	0.0.0.0	255.255.255.255	DHCP	397	DHCP Request - Transaction ID
11 12.760079	10.88.39.254	255.255.255.255	DHCP	359	DHCP ACK - Transaction ID

```

> Frame 6: Packet, 379 bytes on wire (3032 bits), 379 bytes captured (3032 bits) on interface
> Ethernet II, Src: Cisco_97:69:58 (74:88:bb:97:69:58), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
< Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x000003fd
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 0.0.0.0
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  > Option: (255) End

```

CORE交换机向DHCP服务器中继的数据包：

Time	Source	Destination	Protocol	Length	Info
1 0.000000	10.88.39.254	10.88.2.63	DHCP	379	DHCP Discover - Transaction ID 0x271
2 0.000139	10.88.2.63	10.88.39.254	DHCP	359	DHCP Offer - Transaction ID 0x271
3 0.463381	10.88.39.254	10.88.2.63	DHCP	397	DHCP Request - Transaction ID 0x271
4 0.463628	10.88.2.63	10.88.39.254	DHCP	359	DHCP ACK - Transaction ID 0x271

```

> Frame 1: Packet, 379 bytes on wire (3032 bits), 379 bytes captured (3032 bits) on interface /tm
> Ethernet II, Src: Cisco_de:46:05 (08:f3:fb:de:46:05), Dst: Cisco_f3:6c:e4 (00:aa:6e:f3:6c:e4)
> Internet Protocol Version 4, Src: 10.88.39.254, Dst: 10.88.2.63
> User Datagram Protocol, Src Port: 67, Dst Port: 67
∨ Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 1
  Transaction ID: 0x00000271
  Seconds elapsed: 0
  > Bootp flags: 0x8000, Broadcast flag (Broadcast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 10.88.39.254
  Client MAC address: Cisco_97:69:58 (74:88:bb:97:69:58)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (57) Maximum DHCP Message Size
  > Option: (61) Client identifier
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  > Option: (60) Vendor class identifier
  > Option: (124) V-I Vendor Class
  > Option: (255) End

```

核心交换机上的调试：

```

Option 82 not present
DHCPD: Reload workspace interface Vlan287 tableid 0.
DHCPD: tableid for 10.88.39.254 on Vlan287 is 0
DHCPD: client's VPN is .
DHCPD: No option 125
DHCPD: No option 124
DHCPD: FSM state change INVALID
DHCPD: Workspace state changed from INIT to INVALID
DHCPD: Finding a relay for client ~~~~ on interface Vlan287.
DHCPD : Locating relay for Subnet 10.88.39.254
DHCPD: there is no pool for 10.88.39.254.
DHCPD: Looking up binding using address 10.88.39.254
DHCPD: setting giaddr to 10.88.39.254

```

在本例中，客户端接收IP地址。

摘要

- 必须启用DHCP监听，交换机才能插入、删除或验证DHCP选项82信息。
- 当禁用DHCP监听时，交换机不执行选项82的插入或移除功能。
- 选项82处理（包括丢弃或允许带有选项82的数据包）取决于是否启用和配置DHCP监听。

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