

# 验证交换机上的IP设备跟踪MAB后配置

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## 简介

本文档介绍在MAB配置后IP设备跟踪的行为以及MAB身份验证后通信问题的可能解决方案。

## 先决条件

### 要求

Cisco 建议您了解以下主题：

- 思科身份服务引擎的配置
- Cisco Catalyst的配置

## 使用的组件

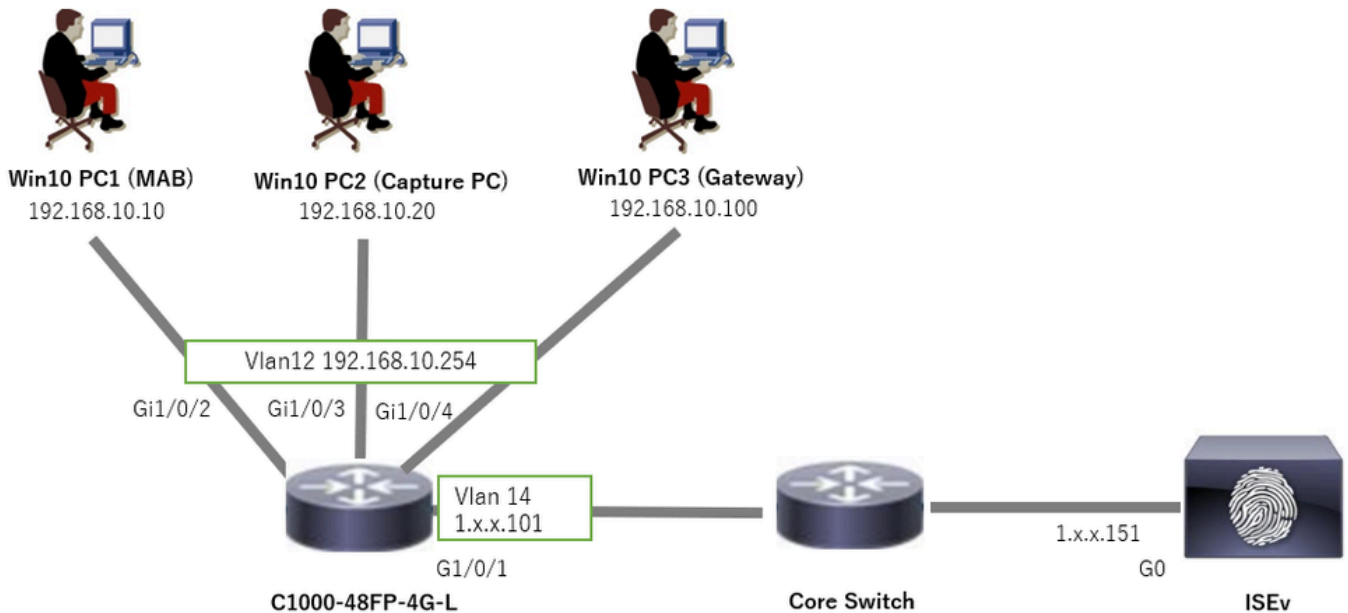
本文档中的信息基于以下软件和硬件版本：

- 身份服务引擎虚拟3.3补丁1
- C1000-48FP-4G-L 15.2(7)E9

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您的网络处于活动状态，请确保您了解所有命令的潜在影响。

## 图解

本文档介绍此图中的MAB身份验证配置和验证。



网络图

## 背景信息

即使MAB身份验证成功，但在重新启动（或拔掉并重新插入电缆）Win10 PC1后，它仍然无法成功ping通网关（Win10 PC3）。此意外行为是由于Win10 PC1上的IP地址冲突引起的。

默认情况下，在已配置MAB的接口上启用IP设备跟踪及其ARP探测。当Windows PC连接到启用了IP设备跟踪的Catalyst交换机时，Windows端可能会检测到IP地址冲突。出现这种情况是因为在此机制的检测窗口期间收到ARP探测（发送方IP地址为0.0.0.0），将其视为IP地址冲突。

## 配置

此配置示例演示了MAB配置后IP设备跟踪的行为。

## C1000中的配置

这是C1000 CLI中的最低配置。

```
aaa new-model

radius server ISE33
address ipv4 1.x.x.191
key cisco123

aaa group server radius AAASERVER
server name ISE33

aaa authentication dot1x default group AAASERVER
aaa authorization network default group AAASERVER
aaa accounting dot1x default start-stop group AAASERVER
dot1x system-auth-control

interface Vlan12
ip address 192.168.10.254 255.255.255.0

interface Vlan14
ip address 1.x.x.101 255.0.0.0

interface GigabitEthernet1/0/1
Switch port access vlan 14
Switch port mode access

interface GigabitEthernet1/0/3
Switch port access vlan 12
Switch port mode access

interface GigabitEthernet1/0/4
Switch port access vlan 12
Switch port mode access

interface GigabitEthernet1/0/2
Switch port access vlan 12
Switch port mode access
authentication host-mode multi-auth
authentication port-control auto
spanning-tree portfast edge
mab

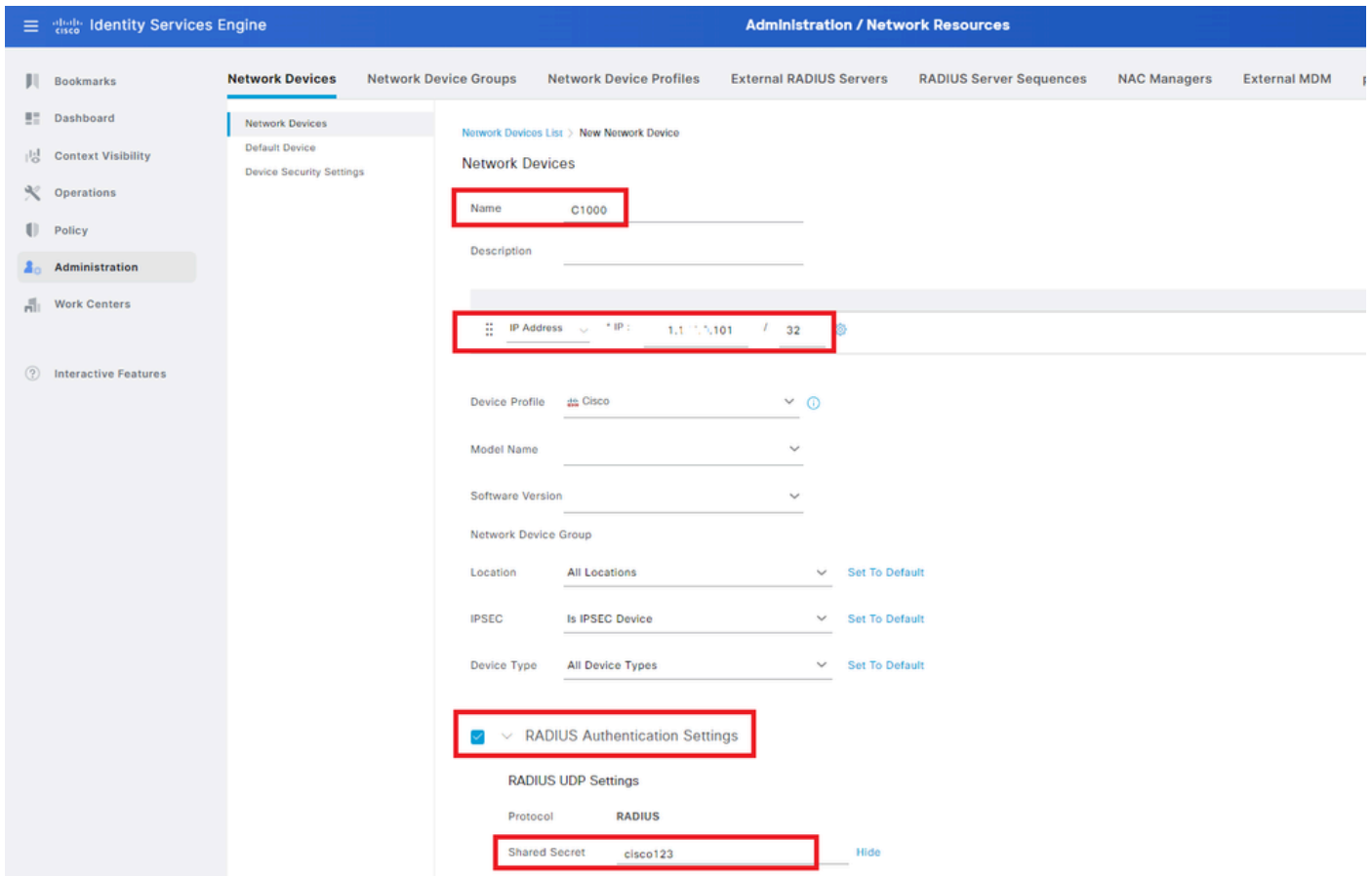
// for packet capture
monitor session 1 source interface Gi1/0/2
monitor session 1 destination interface Gi1/0/3
```

## ISE中的配置

### 步骤1:添加设备

导航到管理>网络设备，点击添加按钮以添加C1000设备。

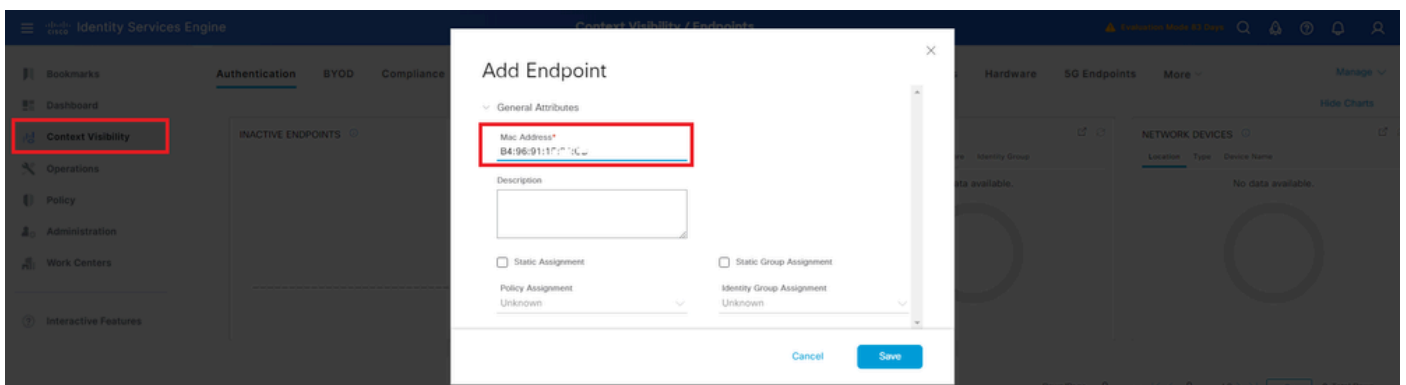
- 名称：C1000
- IP地址：1.x.x.101



添加设备

## 第二步：添加终端

导航到情景可视性>终端，点击添加按钮添加终端的MAC。



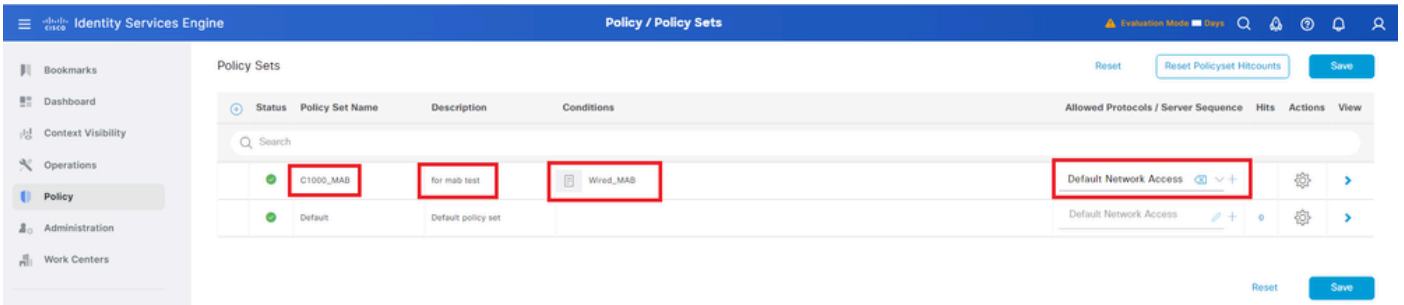
添加终端

## 第三步：添加策略集

导航到策略>策略集，点击+ 添加策略集。

- 策略集名称：C1000\_MAB
- 说明：用于mab测试

- 条件：Wired\_MAB
- 允许的协议/服务器序列：默认网络访问

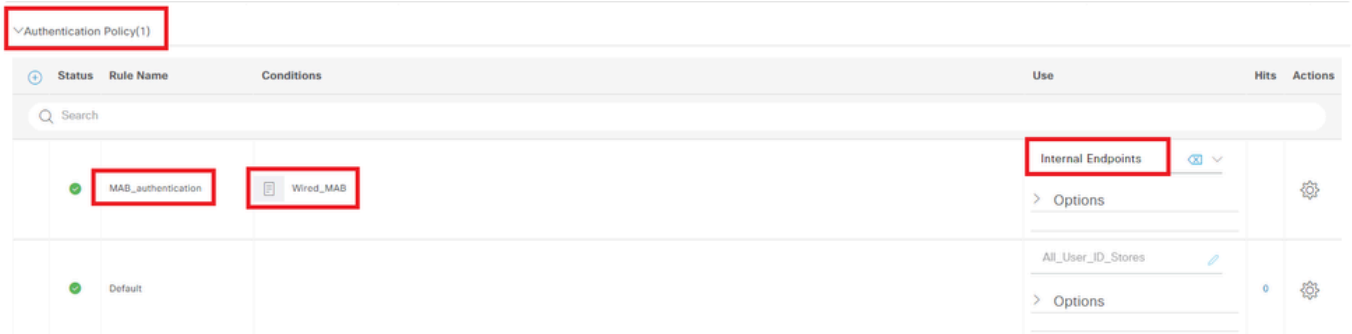


添加策略集

#### 第四步：添加身份验证策略

导航到策略集，点击C1000\_MAB添加身份验证策略。

- 规则名称：MAB\_authentication
- 条件：Wired\_MAB
- 使用：内部终端



添加身份验证策略

#### 第五步：添加授权策略

导航到策略集，点击C1000\_MAB添加授权策略。

- 规则名称：MAB\_authorization
- 条件：Network\_Access\_Authentication\_Passed
- 结果：PermitAccess



添加授权策略

## 验证

## 配置MAB之前

运行show ip device tracking all命令以确认IP设备跟踪功能已禁用。

```
<#root>
```

```
Switch #
```

```
show ip device tracking all
```

```
Global IP Device Tracking for clients =
```

```
Disabled
```

```
-----  
IP Address MAC Address Vlan Interface Probe-Timeout State Source  
-----
```

## 配置MAB之后

步骤1:在MAB身份验证之前

运行show ip device tracking all命令以确认IP设备跟踪功能已启用。

```
<#root>
```

```
Switch #
```

```
show ip device tracking all
```

```
Global IP Device Tracking for clients =
```

```
Enabled
```

```
Global IP Device Tracking Probe Count = 3
```

```
Global IP Device Tracking Probe Interval = 30
```

```
Global IP Device Tracking Probe Delay Interval = 0
```

```
-----  
IP Address MAC Address Vlan Interface Probe-Timeout State Source  
-----
```

```
Total number interfaces enabled: 1
```

```
Enabled interfaces:
```

```
Gi1/0/2
```

第二步：在MAB身份验证之后

从Win10 PC1初始化MAB身份验证并运行show ip device tracking all命令，以确认GigabitEthernet1/0/2上IP设备跟踪的状态。

<#root>

Switch #

```
show ip device tracking all
```

Global IP Device Tracking for clients =

**Enabled**

Global IP Device Tracking Probe Count = 3

Global IP Device Tracking Probe Interval = 30

Global IP Device Tracking Probe Delay Interval = 0

-----  
IP Address MAC Address Vlan Interface Probe-Timeout State Source  
-----

192.168.10.10

b496.9115.84cb 12 GigabitEthernet1/0/2 30

**ACTIVE**

ARP

Total number interfaces enabled: 1

Enabled interfaces:

Gi1/0/2

第三步：确认身份验证会话

运行show authentication sessions interface GigabitEthernet1/0/2 details命令以确认MAB身份验证会话。

<#root>

Switch #

```
show authentication sessions interface GigabitEthernet1/0/2 details
```

Interface: GigabitEthernet1/0/2

MAC Address: b496.9115.84cb

IPv6 Address: Unknown

IPv4 Address: 192.168.10.10

User-Name: B4-96-91-15-84-CB

Status: Authorized

Domain: DATA

Oper host mode: multi-auth

Oper control dir: both

Session timeout: N/A

Restart timeout: N/A

Periodic Acct timeout: N/A

Session Uptime: 114s

Common Session ID: 01C200650000001D62945338

Acct Session ID: 0x0000000F

Handle: 0xBE000007

Current Policy: POLICY\_Gi1/0/2

Local Policies:  
Service Template: DEFAULT\_LINKSEC\_POLICY\_SHOULD\_SECURE (priority 150)

Server Policies:

Method status list:  
Method State

mab Authc Success

#### 第四步：确认Radius实时日志

在ISE GUI中导航到操作 > RADIUS > 实时日志，确认MAB身份验证的实时日志。

Time	Status	Details	Repea...	Identity	Endpoint ID	Endpoint Profile	Authentication Policy	Authorization Policy	Authorization Profiles	IP Address	Network De...
Feb 25, 2024 04:32:06.437 PM			0	B4:96:91:15:84:CB	B4:96:91:15:84:CB	Intel-Device	C1000_MAB >> MAB_authentication	C1000_MAB >> MAB_authorizati...	PermitAccess	192.168.10.10	
Feb 25, 2024 04:32:05.396 PM				B4:96:91:15:84:CB	B4:96:91:15:84:CB	Intel-Device	C1000_MAB >> MAB_authentication	C1000_MAB >> MAB_authorizati...	PermitAccess	192.168.10.10	C1000

#### 第五步：确认IP设备跟踪的数据包详细信息

运行show interfaces GigabitEthernet1/0/2命令以确认GigabitEthernet1/0/2的MAC地址。

```
<#root>
```

```
Switch #
```

```
show interfaces GigabitEthernet1/0/2
```

```
GigabitEthernet1/0/2 is up, line protocol is up (connected)  
Hardware is Gigabit Ethernet, address is 3c41.0e4f.1782 (bia 3c41.0e4f.1782)
```

在数据包捕获中，确认GigabitEthernet1/0/2每30秒发送一次ARP探测。

74	01:26:01.357866	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 0.0.0.0
75	01:26:01.357988	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
113	01:26:30.825787	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 0.0.0.0
114	01:26:30.825919	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
138	01:26:59.688695	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 0.0.0.0
139	01:26:59.688876	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
158	01:27:28.392691	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 0.0.0.0
159	01:27:28.392910	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
179	01:27:57.827636	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 0.0.0.0
180	01:27:57.827784	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb

ARP探测功能



在数据包捕获中，确认ARP探测的发送方IP地址为0.0.0.0。

Wireshark · Packet 74 · pciPassthru0

```
> Frame 74: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0
> Ethernet II, Src: 3c:41:0e:4f:17:82 (3c:41:0e:4f:17:82), Dst: IntelCor_15:84:cb (b4:96:91:15:84:cb)
▼ Address Resolution Protocol (request)
  Hardware type: Ethernet (1)
  Protocol type: IPv4 (0x0800)
  Hardware size: 6
  Protocol size: 4
  Opcode: request (1)
  Sender MAC address: 3c:41:0e:4f:17:82 (3c:41:0e:4f:17:82)
  Sender IP address: 0.0.0.0
  Target MAC address: IntelCor_15:84:cb (b4:96:91:15:84:cb)
  Target IP address: 192.168.10.10
```

ARP探测的详细信息

## 问题

当Catalyst交换机发送带有发送方IP地址0.0.0.0的ARP探测时，该交换机的IP设备跟踪功能可能会导致Windows PC上的IP地址冲突。

## 可能的解决方案

有关可能的解决方案，请参阅[IP地址重复0.0.0.0的错误消息故障排除](#)。

以下是思科实验室中测试的每种解决方案的示例，以了解更多详细信息。

### 1. 延迟ARP探测的发送

运行ip device tracking probe delay <1-120>命令以延迟从交换机发送ARP探测。此命令不允许交换机在检测到链路UP/抖动时发送<1-120>秒的探测，这样可以最大程度地降低在链路另一端的主机检查重复IP地址时发送探测的可能性。

这是为10配置ARP探测延迟的示例。

```
Switch (config)#ip device tracking probe delay 10
```

运行show ip device tracking all命令以确认延迟设置。

```
<#root>
```

```
Switch #show ip device tracking all
Global IP Device Tracking for clients = Enabled
Global IP Device Tracking Probe Count = 3
Global IP Device Tracking Probe Interval = 30
Global IP Device Tracking Probe Delay Interval = 10
```

```
-----  
IP Address MAC Address Vlan Interface Probe-Timeout State Source  
-----  
192.168.10.10 b496.9115.84cb 12 GigabitEthernet1/0/2 30 ACTIVE ARP
```

```
Total number interfaces enabled: 1  
Enabled interfaces:  
Gi1/0/2
```

## 2. ARP探测的配置自动源

运行ip device tracking probe auto-source fallback <host-ip> <mask> [override]命令以更改ARP探测的源IP地址。使用此命令，ARP探测功能的IP源不是0.0.0.0，而是主机所在VLAN中的交换机虚拟接口(SVI)的IP地址，或者如果SVI未设置IP地址，则会自动计算该IP地址。

这是将<host-ip>配置为0.0.0.200的示例。

```
Switch (config)#ip device tracking probe auto-source fallback 0.0.0.200 255.255.255.0 override
```

### 模式1。已配置SVI的IP

在本文档中，由于为执行MAB身份验证的接口(GigabitEthernet1/0/2)设置了SVI IP地址 (vlan12的IP地址)，因此ARP探测的源IP地址更改为192.168.10.254。

运行show ip device tracking all命令以确认自动源的设置。

```
<#root>
```

```
Switch #show ip device tracking all  
Global IP Device Tracking for clients = Enabled  
Global IP Device Tracking Probe Count = 3  
Global IP Device Tracking Probe Interval = 30  
Global IP Device Tracking Probe Delay Interval = 0  
IP Device Tracking Probe Auto Source = Enabled
```

```
Probe source IP selection order: SVI,Fallback 0.0.0.200 255.255.255.0
```

```
-----  
IP Address MAC Address Vlan Interface Probe-Timeout State Source  
-----  
192.168.10.10 b496.9115.84cb 12 GigabitEthernet1/0/2 30 ACTIVE ARP
```

```
Total number interfaces enabled: 1  
Enabled interfaces:  
Gi1/0/2
```

在数据包捕获中，确认GigabitEthernet1/0/2每30秒发送一次ARP探测。

102	13:31:03.121397	3c:41:0e:4f:17:c1	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.254
103	13:31:03.121608	IntelCor_15:84:cb	3c:41:0e:4f:17:c1	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
123	13:31:33.006355	3c:41:0e:4f:17:c1	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.254
124	13:31:33.006502	IntelCor_15:84:cb	3c:41:0e:4f:17:c1	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
144	13:32:01.534263	3c:41:0e:4f:17:c1	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.254
145	13:32:01.534377	IntelCor_15:84:cb	3c:41:0e:4f:17:c1	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
163	13:32:30.386323	3c:41:0e:4f:17:c1	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.254
164	13:32:30.386325	IntelCor_15:84:cb	3c:41:0e:4f:17:c1	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
182	13:32:59.104148	3c:41:0e:4f:17:c1	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.254
183	13:32:59.104318	IntelCor_15:84:cb	3c:41:0e:4f:17:c1	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb

## ARP探测功能

在数据包捕获中，确认ARP探测的发送方IP地址为192.168.10.254，这是SVI (vlan 12)的IP。

### Wireshark · Packet 102 · pciPassthru0

```

> Frame 102: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0
> Ethernet II, Src: 3c:41:0e:4f:17:c1 (3c:41:0e:4f:17:c1), Dst: IntelCor_15:84:cb (b4:96:91:15:84:cb)
  Address Resolution Protocol (request)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (1)
    Sender MAC address: 3c:41:0e:4f:17:c1 (3c:41:0e:4f:17:c1)
    Sender IP address: 192.168.10.254
    Target MAC address: IntelCor_15:84:cb (b4:96:91:15:84:cb)
    Target IP address: 192.168.10.10

```

## ARP探测的详细信息

### 模式2.未配置SVI的IP

在本文档中，由于ARP探测的目的地是192.168.10.10/24，如果未配置SVI IP地址，则源IP地址为192.168.10.200。

### 删除SVI的IP地址

```

Switch (config)#int vlan 12
Switch (config-if)#no ip address

```

运行show ip device tracking all命令以确认自动源的设置。

```
<#root>
```

```

Switch #show ip device tracking all
Global IP Device Tracking for clients = Enabled
Global IP Device Tracking Probe Count = 3
Global IP Device Tracking Probe Interval = 30
Global IP Device Tracking Probe Delay Interval = 0
IP Device Tracking Probe Auto Source = Enabled

Probe source IP selection order: SVI,Fallback 0.0.0.200 255.255.255.0

```

```
-----
IP Address MAC Address Vlan Interface Probe-Timeout State Source
-----
192.168.10.10 b496.9115.84cb 12 GigabitEthernet1/0/2 30 ACTIVE ARP
-----
```


Total number interfaces enabled: 1  
 Enabled interfaces:  
 Gi1/0/2

在数据包捕获中，确认GigabitEthernet1/0/2每30秒发送一次ARP探测。

176	13:39:00.167788	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.200
177	13:39:00.167975	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
196	13:39:29.131512	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.200
197	13:39:29.131616	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
217	13:39:58.724683	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.200
218	13:39:58.724858	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
238	13:40:27.746620	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.200
239	13:40:27.746784	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
257	13:40:57.240571	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.200
258	13:40:57.240702	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb
278	13:41:27.193284	3c:41:0e:4f:17:82	IntelCor_15:84:cb	ARP	60	Who has 192.168.10.10? Tell 192.168.10.200
279	13:41:27.193419	IntelCor_15:84:cb	3c:41:0e:4f:17:82	ARP	60	192.168.10.10 is at b4:96:91:15:84:cb

ARP探测功能

在数据包捕获中，确认ARP探测的发送方IP地址已更改为192.168.10.200。

 Wireshark · Packet 176 · pciPassthru0

```
> Frame 176: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0
> Ethernet II, Src: 3c:41:0e:4f:17:82 (3c:41:0e:4f:17:82), Dst: IntelCor_15:84:cb (b4:96:91:15:84:cb)
  Address Resolution Protocol (request)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (1)
    Sender MAC address: 3c:41:0e:4f:17:82 (3c:41:0e:4f:17:82)
    Sender IP address: 192.168.10.200
    Target MAC address: IntelCor_15:84:cb (b4:96:91:15:84:cb)
    Target IP address: 192.168.10.10
```

ARP探测的详细信息

### 3. 强制禁用IP设备跟踪

运行 `ip device tracking maximum 0` 命令以禁用IP设备跟踪。



注意：此命令并不是真正禁用IP设备跟踪，而是将跟踪的主机数量限制为零。

---

```
Switch (config)#int g1/0/2
Switch (config-if)#ip device tracking maximum 0
```

运行show ip device tracking all命令以确认GigabitEthernet1/0/2上IP设备跟踪的状态。

```
Switch #show ip device tracking all
Global IP Device Tracking for clients = Enabled
```

Global IP Device Tracking Probe Count = 3  
Global IP Device Tracking Probe Interval = 30  
Global IP Device Tracking Probe Delay Interval = 0

---

IP Address MAC Address Vlan Interface Probe-Timeout State Source

---

Total number interfaces enabled: 1

Enabled interfaces:

Gi1/0/2

参考

[排除IP地址为0.0.0.0的重复错误消息故障](#)

[验证IPDT设备操作](#)

## 关于此翻译

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