

在 Cisco Catalyst 8540 MSR 上配置 ATM 路由模块 (ARM) 上的 IP 组播路由

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简介

当网络在大小上增加，IP组播路由变为极其重要作为方法确定哪些分段要求组播数据流，并且哪些不。IP组播是允许从一来源将传播的IP数据流到一定数量的目的地的一个路由技术，或者从许多来源到许多目的地。而不是发送一数据包对每个目的地，一数据包发送给单个IP目的地组地址识别的组播组。

本文显示如何配置在一个ATM路由器模块(ARM)的IP组播路由在Catalyst 8540 MSR。ARM和增强型ARM支持此配置(叫作ARM I和ARM II，分别)。

先决条件

要求

本文读者应该熟知关于在Cisco路由器的基本IP组播配置。背景信息，参考这些文档：

- [配置IP组播路由](#)
- [IP组播路由命令](#)
- [IP组播故障排除指南](#)

使用的组件

本文档中的信息基于以下软件和硬件版本：

- Cisco3600，运行Cisco IOS软件版本12.1.(7)的7200和7500系列路由器
- 运行Cisco IOS软件版本12.1(7)EY的Catalyst 8540 MSR和Catalyst 8510 MSR

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。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

规则

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

配置

本部分提供有关如何配置本文档所述功能的信息。

注意：要查找本文档所用命令的其他信息，请使用[命令查找工具](#)（[仅限注册用户](#)）。

网络图

本文档使用此图中所示的网络设置：

Cisco 3640路由器，叫作C3640，连接到Cisco Catalyst 8540 MSR (叫作8540MSR)通过快速以太网端口3/0/1。8540MSR有在SLOT 11的ARM。使用接口atm 9/1/0，C8540MSR物理的连接对8510MSR。8510MSR ATM交换机连接对在ATM接口1/0/2的8540MSR。

有通过8510MSR (PVC)被建立的两永久虚电路。一是从8540MSR ARM多点子接口到C7513路由器，并且其他是从同一个8540MSR ARM多点子接口到C7204路由器。使用的路由协议是开放最短路径优先(OSPF)。独立于IP协议的组播(PIM)密集模式在路由器配置。这包括在8540MSR的ARM模块。C3640、C7513和C7204有配置的一个接口参加多播组239.0.10.1。从C3640的一ping到组播地址239.0.10.1从C3640、C7513和C7204得到答复。

配置

此部分包含配置的部分在网络图中和交换机的描述的路由器。这是关于配置的一些特定信息：

- 在本文用途封装aal5mux出现的配置。
- 而ATM PVC配置到远程站点，一个多点子接口在ARM创建。
- PIM用于密集模式。就PIM而言，ARM不区分在多点接口的个人VC之间。
- 组播数据流转发对“广播”配置的所有VC。
- **show ip mroute**输出说明PIM只识别流出接口和不各自的VC。

IP组播路由的配置在PIM帮助下显示此处。IP组播路由的所有相关命令在粗体显示。

C3640

```
ip multicast-routing ! interface Ethernet1/0 ip address
10.10.200.1 255.255.255.0 ip pim dense-mode ip igmp
join-group 239.0.10.1 half-duplex !! router ospf 1 log-
```

```
adjacency-changes network 10.10.200.0 0.0.0.255 area 0 !
```

C8540MSR

```
ip multicast-routing ! interface FastEthernet3/0/1 ip
address 10.10.200.2 255.255.255.0 ip pim dense-mode no
ip route-cache no ip mroute-cache ! ! interface
ATM11/0/0.1 multipoint ip address 75.75.75.2
255.255.255.0 ip pim dense-mode ip ospf network point-
to-multipoint map-group multicast atm pvc 2 1000 pd on
encap aal5mux ip interface ATM9/1/0 0 1000 atm pvc 2
1001 pd on encap aal5mux ip interface ATM9/1/0 0 1001 !
! router ospf 1 log-adjacency-changes network
10.10.200.0 0.0.0.255 area 0 network 75.75.75.0
0.0.0.255 area 0 ! map-list multicast ip 75.75.75.1 atm-
vc 1000 aal5mux broadcast ip 75.75.75.3 atm-vc 1001
aal5mux broadcast
```

8510MSR

```
interface ATM1/0/2
no ip address
atm pvc 0 1000 interface ATM1/0/1 0 1000
!
interface ATM1/0/3
no ip address
atm pvc 0 1001 interface ATM1/0/2 0 1001
!
```

C7513

```
ip multicast-routing ! ! interface Ethernet9/0/2 ip
address 30.30.30.1 255.255.255.0 ip pim dense-mode ip
igmp join-group 239.0.10.1 ! interface ATM1/0/0.1
multipoint ip address 75.75.75.1 255.255.255.0 ip pim
dense-mode no ip route-cache ip ospf network point-to-
multipoint no ip mroute-cache map-group multicast atm
pvc 1000 0 1000 aal5mux ip ! ! router ospf 1 log-
adjacency-changes network 30.30.30.0 0.0.0.255 area 0
network 75.75.75.0 0.0.0.255 area 0 ! map-list multicast
ip 75.75.75.2 atm-vc 1000 broadcast !
```

C7204

```
ip multicast-routing ! interface Loopback0 ip address
40.40.40.1 255.255.255.0 ip igmp join-group 239.0.10.1 !
! interface ATM4/0.5 multipoint ip address 75.75.75.3
255.255.255.0 ip pim dense-mode no ip route-cache ip
ospf network point-to-multipoint no ip mroute-cache map-
group multicast atm pvc 1 0 1001 aal5mux ip ! router
ospf 1 log-adjacency-changes network 40.40.40.0
0.0.0.255 area 0 network 75.75.75.0 0.0.0.255 area 0 !
map-list multicast ip 75.75.75.2 atm-vc 1 broadcast
```

验证

请使用这些命令测试您的网络正常运行：

[命令输出解释程序工具](#) ([仅限注册用户](#)) 支持某些 **show** 命令。通过此工具可查看对 **show** 命令输出的分析。

- **show ip route** - 显示 IP 路由表条目。

- **show ip pim neighbor** —列出Cisco IOS软件发现的PIM邻居。
- **show ip mroute** —显示IP组播路由表的内容。
- **show ip igmp groups** —显示直接地连接到路由器，并且通过IGMP了解的组播组。

此输出是结果输入这些显示on命令在[网络图中](#)显示的设备。此输出显示网络正常运行。

[C3640](#)

show ip route命令在C3640用于验证此路由器到达所有网络IP地址。它有一个路由对75.75.75.1，75.75.75.2，75.75.75.3。回环接口定义。找到所有路由通过OSPF。

```
C3640#show ip route Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP D -
EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 -
OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-
IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U -
per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is
not set 40.0.0.0/32 is subnetted, 1 subnets O 40.40.40.1 [110/12] via 10.10.200.2, 00:01:48,
Ethernet1/0 10.0.0.0/24 is subnetted, 1 subnets C 10.10.200.0 is directly connected, Ethernet1/0
75.0.0.0/32 is subnetted, 3 subnets O 75.75.75.3 [110/11] via 10.10.200.2, 00:01:48, Ethernet1/0
O 75.75.75.2 [110/10] via 10.10.200.2, 00:01:48, Ethernet1/0 O 75.75.75.1 [110/11] via
10.10.200.2, 00:01:48, Ethernet1/0 30.0.0.0/24 is subnetted, 1 subnets O 30.30.30.0 [110/21] via
10.10.200.2, 00:01:49, Ethernet1/0
```

此命令用于识别IP PIM邻居。邻居在这种情况下是C8540MSR。

```
C3640#show ip pim neighbor PIM Neighbor Table Neighbor Interface Uptime/Expires Ver DR Address
Priority/Mode 10.10.200.2 Ethernet1/0 3d03h/00:01:16 v2 N / DR
```

如果组播组从C3640 ping，是成功的。这表明C3640通信给IP地址239.0.10.1定义的组播组。

```
C3640#ping 239.0.10.1 Type escape sequence to abort. Sending 1, 100-byte ICMP Echos to
239.0.10.1, timeout is 2 seconds: Reply to request 0 from 10.10.200.1, 4 ms Reply to request 0
from 75.75.75.3, 4 ms Reply to request 0 from 75.75.75.1, 4 ms
```

show ip mroute命令显示关于组播路由表的信息。在本例中有239.0.10.1和224.0.1.40的无效路由。最后组播地址是cisco-rp-discovery的互联网分配号码授权中心(IANA)选定的那个。

```
C3640#show ip mroute IP Multicast Routing Table Flags: D - Dense, S - Sparse, B - Bidir Group, s
- SSM Group, C - Connected, L - Local, P - Pruned, R - RP-bit set, F - Register flag, T - SPT-
bit set, J - Join SPT, M - MSDP created entry, X - Proxy Join Timer Running, A - Advertised via
MSDP, U - URD, I - Received Source Specific Host Report Outgoing interface flags: H - Hardware
switched Timers: Uptime/Expires Interface state: Interface, Next-Hop or VCD, State/Mode (*,
224.0.1.40), 2d23h/00:00:00, RP 0.0.0.0, flags: DJCL Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list: Ethernet1/0, Forward/Dense, 2d23h/00:00:00 (*, 239.0.10.1),
1w1d/00:00:00, RP 0.0.0.0, flags: DJCL Incoming interface: Null, RPF nbr 0.0.0.0 Outgoing
interface list: Ethernet1/0, Forward/Dense, 2d23h/00:00:00 (10.10.200.1, 239.0.10.1),
00:02:37/00:00:22, flags: PCLTA Incoming interface: Ethernet1/0, RPF nbr 0.0.0.0 Outgoing
interface list: Null
```

在**show ip igmp groups**命令帮助下检查IP IGMP组。cisco-rp-discovery组播IP地址和C3640参加的igmp组播组是已发现。

```
C3640#show ip igmp groups IGMP Connected Group Membership Group Address Interface Uptime Expires
Last Reporter 224.0.1.40 Ethernet1/0 3d00h 00:02:38 10.10.200.2 239.0.10.1 Ethernet1/0 1w1d
00:02:44 10.10.200.1
```

[C8540MSR](#)

同样显示命令用于C8540MSR Catalyst交换机作为那些在C3460。**show ip route**命令显示C8540MSR到达网络的所有子网。

```
C8540MSR#show ip route Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
```

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is 10.118.1.21 to network 0.0.0.0 40.0.0.0/32 is subnetted, 1 subnets O 40.40.40.1 [110/2] via 75.75.75.3, 01:25:34, ATM11/0/0.1 10.0.0.0/24 is subnetted, 2 subnets C 10.118.1.0 is directly connected, Ethernet0 C 10.10.200.0 is directly connected, FastEthernet3/0/1 75.0.0.0/8 is variably subnetted, 3 subnets, 2 masks O **75.75.75.3/32** [110/1] via 75.75.75.3, 01:25:34, ATM11/0/0.1 O 75.75.75.1/32 [110/1] via 75.75.75.1, 01:25:34, ATM11/0/0.1 C 75.75.75.0/24 is directly connected, ATM11/0/0.1 30.0.0.0/24 is subnetted, 1 subnets O 30.30.30.0 [110/11] via 75.75.75.1, 01:25:35, ATM11/0/0.1 S* 0.0.0.0/0 [1/0] via 10.118.1.21

show ip pim neighbor命令显示组播邻居。一旦C8540MSR，IP PIM邻居是C3640 (10.10.200.1)，C7513 (75.75.75.1)和C7204 (75.75.75.3)。

```
C8540MSR#show ip pim neighbor PIM Neighbor Table Neighbor Address Interface Uptime Expires Ver
Mode 10.10.200.1 FastEthernet3/0/1 3d02h 00:01:25 v2 75.75.75.3 ATM11/0/0.1 00:12:11 00:01:33 v2
(DR) 75.75.75.1 ATM11/0/0.1 00:18:43 00:01:32 v2
```

关于组播路由表的**show ip mroute**命令提供信息。此示例显示有239.0.10.1和224.0.1.40的无效路由。最后组播地址是cisco-rp-discovery的IANA选定的那个。

```
C8540MSR#show ip mroute IP Multicast Routing Table Flags: D - Dense, S - Sparse, s - SSM Group,
C - Connected, L - Local, P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set, J -
Join SPT, M - MSDP created entry, X - Proxy Join Timer Running A - Advertised via MSDP, U - URD,
I - Received Source Specific Host Report Outgoing interface flags: H - Hardware switched Timers:
Uptime/Expires Interface state: Interface, Next-Hop or VCD, State/Mode (*, 224.0.1.40),
3d03h/00:00:00, RP 0.0.0.0, flags: DJCL Incoming interface: Null, RPF nbr 0.0.0.0 Outgoing
interface list: ATM11/0/0.1, Forward/Dense, 01:33:56/00:00:00 FastEthernet3/0/1, Forward/Dense,
3d03h/00:00:00 (*, 239.0.10.1), 3d03h/00:02:59, RP 0.0.0.0, flags: DJC Incoming interface: Null,
RPF nbr 0.0.0.0 Outgoing interface list: ATM11/0/0.1, Forward/Dense, 01:33:56/00:00:00
FastEthernet3/0/1, Forward/Dense, 3d03h/00:00:00 (10.10.200.1, 239.0.10.1), 00:00:17/00:02:49,
flags: CT Incoming interface: FastEthernet3/0/1, RPF nbr 0.0.0.0 Outgoing interface list:
ATM11/0/0.1, Forward/Dense, 00:00:19/00:00:00
```

[C7513](#)

说明和说明显示的命令的此处是作为那个为[C3640](#)和[C8540MSR](#)提供的相同的。

```
C7513#show ip route Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP D -
EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 -
OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-
IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U -
per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is
10.118.1.21 to network 0.0.0.0 40.0.0.0/32 is subnetted, 1 subnets O 40.40.40.1 [110/3] via
75.75.75.2, 02:05:04, ATM1/0/0.1 10.0.0.0/24 is subnetted, 2 subnets C 10.118.1.0 is directly
connected, Ethernet9/0/1 O 10.10.200.0 [110/2] via 75.75.75.2, 02:05:04, ATM1/0/0.1 11.0.0.0/24
is subnetted, 2 subnets C 11.12.12.0 is directly connected, Serial0/0/0/2:2 C 11.11.11.0 is
directly connected, Serial0/0/0/1:1 75.0.0.0/8 is variably subnetted, 3 subnets, 2 masks O
75.75.75.3/32 [110/2] via 75.75.75.2, 02:05:05, ATM1/0/0.1 O 75.75.75.2/32 [110/1] via
75.75.75.2, 02:05:05, ATM1/0/0.1 C 75.75.75.0/24 is directly connected, ATM1/0/0.1 30.0.0.0/24
is subnetted, 1 subnets C 30.30.30.0 is directly connected, Ethernet9/0/2 S* 0.0.0.0/0 [1/0] via
10.118.1.21 C7513#show ip pim neighbor PIM Neighbor Table Neighbor Interface Uptime/Expires Ver
DR Address Prio/Mode 75.75.75.2 ATM1/0/0.1 04:28:34/00:01:18 v2 N / DR C7513#show ip mroute IP
Multicast Routing Table Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C -
Connected, L - Local, P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set, J - Join
SPT, M - MSDP created entry, X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
U - URD, I - Received Source Specific Host Report Outgoing interface flags: H - Hardware
switched Timers: Uptime/Expires Interface state: Interface, Next-Hop or VCD, State/Mode (*,
224.0.1.40), 22:03:58/00:00:00, RP 0.0.0.0, flags: DCL Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list: Ethernet9/0/2, Forward/Dense, 22:03:58/00:00:00 ATM1/0/0.1,
Forward/Dense, 04:28:37/00:00:00 (*, 239.0.10.1), 22:03:58/00:00:00, RP 0.0.0.0, flags: DCL
Incoming interface: Null, RPF nbr 0.0.0.0 Outgoing interface list: Ethernet9/0/2, Forward/Dense,
22:03:58/00:00:00 ATM1/0/0.1, Forward/Dense, 04:28:37/00:00:00 (10.10.200.1, 239.0.10.1),
```

```
00:00:51/00:02:08, flags: CLT Incoming interface: ATM1/0/0.1, RPF nbr 75.75.75.2 Outgoing
interface list: Ethernet9/0/2, Forward/Dense, 00:00:52/00:00:00 C7513#show ip igmp groups IGMP
Connected Group Membership Group Address Interface Uptime Expires Last Reporter 224.0.1.40
Ethernet9/0/2 22:04:09 00:02:50 30.30.30.1 239.0.10.1 Ethernet9/0/2 22:04:15 00:02:50 30.30.30.1
```

[C7204](#)

说明和说明显示的命令的此处是作为那个为[C3640](#)和[C8540MSR](#)提供的相同的。

```
C7204#show ip route Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP D -
EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 -
OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP i - IS-
IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area * - candidate default, U -
per-user static route, o - ODR P - periodic downloaded static route Gateway of last resort is
10.118.1.21 to network 0.0.0.0 40.0.0.0/24 is subnetted, 1 subnets C 40.40.40.0 is directly
connected, Loopback0 10.0.0.0/24 is subnetted, 2 subnets C 10.118.1.0 is directly connected,
FastEthernet0/0 O 10.10.200.0 [110/2] via 75.75.75.2, 03:31:48, ATM4/0.5 75.0.0.0/8 is variably
subnetted, 3 subnets, 2 masks O 75.75.75.2/32 [110/1] via 75.75.75.2, 03:31:48, ATM4/0.5 O
75.75.75.1/32 [110/2] via 75.75.75.2, 03:31:48, ATM4/0.5 C 75.75.75.0/24 is directly connected,
ATM4/0.5 30.0.0.0/24 is subnetted, 1 subnets O 30.30.30.0 [110/12] via 75.75.75.2, 03:31:49,
ATM4/0.5 S* 0.0.0.0/0 [1/0] via 10.118.1.21 C7204#show ip pim neighbor PIM Neighbor Table
Neighbor Interface Uptime/Expires Ver DR Address Prio/Mode 75.75.75.2 ATM4/0.5 03:32:29/00:01:23
v2 N / C7204#show ip mroute IP Multicast Routing Table Flags: D - Dense, S - Sparse, B - Bidir
Group, s - SSM Group, C - Connected, L - Local, P - Pruned, R - RP-bit set, F - Register flag, T
- SPT-bit set, J - Join SPT, M - MSDP created entry, X - Proxy Join Timer Running, A - Candidate
for MSDP Advertisement, U - URD, I - Received Source Specific Host Report Outgoing interface
flags: H - Hardware switched Timers: Uptime/Expires Interface state: Interface, Next-Hop or VCD,
State/Mode (*, 224.0.1.40), 05:20:47/00:00:00, RP 0.0.0.0, flags: DCL Incoming interface: Null,
RPF nbr 0.0.0.0 Outgoing interface list: ATM4/0.5, Forward/Dense, 03:57:26/00:00:00 (*,
239.0.10.1), 03:31:41/00:00:00, RP 0.0.0.0, flags: DL Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list: ATM4/0.5, Forward/Dense, 03:31:41/00:00:00 7204#show ip igmp groups
IGMP Connected Group Membership Group Address Interface Uptime Expires Last Reporter 224.0.1.40
ATM4/0.5 05:20:53 00:02:24 75.75.75.3 239.0.10.1 Loopback0 23:33:52 stopped 40.40.40.1
```

[故障排除](#)

目前没有针对此配置的故障排除信息。

[相关信息](#)

- [配置IP组播路由](#)
- [IP组播路由命令](#)
- [IP组播故障排除指南](#)
- [配置ATM路由器模块接口](#)
- [在ATM路由模块上的RFC1483路由](#)
- [ATM交换路由器软件配置指南](#)
- [ATM技术支持页](#)
- [技术支持和文档 - Cisco Systems](#)