

# 配置路由在ATM路由模块(ARM)的IP组播在Cisco Catalyst 8540 MSR

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## [Introduction](#)

当网络在大小上增加，IP组播路由变得极其重要，当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IP数据流从一个来源被传播到一定数量的目的地的路由技术，或者从许多来源到许多目的地。而不是发送一个信息包到每个目的地，一个信息包被发送到单个IP目的地确定的组播组地址。

本文显示如何配置路由在一个ATM路由器模块(ARM)的IP组播在Catalyst 8540 MSR。两个ARM和增强型ARM支持此配置(叫作ARM I和ARM II，分别)。

## [Prerequisites](#)

### [Requirements](#)

本文的读者应该熟知关于在Cisco路由器的基本的IP组播配置。背景信息，请参见这些文件：

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

## Components Used

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 Software Release 12.1(7)EY的Catalyst 8540 MSR和Catalyst 8510 MSR

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

## Conventions

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

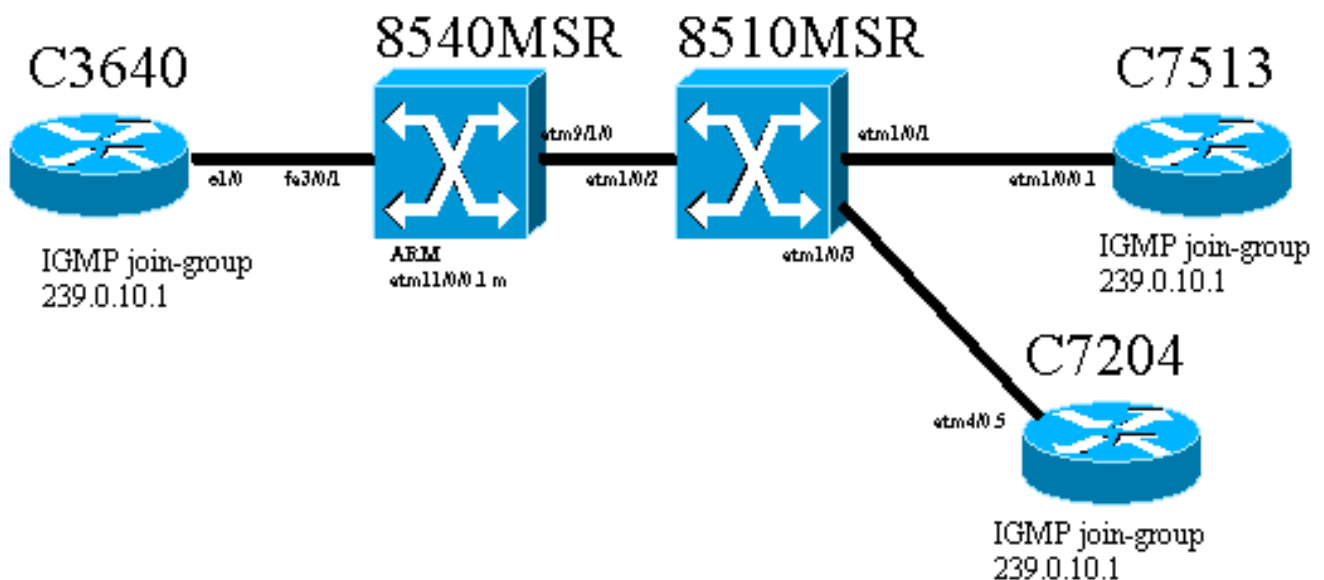
## Configure

本部分提供有关如何配置本文档所述功能的信息。

**Note:** 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](#)）。

## Network Diagram

本文档使用此图中所示的网络设置：



Cisco 3640路由器，叫作C3640，被连接到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物理的被连接到8510MSR。8510MSR ATM交换机连接到在ATM接口1/0/2的8540MSR。

有通过8510MSR被建立的两个永久虚拟电路(PVC)。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)密集模式在路由器被配置。这包括在8540MSR的

ARM模块。C3640、C7513和C7204有被配置的一个接口参加组播组239.0.10.1。从C3640的ping到组播地址239.0.10.1从C3640、C7513和C7204得到回应。

## 配置

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

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

路由在PIM帮助下的IP组播的配置显示得这里。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

```
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
```

## 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
```

## Verify

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相邻。
- **show ip mroute** —显示IP组播路由表的内容。
- **show ip igmp groups** —显示直接地被连接到路由器，并且通过IGMP是获知的组播组。

此输出是输入这些的结果显示on命令在[网络图中](#)显示的设备。此输出表示，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。环回接口被定义。所有路由通过OSPF被找到。

```
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相邻。相邻在这种情况下是C8540MSR。

```
C3640#show ip pim neighbor
```

PIM Neighbor Table

Neighbor Address	Interface	Uptime/Expires	Ver	DR	Priority/Mode
10.10.200.2	Ethernet1/0	3d03h/00:01:16	v2	N	DR

如果组播组从C3640连接，是成功的。这表明C3640沟通对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。发现cisco-rp-discovery组播IP地址和C3640参加的igmp组播组。

```
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命令表示，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相邻是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。此示例表示，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](#)

说明和解释显示的命令的这里是作为那个为[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](#)

说明和解释显示的命令的这里是作为那个为[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 Address	Interface	Uptime/Expires	Ver	DR 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

## [Troubleshoot](#)

目前没有针对此配置的故障排除信息。

## [Related Information](#)

- [IP组播故障排除指南](#)
- [ATM交换路由器软件配置指南](#)
- [ATM技术支持页面](#)