

在Cisco 7X00路由器和ATM交换机的相反ATM多路复用

Contents

[Introduction](#)

[Prerequisites](#)

[Requirements](#)

[Components Used](#)

[Network Diagram](#)

[Conventions](#)

[ICP \(IMA控制协议\)信元](#)

[IMA填充信元](#)

[配置](#)

[Verify](#)

[Troubleshoot](#)

[Related Information](#)

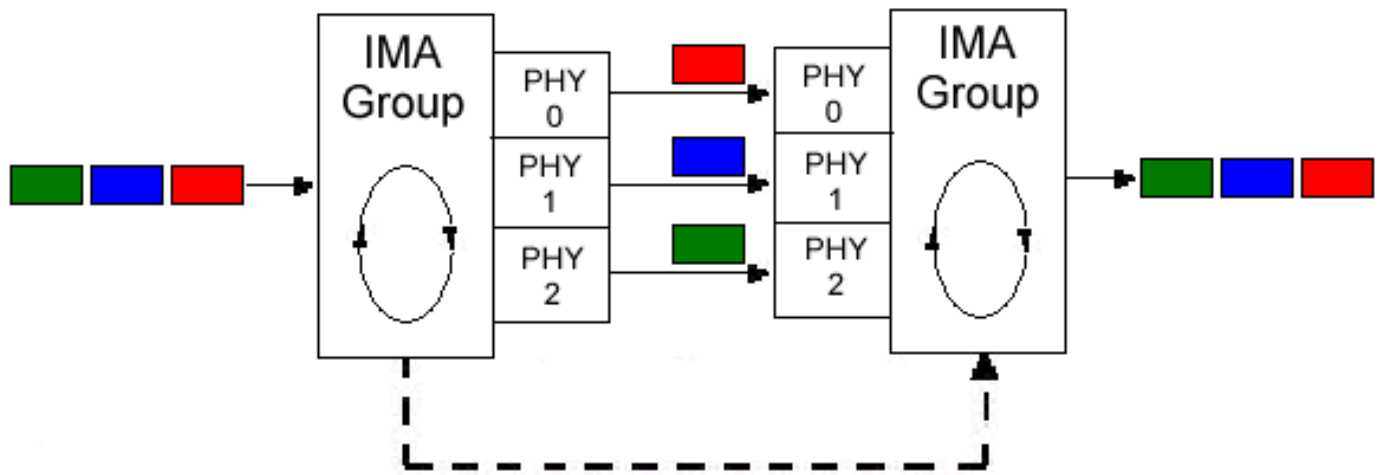
[Introduction](#)

ATM反向多路复用(IMA)在被组队的物理链路中以循环的方式介入相反多路复用和多路解编ATM信元形成一个更高带宽和逻辑链接。逻辑链接的费率近似是物理链路的费率的总和在IMA组的。信元流被分配以在多条T1/E1链路间的一个循环方式并且被重新召集在目的地形成原始信元流。使用IMA控制协议(ICP)信元，程序化提供。

在传送方向，从ATM层接收的ATM信元流在信元被分配由在多条链路间的信元基本类型在IMA组内。在远端，接受IMA单元重新召集从每条链路的信元在池经池的基础上并且再创原始ATM信元流。镜像在显示之下信元流如何在多个接口间传输并且被再结合形成原始信元流。接收接口丢弃ICP信元，并且会聚信元流然后通过ATM层。

周期地，传输IMA发送允许ATM信元流重建在接受IMA的特殊信元。这些ICP信元提供IMA帧的定义。

信元流在多个接口间传输并且被再结合形成原始流。



Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

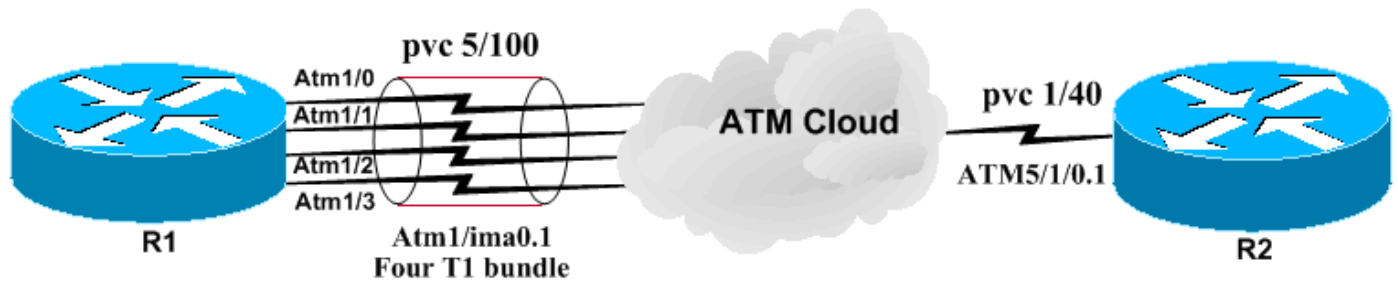
本文档中的信息基于以下软件和硬件版本：

- 对于思科7200系列路由器，八端口T1/E1 IMA端口适配器从Cisco IOS软件版本12.0(5)XE、12.0(7)XE、12.1(1)E和12.1(5)T支持。
- 对于思科7500系列路由器，以下VIP支持八端口T1/E1 IMA端口适配器：VIP2-40 -从Cisco IOS版本12.0(5)XE，12.0(7)XE，12.1(1)E。VIP2-50 -从Cisco IOS版本12.0(5)XE、12.0(7)XE、12.1(1)E和12.1(5)T。VIP4-80 -从Cisco IOS 12.2(1)T，12.2(1)，12.0(16)S和12.1(7)E。
- 对于Cisco lightstream 1010和Catalyst 8510 ATM交换机路由器，支持八端口T1/E1 IMA模块，因为Cisco IOS版本12.0(4a)W5(11a)并且要求有每个流排队功能卡的(FC-PFQ)一个ATM交换机处理器。
- 对于Cisco Catalyst 8540 ATM交换机路由器，八端口T1/E1 IMA模块从Cisco IOS版本12.0(7)W5(15c)支持。

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.

Network Diagram

本文档使用以下网络设置：



Conventions

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

ICP (IMA控制协议)信元

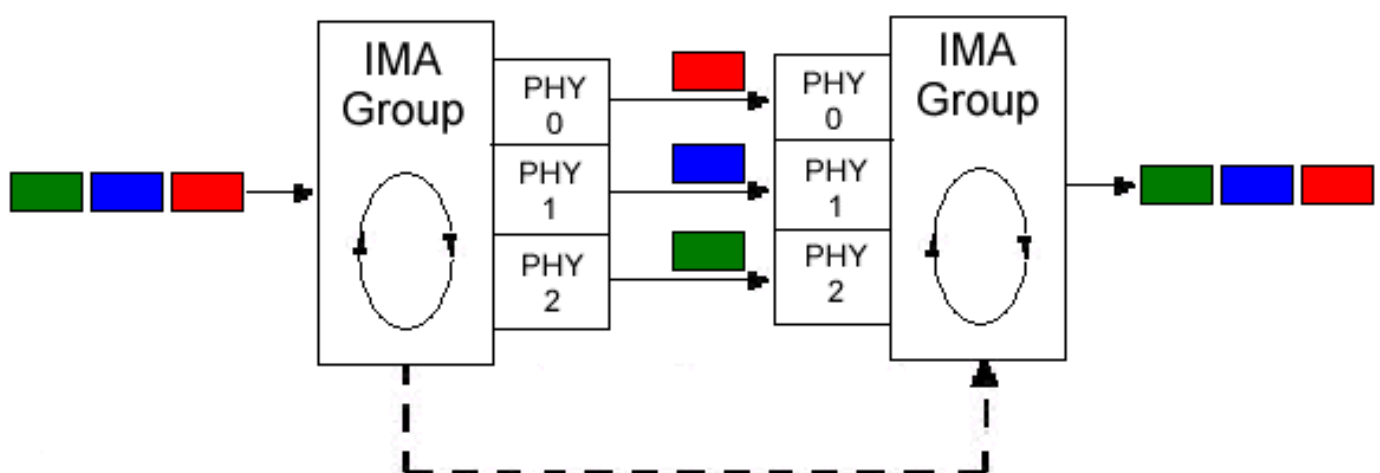
ICP信元被传输在IMA接口之间。这些信元使用分离和调整ATM信元流。传输的IMA对齐发送在所有链路的IMA帧。这允许接受器为可能是有经验的在链路间的所有延迟调整。在上面镜像(简化此示例)，发射从左到右是。然而，此数据和ICP信元在两个方向被发送。因此接受器能通过测量IMA帧的到达时间发现延迟在每个物理端口的。默认情况下，每个帧包括128个信元。结果，之一每128个信元是IMA信元。帧长度用show ima interface命令查看。

Note: 接收接口丢弃ICP信元。所以，计数器信息不显示ICP信元。请参见详细说明ATM控制信元的 [ATM控制信元说明](#)。

IMA填充信元

IMA设备总是发送连续流。如果没有发送ATM层信元，则IMA填充信元被传输提供恒定的流在物理层。允许费率分离在IMA下层的插入的填充信元。

Note: 接受器丢弃填充信元。所以，计数器信息不显示填充信元。请参见一个详细说的 [ATM控制信元说明](#)在ATM控制信元。



配置

本文档使用以下配置：

- [c7200-IMA](#)
- [LightStream 1010-2](#)
- [Router-B](#)

遵从这些步骤配置被标记c7200-IMA的路由器：

1. 分组您需要的T1/E1接口。注意接口必须在相同端口适配器。
2. 定义所有物理层参数(如果必须)。加扰是一个示例。
3. 创建一个IMA接口并且用虚拟电路(VC)配置它，如您配置一个标准，非IMA ATM接口。

IMA接口有以下语法：**建立接口**x是插槽编号的**ATM x/ima_y**，并且y是IMA组编号。

在下面的配置中，配置仅PVC。

c7200-IMA

```
hostname c7200-IMA
!
interface ATM1/0
  no ip address
  no ip directed-broadcast
  ima-group 0
!
interface ATM1/ima0
  no ip address
  no ip directed-broadcast
  no atm ilmi-keepalive
!
interface ATM1/ima0.1 point-to-point
  ip address 100.100.100.1 255.255.255.0
  no ip directed-broadcast
  pvc 5/100
    encapsulation aal5snap
    ubr 600
!
interface ATM1/1
  no ip address
  no ip directed-broadcast
  ima-group 0
!
interface ATM1/2
  no ip address
  no ip directed-broadcast
  ima-group 0
!
interface ATM1/3
  no ip address
  no ip directed-broadcast
  ima-group 0
```

LightStream 1010-2

```
hostname ls1010-2
!
interface ATM0/0/0
  no ip directed-broadcast
  lbo short 133
  ima-group 0
!
interface ATM0/0/1
  no ip address
```

```

no ip directed-broadcast
clock source free-running
lbo short 133
ima-group 0
!
interface ATM0/0/2
no ip address
no ip directed-broadcast
lbo short 133
ima-group 0
!
interface ATM0/0/3
no ip address
no ip directed-broadcast
lbo short 133
ima-group 0
!
interface ATM0/0/ima0
no ip address
no ip directed-broadcast
no ip route-cache cef
no atm ilmi-keepalive
atm pvc 5 100 interface ATM0/1/0 1 40

```

Router-B

```

hostname ls1010-2
!
interface ATM0/0/0
no ip directed-broadcast
lbo short 133
ima-group 0
!
interface ATM0/0/1
no ip address
no ip directed-broadcast
clock source free-running
lbo short 133
ima-group 0
!
interface ATM0/0/2
no ip address
no ip directed-broadcast
lbo short 133
ima-group 0
!
interface ATM0/0/3
no ip address
no ip directed-broadcast
lbo short 133
ima-group 0
!
interface ATM0/0/ima0
no ip address
no ip directed-broadcast
no ip route-cache cef
no atm ilmi-keepalive
atm pvc 5 100 interface ATM0/1/0 1 40

```

这些是关于此配置的另外的考虑：

- 流量整形参数能变化基于您的环境。请参见[了解ATM实时服务类别的路由器支援](#)。

- 加扰可以或不可以需要在界面水平根据载波配置。 [请如果慌忙被启用在ATM虚拟电路](#)欲知更多信息，请参见，[当](#)。

Verify

本部分所提供的信息可用于确认您的配置是否正常工作。

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

请使用这些命令测试您的网络是否正常运行：

- **show atm vc**
- **show interface atm 1/ima0**
- **show ima interface atm1/ima0**
- **show ima interface atm1/ima0 detail**
- **show controller atm 1/0**
- **ping**

如下所示的输出是输入这些on命令的结果在网络以上图表显示的设备。此输出表示，网络正常运行。请使用[show atm vc命令](#)显示PVC和数据流信息。如下所示，PVC 1/500和使用UBR以600 Kbps峰值信元速率。

```
c7200-IMA# show atm vc
```

Interface	Name	VCD	VPI	VCI	Type	Encaps	SC	Peak Kbps	Avg/Min Kbps	Burst Cells	Status
1/ima0.1	1	5	100	PVC	SNAP	UBR	600				UP

请使用[show interface atm 1/ima 0命令](#)寻找输入-输出错误。很大数量的输入-输出错误意味线路不是干净的。

```
c7200-IMA# show interface atm 1/ima0
ATM1/ima0 is up, line protocol is up

Hardware is IMA PA
MTU 4470 bytes, sub MTU 4470, BW 1523 Kbit, DLY 20000 usec,
  reliability 255/255, txload 1/255, rxload 1/255

Encapsulation ATM, loopback not set
Keepalive not supported
Encapsulation(s): AAL5
2048 maximum active VCs, 1 current VCCs
VC idle disconnect time: 300 seconds
3 carrier transitions
Last input 00:01:24, output 00:01:24, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: Per VC Queueing
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  464 packets input, 17320 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  474 packets output, 17176 bytes, 0 underruns
```

0 output errors, 0 collisions, 0 interface resets
0 output buffer failures, 0 output buffers swapped out

发出[show ima interface](#)命令寻找IMA故障。下面的输出表示没有故障，并且，NearEnd和远端是可操作的。

c7200-IMA# show ima interface atml/ima0

```
ATM1/ima0 is up
  ImaGroupState:      NearEnd = operational, FarEnd = operational
  ImaGroupFailureStatus = noFailure
IMA Group Current Configuration:
  ImaGroupMinNumTxLinks = 1      ImaGroupMinNumRxLinks = 1
  ImaGroupDiffDelayMax = 250    ImaGroupNeTxClkMode = common(ctc)
  ImaGroupFrameLength = 128    ImaTestProcStatus = disabled
  ImaGroupTestLink = 0         ImaGroupTestPattern = 0xFF
IMA Link Information:
  Link                Link Status          Test Status
-----
ATM1/0                up                    disabled
ATM1/1                up                    disabled
ATM1/2                up                    disabled
ATM1/3                up                    disabled
```

c7200-IMA# show ima interface atml/ima0 detail

```
ATM1/ima0 is up
  ImaGroupState:      NearEnd = operational, FarEnd = operational
  ImaGroupFailureStatus = noFailure
IMA Group Current Configuration:
  ImaGroupMinNumTxLinks = 1      ImaGroupMinNumRxLinks = 1
  ImaGroupDiffDelayMax = 250    ImaGroupNeTxClkMode = common(ctc)
  ImaGroupFrameLength = 128    ImaTestProcStatus = disabled
  ImaGroupTestLink = 0         ImaGroupTestPattern = 0xFF
IMA MIB Information:
  ImaGroupSymmetry = symmetricOperation
  ImaGroupFeTxClkMode = common(ctc)
  ImaGroupRxFrameLength = 128
  ImaGroupTxTimingRefLink = 0    ImaGroupRxTimingRefLink = 1
  ImaGroupTxImaId = 0           ImaGroupRxImaId = 0
  ImaGroupNumTxCfgLinks = 4     ImaGroupNumRxCfgLinks = 4
  ImaGroupNumTxActLinks = 4     ImaGroupNumRxActLinks = 4
  ImaGroupLeastDelayLink = 3    ImaGroupDiffDelayMaxObs = 0
IMA group counters:
  ImaGroupNeNumFailures = 3     ImaGroupFeNumFailures = 3
  ImaGroupUnAvailSecs = 2      ImaGroupRunningSecs = 427185
IMA Detailed Link Information:
```

ATM1/0 is up

```
  ImaLinkRowStatus = active
  ImaLinkIfIndex = 1           ImaLinkGroupIndex = 51
  ImaLinkState:
    NeTx = active
    NeRx = active
    FeTx = active
    FeRx = active
  ImaLinkFailureStatus:
    NeRx = noFailure
    FeRx = noFailure
  ImaLinkTxLid = 0            ImaLinkRxLid = 0
  ImaLinkRxTestPattern = 65   ImaLinkTestProcStatus = disabled
  ImaLinkRelDelay = 0
IMA Link counters :
  ImaLinkImaViolations = 1
  ImaLinkNeSevErroredSec = 32  ImaLinkFeSevErroredSec = 8
```

```
ImaLinkNeUnavailSec      = 543      ImaLinkFeUnAvailSec      = 0
ImaLinkNeTxUnusableSec  = 2         ImaLinkNeRxUnUsableSec  = 572
ImaLinkFeTxUnusableSec  = 78        ImaLinkFeRxUnusableSec  = 78
ImaLinkNeTxNumFailures  = 0         ImaLinkNeRxNumFailures  = 9
ImaLinkFeTxNumFailures  = 4         ImaLinkFeRxNumFailures  = 4
```

ATM1/1 is up

```
ImaLinkRowStatus = active
ImaLinkIfIndex   = 2           ImaLinkGroupIndex      = 51
ImaLinkState:
    NeTx = active
    NeRx = active
    FeTx = active
    FeRx = active
ImaLinkFailureStatus:
    NeRx = noFailure
    FeRx = noFailure
ImaLinkTxLid     = 1           ImaLinkRxLid          = 1
ImaLinkRxTestPattern = 65     ImaLinkTestProcStatus = disabled
ImaLinkRelDelay  = 0
```

IMA Link counters :

```
ImaLinkImaViolations      = 1
ImaLinkNeSevErroredSec    = 1     ImaLinkFeSevErroredSec = 0
ImaLinkNeUnavailSec      = 0     ImaLinkFeUnAvailSec    = 0
ImaLinkNeTxUnusableSec   = 2     ImaLinkNeRxUnUsableSec = 2
ImaLinkFeTxUnusableSec   = 0     ImaLinkFeRxUnusableSec = 0
ImaLinkNeTxNumFailures   = 0     ImaLinkNeRxNumFailures = 0
ImaLinkFeTxNumFailures   = 0     ImaLinkFeRxNumFailures = 0
```

ATM1/2 is up

```
ImaLinkRowStatus = active
ImaLinkIfIndex   = 3           ImaLinkGroupIndex      = 51
ImaLinkState:
    NeTx = active
    NeRx = active
    FeTx = active
    FeRx = active
ImaLinkFailureStatus:
    NeRx = noFailure
    FeRx = noFailure
ImaLinkTxLid     = 2           ImaLinkRxLid          = 2
ImaLinkRxTestPattern = 65     ImaLinkTestProcStatus = disabled
ImaLinkRelDelay  = 0
```

IMA Link counters :

```
ImaLinkImaViolations      = 1
ImaLinkNeSevErroredSec    = 1     ImaLinkFeSevErroredSec = 0
ImaLinkNeUnavailSec      = 0     ImaLinkFeUnAvailSec    = 0
ImaLinkNeTxUnusableSec   = 2     ImaLinkNeRxUnUsableSec = 2
ImaLinkFeTxUnusableSec   = 0     ImaLinkFeRxUnusableSec = 0
ImaLinkNeTxNumFailures   = 0     ImaLinkNeRxNumFailures = 0
ImaLinkFeTxNumFailures   = 0     ImaLinkFeRxNumFailures = 0
```

ATM1/3 is up

```
ImaLinkRowStatus = active
ImaLinkIfIndex   = 4           ImaLinkGroupIndex      = 51
ImaLinkState:
    NeTx = active
    NeRx = active
    FeTx = active
    FeRx = active
ImaLinkFailureStatus:
    NeRx = noFailure
    FeRx = noFailure
ImaLinkTxLid     = 3           ImaLinkRxLid          = 3
```



```

        ImaLinkRxTestPattern      = 65      ImaLinkTestProcStatus = disabled
        ImaLinkRelDelay           = 0
IMA Link counters :
        ImaLinkImaViolations      = 1
        ImaLinkNeSevErroredSec    = 1      ImaLinkFeSevErroredSec = 0
        ImaLinkNeUnavailSec       = 0      ImaLinkFeUnAvailSec    = 0
        ImaLinkNeTxUnusableSec    = 2      ImaLinkNeRxUnUsableSec = 2
        ImaLinkFeTxUnusableSec    = 0      ImaLinkFeRxUnusableSec = 0
        ImaLinkNeTxNumFailures    = 0      ImaLinkNeRxNumFailures = 0
        ImaLinkFeTxNumFailures    = 0      ImaLinkFeRxNumFailures = 0

```

Note: 它是一个好想法检查控制器好了验证，并且那那里是没有报告的警报。

c7200-IMA# show controller atm 1/0

Interface ATM1/0 is up

Hardware is IMA PA - DS1 (1Mbps)

Framer is PMC PM7344, SAR is LSI ATMIZER II

Firmware rev: G114, ATMIZER II rev: 3

idb=0x621903D8, ds=0x62198DE0, vc=0x621BA340, pa=0x62185EC0

slot 1, unit 1, subunit 0, fci_type 0x00BA, ticks 414377

400 rx buffers: size=512, encap=64, trailer=28, magic=4

Curr Stats:

rx_cell_lost=0, rx_no_buffer=0, rx_crc_10=0

rx_cell_len=0, rx_no_vcd=827022, rx_cell_throttle=0, tx_aci_err=0

Rx Free Ring status:

base=0x3CFF0040, size=1024, write=432

Rx Compl Ring status:

base=0x7B095700, size=2048, read=464

Tx Ring status:

base=0x3CFE8040, size=8192, write=476

Tx Compl Ring status:

base=0x4B099740, size=4096, read=238

BFD Cache status:

base=0x621B52C0, size=5120, read=5119

Rx Cache status:

base=0x621A0D00, size=16, write=0

Tx Shadow status:

base=0x621A1140, size=8192, read=463, write=476

Control data:

rx_max_spins=2, max_tx_count=17, tx_count=13

rx_threshold=267, rx_count=0, tx_threshold=3840

tx bfd write indx=0x10DF, rx_pool_info=0x621A0DA0

Control data base address:

rx_buf_base = 0x4B059E60 rx_p_base = 0x62199300

rx_pak = 0x621A0A14 cmd = 0x621990A0

device_base = 0x3C800000 ima_pa_stats = 0x4B09D860

s dram_base = 0x3CE00000 pa_cmd_buf = 0x3CFFFC00

vcd_base[0] = 0x3CE3C400 vcd_base[1] = 0x3CE1C000

chip_dump = 0x4B09E63C dpram_base = 0x3CD80000

sar_buf_base[0] = 0x3CE54000 sar_buf_base[1] = 0x3CF2A000

bfd_base[0] = 0x3CFD4000 bfd_base[1] = 0x3CFC0000

acd_base[0] = 0x3CE8CE00 acd_base[1] = 0x3CE5C800

pci_atm_stats = 0x4B09D780

fdl is DISABLED

Scrambling is Disabled

Yellow alarm is Enabled in Rx and Enabled in Tx

linecode is B8ZS

T1 Framing Mode: ESF ADM format

LBO (Cablelength) is long gain36 0db

Facility Alarms:

No Alarm

要测试连接，我们从7200路由器的一端连接对另一个末端(路由器B)和保证ping是成功的。在ping的故障表明可能错误配置IMA端口或IP编址。

```
c7200-IMA# ping 100.100.100.2
Type escape sequence to abort.
  Sending 5, 100-byte ICMP Echos to 100.100.100.2, timeout is 2 seconds:
!!!!
  Success rate is 100 percent (5/5), round-trip min/avg/max = 4/6/8 ms
```

[Troubleshoot](#)

目前没有针对此配置的故障排除信息。

[Related Information](#)

- [ATM 反向复用 \(IMA\) 常见问题](#)
- [ATM反向多路复用\(IMA\)技术支持](#)
- [Multiport T1/E1有相反ATM多路复用的ATM端口适配器](#)