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ATM Router Module (ARM) Frequently Asked Questions

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Questions

Introduction

This document provides a list of frequently asked questions on the ATM Router Module (ARM) module.

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

Q. What is ARM?

A. ARM stands for ATM Router Module. It provides high−speed internetworking between the ATM and Layer 2/Layer 3 functions on the Cisco Catalyst 8540 MSR, 8510 MSR, and LightStream 1010 (LS1010) series ATM switches. When an ARM is installed, Ethernet−to−ATM and ATM−to−ATM bridging and routing are possible. For more information about ARM, refer to ATM Router Module for the Catalyst 8540 MSR. There is an enhanced version of the ARM called Enhanced ARM or ARM II. The ARM II module with Request for Comments (RFC) 1483 and RFC 1577 capabilities, enhances the integration of Fast Ethernet, Gigabit Ethernet, and ATM with ease of management and configuration. For more information on ARM II, refer to Catalyst 8540 Multiservice Switch Router ATM Router Module II.

Q. Does ARM support Layer 2 switching?

A. Yes. With the help of LAN Emulation (LANE), ARM supports ELAN−to−ELAN bridging. When Request for Comments (RFC) 1483 is used, Layer 2 traffic is bridged between ATM permanent virtual circuits (PVCs). ARM is configured to support either RFC 1483 or LANE to provide integrated Layer 3 and ATM services. ARM II supports switched virtual circuits (SVCs) and ATM Address Resolution Protocol (ARP) server functionality. See the Table for a comparison between the features and functionalities of ARM I and ARM II.

Q. Does ARM support bridging?

A. Yes, ARM supports Integrated Routing and Bridging (IRB). This provides a means to route a given protocol between routed and bridged interfaces. Bridged Virtual Interfaces (BVIs) configured with IRB can be used to route a protocol between bridge groups.

Q. Does the ARM support traffic shaping?

A. The original ARM (ARM I) does not support traffic shaping. It only supports unspecified bit rate (UBR). The ARM for 8510 MSR supports variable bit rate (VBR). The enhanced ARM (ARM II) only supports constant bit rate (CBR) traffic shaping which starts with Cisco IOS® Software Release 12.1(7a)EY. ARM does not support traffic shaping by itself. Shaping is achieved by configuring a Shaped or Hierarchical VP Tunnel (HVPT) on the ATM interface and directing the traffic from ARM through the tunnel. Once the tunnel is configured, all the service classes are supported. Traffic shaping is supported in the hardware with the help of a Traffic−Shaping Carrier Access Module (TSCAM) on the Catalyst 8510 MSR and LS1010.

Q. What is the difference between ARM (ARM I) and Enhanced ARM (ARM II)?

A. ARM II is an enhanced ARM. It has similar software architecture to that of the original ARM. There are no configuration changes from the original ARM. There is no LAN Emulation (LANE) support on ARM II. The minimum software image required is Cisco IOS Software Release 12.1(5)EY. This table gives you a clear comparison between ARM I and ARM II features and functionalities. For more information on ARM II, refer to Catalyst 8540 Multiservice Switch Router ATM Router Module II.

Feature and Functionality	ARM I	ARM II
LANE	x	
Request for Comment (RFC) 1483 (IP Encapsulation over ATM)	x	x
RFC 1577 (Classic IP over ATM)	x	x
Cisco Express Forwarding (CEF)	x	x

Integrated Layer 3 and ATM	x	x
Built−in Access Control List (ACL)		x
256K Routing Entries		x
Jumbo Frame Support		x
Migration to Multiprotocol Label Switching (MPLS) and Enhanced IP Quality of Service (QoS)		x

Q. What is the part number for ARM I and ARM II?

A. ARM I is C8510−ARM−64K or C8540−ARM−64K

ARM II is C8510−ARM2 or C8540−ARM2

Q. What are the hardware restrictions for using the ARM and ARM II?

A. These hardware restrictions apply to the Catalyst 8540 MSR, Catalyst 8510 MSR, and LS1010 ARMs, and the ARM II on Catalyst 8540 MSR:

- The ARM is installed in any slot except a route processor slot. In Catalyst 8540 MSR, it is installed in a switch processor slot.
- The ARM is only supported on LS1010 ATM switches with a multiservice ATM switch route processor with Feature Card Per Flow Queuing (FC−PFQ), and the Catalyst 8510 MSR system software image. On LS1010 switches, ARM is supported only with FC−PFQ ATM Switch Processor (ASP−C).
- The ARM does not operate with FC−PCQ on the processor card. FC−PCQ provides a subset of the ATM Forum traffic management features provided by FC−PFQ.
- You can install up to two ARMs per chassis on 8540MSR in slot 0−3 and 9−13 (either two ARM II or a combination of ARM I and II).
- A maximum of one ARM is installed on 8510MSR and LS1010.
- When you hot swap an ARM, wait for one minute after you remove the module before you insert a new module.
- The ARM is only supported on ATM switches which have a multiservice ATM switch processor installed.

Q. How do I troubleshoot a hardware failure on an ARM?

A. On the faceplate, there is only one Status LED on the left corner. If that LED appears green, it means that the ARM functions properly. If the LED appears red, it means that the ATM router module has failed its internal diagnostic self−tests.

Follow these steps to troubleshoot the ARM hardware:

1. Issue the **show hardware detail** command to confirm the ARM Field Programmable Gateway Array (FPGA) version and Content Addressable Memory (CAM)

configuration, as shown in this example:

```
Switch# show hardware detail
     Switch named Switch, Date: 18:23:14 UTC Tue Dec 5 2000

Slot Ctrlr−Type    Part No.  Rev  Ser No  Mfg Date   RMA No. Hw Vrs  Tst EEP
──── ────────────  ────────── ── ──────── ──────── ──────── ─────── ─── ───
 0/* Super Cam     73−2739−03 D0 03170TAL May 03 99 0          3.1
 0/0 8T1 IMA PAM   73−3367−02 B2 03100061 Mar 15 99 00−00−00   2.0     0   0
 0/1 8E1 IMA PAM   73−3378−02 B2 03120056 Mar 25 99 00−00−00   2.0     0   2
 2/* ARM PAM       73−4208−01 05 03150016 Apr 18 99            1.0
 3/* ETHERNET PAM  73−3754−06 B0 03282WBF Jul 13 99 0          5.1
 9/* OC48c PAM     73−3745−02 12 03190UXC Jun 28 99            2.1
10/* OCM Board     73−4165−01 04 03230ZZ2 Jun 28 99           10.1
10/0 QUAD 622 Gen  73−2851−05 A0 03160RVS Jun 16 99            5.0
11/* OC48c PAM     73−3745−02 12 03100015 Jun 28 99            2.1
12/* OCM Board     73−4165−01 04 03190UJV Jun 28 99           10.1
12/0 QUAD 622 Gen  73−2851−05 A0 03160S9J Jun 16 99 0          5.0
.
[Information snip]
.
slot:  2/*  Controller−Type : ARM PAM
  Part Number: 73−4208−01                      Revision: 05
Serial Number: SCA03150016                     Mfg Date: APR 18 99
   RMA Number:                               H/W Version: 1.0
FPGA Version: 2.3
[Information snip]
```

2. Check the Ctrlr−Type field. Find the slot where the ARM (shown as **ARM PAM**) is installed.
3. Check the FPGA version field. It should match the version listed in the Hardware and Software Compatibility Matrix. If it is not the correct version, update the FPGA image with the help of the instructions in the IOS Upgrade Procedures.
4. Check the CAM size and type.
5. Check the physical damange, such as pins, connectors, and so forth.

A. During OIR of the ARM module, wait for two minutes before you reinsert it.

Q. What is the minimum Cisco IOS Software Release required for ARM to be recognized and run properly?

A. LAN Emulation (LANE) needs Cisco IOS Software Release 12.0(4a)W5(11a) or later. Request for Comments (RFC) 1483 needs Cisco IOS Software Release 12.0(10)W5(18) or later. For ARM II, the minimum Cisco IOS Software Release is 12.1(5)EY.

Q. What are the software restrictions on ARM?

A. There are some Cisco IOS software restrictions that apply to ARM in the Catalyst 8500 MSR Series. They are listed here:

- Use tag switching functionality with caution. Do not distribute routes learned through tag switching to Fast Ethernet or Gigabit Ethernet, or the other way around. Otherwise, the route destinations might be unreachable.
- The ARM does not initialize if it replaces an ATM port adapter or interface module when Hierarchical VP Tunnels (HVPTs) are globally enabled. Reboot the switch to initialize the ARM.
- ATM Director does not support any permanent virtual circuit (PVC) commands.

- Only LAN Emulation Clients (LECs) or Request for Comments (RFC) 1483, not both, can be configured on an ARM interface.
- RFC 1483 on the ARM supports only ATM adaptation layer 5 (AAL5) Subnetwork Access Protocol (SNAP) encapsulation.
- Even though each ARM interface supports a maximum of 2048 virtual circuits (VCs), only 1400 to 1500 external VCS are configured. Internal VCS use up the rest.
- IP multicast is only supported over 1483 LLC/SNAP encapsulated PVCs.
- You can have a maximum of 64 LECs per chassis.
- Do not install an ARM in a slot pair where HVPTs are configured. Slot pairs 0 and 1, 2 and 3, 9 and 10, and 11 and 12 use the same switching modules for scheduling. For example, do not install an ARM in slot 10 when HVPTs are configured on the slot. HVPT and ARM cannot co−exist on LS1010/8510 MSR.

Q. Is there any difference between configuring an ARM and other ATM modules?

A. Configure an ARM port like any other ATM port, as shown in this example:

```
(cat−8500msr) #  config terminal
(cat−8500msr) #  interface arm 1/0/0
(cat−8500msr−if) # interface arm 1/0/0.2
```

An ARM interface is automatically generated with the presence of an ARM in the system. Each ARM port is associated with an interface description block (IDB). The ARM ports are internal to the ARM. There is no need to connect any cables for the ARM interfaces to come up. Each ARM interface has a unique Media Access Control (MAC) address. This is allocated by the system. ARM interfaces allow restricted ATM functions. The user configures sub−interfaces on the ARM interface where the LAN Emulation Clients (LECs) or Request for Comments (RFC) 1483 clients are configured These are not created by default. The sub−interfaces on the ARM interface support full ATM functionality.

Note: When you configure permanent virtual circuits (PVCs) and/or switched virtual circuits (SVCs), the virtual path identifier (VPI) number on the ARM interface must be "2." No other VPI number except "2" is allowed on the ARM interface if the minimum software requirement is met. If the ARM port allows a different VPI (such as "0"), the switch accepts the command and adds it to the configuration. However, the virtual circuits (VCS) do not forward any traffic. VPI "2" is reserved for ARM interfaces. It allows up to 2048 external VCS on each ARM interface. The use of VPI "0" would have allowed less than 1024 external VCS on an ARM interface because the ARM external VCS would have been forced to share the VC space within the VPI "0" with the internal PVCs.

Q. How do I configure LAN Emulation Clients (LECs) on ARM Interfaces?

A. The procedures to configure LECs on the ARM are the same as for the configuration of LECs on the route processor, with one exception. To specify an ATM router module interface, issue the **interface atm card/subcard/port** command. On the route processor, issue the **interface atm 0** command.

Example:

This example shows how to configure two LECs on an ARM interface:

```
Switch# configure terminal
Switch(config)# interface atm 1/0/0.4 multipoint

!--- The ARM only supports point-to-multipoint sub-interfaces.

Switch(config-subif)# ip address 40.0.0.1 255.0.0.0
Switch(config-subif)# lane client ethernet VLAN4
Switch(config-subif)# exit
Switch(config)# interface atm 1/0/0.5 multipoint
Switch(config-subif)# ip address 50.0.0.1 255.0.0.0
```

For more information on configuring LECs on ARM interfaces, refer to LAN Emulation Using the ATM Router Module.

Q. How do I configure Multiprotocol Encapsulation over ATM?

A. This example shows how to configure Request for Comments (RFC) 1483 on an ARM interface, beginning in global configuration mode:

```
Switch(config)# interface atm 1/0/0.1011 multipoint

!--- The ARM only supports point-to-multipoint sub-interfaces.

Switch(config-subif)# ip address 10.1.1.1 255.255.255.0
Switch(config-subif)# map-group test
Switch(config-subif)# atm pvc 2 1011 interface atm 3/0/0 0 1011 encap aal5snap

!--- The virtual path identifier (VPI) number on the ARM interface must be "2."


Switch(config-subif)# exit
Switch(config)# map-list test
Switch(config-map-list)# ip 10.1.1.2 atm-vc 1011
Switch(config-map-list)# end
```

For more information on configuring RFC 1483 on ARM interfaces, refer to Routed RFC1483 on the ATM Router Module.

Note: ARM only supports this syntax for the permanent virtual circuits (PVCs). It does not support the new syntax as the routers do.

Q. How do I configure bridging on ARM?

A. Configuring bridging on ARM is done in the same way as the Cisco router platforms. Only the bridge−group number at the interface and the bridge protocol in global configuration need to be specified. A sample of this is shown in this output:

```
Switch(config)# interface atm 3/0/0
Switch(config-if)# atm PVC 2 200 interface atm 1/0/0 0 200

!---  The virtual path identifier (VPI) number on the ARM interface must be "2."

Switch(config-if)# bridge-group 5
Switch(config-if)# end
Switch(config)# interface fastethernet 0/0/0
Switch(config-if)# no cdp enable
Switch(config-if)# bridge-group 5
Switch(config-if)# end
Switch(config)# bridge 5 protocol ieee
```

Q. What are some of the most useful show commands to troubleshoot ARM?

A. These are some of the most useful **show** commands used to troubleshoot ARM. However, these two issues must be taken care of:

1. Use regular LAN Emulation (LANE), Request for Comments (RFC) 1483, and RFC 1577 debugging techniques and commands.
2. Verify different flags in the if−entry for that interface/sub−interface of the ARM port.

Issue the **show epc if−entry interface atm** command. Test the Content−Addressable Memory (CAM) information between the egress Gigabit Ethernet interface and the ingress ATM interface.

Check for the information shown in this example :

- The Broute VC field status is "up."
- Notice the Broute VC number. In the example, the Broute VC is "322."
- IP routing is "on."

```
Switch# show epc if−entry interface atm 10/0/0 entry gigabitEthernet 3/0/1
IF Entry for GigabitEthernet3/0/1 on atm10/0/0
   Mac(hex) − 00:90:21:41:88:38
   isMyInteface : False isSubInterface : False<
   Status Up Broute VC − 322 Bcast VC − 0
   Netmask: 24<
   FEC disabled
   Trunking Disabled
   State : Not−Applicable/Listening/Blocking
   IP routing on bridging off
   IPX routing off bridging off
   Appletalk routing off
   In Encapsulation:
   ICMP Redirect enabled Unreachable enabled
```

- Verify the CAM entries for that IP address/network. Issue the **show epc ip−address** command with the IP address of the egress interface to display the status of the Media Access Control (MAC) address rewrite and the virtual channel identifier (VCI) number, as shown in this example:

```
Switch# show epc ip−address interface atm 10/0/0 128.250.0.1
IPaddr: 128.250.0.1 MACaddr: 0000.0c07.ac01  Routed to VC(940)

!−−− Check the Routed to VC field (in this example, the VC is "940").


!−−− The value is used in the next step.
```

- Issue the **show atm vc traffic interface atm** command with the virtual path identifier (VPI) and VCI parameters to see the receive (RX) and transmit (TX) cell counts. Check the RX and TX counters on the VC. Verify if the traffic flows through. This example shows this situation:

```
Switch# show atm vc traffic interface atm 10/0/0 0 940
Interface         VPI  VCI   Type      rx−cell−cnts     tx−cell−cnts
atm10/0/0          0    940   SVC       18               25
```

- Issue the **show atm vc traffic interface atm** command with the VPI and VCI parameters, to confirm that the receive and transmit cell counts are incrementing, as

shown in this example:

```
Switch# show atm vc traffic interface atm 10/0/0 0 940
Interface         VPI  VCI   Type      rx-cell-cnts     tx-cell-cn
TM10/0/0           0   940   SVC       33               40
```

- Verify that the rx−cell−cnts and tx−cell−cnts fields on all eight channels are incrementing (from 128/34 up to VPI 135/34), as shown in this example:

```
Switch# show atm vc traffic int a12/0/0 128 34
Interface         VPI  VCI   Type      rx-cell-cnts     tx-cell-cnts
atm12/0/0         128  34    PVC       2521             6961

ar02_m84_01# show atm vc traffic int a12/0/0 128 34
Interface         VPI  VCI   Type      rx-cell-cnts     tx-cell-cnts
atm12/0/0         128  34    PVC       2530             6979
.
.
ar02_m84_01# show atm vc traffic int a12/0/0 135 34
Interface         VPI  VCI   Type      rx-cell-cnts     tx-cell-cnts
atm12/0/0         135  34    PVC       2691             5382

ar02_m84_01# show atm vc traffic int a12/0/0 135 34
Interface         VPI  VCI   Type      rx-cell-cnts     tx-cell-cnts
atm12/0/0         135  34    PVC       2697             5394
```

Related Information

- **Routed RFC 1483 on the ATM Router Module**
- **LAN Emulation Using the ATM Router Module**
- **ATM Technology Support Pages**
- **Technical Support & Documentation − Cisco Systems**

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