

Bridged PVC Connection Between a Router and a Catalyst Switch

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Introduction

This document illustrates a sample configuration between a router and a Catalyst Switch with a LANE module, using Logical Link Control (LLC) encapsulation. Router A routes on the Ethernet and performs bridging between the Catalyst switch. No mapping is done on the permanent virtual circuit (PVC) for bridging. This is because all VCs on a bridged subinterface are automatically used for bridging.

LAN Emulation (LANE) modules used in the Catalyst 5000 and Catalyst 6000 Family switches cannot use routed RFC 1483. This document demonstrates bridged RFC 1483 between a Catalyst 5000 Family switch and a router. In the sample configuration, Router A is used as a Layer 2 device, with end stations attached to their Ethernets.

Note: This document focuses on PVC configurations on Cisco routers running Cisco IOS® software. For PVC configuration examples on Cisco WAN switches, refer to WAN Switches Technical Support.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is based on these software and hardware versions:

- Cisco IOS® Software Release 11.2 or later is needed for integrated routing and bridging (IRB). The command syntax was enhanced in Cisco IOS Software Release 11.3T. The configurations in this document use the enhanced syntax.
- Catalyst 5000 or 6000 Family switch with a LANE module.

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

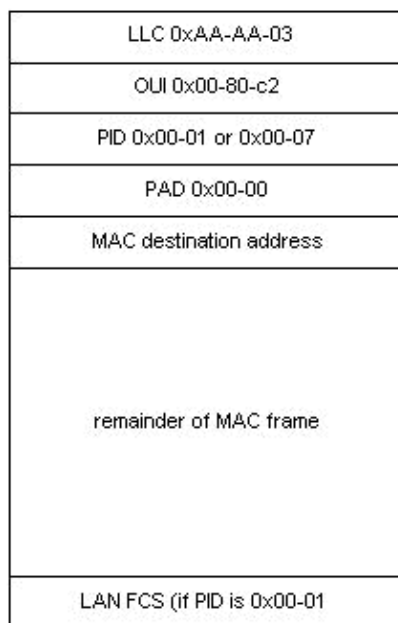
For more information on document conventions, refer to Cisco Technical Tips Conventions.

Bridged RFC 1483

When you use PVCs, there are two ways to carry multiple protocols over Asynchronous Transfer Mode (ATM).

- **virtual circuit (VC) multiplexing** The user defines one PVC per protocol. This method uses more VCs than LLC encapsulation, but reduces overhead because a header is not necessary.
- **Logical Link Control (LLC) / Subnetwork Access Protocol (SNAP) Encapsulation** The user multiplexes multiple protocols over a single ATM VC. The protocol of a carried protocol data unit (PDU) is identified by prefixing the PDU with an LLC / SNAP header.

LLC / SNAP headers use either a routed format or a bridged format. The format of the ATM Adaptation Layer 5 (AAL5) common part convergence sublayer (CPCS)–PDU Payload field for bridged Ethernet/802.3 PDUs is shown in this diagram:



A bridged format does not necessarily mean that the encapsulated protocol is not routable. It is typically used when one side of the link supports only the bridged–format PDUs, such as in a connection between a router and a Catalyst switch in a corporate campus ATM network. In this application, the router interface typically serves as the default gateway for the remote users. Then, integrated routing and bridging (IRB), routed bridge encapsulation (RBE) or bridged–style PVCs (BPVCs) provide the mechanism for routing traffic off–network.

These protocols allow the ATM interface to receive bridged–format PDUs. However, they have important differences in performance. Cisco recommends that you consider RBE when the configuration supports it.

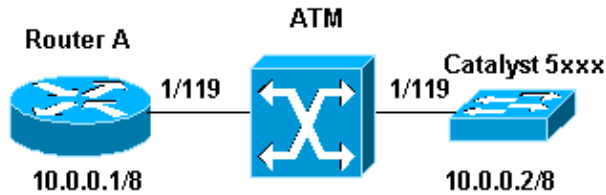
Configure

In this section, you are presented with the information to configure the features described in this document.

Note: To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

Network Diagram

This document uses this network setup:



Network Diagram Notes:

- In this example 1/119 is switched to 1/119 by the ATM switch.
- The IP address on the switch is the address of the sc0 interface which is configured in Virtual LAN (VLAN) 1.
- This example uses IRB for routing off-network. Refer to Configuring Integrated Routing and Bridging in the Cisco IOS Bridging and IBM Networking Configuration Guide for guidance on using the IRB commands. See the Related Information section for links to sample configurations of RBE and BPVCs.

Configurations

This document uses these configurations:

- Router A: IRB Configuration
- Catalyst Switch: LANE Module Configuration
- Catalyst Switch Supervisor Configuration

Router A: IRB Configuration

```
interface ATM4/0.119 multipoint
  pvc router-to-switch 1/119
    encapsulation aal5snap
  !
  bridge-group 2
  !
interface BVI2
  ip address 10.0.0.1 255.0.0.0
  no ip directed-broadcast
  !
bridge irb
bridge 2 protocol ieee
bridge 2 route ip
```

Catalyst Switch: LANE Module Configuration

```
interface ATM0
  atm preferred phy A
  no atm ilmi-keepalive
  !
interface ATM0.119 multipoint
  atm pvc 119 1 119 aal5snap
  atm bind pvc vlan 119 1
```

Catalyst Switch Supervisor Configuration

```
my_switch (enable) set interface sc0 1 10.0.0.2 255.0.0.0
Interface sc0 vlan set, IP address and netmask set.
```

Verify

This section provides information you can use to confirm your configuration is working properly.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only), which allows you to view an analysis of **show** command output.

- **show interface** Displays the status of the sc0 interface of the supervisor.

```
my_switch (enable) show interface
s10: flags=51<UP,POINTOPOINT,RUNNING>
      slip 0.0.0.0 dest 0.0.0.0
sc0: flags=63<UP,BROADCAST,RUNNING>
      vlan 1 inet 10.0.0.2 netmask 255.0.0.0 broadcast 10.255.255.255
my_switch (enable)
```

- **show atm pvc <vpi/vci>**(for Cisco IOS Software Release 11.3T and later) Displays all ATM PVCs and traffic information. This includes the ATM VPI and VCI numbers.

```
route_Ar#show atm pvc 1/119
VC 1/119 doesn't exist on interface ATM2/0 - cannot display
ATM4/0.119: VCD: 13, VPI: 1, VCI: 119, Connection Name: router-to-switc
UBR, PeakRate: 149760
AAL5-LLC/SNAP, etype:0x0, Flags: 0xC20, VCmode: 0x0
OAM frequency: 0 second(s), OAM retry frequency: 1 second(s)
OAM up retry count: 3, OAM down retry count: 5
OAM Loopback status: OAM Disabled
OAM Managed VC Status: Not Managed
ILMI Managed VC status: Not Managed
VC TxRingLimit: 40 particles
VC Rx Limit: 800 particles
InARP frequency: 15 minutes(s)
Transmit priority 6
InPkts: 5037, OutPkts: 1204, InBytes: 526798, OutBytes: 86859
InCells: 12722, OutCells: 2219
InPRoc: 3475, OutPRoc: 1204, Broadcasts: 0
InFast: 1562, OutFast: 0, InAS: 0, OutAS: 0
InPktDrops: 0, OutPktDrops: 0/0/0 (holdq/outputq/total)
InCellDrops: 0, OutCellDrops: 0
InByteDrops: 0, OutByteDrops: 0
CrcErrors: 0, SarTimeOuts: 0, OverSizedSDUs: 0, LengthViolation: 0, CPiErrors: 0
Out CLP=1 Pkts: 0, Cells: 0
OAM cells received: 0
F5 InEndloop: 0, F5 InSegloop: 0, F5 InAIS: 0, F5 InRDI: 0
F4 InEndloop: 0, F4 InSegloop: 0, F4 InAIS: 0, F4 InRDI: 0
OAM cells sent: 0
F5 OutEndloop: 0, F5 OutSegloop: 0, F5 OutRDI: 0
F4 OutEndloop: 0, F4 OutSegloop: 0, F4 OutRDI: 0
OAM cell drops: 0
Status: UP
router_A#
```

- **show atm pvc interface atm <slot/port>** Displays all ATM PVCs and traffic information. This includes the interface number or subinterface number of the PVC. Displays all PVCs on the specified interface or subinterface.

```
router_A#show atm vc interface atm 4/0.119
      VCD /
Interface Name          VPI  VCI  Type  Encaps  SC  Peak  Avg/Min  Burst
                          Kbps  Kbps  Cells  Sts
```

- **show atm map** Displays the list of all configured ATM static maps to remote hosts on an ATM network.
- **show atm traffic** Display current, global ATM traffic information to and from all ATM networks connected to the router.

```
router_Ar#show atm traffic
1089949 Input packets
1760679 Output packets
0 Broadcast packets
0 Packets received on non-existent VC
103294 Packets attempted to send on non-existent VC
621172 OAM cells received
F5 InEndloop: 621172, F5 InSegloop: 0, F5 InAIS: 0, F5 InRDI: 0
F5 InEndcc: 0, F5 InSegcc: 0,
F4 InEndloop: 0, F4 InSegloop: 0, F4 InAIS: 0, F4 InRDI: 0
929831 OAM cells sent
F5 OutEndloop: 929831, F5 OutSegloop: 0, F5 OutRDI: 0
F5 OutEndcc: 0, F5 OutSegcc: 0,
F4 OutEndloop: 0, F4 OutSegloop: 0, F4 OutRDI: 0
0 OAM cell drops
```

- **show atm interface atm <slot/port>** Displays ATM-specific information about an ATM interface.

```
router_A#show atm interface atm 4/0
Interface ATM4/0:
AAL enabled: AAL5 , Maximum VCs: 4095, Current VCCs: 12

Maximum Transmit Channels: 0
Max. Datagram Size: 4528
PLIM Type: SONET - 155000Kbps, TX clocking: LINE
Cell-payload scrambling: ON
sts-stream scrambling: ON
60607 input, 436583 output, 7741 IN fast, 3870 OUT fast, 0 out dropVBR-NRT : 1628
Avail bw = 153372
Config. is ACTIVE
router_A#
```

- **show spanning-tree** Displays the spanning-tree topology known to the router.

```
router_A#show spanning-tree 2

Bridge group 2 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address 0000.0c99.8950
Configured hello time 2, max age 20, forward delay 15
Current root has priority 34, address 00e0.1e2e.e800
Root port is 60 (ATM4/0.119), cost of root path is 14
Topology change flag not set, detected flag not set
Number of topology changes 1 last change occurred 00:53:27 ago
from ATM4/0.119
Times: hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300

Port 60 (ATM4/0.119) of Bridge group 2 is forwarding
Port path cost 14, Port priority 128, Port Identifier 128.60.
Designated root has priority 34, address 00e0.1e2e.e800
Designated bridge has priority 34, address 00e0.1e2e.e800
Designated port id is 128.65, designated path cost 0
Timers: message age 2, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 421, received 1198
```

```
router_A#
```

- **show bridge** Displays classes of entries in the bridge forwarding database.

```
router_A#show bridge 2
```

```
Total of 300 station blocks, 280 free  
Codes: P - permanent, S - self
```

```
Bridge Group 2:
```

Address	Action	Interface	Age	RX count	TX count
0010.7bdc.8b80	forward	ATM4/0.119	0	621	0
00e0.1e2e.ebfb	forward	ATM4/0.119	0	31	0
0010.7b69.5041	forward	ATM4/0.119	0	653	0
00e0.1e2e.ebff	forward	ATM4/0.119	4	317	41

Troubleshoot

Refer to Troubleshooting Bridging and IRB over ATM PVCs for detailed troubleshooting tips.

Related Information

- [Frequently Asked Questions About Bridging on ATM Interfaces](#)
 - [Configuring Bridged-Style PVCs on ATM Interfaces in the GSR and 7500 Series](#)
 - [ATM Technical Support](#)
 - [ATM Command Reference](#)
 - [Basic PVC Configuration Using Bridged RFC 1483](#)
 - [Technical Support – Cisco Systems](#)
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