

# Configuring ATM SVCs With Static Map Statements

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## Introduction

This document provides a sample configuration for ATM switched virtual circuits (SVCs) using Cisco static-mapping commands between the layer 3 destination IP address and the ATM-layer destination network service access point (NSAP) address.

## Prerequisites

### Requirements

There are no specific requirements for this document.

### Components Used

This document is not restricted to specific software and hardware versions.

### Conventions

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

## QSAAL and ILMI PVCs

An SVC is dynamically established, maintained and released. It allows you to provide bandwidth on demand for a particular connection or set of user traffic. When configuring SVCs on Cisco router ATM interfaces, you need to configure the following two permanent virtual circuits (PVCs):

- **pvc 0/5 qsaal** (Required) Configures the signaling PVC. SVC service requires a signaling protocol between the end-device and the ATM switch. Cisco IOS® Software conforms to the ATM Forum's UNI 3.0, UNI 3.1 or UNI 4.0 user-to-network signaling standard, depending on what version is

selected by Interim Local Management Interface (ILMI) or configuration.

- **pvc 0/16 ilmi** (Optional) Configures an ILMI PVC. The ATM router interface exchanges ILMI packets to communicate ATM-layer addressing information and to register its complete ATM address with the directly attached switch, which then provides ATM-layer routing to the destination router. Refer to Understanding ILMI on ATM Interfaces.

Both of these overhead PVCs are configured on the ATM main interface.

## Static and Dynamic Mappings

Static map lists are a Cisco IOS Software feature that offers an alternative to using the dynamic address-resolution mechanisms of ATM ARP and In ATM ARP defined in RFC 1577 . Using static maps, you can associate a protocol address with an ATM address on an SVC.

Every ATM interface involved with signaling must be configured with an NSAP address. The NSAP address is the ATM address of the interface and must be unique across the network.

Static mappings with ATM SVCs use the following two configuration commands:

```
Router(config-if)# svc [name] nsap address
```

```
Router(config-if-atm-vc)# protocol protocol protocol-address [[no] broadcast]
```

When IP data needs to be sent to the destination defined in the configuration statements, the source router interface places a call to the destination router's NSAP address. The directly connected ATM switch receives the signaling packet and initiates ATM routing. As the call is routed through the ATM network, the ATM switches assign VPI/VCI (virtual path identifier and virtual channel identifier) values to use on a particular leg of this new connection.

From this information, it is important to understand that NSAP addresses are used only during the initial setup of an SVC. The signaling packets are transmitted over the QSAAL PVC. After signaling, the user IP packets are transmitted over the VPI/VCI that the switches dynamically assigned to the connection.

## Point to Point and Multipoint

SVCs are not supported on a point-to-point subinterface. The router rejects this configuration with the following error message:

```
ATM: cannot configure NSAP on point-to-point sub-interfaces.
```

The reason is that the ATM NSAP address, which the router uses to originate and terminate SVC calls, implies that the subinterface can send IP traffic to multiple destinations by originating calls and receiving IP traffic from multiple destinations by accepting calls. By definition, a point-to-point subinterface supports only a single virtual circuit (VC).

In addition, configuring a single VC on point-to-point and point-to-multipoint interfaces is very different from an implementation perspective. Point-to-point interfaces effectively use a wildcard match for address resolution between the destination IP address and the local ATM VC. Once the routing points to an outgoing interface, we simply forward the traffic on to the VC. In contrast, on a point-to-multipoint interface, once the routing identifies the outgoing interface, the router needs to look up a static map for an exact match of the layer-3 address to find the layer-2 address. On an SVC, the virtual circuit descriptor (VCD), which provides a label for a VC in the router's internal tables, is not constant and changes each time that the SVC is torn down and recreated.

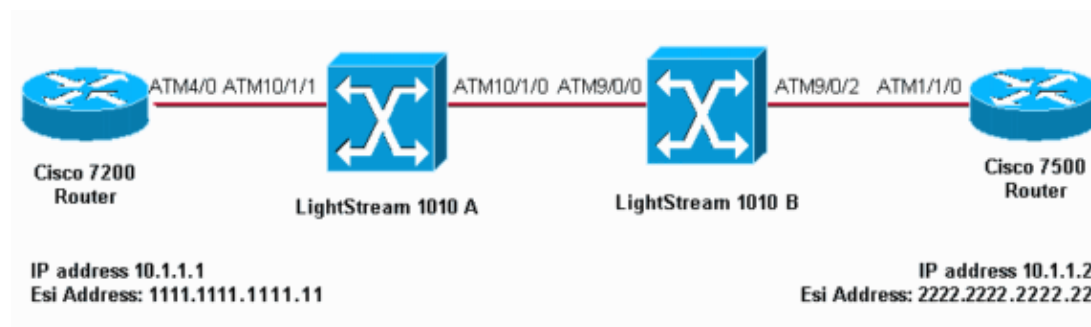
# Configure

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:



## Configurations

These tables illustrate the steps for bringing up and testing an SVC:

- Configure the QSAAL (Signaling) and ILMI PVCs on a Cisco 7200 Router
- Configure Static Mapping on a Multipoint Subinterface on a Cisco 7200 Router
- Display the SVC on ATM Switch A
- Display the SVC on ATM Switch B
- Configure ATM PVCs for ILMI and Signaling on a Cisco 7500 Router
- Configure a Static Mapping on a Multipoint Subinterface on a Cisco 7500 Router

Configure the QSAAL (Signaling) and ILMI PVCs on a Cisco 7200 Router											
<pre>interface ATM4/0 no ip address no atm ilmi-keepalive pvc 0/5 qsaal ! pvc 0/16 ilmi  C7200# show atm vc           VCD / Interface Name  VPI  VCI  Type  Encaps  SC  Peak  Avg/Min  Burst  Sts 4/0        2    0    5    PVC    SAAL    UBR  149760 4/0        1    0    16   PVC    ILMI    UBR  149760  C7200# show atm ilmi-status  Interface : ATM4/0 Interface Type : Private UNI (User-side) ILMI VCC : (0, 16) ILMI Keepalive : Disabled ILMI State:      UpAndNormal Peer IP Addr:    10.118.1.166 Peer IF Name:      ATM10/1/1 Peer MaxVPIbits: 8 Peer MaxVCIBits:  14 Active Prefix(s) : 47.0091.8100.0000.0010.7909.3501</pre>											

```
!--- The QSAAL and ILMI PVCs are up. ILMI state is UpAndNormal.
!--- The router has received an "Active Prefix" from the ATM switch.
```

## Configure Static Mapping on a Multipoint Subinterface on a Cisco 7200 Router

```
interface ATM4/0
  no ip address
  no atm ilmi-keepalive
  pvc 0/5 qsaal
  !
  pvc 0/16 ilmi
  !
!
interface ATM4/0.1 multipoint
  ip address 10.1.1.1 255.255.255.0
  atm esi-address 111111111111.11
  !
  svc SVC1 nsap 47.00918100000000100B287701.222222222222.22
  protocol ip 10.1.1.2
  broadcast
  encapsulation aal5snap

C7200# show atm ilmi-status

Interface : ATM4/0 Interface Type : Private UNI (User-side)
ILMI VCC : (0, 16) ILMI Keepalive : Disabled
ILMI State:          UpAndNormal
Peer IP Addr:       10.118.1.166   Peer IF Name:      ATM10/1/1
Peer MaxVPIbits:   8               Peer MaxVCibits:  14
Active Prefix(s) :
47.0091.8100.0000.0010.7909.3501
End-System Registered Address(s) :
47.0091.8100.0000.0010.7909.3501.1111.1111.1111.11(Confirmed)

!--- ESI address is local and is required to create and register 20-byte NSAP
!--- address with the ATM switch.

1d22h: ILMI: Validating address 47.0091.8100.0000.0010.7909.3501
1d22h: ILMI: Clients Registered but none to validate
1d22h: ILMI: Address considered validated (ATM4/0)
1d22h: ILMI: Address added : 47.0091.8100.0000.0010.7909.3501 (ATM4/0)
1d22h: %LANE-6-INFO: ATM4/0: ILMI prefix add event received
1d22h: ILMI(ATM4/0): Registration local validation attempt for
47.0091.8100.0000.0010.7909.3501.1111.1111.1111.11
1d22h: ILMI(ATM4/0): Sent Out. Will be added on confirmation
1d22h: ILMI(ATM4/0):Sending out Request 64
1d22h: ILMI(ATM4/0):Response received for request 64
1d22h: ILMI(ATM4/0):Updating ES Database with
47.0091.8100.0000.0010.7909.3501.1111.1111.1111.11
1d22h:   Reg Status :- Delete in progress - False,
Add in progress - True

!--- ILMI debug info shows the NSAP address registration.

cC7200# show atm map

Map list SVC1_ATM4/0.1 : PERMANENT
ip 10.1.1.2 maps to NSAP 47.00918100000000100B287701.222222222222.22
, broadcast, connection up, VC 29, VPI 0, VCI 61, ATM4/0.1

!--- In the SVC config, we map the remote NSAP address to the IP address
!--- of the end-device.

C7200# show atm vc
```

Interface	VCD / Name	VPI	VCI	Type	Encaps	SC	Peak Kbps	Avg/Min Kbps	Burst Cells	Sts
4/0	2	0	5	PVC	SAAL	UBR	149760			UP
4/0	1	0	16	PVC	ILMI	UBR	149760			UP

*!--- The SVC is not up.*

C7200# ping 10.1.1.2

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:

```
1d23h: ATMSIG(ATM4/0 0,0 - 0044/00): (vcnum:0) API -
alloc_connection_id 2C
1d23h: ATMSIG: Called len 20
1d23h: ATMSIG: Calling len 20
1d23h: ATMSIG(ATM4/0 0,0 - 0044/00): (vcnum:0) build Setup msg,
Null(U0) state
1d23h: ATMSIG(ATM4/0 0,0 - 0044/00): (vcnum:0) API -
from sig-client ATM_OWNER_SMAP
1d23h: ATMSIG(ATM4/0 0,0 - 0044/00): (vcnum:46) Input event :
Req Setup in Null(U0)
1d23h: ATMSIG(ATM4/0 0,0 - 0044/00): (vcnum:46) Output Setup
msg(XferAndTx), Null(U0) state
1d23h: ATMSIG: Called Party Addr:
47.0091810000000100B287701.222222222222.22
1d23h: ATMSIG: Calling Party Addr:
47.00918100000001079093501.111111111111.11
1d23h: ATMSIG(ATM4/0 0,0 - 0044/00): (vcnum:46) Null(U0) ->
Call Initiated(U1)
1d23h: E164 NOT Converted
1d23h: ATMSIG(ATM4/0 0,0 - 0044/00): (vcnum:46) Input event :
Rcvd Call Proceeding in Call Initiated(U1)
1d23h: ATMSIG(ATM4/0 0,35 - 0044/00): (vcnum:46) Call Initiated(U1)
-> Outgoing Call Proceeding(U3)
1d23h: ATMSIG(ATM4/0 0,35 - 0044/00): (vcnum:46) Input event :
Rcvd Connect in Outgoing Call Proceeding(U3)
1d23h: ATMSIG(ATM4/0 0,35 - 0044/00): (vcnum:46) Input event :
Req Connect Ack in Outgoing Call Proceeding(U3)
1d23h: ATMSIG(ATM4/0 0,35 - 0044/00): (vcnum:46) Output Connect
Ack msg, Outgoing Call Proceeding(U3) state
1d23h: ATMSIG(ATM4/0 0,35 - 0044/00): (vcnum:46) Outgoing Call
Proceeding(U3) -> Active(U10)
1d23h: ATMSIG(ATM4/0 0,35 - 0044/00): (vcnum:46) API -
notifying Connect event to client ATM4/0.1
```

.!!!!

Success rate is 80 percent (4/5), round-trip min/avg/max = 1/1/4 ms

*!--- The output of debug atm sig-events during the ping displays the  
!--- signaling packets sent to the remote router through the ATM network.*

C7200# show atm vc

Interface	VCD / Name	VPI	VCI	Type	Encaps	SC	Peak Kbps	Avg/Min Kbps	Burst Cells	Sts
4/0	2	0	5	PVC	SAAL	UBR	149760			UP
4/0	1	0	16	PVC	ILMI	UBR	149760			UP
4/0.1	SVC1	0	35	SVC	SNAP	UBR	155000			UP

*!--- SVC is up and listed in the show atm vc table.*

Display the SVC on ATM Switch A

```
LS1010A# show atm vc
```

Interface	VPI	VCI	Type	X-Interface	X-VPI	X-VCI	Encap	Status
ATM10/1/0	0	35	SVC	ATM10/1/1	0	35		UP

```
!--- ATM switch dynamically allocates incoming and outgoing VPI/VCI pairs  
!--- to the connection. The X-VPI and X-VCI on Switch A connect to Switch B.
```

### Display the SVC on ATM Switch B

```
LS1010B# show atm vc
```

Interface	VPI	VCI	Type	X-Interface	X-VPI	X-VCI	Encap	Status
ATM9/0/0	0	35	SVC	ATM9/0/2	0	37		UP

```
!--- ATM switch dynamically allocates incoming and outgoing VPI/VCI pairs  
!--- to the connection. The X-VPI and X-VCI on Switch B connect to C7500.
```

### Configure ATM PVCs for ILMI and Signaling on a Cisco 7500 Router

```
interface ATM1/1/0  
no ip address  
no atm ilmi-keepalive  
pvc 0/16 ilmi  
!  
pvc 0/5 qsaal
```

```
C7500# show atm vc
```

Interface	VCD / Name	VPI	VCI	Type	Encaps	Peak Kbps	Avg/Min Kbps	Burst Cells	Sts
1/1/0	2	0	5	PVC	SAAL	155000			UP
1/1/0	1	0	16	PVC	ILMI	155000			UP

```
C7500# show atm ilmi-status
```

```
Interface : ATM1/1/0 Interface Type : Private UNI (User-side)  
ILMI VCC : (0, 16) ILMI Keepalive : Disabled  
ILMI State: UpAndNormal  
Peer IP Addr: 0.0.0.0 Peer IF Name: ATM9/0/2  
Peer MaxVPIbits: 8 Peer MaxVCibits: 14  
Active Prefix(s) :  
47.0091.8100.0000.0010.0b28.7701
```

```
!--- The QSAAL and ILMI PVCs are up. ILMI state is UpAndNormal.  
!--- The router has received an "Active Prefix" from the ATM switch.
```

### Configure a Static Mapping on a Multipoint Subinterface on a Cisco 7500 Router

```
interface ATM1/1/0  
no ip address  
no atm ilmi-keepalive  
pvc 0/16 ilmi  
!  
pvc 0/5 qsaal  
!  
!  
interface ATM1/1/0.1 multipoint  
ip address 10.1.1.2 255.255.255.0
```

```
no ip directed-broadcast
atm esi-address 222222222222.22
!
svc SVC1 nsap 47.009181000000001079093501.111111111111.11
protocol ip 10.1.1.1
broadcast
encapsulation aal5snap
```

C7500# **show atm ilmi-status**

```
Interface : ATM1/1/0 Interface Type : Private UNI (User-side)
ILMI VCC : (0, 16) ILMI Keepalive : Disabled
ILMI State:          UpAndNormal
Peer IP Addr:       0.0.0.0          Peer IF Name:       ATM9/0/2
Peer MaxVPIbits:   8                Peer MaxVCibits:   14
Active Prefix(s) :
47.0091.8100.0000.0010.0b28.7701
End-System Registered Address(s) :
47.0091.8100.0000.0010.0b28.7701.2222.2222.2222.22(Confirmed)
```

*!--- The router registered a complete ATM-layer address with Switch B.  
!--- Ensure a "Confirmed" status for the "Eng-System Registered Address."*

```
1d23h: ILMI: Validating address 47.0091.8100.0000.0010.0b28.7701
1d23h: ILMI: Clients Registered but none to validate
1d23h: ILMI: Address considered validated (ATM1/1/0)
1d23h: ILMI: Address added : 47.0091.8100.0000.0010.0b28.7701 (ATM1/1/0)
1d23h: %LANE-6-INFO: ATM1/1/0: ILMI prefix add event received
1d23h: ILMI(ATM1/1/0): Registration local validation attempt for
47.0091.8100.0000.0010.0b28.7701.2222.2222.2222.22
1d23h: ILMI(ATM1/1/0): Sent Out. Will be added on confirmation
1d23h: ILMI(ATM1/1/0):Sending out Request 20
1d23h: ILMI(ATM1/1/0):Response received for request 20
1d23h: ILMI(ATM1/1/0):Updating ES Database with
47.0091.8100.0000.0010.0b28.7701.2222.2222.2222.22
1d23h:  Reg Status :- Delete in progress - False, Add in progress - True
```

*!--- ILMI debug info shows the NSAP address registration.*

C7500# **show atm map**

```
Map list SVC1 : DYNAMIC
```

```
Map list SVC1_ATM1/1/0.1 : PERMANENT
ip 10.1.1.1 maps to NSAP 47.009181000000001079093501.111111111111.11
, broadcast, connection up, VC 30, VPI 0, VCI 61, ATM1/1/0.1
```

*!--- Confirm the static mapping appears in the show atm map output.*

C7500# **show atm vc**

Interface	VCD /		VPI	VCI	Type	Encaps	Peak Avg/Min Burst			
	Name						Kbps	Kbps	Cells	Sts
1/1/0	2		0	5	PVC	SAAL	155000			UP
1/1/0	1		0	16	PVC	ILMI	155000			UP

*!--- Before the ping, the SVC is not up and not listed in the VC table.*

C7500# **ping 10.1.1.1**

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
```

```
2d00h: ATMSIG: Called len 20
2d00h: ATMSIG: Calling len 20
2d00h: ATMSIG(ATM1/1/0 0,0 - 0001/00): (vcnum:0) build Setup msg,
```

```

Null(U0) state
2d00h: ATMSIG(ATM1/1/0 0,0 - 0001/00): (vcnum:0) API - from sig-client
ATM_OWNER_SMAP
2d00h: ATMSIG(ATM1/1/0 0,0 - 0001/00): (vcnum:0) Input event :
Req Setup in Null(U0)
2d00h: ATMSIG(ATM1/1/0 0,0 - 0001/00): (vcnum:0) Output Setup msg(XferAndTx),
Null(U0) state
2d00h: ATMSIG: Called Party Addr:
47.009181000000001079093501.111111111111.11
2d00h: ATMSIG: Calling Party Addr:
47.00918100000000100B287701.222222222222.22
2d00h: ATMSIG(ATM1/1/0 0,0 - 0001/00): (vcnum:0) Null(U0) -> Call Initiated(U1)
2d00h: E164 NOT Converted
2d00h: ATMSIG(ATM1/1/0 0,0 - 0001/00): (vcnum:0) Input event : Rcvd Call
Proceeding in Call Initiated(U1)
2d00h: ATMSIG(ATM1/1/0 0,37 - 0001/00): (vcnum:0) Call Initiated(U1)
-> Outgoing Call Proceeding(U3)
2d00h: ATMSIG(ATM1/1/0 0,37 - 0001/00): (vcnum:0) Input event : Rcvd Connect
in Outgoing Call Proceeding(U3)
2d00h: ATMSIG(ATM1/1/0 0,37 - 0001/00): (vcnum:36) Input event : Req Connect
Ack in Outgoing Call Proceeding(U3)
2d00h: ATMSIG(ATM1/1/0 0,37 - 0001/00): (vcnum:36) Output Connect Ack msg,
Outgoing Call Proceeding(U3) state
2d00h: ATMSIG(ATM1/1/0 0,37 - 0001/00): (vcnum:36) Outgoing Call Proceeding(U3)
-> Active(U10)
2d00h: ATMSIG(ATM1/1/0 0,37 - 0001/00): (vcnum:36) API - notifying Connect event
to client ATM1/1/0.1

.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/1/4 ms
cs-c7505-14a#

!--- The output of debug atm sig-events during the ping displays the
!--- signaling packets sent to the remote router through the ATM network.

C7500# show atm vc

Interface          VCD /
Name VPI VCI Type Encaps Peak Avg/Min Burst
Kbps Kbps Cells Sts
1/1/0              2 0 5 PVC SAAL 155000
1/1/0              1 0 16 PVC ILMI 155000
1/1/0.1            SVC1 0 37 SVC SNAP 155000

!--- SVC is up and listed in the show atm vc table.

```

## Verify

There is currently no verification procedure available for this configuration.

## Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

## Related Information

- [Understanding ATM Addresses with Cisco Devices](#)
- [Understanding and Troubleshooting ATM UNI Signaling](#)
- [Understanding ILMI on ATM Interfaces](#)
- [Troubleshooting SSCOP Errors and LANE Client Resets on ATM Interfaces](#)

- **Troubleshooting Rejected Calls and ATM Signalling RELEASE Messages**
  - **ATM UNI Signaling Support on Cisco Routers and Switches**
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