Doc. No. 78-1735-05

Cisco LightStream 100 Release Note for Software Release 2.5

This release note describes the new features and modifications for Cisco LightStream 100 Software Release 2.5.

Software Release 2.5 supports the following additional features:

- Soft permanent virtual connection/permanent virtual path (PVC/PVP)
- Switched virtual circuit (SVC) tunneling

Note The LightStream 100 product was formerly known as the HyperSwitch A100.

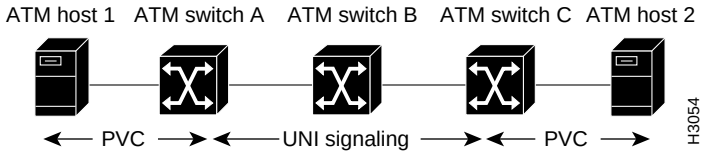
Soft PVC/PVP Overview

To shorten the time-consuming and error-prone task of end-to-end manual configuration of PVCs, Software Release 2.5 now supports soft PVC/PVP. With soft PVC/PVP support, you can create a PVC across a multiswitch network by designating only the two end points of the connection. The software dynamically establishes a connection between the two end points, eliminating manual configuration of the switches between the two points. Without soft PVC/PVP support, every link in the path between the two ATM hosts must be manually configured as a PVC. By reducing manual configuration, soft PVC/PVP can save you considerable time configuring a network.

To illustrate how soft PVC/PVP dynamically establishes a connection between the two end points, Figure 1 shows a simple three-switch network that contains the following:

- ATM hosts 1 and 2 are PVC-capable. An ATM host is a device, such as a router, workstation, or PC, with an ATM interface.
- Switches A and C are border switches. A border switch is an ATM switch that is directly connected to an ATM host.
- Switch B is as an intermediate ATM switch. An intermediate switch is an ATM switch in the line between the ATM hosts and border switches.

Figure 1 Three-Switch Network



With soft PVC/PVP support, you need only configure the PVCs on the ATM hosts and assign a 20-byte ATM address to each border switch. Then enter the **setup** command on one of the border switches. Upon receiving the command, the signaling component in the LS-100 uses standard User-Network Interface (UNI) 3.*x* signaling and Interim Inter-Switch Signaling Protocol (IISP) to originate and route a call through the ATM network and dynamically establish a connection between ATM hosts.

A soft PVC/PVP connection can only be established between PVC-capable hosts (ATM host 1 and 2 in Figure 1). Additionally, the border switches (ATM switch A and C in Figure 1) must support soft PVC/PVP. However, soft PVC/PVP support is not necessary on intermediate switches (switch B in Figure 1), although the intermediate switches must support UNI 3.*x* signaling and IISP. Furthermore, a minimum of two ATM switches are required for a soft PVC/PVP connection: a source-border switch and target-border switch. You cannot establish a soft PVC/PVP connection between two ATM hosts connected to a single ATM switch.

A source-border switch initiates a soft PVC/PVP connection between two ATM hosts, and must be directly connected to a PVC-capable ATM host. In Figure 1, either switch A or C could be a source-border switch.

The target-border switch terminates the SVC portion of the soft PVC/PVP connection. Normally an SVC connection terminates at an ATM host, but for soft PVC/PVPs the SVC connection terminates at the target-border switch. The target-border switch must also be directly connected to a PVC-capable ATM host. In Figure 1, either switch A or C could be a target-border switch.

The type of switch, source-border or target-border, depends on which ATM switch you enter in the **setup** command to establish a soft PVC/PVP connection. For example, if you enter the **setup** command on ATM switch A in Figure 1, ATM switch A becomes the source-border switch, and ATM switch C becomes the target-border switch.

End-to-end signaling between ATM hosts via LightStream100 switches is still available. Even though the previous examples show a PVC-capable only host, you can use soft PVC/PVP to setup a virtual path (VP) between PVC connections and use standard UNI end-to-end signaling to set up virtual paths between PVCs. However, soft PVC/PVP support is only between ATM hosts with PVC connections. For example, you cannot use soft PVC/PVP to establish paths if one ATM host is PVC-capable only and the other ATM host is SVC-capable only.

Setting Up a Soft PVC/PVP Connection

To set up a soft PVC/PVP connection, follow these steps:

Step 1 Set up a PVC between the ATM hosts and the border switches. Refer to the documentation that accompanied your ATM host for instructions.

Step 2 Use the **set local** command to assign an ATM address to each border switch in the network. An ATM address is required on both border switches, but the address is optional on intermediate switches. Refer to the command section “set local” later in this release note for the command syntax.

Step 3 Enter the **setup** command on one border switch. Refer to the command section “setup” later in this release note for the command syntax.

Note The **release** command releases a soft PVC/PVP connection.

Soft PVC/PVP Configuration Commands

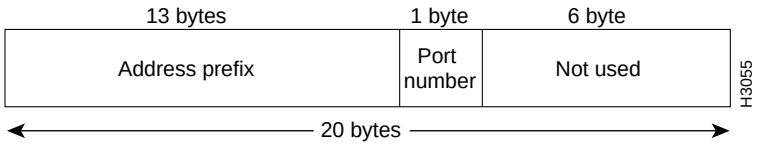
The **pvc add**, **pvc delete**, and **show softPVP,** and **soft establish** commands are new with Software Release 2.5. This section describes the new commands. The **set local** command has been modified. The **set local** command in this section supersedes the same command in the *Cisco LightStream 100 User Guide*. This section describes the configuration commands used to configure soft PVC/PVP on the LightStream100. This section also describes the ATM network service access point (NSAP) address format.

Note For more information about a command or subcommand, type a question mark (**?**) or **HELP** after the command or subcommand.

ATM NSAP Address

This section describes the ATM NSAP address format used in some of the commands in this section. Refer back to this section for an explanation of the NSAP address format. Figure 2 shows the format of the NSAP address.

Figure 2 NSAP Address Format



The 20-byte ATM NSAP address consists of the following:

- The first 13 bytes of the address are used for the address prefix.
- The fourteenth byte of the address is used for a port number on the LightStream100.
- The remaining six bytes of the ATM address are not used (and need not be configured).

The first 14 bytes of an ATM address (13 byes for address prefix and 1 byte for port number) uniquely identify a particular port on a switch in an ATM network. For example, if switch C in Figure 1 is the target-border switch, the ATM address for switch C would be 13 bytes of address prefix and the fourteenth byte would be the port number connecting ATM switch C to ATM host 2.

pvc add

The **pvc add** command adds a PVC endpoint. When using this command, confirm that a broadcast connection is already set by the **pvc establish** command. Enter the same source parameters (line number, VPI, VCI) as those specified by the **pvc establish** command. Note that the traffic type (bit rate type) on the endpoint becomes the same as that specified by the **pvc establish** command.

Format:

```
LS100# pvc add p1 p2 p3 p4 p5 p6
```

Format explanation:

P1: Low line number (0-15, corresponds to slot number)

P2: Low VPI (0-4095)

P3: Low VCI (0-4095)

P4: High line number (0-15, corresponds to slot number)

P5: High VPI (0-4095)

P6: High VCI (0-4095)

Example:

```
LS100# pvc add 1 3 3 12 5 5
Connection endpoint has been added.
Modified Connection:
Low:     1,     3,     3,     1, 1
High:    1,     5,     5
High:    12,    5,     5
```

Error messages:

Hardware error has been detected on specified line/Switch.

Specified connection is non-existing.

Specified connection is bidirectional.

Specified VPI/VCI is out of range.

Specified line number is invalid.

PVC Table Overflow.

Error messages (Multicast):

Command name is illegal.

Subcommand name is illegal.

Number of parameter is illegal.

Specified line is invalid.

Specified VPI is out of range.

Specified VCI is out of range.

Specified VPI+VCI is out of range.

Specified connection is uni/bidirection.

ICI Hunt Error.

BCI Hunt Error.

If an endpoint is added incorrectly, first remove the endpoint using the **pvc remove** command; then reenter the **pvc add** command.

pvc delete

The **pvc delete** command deletes a PVC setting.

Format:

```
LS100# pvc delete p1 p2 p3 p4 p5 p6 p7 p8
```

Format explanation:

P1: Connection type

- 0: Unidirectional
- 1: Bidirectional
- 2: Multicast

P2: Traffic type

- 0: Guaranteed
- 1: Best effort

P3: Low line number (0-15, corresponds to slot number)

P4: Low VPI (0-4095)

P5: Low VCI (0-4095)

P6: High line number (0-15, corresponds to slot number)

P7: High VPI (0-4095)

P8: High VCI (0-4095)

Example:

```
LS100# pvc delete 1 1 1 2 7 1 3 8
Bi direction Best Effort Connection has been deleted.
Low:         1,      2,      7,      1,      1
High:        1,      3,      8,      1,      1Error message:
No such connection
```

Note Some error messages listed under the **pvc establish** command may occur.

set local

The **set local** command sets the IP address, mask, and host name of the LightStream 100 switch.

Format:

```
LS100# set local p1 p2 p3 p4
```

Format explanation:

P1: Host name (up to eight alphabetic characters)

P2: IP address (dot notation)

P3: Mask (dot notation)

P4: ATM NSAP address

The 20-byte ATM NSAP address consists of the following:

- The first 13 bytes of the address are used for the address prefix.
- The fourteenth byte of the address is used for a port number on the LightStream 100 switch.
- The remaining six bytes of the ATM address are not used (and need not be configured).

The first 14 bytes of an ATM address (13 byes for address prefix and 1 byte for port number) uniquely identify a particular port on a switch in an ATM network.

Example:

```
LS100# set local m5core 13.12.11.10 222.123.22.23 cc0102030405060708091011 12
Local configuration data has been set.
```

Error messages:

Command name is illegal.

Sub command name is illegal.

Number of parameter is illegal.

Specified HOST NAME is out of range.

Specified IP ADDRESS is out of range.

Specified MASK is out of range.

Enter the **show local** command on the console to display the ATM address.

show softPVP

The **show softPVP** command displays soft PVC/PVP information. Enter this command on either the source-border or the target-border switch, but not on an intermediate switch. Intermediate switches cannot differentiate a normal SVC from soft PVC/PVPs.

Format:

```
LS100# show softPVP p1
```

Format explanation:

P1: The port/line number (0-15) of the border switch directly connected to the ATM host.

Example:

```
LS100# show softPVP 0
Line Number : 0
Endpoint TrfType FwdMbps BkwdMbps LN VPI VCI VPI VCI Retry Calling UBR-BE--00 500 502 Calling
UBR-BE--02 703 802
CallingPartyAddress AA AA
CalledPartyAddress CC0102030405060708091011 1204 CC0102030405060708091011 1204
```

If the calling party address is not fully specified, the system will left justify the address and fill in the remaining bytes with zeros.

Also, the fourteenth byte of the called party address is the port number (in this case, port number 4), which is the port to which the target ATM host is directly connected.

Use the **show svc** command to display all the SVCs associated with a particular port. The **show svc** command does not differentiate between regular end-to-end signaling and soft PVC/PVP connections.

soft establish

The **soft establish** command sets up a soft PVP/PVC connection.

Format:

```
LS100# soft establish p1 p2 p3 p4 p5 p6 p7 p8 p9 p10 p11 p12 p13 p14 p15 [CR]
```

Format explanation:

P1: Calling party address (40 hexadecimal digits maximum). The LightStream 100 ATM address of source-border switch.

P2: Input/source port number (0–15). The port connected to the PVC-capable ATM host.

P3: Input/source VPI (0–4095). The VPI allocated to the PVC-capable ATM host.

P4: Input/source VCI (0–4095). The VCI allocated to the PVC-capable ATM host. When soft PVP, set P4 to zero.

P5: Called party address (40 hexadecimal digits maximum). The LightStream 100 ATM address of the target-border switch. Specify the called party address in LightStream 100 NSAP address format.

P6: Output/target VPI (0–4095). The VPI allocated to the target PVC-capable ATM host.

P7: Output/target VCI (0–4095). The VCI allocated to the target PVC-capable ATM host. When soft PVP, set P7 to zero.

P8: Number of retries (0–15; default=2). Retry time interval is 10 seconds.

P9: Traffic type (CBR, VBR or UBR; default=UBR).

P10: Forward peak cell rate in Mbps.

P11: Backward peak cell rate in Mbps.

P1–P11 are required parameters.

P12: Local UPVP, (0-512).

Note NOTE : UPVP/512 should be greater than PCR/line-rate.

P13: Local COOP

0:Pass non-conforming cells

1: Drop non-conforming cells

P14: Remote UPVP (0-512)

Note NOTE : UPVP/512 should be greater than PCR/line-rate.

P15: Remote COOP

0: Pass non-conforming cells

1: Drop non-conforming cells

Output example:

```
Soft PVPC/PVCC has been issued.
```

Error message:

Number of parameter is illegal.

Example:

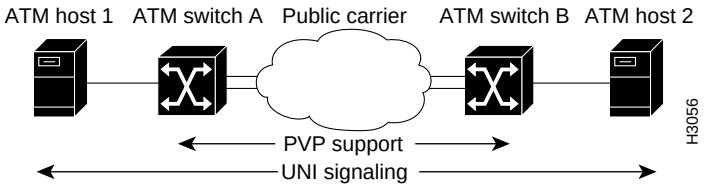
```
kirin# soft est ?
<SrcAtmAddrs>  Calling Party ATM Address    (0-9,a-f,A-F max=40)
<LclTermPort>  Local Port where soft PVP/PVC is terminated(0-15)
<Local VPI>    VPI on Local Port   (0-4095)
<Local VCI>    VCI on Local Port   (0, 32-4095, 0 : PVPC)
<DstAtmAddrs>  Called Party ATM Address      (0-9,a-f,A-F max=40)
<Remote VPI>   VPI on Remote Port  (0-4095)
<Remote VCI>   VCI on Remote Port  (0, 32-4095, 0 : PVPC)
<Retry>        Number of retry     (0-15) or infinite
<Traffic>      Traffic type VBR-GS(0),CBR-GS(1) or UBR-BE(2)
<FWPCR>        Forward  Peak Cell Rate, 0-155(Mbps), Valid for VBR/CBR
<BWPCR>        Backward Peak Cell Rate, 0-155(Mbps), Valid for VBR/CBR
<Local UPVP>   Local UPVP(0-512)
<Local COOP>   Local COOP 0:Pass non-conforming cells
                          1:Drop non-conforming cells
<Remote UPVP>  Remote UPVP(0-512)
<Remote COOP>  Remote COOP 0:Pass non-conforming cells
                           1:Drop non-conforming cells
```

SVC Tunneling Overview

To enable the use of standards-based signaling over public carriers, the LightStream100 now supports switched virtual circuit (SVC) tunneling. SVC tunneling allows you to set up temporary SVCs over previously established permanent virtual paths (PVPs).

Figure 3 shows a simple network composed of two ATM hosts and two ATM switches.

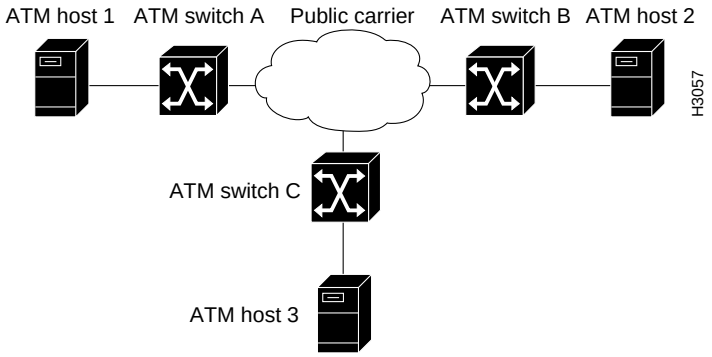
Figure 3 SVC Tunneling



One benefit of SVC tunneling is that you need only configure a PVP between the ATM switches connected to the public carrier. Signaling messages between the two ATM switches are then “tunneled” (exchanged) through the PVP over the ATM Forum-recommended virtual circuit five. The PVP appears as a point-to-point link to the two ATM switches. Routing of signaling messages between the two ATM switches over the public carrier is based on ATM Forum standard IISP. Without SVC tunneling, the complete path between the two ATM hosts must be configured as a PVC.

Another benefit of SVC tunneling is that only a single ATM switch port must be connected to the public carrier network. Through a single port, an ATM switch can communicate with multiple ATM switches (that support SVC tunneling) connected to the same public carrier, as shown in Figure 4.

Figure 4 Multiple ATM Switches Connected to a Public Carrier



For example, in Figure 4 ATM switch A can communicate with ATM switch B and C simultaneously through a single port connected to the public carrier. For this communication to occur, the public carrier provides two PVPs: one PVP (VP1) between ATM switch A and B and another PVP (VP2) between ATM switch A and C.

In general, one PVP is required between two ATM switches connected to the public carrier. Messages are tunneled between the two ATM switches over the assigned PVP. Signaling messages are exchanged over VP 5, where VP is the PVP between the two ATM switches and 5 is the reserved VCI channel (on the VP) allocated by the ATM Forum for signaling.

The LightStream100 supports a maximum of 64 virtual paths.

Setting Up SVC Tunneling

Except where indicated otherwise, the syntax for the commands used to configure SVC tunneling are described in the next section, “SVC Tunneling Configuration Commands.” To set up SVC tunneling, follow these steps only on the LightStream100s connected to the public carrier (for example, ATM switch A, B, and C in Figure 4):

Step 1 Suspend the line on which you want to configure SVC tunneling. Enter the **set svcline** *line_number* **suspend** command, where *line_number* is the number of the line (0–15) on which you want to configure SVC tunneling. **(**Refer to the *Cisco LightStream100 User Guide* for the command syntax.)

Step 2 Configure a virtual path on the line. Enter the **set signaling** command on the line you want to configure a virtual path.

Step 3 Configure the virtual path for the SSCOP protocol. Enter the **set sscop** command on the line you want to configure for SVC tunneling.

Step 4 Configure the virtual path for the Q.2931 protocol. Enter the **set atmsig** command on the line you want to configure for SVC tunneling.

Step 5 Enter the **route add** command on the line you want to configure for SVC tunneling.

Step 6 Reactivate the port. Enter the **set svcline** *line_number* **resume** command, where *line_number* is the number of the line (0–15) on which SVC tunneling is configured. (Refer to the *Cisco LightStream100 User Guide* for the command syntax.)

Note The **route delete** command deletes the configured route.

SVC Tunneling Configuration Commands

In Software Release 2.5, the **set signaling** command is new. The **set sscop**, **set atmsig**, and **route add** commands have been modified. The modified commands in this section supersede the same commands in the *Cisco LightStream100 User Guide*. This section describes the configuration commands used to configure SVC tunnels on the LightStream100.

Note For more information about a command or subcommand, type a question mark (?) or HELP after the command or subcommand.

---

set signaling

The **set signaling** command configures a virtual path on a particular port or line. Configure multiple VPs per port by entering the **set signaling** command multiple times.

Format:

```
LS100# set signaling p1 p2
```

Format explanation:

P1: Port/line number (0–15)

P2: Virtual path (0–4095)

The **delete signaling** command deletes the configured tunnel.

Example:

```
LS100# set signaling 1 12
```

Error message:

Number of parameter is illegal.

set sscop

The **set sscop** command sets the SSCOP parameters for ATM signaling per line.

Format:

```
LS100# set sscop p1 p2 p3 p3 p4 p5 p6 p7 p8 p9 p10
```

Format explanation:

P1: Line number (0-15)

P2: MaxCC (1-255; default = 4 seconds)

P3: TimerCC (1-255; default = 1 second)

P4: Timer_KEEPALIVE (1-255; default = 30 seconds)

P5: Timer_NORESPONSE (1-255; default = 10 seconds)

P6: Timer_POLL (1-1023 seconds; default = 1 second)

P7: MaxPD (1-255; default = 10)

P8: MaxSTAT (1-255; default = 4)

P9: Clear buffers

— No

— Yes (default)

P10: VP (0–4095)

Example:

```
LS100# set sscop 0 4 1 1 10 100 25 4 yes 70
```

Error messages:

Specified line is invalid.

Specified parameter is out of range.

Note that P1 and P10 should match the port number and virtual path configured by the **set signaling** command.

Parameters P2 through P9 are standard SSCOP parameters with built-in default values. The default parameters are well suited for most networks. Do not change the parameters unless you have excellent knowledge of the SSCOP protocol and the network configuration.

Display the defaults by entering the **show sscop** command to display parameters P2 through P9. Then refer to the parameters when configuring tunnels.

The **delete sscop** command deletes the configured tunnel.

Format explanation:

P1: Flag identification number

— 00 =Disable event flag, packet flag, and error flag

— 01=Enable event flag

— 02=Enable packet flag

— 03=Enable event flag and packet flag

— 04=Enable error flag

— 05=Enable event flag and error flag

— 06=Enable packet flag and error flag

— 07=Enable event flag, packet flag, and error flag

P2: Line interface number (0–15). If no line interface number is specified all lines configured.

set atmsig

The **set atmsig** command sets Q.2931 (formerly Q.93B) parameters for ATM signaling on the specified line.

Format:

```
LS100# set atmsig p1 p2 p3 p4 p5 p6 p7 p8 p9 p10 p11 p12 p13
```

Format explanation:

P1: Line number (0-15)

P2: Master/slave switch identifier

- 0: Slave (user)
- 1: Master (default) (network)

Note The system accepts either alpha or numeric values.

P3: T303 (1-255; default = 4 seconds.)

P4: T308 (1-511; default = 30 seconds.)

P5: T309 (1-511; default = 90 seconds.)

P6: T310 (1-255; default = 10 seconds.)

P7: T313 (1-255; default = 4 seconds.)

P8: T316 (1-511; default = 120 seconds.)

P9: T317 (1-255; default = 60 seconds.)

P10: T322 (1-255; default = 4 seconds.)

P11: T398 (1-255; default = 4 seconds.)

P12: T399 (1-511; default = 14 seconds.)

Note P11 and P12 are not supported; specify a number within the range listed.

P13: VP (0–4095)

Note P13 is only used for tunneling the VPI for that port.

Command example:

```
LS100# set atmsig 0 master 4 30 90 10 4 120 15 4 4 14 8
```

Error messages:

Specified line number is invalid.

Specified line number is out of range or not installed.

Note that parameters P1 and P13 should match the port number and virtual path configured by the **set signaling** command. Parameters P1 and P13 should also match parameters P1 and P10 specified by the **set sscop** command.

Parameters P2 through P12 are standard Q.2931 parameters with built-in default parameters. The default parameters are well suited for most networks. Do not change these parameters unless you have excellent working knowledge of the Q.2931 protocol and the network configuration.

Display the default values by entering the **show atmsig** command, which displays parameters P2 through P12. Then refer to them when configuring SVC tunnels.

The LightStream 100 switch currently supports only UNI 3.0 signaling.

The **delete atmsig** command deletes the configured tunnel.

route add

The **route add** command is used by IISP to route signaling messages across multiple switches and even among multiple ports on a single switch.

Format:

```
LS100# route add p1 p2 p3 p4 p5 p6
```

Format explanation:

P1: Destination address (40 hexadecimal digits maximum)

P2: ATM address type (NSAP/E.164)

P3: Primary port number (0–15). The primary port is the port through which the destination ATM node is reachable and, if active, will always be selected first by the LightStream 100 switch.

P4: Secondary port number (0–15). The secondary port is the alternate port through which the destination node is reachable and will be selected only by the LightStream 100 switch if the primary port is inactive.

Note If there is no alternate route to the destination, specify the same port for both P3 and P4.

P5: Primary tunneling VPI (0–4095)

P6: Secondary tunneling VPI (0–4095)

Example:

```
LS100# route add xxx123456789 e.164 2 3 10 200
SVC route has been added.
```

Error messages:

Command name is illegal.

Subcommand name is illegal.

Number of parameter is illegal.

Specified parameter is invalid.

Routing Table Overflow.

The **route add** command has been extended to now include a virtual path tied to a particular port because there could be multiple virtual paths associated with a single port.

Cisco LightStream User Guide Errata for Release 2.5

This section provides corrections and additional information for Release 2.5 of the *Cisco LightStream 100 User Guide* publication.

On page 1-18, add the following section after the section "Communicating with the NMS Manager."

The LightStream 100 only supports AAL5 SNAP encapsulation for the packets that go to the switch.

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This document is to be used in conjunction with the *Cisco LightStream 100 User Guide* publication.