

## Chapter 10

# Configuring ATM-over-SHDSL Interfaces

The symmetric high-speed digital subscriber line (SHDSL) Physical Interface Module (PIM) is available for J-series Services Routers. The PIM supports multi-rate, high-speed, symmetrical digital subscriber line technology for data transfer between a single customer premises equipment (CPE) subscriber and a central office (CO). Unlike ADSL, which was designed for delivering more bandwidth downstream than upstream, SHDSL is symmetrical and delivers a bandwidth of 2.3 Mbps in both directions. The SHDSL PIM has 2 ports and supports ATM-over-SHDSL mode only.

SHDSL is defined in the following specifications from the ITU and the Internet Engineering Task Force (IETF):

- ITU G.991.2, *Single-pair High-speed Digital Subscriber Line (SHDSL) Transceiver*.
- ITU G.994.1, *Handshake Procedures for Digital Subscriber Line (DSL) Transceivers*.
- ITU G.997.1, *Physical Layer Management for Digital Subscriber Line (DSL) Transceivers*.
- RFC 3276, *Definitions of Managed Objects for High Bit-Rate DSL - 2nd generation (HDSL2) and Single-Pair High-Speed Digital Subscriber Line (SHDSL) Lines*.

J-series Services Routers with SHDSL Annex A or Annex B PIMs act as a primary WAN link. They use an ATM interface to send network traffic through a point-to-point connection to a DSL-access multiplexer (DSLAM). You can configure Point-to-Point Protocol over Ethernet (PPPoE) over ATM to connect through DSL lines. For more information about configuring PPPoE, see “Configuring Point-to-Point Protocol over Ethernet” on page 481.

ATM-over-SHDSL interfaces are not supported on J2300 Services Routers.



**NOTE:** You can configure J-series Services Routers with SHDSL PIMs for connections through SHDSL only, not for direct ATM connections.

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To configure the ATM mode for SHDSL, include the `pic-mode` statement at the `[edit chassis fpc fpc-number pic 0 shdsl]` hierarchy level:

```
[edit chassis]
  fpc fpc-number {
    pic 0 {
      shdsl {
        pic-mode (1-port-atm | 2-port-atm);
      }
    }
  }
```

For more information about configuring the ATM mode, see the *JUNOS System Basics Configuration Guide* and the *J-series Services Router Advanced WAN Access Configuration Guide*.

To configure SHDSL operating mode on the physical ATM interface and set the encapsulation, include the `shdsl-options` statement and the `encapsulation` statement at the `[edit interfaces at-pim/0/port]` hierarchy level:

```
[edit interfaces at-pim/0/port]
  shdsl-options {
    annex (annex-a | annex-b);
    line-rate line-rate;
    loopback (local remote);
    snr-margin {
      current margin;
      snext margin;
    }
    encapsulation (atm-pvc | ethernet-over-atm)
  }
}
```

To configure ATM virtual path identifier (VPI) options for the interface, include the `vpi` statement at the `[edit interfaces interface-name atm-options]` hierarchy level:

```
[edit interfaces interface-name]
  atm-options {
    vpi vpi-identifier {
      maximum-vcs maximum-vcs;
      oam-liveness {
        up-count cells;
        down-count cells;
      }
      oam-period (disable | seconds);
    }
  }
}
```

For more information about configuring ATM VPI options, see “Configuring the Maximum Number of ATM1 VCs on a VP” on page 199.

To configure logical interface properties, include the `encapsulation` statement, `family` statement, and `vci` statement:

```
unit logical-unit-number {
    encapsulation type;
    family inet{
        vci vpi-identifier.vci-identifier;
    }
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-routers *logical-router-name* interfaces *interface-name* unit *logical-unit-number*]

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## Configuring ATM Mode on the PIM

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The J-series Services Routers with an SHDSL PIM installed support the 2-port, two-wire mode (Annex A or Annex B). You can configure only one mode on each 2-port SHDSL PIM.



**NOTE:** G.SHDSL interfaces on a J-series Services Router only support 2-port, 2-wire mode. This is enabled by default. The 1-port, 4-wire mode is not supported.

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The two-wire mode supports autodetection of the line rate or fixed line rate and network speeds from 192 Kbps to 2.3 Kbps in 64-Kbps increments.

For information about configuring Annex A or Annex B, see “Configuring SHDSL Operating Mode on an ATM Physical Interface” on page 264.

To configure the ATM mode for SHDSL, include the `pic-mode` statement at the `[edit chassis fpc fpc-number pic 0 shdsl]` hierarchy level:

```
[edit chassis]
  fpc fpc-number {
    pic 0 {
      shdsl {
        pic-mode 2-port-atm;
      }
    }
  }
```

The default is 2-wire mode. If nothing is configured, the SHDSL interface will be configured in 2-wire mode (2-port-atm).

For more information about configuring the `pic-mode` statement, see the *JUNOS System Basics Configuration Guide*. For information about configuring the ATM mode, see the *J-series Services Router Basic LAN and WAN Access Configuration Guide*.

## Configuring SHDSL Operating Mode on an ATM Physical Interface

To configure the SHDSL operating mode on the physical ATM interface, include the `shdsl-options` statement at the `[edit interfaces at-pim/0/port]` hierarchy level:

```
[edit interfaces at-pim/0/port]
  shdsl-options {
    annex (annex-a | annex-b);
    line-rate line-rate;
    loopback (local | remote);
    snr-margin {
      current margin;
      snext margin;
    }
  }
```

Configure the following SHDSL options:

- **annex**—The type of annex:
  - **annex-a**—Use for North American SHDSL network implementations.
  - **annex-b**—Use for European SHDSL network implementations.
- **line-rate**—The SHDSL line rate. The default for 2-wire mode is auto. The default for 4-wire mode is 4608 Kbps.
- **loopback**—A loopback connection, local or remote.
  - **local**—Use to troubleshoot physical PIC errors. A local loopback loops packets, including both data and timing information, back on the local routing platform's PIM.

- **remote**—Use to troubleshoot physical circuit problems between the local router and the remote router. A remote loopback loops packets, including both data and timing information, back on the remote routing platform's PIC.
- **snr-margin**— The SHDSL signal-to-noise ratio (SNR) margin, **current** or **snext**. The SNR margin is the difference between the desired SNR and the actual SNR.
  - **current**—Current SNR is the difference between desired SNR and the actual SNR. When configured, the line trains at higher than current noise margin plus SNR threshold.
  - **snext**—Self-near-end crosstalk (SNEXT) SNR margin line trains the line at higher than SNEXT threshold.

## Configuring Encapsulation on the ATM Physical Interface

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To configure the type of encapsulation for the physical ATM interface, include the encapsulation statement at the [edit interfaces *at-pim/0/port*] hierarchy level:

```
[edit interfaces at-pim/0/port]
  encapsulation (atm-pvc | ether-over-atm);
}
```

Configure one of the following:

- **atm-pvc**—ATM permanent virtual circuits (PVCs), used for PPP over ATM over SHDSL interfaces. This is the default encapsulation.
- **ether-over-atm**—Ethernet over ATM encapsulation. For interfaces that carry IPv4 traffic, use this type of encapsulation.

## Configuring Logical Interface Properties

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To configure logical interface properties, include the **encapsulation** statement, **family** statement, and **vci** statement:

```
unit logical-unit-number {
  encapsulation type;
  family inet{
    vci vpi-identifier.vci-identifier;
  }
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-routers *logical-router-name* interfaces *interface-name* unit *logical-unit-number*]

To configure the logical link-layer encapsulation type, include the **encapsulation** statement.

ATM-over-SHDSL interfaces that use `inet` (IP) protocols support the following encapsulations on the logical interface:

- `atm-vc-mux`—Use ATM VC multiplex encapsulation. You can only configure the `inet` family when you use this type of encapsulation.
- `atm-nlpd`—Use ATM network layer protocol ID (NLPD) encapsulation. You can only configure the `inet` family when you use this type of encapsulation.
- `atm-cisco-nlpd`—Use Cisco NLPD encapsulation. You can only configure the `inet` family when you use this type of encapsulation.

ATM-over-SHDSL for PPP over ATM interfaces support the following encapsulations on the logical interface:

- `atm-ppp-llc`—Use ATM PPP over AAL5 logical link control (LLC) encapsulation.
- `atm-ppp-vc-mux`—Use PPP over ATM AAL5 multiplex encapsulation.

ATM-over-SHDSL interfaces also support the following encapsulations on the logical interface:

- `atm-snap`—Use ATM subnetwork attachment point (SNAP) encapsulation.
- `atm-mlppp-llc`—For ATM2 IQ interfaces only, use Multilink PPP (MLPPP) over AAL5 LLC. For this encapsulation type, your routing platform must be equipped with a Link Services or Voice Services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces.
- `ppp-over-ether-over-atm-llc`—Use PPP over Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, you configure the interface address on the PPP interface.
- `family`—The family protocol type.
- `vci`—The virtual channel identifier (VCI) type and value.
  - `vci-identifier`—ATM virtual circuit identifier. Unless you configure the interface to use promiscuous mode, this value cannot exceed the largest numbered VC configured for the interface with the `maximum-vc` option of the `vpi` statement. Specify a VCI identifier from 0 through 4089 or 0 through 65,535 with promiscuous mode. VCIs from 0 through 31 are reserved.
  - `vpi-identifier`—ATM virtual path identifier. Specify a VPI from 0 through 255. The default is 0.

## Example: Configuring an ATM-over-SHDSL Interface

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The following example illustrates an ATM-over-SHDSL interface configuration.

### Configuration for the ATM mode on the PIM

```
[edit chassis]
  fpc 6 {
    pic 0 {
      shdsl {
        pic-mode 2-port-atm;
      }
    }
  }
```

### Configuration for the SHDSL operating mode on the physical ATM interface

```
[edit interfaces at-6/0/0/0]
  shdsl-options {
    annex annex-b;
    line-rate 192;
    loopback local;
    snr-margin {
      current 1;
      snext 2;
    }
  }
}
```

### Configuration for the encapsulation on the physical ATM interface

```
[edit interfaces at-6/0/0/0]
  encapsulation ethernet-over-atm;
}
}
```

### Configuration for the logical interface

```
[edit interfaces at-6/0/0/0 unit 3]
  encapsulation atm-nlpid;
  family inet {
    vci 25;
  }
```

## Verifying an ATM-over-SHDSL Interface Configuration

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To verify an ATM-over-SHDSL interface configuration, you can issue the following operational mode command:

- `show interfaces at-pim/0/port extensive`

