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 PPPoE” on page 548.

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.

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 227.

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*]

This chapter includes the following topics:



## Configuring ATM Mode on the PIM

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.

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 292.

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

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

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-vcs 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

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

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

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