CISCO SYSTEMS

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Configuring Subscriber Equipment for Use with the Cisco 90i IDSL Channel Unit

This document provides high-level information and guidelines to assist you when configuring customer premises equipment (CPE)—for example, a Cisco 762, 1004, or 1604 router—for leased-line operation with the Cisco 90i Channel Unit. Examples for both Frame Relay and Point-to-Point Protocol (PPP) encapsulation in Frame Relay are provided. (For information on PPP encapsulation in Frame Relay, refer to RFC-1973.)

Note The subscriber equipment can be any third-party vendor's ISDN/IDSL router or terminal adapter that supports Frame Relay or PPP and leased-line operation.

This document contains the following sections:

* Configuration Overview
    — Frame Relay Operation
    — PPP over Frame Relay Operation
* Configuring Cisco 700 Series Routers for PPP Operation
* Configuring the Motorola BitSurfer Pro
* Configuring the Cisco 1004 or Cisco 1604 for PPP Operation
* Cisco Connection Online

Configuration Overview

There are two possible ways the subscriber's CPE can be configured to set up a subscriber line from the Cisco 90i Channel Unit through a Frame Relay network to an ISP or corporate gateway router.

* Over Frame Relay protocol to the destination gateway router
* Over PPP to the Cisco 90i Channel Unit, then encapsulated PPP over Frame Relay (RFC-1973) to the destination gateway router

Each configuration is discussed in the following sections.

Frame Relay Operation
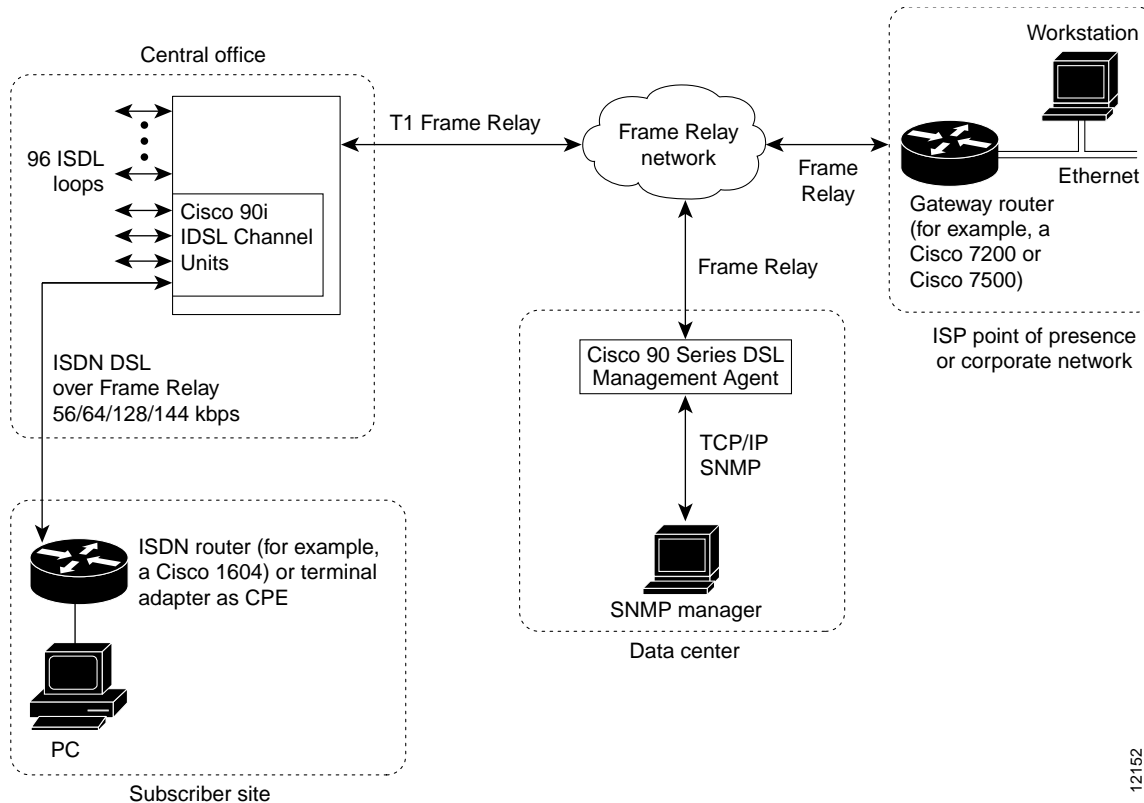
Figure 1 shows a sample configuration operating over Frame Relay protocol.

Figure 1   Running Frame Relay from Subscriber to Destination Gateway Router

Note   It is assumed, at this point, that the relevant subscriber port on the Cisco 90i has been configured for Frame Relay operation as described in the "Managing Cisco 90i. IDSL Channel Units and Subscriber Loops" chapter in the *Cisco 90 Series Agent Installation Guide*.

As shown in Figure 1, subscriber traffic can be transported over Frame Relay between the subscriber access equipment and the Cisco 90i. Each subscriber can have up to eight (8) Frame Relay permanent virtual circuits (PVCs) provisioned for traffic. From the subscriber perspective, depending on the PVCs provisioned on the Frame Relay network, PVCs with DLCIs in the range 16–23 are visible on the subscriber loop. Any traffic sent on one of these DLCIs is automatically mapped to the appropriate network PVC by the Cisco 90i. No additional configuration is necessary for this translation to occur. Traffic is then transported across the Frame Relay network to the ultimate destination—a Frame Relay-capable router—and the PVC terminated just like any other Frame Relay PVC.

The Cisco 90i also supports the use of the Annex D Local Management Interface (LMI) on the subscriber loop in Frame Relay mode. If the subscriber equipment sends Annex D messages, the Cisco 90i will respond appropriately. Note that Annex D LMI on the subscriber loop is not required

for traffic to be transported. The Cisco 90i will allow subscriber traffic to be sent and received even if Annex D is not active. We recommend, however, that you use Annex D LMI if it is supported on the subscriber equipment.

PPP over Frame Relay Operation

Following is a sample configuration showing the subscriber running PPP to the corporate gateway router.

Figure 2   Running PPP from Subscriber to Router
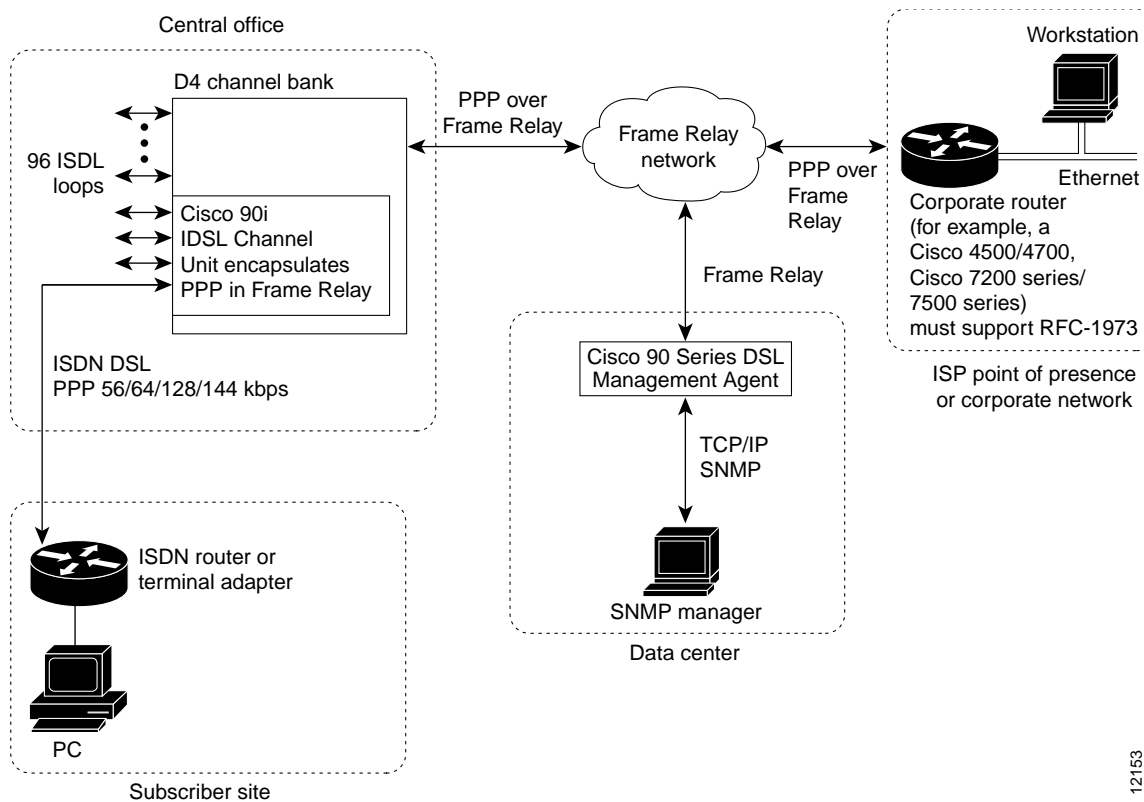
> **Note**   It is assumed, at this point, that the relevant subscriber port on the Cisco 90i has been configured for PPP operation as described in the "Managing Cisco 90i. IDSL Channel Units and Subscriber Loops" chapter in the *Cisco 90 Series Agent Installation Guide*.

PPP operation is supported primarily to allow the use of low-cost ISDN terminal adapters and routers. Unlike Frame Relay, PPP supports only a single destination for subscriber traffic to be defined. This, however, is usually acceptable for Internet users or telecommuters. The Cisco 90i also treats the subscriber loop as a single, wide data pipe rather than as multiple channels, the way traditional ISDN equipment does. This eliminates the need for multilink PPP (MLPPP) and increases throughput by reducing the protocol overhead.

Using PPP with the Cisco 90i differs in one other significant way from Frame Relay operation. Because all traffic must be ultimately carried over a Frame Relay network, PPP has to be encapsulated in Frame Relay for the trip. The Cisco 90i uses PPP over Frame Relay encapsulation, defined by IETF RFC 1973, to automatically place PPP traffic from the subscriber into a Frame Relay frame and likewise extract PPP traffic from Frame Relay that is destined for the subscriber.

Using PPP requires that the destination router support RFC-1973 encapsulation. Cisco IOS fully supports RFC-1973 traffic. PPP traffic, once removed from Frame Relay, can be terminated and authenticated using standard authentication, authorization, and accounting (AAA) servers. Traffic can also be tunnelled over L2F/L2TP tunnels to be terminated and authenticated elsewhere. Refer to your Cisco and third-party product documentation for information regarding configuring RFC-1973 functions and operations.

Configuring Cisco 700 Series Routers for PPP Operation

Following is a sample configuration file for Cisco 700 series routers. These settings reflect a Cisco 700 series router as customer premises equipment running PPP in leased-line operation with the Cisco 90i in the network configuration shown in Figure 2.

Note   The Cisco 762, 766, 772, and 776 support IDSL operation using software version 4.1 or later.

The settings that are relevant to the Cisco 90i configuration are shown in bold. For current information on what Cisco IOS configuration settings to use for your network topology, see the software configuration guide for your platform.

```
set system 770
set ppp authentication in chap
set ppp authentication out chap
set ppp secret client
cisco
cisco
set switch perm128                     ! Set 128-kbps, leased-line mode
cd lan
set ip address 192.168.221.13
set ip netmask 255.255.255.252
set ip routing on
set bridging off
cd
set user 7500
set ip address 0.0.0.0
set ip netmask 255.255.255.224
set ip routing on
set bridging off
set ip route des 0.0.0.0/0 ga 192.168.220.2 pr=on
set ppp secret host
cisco
cisco
reb
```

Note   This configuration sets the loop speed to 128 kbps; however, 56-, 64-, and 144-kbps speeds can also be supported. Consult the product documentation for the devices in your configuration (routers, terminal adapters, and so on) for specific information on supported options.

Configuring the Cisco 1004 or Cisco 1604 for PPP Operation

Following is a sample configuration file for the Cisco 1004 or Cisco 1604 in PPP mode.

Note The Cisco 1004 and Cisco 1604 support IDSL operation using software version 11.3 or later.

The settings that are relevant to the Cisco 90i configuration are shown in bold. For current information on what Cisco IOS configuration settings to use for your network topology, see the software configuration guide for your platform.

```
version 11.3
no service password-encryption
!
hostname 1004
username 7500 password cisco
!
enable password cisco
!
isdn switch-type basic-net3
isdn leased-line BRI0 128                      ! Set 128-kbps, leased-line mode
!
interface Ethernet0
 ip address 192.168.221.9 255.255.255.252
 no shutdown

interface BRI0
 ip unnumbered e0
 encapsulation ppp                             ! Set PPP line encapsulation
 no cdp enable
ppp authentication chap
!
no ip classless
ip route 0.0.0.0 0.0.0.0 192.168.220.2
ip route 192.168.220.0 255.255.255.0 192.168.220.2
!
line con 0
line vty 0 4
 password cisco
 login
!
end
```

Note This configuration sets the loop speed to 128 kbps; however, 56-, 64-, and 144-kbps speeds can also be supported. Consult the product documentation for the devices in your configuration (routers, terminal adapters, and so on) for specific information on supported options.

Configuring the Motorola BitSurfer Pro

The Motorola BitSurfer Pro currently only works with the Cisco 90i at 64 kbps in PPP leased-line mode.

Testing was done using the BitSurfer Pro at 64 kbps using either CHAP or PAP authentication.

An external BitSurfer Pro was used and connected to the serial port of a Windows 95 PC. An internal PC card version of the BitSurfer Pro is also available. Windows 95 dialup networking is used to make the call.

To configure the Motorola BitSurfer Pro, perform Tasks 1 and 2, and then select Task 3 (for CHAP authenication) or Task 4 (for PAP authentication).

Task 1: Install a New Modem Definition

To support the Motorola BitSurfer Pro and Windows 95 Dialup networking, a new modem definition has to be installed.

Step 1   Click **Start—>Settings—>Control Panel**.

Step 2   Click **Modems**.

Step 3   Modem Properties should appear. Click **Add**.

Step 4   Click **Don't detect my Modem, I will select it from a list**.

Step 5   When it asks for the modem type, select **Have Disk**.

Step 6   Install ISDN Surfer Setup disk 1. This has the BitSurfer Pro information for Windows 95.

Step 7   Click **BitSurfer PRO I**.

Step 8   Select the port to use with this modem.

Step 9   Click **Finish**.

Task 2: Configure the Modem for 64 kbps and PPP

To configure the Motorola BitSurfer for 64-kbps, leased-line and PPP, do the following:

Step 1   Use HyperTerminal to define the BitSurfer setup. Set HyperTerminal to a connect speed of 115200.

Step 2   To test if you are communicating with Motorola BitSurfer, type **AT**.

AT should display on the screen.

Step 3   Press **Enter**.

When the screen displays OK, you can proceed with defining the BitSurfer by entering the following commands as appropriate for your network.

Note   To use Motorola BitSurfer Pro terminal adapter, you need at least Revision K software. You can determine which version you are running by issuing the **ATI8** command. If you do not have Revision K, level, you need to upgrade the Motorola BifSurfer Pro software before proceeding.

```
AT>F ( Load factory switch parameters)
AT!C4=9 ( Set B1 provisioning to nailed up )
AT!C5=9 ( Set B2 provisioning to nailed up )
AT!D3=127 ( Disable TEI on data port )
AT*!D3=127 ( Disable TEI on POTS port 1 )
AT*2!D3=127 ( Disable TEI on POTS port 2 )
AT>W ( Save switch configuration to nonvol )
AT>Z ( Activate switch configuration )
```

Task 3: Make a Connection Using Windows 95 and PAP

To make a connection using Windows 95 and PAP, do the following:

Use Windows 95 dialup networking to make a connection. The BitSurfer defaults to PAP authentication. To make the connection, type **B1** as the phone number, this will start leased-line on one channel.

Step 1   Click **Dialup networking** and **Make a new connection**.

Step 2   Select a modem by clicking **Use BitSurfer Pro**. This modem should have already been installed.

Step 3   Enter the telephone number, **B1**.

Step 4   Click on your new dialup profile and use your username and password to connect.

Task 4: Make a Connection Using Windows 95 and CHAP

To make a connection using Windows 95 and CHAP, do the following:

Step 1   Click **Dialup networking** and **Make a new connection**.

Step 2   Select a modem by clicking **Use BitSurfer Pro**. This modem should have already been installed.

Step 3   Click on **configure, connections, and advanced**. In the "extra settings" field, type **@m2=c**.

Step 4   Enter the telephone number, **B1**.

Step 5   Click on your new dialup profile and use your username and password to connect.

Cisco Connection Online

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CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously: a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, and Internet e-mail, and it is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

- WWW: http://www.cisco.com

- WWW: http://www-europe.cisco.com

- WWW: http://www-china.cisco.com

- Telnet: cco.cisco.com

- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and connection rates up to 28.8 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact cco-help@cisco.com. For additional information, contact cco-team@cisco.com.

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