ProCurve Secure Router
(with 8xT1/E1 Wide Module)

Quick Configuration Guide **5991-2118** **April 2005**

ProCurve Networking
HP Innovation

Equipment Required

- A VT100 terminal or a PC with VT100 emulator software for connecting to the unit.
- Serial cable (5184-1894) supplied with the router. This console cable is used in other ProCurve switches such as the 5300xl series. The console port is a DB-9 DTE male connector.
- Appropriate cable(s) for connecting the system to the existing network.

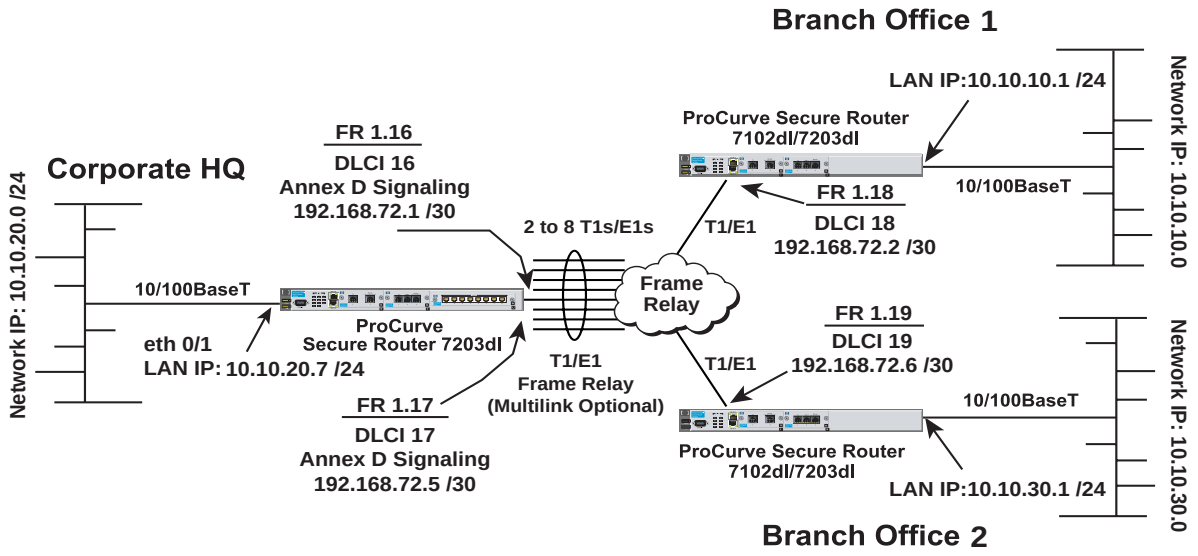
Note

This quick configuration guide provides step-by-step instructions for configuring your application. The configuration script is available at the end of this document.

*The configuration parameters used in the example outlined in this document are for instructional purposes only. Please replace all underlined entries (**example**) with your specific parameters to configure your application.*

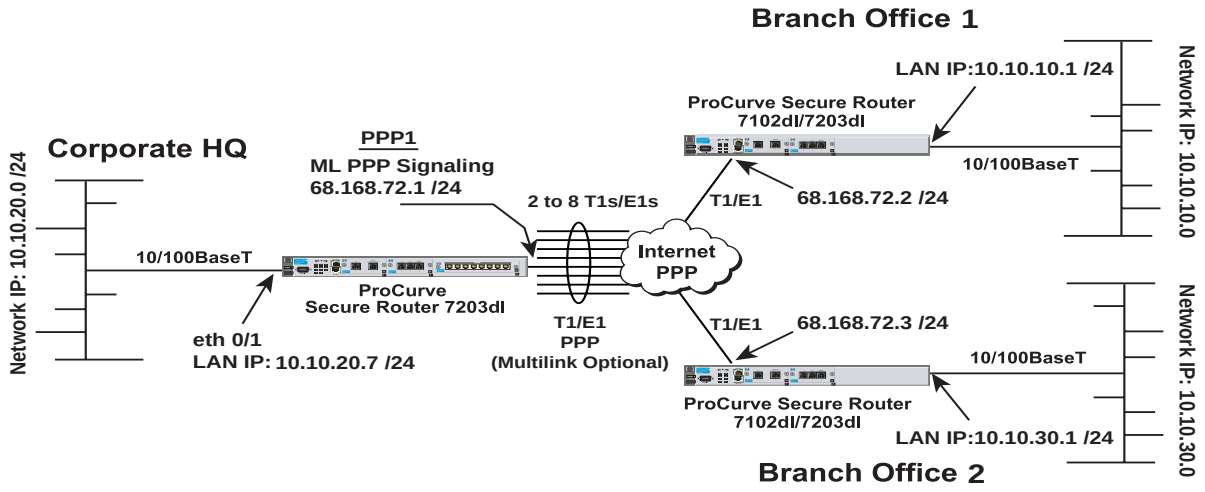
Network Diagrams

Frame Relay Diagram (Multilink Optional)



Network Diagrams (continued)

PPP Diagram (Multilink Optional)



Configure the Unit

The ProCurve Secure Router may be initially accessed and managed via a console session. Refer to *Initiate a Console Session* for console session instructions. Initiating a Telnet session requires using a hub and two Ethernet cables (one for the PC and one for the unit). Refer to *Configure Telnet Access* on page 10 to configure Telnet session settings.

Initiate a Console Session

1. Connect a VT100 terminal (or PC with VT100 emulation software) to the ProCurve Secure Router **Console** port using the serial cable supplied with your router.
2. Configure the COM port with the following parameters:
   - Data Rate: 9600
   - Data Bits: 8
   - Parity Bits: None
   - Stop Bits: 1
   - Flow Control: None
3. Open a VT100 terminal session. (Please refer to the appropriate VT100 terminal software documentation for detailed instructions.)
4. Press the **<Enter>** key.
5. Enter **enable** at the **>** prompt.
6. Enter the password when prompted or press **<Enter>** if you have not yet set a password.
7. You are now at the # prompt. At the # prompt, enter **config terminal** to enter the Global Configuration mode.

Configure the Ethernet Port Parameters

1. At the **(config)#** prompt, enter **interface eth 0/1** to access the configuration parameters for the Ethernet port located on the base unit.
2. Enter **ip address 10.10.20.7 255.255.255.0** to assign an IP address to the Ethernet port using a 24-bit subnet mask.

Note *If you are accessing the ProCurve Secure Router via Telnet, once you change this IP address, you will lose connection to the router. You must change the IP address of your PC before you can proceed.*

Note *ProCurve Networking recommends that you set the Ethernet speed and duplex to match the switch or hub it is plugged in to.*

For example: (config-eth 0/1)#**speed 10**

(config-eth 0/1)#**half-duplex**

3. Enter **no shutdown** to activate the interface to pass data.
4. Enter **exit** to exit the Ethernet interface commands and return to the Global Configuration mode.

Note *The ProCurve Secure Router interface modules use a* **slot/port** *notation for interface identification. All non-modular interfaces built into the base unit (e.g., the Ethernet port) are identified using* **0** *as the slot number.*

Configure the T1 Network Interfaces

Note *Repeat Configure the T1 Network Interfaces and Create the T1 Interface TDM Group on page 4 for all T1 network interfaces. Each interface must be configured individually.*

The following steps specifies the clock source for the T1 network interface. Skip to *Configure the E1 Network Interface* on page 4 for E1 applications.

1. At the **(config)#** prompt, enter **interface t1 3/1** to activate the interface configuration mode for the T1 network interface.
2. Enter **clock source line** to configure the router to recover clocking from the T1 network connection.

Note *If two routers are configured on a private T1 using PPP (as in the PPP diagram), one router must be configured for* **clock source internal** *to provide timing on the circuit and the other to* **clock source line***. Configuring the routers as such provides a single master clock on the point-to-point circuit and avoids timing issues. This only applies to circuits that do not contain timing sources from the provider. Frame Relay circuits inherently have a provided clock source, so all routers connected to the public Frame Relay network should be set to* **clock source line** *to recover clocking from the network source and avoid timing issues.*

Create the T1 Interface TDM Group

The following steps demonstrate configuring a T1 network interface with all timeslots (1 through 24) reserved for data.

1. At the **(config-t1 3/1)#** prompt, enter **tdm-group 1 timeslots 1-24** to create a TDM group for DS0s 1 through 24 on the T1 network connection (**t1 3/1**).
2. Enter **no shutdown** to activate the T1 interface.
3. Enter **exit** to return to the Global Configuration mode.

Configure the E1 Network Interface

Note *Repeat Configure the E1 Network Interface and Create the E1 Interface TDM Group for all E1 network interfaces. Each interface must be configured individually.*

1. At the **(config)#** prompt, enter **interface e1 3/1** to activate the interface configuration mode for the E1 network interface.
2. If necessary (this is the default), enter **clock source line** to configure the unit to recover clocking from the E1 network connection.

Note *If two routers are configured on a private E1 using PPP (as in the PPP diagram), one router must be configured for* **clock source internal** *to provide timing on the circuit and the other to* **clock source line***. Configuring the routers as such provides a single master clock on the point-to-point circuit and avoids timing issues. This only applies to circuits that do not contain timing sources from the provider. Frame Relay circuits inherently have a provided clock source, so all routers connected to the public Frame Relay network should be set to* **clock source line** *to recover clocking from the network source and avoid timing issues.*

Create the E1 Interface TDM Group

The following steps demonstrate configuring an E1 network interface with timeslots 1 through 31 for data.

1. At the **(config-e1 3/1)#** prompt, enter **framing crc4** to enable CRC-4 framing on the interface.
2. Enter **tdm-group 1 timeslots 1-31 speed 64** to create a TDM group for timeslots 1 through 31 on the E1 network connection (**e1 3/1**).

Note *Timeslot 0 is for synchronization, alarm transport, and international carrier use. It is not accessible for use for voice or data.*

3. Enter **no shutdown** to activate the interface.
4. Enter **exit** to return to the Global Configuration mode.

Configure the Frame Relay Virtual Interface

The following steps outline configuring a Frame Relay virtual interface (labeled 1) using a single DLCI back to the corporate router (defined as DLCI 16). Skip to *Configure the PPP Interface* on page 6 if you are using PPP.

1. At the **(config)#** prompt, enter **interface fr 1** to create a Frame Relay virtual interface labeled 1.
2. If the default setting of **ansi** was changed, enter **frame-relay lmi-type ansi** to configure Frame Relay virtual interface 1 to use ANSI (Annex D) signaling.

Note *If your application requires multilink Frame Relay functionality, complete step 3 to enable multilink on the Frame Relay interface. If multilink is not required, skip to step 4.*

3. Enter **frame-relay multilink** to enable the multilink interface.
4. Enter **no shutdown** to activate the virtual interface.
5. Enter **exit** to return to the Global Configuration mode.

Create the PVCs and Assign the IP Addresses

1. At the **(config)#** prompt, enter **interface fr 1.16** to create a PVC assigned to Frame Relay virtual interface 1 (for Branch Office 1). This activates the configuration parameters for the PVC. Your prompt should now display **(config-fr 1.16)#**.
2. Enter **frame-relay interface-dlci 16** to assign DLCI 16 to this PVC.
3. Enter **ip address 192.168.72.1 255.255.255.252** to assign an IP address of 192.168.72.1 for this PVC using a 30-bit subnet mask.
4. Enter **no shutdown** to activate the virtual interface.
5. Enter **exit** to return to the Global Configuration mode.
6. Enter **interface fr 1.17** to create a PVC assigned to Frame Relay virtual interface 1 (for Branch Office 2). This activates the configuration parameters for the PVC. Your prompt should now display **(config-fr 1.17)#**.
7. Enter **frame-relay interface-dlci 17** to assign DLCI 17 to this PVC.
8. Enter **ip address 192.168.72.5 255.255.255.252** to assign an IP address of 192.168.72.5 for this PVC using a 30-bit subnet mask.
9. Enter **no shutdown** to activate the virtual interface.
10. Enter **exit** to return to the Global Configuration mode.
11. If you are configuring the ProCurve Secure Router for use in a Frame Relay application and have completed this step, skip to *Bind the Interfaces* on page 6.

Note *The default encapsulation is RFC1490 or IETF. Assure the remote router uses the same encapsulation for Frame Relay.*

Configure the PPP Interface

The following steps show how to configure a PPP virtual interface (labeled 1) to the corporate router. Skip to *Bind the Interfaces* if you are using Frame Relay.

1. At the **(config)#** prompt, enter **interface ppp 1** to create a PPP virtual interface labeled 1.

Note *If your application requires multilink PPP functionality, complete step 2 to enable multilink on the PPP interface. If multilink is not required, skip to step 3.*

2. Enter **ppp multilink** to enable the multilink interface.
3. Enter **ip address 68.168.72.1 255.255.255.0** to assign an IP address to the PPP endpoint using a 24-bit mask.
4. Enter **no shutdown** to activate the virtual interface.
5. Enter **exit** to return to the Global Configuration mode.

Bind the Interfaces

Note *Repeat these steps for each network interface of the multilink bundle. You must bind each interface individually and each bind command must have a unique bind ID.*

In the following steps, replace **t1** *with* **e1** *if your application is E1.*

Note *Binding multiple TDM groups to the same interface is only valid in multilink operation.*

1. For Frame Relay applications, at the **(config)#** prompt, enter **bind 1 t1 3/1 1 frame-relay 1** to connect the first T1 network connection (**t1 3/1**) to the virtual multilink Frame Relay interface (**fr 1**).
2. Enter **bind 2 t1 3/2 1 frame-relay 1** to connect the second T1 network connection (**t1 3/2**) to the virtual multilink Frame Relay interface (**fr 1**).
3. Enter **bind 3 t1 3/3 1 frame-relay 1** to connect the third T1 network connection (**t1 3/3**) to the virtual multilink Frame Relay interface (**fr 1**).

or

1. For PPP applications, enter **bind 1 t1 3/1 1 ppp 1** to connect the first T1 network connection (**t1 3/1**) to the virtual multilink PPP interface (**ppp 1**).
2. Enter **bind 2 t1 3/2 1 ppp 1** to connect the second T1 network connection (**t1 3/2**) to the virtual multilink PPP interface (**ppp 1**).
3. Enter **bind 3 t1 3/3 1 ppp 1** to connect the third T1 network connection (**t1 3/3**) to the virtual multilink PPP interface (**ppp 1**).

Configure Static Routes

Routes may be assigned either statically or dynamically. Continue with this section to create a static route. Refer to *Configure Dynamic Routes* on page 8 for information on configuring RIP and OSPF dynamic route assignments.

Note *These examples are based on the network diagrams on pages 1 and 2.*

Depending on your network setup, configure static routing on your unit in one of the following ways.

Configuration for Corporate HQ router in the diagram on page 1 (Frame Relay)

1. At the **(config)#** prompt, enter **ip route 10.10.10.0 255.255.255.0 frame-relay 1.16** to set up the static route to Branch Office 1.
2. Enter **ip route 10.10.30.0 255.255.255.0 frame-relay 1.17** to set up the static route to Branch Office 2.
3. Enter **ip route 0.0.0.0 0.0.0.0 10.10.20.x** (i.e., address of internet router) to set up the default route for local internet.

Configuration for Corporate HQ router in the diagram on page 2 (PPP)

1. At the **(config)#** prompt, enter **ip route 10.10.10.0 255.255.255.0 ppp 1** to set up the static route to Branch Office 1.
2. Enter **ip route 10.10.30.0 255.255.255.0 ppp 1** to set up the static route to Branch Office 2.
3. Enter **ip route 0.0.0.0 0.0.0.0 10.10.20.x** (i.e., address of internet router) to set up the default route.

Configuration for Branch Office 1 router in the diagram on page 1 (Frame Relay)

1. At the **(config)#** prompt, enter **ip route 0.0.0.0 0.0.0.0 frame-relay 1.18** to set up the default route to the Corporate HQ.
2. The internet router at the far side (Corporate HQ) will need a route statement to send traffic back to this network through the ProCurve Secure Router. The information (based on the diagram shown at the beginning of this document) is as follows:
   - Destination address: 10.10.10.0 (Branch Office 1 LAN)
   - Subnet mask: 255.255.255.0
   - Gateway: 10.10.20.7 (Corporate HQ 7203dl's LAN IP)

Configuration for Branch Office 1 router in the diagram on page 2 (PPP)

1. At the **(config)#** prompt, enter **ip route 0.0.0.0 0.0.0.0 ppp 1** to set up the default route to the Corporate HQ.
2. The internet router at the far side (Corporate HQ) will need a route statement to send traffic back to this network through the ProCurve Secure Router. The information (based on the diagram shown at the beginning of this document) is as follows:
   - Destination address: 10.10.10.0 (Branch Office 1 LAN)
   - Subnet mask: 255.255.255.0
   - Gateway: 10.10.20.7 (Corporate HQ 7203dl's LAN IP)

Configuration for Branch Office 2 router in the diagram on page 1 (Frame Relay)

1. At the **(config)#** prompt, enter **ip route 0.0.0.0 0.0.0.0 frame-relay 1.19** to set up the default route to the Corporate HQ.
2. The internet router at the far side (Corporate HQ) will need a route statement to send traffic back to this network through the ProCurve Secure Router. The information (based on the diagram shown at the beginning of this document) is as follows:
   - Destination address: 10.10.30.0 (Branch Office 2 LAN)
   - Subnet mask: 255.255.255.0
   - Gateway: 10.10.20.7 (Corporate HQ 7203dl's LAN IP)

Configuration for Branch Office 2 router in the diagram on page 2 (PPP)

1. At the **(config)#** prompt, enter **ip route 0.0.0.0 0.0.0.0 ppp 1** to set up the default route to the Corporate HQ.
2. The internet router at the far side (Corporate HQ) will need a route statement to send traffic back to this network through the ProCurve Secure Router. The information (based on the diagram shown at the beginning of this document) is as follows:
   - Destination address: 10.10.30.0 (Branch Office 1 LAN)
   - Subnet mask: 255.255.255.0
   - Gateway: 10.10.20.7 (Corporate HQ 7203dl's LAN IP)

Configure Dynamic Routes

Scenario 1: Dynamic Routing via OSPF

Configuration for Frame Relay diagram on page 1

1. At the **(config)#** prompt, enter **router ospf** to activate the OSPF configuration mode. Your prompt should now display **(config-ospf)#.**
2. Specify the networks:

   Corporate HQ Router
   (config-ospf)#**network 10.10.20.0 0.0.0.255 area 0** (for eth 0/1 LAN)
   (config-ospf)#**network 192.168.72.0 0.0.0.3 area 0** (for FR 1.16)
   (config-ospf)#**network 192.168.72.4 0.0.0.3 area 0** (for FR 1.17)

   Branch Office 1 Router
   (config-ospf)#**network 10.10.10.0 0.0.0.255 area 0** (for eth 0/1 LAN)
   (config-ospf)#**network 192.168.72.0 0.0.0.3 area 0** (for FR 1.18)

   Branch Office 2 Router
   (config-ospf)#**network 10.10.30.0 0.0.0.255 area 0** (for eth 0/1 LAN)
   (config-ospf)#**network 192.168.72.4 0.0.0.3 area 0** (for FR 1.19)

3. Enter **exit** to return to the Global Configuration mode.

Configuration for PPP diagram on page 2

1. At the **(config)#** prompt, enter **router ospf** to activate the OSPF configuration mode. Your prompt should now display **(config-ospf)#.**
2. Specify the networks:

   Corporate HQ Router
   (config-ospf)#**network 10.10.20.0 0.0.0.255 area 0** (for eth 0/1 LAN)
   (config-ospf)#**network 68.168.72.0 0.0.0.255 area 0** (for PPP 1)

   Branch Office 1 Router
   (config-ospf)#**network 10.10.10.0 0.0.0.255 area 0** (for eth 0/1 LAN)
   (config-ospf)#**network 68.168.72.0 0.0.0.255 area 0** (for PPP 1)

   Branch Office 2 Router
   (config-ospf)#**network 10.10.30.0 0.0.0.255 area 0** (for eth 0/1 LAN)
   (config-ospf)#**network 68.168.72.0 0.0.0.255 area 0** (for PPP 1)

3. Enter **exit** to return to the Global Configuration mode.

Scenario 2: Dynamic Routing via RIP

Configuration for Frame Relay diagram on page 1

1. At the **(config)#** prompt, enter **router rip** to activate the RIP configuration mode. Your prompt should now display **(config-rip)#**.
2. Enter **version 2** to globally define RIP version 2 on all interfaces.
3. Specify the networks:

   Corporate HQ Router
   (config-rip)#**network 10.10.20.0 255.255.255.0** (for eth 0/1 LAN)
   (config-rip)#**network 192.168.72.0 255.255.255.252** (for FR 1.16)
   (config-rip)#**network 192.168.72.4 255.255.255.252** (for FR 1.17)

   Branch Office 1 Router
   (config-rip)#**network 10.10.10.0 255.255.255.0** (for eth 0/1 LAN)
   (config-rip)#**network 192.168.72.0 255.255.255.252** (for FR 1.18)

   Branch Office 2 Router
   (config-rip)#**network 10.10.30.0 255.255.255.0** (for eth 0/1 LAN)
   (config-rip)#**network 192.168.72.4 255.255.255.252** (for FR 1.19)

4. Enter **exit** to return to the Global Configuration mode.

Configuration for PPP diagram on page 1

1. At the **(config)#** prompt, enter **router rip** to activate the RIP configuration mode. Your prompt should now display **(config-rip)#**.
2. Enter **version 2** to globally define RIP version 2 on all interfaces.
3. Specify the networks:

   Corporate HQ Router
   (config-rip)#**network 10.10.20.0 255.255.255.0** (for eth 0/1 LAN)
   (config-rip)#**network 68.168.72.0 255.255.255.0** (for PPP 1)

Branch Office 1 Router
(config-rip)#**network 10.10.10.0 255.255.255.0** (for eth 0/1)
(config-rip)#**network 68.168.72.0 255.255.255.0** (for PPP 1)

Branch Office 2 Router
(config-rip)#**network 10.10.30.0 255.255.255.0** (for eth 0/1)
(config-rip)#**network 68.168.72.4 255.255.255.252** (for PPP 1)

4. Enter **exit** to return to the Global Configuration mode.

Set Enable Security Mode Password

1. Verify that the prompt of your unit displays **(config)#**.
2. Enter **enable password word** to set the Enable Security mode password.

   or

3. Enter **enable password md5 word** to encrypt the enable password using MD5 encryption.

Note *The Enable Security mode passwords are case sensitive.*

Configure Telnet Access

The following steps show how to access the Telnet configuration parameters and change the password. For this example, replace the underlined **word** with a password of your choosing. The ProCurve Secure Router supports five Telnet sessions (0 through 4).

1. Verify that the prompt of your unit displays **(config)#**.
2. Enter **line telnet 0 4** to change the configuration parameters for the Telnet session. Your prompt should now display **(config-telnet-0-4)#**.
3. Enter **password word** to change the login password for the Telnet session.
4. Enter **exit** to return to the Global Configuration mode.

Note *An Enable Security mode password and the Ethernet port parameters must be defined before configured Telnet sessions are activated. Refer to Configure the Ethernet Port Parameters on page 3 and Set Enable Security Mode Password on page 10 for more information.*

Save the Configuration

1. Verify that the prompt of your unit displays **(config)#**.
2. Enter **exit** to leave configuration mode.
3. Enter **copy running-config startup-config** to save the current configuration to memory. This command may be abbreviated as **copy run start**.
4. Enter **exit** to close the configuration session.

Complete the Installation

The ProCurve Secure Router is now configured and operational. Complete the installation by connecting the appropriate cables to the T1 and Ethernet networks. Please refer to the ProCurve Secure Router *Installation Guide* for more details on pinouts and cabling.

Script for this Example

Note *The scripts below contains ALL configuration parameters for each part of this example and cannot be used in their entirety. Each section is divided by a row of symbols (*). Use only the sections that pertain to your application. (For example, if your application is Frame Relay, do not use the PPP sections.)*

```
!*****************************************************************************************************!
! Corporate Headquarter Router Script
!*****************************************************************************************************!
! This is a sample script to configure the 8xT1/E1 Wide Module for the Corporate
! Headquarter Router in the diagrams on page 1 and page 2.
!
! Enter the enable mode.
enable
!
! Enter the global configuration mode.
config terminal
!
! ETHERNET INTERFACE CONFIGURATION
!*************************************************************!
! Enter the ethernet interface configuration mode.
interface eth 0/1
!
! Assign the ethernet port an IP address.
ip address 10.10.20.7 255.255.255.0
!
! Activate the interface to pass data.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
! 1ST T1 INTERFACE CONFIGURATION
!*************************************************************!
! Enter the T1 interface configuration mode for the first
! T1 interface.
interface t1 3/1
!
! Configure the t1 interface to recover clocking from the T1
! network connection.
clock source line
!
```

```
! Create a TDM group (labeled 1) on the T1 interface containing
! all 24 DS0s (1-24).
tdm group 1 timeslots 1-24
!
! Activate the interface.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
! 2ND T1 INTERFACE CONFIGURATION
!*************************************************************************!
! Enter the interface configuration mode for the second T1
! interface.
interface t1 3/2
!
! Configure the t1 interface to recover clocking from the T1
! network connection.
clock source line
!
! Create a tdm group (labeled 1) on the T1 interface containing
! all 24 DS0s (1-24).
tdm group 1 timeslots 1-24
!
! Activate the interface.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
! 1ST E1 INTERFACE CONFIGURATION
!*************************************************************!
! Enter the E1 interface configuration mode for the first
! E1 interface.
interface e1 3/1
!
! Configure the e1 interface to recover clocking from the E1
! network connection.
clock source line
!
! Enable CRC-4 framing on the interface.
framing crc4
!
! Create a TDM group (labeled 1) on the E1 interface containing
! timeslots 1 through 31 (1-31).
tdm group 1 timeslots 1-31
!
! Activate the interface.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
```

```
! 2ND E1 INTERFACE CONFIGURATION
!*************************************************************************!
! Enter the interface configuration mode for the second E1
! interface.
interface e1 3/2
!
! Configure the e1 interface to recover clocking from the E1
! network connection.
clock source line
!
! Enable CRC-4 framing on the interface
framing crc4
!
! Create a tdm group (labeled 1) on the E1 interface containing
! timeslots 1 through 31 (1-31).
tdm group 1 timeslots 1-31
!
! Activate the interface.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
! FRAME RELAY VIRTUAL INTERFACE CONFIGURATION
!*****************************************************************************************!
! Create a Frame Relay virtual interface (labeled 1) and
! enter the Frame Relay interface configuration mode.
interface fr 1
!
! Your prompt should now display (config-fr1)#.
!
! Set the signaling mode.
frame-relay lmi-type ansi
!
! (Optional) Enable multilink on the interface.
frame-relay multilink
!
! Activate the interface.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
! PVC CONFIGURATION (fr 1.16 and fr 1.17)
!*************************************************************!
! Create Frame Relay PVCs (with DLCI 16 and 17) under Frame Relay
! virtual interface 1.
interface fr 1.16
!
! Your prompt should now display Router(config-fr1.16)#.
!
```

```
! Now assign DLCI 16 to the pvc.
frame-relay interface-dlci 16
!
! Next, assign an IP address to this pvc.
ip address 192.168.72.1 255.255.255.252
!
! Activate the interface.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
interface fr 1.17
!
! Your prompt should now display Router(config-fr1.17)#.
!
! Now assign DLCI 17 to the pvc.
frame-relay interface-dlci 17
!
! Next, assign an IP address to this pvc.
ip address 192.168.72.5 255.255.255.252
!
! Activate the interface.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
! PPP VIRTUAL INTERFACE CONFIGURATION
!*****************************************************************************!
! Create a PPP virtual interface (labeled 1) and enter the
! PPP configuration mode.
!
! Your prompt should now display (config-ppp1)#.
!
! (Optional) Enable multilink operation on this interface.
ppp multilink
!
! Assign an IP address to the interface using a 24-bit mask.
ip address 68.168.72.1 255.255.255.0
!
! Activate the interface to pass data.
no shutdown
!
! Exit back to the global configuration mode
exit
!
```

```
! BINDING THE INTERFACES - FRAME RELAY
!*************************************************************!
! Connect the tdm group (1) on the first t1 interface to the
! virtual multilink Frame Relay interface (fr 1).
!
bind 1 t1 1/1  1 frame-relay 1
!
! (Multilink Only) Connect the tdm group (1) on the second t1 interface to the
! virtual multilink Frame Relay interface (fr 1).
!
bind 2 t1 1/2  1 frame-relay 1
!
! BINDING THE INTERFACES - PPP
!*************************************************************!
! Connect the tdm group (1) on the first t1 interface  to the
! virtual multilink PPP interface (ppp 1).
!
bind 1 t1 1/1 1 ppp 1
!
! (Multilink Only) Connect the tdm group (1) on the second t1 interface  to the
! virtual multilink PPP interface (ppp 1).
!
bind 2 t1 1/2 1 ppp 1
!
! CONFIGURING STATIC ROUTES - CORP HQ ROUTER - DEFAULT ROUTE
!*****************************************************************************************!
! Configures the default gateway to the internet router.
!
! Enter the default gateway ip address to the route table.
! This is the address of the internet router.
ip route 0.0.0.0 0.0.0.0 10.10.20.x
!
! CONFIGURING THE STATIC ROUTES - CORP HQ ROUTER - FRAME RELAY
!*****************************************************************************************!
! Enter the static route to the branch office 1 through the virtual Frame Relay
!interface (fr 1.16).
ip route 10.10.10.0 255.255.255.0 fr 1.16
!
! Enter the static route to the branch office 2 through the virtual Frame Relay
!interface (fr 1.17).
ip route 10.10.30.0 255.255.255.0 fr 1.17
!
! CONFIGURING THE STATIC ROUTES - CORP HQ ROUTER - PPP
!*****************************************************************************************!
! Enter the static route to the branch office 1 through the
! virtual PPP interface (ppp 1).
ip route 10.10.10.0 255.255.255.0 ppp 1
!
! Enter the static route to the branch office 2 through the
! virtual PPP interface (ppp 1).
ip route 10.10.30.0 255.255.255.0 ppp 1
!
```

```
! CONFIGURING DYNAMIC ROUTES VIA OSPF - CORP HQ - FRAME RELAY
!*********************************************************************************************!
! Enter the OSPF configuration mode.
router ospf
!
! Your prompt should now display (config-ospf)#.
!
! Specify the networks.
network 10.10.20.0 0.0.0.255 area 0
network 192.168.72.0 0.0.0.3 area 0
network 192.168.72.4 0.0.0.4 area 0
!
! Exit back to the global configuration mode.
exit
!
! CONFIGURING DYNAMIC ROUTES VIA OSPF - CORP HQ - PPP
!*********************************************************************************!
! Enter the OSPF configuration mode.
router ospf
!
! Your prompt should now display (config-ospf)#.
!
! Specify the networks.
network 10.10.20.0 0.0.0.255 area 0
network 68.168.72.0 0.0.0.255 area 0
!
! Exit back to the global configuration mode.
exit
!
! CONFIGURING DYNAMIC ROUTES VIA RIP - CORPORATE HQ - FRAME RELAY
!*****************************************************************************************************!
! Enter the RIP configuration mode.
router rip
!
! Your prompt should now display (config-rip)#.
!
! Define RIP version 2.
version 2
!
! Specify the networks.
network 10.10.20.0 255.255.255.0
network 192.168.72.0 255.255.255.252
network 192.168.72.4 255.255.255.252
!
! Exit back to the global configuration mode.
exit
!
! CONFIGURING DYNAMIC ROUTES VIA RIP - CORPORATE HQ - PPP
!*********************************************************************************!
! Enter the RIP configuration mode.
router rip
!
! Your prompt should now display (config-rip)#.
```

```
!
! Define RIP version 2.
version 2
!
! Specify the networks.
network 10.10.20.0 255.255.255.0
network 68.168.72.0 255.255.255.0
!
! Exit back to the global configuration mode.
exit
!
! ENABLE THE SECURITY MODE PASSWORD
!*****************************************************************!
! Activate the enable password.
enable password WORD
!
! ENABLE THE SECURITY MODE PASSWORD USING MD5
!*************************************************************************!
! Activate the enable password using MD5 encryption.
enable password md5 WORD
!
! CONFIGURE TELNET ACCESS
!*****************************************************************!
! Enter the Telnet configuration mode.
line telnet 0 4
!
! Your prompt should now display (config-telnet-0-4)#.
!
! Change the Telnet password.
password WORD
!
! Exit back to the global configuration mode.
exit
!
! SAVE THE CONFIGURATION
!*****************************************************************!
! Exit the global configuration mode.
exit
!
! Your prompt should now display Router>.
!
! Save the current configuration to memory.
copy running-config startup-config
!
! Exit to close the configuration session.
exit
!
! End script
```

```
!*****************************************************************************************************!
! Branch Office Router Script
!*****************************************************************************************************!
! This is a sample script to configure the 8xT1/E1 Wide Module for the Branch
! Office 1 Router in the diagrams on page 1 and page 2. The following script can be
! used for the Branch Office 2 Router configuration by changing the appropriate IP
! addresses.
!
! Enter the enable mode.
enable
!
! Enter the global configuration mode.
config terminal
!
! ETHERNET INTERFACE CONFIGURATION
!*************************************************************!
! Enter the ethernet interface configuration mode.
interface eth 0/1
!
! Assign the ethernet port an IP address.
ip address 10.10.10.1 255.255.255.0
!
! Activate the interface to pass data.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
! T1 INTERFACE CONFIGURATION
!*************************************************************!
! Enter the T1 interface configuration mode.
interface t1 1/1
!
! Configure the t1 interface to recover clocking from the T1
! network connection.
clock source line
!
! Create a tdm group (labeled 1) on the T1 interface containing
! all 24 DS0s (1-24).
tdm group 1 timeslots 1-24
!
! Activate the interface to pass data.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
```

```
! E1 INTERFACE CONFIGURATION
!*************************************************************!
! Enter the E1 interface configuration mode.
interface e1 1/1
!
! Configure the e1 interface to recover clocking from the E1
! network connection.
clock source line
!
! Enable CRC-4 framing on the interface.
framing crc4
!
! Create a tdm group (labeled 1) on the E1 interface containing
! timeslots 1 through 31 (1-31).
tdm group 1 timeslots 1-31
!
! Activate the interface to pass data.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
! FRAME RELAY VIRTUAL INTERFACE CONFIGURATION
!*****************************************************************************************!
! Create a Frame Relay virtual interface (labeled 1) and
! enter the Frame Relay interface configuration mode.
interface fr 1
!
! Your prompt should now display (config-fr1)#.
!
! Set the signaling mode.
frame-relay lmi-type ansi
!
! Activate the interface.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
! PVC CONFIGURATION (fr 1.18)
!*************************************************************!
! Create Frame Relay PVC (with DLCI 18) under Frame Relay
! virtual interface 1.
interface fr 1.18
!
! Your prompt should now display Router(config-fr1.18)#.
!
! Now assign DLCI 18 to the pvc.
frame-relay interface-dlci 18
!
! Next, assign an IP address to this pvc.
ip address 192.168.72.2 255.255.255.252
```

```
!
! Activate the interface.
no shutdown
!
! Exit back to the global configuration mode.
exit
!
! PPP VIRTUAL INTERFACE CONFIGURATION
!*****************************************************************************!
! Create a PPP virtual interface (labeled 1) and enter the
! PPP configuration mode.
!
! Your prompt should now display (config-ppp1)#.
!
! Assign an IP address to the interface using a 30-bit mask.
ip address 68.168.72.2 255.255.255.252
!
! Activate the interface.
no shutdown
!
! Exit back to the global configuration mode
exit
!
! BINDING THE INTERFACES - FRAME RELAY
!*************************************************************!
! Connect the TDM group (1) on the t1 interface to the
! virtual Frame Relay interface (fr 1).
!
bind 1 t1 1/1  1 frame-relay 1
!
! BINDING THE INTERFACES - PPP
!*************************************************************!
! Connect the TDM group (1) on the t1 interface to the
! virtual PPP interface (ppp 1).
!
bind 1 t1 1/1 1 ppp 1
!
! CONFIGURING THE STATIC ROUTES - BRANCH OFFICE 1 - FRAME RELAY
!*****************************************************************************************************!
! Enter the static route back to the Corp HQ router through the
! virtual Frame Relay interface (fr 1.18).
ip route 0.0.0.0 0.0.0.0 fr 1.18
!
! CONFIGURING THE STATIC ROUTES - BRANCH OFFICE 1 - PPP
!*****************************************************************************************!
! Enter the static route back to the Corp HQ router through the
! virtual ppp interface (ppp 1).
ip route 0.0.0.0 0.0.0.0 ppp 1
!
```

```
! CONFIGURING DYNAMIC ROUTES VIA OSPF - BRANCH OFFICE 1 - FRAME RELAY
!*********************************************************************************************************!
! Enter the OSPF configuration mode.
router ospf
!
! Your prompt should now display (config-ospf)#.
!
! Specify the networks.
network 10.10.10.0 0.0.0.255 area 0
network 192.168.72.0 0.0.0.3 area 0
!
! Exit back to the global configuration mode.
exit
!
! CONFIGURING DYNAMIC ROUTES VIA OSPF - BRANCH OFFICE 1 - PPP
!*********************************************************************************************************!
! Enter the OSPF configuration mode.
router ospf
!
! Your prompt should now display (config-ospf)#.
!
! Specify the networks.
network 10.10.10.0 0.0.0.255 area 0
network 68.168.72.0 0.0.0.255 area 0
!
! Exit back to the global configuration mode.
exit
!
! CONFIGURING DYNAMIC ROUTES VIA RIP - BRANCH OFFICE 1 - FRAME RELAY
!*********************************************************************************************************!
! Enter the RIP configuration mode.
router rip
!
! Your prompt should now display (config-rip)#.
!
! Define RIP version 2.
version 2
!
! Specify the networks.
network 10.10.10.0 255.255.255.0
network 192.168.72.0 255.255.255.252
!
! Exit back to the global configuration mode.
exit
!
! CONFIGURING DYNAMIC ROUTES VIA RIP - BRANCH OFFICE 1 - PPP
!*********************************************************************************************************!
! Enter the RIP configuration mode.
router rip
!
! Your prompt should now display (config-rip)#.
!
```

```
! Define RIP version 2.
version 2
!
! Specify the networks.
network 10.10.10.0 255.255.255.0
network 68.168.72.0 255.255.255.0
!
! Exit back to the global configuration mode.
exit
!
! ENABLE THE SECURITY MODE PASSWORD
!*****************************************************************!
! Activate the enable password.
enable password WORD
!
! ENABLE THE SECURITY MODE PASSWORD USING MD5
!*****************************************************************************!
! Activate the enable password using MD5 encryption.
enable password md5 WORD
!
! CONFIGURE TELNET ACCESS
!*****************************************************************!
! Enter the Telnet configuration mode.
line telnet 0 4
!
! Your prompt should now display (config-telnet-0-4)#.
!
! Change the Telnet password.
password WORD
!
! Exit back to the global configuration mode.
exit
!
! SAVE THE CONFIGURATION
!*****************************************************************!
! Exit the global configuration mode.
exit
!
! Your prompt should now display Router>.
!
! Save the current configuration to memory.
copy running-config startup-config
!
! Exit to close the configuration session.
exit
!
! End script
```