



Set Up Your Cisco Router

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Step 7: Set Up a T1, E1, or Serial WAN Connection

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Introduction

This document explains how to set up a T1, E1, or serial WAN connection on your router.

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Requirements

- You must have completed the [Configure Your Router with Security Device Manager](#) document.
- You must have completed the [Site Survey](#), which includes the Internet worksheet for the router.
- A WAN Interface Card (WIC). If you do not have a WIC card or need assistance to install a new WIC, contact the [SMB Technical Assistance Center \(SMB TAC\)](#).

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Verify Encapsulation Type

In order to configure your WAN Connection, you need to verify the encapsulation that the connection uses.

Consult the Internet Worksheet to determine the encapsulation type that your WAN connection will use (A22). Then select the appropriate section to configure your connection:

- If your connection uses HDLC encapsulation, see [Set Up a Connection with HDLC Encapsulation](#).
- If your connection uses PPP encapsulation, see [Set Up a Connection with PPP Encapsulation](#).
- If your connection uses Frame Relay encapsulation, see [Set Up a Connection with Frame Relay Encapsulation](#).

Note: If you have a Fractional T1 connection that uses fewer than 24 channels, contact [SMB Technical Assistance Center \(SMB TAC\)](#) for assistance.

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Configure Your WAN Connection

To configure your WAN connection, follow these steps:

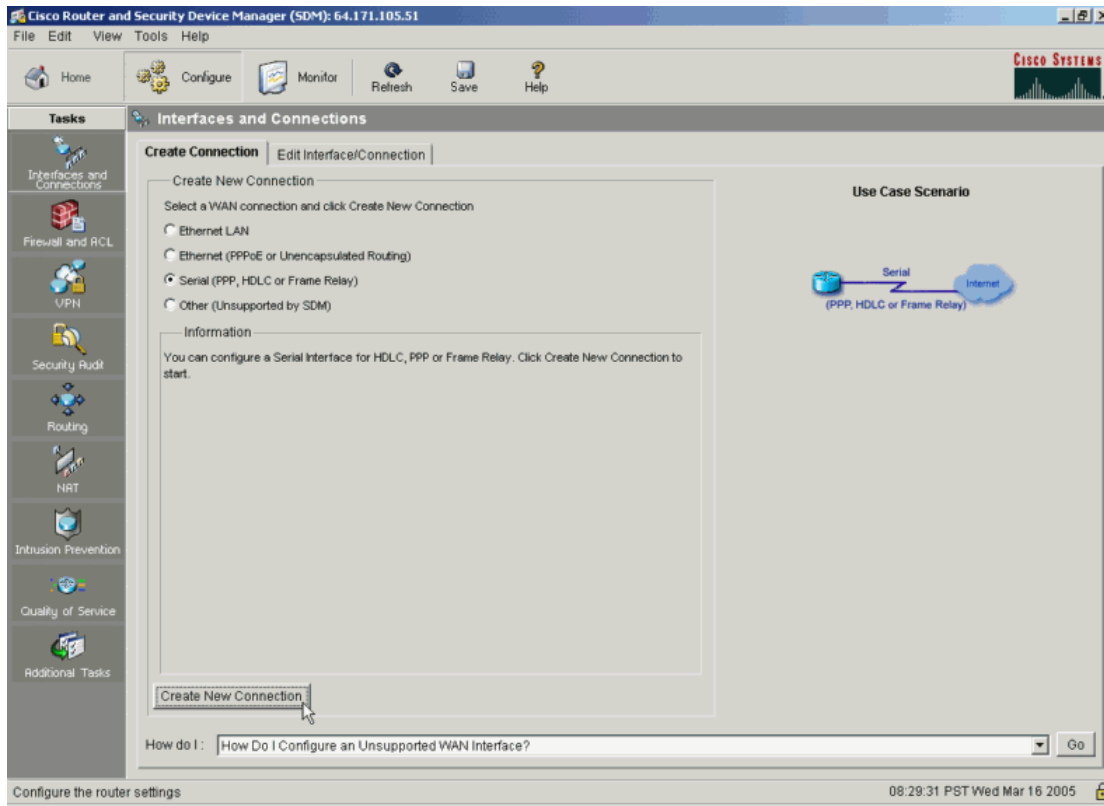
Set Up a Connection with HDLC Encapsulation

To set up a T1 connection with HDLC encapsulation, follow these steps:

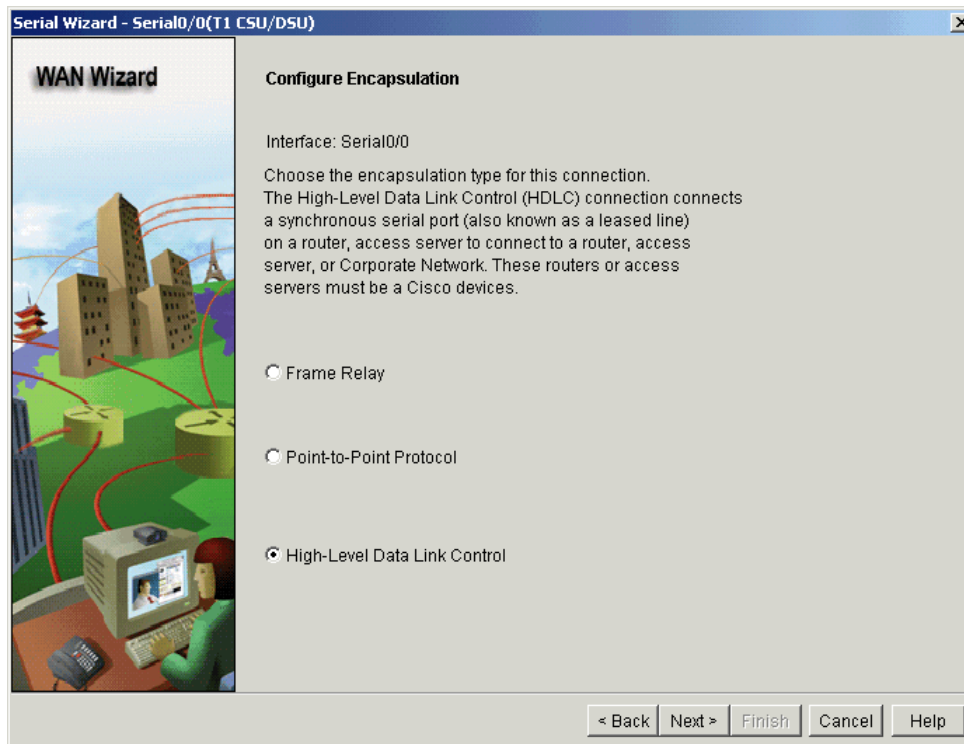
1. Enter the IP address of your router in a browser window to open Security Device Manager (SDM). For more information about how to launch SDM, refer

to the [Configure your Router with Security Device Manager](#) document.

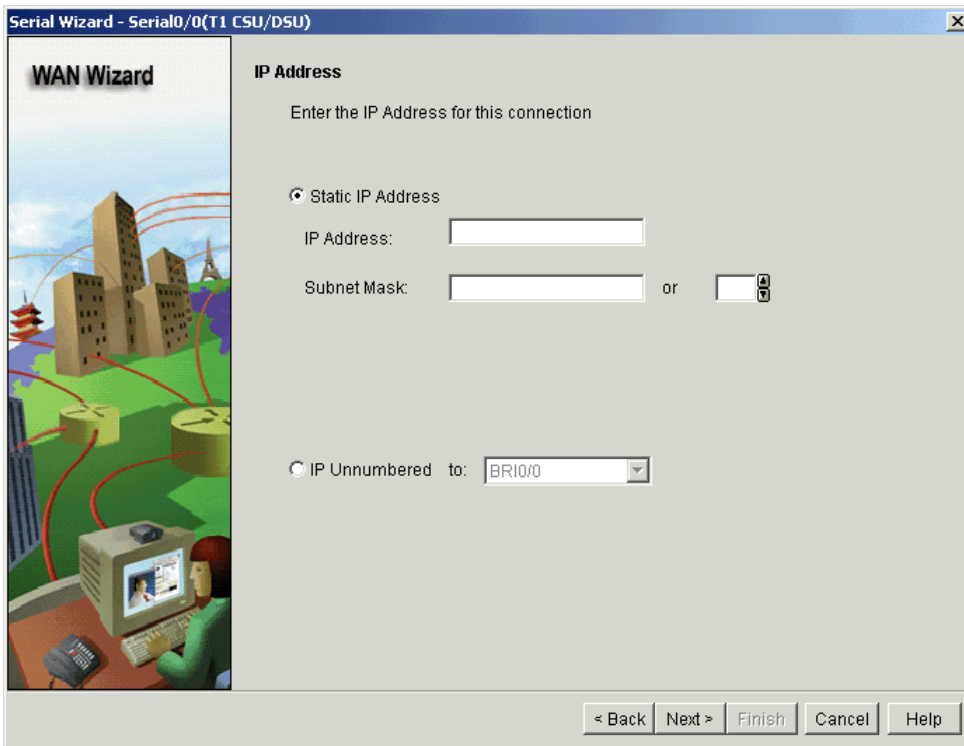
2. Click **Configure > Interfaces and Connections**.
3. Choose **Serial (PPP, HDLC, or Frame Relay)** and click **Create New Connection**.



4. Click **Next** at the **Welcome to the Serial WAN Configuration Wizard** screen.
5. Choose **High-Level Data Link Control** and click **Next**.

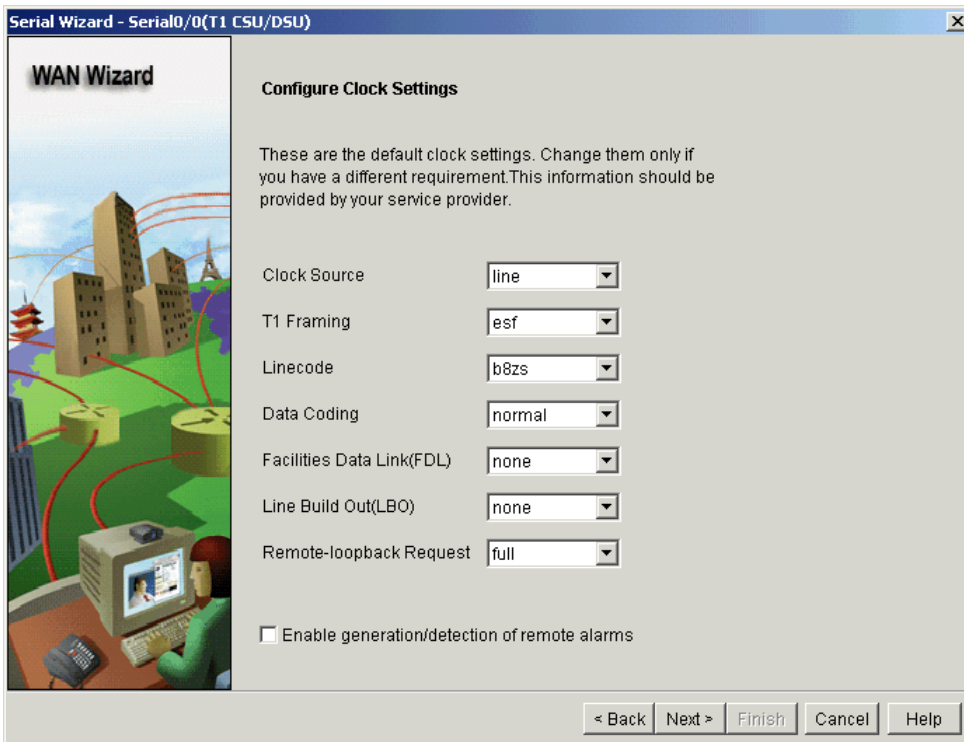


6. If you have a WAN connection with a static IP address, enter the router IP address and subnet mask that you entered in the Internet Worksheet (B46, B41). If you have a WAN connection that is unnumbered, choose **IP Unnumbered** and select the first available LAN interface such as Ethernet0, FastEthernet0 or FastEthernet0/0.



7. Choose these clock settings:

- o **Clock Source:** Choose **line** unless your Internet Service Provider (ISP) recommends a different setting.
- o **T1 Framing:** Enter the value you entered in the Internet Worksheet (A21).
- o **Linecode:** Enter the value you entered in the Internet Worksheet (A20).
- o **Data Coding:** Choose **normal** unless your ISP recommends a different setting.
- o **Facilities Data Link(FDL):** Choose **none** unless your ISP recommends a different setting.
- o **Line Build Out(LBO):** Choose **none** unless your ISP recommends a different setting.
- o **Remote-loopback Request:** Choose **full** unless your ISP recommends a different setting.



8. Review the configuration in the **Summary** screen and click **Finish**.

9. The **Commands Delivery Status** screen appears. Click **OK** to confirm.

10. Click **Save** to save your new configuration.



11. Click **File > Exit** to exit SDM.

[t1-sdmwan21.gif](#)

Set Up a Connection with PPP Encapsulation

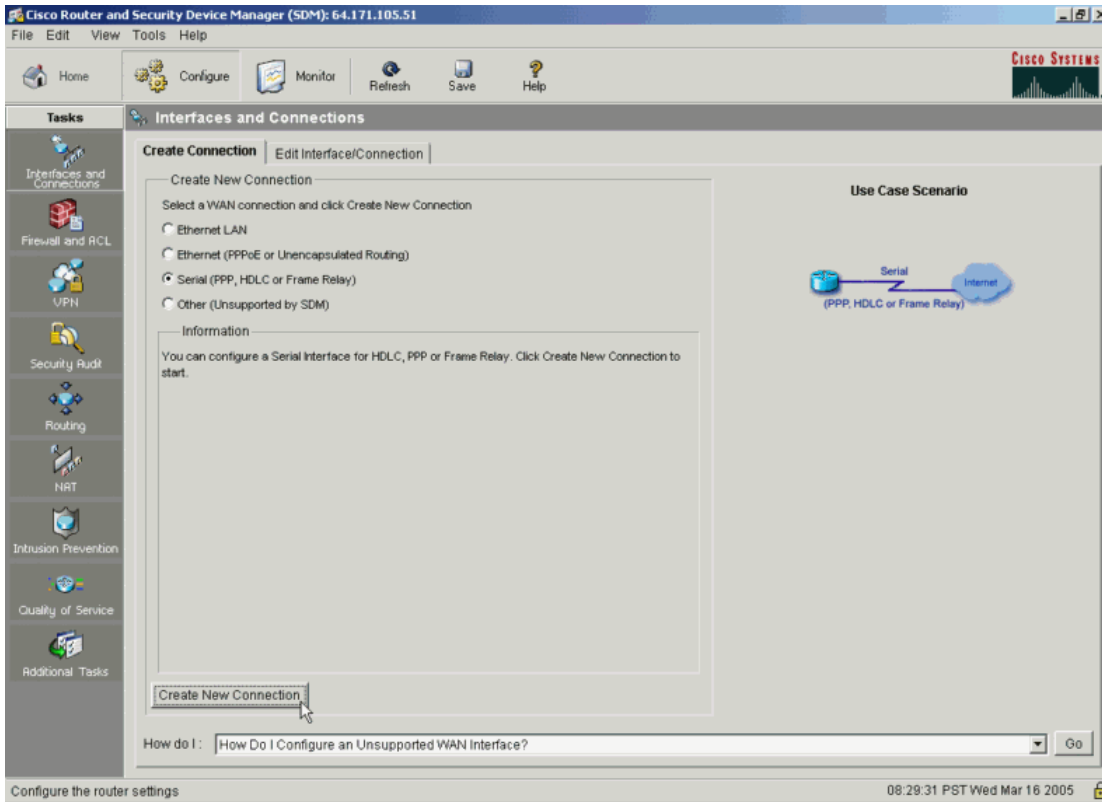
To set up a T1 connection with HDLC encapsulation, follow these steps:

- Encapsulation (Y/N)

- Encapsulation type

(A22)

1. Enter the IP address of your router in a browser window to open Security Device Manager (SDM). For more information about how to launch SDM, refer to the [Configure your Router with Security Device Manager](#) document.
2. Click **Configure > Interfaces and Connections**.
3. Choose **Serial (PPP, HDLC, or Frame Relay)** and click **Create New Connection**.

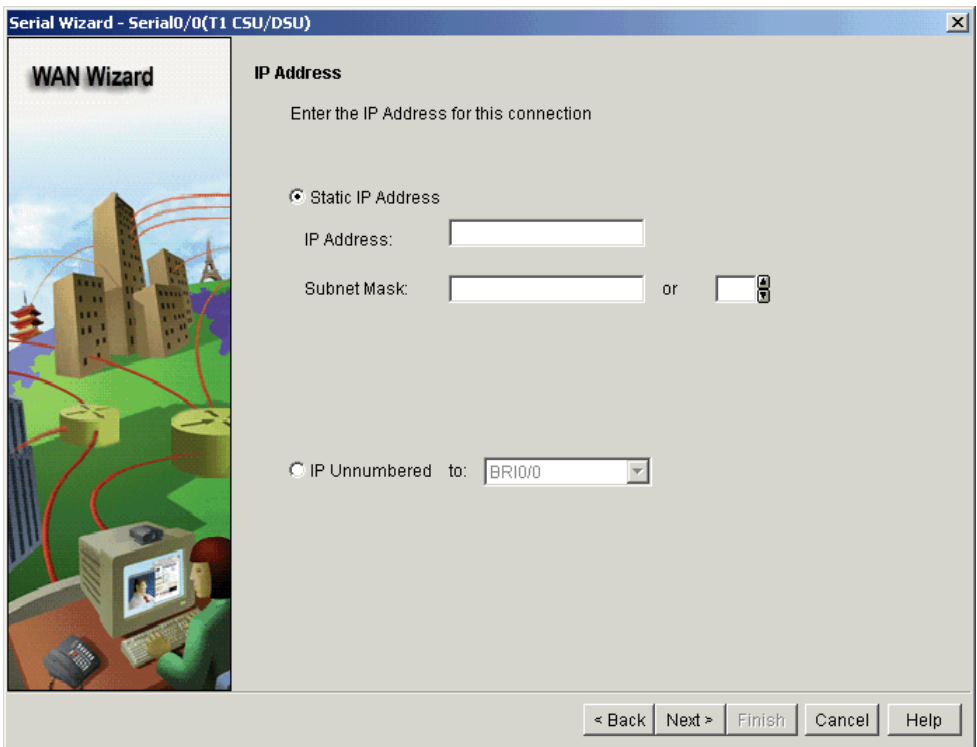


4. Click **Next** at the **Welcome to the Serial WAN Configuration Wizard** screen.

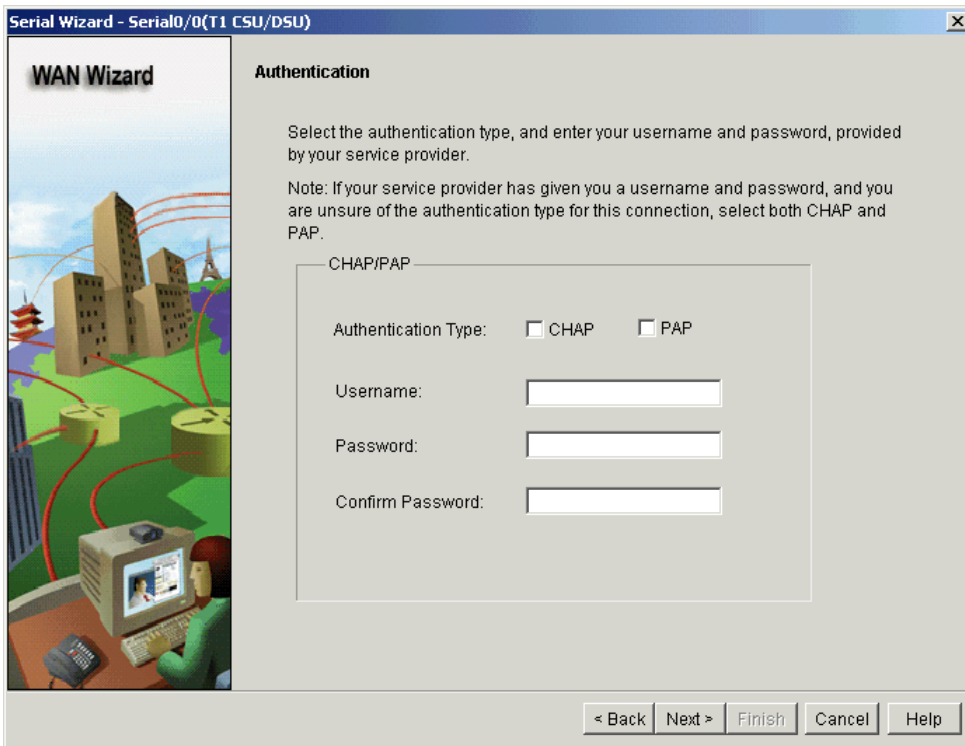
5. Choose **Point-to-Point Protocol** and click **Next**.



6. Enter the router IP address and subnet mask that you entered in the Internet Worksheet (B46, B41).

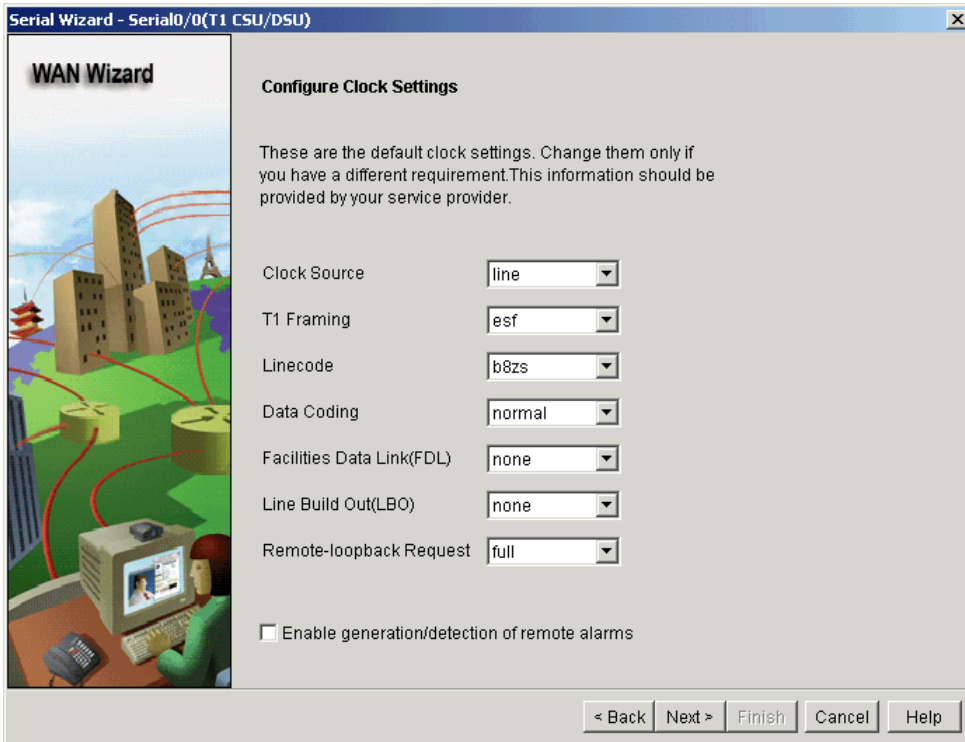


7. Choose the Authentication Type and authentication Username and Password that you entered in the Internet Worksheet (A25, A26, A27).



8. Choose these clock settings:

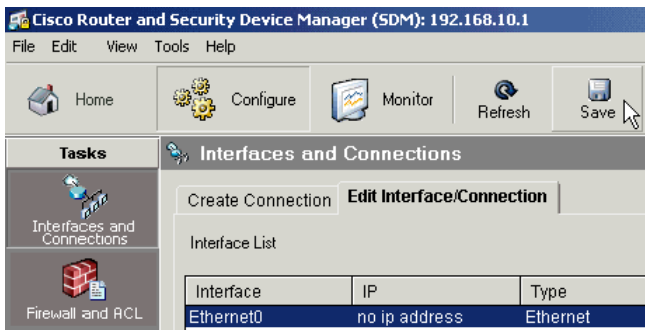
- o **Clock Source:** Choose **line** unless your Internet Service Provider (ISP) recommends a different setting.
- o **T1 Framing:** Enter the value you entered in the Internet Worksheet (A21).
- o **Linecode:** Enter the value you entered in the Internet Worksheet (A20).
- o **Data Coding:** Choose **normal** unless your ISP recommends a different setting.
- o **Facilities Data Link(FDL):** Choose **none** unless your ISP recommends a different setting.
- o **Line Build Out(LBO):** Choose **none** unless your ISP recommends a different setting.
- o **Remote-loopback Request:** Choose **full** unless your ISP recommends a different setting.



9. Review the configuration in the **Summary** screen and click **Finish**.

10. The **Commands Delivery Status** screen appears. Click **OK** to confirm.

11. Click **Save** to save your new configuration.



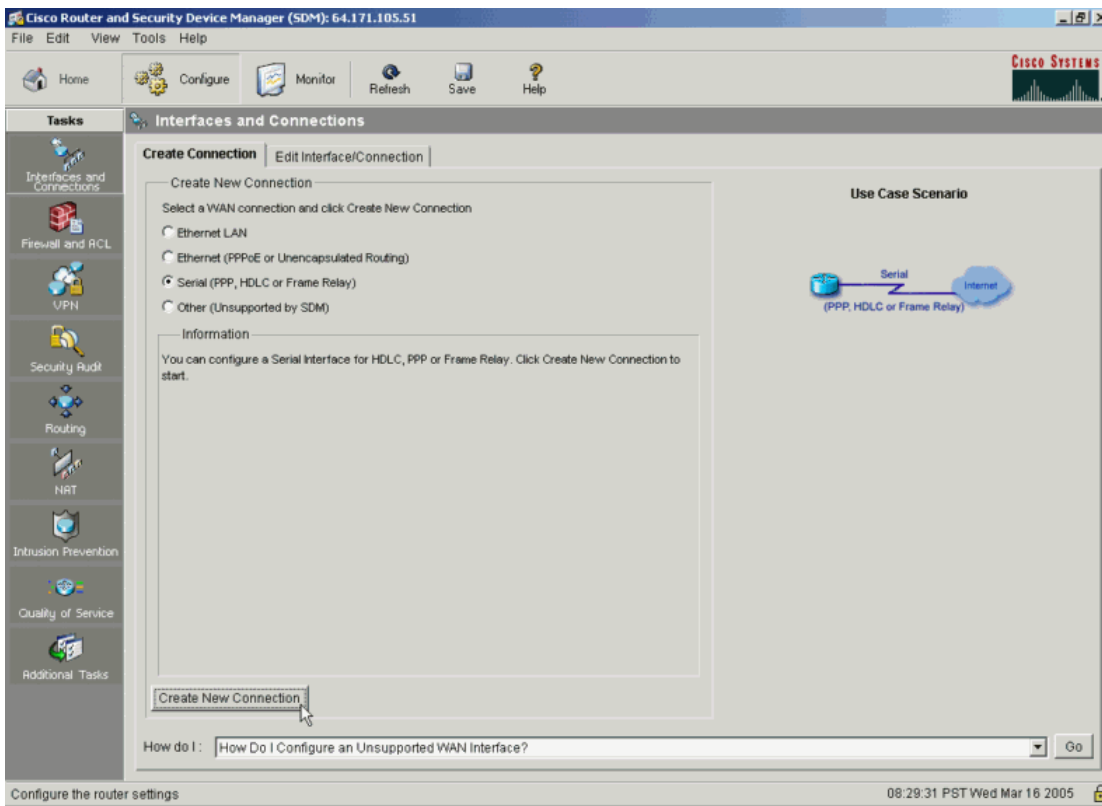
12. Click **File > Exit** to exit SDM.

[t1-sdmwan21.gif](#)

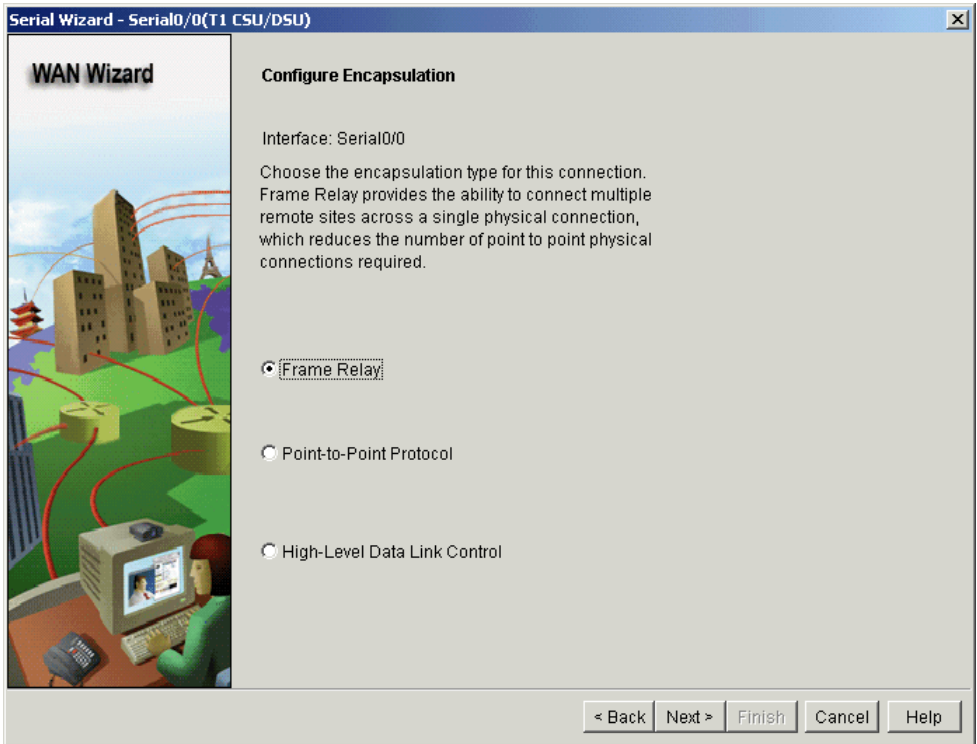
Set Up a Connection with Frame Relay Encapsulation

To set up a T1 connection with HDLC encapsulation, follow these steps:

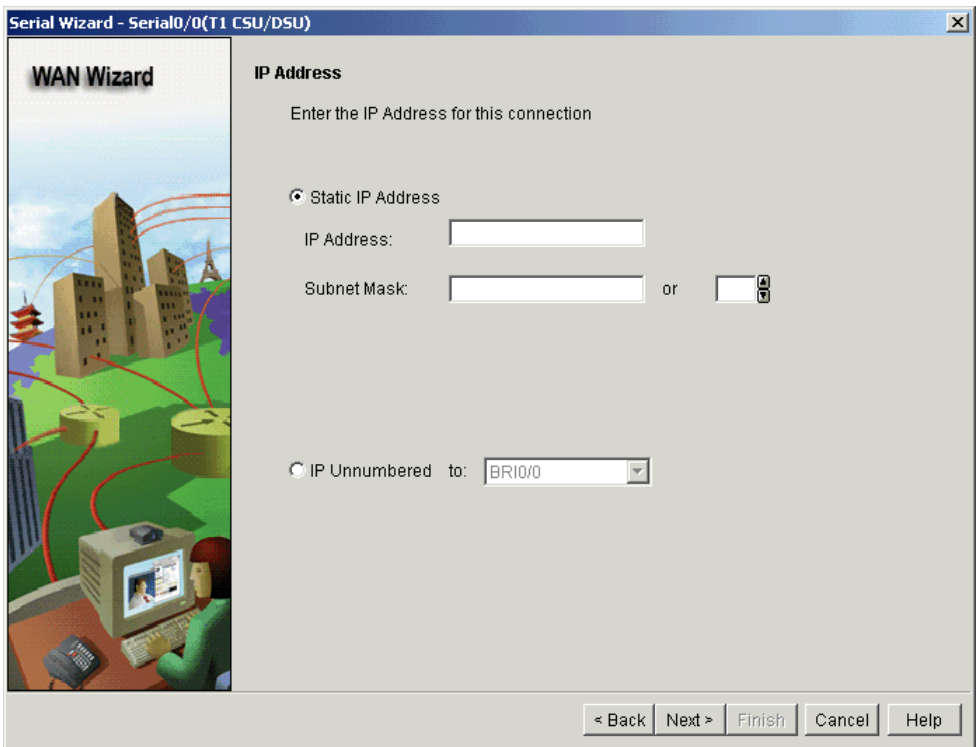
1. Enter the IP address of your router in a browser window to open Security Device Manager (SDM). For more information about how to launch SDM, refer to the [Configure your Router with Security Device Manager](#) document.
2. Click **Configure > Interfaces and Connections**.
3. Choose **Serial (PPP, HDLC, or Frame Relay)** and click **Create New Connection**.



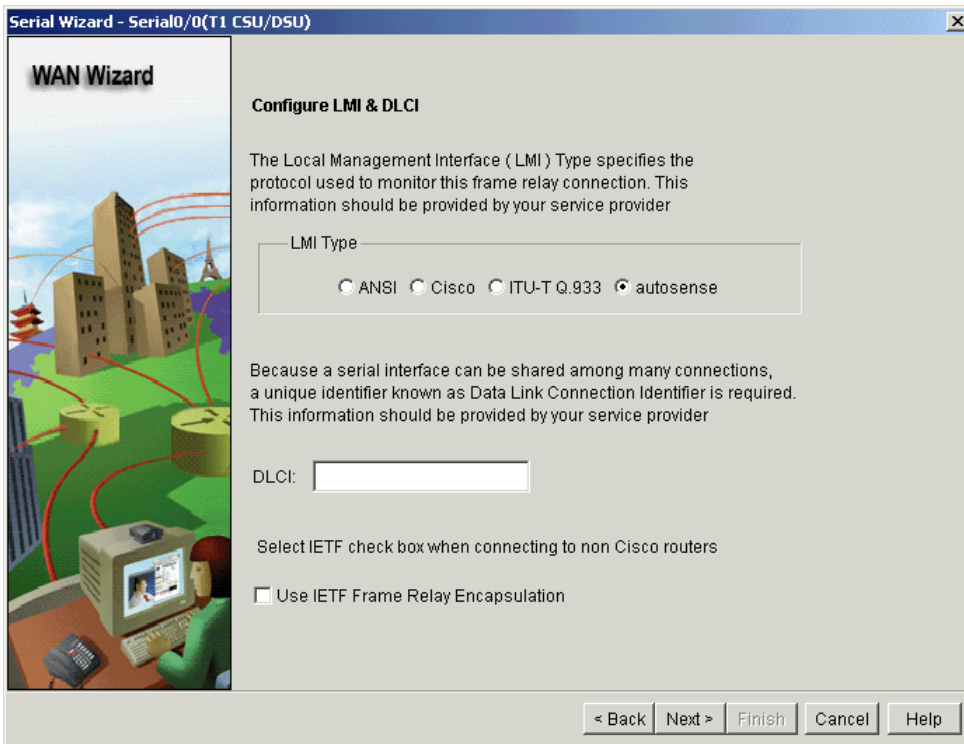
4. Click **Next** at the **Welcome to the Serial WAN Configuration Wizard** screen.
5. Choose **Frame Relay** encapsulation and click **Next**.



6. Enter the router IP address and subnet mask that you entered in the Internet Worksheet (B46, B41).

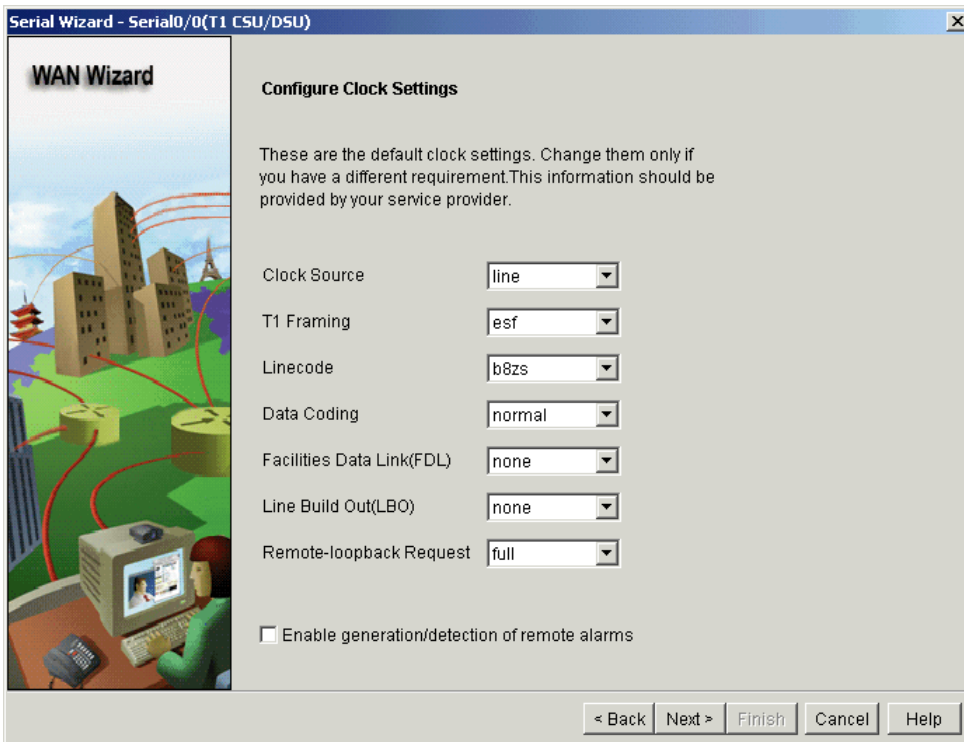


7. Choose **autosense** in the **LMI Type** field unless your ISP recommends a different setting. Enter the DLCI value that you entered in the Internet Worksheet in the **DLCI** field (A24). Check the **Use IETF Frame Relay Encapsulation** box if you are connecting to a Frame Relay network with non-Cisco equipment. For more information, consult your Internet Service Provider (ISP).



8. Choose these clock settings:

- o **Clock Source:** Choose **line** unless your Internet Service Provider (ISP) recommends a different setting.
- o **T1 Framing:** Enter the value you entered in the Internet Worksheet (A21).
- o **Linecode:** Enter the value you entered in the Internet Worksheet (A20).
- o **Data Coding:** Choose **normal** unless your ISP recommends a different setting.
- o **Facilities Data Link(FDL):** Choose **none** unless your ISP recommends a different setting.
- o **Line Build Out(LBO):** Choose **none** unless your ISP recommends a different setting.
- o **Remote-loopback Request:** Choose **full** unless your ISP recommends a different setting.



9. Review the configuration in the **Summary** screen and click **Finish**.

10. The **Commands Delivery Status** screen appears. Click **OK** to confirm.

11. Click **Save** to save your new configuration.



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Verify WAN Connection

To verify your WAN connection, follow these steps:

1. Click **Tools > Ping**

[t1-pinga.gif](#)

2. Enter the ISP router address in the Destination Field. Use the value that you entered in the Internet Worksheet (B47).

[t1-ping1a.gif](#)

3. Click **Ping**.

4. Review the results. If the ping success rate was 100%, proceed to the next step. If the ping success rate was less than 100%, see the [Troubleshoot WAN Connection](#) section.

[t1-ping2a.gif](#)

5. Click **File > Exit** to exit SDM.

[t1-sdmwan21.gif](#)

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Next Step

You have now set up a T1 WAN connection.

You can now set up firewall and security options on your router. For instructions, refer to the [Set Up Internet Security on a Cisco Router](#) document.

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Troubleshoot the Procedure

This section provides information about common problems that you may encounter. If this information does not solve your problem, contact the [SMB Technical Assistance Center \(SMB TAC\)](#) for assistance.

Problem	Cause(s) and Suggested Solution(s)
The Create Connection screen does not display an option for the WAN connection I want to set up.	<ul style="list-style-type: none"> • Make sure the WIC is properly installed. For further assistance, contact SMB Technical Assistance Center (SMB TAC). • If you have installed the card and the router does not detect the card, contact SMB Technical Assistance Center (SMB TAC) for assistance. • If the router detects your WIC card but the settings you require are not available in the Create Connection Wizard, you have an unsupported interface type. You need to use Command Line Interface (CLI) to configure your interface. Cisco recommends that you contact your Internet Service Provider to request a sample configuration. To access CLI, refer to the Create a HyperTerminal Connection document. If you require further assistance, contact SMB Technical Assistance Center (SMB TAC).
I need more information about my WAN connection to complete wizard.	Contact your Internet Service Provider (ISP) to confirm the details of your WAN connection.
I set up my WAN connection but it does not function properly.	See the Troubleshoot WAN Connection section.

[Troubleshoot WAN Connection](#)

To troubleshoot your WAN connection, follow these steps:

1. If you are using SDM, click **File > Exit** to exit SDM.
2. Create a terminal connection to the router. For more information, refer to the [Create a HyperTerminal Connection](#) document.
3. Log into the router. The default login is username cisco, password cisco. Otherwise, use the administrator login and password that you entered in the Internet Worksheet (B10, B11).

```
Username: cisco
Password:
```

4. Type **show interface serial0/0** and press **Enter**.

```
Router#show interface serial0/0
FastEthernet0/0 is up, line protocol is down !--- Interface state

    Hardware is Gt96k FE, address is 0011.21a8.5ca2 (bia 0011.21a8.5ca2)
!--- Output truncated
```

Note: If the router displays an error, try the commands **show interface serial0** or **show interface serial0/1**.

5. The router displays the interface state on the first line of output. Note the interface state and use the table to determine your problem and the appropriate solution.

Interface physical status:	Line Protocol Status	Action
Up	Up	This interface status indicates that the interface functions properly and the router can communicate with the remote device on the WAN.
Administratively Down	Down	This interface status indicates that the interface is disabled in the router configuration. To enable your interface, follow these steps: <ol style="list-style-type: none">a. Type interface serial0/0 and press Enter.b. Type no shutdown and press Enter.c. Type end to exit configuration mode.d. Type write memory to save the new configuration.
Down	Down	This interface status indicates that the WAN interface is unable to communicate with a remote device. <ul style="list-style-type: none">o Your router configurations do not match the configurations used by your Internet Service Provider (ISP). Contact your ISP to verify that you have the correct settings.o Physical WAN connection is not in place. Ensure that the router is properly plugged into the WAN connection and that your ISP has completed installation of the WAN connection.o Verify with your Internet Service Provider (ISP) that service is ready for use. Make a note of your current interface state and your current configuration before you contact your ISP.
Up	Down	This interface status indicates that the interface is enabled and the router is physically connected to a remote WAN device but the interface cannot communicate properly with the remote WAN device. <ul style="list-style-type: none">o Your configuration partially matches the settings used in the ISP network. Contact your ISP to verify that you have the correct settings.o Check to ensure that you have the proper cable type attached to your WAN connection. Make a note of your current interface state and your current configuration before you contact your ISP. For more information about cable types refer to the Cable Descriptions document.
Up	Up (looped)	This interface status indicates that a device on the Internet Service Provider (ISP) network is in loopback mode. Contact your ISP for further assistance.

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Related Information

- [Cable Descriptions](#)
- [Configure Your Router with SDM](#)
- [Create a HyperTerminal Connection](#)
- [Set Up Internet Security on a Cisco Router](#)
- [Site Survey](#)

