Application Note

Cisco Router and Security Device Manager
USB Storage

Introduction

The USB Storage feature on the Cisco® Router and Security Device Manager (Cisco SDM) allows the Cisco 871 and Cisco 1800, 2800, and 3800 series integrated services routers to support USB flash modules with SmartCard technology in a USB key form factor (also referred to as a USB token) to provide secure router access. USB token provides secure configuration distribution and allows users to store VPN credentials for deployment. USB flash drivers allow users to store images and configurations externally. For more detail information, please refer to the eToken and USB Flash Features Support document.

This document includes the following topics:

- Configuring a router using USB token and USB flash
- Importing a signature definition file (SDF) from USB flash
- Configuring the USB token PIN
- Configuring public key infrastructure (PKI) storage
- File management

Prerequisites for USB Storage

Before you can use a USB flash module or a USB token, you should have the following system requirements:

- A Cisco 871, Cisco 1800 Series, Cisco 2800 Series, or a Cisco 3800 Series Integrated Services Router
- At minimum, Cisco IOS® Software Release 12.3(14)T image running on any of the supported platforms
- A Cisco supported USB flash or USB token

Roles of the USB Token and the USB Flash Module

The USB token can securely store any type of file within its available storage space (32 KB). Configuration files that are stored on the USB token can be encrypted and accessed only with a user PIN. The router will not load the configuration file unless the correct PIN has been configured for secure deployment of router configuration files.

After you plug the USB token into the router, you must first log into the USB token before you can securely store and transfer digital certificates, preshared keys, and router configurations between the USB token and the router. You can also perform administrative tasks, such as changing the user PIN and copying files between the router and the USB token.

A Cisco USB flash module allows you to store and deploy router configurations and Cisco IOS Software images in a nonsecure format. Cisco USB flash modules are available in 64 MB, 128 MB, and 256 MB versions. The USB flash is not a replacement for the router compact flash; the compact flash must be present for the router to boot.

USB Storage Supported by the Cisco Router and Security Device Manager

The Cisco Router and Security Device Manager (Cisco SDM) allows users to manage (add, view, and delete) router configuration files on the USB flash module; move files between the SDM management host and the USB flash module, or between USB flash module and the router compact flash; store credentials on the USB token; and modify default settings on the USB token, such as the user PIN and the maximum number of allowable login failures.

This document contains information on using Cisco SDM Express to configure a new router using USB token and USB flash, importing SDF from USB flash, storing credentials to a USB token for IP Security (IPSec) VPN, and managing USB devices.

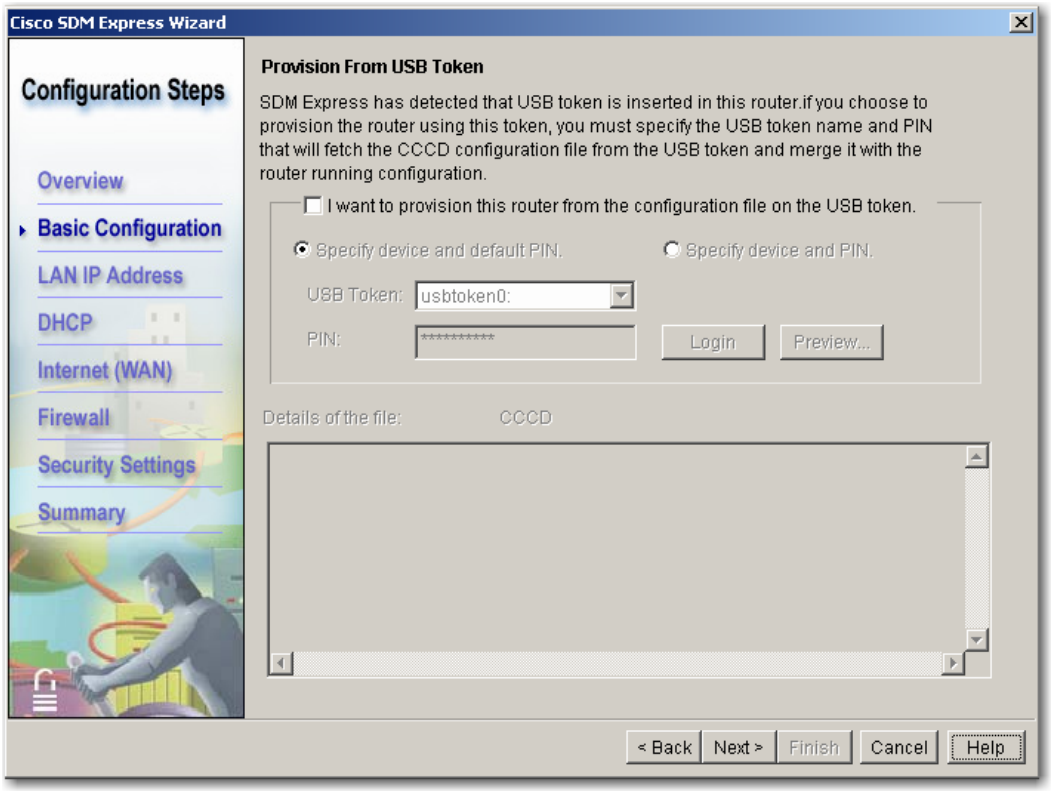
Configuring a Router Using USB Token and USB Flash

If Cisco SDM Express is installed on the router flash for initial setup, when you access a router for the first time, Cisco SDM Express is launched and displays the Basic Configuration screen. When a USB token is connected to your router, it displays the "Provision From USB Token" window (Figure 1).

Cisco SDM Express looks for a configuration file named CCCD[1] in the USB token. If the configuration file does not exist, Cisco SDM Express will fail the operation. (Note: If the USB token and the USB flash device are both connected to your router, Cisco SDM Express will use the USB token by default. If you want to use the USB flash device (Figure 2) connected to your router, all USB tokens must be removed from your router before running Cisco SDM Express.)

Figure 1. Provision From USB Token

[1] You can use a Token Management System (TMS) software from Aladdin Knowledge Systems to load the CCCD file to the USB token. For more details, go http://www.aladdin.com and look for Token Management.

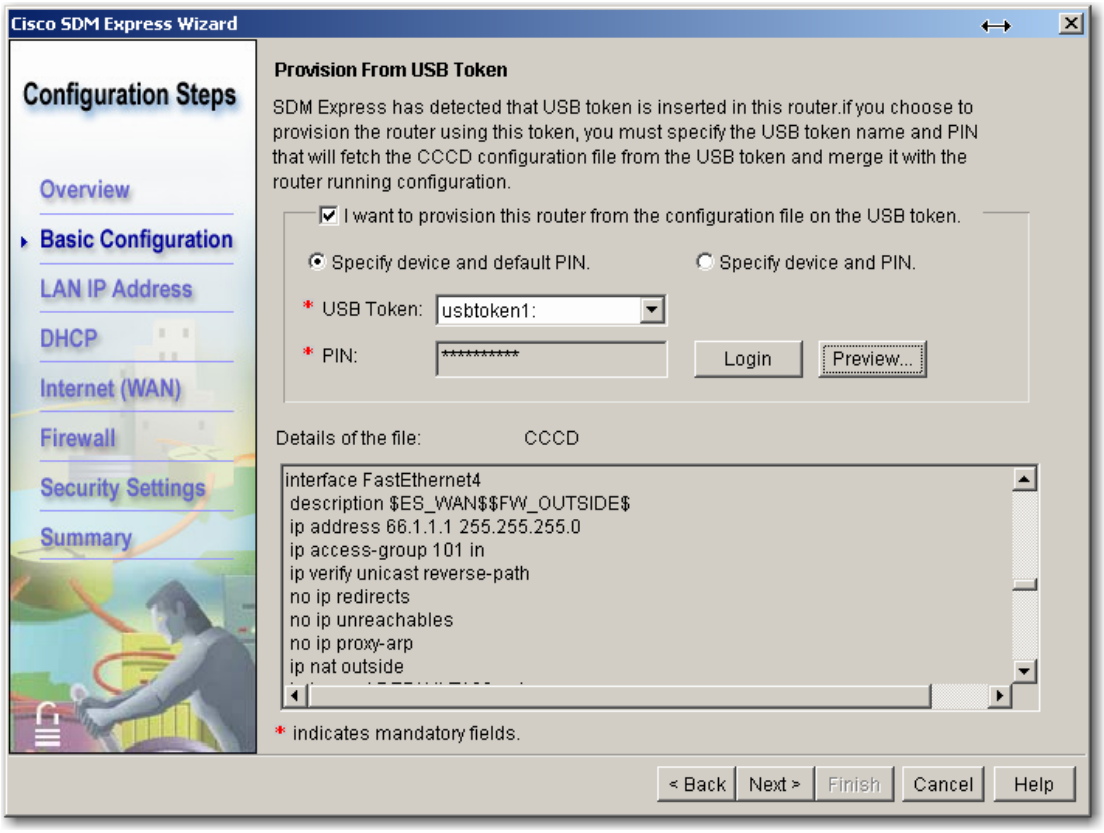


To provision your router from an USB token, follow these steps:

1. Select the checkbox to enable provisioning your router from a USB token.
2. Choose to use the default device and PIN, or to specify a device and PIN to log into the USB token. The USB token used in this example is usbtoken1 and has the default PIN. Select **Specify device and default PIN**[2].
   - USB Token: **usbtoken1:**
   - PIN: **********
3. Click **Login** to log into the USB token. You should see the Login to the USB Token Successful window.
4. Click **Preview…** to display the contents of the file[3] in the lower panel (Figure 2).

Figure 2. Provision From USB Token

[2] In this example, the default PIN used by Cisco SDM is the default PIN of the USB token manufactured by Aladdin Knowledge Systems.
[3] A USB token can securely store any type of file within its available storage space. Configuration files that are stored on the USB token can be encrypted and accessed only through a user PIN. The router will not load the configuration file unless the proper PIN has been configured for secure deployment of router configuration files.



5. Click **Next**.
6. Cisco SDM Express Summary screen appears; if you are satisfied with the configuration, click **Finish**.

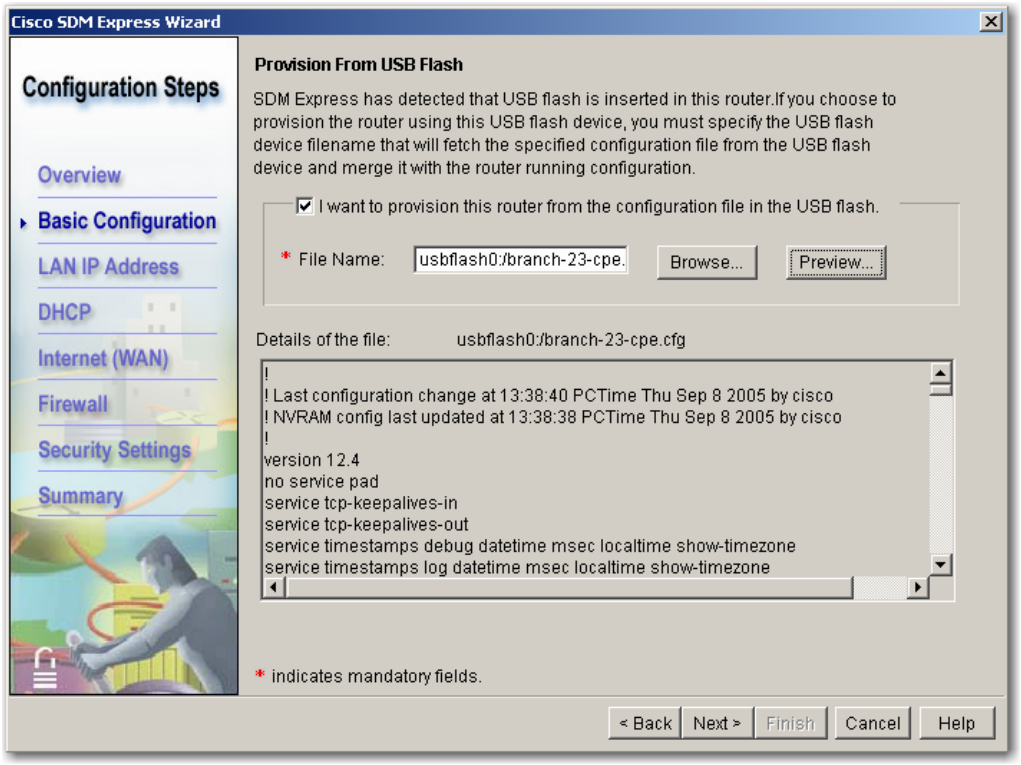
To provision your router from a USB flash, follow these steps:

If no USB token is connected to the router, Cisco SDM Express will look for a USB flash. When a USB flash is connected to your router, Cisco SDM Express displays the "Provision From USB Flash" window.

1. Select the checkbox to enable provisioning your router from a USB flash device.
2. Enter the File Name of the configuration file with full path, or click **Browse...** to open a file selection window.
   - File Name: **usbflash0:/branch-23-cpe.cfg**[4]
3. Click **Preview…** to display the contents of the file in the lower panel (Figure 3).
4. Click **Next**.

Figure 3. Provision from USB Flash

[4] The file must have the extension .cfg



5. Cisco SDM Express Summary screen appears; if you are satisfied with the configuration, click **Finish**.

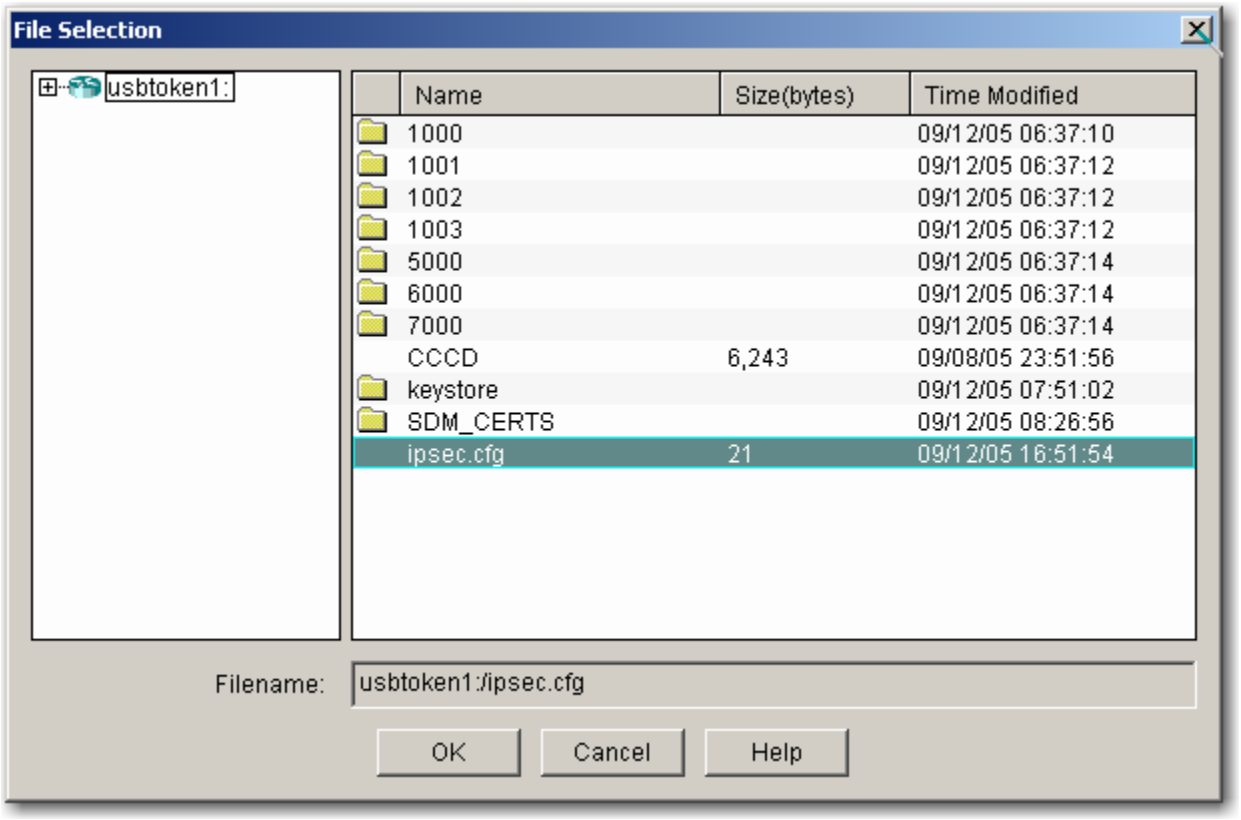
Cisco SDM Express configures the router without going through the standard Cisco SDM Express Setup routine including Dynamic Host Configuration Protocol (DHCP) configuration, LAN/WAN configuration, Firewall configuration, and Security configuration. Launch Cisco SDM to check if the configuration is loaded to the router.

Cisco SDM also supports router provisioning using USB token or USB flash. The configuration file from the USB token or USB flash device is merged with your router's running configuration file to create a new running configuration file. Launch Cisco SDM, and at the Configure Mode screen, select Additional Tasks, select Router Provisioning, and click the **Router Provisioning…** button to launch Router Provisioning window. (Note: If both USB token and USB flash are connected to the router, Cisco SDM uses USB token for router provisioning. If you want to use the USB flash device, all USB tokens must be removed from your router.)

1. Router Provisioning

   - Choose the device type: **Use USB token**
   - USB Token: **usbtoken1**:
   - Token PIN: **1234567890**
   - Filename: **ipsec.cfg** (if you are not sure about the file name, click **Browse…** to view files stored in usbtoken1, and select the file (Figure 4)

Figure 4. File Selection



2. Click **Preview File…** to display the contents of the file in the lower panel (optional).
3. Click **OK**.
4. Click **Yes** to continue if the configuration file on the USB device is correct.

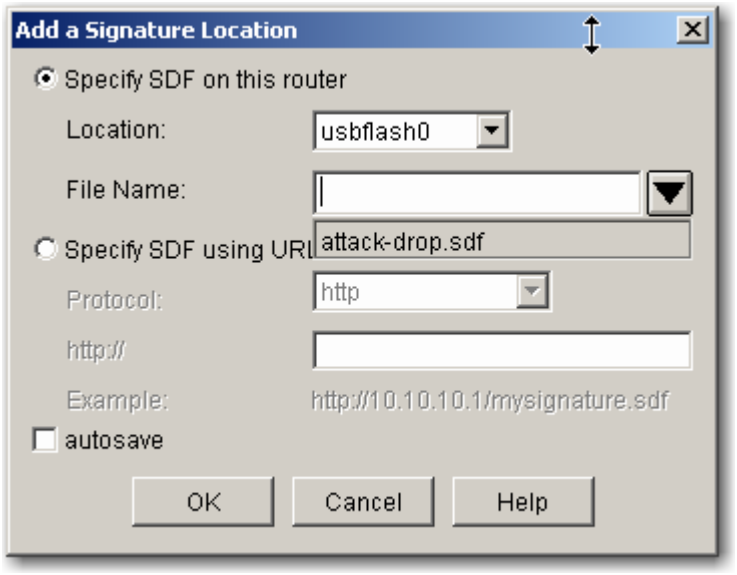
Importing an SDF from a USB Flash

An USB flash can provide an optional secondary storage space that can be used to import SDFs to the router.

Launch Cisco SDM, and at the Configure Mode screen, select Intrusion Prevention. If IPS is not enabled on the router, click **Create IPS** tab, and click **Launch IPS Rule Wizard…** to launch the wizard:

1. Click **Next** when finishing reading the Welcome to IPS Policies Wizard message
2. Select the interfaces and the traffic direction, click **Next**
3. SDF Location window displays, click **Add…**
4. Add a Signature Location window displays, Cisco SDM automatically checks the USB flash for SDFs. SDFs will be listed when USB flash is selected for Location (Figure 5).
    - Location: **usbflash0**
    - File Name: **attack-drop.sdf**
    - Click **OK**

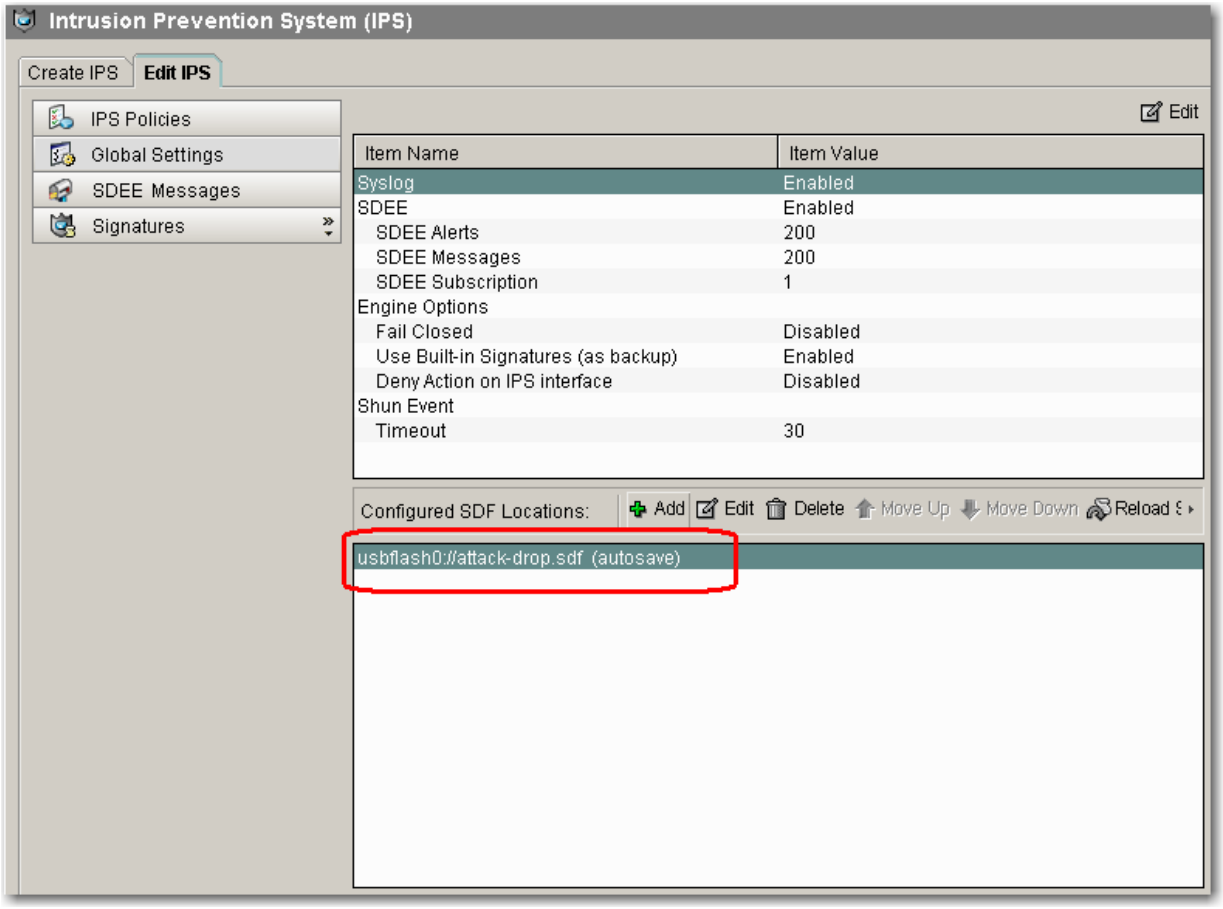
Figure 5. Add a Signature Location



5. You will be redirected back to SDF Location window, click **Next**
6. Click **Finish**
7. Click **OK**

To verify the IPS configuration, at Configure mode, select Intrusion Prevention, click Edit IPS tab, select **Global Settings**. The *usbflash0://attack-drop.sdf* should be listed in the Configured SDF Locations in the lower panel (Figure 6).

Figure 6. Configured SDF Locations



If IPS has been enabled on the router, follow these steps to import an SDF file from a USB flash:

1. At the Configure Mode, select Intrusion Prevention, click Edit IPS tab, select Signatures
2. From the Signature working panel, click **Import** on the upper panel, and select **From router flash** (Figure 7)
3. The File Selection window appears, select the USB flash. In this example, click usbflash0: (Figure 8)
4. Select the SDF file you want to import, click **OK**. In this example, select IOS-S168.zip[5]
5. The IPS Import window appears, select the signatures listed on the right upper panel
6. Select **Merge** to import the signatures on the lower panel, click **OK**

Figure 7. Import SDF From Router Flash

[5] An SDF file must be either an XML file or a zip file with extension .zip

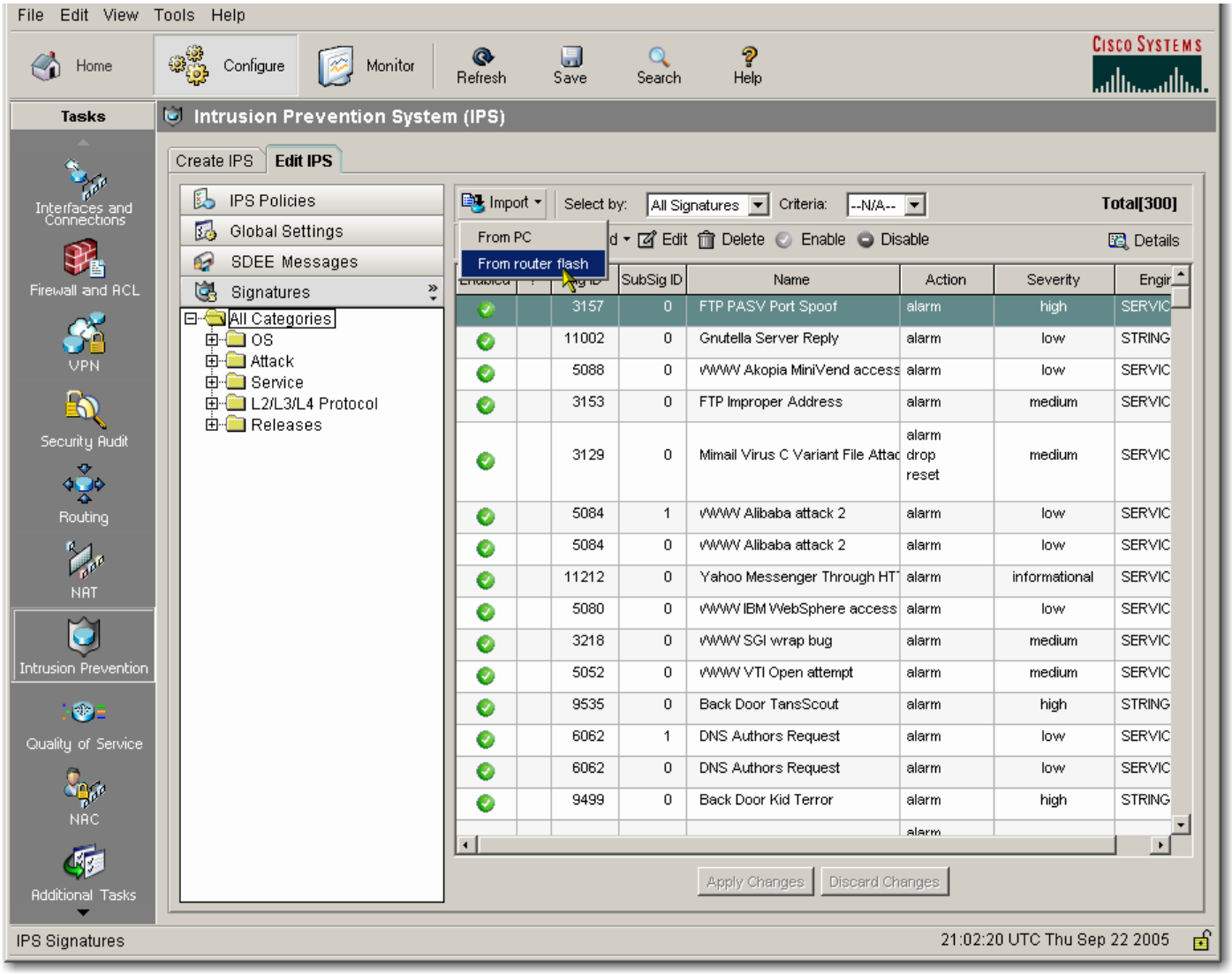
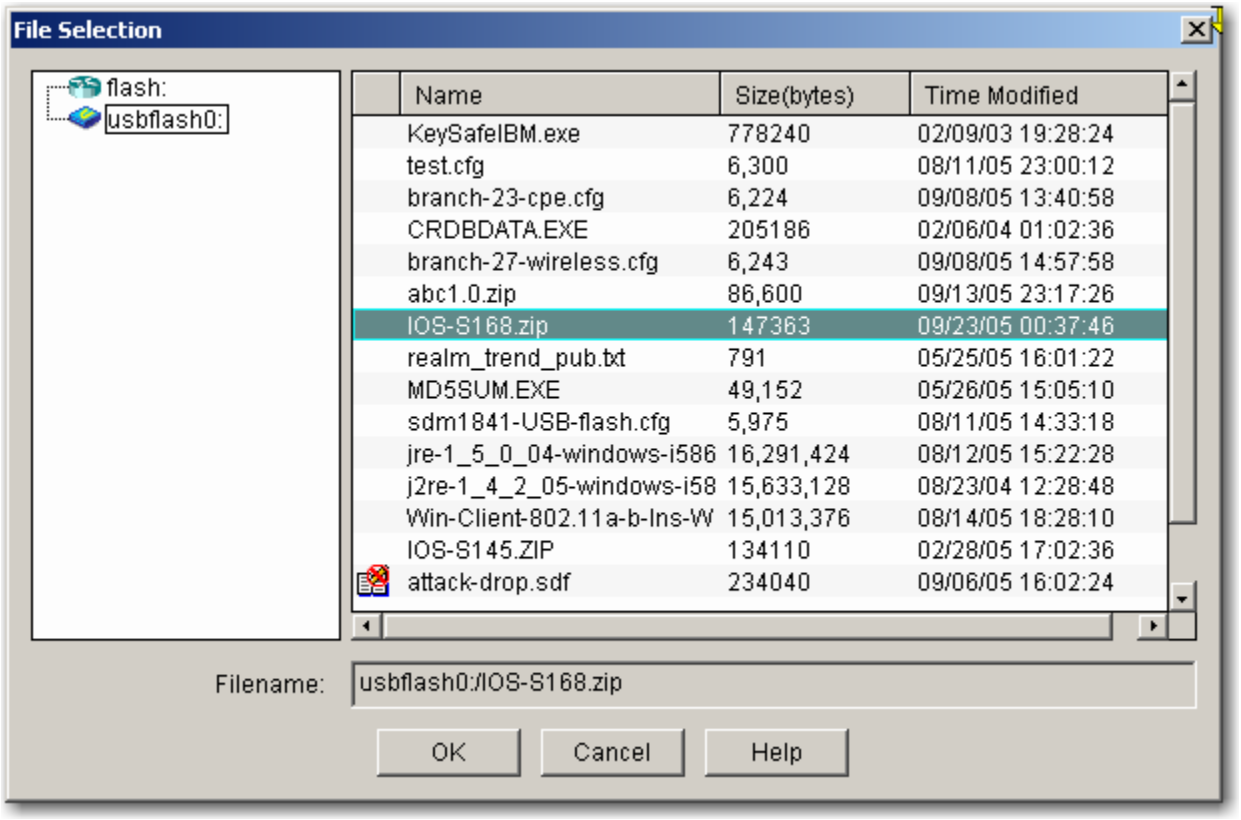


Figure 8. File Selection



Configuring the USB Token PINs

Cisco SDM allows users to set PINs for USB tokens connected to their routers. There are two kinds of PINs—an administrator PIN and a user PIN. The user PIN has a default value; the administrator PIN does not. The administrator PIN is required to set or change the user PIN. The user PIN is used to unlock the token and gain access to the protected memory area. The token's name is set by the manufacturer, for example, USB tokens manufactured by Aladdin Knowledge Systems are named **eToken**.

To change your user PIN, follow these steps:

Please consult your USB eToken provider for the token name and default PIN. In the following example the USB token manufactured by Aladdin Knowledge System is named **eToken** with default PIN 1234567890.

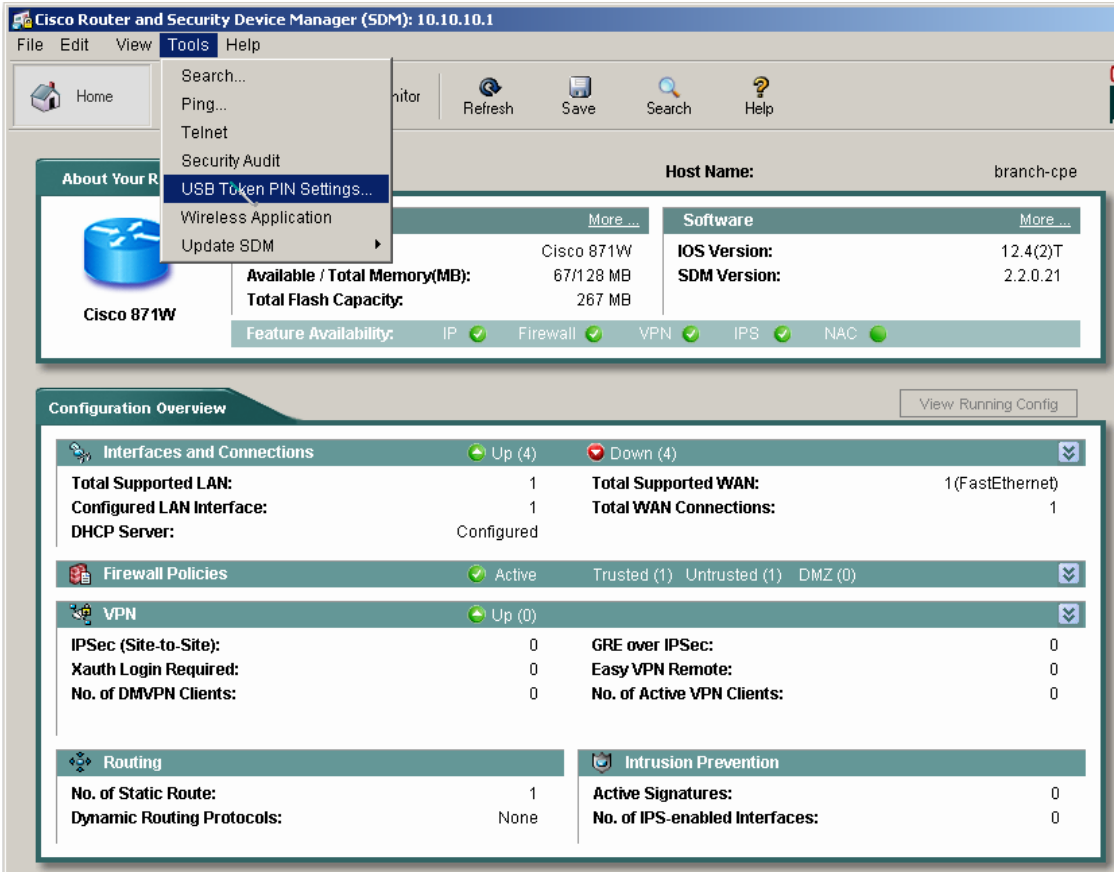
1. Launch Cisco SDM
2. Click Tools from the window menu, select USB Token PIN Settings… (Figure 9)
   - Select a PIN type: **User PIN**
   - Token Name: **eToken**[6]
   - Current PIN: **1234567890**
   - New PIN: **zxcvbnmasd**

[6] If you do not know the manufactured token name, click More… from SDM Home/Hardware Panel. The Hardware configuration shows the name "usbtoken*x*", where x is the number of the USB port to which the USB token is connected.

- Confirm PIN: **zxcvbnmasd**

3. Click **OK**

Figure 9. USB Token PIN Settings



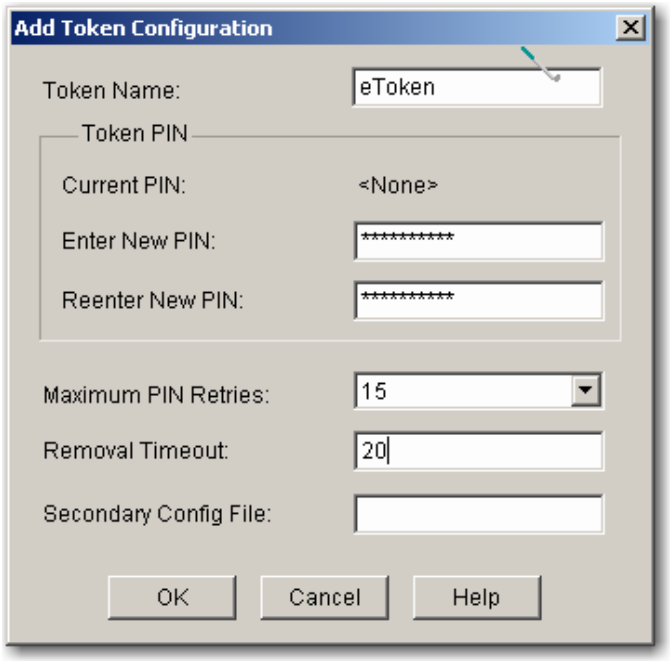
Configuring Automatic Login and Administrative Parameters

Automatic login is required when a router reboots or a USB token is inserted and connected to the router. At the Configure Mode screen, select VPN, expand VPN Components, expand Public Key Infrastructure, and select USB Tokens.

1. Click **Add…** button on the USB Tokens window
2. Add Token Configuration window displays (Figure 10)
   - Token Name: **eToken**
   - Current PIN: <None>
   - Enter New PIN: **zxcvbnmasd** (optional)
   - Reenter New PIN: **zxcvbnmasd**
   - Maximum PIN Retries: **15** (optional)

- Removal Timeout: **20** (optional)
- Secondary Config File: (optional)

Figure 10. USB Tokens



3. Click **OK**

Configuring PKI Storage

You can use Cisco SDM to create a PIN that automatically allows the router to log into the USB token at the router[7]. You can set the administrative parameters on the USB token, such the number of seconds that the router will wait before removing the RSA keys that are stored in the USB token after the USB token has been removed from the router[8]. You can also set the maximum number of consecutive failed login attempts allowed before access to the USB token is denied, and configure the secondary configuration stored in the USB token during boot time[9]. For more information please refer to Storing PKI Credentials.

Generating RSA Key Pair

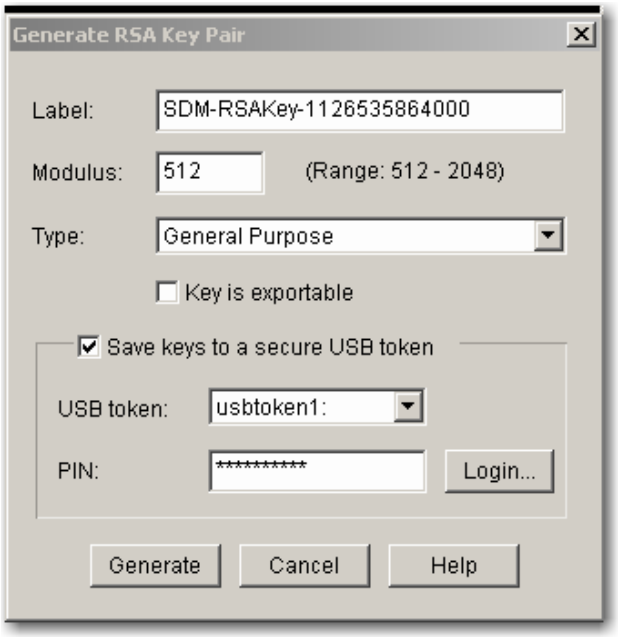
At the Configure Mode screen, select VPN, expand VPN Components, expand Public Key Infrastructure, and select RSA Keys.

1. Click **Add…** button on the RSA Keys window. You will be prompted to enter SSH Credentials. If you have not entered the credentials, enter the username/password and click OK.
2. Generate RSA Key Pair window displays (Figure 11).

[7] Automatic Login allows the router to completely come back up without any user or operator intervention.
[8] If the removal timeout is not set, all RSA keys and IPSec tunnels associated with the USB token are torn down immediately after the USB token is removed from the router.
[9] A secondary configuration allows users to load their IPSec configuration.

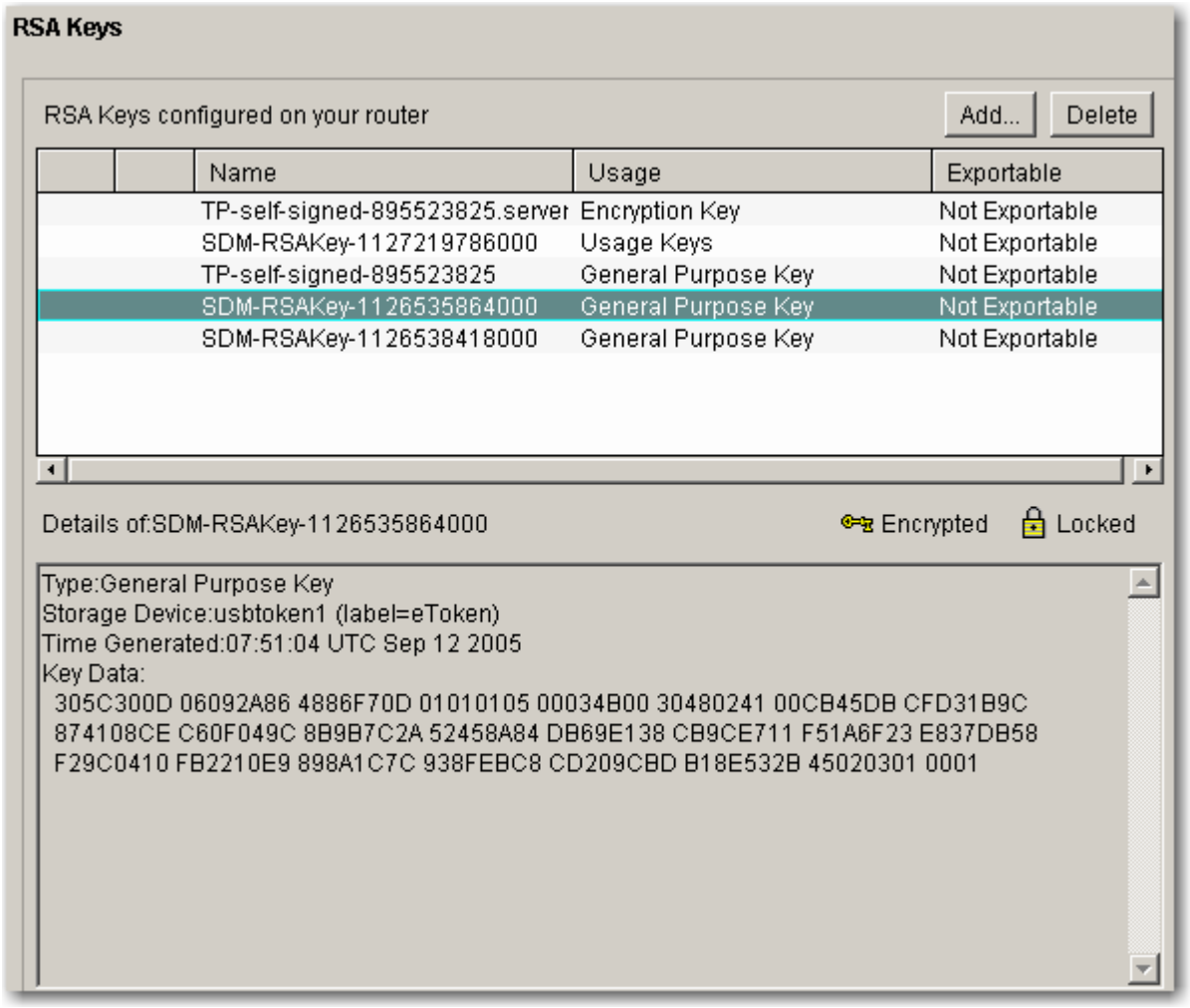
- Label: **SDM-RSAKey-1126535864000** (Note: It is recommended to use the SDM randomly generated label name starting with SDM-RSAKey- followed by numbers. In this example the label = SDM-RSAKey-1126535864000)
- Modulus: **512**
- Key is exportable: (optional)
- Save keys to a secure USB toke: **check**
- USB token: **usbtoken1:**
- PIN: **1234567890**
- Click **Login…** to verify the router can log into the USB token. Click **OK** to close the information window if successfully logged into the USB token; otherwise check that the USB token and PIN are correctly entered.

Figure 11. Generate RSA Key Pair



3. Click **Generate**.
4. You will be prompted by Warning information; read the information and click **Yes**.
5. You will be redirected to the RSA Keys window after SDM-RSAKey-112653586400 is generated (Figure 12). Select the Key, and you should see Storage Device:usbtoken1 shown on the lower panel.

Figure 12. RSA Keys



Storing RSA Key Pair and CA Certificate in a USB Token

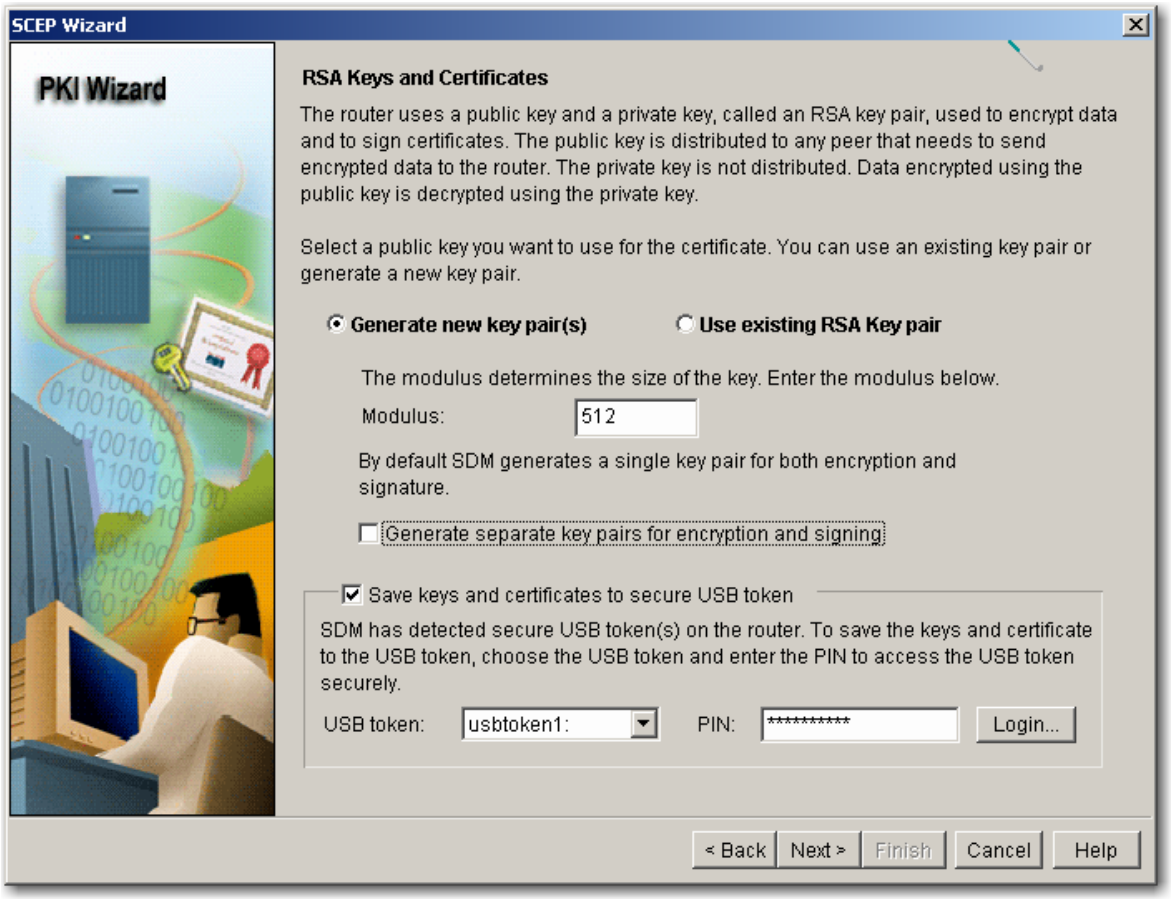
For more details on how to enroll a router to a certificate authority (CA) server, please refer to Cisco Router and Security Device Manager Public Key Infrastructure Management.

At Configure Mode, select VPN, expand VPN Components, expand Public Key Infrastructure, and select Certificate Wizards.

1. In the following example, Secure Shell (SSH) credential and Network Time Protocol (NTP) have been configured, and you skip Configure DNS.
2. Select **Simple Certificate Enrollment Protocol (SCEP)**, and click **Launch the selected task**
3. SCEP Wizard appears, click **Next**
4. Enter the Certificate Authority Details, and click **Next**
5. Enter the Certificate Subject Name Attributes, and click **Next**
6. RSA Keys and Certificates (Figure 13)

- Select Generate new key pair(s)
- Modulus: **512**
- Save keys and certificates to secure USB token: **check**
- USB token: **usbtoken1:**
- PIN: **1234567890**
- Click **Login…** to verify the router can login to the USB token. Click **OK** to close the information window if successfully login to the USB token
- Click **Next**

Figure 13. RSA Keys and Certificates

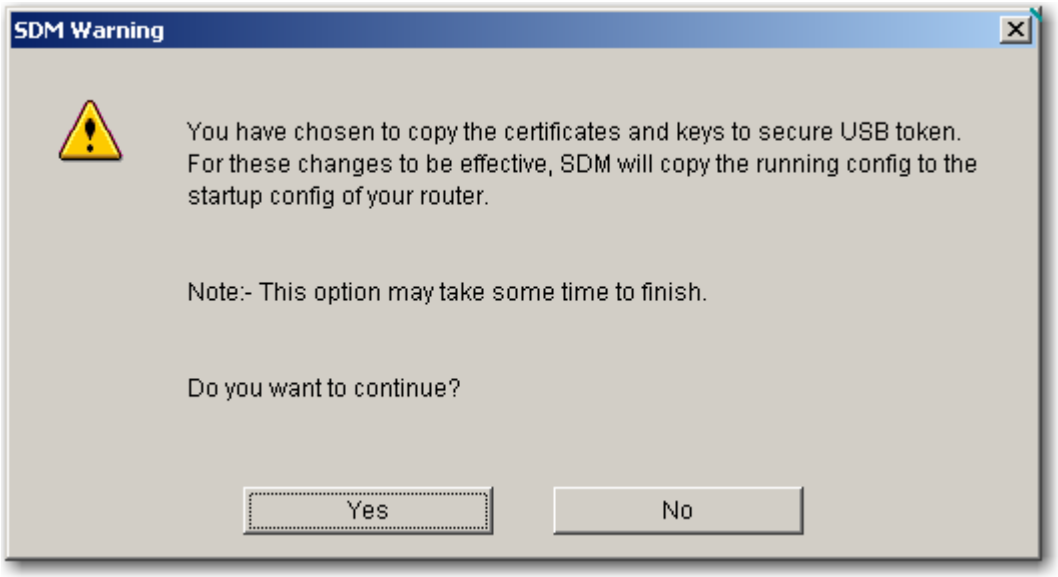


7. You will be prompted by Warning information; read the information and click **Yes**
8. Read the Summary, and if you are satisfied with the data, click **Next**, otherwise click **Back** to modify the information
9. You will see **Generating RSA Key** Message
10. You will see the router start to contact the CA server

11. Click **Yes** when you are prompted by CA Server Certificate window to verify the CA server's certificate to complete the certificate enrollment process

12. Click **Yes** when you are prompted to copy the certificates and keys to secure the USB token (Figure 14)

Figure 14. Copy the Certificates and Keys to Secure USB Token



13. Click **OK** to delivery the configuration

14. You will be directed to Enrollment Status window; click **Finish**

The newly generated RSA Key pair and certificate are stored in the USB token.

For the existing certificates on the router, you can copy the certificates to the USB token. At Configure Mode, select VPN, expand VPN Components, expand Public Key Infrastructure, select Router Certificates.

1. The Router Certificates window lists existing certificates on the router (Figure 15).

2. Click **Save Certificates to USB Token** button to copy all the available certificates in the USB token.

3. The **USB Token Credentials** window appears (Figure 16), enter PIN, click **OK**

4. Cisco SDM creates a folder named SDM_CERTS in the USB token, and the certificates are copied to the folder.

Figure 15. Available Certificates

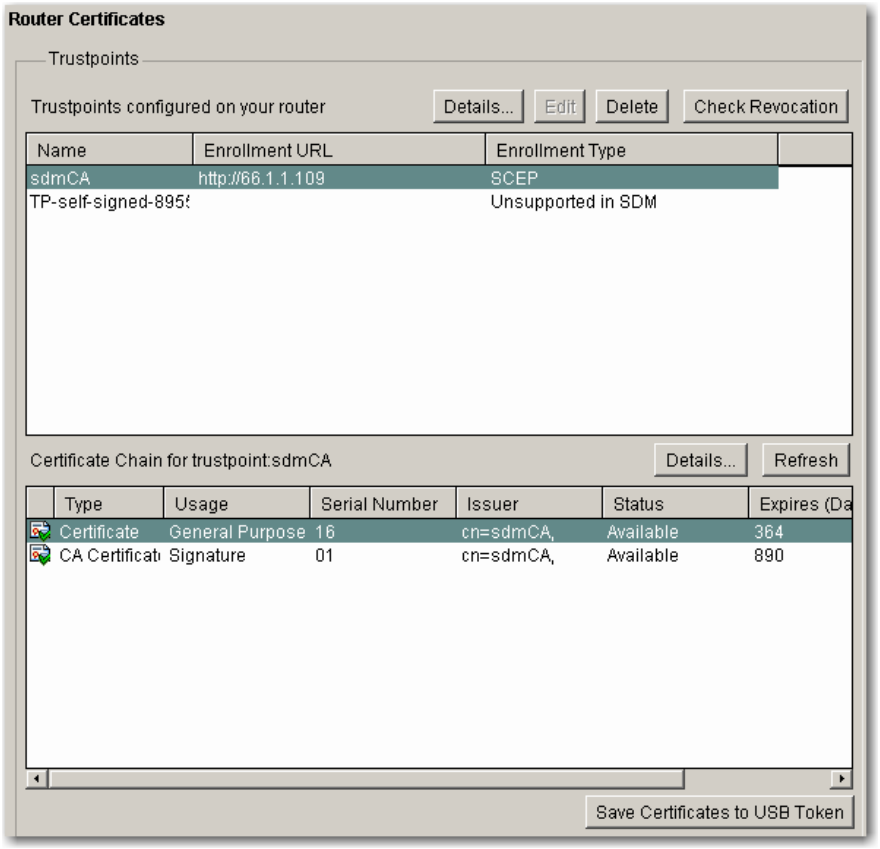
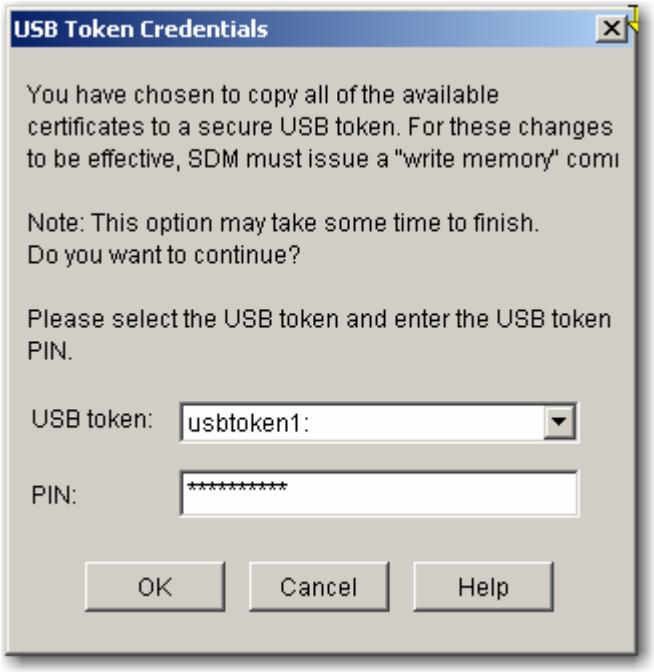


Figure 16. USB Token Credentials



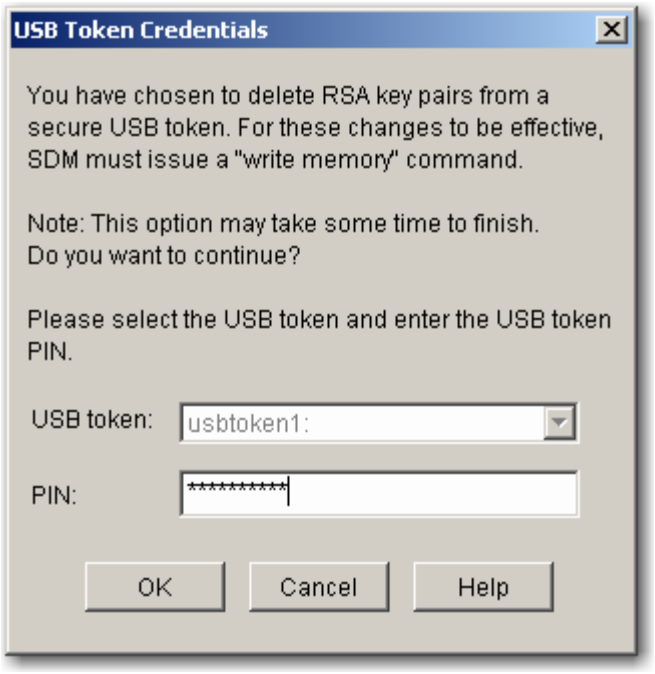
Deleting RSA Key Pair in a USB Token

Cisco SDM Version 2.2 supports RSA key deletion from the USB token. It does not support certificate deletion from the USB token.

At Configure Mode, select VPN, expand VPN Components, expand Public Key Infrastructure, and select RSA Key.

1. The RSA Keys window lists the RSA Keys configured on the router (Figure 12).
2. Select key RSA Key stored in the USB Token you want to delete, and click **Delete** button on the right upper window.
3. You will be prompted by a warning message; click **Yes** if you want to delete the RSA key.
4. The USB Token Credentials window appears (Figure 17); enter PIN and click **OK.**

Figure 17. USB Token Credentials

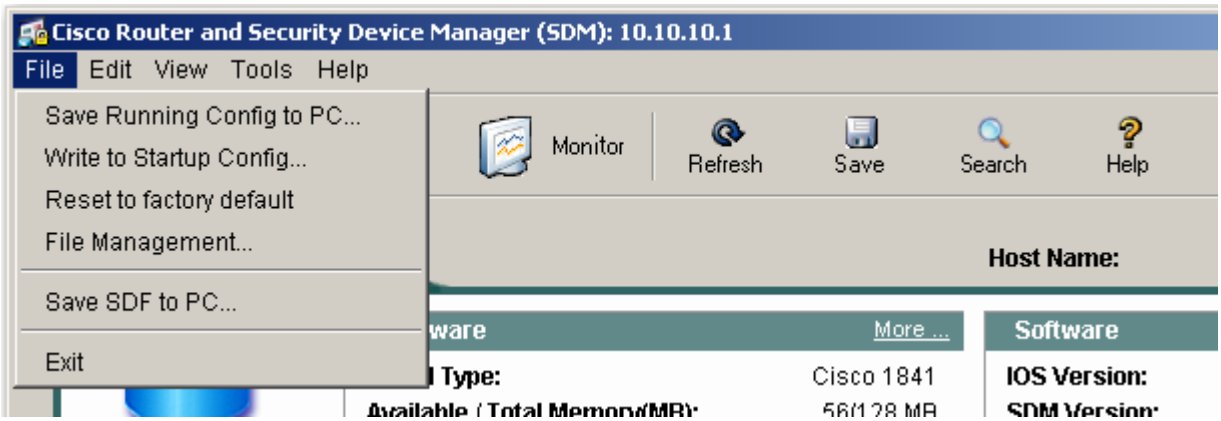


File Management

Cisco SDM allows you to view and manage the file system on your Cisco router flash memory and on USB flash devices connected to that router. Only DOSFS files systems can be viewed and managed by Cisco SDM.

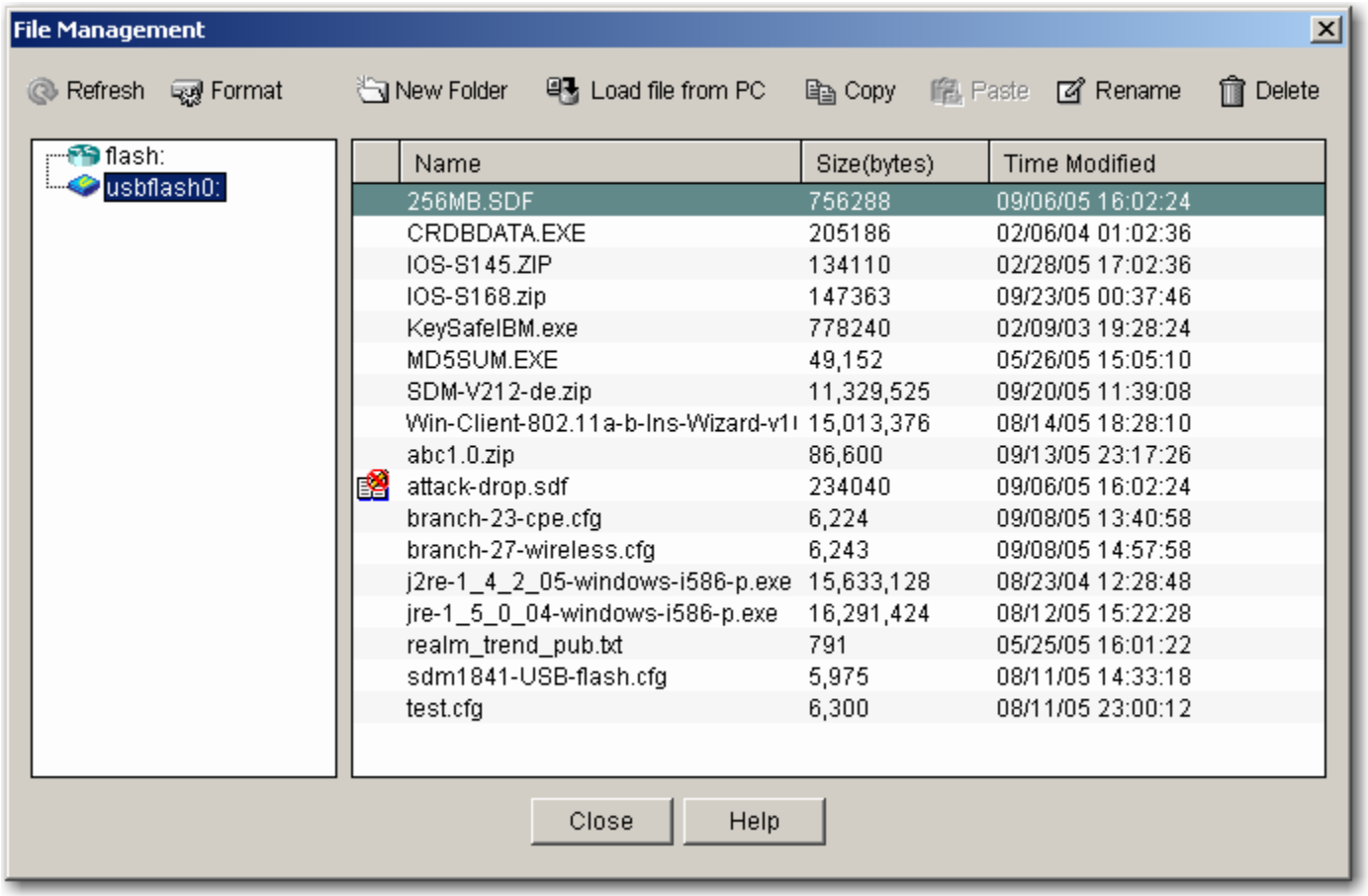
From the Cisco SDM window menu bar, click File, select File Management (Figure 18), and the File Management window appears.

Figure 18. Launch File Management



Click the USB flash connected to your router (Figure 19). You can copy, paste, rename, or delete the files, except for the boot image file. Files with the no-write icon next to their names cannot be copied, pasted, renamed, or deleted. The following example shows attack-drop.sdf with the no-write icon.

Figure 19. File Management



In summary, Cisco SDM and Cisco SDM Express can help you easily and effectively manage Cisco IOS Software images, digital certificate storage, and secure credentials with USB token and USB flash.

For More Information

For more information about USB storage, please visit:

http://www.cisco.com/en/US/partner/products/sw/iosswrel/ps5207/products_feature_guide09186a0080420500.html

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
Capital Tower
168 Robinson Road
#22-01 to #29-01
Singapore 068912
www.cisco.com
Tel: +65 317 7777
Fax: +65 317 7799

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