# Configuring IPSec Profiles (Auto Keying Mode) on the RV160 and RV260

## Objective

This document will demonstrate how to create a new Internet Protocol Security (IPsec) profile using auto keying mode on RV160 and RV260 series routers.

## Introduction

IPsec ensures that you have secure private communication over the Internet. It gives two or more hosts privacy, integrity, and authenticity for transmitting sensitive information over the Internet. IPsec is commonly used in Virtual Private Network (VPN) and is implemented at the IP layer and its use can assist many applications that lack security. A VPN is used to provide a secure communication mechanism for sensitive data and IP information that is transmitted through an unsecure network such as the Internet. It provides a flexible solution for remote users and the organization to protect any sensitive information from other parties on the same network.

In order for the two ends of a VPN tunnel to be successfully encrypted and established, they both need to agree on the methods of encryption, decryption, and authentication. IPsec profile is the central configuration in IPsec that defines the algorithms such as encryption, authentication, and Diffie-Hellman (DH) group for Phase I and II negotiation in auto mode as well as manual keying mode. Phase 1 establishes the pre-shared keys to create a secure authenticated communication. Phase 2 is where the traffic gets encrypted. You can configure most of the IPsec parameters such as protocol, mode, algorithm, Perfect Forward Secrecy (PFS), Security Association (SA) lifetime, and key management protocol.

Note that when you are configuring Site-to-Site VPN, the remote router would need to have the same profile settings as your local router.

Additional information about Cisco IPsec technology can be found in this link: Introduction to Cisco IPSec Technology.

To configure IPsec profile and Site-to-Site VPN using the VPN Setup Wizard, please click the link: Configuring VPN Setup Wizard on the RV160 and RV260.

To configure Site-to-Site VPN, please see the document: Configuring Site-to-Site VPN on the RV160 and RV260.

## Applicable Devices

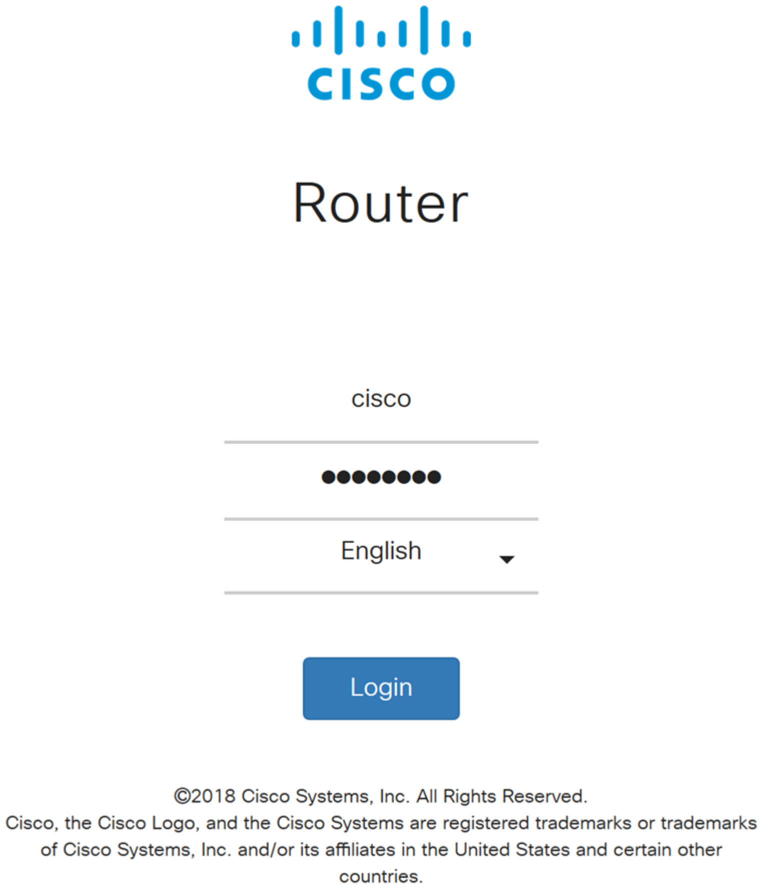
- RV160
- RV260

## Software Version

- 1.0.00.13

## Configuring IPsec Profiles

Step 1. Log into the web configuration page on your router.



Router

cisco

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English

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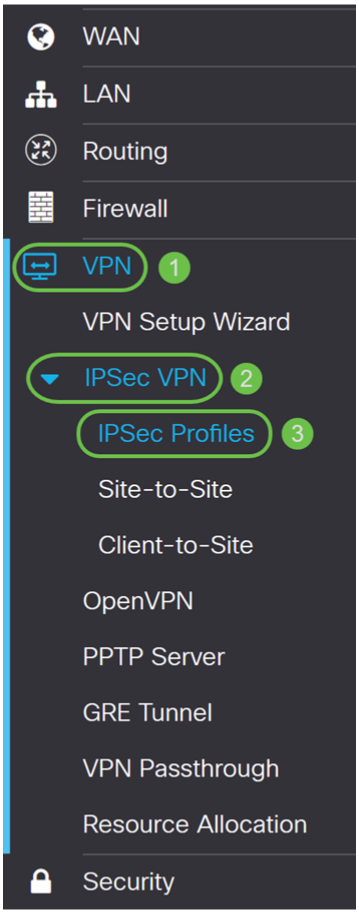
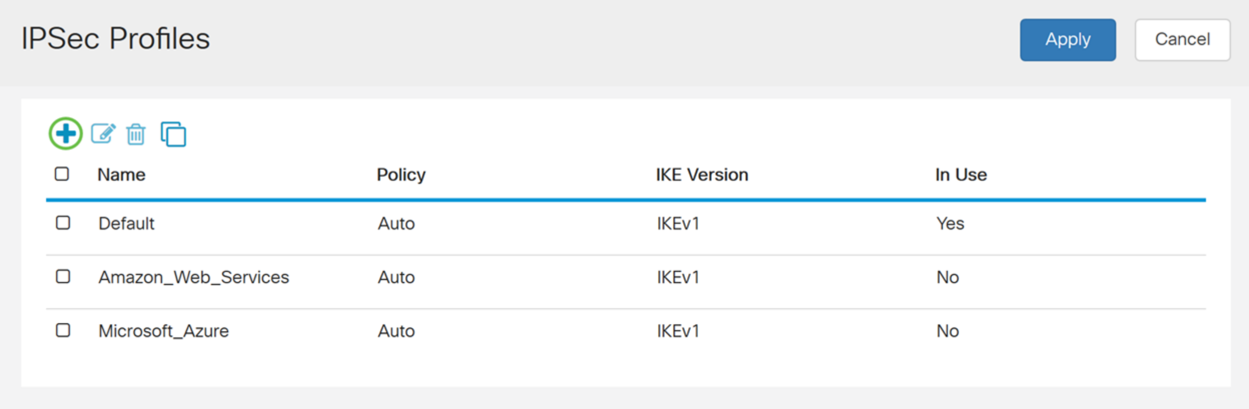
Step 2. Navigate to **VPN > IPSec VPN > IPSec Profiles**.



Step 3. In the *IPSec Profiles* table, click **Add** to create a new IPsec profile. There's also choices to edit, delete, or clone a profile.

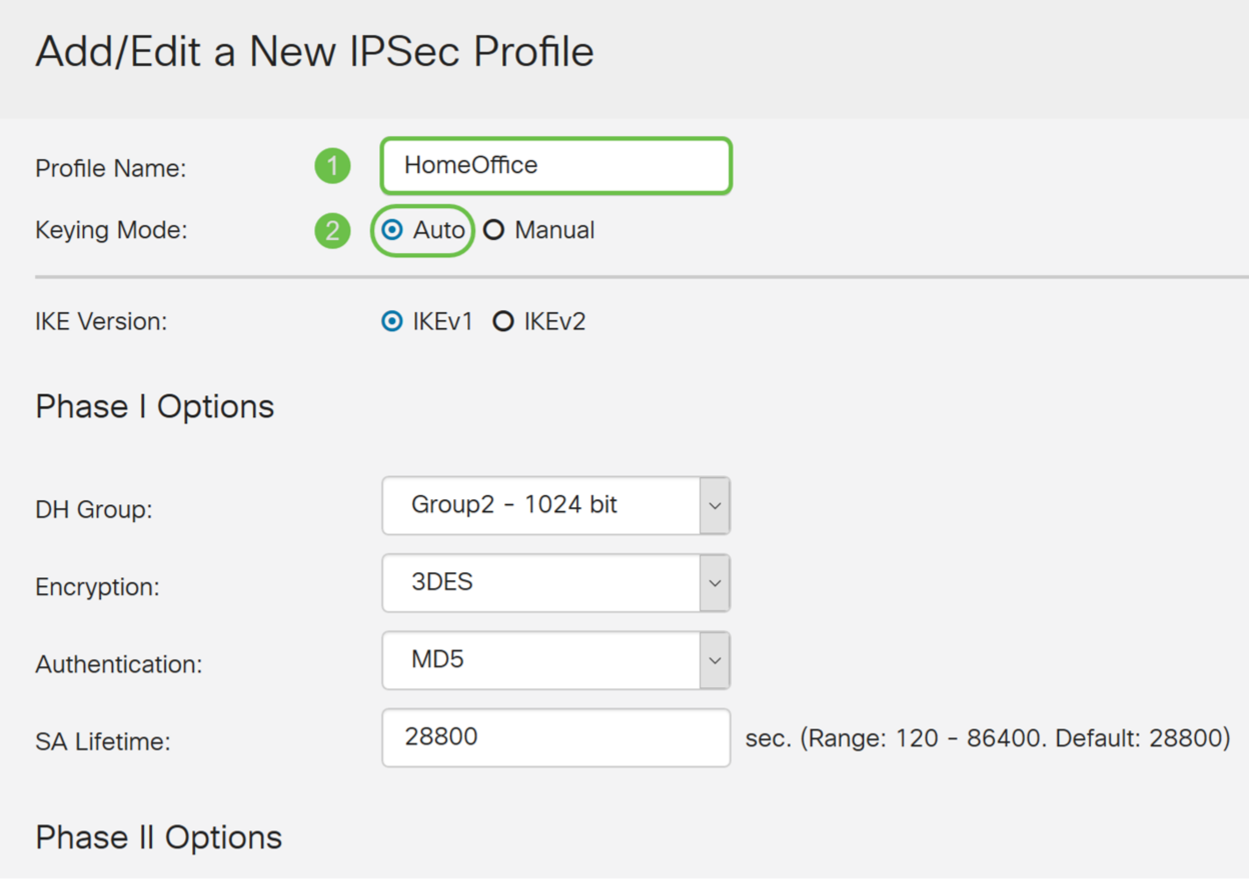


| □ | Name | Policy | IKE Version | In Use |
|---|---|---|---|---|
| □ | Default | Auto | IKEv1 | Yes |
| □ | Amazon_Web_Services | Auto | IKEv1 | No |
| □ | Microsoft_Azure | Auto | IKEv1 | No |

Step 4. Enter a profile name and select the keying mode (Auto or Manual).

**HomeOffice** is entered as the *Profile Name*.

**Auto** is selected for *Keying Mode*.



Add/Edit a New IPSec Profile

Profile Name: HomeOffice

Keying Mode: ● Auto ○ Manual

IKE Version: ● IKEv1 ○ IKEv2

Phase I Options

DH Group: Group2 - 1024 bit

Encryption: 3DES

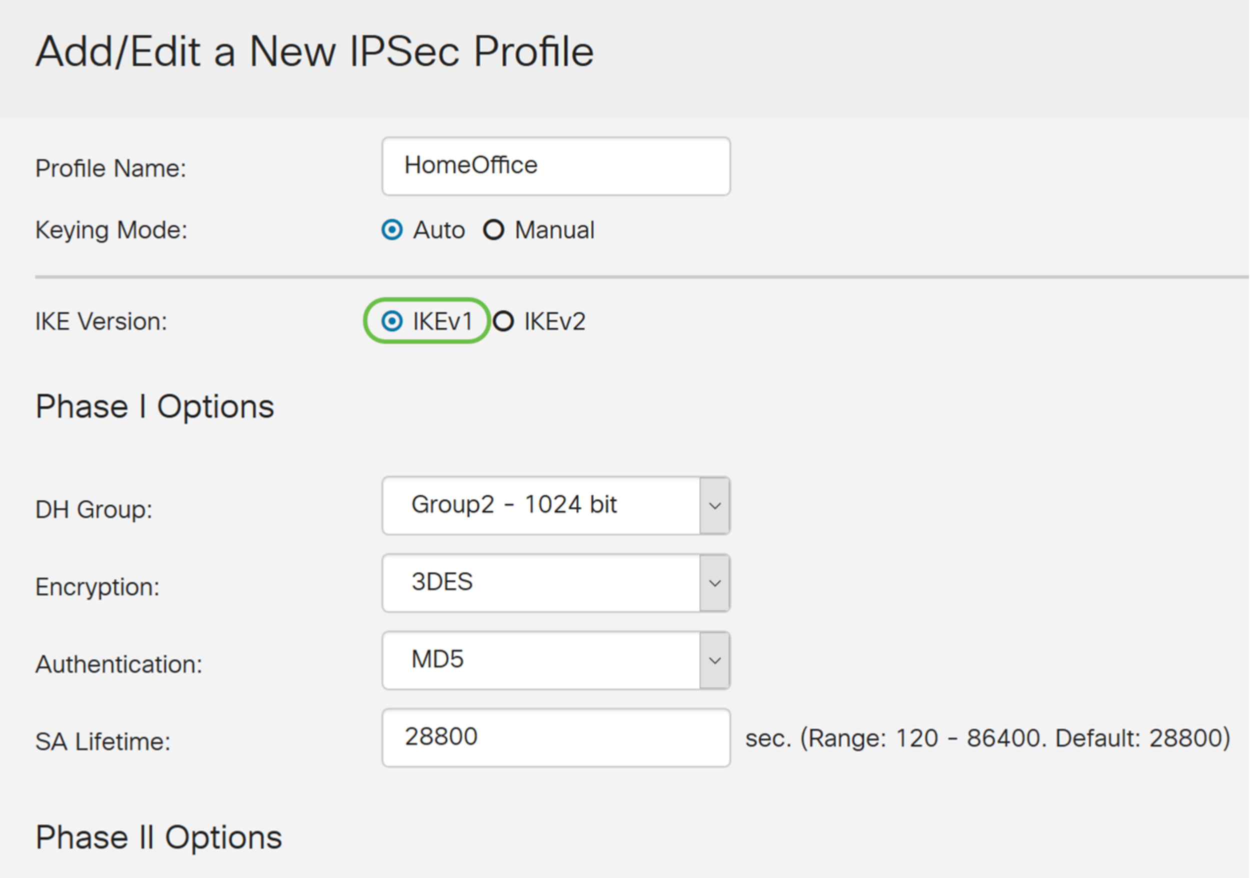
Authentication: MD5

SA Lifetime: 28800 sec. (Range: 120 - 86400. Default: 28800)

Phase II Options

Step 5. Choose *Internet Key Exchange Version 1* (*IKEv1)* or *Internet Key Exchange Version 2 (IKEv2)* as your IKE Version. IKE is a hybrid protocol that implements the Oakley key exchange and the Skeme key exchange inside the Internet Security Association and Key Management Protocol (ISAKMP) framework. Oakley and Skeme both defines how to derive authenticated keying material but Skeme also includes rapid key refreshment. IKE provides authentication of the IPsec peers, negotiates IPsec keys, and negotiates IPsec security associations. IKEv2 is more efficient because it takes less packet to do the key exchange, supports more authentication options while IKEv1 only does shared key and certificate based authentication. In this example, **IKEv1** was selected as our IKE version.

**Note:** If your device supports IKEv2 then it is recommended to use IKEv2. If your devices doesn’t support IKEv2 then use IKEv1.



Add/Edit a New IPSec Profile

| | | |
|---|---|---|
| Profile Name: | HomeOffice | |
| Keying Mode: | ● Auto ○ Manual | |
| IKE Version: | ● IKEv1 ○ IKEv2 | |

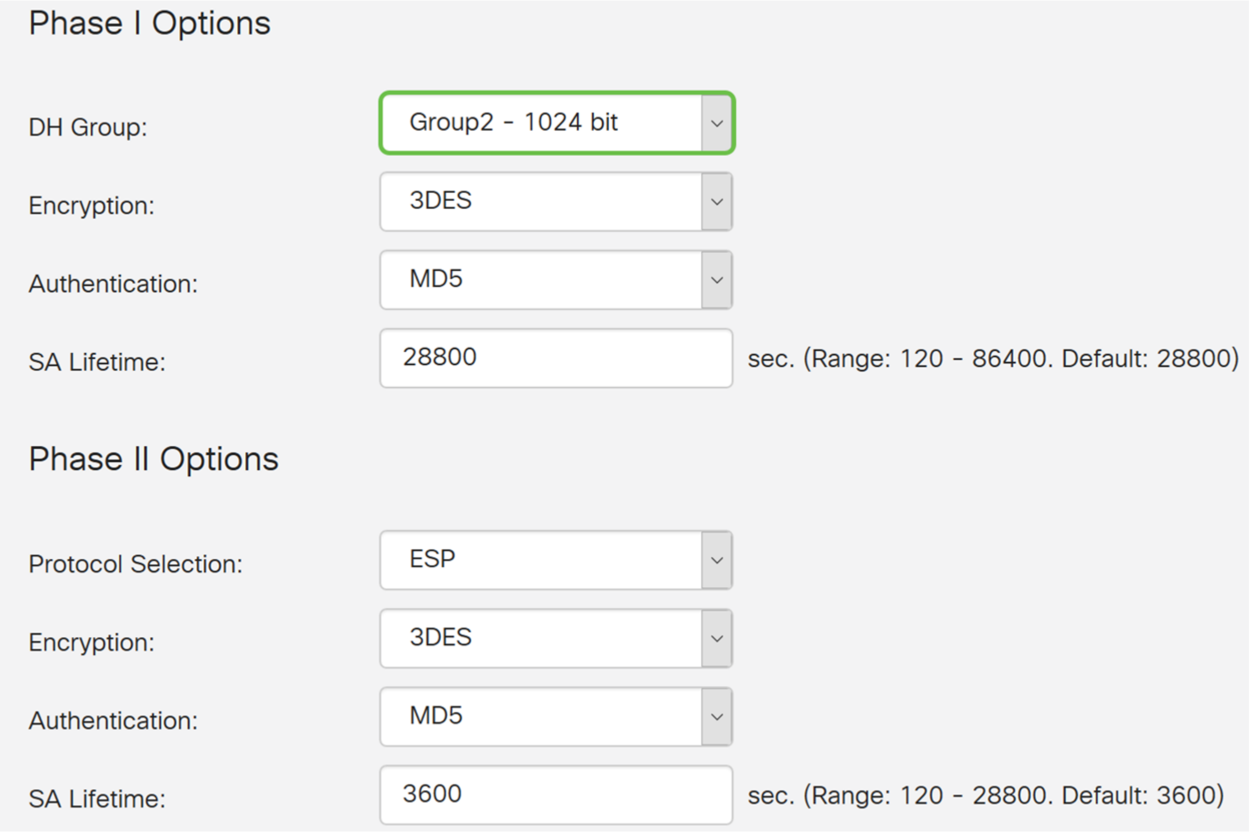
Phase I Options

| | | |
|---|---|---|
| DH Group: | Group2 - 1024 bit | |
| Encryption: | 3DES | |
| Authentication: | MD5 | |
| SA Lifetime: | 28800 | sec. (Range: 120 - 86400. Default: 28800) |

Phase II Options

Step 6. Phase I sets up and exchanges the keys you will be using to encrypt data in phase II. In the *Phase I* section, select a Diffie-Hellman (DH) Group. DH is a key exchange protocol, with two groups of different prime key lengths, **Group 2 - 1024 bit** and **Group 5 - 1536 bit**. We selected **Group 2 – 1024 bit** for this demonstration.

**Note:** For faster speed and lower security, choose Group 2. For slower speed and higher security, choose Group 5. Group 2 is selected as default.



Phase I Options

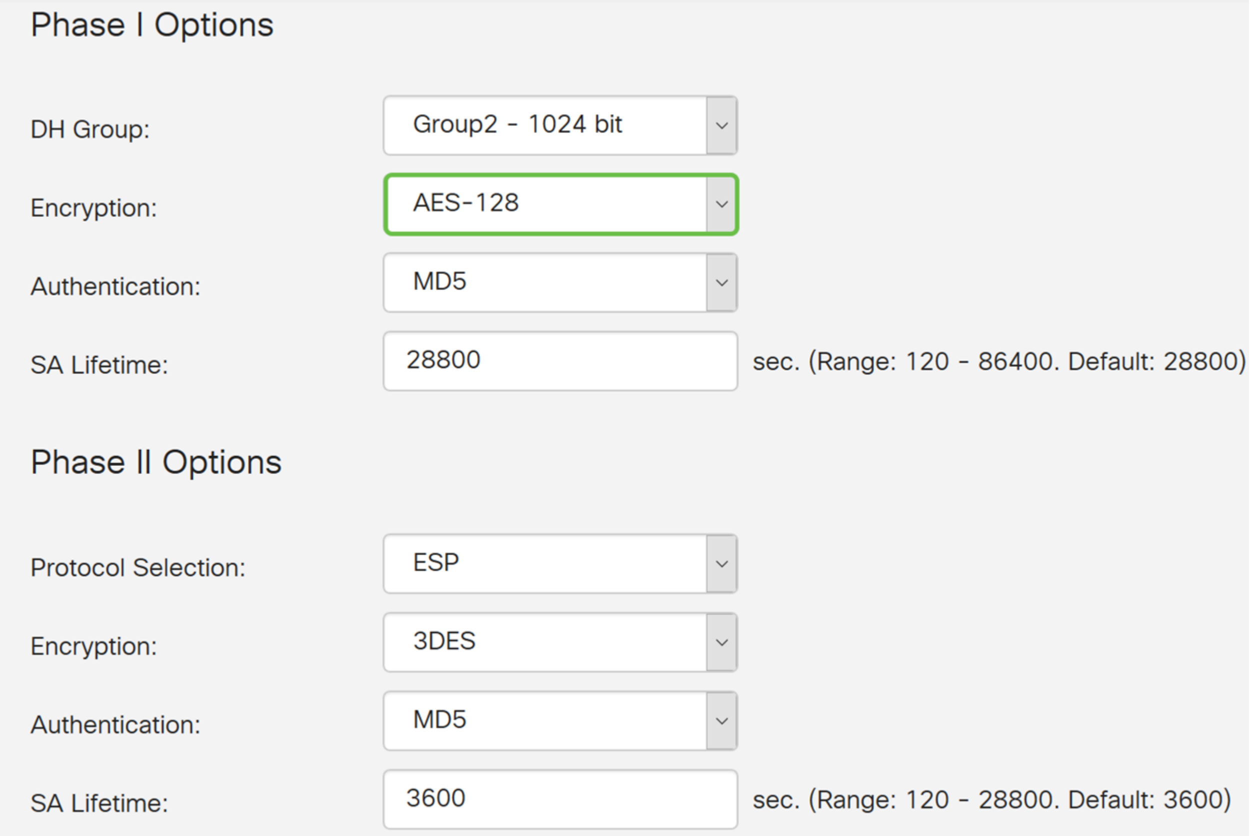
| | | |
|---|---|---|
| DH Group: | Group2 - 1024 bit | |
| Encryption: | 3DES | |
| Authentication: | MD5 | |
| SA Lifetime: | 28800 | sec. (Range: 120 - 86400. Default: 28800) |

Phase II Options

| | | |
|---|---|---|
| Protocol Selection: | ESP | |
| Encryption: | 3DES | |
| Authentication: | MD5 | |
| SA Lifetime: | 3600 | sec. (Range: 120 - 28800. Default: 3600) |

Step 7. Select an encryption option (**3DES**, **AES-128**, **AES-192**, or **AES-256**) from the drop-down list. This method determines the algorithm used to encrypt and decrypt ESP/ISAKMP packets. Triple Data Encryption Standard (3DES) uses DES encryption three times but is now a legacy algorithm. This means that it should only be used when there's no better alternatives since it still provides a marginal but acceptable security level. Users should only use it if it's required for backwards compatibility as it's vulnerable to some "block collision" attacks. It is not recommended to use 3DES as it is not considered secure. Advanced Encryption Standard (AES) is a cryptographic algorithm that is designed to be more secure than DES. AES uses a larger key size which ensures that the only known approach to decrypt a message is for an intruder to try every possible key. It is recommended to use AES if your device can support it. In this example, we selected **AES-128** as our encryption option.

**Note:** Here are some additional resources that may help: Configuring Security for VPNs with IPsec and Next Generation Encryption.



Phase I Options

DH Group: Group2 - 1024 bit

Encryption: AES-128

Authentication: MD5

SA Lifetime: 28800 sec. (Range: 120 - 86400. Default: 28800)

Phase II Options

Protocol Selection: ESP

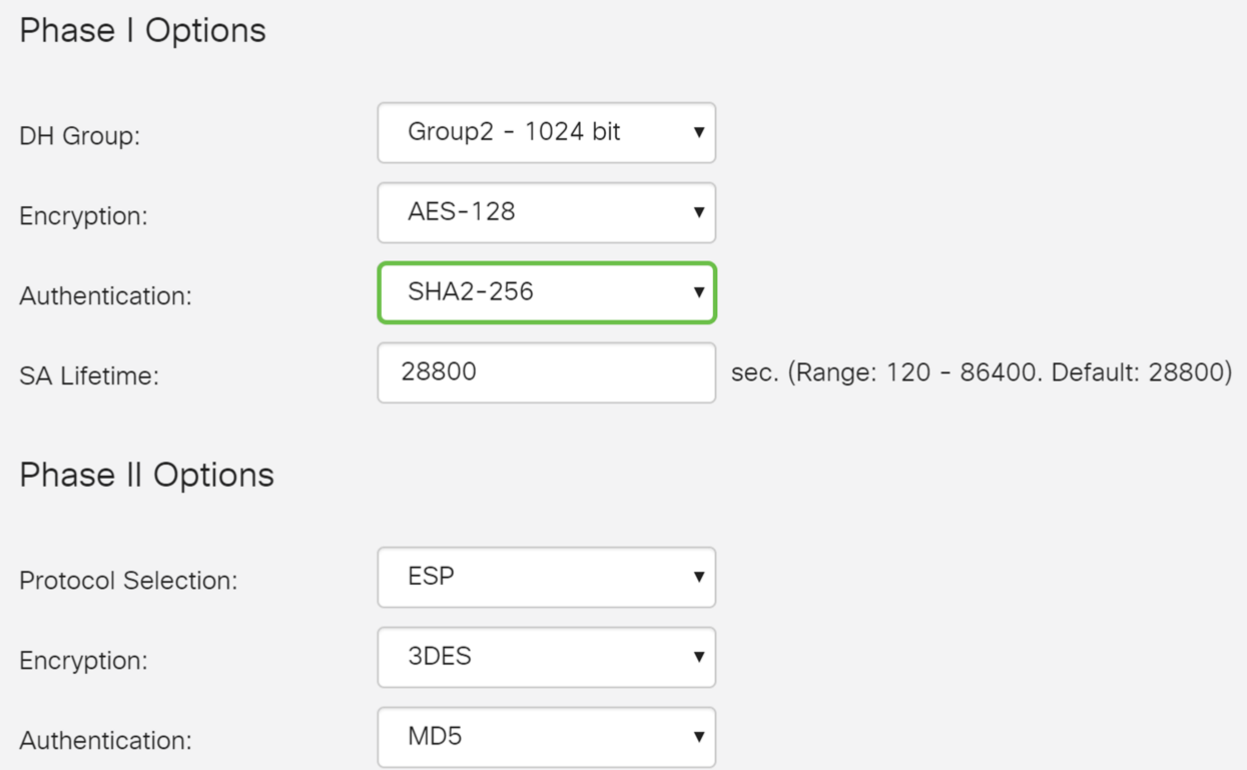
Encryption: 3DES

Authentication: MD5

SA Lifetime: 3600 sec. (Range: 120 - 28800. Default: 3600)

Step 8. The authentication method determines how the ESP header packets are validated. This is the hashing algorithm used in the authentication to validate that side A and side B really are who they say they are. The MD5 is a one-way hashing algorithm that produces a 128-bit digest and is faster than SHA1. The SHA1 is a one-way hashing algorithm that produces a 160-bit digest while SHA2-256 produces a 256-bit digest. SHA2-256 is recommended because it is more secure. Make sure that both ends of the VPN tunnel use the same authentication method. Select an authentication (**MD5, SHA1,** or **SHA2-256**).

**SHA2-256** was selected for this example.



Phase I Options

| | | |
|---|---|---|
| DH Group: | Group2 - 1024 bit | |
| Encryption: | AES-128 | |
| Authentication: | SHA2-256 | |
| SA Lifetime: | 28800 | sec. (Range: 120 - 86400. Default: 28800) |

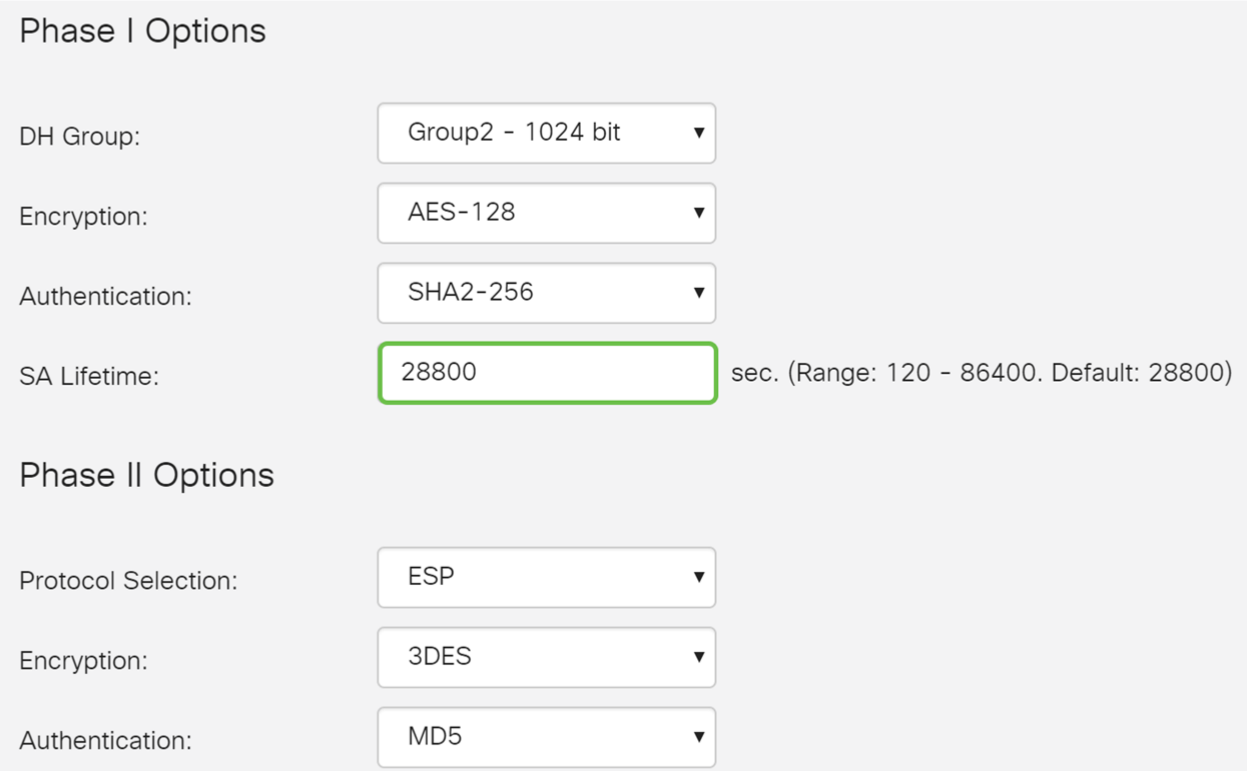
Phase II Options

| | |
|---|---|
| Protocol Selection: | ESP |
| Encryption: | 3DES |
| Authentication: | MD5 |

Step 9. The *SA Lifetime (Sec)* tells you the amount of time an IKE SA is active in this phase. When the SA expires after the respective lifetime, a new negotiation begins for a new one. The range is from 120 to 86400 and the default is 28800.

We will be using the default value of **28800** seconds as our SA Lifetime for Phase I.

**Note:** It is recommended that your SA Lifetime in Phase I is longer than your Phase II SA Lifetime. If you make your Phase I shorter than Phase II, then you will be having to renegotiate the tunnel back and forth frequently as opposed to the data tunnel. Data tunnel is what needs more security so it is better to have the lifetime in Phase II to be shorter than Phase I.



Phase I Options

| | | |
|---|---|---|
| DH Group: | Group2 - 1024 bit | |
| Encryption: | AES-128 | |
| Authentication: | SHA2-256 | |
| SA Lifetime: | 28800 | sec. (Range: 120 - 86400. Default: 28800) |

Phase II Options

| | |
|---|---|
| Protocol Selection: | ESP |
| Encryption: | 3DES |
| Authentication: | MD5 |

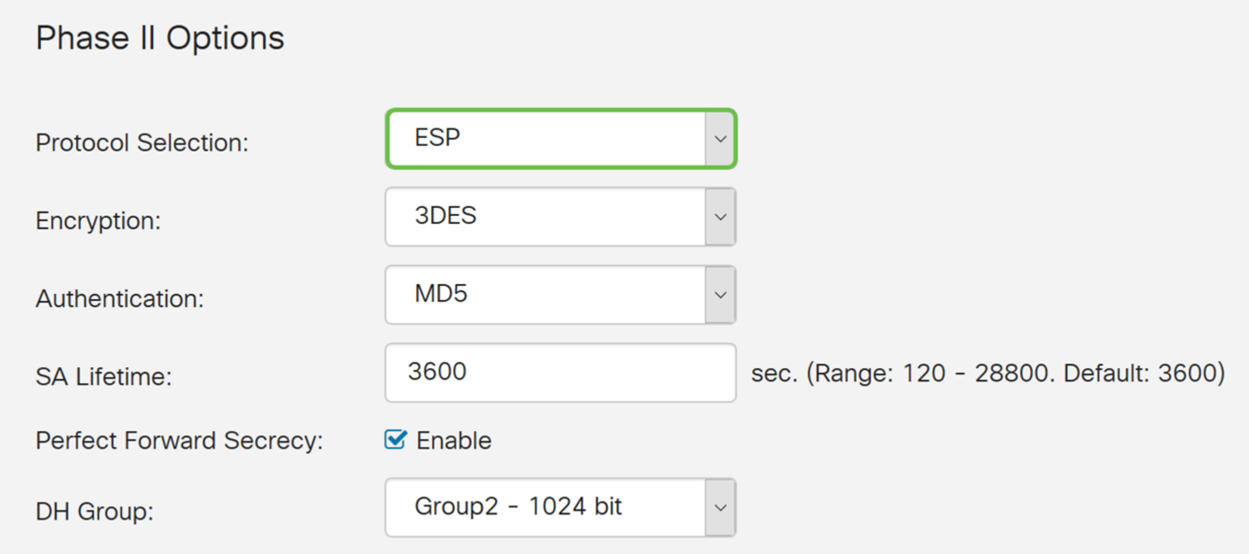
Step 10. Phase II is where you would be encrypting the data that is being passed back and

forth. In the *Phase 2 Options*, Select a protocol from the drop-down list, the options are:

- Encapsulating Security Payload (ESP) – Select ESP for data encryption and enter the encryption.

- Authentication Header (AH) – Select this for data integrity in situations where data is not secret, in other words, it is not encrypted but must be authenticated. It is only used to validate the source and destination of the traffic.

In this example, we will be using **ESP** as our *Protocol Selection*.



Phase II Options

Protocol Selection: ESP

Encryption: 3DES

Authentication: MD5

SA Lifetime: 3600 sec. (Range: 120 - 28800. Default: 3600)

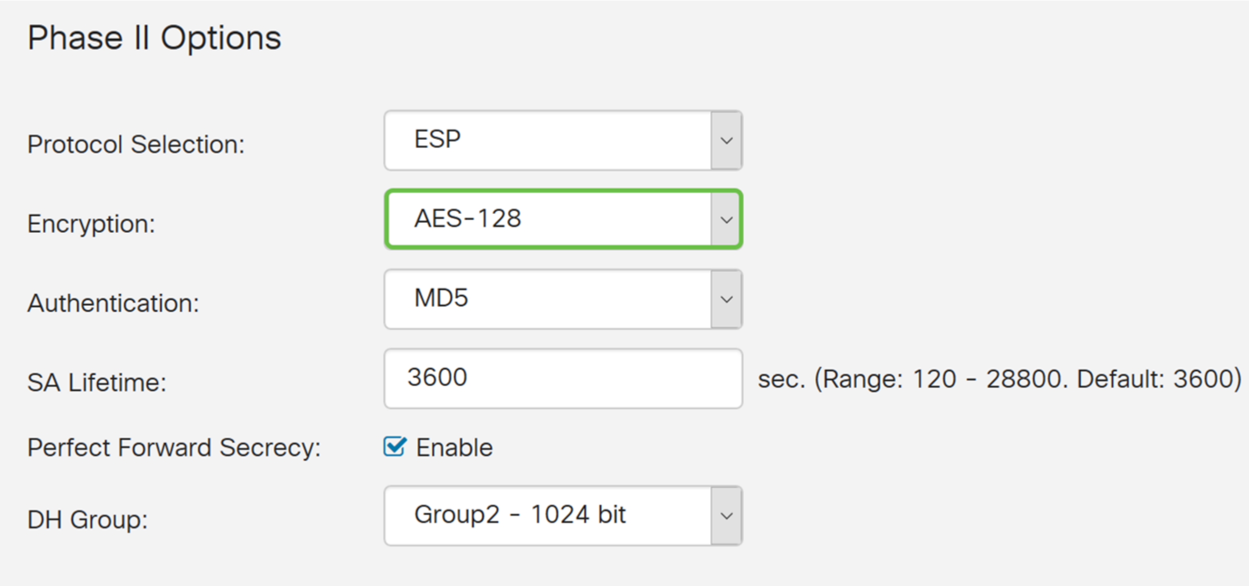
Perfect Forward Secrecy: ☑ Enable

DH Group: Group2 - 1024 bit

Step 11. Select an encryption option (**3DES**, **AES-128**, **AES-192**, or **AES-256**) from the drop-down list. This method determines the algorithm used to encrypt and decrypt ESP/ISAKMP packets.

In this example, we will use **AES-128** as our encryption option.

**Note:** Here are some additional resources that may help: [Configuring Security for VPNs with IPsec]() and [Next Generation Encryption]().



Phase II Options

Protocol Selection: ESP

Encryption: AES-128

Authentication: MD5

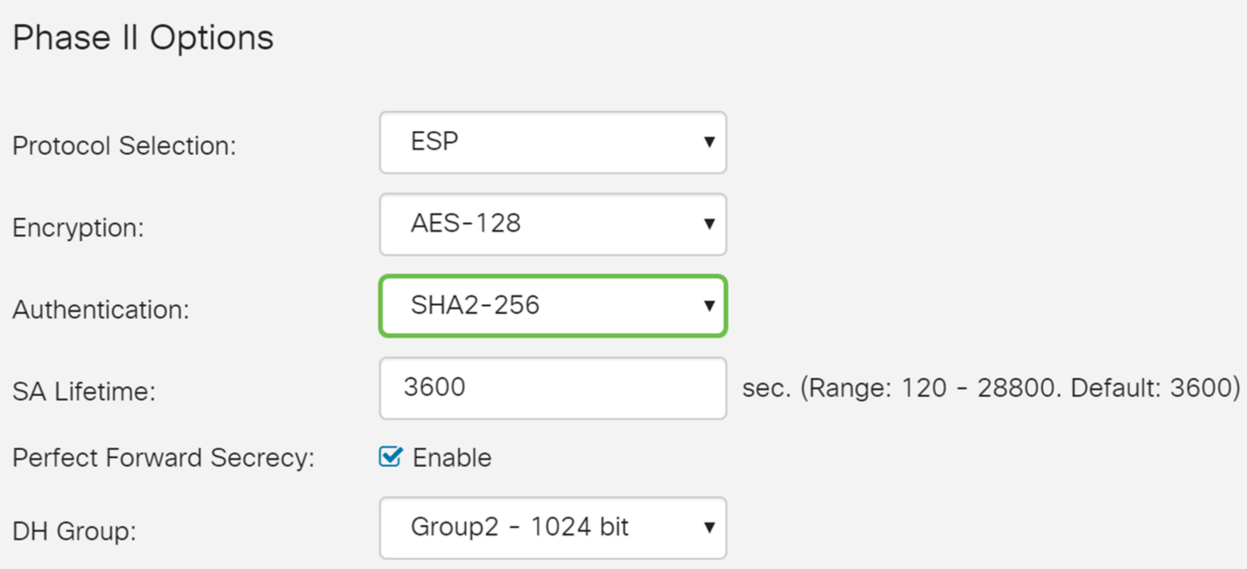
SA Lifetime: 3600 sec. (Range: 120 - 28800. Default: 3600)

Perfect Forward Secrecy: ☑ Enable

DH Group: Group2 - 1024 bit

Step 12. The authentication method determines how the Encapsulating Security Payload Protocol (ESP) header packets are validated. Select an authentication (**MD5, SHA1,** or **SHA2-256**).

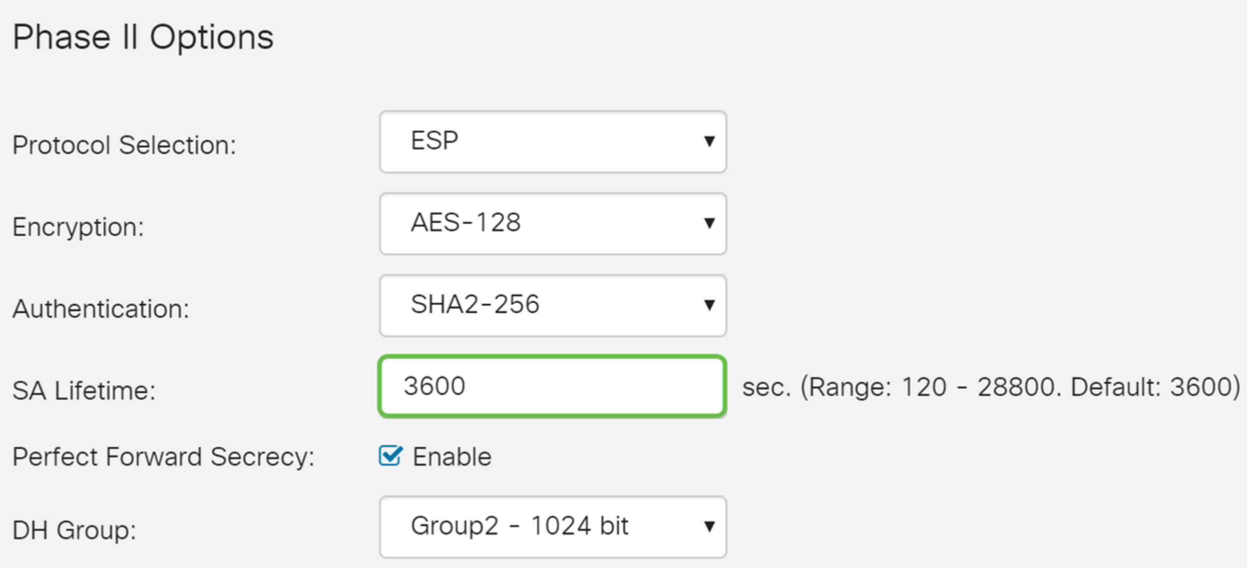
**SHA2-256** was selected for this example.



Phase II Options

| | |
|---|---|
| Protocol Selection: | ESP |
| Encryption: | AES-128 |
| Authentication: | SHA2-256 |
| SA Lifetime: | 3600 sec. (Range: 120 - 28800. Default: 3600) |
| Perfect Forward Secrecy: | ☑ Enable |
| DH Group: | Group2 - 1024 bit |

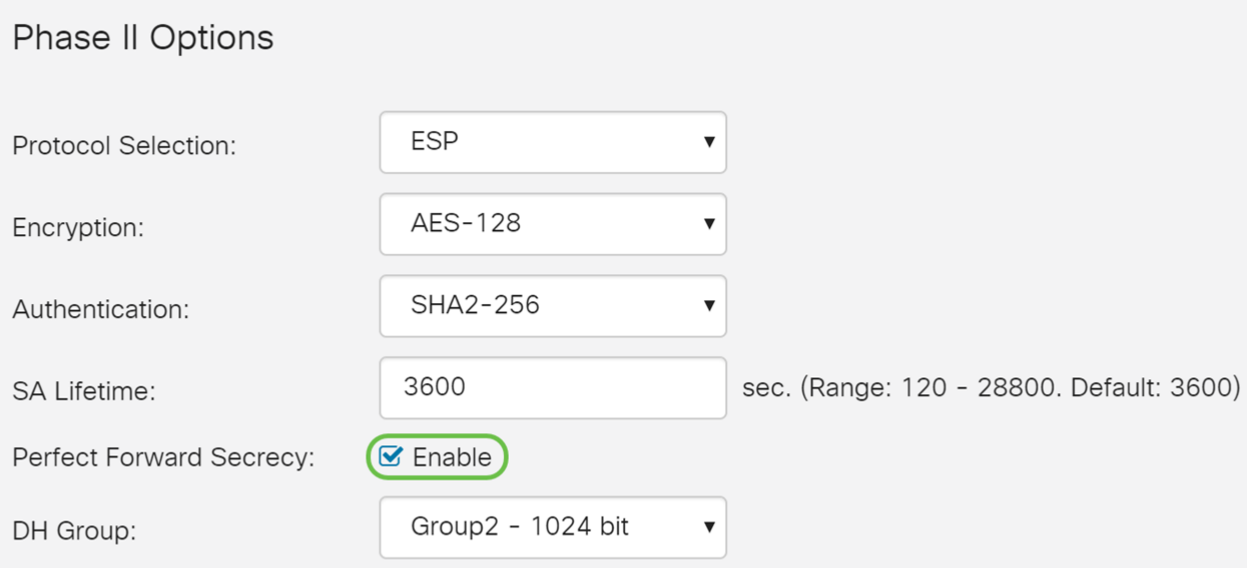
Step 13. Enter the amount of time a VPN tunnel (IPsec SA) is active in this phase. The default value for Phase 2 is 3600 seconds. We will be using the default value for this demonstration.



Phase II Options

| | |
|---|---|
| Protocol Selection: | ESP |
| Encryption: | AES-128 |
| Authentication: | SHA2-256 |
| SA Lifetime: | 3600 sec. (Range: 120 - 28800. Default: 3600) |
| Perfect Forward Secrecy: | ☑ Enable |
| DH Group: | Group2 - 1024 bit |

Step 14. Check **Enable** to enable the perfect forward secrecy. When Perfect Forward Secrecy (PFS) is enabled, IKE Phase 2 negotiation generates new key material for IPsec traffic encryption and authentication. PFS is used to improve the security of communications transmitted across the Internet using public key cryptography. This is recommended if your device supports it.



Phase II Options

Protocol Selection: ESP

Encryption: AES-128

Authentication: SHA2-256

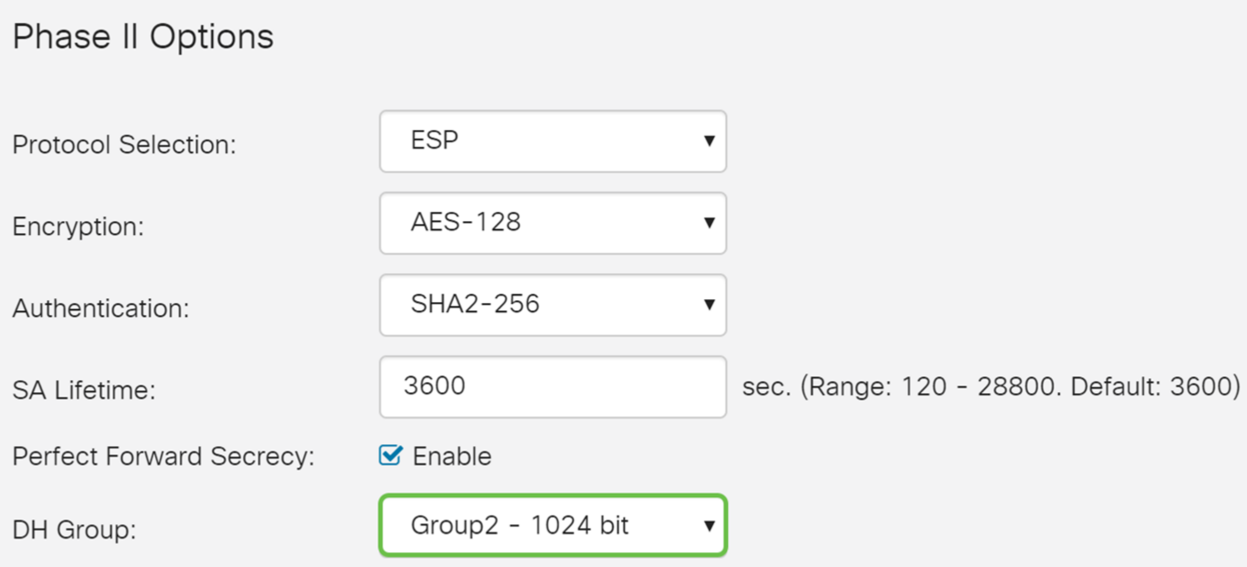
SA Lifetime: 3600 sec. (Range: 120 - 28800. Default: 3600)

Perfect Forward Secrecy: ☑ Enable

DH Group: Group2 - 1024 bit

Step 15. Select a Diffie-Hellman (DH) Group. DH is a key exchange protocol, with two groups of different prime key lengths, **Group 2 - 1024 bit** and **Group 5 - 1536 bit**. We selected **Group 2 – 1024 bit** for this demonstration.

**Note:** For faster speed and lower security, choose Group 2. For slower speed and higher security, choose Group 5. Group 2 is selected by default.



Phase II Options

Protocol Selection: ESP

Encryption: AES-128

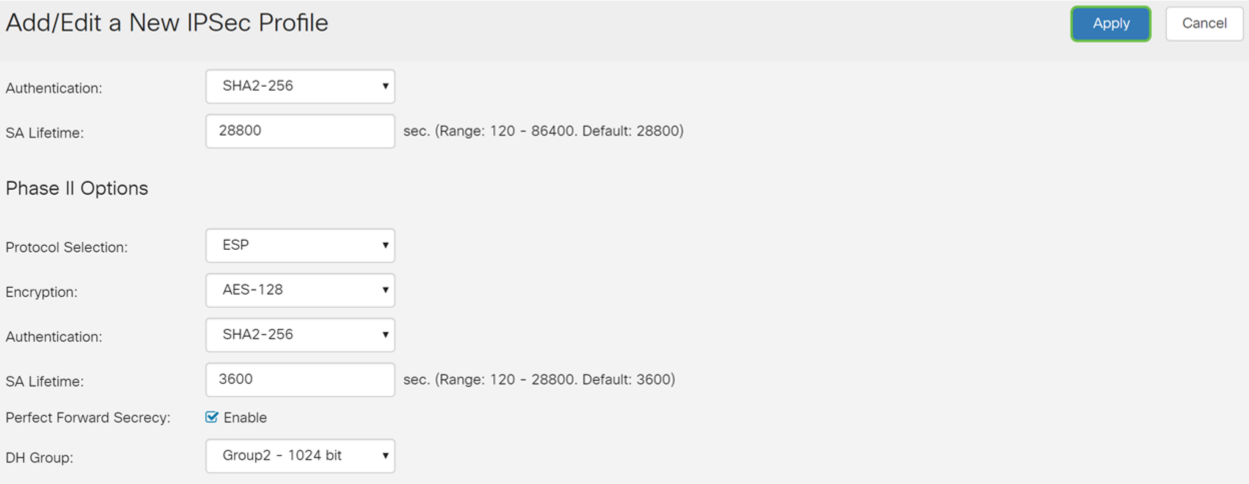
Authentication: SHA2-256

SA Lifetime: 3600 sec. (Range: 120 - 28800. Default: 3600)

Perfect Forward Secrecy: ☑ Enable

DH Group: Group2 - 1024 bit

Step 16. Click **Apply** to add a new IPsec profile.



Add/Edit a New IPSec Profile

Authentication: SHA2-256

SA Lifetime: 28800 sec. (Range: 120 - 86400. Default: 28800)

Phase II Options

Protocol Selection: ESP

Encryption: AES-128

Authentication: SHA2-256

SA Lifetime: 3600 sec. (Range: 120 - 28800. Default: 3600)

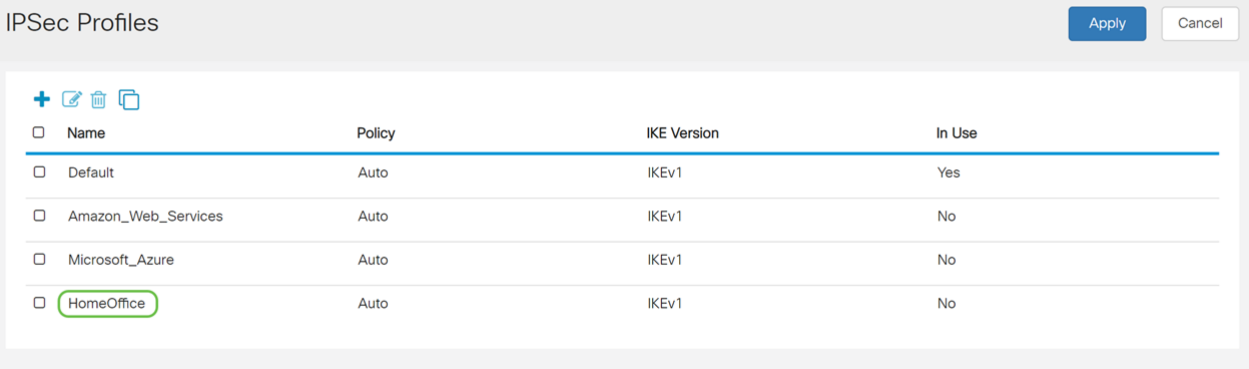
Perfect Forward Secrecy: ☑ Enable

DH Group: Group2 - 1024 bit

## Conclusion

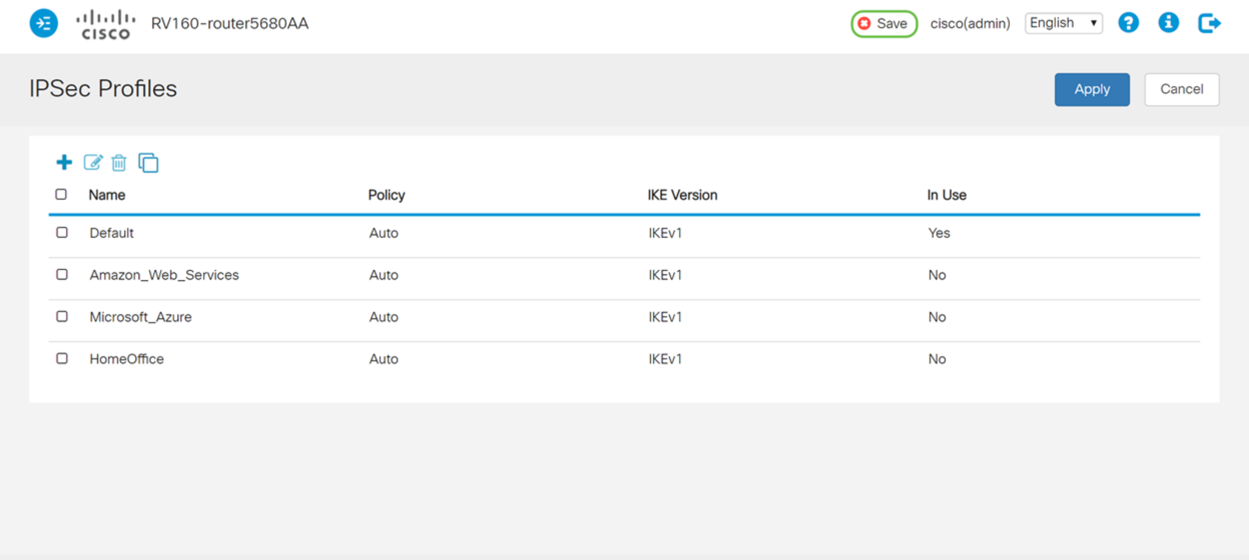
You should now have successfully created a new IPsec profile. Please continue below to verify that your IPsec profile is added. You can also follow the steps to copy your Running Configuration File to the Startup Configuration File so all of your configuration is retained between reboots.

Step 1. After clicking *Apply*, your new IPsec profile should be added.



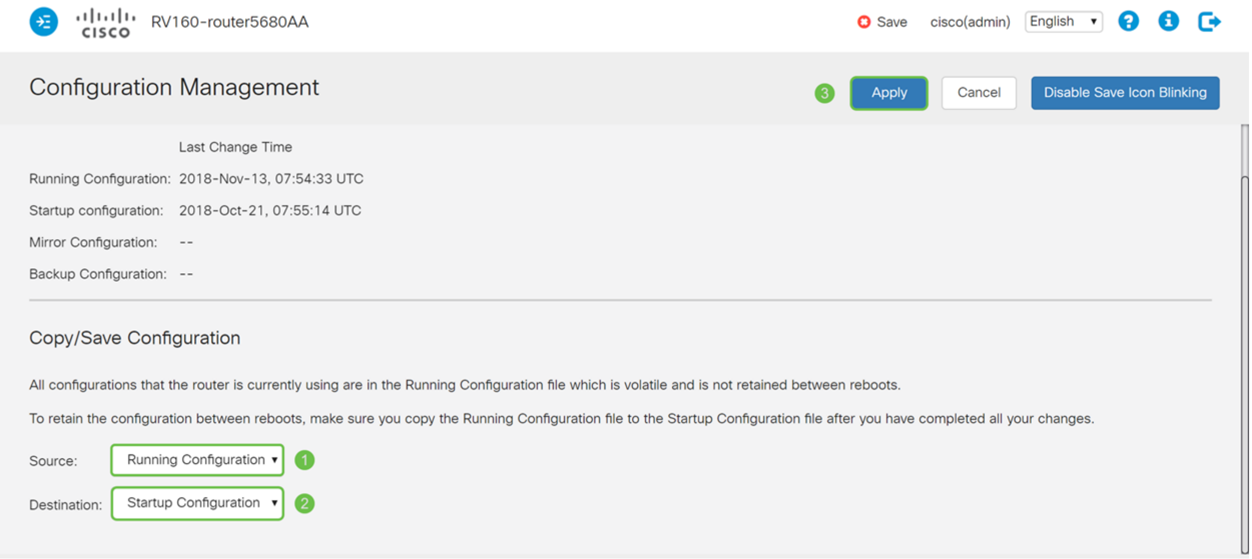
| □ | Name | Policy | IKE Version | In Use |
|---|---|---|---|---|
| □ | Default | Auto | IKEv1 | Yes |
| □ | Amazon_Web_Services | Auto | IKEv1 | No |
| □ | Microsoft_Azure | Auto | IKEv1 | No |
| □ | HomeOffice | Auto | IKEv1 | No |

Step 2. At the top of the page, click the **Save** button to navigate to the *Configuration Management* to save your running configuration to the startup configuration. This is to retain the configuration between reboots.



| □ | Name | Policy | IKE Version | In Use |
|---|---|---|---|---|
| □ | Default | Auto | IKEv1 | Yes |
| □ | Amazon_Web_Services | Auto | IKEv1 | No |
| □ | Microsoft_Azure | Auto | IKEv1 | No |
| □ | HomeOffice | Auto | IKEv1 | No |

Step 3. In the *Configuration Management*, make sure the *Source* is **Running Configuration** and the *Destination* is **Startup Configuration**. Then press **Apply** to save your running configuration to the startup configuration. All configuration that the router is currently using are in the Running Configuration file which is volatile and is not retained between reboots. Copying the Running Configuration file to the Startup Configuration file will retain all the configuration between reboots.



Configuration Management

| | Last Change Time |
|---|---|
| Running Configuration: | 2018-Nov-13, 07:54:33 UTC |
| Startup configuration: | 2018-Oct-21, 07:55:14 UTC |
| Mirror Configuration: | -- |
| Backup Configuration: | -- |

Copy/Save Configuration

All configurations that the router is currently using are in the Running Configuration file which is volatile and is not retained between reboots.

To retain the configuration between reboots, make sure you copy the Running Configuration file to the Startup Configuration file after you have completed all your changes.

Source: Running Configuration

Destination: Startup Configuration