# Configure Advanced Virtual Private Network (VPN) Setup on an RV130 or RV130W Router

## **Objective**

A Virtual Private Network (VPN) is a secure connection established within a network or between networks. VPNs serve to isolate traffic between specified hosts and networks from the traffic of unauthorized hosts and networks. A site-to-site (gateway-to-gateway) VPN connects entire networks to each other, maintaining the security by creating a tunnel over a public domain otherwise known as the Internet. Each site needs only a local connection to the same public network, thereby saving money on long private leasedlines.

VPNs are beneficial to companies in such a way that it is highly scalable, simplifies network topology, and improves productivity by reducing travel time and cost for remote users.

Internet Key Exchange (IKE) is a protocol used to establish a secure connection for communication in a VPN. This secure connection is called a Security Association (SA). You can create IKE policies to define the security parameters to be used in this process such as authentication of the peer, encryption algorithms, and so on. For a VPN to function properly, the IKE policies for both end points should be identical.

This article aims to show how to configure the Advanced VPN Setup on an RV130 or RV130W router, which covers IKE Policy settings and VPN Policy settings.

# **Applicable Devices**

- RV130
- RV130W

#### **Software Version**

• 1.0.3.22

## **Configure Advanced VPN Setup**

#### Add/Edit Internet Key Exchange (IKE) Policy Settings

Step 1. Log in to the web-based utility and choose **VPN > Site-to-Site IPSec VPN >Advanced VPN Setup**.

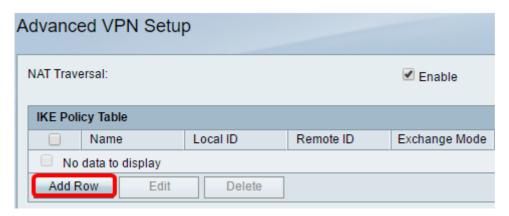


Step 2. (Optional) Check the **Enable** check box in NAT Traversal if you want to enable Network Address Translation (NAT) Traversal for the VPN connection. NAT Traversal allows a VPN connection to be made between gateways that use NAT. Choose this option if your VPN connection passes through a NAT-enabled gateway.



Step 3. In the IKE Policy Table, click **Add Row** to create a new IKE policy.

**Note:** If basic settings have been configured, then the table below will contain the created basic VPN setting. You can edit an existing IKE policy by checking the check box for the policy and click **Edit**. The Advanced VPN Setup page changes:



Step 4. In the *IKE Name* field, enter a unique name for the IKE policy.

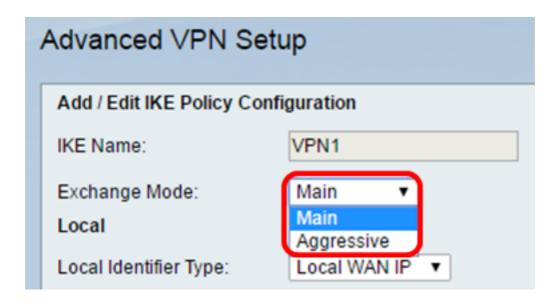
**Note:** If basic settings have been configured, the connection name created would be set as the IKE Name. In this example, VPN1 is the chosen IKE name.

Advanced VPN Setup		
Add / Edit IKE Policy Cont	figuration	
IKE Name:	VPN1	)
Exchange Mode:	Main ▼	
Local Identifier Type:	Local WAN IP ▼	
Local Identifier:		
Remote		
Remote Identifier Type:	Remote WAN IP ▼	
Remote Identifier:		
IKE SA Parameters		
Encryption Algorithm:	AES-128 ▼	
Authentication Algorithm:	SHA-1 ▼	
Authentication Method:	Pre-Shared Key ▼	
Pre-Shared Key:		
DH Group:	Group1 (768 bit) ▼	
SA-Lifetime:	28800	Seconds (Range: 30 - 86400, Default: 28800)
Dead Peer Detection:	Enable	
DPD Delay:	10	(Range: 10 - 999, Default: 10)
DPD Timeout:	30	(Range: 30 - 1000, Default: 30)
Save Cancel	Back	

Step 5. From the Exchange Mode drop-down list, choose an option.

- Main This option allows the IKE policy to negotiate the VPN tunnel with higher security than aggressive mode. Click this option if a more secure VPN connection is a priority over a speed of negotiation.
- Aggressive This option allows the IKE policy to establish a faster but less secure connection than the main mode. Click this option if a faster VPN connection is a priority over a high security.

Note: In this example, Main is chosen.



Step 6. Choose from the Local Identifier Typedrop-down list to identify or specify the Internet Security Association and Key Management Protocol (ISAKMP) of your local router. The options are:

- Local WAN IP Router uses local Wide Area Network (WAN) IP as the main identifier. This
  option connects through the Internet. Choosing this option greys out the Local Identifier field
  below.
- IP Address Clicking this allows you to enter an IP address in the Local Identifier field.
- FQDN A Fully Qualified Domain Name (FQDN) or your domain name such as
   <a href="http://www.example.com">http://www.example.com</a> allows you to enter your domain name or IP address in the Local Identifier field.
- User-FQDN This option is a user email address such as user@email.com. Enter a domain name or an IP address in the *Local Identifier* field.
- DER ASN1 DN This option is an identifier type for the Distinguished Name (DN) that uses
  Distinguished Encoding Rules Abstract Syntax Notation One (DER ASN1) to transmit
  information. This happens when the VPN tunnel is associated with a user certificate. If this is
  chosen, enter a domain name or an IP address in the Local Identifier field.

Note: In this example, Local WAN IP is chosen.

Advanced VPN Setup			
Add / Edit IKE Policy Conf	Add / Edit IKE Policy Configuration		
IKE Name:	VPN1		
Exchange Mode:	Main ▼		
Local			
Local Identifier Type:	Local WAN IP ▼		
Local Identifier:	IP Address FQDN		
Remote Identifier Type:	User-FQDN DER ASN1 DN		

Step 7. Choose from the Remote Identifier Type drop-down list to identify or specify the Internet Security Association and Key Management Protocol (ISAKMP) of your remote router. The options are Remote WAN IP, IP Address, FQDN, User FQDN, and DER ASN1 DN.

**Note:** In this example, Remote WAN IP is chosen.

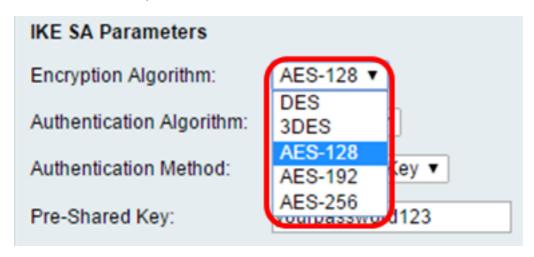


Step 8. Choose an option from the Encryption Algorithm drop-down list.

- DES Data Encryption Standard (DES) is a 56-bit, old encryption method which is not a very secure encryption method, but may be required for backwards compatibility.
- 3DES Triple Data Encryption Standard (3DES) is a 168-bit, simple encryption method used to increase the key size because it encrypts the data three times. This provides more security than DES but less security than AES.
- AES-128 Advanced Encryption Standard with 128-bit key (AES-128) uses a 128-bit key for AES encryption. AES is faster and more secure than DES. In general, AES is also faster and more secure than 3DES. AES-128 is the default encryption algorithm and is faster but less secure than AES-192 and AES-256.

- AES-192 AES-192 uses a 192-bit key for AES encryption. AES-192 is slower but more secure than AES-128, and faster but less secure than AES-256.
- AES-256 AES-256 uses a 256-bit key for AES encryption. AES-256 is slower but more secure than AES-128 and AES-192.

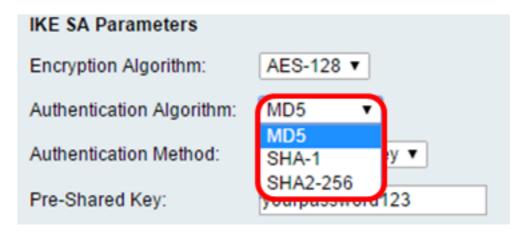
Note: In this example, AES-128 is selected.



Step 9. From the Authentication Algorithm drop-down list, choose from the following options:

- MD5 Message Digest 5 (MD5) is an authentication algorithm that uses a 128-bit hash value for authentication. MD5 is less secure, but faster than SHA-1 and SHA2-256.
- SHA-1 Secure Hash Function 1 (SHA-1) uses a 160-bit hash value for authentication. SHA-1 is slower but more secure than MD5. SHA-1 is the default authentication algorithm and is faster but less secure than SHA2-256.
- SHA2-256 Secure Hash Algorithm 2 with a 256-bit hash value (SHA2-256) uses a 256-bit hash value for authentication. SHA2-256 is slower but more secure than MD5 and SHA-1.

Note: In this example, MD5 is chosen.



Step 10. In the Authentication Method drop-down list, choose from the following options:

- Pre-Shared Key This option requires a password that is shared with the IKE peer.
- RSA-Signature This option uses certificates to authenticate connection. If this is chosen,
   Pre-Shared Key field is disabled. Skip to <a href="Step 12">Step 12</a>.

Note: In this example Pre-Shared key is chosen.

IKE SA Parameters	
Encryption Algorithm:	AES-128 ▼
Authentication Algorithm:	MD5 ▼
Authentication Method:	Pre-Shared Key ▼
Pre-Shared Key:	Pre-Shared Key RSA-Signature
DH Group:	Group2 (1024 bit) ▼

Step 11. In the *Pre-Shared Key* field, enter a password that is between 8 and 49 characters in length.

**Note:** In this example, yourpassword123 is used.

IKE SA Parameters	
Encryption Algorithm:	AES-128 ▼
Authentication Algorithm:	MD5 ▼
Authentication Method:	Pre-Shared Key ▼
Pre-Shared Key:	yourpassword123

<u>Step 12.</u> From the DH Group drop-down list, choose which Diffie-Hellman (DH) group algorithm the IKE uses. Hosts in a DH group can exchange keys without the knowledge of each other. The higher the group bit number is, the better the security.

**Note:** In this example, Group1 is chosen.

DH Group: SA-Lifetime:	Group1 (768 bit) ▼ Group1 (768 bit) Group2 (1024 bit)	Seconds (Range: 30 - 86400, Default: 28800)
Dead Peer Detection:	Group5 (1536 bit)	
DPD Delay:	10	(Range: 10 - 999, Default: 10)
DPD Timeout	30	(Range: 30 - 1000, Default: 30)
Save Cancel	Back	

Step 13. In the SA-Lifetime field, enter how long in seconds an SA for the VPN lasts before

the SA is renewed. The range is from 30 to 86400 seconds. The default is 28800.

DH Group:	Group1 (768 bit) ▼	
SA-Lifetime:	28800	Seconds (Range: 30 - 86400, Default: 28800)
Dead Peer Detection:	Enable	
DPD Delay:	10	(Range: 10 - 999, Default: 10)
DPD Timeout	30	(Range: 30 - 1000, Default: 30)
Save Cancel	Back	

Step 14. (Optional) Check the **Enable** Dead Peer Detection check box to enable Dead Peer Detection (DPD). DPD monitors IKE peers to see if a peer has ceased to function or is still alive. If the peer is detected as dead, the device deletes the IPsec and IKE Security Association. DPD prevents the waste of network resources on inactive peers.

**Note:** If you do not wish to enable Dead Peer Detection, skip to <u>Step 17</u>.

Dead Peer Detection:	Enable	
DPD Delay:	10	(Range: 10 - 999, Default: 10)
DPD Timeout:	30	(Range: 30 - 1000, Default: 30)
Save Cancel	Back	

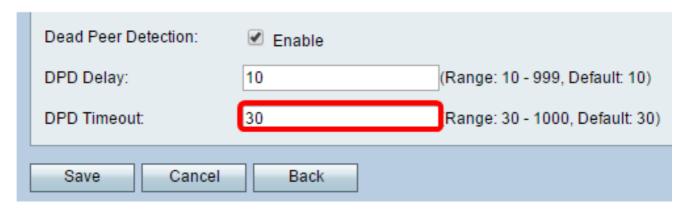
Step 15. (Optional) If you enabled DPD in <u>Step 14</u>, enter how often (in seconds) the peer is checked for activity in the *DPD Delay* field.

**Note:** The DPD Delay is the interval in seconds between consecutive DPD R-U-THERE messages. DPD R-U-THERE messages are sent only when the IPsec traffic is idle. The default value is 10.

Dead Peer Detection:	✓ Enable	
DPD Delay:	10	Range: 10 - 999, Default: 10)
DPD Timeout:	30	(Range: 30 - 1000, Default: 30)
Save Cancel	Back	

Step 16. (Optional) If you enabled DPD in <u>Step 14</u>, enter how many seconds to wait before an inactive peer is dropped in the *DPD Timeout* field.

**Note:** This is the maximum time that the device should wait to receive a response to the DPD message before considering the peer to be dead. The default value is 30.



Step 17. Click Save.

,	Advanced VPN Set	ир	
	Add / Edit IKE Policy Conf	iguration	
	IKE Name:	VPN1	
	Exchange Mode: Local	Main ▼	
	Local Identifier Type:	Local WAN IP ▼	
	Local Identifier:		
	Remote		
	Remote Identifier Type:	Remote WAN IP ▼	
	Remote Identifier:		
	IKE SA Parameters		
	Encryption Algorithm:	AES-128 ▼	
	Authentication Algorithm:	MD5 ▼	
	Authentication Method:	Pre-Shared Key ▼	
	Pre-Shared Key:	yourpassword123	
	DH Group:	Group2 (1024 bit) ▼	
	SA-Lifetime:	28800	Seconds (Range: 30 - 86400, Defa
	Dead Peer Detection:	Enable	
	DPD Delay:	10	(Range: 10 - 999, Default: 10)
	DPD Timeout:	30	(Range: 30 - 1000, Default: 30)
1	Onus.	Doct	
	Save Cancel	Back	

Note: The main Advanced VPN Setup page re-appears.

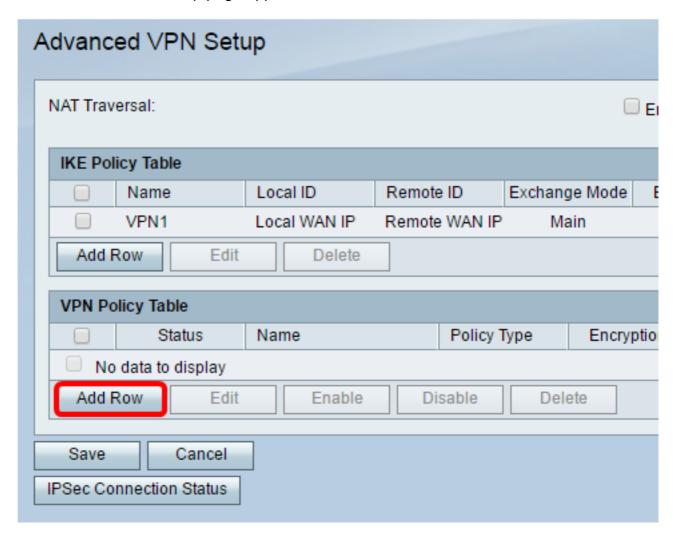
You should now have successfully configured the IKE Policy Settings on your router.

## **Configure VPN Policy Settings**

**Note:** For a VPN to function properly, the VPN policies for both end points should be identical.

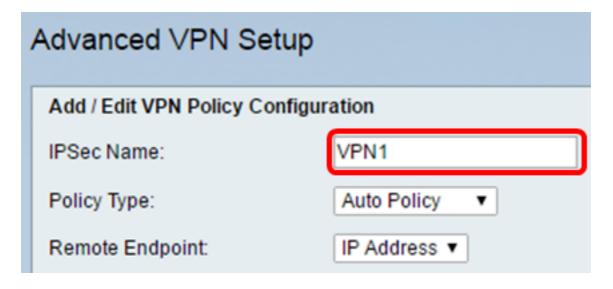
Step 1. In the VPN Policy Table, click **Add Row** to create a new VPN policy.

**Note**: You can also edit a VPN policy by checking the check box for the policy and click **Edit**. The Advanced VPN Setup page appears:



Step 2. In the *IPSec Name* field under the Add/Edit VPN Configuration area, enter a name for the VPN policy.

Note: In this example, VPN1 is used.



Step 3. From the Policy Type drop-down list, choose an option.

• Manual Policy — This option allows you to manually configure the keys for data encryption

and integrity for the VPN tunnel. If this is chosen, the configuration settings under the Manual Policy Parameters area are enabled. Continue the steps until Remote Traffic Selection. Click <a href="here">here</a> to know the steps.

Auto Policy — Policy parameters are set automatically. This option uses an IKE policy for data
integrity and encryption key exchanges. If this is chosen the configuration settings under the
Auto Policy Parameters area are enabled. Click <a href="here">here</a> to know the steps. Make sure that your
IKE protocol automatically negotiates between the two VPN endpoints.

Note: In this example, Auto Policy is chosen.

Advanced VPN Setup			
Add / Edit VPN Policy Config	uration		
IPSec Name:	VPN1		
Policy Type:	Auto Policy ▼		
Remote Endpoint:	Auto Policy Manual Policy		

Step 4. From the Remote Endpoint drop-down list, choose an option.

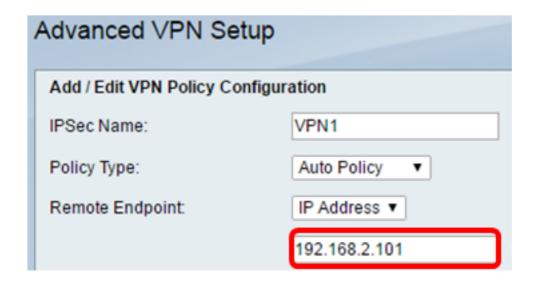
- IP Address This option identifies the remote network by a public IP address.
- FQDN Complete domain name for a specific computer, or host, or the Internet. The FQDN consists of two parts: the hostname and the domain name. This option can only be enabled when Auto Policy is selected in <a href="Step 3">Step 3</a>.

Note: For this example, IP Address is chosen.

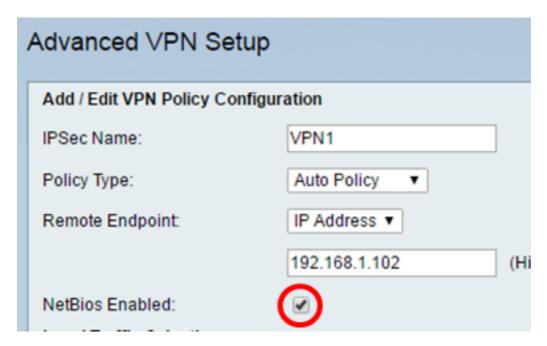
Advanced VPN Setup		
Add / Edit VPN Policy Configur	ation	
IPSec Name:	VPN1	
Policy Type:	Auto Policy ▼	
Remote Endpoint:	IP Address ▼ IP Address	
	FQDN	

Step 5. In the *Remote Endpoint* field, enter either the public IP address or domain name of the remote address.

**Note:** In this example, 192.168.2.101 is used.



Step 6. (Optional) Check the **NetBios Enabled** check box if you want to enable Network Basic Input/Output System (NetBIOS) broadcasts to be sent through the VPN connection. NetBIOS allows hosts to communicate with each other within a Local Area Network (LAN).



<u>Step 7.</u> From the Local IP drop-down list under the Local Traffic Selection area, choose an option.

- Single Limits the policy to one host.
- Subnet Allows hosts within an IP address range to connect to the VPN.

**Note:** In this example, Subnet is chosen.



Step 8. In the IP Address field, enter the host or subnet IP address of the local subnet or host.

**Note:** In this example, the local subnet IP Address of 10.10.10.1 is used.

Local Traffic Selection		
Local IP:	Subnet ▼	
IP Address:	10.10.10.1	
Subnet Mask:	255.255.0.0	

Step 9. (Optional) If Subnet is selected in <u>Step 7</u>, enter the subnet mask of the client in the *Subnet Mask* Field. The Subnet Mask field is disabled if Single is chosen in Step 1.

**Note:** In this example, the subnet mask of 255.255.0.0 is used.

Local Traffic Selection	
Local IP:	Subnet ▼
IP Address:	10.10.10.1
Subnet Mask:	255.255.0.0

<u>Step 10.</u> From the Remote IP drop-down list under the Remote Traffic Selection area, choose an option.

- Single Limits the policy to one host.
- Subnet Allows hosts within an IP address range to connect to the VPN.

Note: In this example, Subnet is chosen.

Remote Traffic Selection	
Remote IP:	Subnet ▼
IP Address:	Single Subnet
Subnet Mask:	

Step 11. Enter the range of IP addresses of the host that will be part of the VPN in the *IP Address* field. If **Single** is selected in <u>Step 10</u>, enter an IP address.

**Note:** In the example below, 10.10.11.2 is used.

Remote	Traffic Selection		
Remote	P:	Subnet ▼	
IP Addre	SS:	10.10.11.2	)
Subnet N	flask:	255.255.0.0	

Step 12. (Optional) If **Subnet** is selected in <u>Step 10</u>, enter the subnet mask of the subnet IP address in the *Subnet Mask* field.

**Note:** In the example below, 255.255.0.0 is used.

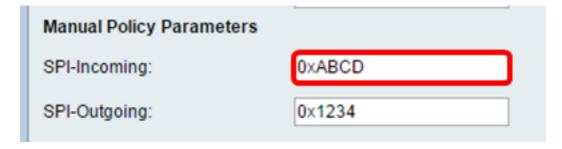
Remote Traffic Selection		
Remote IP:	Subnet ▼	
IP Address:	10.10.11.2	(Hint: 1.2.3.4)
Subnet Mask:	255.255.0.0	(Hint: 255.255.255.0)

#### **Manual Policy Parameters**

**Note:** These fields can only be edited if **Manual Policy** is chosen.

Step 1. In the *SPI-Incoming* field, enter a three to eight hexadecimal characters for Security Parameter Index (SPI) tag for incoming traffic on the VPN connection. The SPI tag is used to distinguish the traffic of one session from the traffic of other sessions.

**Note:** For this example, 0xABCD is used.



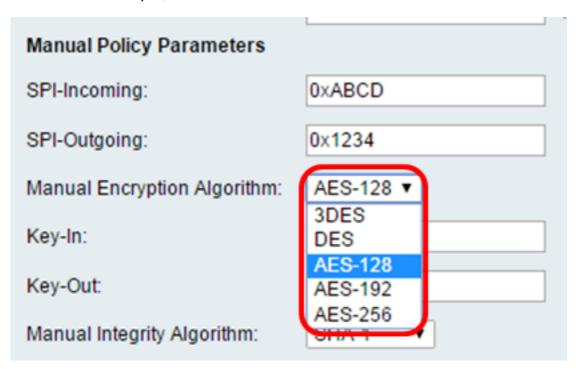
Step 2. In the *SPI-Outgoing* field, enter three to eight hexadecimal characters for SPI tag for outgoing traffic on the VPN connection.

Note: For this example, 0x1234 is used.

Manual Policy Parameters	
SPI-Incoming:	0xABCD
SPI-Outgoing:	0x1234

<u>Step 3.</u> From the Manual Encryption Algorithm drop-down list, choose an option. The options are DES, 3DES, AES-128, AES-192, and AES-256.

**Note:** In this example, AES-128 is chosen.



Step 4. In the *Key-In* field, enter a key for the inbound policy. The key length depends on the algorithm chosen in <u>Step 3</u>.

- DES uses an 8-character key.
- 3DES uses a 24-character key.
- AES-128 uses a 16-character key.
- AES-192 uses a 24-character key.
- AES-256 uses a 32-character key.

Note: In this example, 123456789ABCDEFG is used.



Step 5. In the *Key-Out* field, enter a key for the outgoing policy. The key length depends on the algorithm chosen in <u>Step 3</u>.

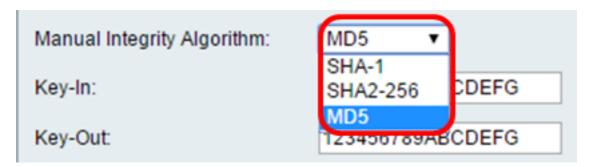
**Note:** In this example, 123456789ABCDEFG is used.

Manual Encryption Algorithm:	AES-128 ▼
Key-In:	123456789ABCDEFG
Key-Out:	123456789ABCDEFG

Step 6. From the Manual Integrity Algorithm drop-down list, choose an option.

- MD5 Uses a 128-bit hash value for data integrity. MD5 is less secure but faster than SHA-1 and SHA2-256.
- SHA-1 Uses a 160-bit hash value for data integrity. SHA-1 is slower but more secure than MD5, and SHA-1 is faster but less secure than SHA2-256.
- SHA2-256 Uses a 256-bit hash value for data integrity. SHA2-256 is slower but secure than MD5 and SHA-1.

Note: In this example, MD5 is chosen.



Step 7. In the *Key-In field*, enter a key for the inbound policy. The key length depends on the algorithm chosen in Step 6.

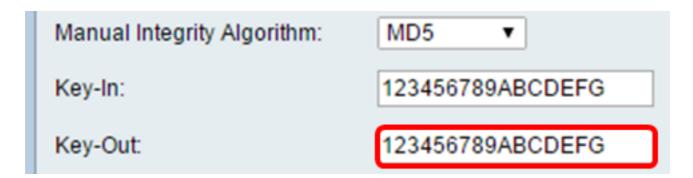
- MD5 uses a 16-character key.
- SHA-1 uses a 20-character key.
- SHA2-256 uses a 32-character key.

Note: In this example, 123456789ABCDEFG is used.



Step 8. In the *Key-Out field*, enter a key for the outgoing policy. The key length depends on the algorithm chosen in Step 6.

**Note:** In this example, 123456789ABCDEFG is used.



#### **Auto Policy Parameters**

**Note:**Before you create an Auto VPN Policy, ensure that you create the IKE Policy based on which you want to create the auto VPN policy. These fields can only be edited if **Auto Policy** is selected in <u>Step 3</u>.

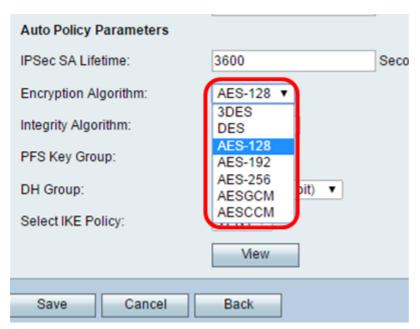
Step 1. In the *IPSec SA-Lifetime field*, enter how long in seconds the SA lasts before renewal. The range is from 30-86400. The default is 3600.



Step 2. From the Encryption Algorithm drop-down list, choose an option. The options are:

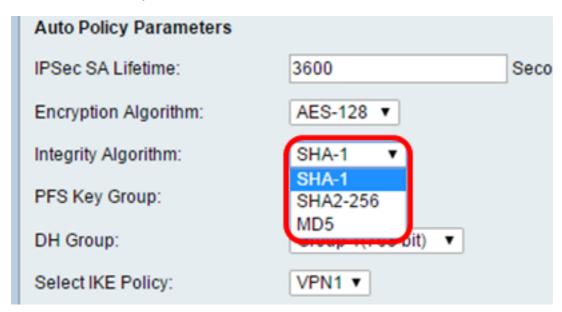
**Note:** In this example, AES-128 is chosen.

- DES A 56-bit, old encryption method which is not a very secure encryption method, but may be required for backwards compatibility.
- 3DES A 168-bit, simple encryption method used to increase the key size because it encrypts the data three times. This provides more security than DES but less security than AES.
- AES-128 Uses a 128-bit key for AES encryption. AES is faster and more secure than DES.
   In general, AES is also faster and more secure than 3DES. AES-128 is faster but less secure than AES-192 and AES-256.
- AES-192 Uses a 192-bit key for AES encryption. AES-192 is slower but more secure than AES-128, and faster but less secure than AES-256.
- AES-256 Uses a 256-bit key for AES encryption. AES-256 is slower but more secure than AES-128 and AES-192.
- AESGCM Advanced Encryption Standard Galois Counter Mode is a generic authenticated encryption block cipher mode. GCM authentication uses operations that are particularly well suited to efficient implementation in hardware, making it especially appealing for high-speed implementations, or for implementations in an efficient and compact circuit.
- AESCCM Advanced Encryption Standard Counter with CBC-MAC Mode is a generic authenticated encryption block cipher mode. CCM is well suited for use in compact software implementations.



Step 3. From the Integrity Algorithm drop-down list, choose an option. The options are MD5, SHA-1, and SHA2-256.

Note: In this example, SHA-1 is chosen.



<u>Step 4.</u> Check the **Enable** check box in the PFS Key Group to enable Perfect Forward Secrecy (PFS). PFS increases the VPN security, but slows down the speed of connection.

Auto Policy Parameters	
IPSec SA Lifetime:	3600 Seconds
Encryption Algorithm:	AES-128 ▼
Integrity Algorithm:	SHA-1 ▼
PFS Key Group:	Enable
DH Group:	Group 1(768 bit) ▼
Select IKE Policy:	VPN1 ▼
	View
Save Cancel	Back

Step 5. (Optional) If you chose to enable PFS in <u>Step 4</u>, choose a DH group to join from the DH group drop-down list. The higher the group number is, the better the security.

Note: For this example, Group 1 is chosen.

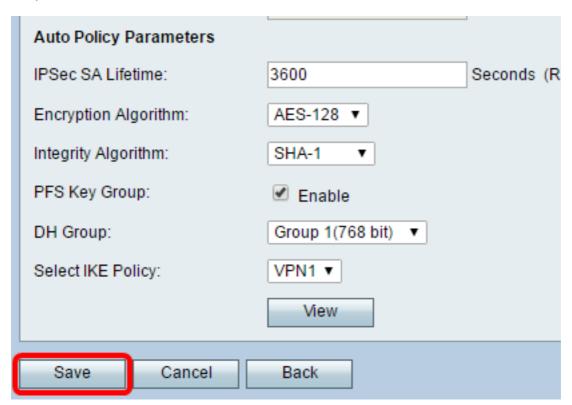
Auto Policy Parameters	
IPSec SA Lifetime:	3600 Seconds
Encryption Algorithm:	AES-128 ▼
Integrity Algorithm:	SHA-1 ▼
PFS Key Group:	✓ Enable
DH Group:	Group 1(768 bit) ▼
Select IKE Policy:	Group 1(768 bit) Group 2(1024 bit) Group 5(1536 bit)
Save Cancel	Back
Caro Candor	200.

Step 6. From the Select IKE Policy drop-down list, choose which IKE policy to use for the VPN policy.

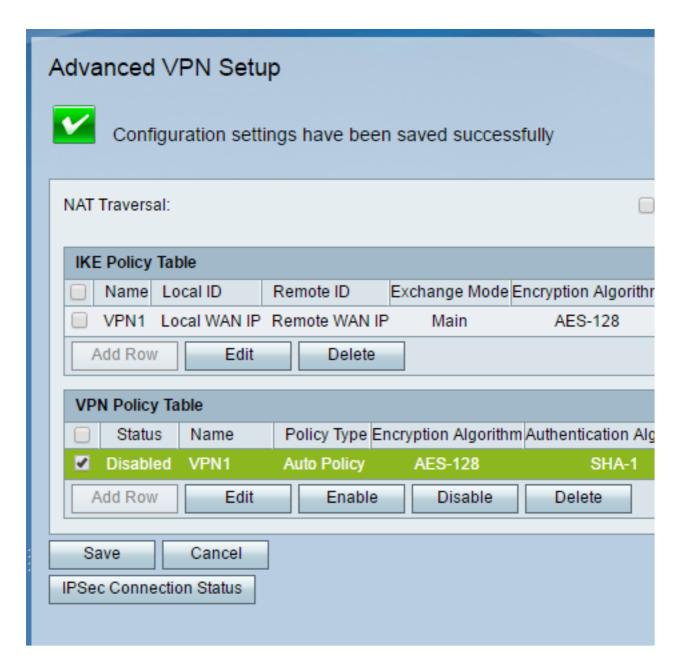
**Note:** In this example, only one IKE policy has been configured so only one policy appears.

Auto Policy Parameters			
IPSec SA Lifetime:	3600 Se	econds	(Ra
Encryption Algorithm:	AES-128 ▼		
Integrity Algorithm:	SHA-1 ▼		
PFS Key Group:	✓ Enable		
DH Group:	Group 1(768 bit) ▼		
Select IKE Policy:	VPN1 ▼		
	View		
Save Cancel	Back		

Step 7. Click Save.

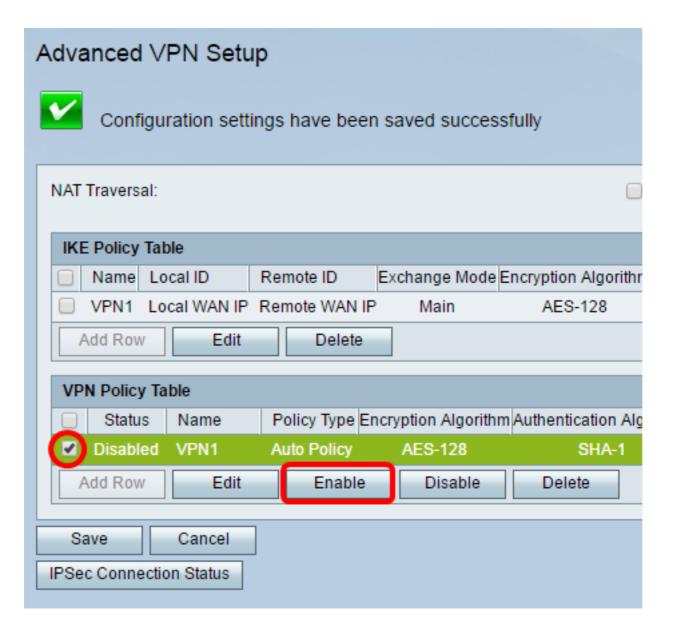


**Note:** The main Advanced VPN Setup page re-appears. A confirmation message that the configuration settings have been saved successfully should appear.

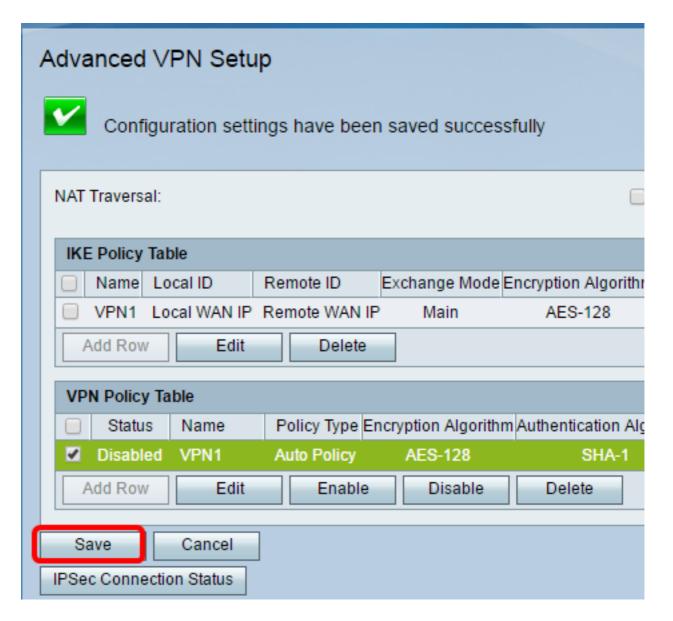


Step 8. Under the VPN Policy table, check a check box to choose a VPN and click **Enable**.

Note: Configured VPN Policy is disabled by default.



Step 9. Click Save.



You should now have successfully configured a VPN Policy on your RV130 or RV130W router.