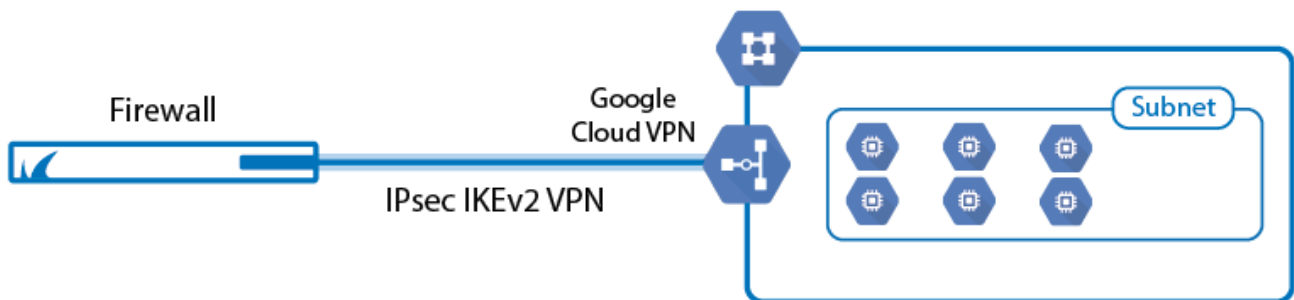


How to Configure BGP over IKEv2 IPsec Site-to-Site VPN to an Google Cloud VPN Gateway

<https://campus.barracuda.com/doc/73701650/>

To connect to the Google Cloud VPN gateway, create an IPsec IKEv2 site-to-site VPN tunnel on your F-Series Firewall and configure BGP to exchange information with the Google BGP peer.

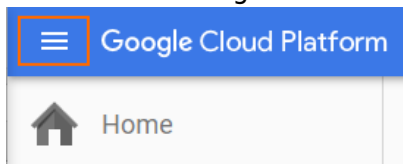


Before You Begin

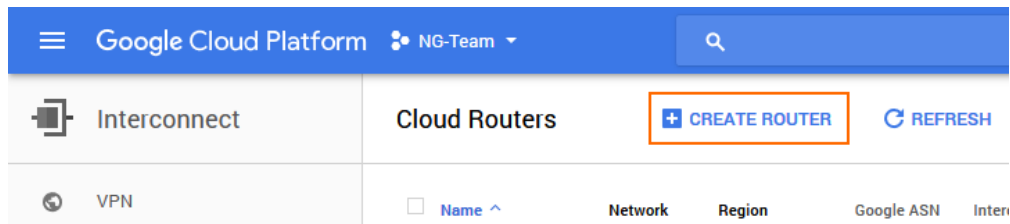
- You will need the following information:
 - Public IP address of your on-premises F-Series Firewall
 - (private) ASN number
- Create a VPC network in Google Cloud.

Step 1. Create a Google Cloud Router

1. Go to <https://console.cloud.google.com>.
2. Click the hamburger menu in the upper-left corner.

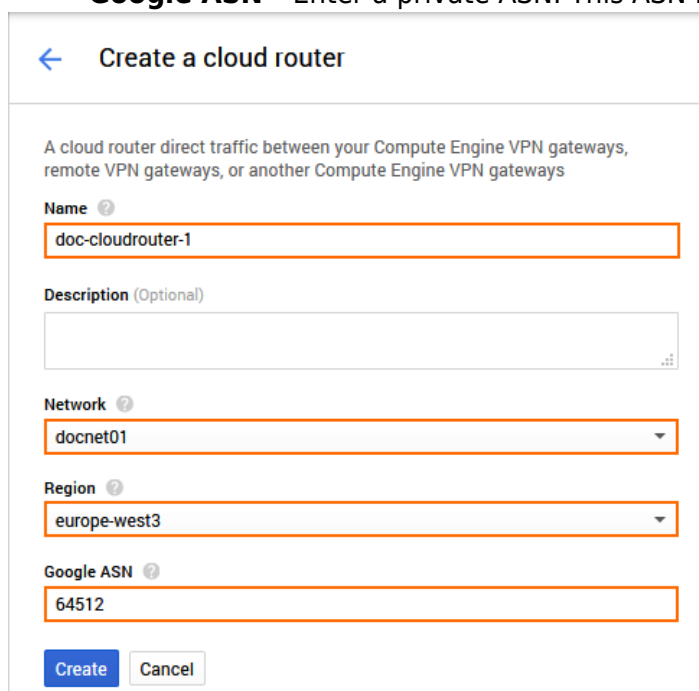


3. In the **Networking** section, click **Interconnect**.
4. In the left menu, click **Cloud Routers**.
5. In the main area, click **Create Router**.




6. Configure the settings for the Google Cloud router:

- **Name** – Enter a name for the cloud router.
- **Network** – Select the network from the list.
- **Region** – Select the region from the list.
- **Google ASN** – Enter a private ASN. This ASN number must be unique in your network.

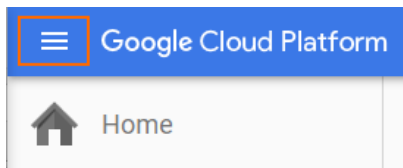


7. Click **Create**.

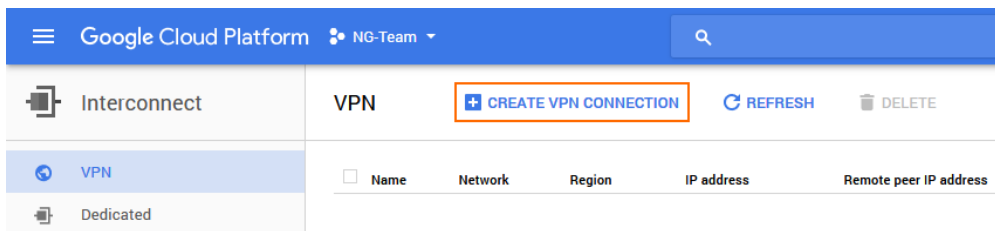
Cloud Routers								
			+ CREATE ROUTER	REFRESH	DELETE			
<input type="checkbox"/>	Name ^	Network	Region	Google ASN	Interconnect	Connection	BGP sessions	Logs
<input type="checkbox"/>	doc-cloudrouter-1	docnet01	europe-west3	64512	 None			View

Step 2. Create a Google VPN

1. Go to <https://console.cloud.google.com>.
2. Click the hamburger menu in the upper-left corner.



3. In the **Networking** section, click **Interconnect**.
4. In the left menu, click **VPN**.
5. In the main area, click **Create Network**.
6. Click **Create VPN connection**.



7. Configure the **Google Compute Engine VPN gateway** settings:
 - **Name** – Enter a name.
 - **Network** – Select your Google Cloud network from the list.
 - **Region** – Select the region for the Google VPN gateway. Select a location close to your on-premises firewall.
 - **IP address** – Reserve a new static IP address or select a free, existing static IP address from the list.

Google Compute Engine VPN gateway ?

Name ?

Description (Optional)

Network ?

Region ?

IP address ?

8. Configure a VPN tunnel in the **Tunnels** settings:
 - **Remote peer IP address** – Enter the public IP address of the on-premises firewall.
 - **IKE version** – Select **IKEv2**.
 - **Shared secret** – Enter a passphrase as the shared secret.

The shared secret can consist of small and capital characters, numbers, and non alpha-numeric symbols, except the hash sign (#).

- **Routing options** – Click **Dynamic (BGP)**.
- **Cloud router** – Select the cloud router created in Step 1.

Tunnels ?

You can have multiple tunnels to a single Peer VPN gateway



Remote peer IP address ?

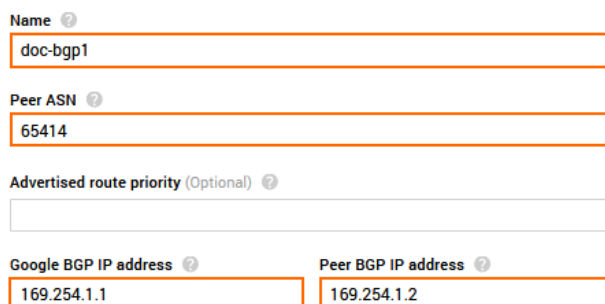
IKE version ?

Shared secret ?

Routing options ?

Cloud router

9. Click the edit icon to configure the **BGP session**.
10. Configure the BGP session for the cloud router:
 - **Name** – Enter a name for the BGP configuration.
 - **Peer ASN** – Enter the ASN assigned to the on-premises firewall.
 - **(optional) Advertised route priority** – Enter a priority value. Routes with higher priorities are preferred.
 - **Google BGP IP address** – Enter the first IP address in a private /30 subnet. The IP address must be in the same /30 network as the **Peer BGP IP address**: E.g., 169.254.1.1
 - **Peer BGP IP address** – Enter the second IP address in the private /30 subnet used for the **Google BGP IP address**. E.g., 169.254.1.2

Add BGP session for cloud router

Name ?

Peer ASN ?

Advertised route priority (Optional) ?

Google BGP IP address ?

Peer BGP IP address ?

[CANCEL](#) [SAVE AND CONTINUE](#)

11. Click **Save and Continue**.

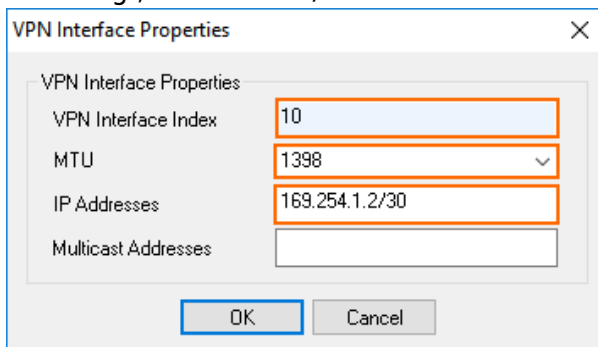
12. Click **Create**.

Wait for the VPN to be created.

VPN								
+ CREATE VPN CONNECTION REFRESH DELETE								
<input type="checkbox"/>	Name	Network	Region	IP address	Remote peer IP address	Cloud routers	Logs	Firewall rules
<input type="checkbox"/>	vpn-1	docnet01	europa-west3	35.198.85.241	80.109.163.8	doc-cloudrouter-1	View	Configure

Step 3. Create VPN Next Hop Interfaces

1. Go to **CONFIGURATION > Configuration Tree > Box > Virtual Servers > your virtual server > Assigned Services > VPN > VPN Settings**.
2. Click **Lock**.
3. Click **Click here for Server Settings**.
4. Click the **Advanced** tab.
5. Click **Add** in the **VPN Next Hop Interface Configuration** section.
 - **VPN Interface Index** – Enter a number between 0 and 99. Each interface index number must be unique.
 - **MTU** – Enter 1398.
 - **IP Addresses** – Enter the **Peer BGP IP address** from Step 2 with a /30 subnet mask. E.g., 169.254.1.2/30



The dialog box titled "VPN Interface Properties" contains the following fields:

- VPN Interface Index: 10
- MTU: 1398
- IP Addresses: 169.254.1.2/30
- Multicast Addresses: (empty)




Buttons: OK, Cancel

6. Click **OK**.
7. Click **Send Changes** and **Activate**.

Step 4. Add the VPN Next Hop Interface IP Address to the Virtual Server IPs

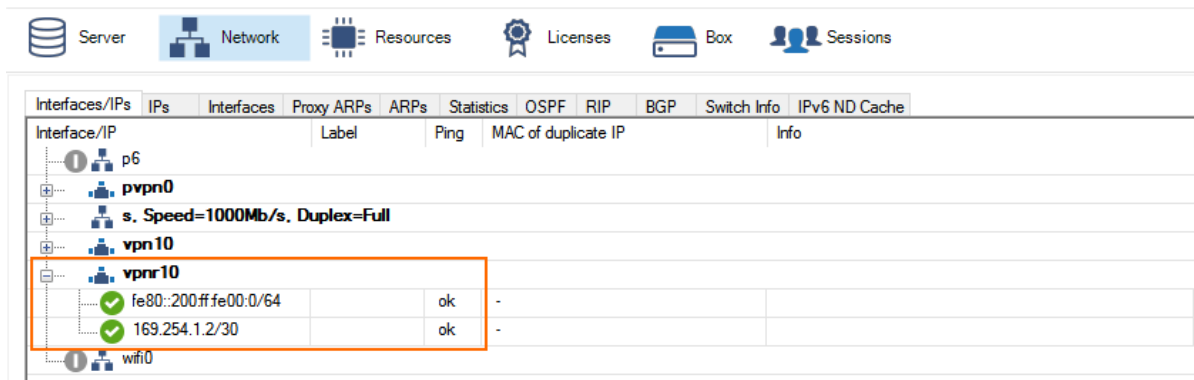
1. Go to **CONFIGURATION > Configuration Tree > Box > Virtual Servers > Server Properties**.
2. Click **Lock**.
3. Click **+** to add an entry to the **Additional IP** table. The **Additional IP** window opens.

4. Add the local BGP peering IP address as a virtual server IP address:
 - **Additional IP** – Enter the **Peer BGP IP address** from Step 2.
 - **Reply to Ping** – Select **yes**.

Additional IP	169.254.1.2	
Label	IP7	
Reply to Ping	yes	
Description		

5. Click **OK**.
6. Click **Send Changes** and **Activate**.

The VPN next hop interface is now listed on the **CONTROL > Network** page.



The screenshot shows the 'Network' tab in the Barracuda CloudGen Firewall interface. The 'Interfaces/IPs' sub-tab is active, displaying a table of network interfaces and their associated IP addresses. The interface 'vpn10' is highlighted with an orange box, showing two IP addresses: 'fe80::200:ff:fe00:0/64' and '169.254.1.2/30', both with a status of 'ok'.

Interface/IP	Label	Ping	MAC of duplicate IP	Info
p6				
pvpn0				
s. Speed=1000Mb/s, Duplex=Full				
vpn10				
✓ fe80::200:ff:fe00:0/64		ok		
✓ 169.254.1.2/30		ok		
wifi0				

Step 5. Configure a IPsec IKEv2 Site-to-Site VPN on the Firewall

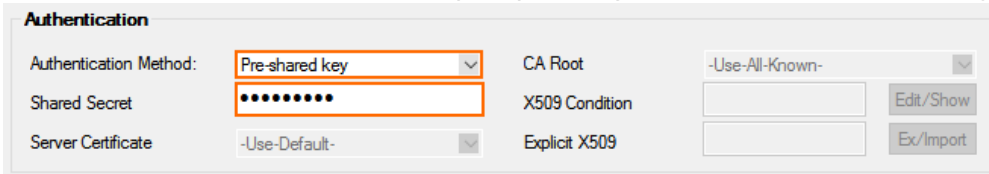
Configure a site-to-site IKEv2 VPN tunnel on the firewall. The firewall is configured as the active VPN endpoint.

1. Go to **CONFIGURATION > Configuration Tree > Box > Virtual Servers > your virtual server > Assigned Services > VPN-Service > Site to Site**.
2. Click the **IPsec IKEv2 Tunnels** tab.
3. Click **Lock**.
4. Right-click the table and select **New IKEv2 tunnel**. The **IKEv2 Tunnel** window opens.
5. In the **IKEv2 Tunnel Name** field, enter your tunnel name.
6. Set **Initiates Tunnel** to **Yes**.

General			
Tunnel name	F180toGoogleVPN	Initiates tunnel	<input checked="" type="radio"/> Yes <input type="radio"/> No
Enabled	<input checked="" type="radio"/> Yes <input type="radio"/> No	Restart SA on Close	<input type="radio"/> Yes <input checked="" type="radio"/> No

7. Configure the **Authentication** settings:
 - **Authentication Method** – Select **Pre-shared key**.

- **Shared Secret** – Enter the passphrase you used to create the Google VPN.



Authentication

Authentication Method: CA Root:

Shared Secret: X509 Condition:

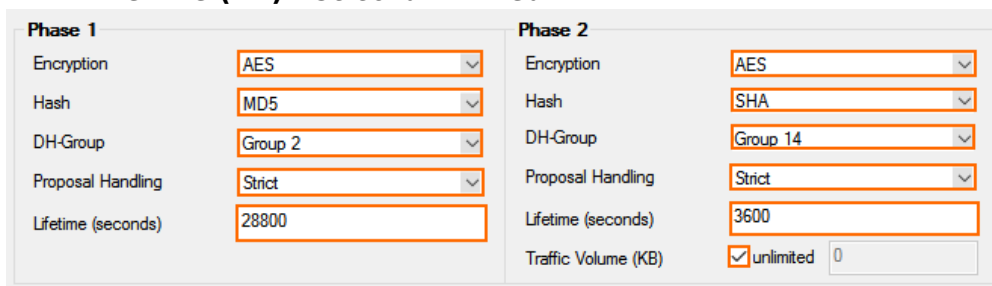
Server Certificate: Explicit X509:

8. Configure the **Phase 1** encryption settings:

- **Encryption** – Select **AES**.
- **Hash Meth.** – Select **MD5**.
- **DH Group** – Select **Group 2**.
- **Proposal Handling** – Select **Strict**.
- **Lifetime** – Enter 28800.

9. Configure the **Phase 2** encryption settings:

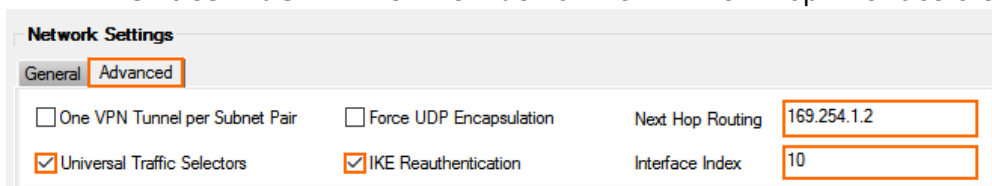
- **Encryption** – Select **AES**.
- **Hash Meth.** – Select **SHA**.
- **DH Group** – Select **Group 14**.
- **Proposal Handling** – Select **Strict**.
- **Lifetime (seconds)** – Enter 3600
- **Lifetime (KB)** – Select **unlimited**.



Phase 1	Phase 2
Encryption: <input type="text" value="AES"/>	Encryption: <input type="text" value="AES"/>
Hash: <input type="text" value="MD5"/>	Hash: <input type="text" value="SHA"/>
DH-Group: <input type="text" value="Group 2"/>	DH-Group: <input type="text" value="Group 14"/>
Proposal Handling: <input type="text" value="Strict"/>	Proposal Handling: <input type="text" value="Strict"/>
Lifetime (seconds): <input type="text" value="28800"/>	Lifetime (seconds): <input type="text" value="3600"/>
	Traffic Volume (KB): <input checked="" type="checkbox"/> unlimited <input type="text" value="0"/>

10. In the **Network Settings** section, click the **Advanced** tab:

- **One VPN Tunnel per Subnet Pair** – Clear the check box.
- **Universal Traffic Selectors** – Select the check box.
- **Force UDP Encapsulation** – Clear the check box.
- **IKE Reauthentication** – Select the check box.
- **Next Hop Routing** – Enter the **Peer BGP IP address** address from Step 2.
- **Interface Index** – Enter the index of the VPN next hop interface created in Step 3.



Network Settings

General ☒ Advanced

☐ One VPN Tunnel per Subnet Pair ☐ Force UDP Encapsulation Next Hop Routing:

☒ Universal Traffic Selectors ☒ IKE Reauthentication Interface Index:

11. Configure the **Local Network** settings:

- **Local Gateway** – Enter the public IP address of the firewall, or use 0.0.0.0 if you are using a dynamic IP address.
- **Network Address** – Click + and enter the **Peer BGP IP address** from Step 2.

12. Configure the **Remote Network** settings:


- **Remote Gateway** – Enter the gateway IP address of the Google Cloud VPN.
- **Network Address** – Click + and enter the **Google VPN IP address**.


Network Local		Network Remote	
Local Gateway:	<input type="text" value="0.0.0.0"/>	Remote Gateway:	<input type="text" value="35.198.85.241"/>
Local ID:	<input type="text"/>	Remote ID:	<input type="text"/>
Network address (e.g. 10.6.0.0/16)	<input type="text" value="169.254.1.2"/>	Network address (e.g. 10.6.0.0/16)	<input type="text" value="169.254.1.1"/>


Dead Peer Detection	
Action	<input type="text" value="Restart"/>
Delay (seconds)	<input type="text" value="30"/>


13. Click **OK**.
14. Click **Send Changes** and **Activate**.





The VPN tunnel to the Google VPN gateway is now established.


Site-to-Site


Client-to-Site


Status


Filter

Name	Tunnel	Local IP	Peer IP	Transport	Encryption	Compr...	Dynamic Bandh
<div>  F180toGoogleVPN </div>	 IPSec-IKEv2	0.0.0.0	0.0.0.0		No enc.	0%	
<div>  F180toGoogleVPN </div>	 IPSec-IKEv2	80.109.163.8	35.198.85.241	ESP	AES128	0%	

Step 6. Configure the BGP Service

Configure BGP routing to learn the subnets from the remote BGP peer behind the Google VPN on the other side of the VPN tunnels.

Step 6.1. Configure Routes to be Advertised via BGP

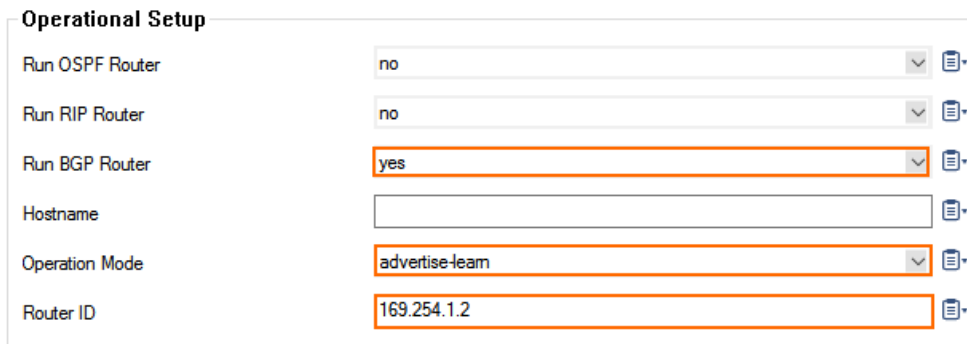
Only routes with the parameter **Advertise** set to **yes** will be propagated via BGP.

1. Go to **CONFIGURATION > Configuration Tree > Box > Network**.
2. Click **Lock**.
3. (optional) To propagate the management network, switch to **Advanced** view and set **Advertise Route** to **yes**.
4. In the left menu, click **Routing**.
5. Edit the **Routes** you want to propagate, and set **Advertise Route** to **yes**.
6. Click **OK**.
7. Click **Send Changes** and **Activate**.

Step 6.2. Enable BGP

Configure the BGP setting for the BGP service on the firewall.

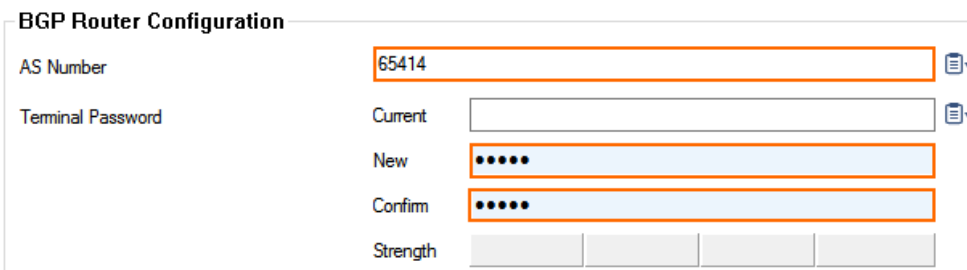
1. Go to **CONFIGURATION > Configuration Tree > Box > Virtual Servers > your virtual server > Assigned Services > OSPF-RIP-BGP-Service > OSPF/RIP/BGP Settings**.
2. From the **Run BGP Router** list, Select **yes**.
3. From the **Operations Mode** list, select **advertise-learn**.
4. Enter the local BGP peering IP address as the **Router ID**.



The 'Operational Setup' window shows the following configuration:

Field	Value
Run OSPF Router	no
Run RIP Router	no
Run BGP Router	yes
Hostname	
Operation Mode	advertise-learn
Router ID	169.254.1.2

5. In the left menu, click **BGP Router Setup**.
6. Enter the **AS Number** for the local BGP peer as per Step 2. E.g., 65414
7. Enter the **Terminal Password**.



The 'BGP Router Configuration' window shows the following configuration:

Field	Value
AS Number	65414
Terminal Password	Current: , New: , Confirm: , Strength:

8. In the left menu, expand **Configuration Mode** and click **Switch to Advanced Mode**.
9. Click the **Set** button for the **Advanced Settings**. The **Advanced Settings** window opens.
10. Set the **Hold timer** to 30 seconds.
11. Set the **Keep Alive Timer** to 10 seconds.
12. Click **OK**.
13. Click **Send Changes** and **Activate**.

Step 6.3. Add a BGP Neighbor for the Google VPN

To dynamically learn the routing of the neighboring network, set up a BGP neighbor for the Google VPN.

1. In the left menu of the **OSPF/RIP/BGP Settings** page, click **Neighbor Setup IPv4**.
2. Click **Lock**.
3. In the left menu, expand **Configuration Mode** and click **Switch to Advanced Mode**.
4. Click **+** to add an entry to the **Neighbors** table. The **Neighbors** window opens.
5. Enter a **Name** and click **OK**.

6. In the **Neighbors** window, configure the following settings in the **Usage and IP** section:

- **Neighbor IPv4** – Enter the remote BGP peer IP address.
- **OSPF Routing Protocol Usage** – Select **no**.
- **RIP Routing Protocol Usage** – Select **no**.
- **BGP Routing Protocol Usage** – Select **yes**.

Usage and IP

Neighbor IPv4	169.254.1.1	
Active	yes	
OSPF Routing Protocol Usage	no	
RIP Routing Protocol Usage	no	
BGP Routing Protocol Usage	yes	

7. In the **BGP Parameters** section, configure the following settings:

- **AS Number**: Enter the ASN for the remote network as per the information from Step 2. E.g., 64512
- **Update Source**: Select **Interface**.
- **Update Source Interface**: Enter the vpnr interface. E.g., vpnr10

BGP Parameters

AS Number	64512	
Description		
Peer Group Affiliation		
Update Source	Interface	
Update Source Interface	vpnr10	
Update Source IPv4 Address		

8. Click **OK**.

9. Click **Send Changes** and **Activate**

Go to **CONTROL > Network > BGP**. The firewall is now learning and advertising networks to the Google VPN BGP peer.

Interfaces/IPs	IPs	Interfaces	Proxy ARPs	ARPs	Statistics	OSPF	RIP	BGP	Switch Info	IPv6 ND Cache
Network										
AS Incomplete										
	> 10.1.1.0/24			0.0.0.0			0		32768	Incomplete
AS 64512										
	Neighbor: 169.254.1.1									
	PrefixesReceived: 3									
	Up/Down-Time: 00:03:02									
	Sent Messages: 14									
	Received Messages: 11									
	> 10.77.0.0/24			169.254.1.1			100		0	64512 Incomplete
	> 10.77.1.0/24			169.254.1.1			100		0	64512 Incomplete
	> 10.77.2.0/24			169.254.1.1			100		0	64512 Incomplete

Step 7. Create an Access Rule

Create a pass access rule to allow traffic from the local networks to the networks learned via BGP.

1. Go to **CONFIGURATION > Configuration Tree > Box > Virtual Servers > *your virtual server* > Assigned Services > Firewall > Firewall Rules**.
2. Click **Lock**.
3. Create a PASS access rule:
 - **Bi-Directional** – Enable.
 - **Source** – Select the local on-premises network(s) advertised via BGP.
 - **Service** – Select the service you want to have access to the remote network, or select **ALL** for complete access.
 - **Destination** – Select the network object containing the learned networks.
 - **Connection Method** – Select **Original Source IP**.
4. Click **OK**.
5. Move the access rule up in the rule list, so that it is the first rule to match the firewall traffic.
6. Click **Send Changes** and **Activate**.

Figures

1. google_cloud_vpn.png
2. google_VPN_01.png
3. google_VPN_04.png
4. google_VPN_05.png
5. google_VPN_06.png
6. google_VPN_01.png
7. google_VPN_02.png
8. google_VPN_03.png
9. google_VPN_07.png
10. google_VPN_08.png
11. google_VPN_09.png
12. google_VPN_10.png
13. google_VPN_11.png
14. google_VPN_12.png
15. google_VPN_13.png
16. GW_02.png
17. google_VPN_14.png
18. google_VPN_15.png
19. google_VPN_16.png
20. google_VPN_17.png
21. google_VPN_18.png
22. google_VPN_19.png
23. google_VPN_20.png
24. google_VPN_21.png
25. google_VPN_22.png

© Barracuda Networks Inc., 2024 The information contained within this document is confidential and proprietary to Barracuda Networks Inc. No portion of this document may be copied, distributed, publicized or used for other than internal documentary purposes without the written consent of an official representative of Barracuda Networks Inc. All specifications are subject to change without notice. Barracuda Networks Inc. assumes no responsibility for any inaccuracies in this document. Barracuda Networks Inc. reserves the right to change, modify, transfer, or otherwise revise this publication without notice.