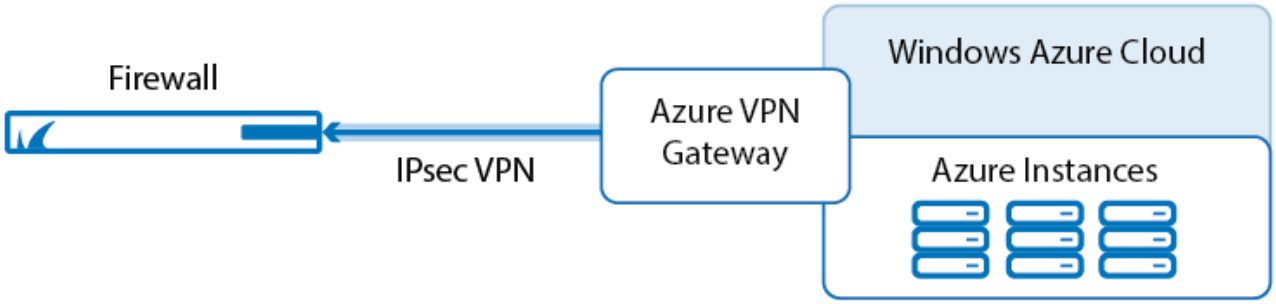
# How to Configure BGP over IKEv2 IPsec Site-to-Site VPN to an Azure VPN Gateway

https://campus.barracuda.com/doc/73719175/

To connect to your Azure virtual network with your on-premises CloudGen Firewall, Microsoft offers the Azure VPN Gateway in three different versions: basic, standard, and high performance. Only standard and high performance SKUs offer the option to use BGP to learn the routes. It is possible to configure multiple parallel VPN connections up to the peer limit of the Azure VPN Gateway SKU. To connect to the VPN Gateway, configure an IPsec IKEv2 site-to-site VPN tunnel on your CloudGen Firewall and configure BGP to exchange information with the Azure VPN Gateway. The CloudGen Firewall must be configured as the active partner. The following private ASN numbers are reserved by Azure and cannot be used for the Azure VPN Gateway.

- Private ASNs: 65515, 65517, 65518, 65519, 65520




## Before You Begin

- You will need the following information:
  - Public IP address of your on-premises CloudGen Firewall
  - (private) ASN number
- Install and configure Azure PowerShell 4.1.2 or higher.

For the VPN tunnel interface, you have to use a network that is larger than the gateway subnet but contains it. The IP address of the interface must not be outside the range of the gateway subnet.

## PowerShell Script to Create Azure VPN Gateway

Use this script to create your Azure VPN gateway with BGP routing.

```
$ResourceGroupName = 'YOUR_RESOURCE_GROUP_NAME'
$Location = 'West Europe'
$VNetName ='YOUR_VNET_NAME'
$SubNet = 'frontend'
$GWSubName = 'GatewaySubnet'
$VNetPrefix = '172.16.200.0/24'
$SubNetPrefix = '172.16.200.0/25'
$GWSubPrefix = '172.16.200.128/28'
$VNet1ASN = 65513
$GWName = 'VNetGW'
$GWIP = 'VNetGWIP'
$GWIPconf = 'gwipconf'
$LNGFName = 'onpremise'
$LNGFPrefix = '172.16.201.227/23'
$LNGFIP = 'YOUR_ONPREMISES_PUBLIC_IP_ADDRESS'
$LNGFASN = 65514
$BGPPeerIP = '172.16.201.227'
$ConnectionName = 'AzureToHome'
$sharedKey='supersecretpassword'

# use 'Standard' or 'HighPerformance' VPN Gateway SKU for BGP over IKEv2
$GatewaySKU = 'HighPerformance'

Write-Host 'Creating Resource Group'
New-AzureRmResourceGroup -Location $Location -Name $RG

Write-Host 'Creating Virtual Networks and Subnets'
$gwpip = New-AzureRmPublicIpAddress -Name $GWIP -ResourceGroupName $RG -
Location $Location -AllocationMethod Dynamic
$front = New-AzureRmVirtualNetworkSubnetConfig -Name $SubNet -AddressPrefix
$SubNetPrefix
$gwsub1 = New-AzureRmVirtualNetworkSubnetConfig -Name $GWSubName -
AddressPrefix $GWSubPrefix
$vnet = New-AzureRmVirtualNetwork -Name $VNetName -ResourceGroupName $RG -
Location $Location -AddressPrefix $VNetPrefix -Subnet $front,$gwsub1
#$vnet = Get-AzureRmVirtualNetwork -Name $VNetName -ResourceGroupName $RG
$subnet1 = Get-AzureRmVirtualNetworkSubnetConfig -Name $GWSubName -
VirtualNetwork $vnet
$gwipconf = New-AzureRmVirtualNetworkGatewayIpConfig -Name $GWIPconf -Subnet
$subnet1 -PublicIpAddress $gwpip
```

```
Write-Host 'Creating Azure VPN Gateway. This may take a long time...'
$vnetgw = New-AzureRmVirtualNetworkGateway -Name $GWName -ResourceGroupName
$RG -Location $Location -Ipconfigurations $gwipconf -GatewayType Vpn -VpnType
RouteBased -GatewaySku HighPerformance -Asn $VNet1ASN

$lnggw = New-AzureRmLocalNetworkGateway -Name $LNGName -ResourceGroupName $RG
-Location $Location -GatewayIpAddress $LNGIP -AddressPrefix $LNGPrefix -Asn
$LNGASN -BgpPeeringAddress $BGPPeerIP

Write-Host 'Waiting 10 seconds and then creating the VPN connection...'
Start-Sleep -Seconds 10

$vpnconnection = New-AzureRmVirtualNetworkGatewayConnection -Name
$ConnectionName -ResourceGroupName $RG -VirtualNetworkGateway1 $vnetgw -
LocalNetworkGateway2 $lnggw -Location $Location -ConnectionType IPsec -
SharedKey $sharedkey -EnableBgp $true

Write-Host 'Azure VPN created. Retrieving configuration information... '
Write-Host ('Public IP Address for the Azure VPN Gateway: {0}' -f (Get-
AzureRmPublicIpAddress -Name "VNetGWIP" -ResourceGroupName $RG).IpAddress )

$lnggw = Get-AzureRmLocalNetworkGateway -Name $LNGName -ResourceGroupName $RG
$vnetgw = Get-AzureRmVirtualNetworkGateway -Name $GWName -ResourceGroupName
$RG

# Retrieve required configuration settings
Write-Host "`nAzure VPN Gateway BGP Settings:"
Write-Host ("`tASN: {0}" -f $vnetgw.BgpSettings.Asn )
Write-Host ("`tBGP Peering Address: {0}" -f
$vnetgw.BgpSettings.BgpPeeringAddress )
Write-Host "`nOnpremises NextGen Firewall BGP Settings:"
Write-Host ("`tASN: {0}" -f $lnggw.BgpSettings.Asn )
Write-Host ("`tBGP Peering Address: {0}" -f
$lnggw.BgpSettings.BgpPeeringAddress )
Write-Host ("`nVPN Connection Status: " -f $vpnconnection.ConnectionStatus)
```

### Step 1. Create a Dynamic Microsoft Azure VPN Gateway Using Azure Resource Manager and PowerShell

Use Azure PowerShell to create a routed-based VPN gateway.

1. Open Azure PowerShell.
2. Connect to your Azure account:

```
Login-AzureRmAccount
```

3. Enter your Azure account credentials and click **Login**.
4. Edit the PowerShell script to create an Azure VPN Gateway to match your needs.
5. Execute the PowerShell script to create the Azure VPN Gateway.

```
PS C:\Users\mzoller\Documents\Azure> .\AzureVPNGatewayBGP.ps1

ResourceGroupName : DOC-VPNGW-BGP
Location          : westeurope
ProvisioningState : Succeeded
Tags              :
ResourceId        : /subscriptions/bde58b49-9951-466e-90e2-592c0920ce77/resourceGroups/DOC-VPNGW-BGP
```

This operation requires between 30 and 60 minutes to complete.

6. Write down the public IP address of the Azure VPN Gateway and BGP information for the local and remote BGP peers from the output of the PowerShell script.

```
Name                     : onpremise
Etag                     : W/"475c7506-f09c-458c-8288-1bb8463cdb9f"
Id                       : /subscriptions/bde58b49-9951-466e-90e2-592c0920ce77/

Waiting 10 seconds and then creating the VPN connection...
Created Azure VPN. Retrieving configuration information
Public IP Address for the Azure VPN Gateway: 52.174.232.81

Azure VPN Gateway BGP Settings:
    ASN: 65020
    BGP Peering Address: 172.16.200.142

Onpremises NextGen Firewall BGP Settings:
    ASN: 65021
    BGP Peering Address: 172.16.201.227

PS C:\Windows\system32>
```

## Step 2. (optional) Get the VPN Gateway Public IP Address and BGP Settings

If you did not use the script to retrieve the public IP address and BGP peers, it is also possible to retrieve this information via PowerShell:

1. Open Azure PowerShell
2. Get the IP address assigned to the VPN gateway:

```
Get-AzureRmPublicIpAddress -Name PUBLIC_IP_NAME -ResourceGroupName
YOUR_RESOURCE_GROUP_NAME
```

```
PS C:\Windows\system32> Get-AzureRmPublicIpAddress -Name "VNetGWIP" -ResourceGroupName $RG


Name                     : VNetGWIP
ResourceGroupName        : DOC-VPNGW-BGP
Location                 : westeurope
Id                       : /subscriptions/                                    /resourceGroups/
Etag                     : W/"36cdebb6-1a2a-4f6b-9371-ea1cbdc8254c"
ResourceGuid             : 032b8e07-8156-464a-9a2f-f6145249220f
ProvisioningState        : Succeeded
Tags                     :
PublicIpAllocationMethod : Dynamic
IpAddress                : 52.233.142.119
PublicIpAddressVersion   : IPv4
IdleTimeoutInMinutes     : 4
IpConfiguration          : {
                             "Id": "/subscriptions/                                    /resour
                           way1/ipConfigurations/gwipconf"
                           }
DnsSettings              : null
```

3. Get the BGP settings for the local VPN endpoint:

```
$lnggw = Get-AzureRmLocalNetworkGateway -Name LOCAL_GATEWAY_NAME -
ResourceGroupName YOUR_RESOURCE_GROUP_NAME
$lngw.BgpSettingsText
```

```
PS C:\Windows\system32> $lnggw = Get-AzureRmLocalNetworkGateway -Name $LNGName -ResourceGroupName $RG

PS C:\Windows\system32> $lnggw.BgpSettingsText
{
  "Asn": 65021,
  "BgpPeeringAddress": "172.16.201.227",
  "PeerWeight": 0
}

PS C:\Windows\system32>
```

4. Get the BGP setting for the remote VPN endpoint:

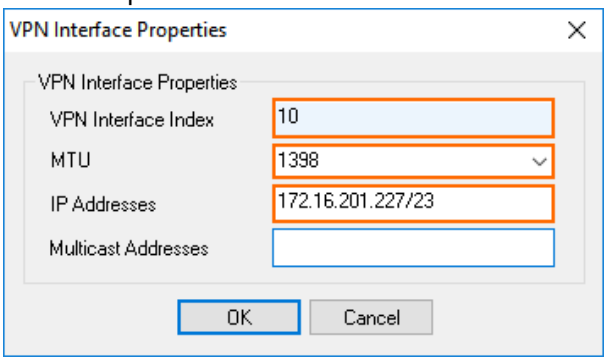
```
$vnetgw = Get-AzureRmVirtualNetworkGateway -Name AZURE_VPN_GATEWAY_NAME
-ResourceGroupName YOUR_RESOURCE_GROUP_NAME
$vnetgw.BgpSettingsText
```

```
PS C:\Windows\system32> $vnetgw = Get-AzureRmVirtualNetworkGateway -Name $GWName -ResourceGroupName $RG

PS C:\Windows\system32> $vnetgw.BgpSettingsText
{
  "Asn": 65020,
  "BgpPeeringAddress": "172.16.200.142",
  "PeerWeight": 0
}

PS C:\Windows\system32>
```

## 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.

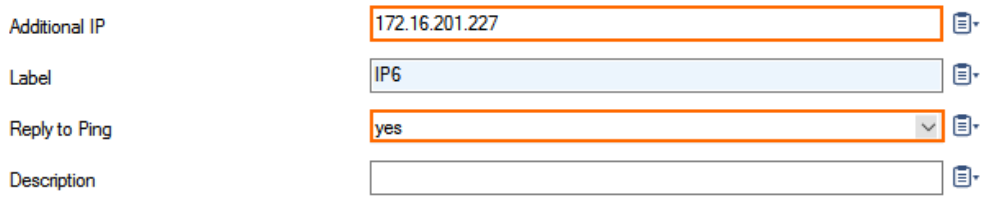
5. Click **Add** in the **VPN Next Hop Interface Configuration** section.
   - **VPN Interface Index** – Enter a number between 0 and 99. Each interface index number must be unique.
   - **MTU** – Enter 1398.
   - **IP Addresses** – Enter the **BgpPeeringAddress** for the local VPN endpoint retrieved in Step 2.




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

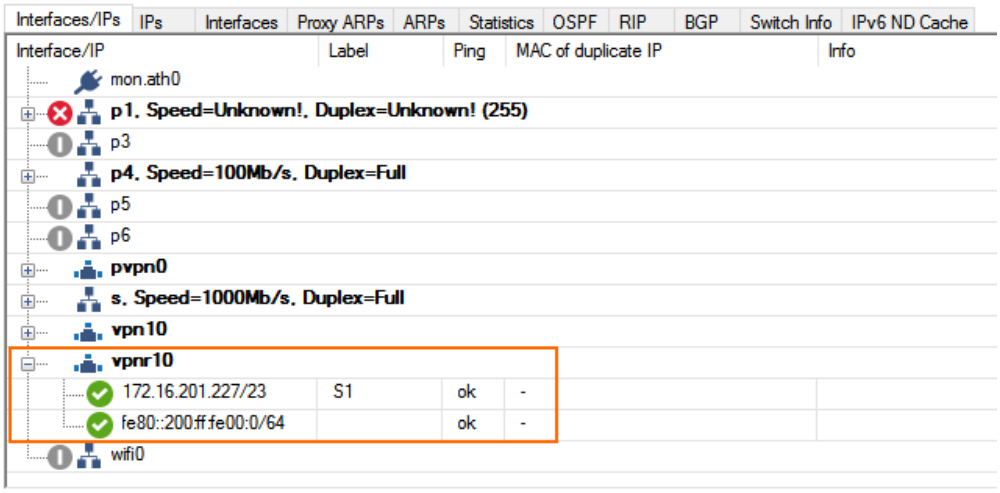
## Step 4. Add the VPN Next Hop Interface IP Address to the Virtual Server IPs

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 IP address for the BGP peering address for the local BGP neighbor retrieved in Step 2 without the subnet mask.
   - **Reply to Ping** – Select **yes**.




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

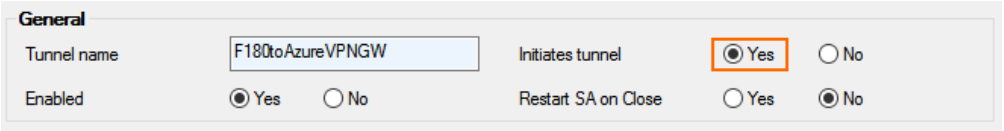
The VPN next hop interface is now listed on the **CONTROL > Network** page.




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

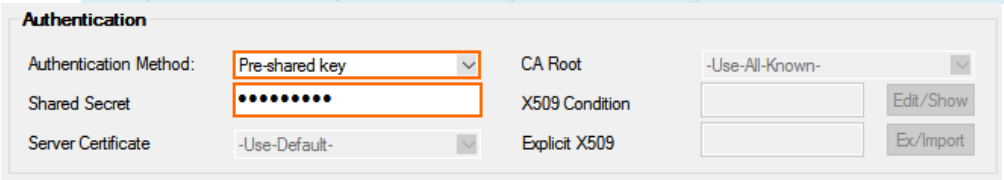
Configure a site-to-site IKEv2 VPN tunnel on the CloudGen Firewall. The firewall is configured as the active VPN endpoint.

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**.




7. Configure the **Authentication** settings:
   - **Authentication Method** – Select **Pre-shared key**.
   - **Shared Secret** – Enter the passphrase you used to create the virtual network gateway connection.

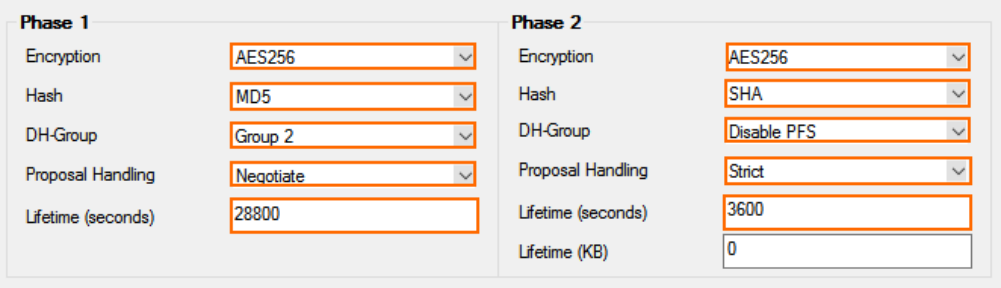
     The shared secret can consist of small and capital characters, numbers, and non alpha-numeric symbols, except the hash sign (#).



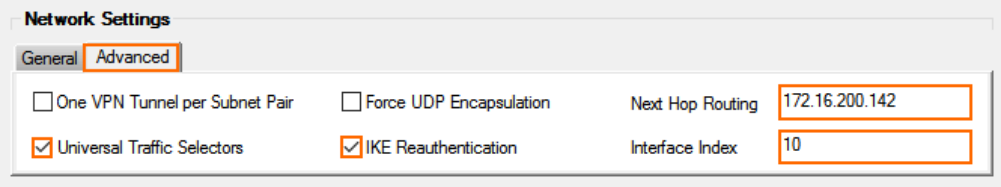

8. Configure the **Phase 1** encryption settings:
   - **Encryption** – Select **AES-256**.
   - **Hash Meth.** – Select **SHA**.

- **DH Group** – Select **Group 2**.
- **Proposal Handling** – Select **Negotiate**.
- **Lifetime** – Enter 28800.

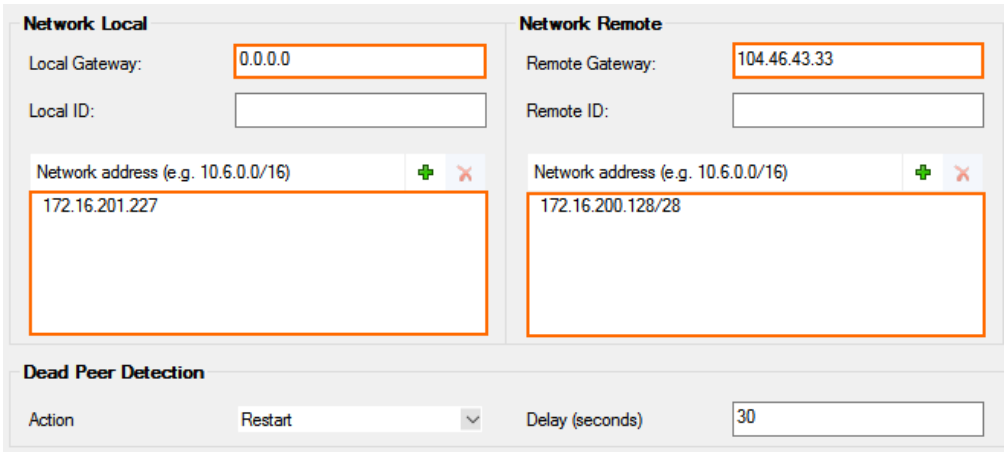
9. Configure the **Phase 2** encryption settings:
   - **Encryption** – Select **AES-256**.
   - **Hash Meth.** – Select **SHA**.
   - **DH Group** – Select **Disable PFS**.
   - **Proposal Handling** – Select **Strict**.
   - **Lifetime (seconds)** – Enter 3600.
   - **LIfetime (KB)** – Enter 0.




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 remote BGP peering address from Step 2.
    - **Interface Index** – Enter the index of the VPN next hop interface created in Step 3.

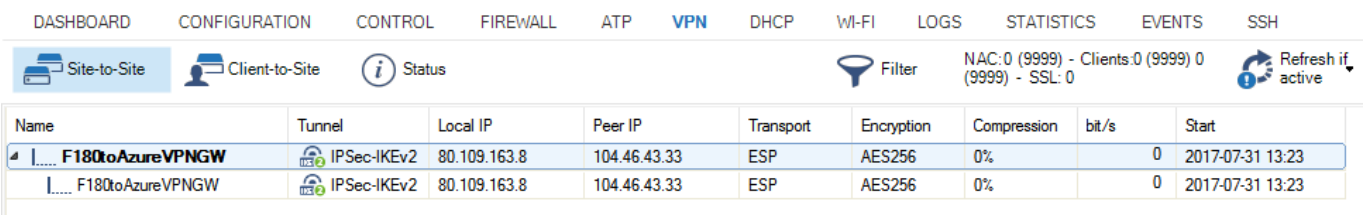



11. Configure the **Local Network** settings:
    - **Local Gateway** – Enter the public IP address of the firewall, or use 0.0.0.0 if you are using a dynamic IP address.
    - **Network Address** – Click **+** and enter the IP address assigned to the VPN next hop interface without the subnet mask.
12. Configure the **Remote Network** settings:
    - **Remote Gateway** – Enter the gateway IP address of the Azure VPN Gateway in Step 2.
    - **Network Address** – Click **+** and enter the Azure gateway subnet.




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

The VPN tunnel to the Azure VPN Gateway is now established.




## Step 6. Configure the BGP Service

Configure BGP routing to learn the subnets from the remote BGP peer behind the Azure VPN Gateway 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.

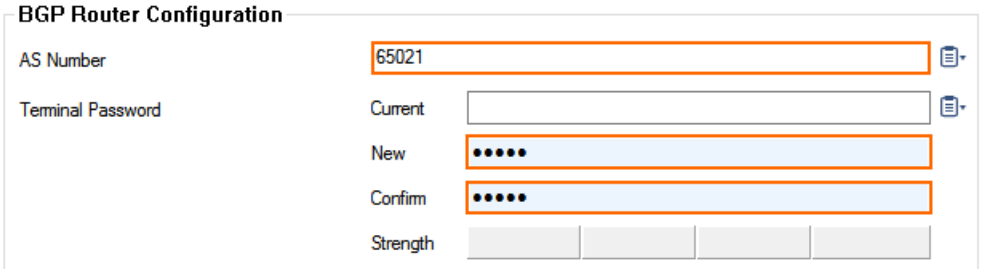
1. Go to **CONFIGURATION > Configuration Tree > Box > Network** .
2. Click **Lock**.
3. (optional) To propagate the management network, set **Advertise Route** to **yes**.
4. In the left menu, click **Routing**.
5. Double-click the **Routes** you want to propagate, and set **Advertise Route** to **yes**.
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**.


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



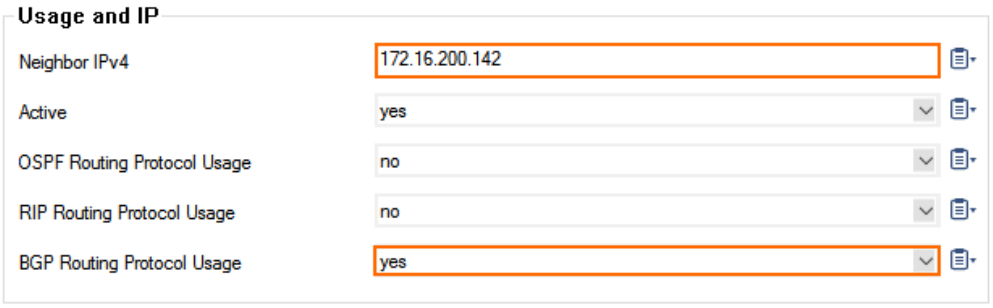

8. In the left menu, expand **Configuration Mode** and click **Switch to Advanced Mode**.
9. Click the **Set** button for the **Advanced Settings.** The **Advanced Settings** window opens.
10. Set the **Hold timer** to 30 seconds.
11. Set the **Keep Alive Timer** to 10 seconds.
12. Click **OK**.
13.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

#### Step 6.3. Add a BGP Neighbor for the Azure VPN Gateway

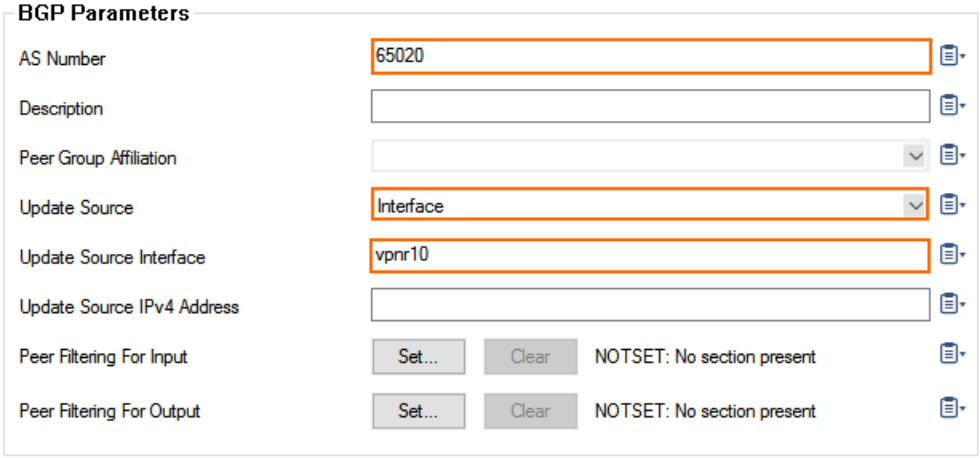
To dynamically learn the routing of the neighboring network, set up a BGP neighbor for the Azure VPN Gateway.

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**.

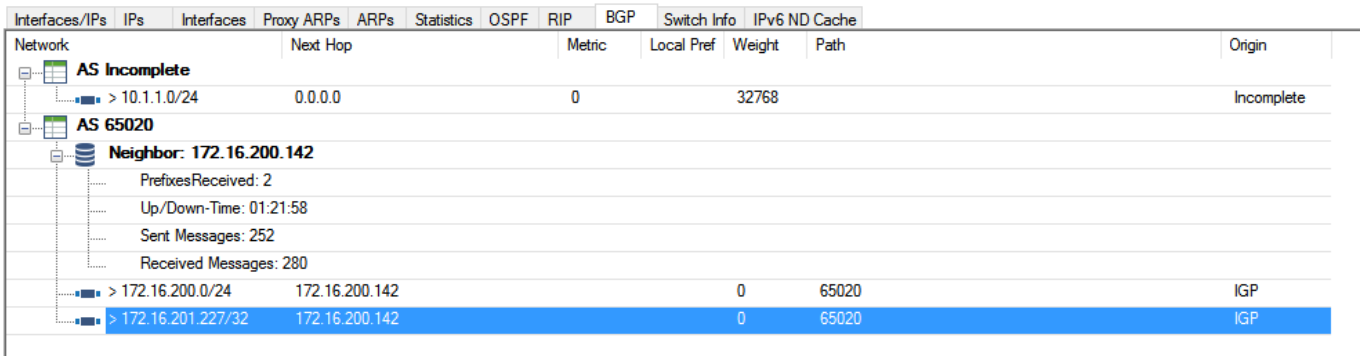



7. In the **BGP Parameters** section, configure the following settings:
   - **AS Number**: Enter the ASN for the remote network as per the information from Step 2.
   - **Update Source**: Select **Interface**.
   - **Update Source Interface**: Enter the vpnr interface. E.g., `vpnr10`




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

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




## 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