# AWS Site-to-Site VPN setup guide

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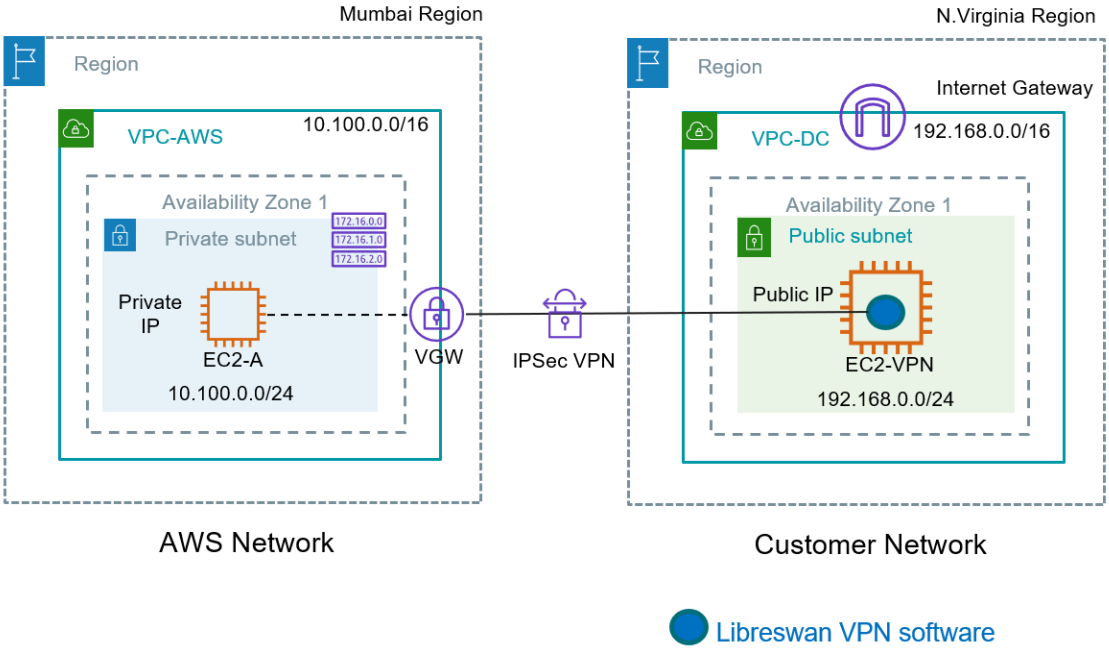
## Architecture




## Steps

1. Create VPC-AWS (10.0.0.0/16) in Mumbai region and VPC-DC (192.168.0.0/16) in N. Virginia region
    a. Create one Private subnet in VPC-AWS, corresponding route table and associate with the subnet
    b. Create IGW for VPC-DC, associate it with the VPC-DC. Create one Public subnet in VPC-DC, corresponding route table and associate route table with the subnet
2. Launch EC2 instances in both the VPCs
    a. In VPC-AWS, instance will have only Private IP. Security group to allow All ICMP IPv4 from VPC-DC CIDR (192.168.0.0/16)

b. In VPC-DC, launch EC2 instance (EC2-VPN) with **Amazon Linux 2023 AMI.**
c. This instance should have Public IP as well. Security group to allow All ICMP – IPv4 for VPC-AWS CIDR and SSH from MyIP or 0.0.0.0/0
d. For EC2-VPN, go to Actions -> Networking -> Source/Destination Check -> Stop

3. Create virtual private gateway and associate with VPC-AWS

    a. In Mumbai region, go to VPC console -> Left panel -> Virtual Private Gateways -> Create virtual private gateway (Use default ASN)
    b. Name: VPC-AWS-VGW -> Create virtual private gateway
    c. Select VGW -> Actions -> Attach to VPC -> Select VPC-AWS from the dropdown -> Attach to VPC-AWS
    d. Wait for the attachment to complete
    e. Modify VPC-AWS Private subnet route table and add route for 0.0.0.0/0 with target as Virtual Private Gateway (vgw-xxxxx)
    f. Note down or copy the Public IP of EC2-VPN instance in N. Virginia region.

4. Create VPN connection

    a. VPC console -> Left panel -> Site-to-Site VPN Connections -> Create VPN connection
    b. Name: AWS-DC-VPN, Target gateway type: Virtual Private Gateway, Select VGW from the dropdown
    c. Customer Gateway: New, Enter Public IP address of EC2-VPN EC2 instance
    d. Routing options: Static, Static IP prefixes: 192.168.0.0/16
    e. Local IPv4 network CIDR – 192.168.0.0/16
    f. Remote IPv4 network CIDR – 10.0.0.0/16
    g. Create VPN connection and wait for the connection to complete

5. Download the configuration file

    a. Select VPN connection you created above -> Download configuration -> Select vendor as **Openswan** -> Download
    b. Save the configuration file on your local machine and open in Notepad

6. Install and configure DC VPN server

    a. SSH into EC2-VPN from your workstation using PuTTy or any SSH client
    b. Install Libreswan

```
sudo yum install libreswan
```

    c. Open the downloaded VPN server configuration file and follow the instructions. Instructions in this file should be like the following steps e. through step i.:

    d. Open /etc/sysctl.conf and ensure that its values match the following:

```
net.ipv4.ip_forward = 1
net.ipv4.conf.default.rp_filter = 0
net.ipv4.conf.default.accept_source_route = 0
```

    e. Apply the changes in step 1 by executing the command 'sysctl -p'

f. Open /etc/ipsec.conf and look for the line below. Ensure that the # in front of the line has been removed, then save and exit the file.
    i. #include /etc/ipsec.d/*.conf
g. Create a new file at /etc/ipsec.d/aws.conf if doesn't already exist, and then open it. Append the following configuration to the end in the file:

- #leftsubnet= is the local network behind your openswan server, and you will need to replace the <LOCAL NETWORK> below with this value (don't include the brackets). If you have multiple subnets, you can use 0.0.0.0/0 instead.

- #rightsubnet= is the remote network on the other side of your VPN tunnel that you wish to have connectivity with, and you will need to replace <REMOTE NETWORK> with this value (don't include brackets).

- **Remove auth=esp**

- **Modify phase2alg and ike as per below:**

**phase2alg=aes256-sha1;modp2048**

**ike=aes256-sha1;modp2048**

Text in red will be different values as per your environment. Make sure to check and replace as necessary.

```
conn Tunnel1
      authby=secret
      auto=start
      left=%defaultroute
      leftid=184.73.51.101
      right=13.232.7.88
      type=tunnel
      ikelifetime=8h
      keylife=1h
      phase2alg=aes256-sha1;modp2048
      ike=aes256-sha1;modp2048
      keyingtries=%forever
      keyexchange=ike
      leftsubnet=192.168.0.0/16
      rightsubnet=10.0.0.0/16
      dpddelay=10
      dpdtimeout=30
      dpdaction=restart_by_peer
      encapsulation=yes
```

h. Create a new file at /etc/ipsec.d/aws.secrets if it doesn't already exist, and append this line to the file (be mindful of the spacing!):

```
184.73.51.101 13.232.7.88: PSK "BbO4GaeAaQbrk3.Z_moK325TOE.ovaZk"
```

i. Start ipsec service

```
sudo systemctl start ipsec.service
```

j. Check status of the ipsec service

```
sudo systemctl status ipsec.service
```

7. Check the connectivity from EC2-VPN to EC2-A. Ping should be successful.

```
ping 10.0.0.x
PING 10.0.0.167 (10.0.0.167) 56(84) bytes of data.
64 bytes from 10.0.0.167: icmp_seq=1 ttl=127 time=187 ms
64 bytes from 10.0.0.167: icmp_seq=2 ttl=127 time=186 ms
```

## Cleanup:

Afterful successful VPN connectivity, delete all the resources that you created during this lab

- Delete VPN Connection in (Mumbai region)
- Delete Customer Gateway (Mumbai region)
- Delete Virtual Private Gateway (Mumbai region)
- Terminate both EC2 instances (both the regions)
- Delete both VPCs (both the regions)

## Troubleshooting:

1. Check the VPN tunnel status by Mumbai region VPN console -> VPN Connections -> Select your connection -> Tunnel details
    a. Tunnel 1 status should be UP. Tunnel 2 will be down as we haven't configured it.

| Tunnel number | Outside IP address | Inside IPv4 CIDR | Inside IPv6 CIDR | Status |
|---|---|---|---|---|
| Tunnel 1 | 13.232.7.88 | 169.254.41.204/30 | – | Up |
| Tunnel 2 | 35.154.79.214 | 169.254.239.84/30 | – | Down |

2. If Tunnel 1 isn't UP
    a. Make sure the VPN configuration file is correct. Specially check instructions highlighted in yellow above.
    b. Enable the VPN logs by editing /etc/ipsec.conf
        i. Remove # from this line to make it: logfile=/var/log/pluto.log
        ii. Remove # from this line to make it: plutodebug="base"
        iii. Save the file
        iv. Start ipsec service and check these logs
    c. Make sure that aws.secrets file is exactly same as given in the VPN configuration file downloaded from AWS.
    d. After any changes restart ipsec service: *sudo systemctl restart ipsec.service*
3. If Tunnel is UP but ping is not working:
    a. Make sure EC2-A Security group allows ICMP IPv4 All traffic from VPC-DC CIDR

b. Make sure VPC-AWS Private subnet route table has route for Destination VPC-DC CIDR with target as VGW