# Setting up Site-to-Site (S2S) VPN using Hyper-V

## Objective:

This document provides a comprehensive guide to set up a Site-to-Site VPN between an on-premises Hyper-V virtual environment and Microsoft Azure. The goal is to simulate an on-premises network using Hyper-V and establish a secure tunnel to Azure Virtual Network using Azure VPN Gateway.

## **Prerequisites:** On-Premises (Hyper-V Host)

- A Windows machine with Hyper-V enabled
- At least one virtual machine to act as the simulated on-premises network

## Phase 1: Azure Configuration

#### Step 1. Create a Resource Group

1. Go to the Azure Portal
2. Navigate to **Resource groups** > Click **Create**
3. Enter:
    - Subscription: Use your current Azure subscription.
    - Resource Group Name: `S2S-RG`
    - Region: Select a region close to your location (e.g., Central India)
4. Click **Review + Create** > **Create**

#### Step 2. Create a Virtual Network

1. Go to **Virtual networks** > Click **Create**
2. Enter:
    - Name: `S2S-VNet`
    - Region: Same as your resource group
    - Address space: `10.1.0.0/16`
3. Create a subnet:
    - Name: `BackendSubnet`
    - Subnet Address Range: `10.1.1.0/24`
2. Click **Review + Create** > **Create**

#### Step 3. Create a VPN Gateway Subnet

1. Navigate to the virtual network you created (`S2S-VNet`)
2. Under **Subnets**, click **+ Gateway subnet**
3. Address range: `10.1.255.0/27` (must not overlap with other subnets)
4. Click **Save**

**Step 4. Create a Virtual Network Gateway**

1. Go to **Virtual network gateways** > Click **Create**
2. Basics:
    - Name: `S2S-Gateway`
    - Region: Same as your VNet
    - Gateway type: VPN
    - VPN type: Route-based
    - SKU: VpnGw1 (minimum for S2S)
    - Virtual network: Select `S2S-VNet`
    - Gateway subnet: Auto-selected
    - Public IP: Create new > Name: `S2S-Gateway-PIP`
3. Click **Review + Create** > **Create**
   *Note: This may take up to 30 minutes*

## CLI Command to perform Phase1

```
# Resource Group
az group create --name S2S-RG --location "Central India"

# Virtual Network for S2S VPN
az network vnet create \
  --name S2S-VNet \
  --resource-group S2S-RG \
  --location centralindia \
  --address-prefix 10.1.0.0/16 \
  --subnet-name BackendSubnet \
  --subnet-prefix 10.1.0.0/24

# Add a Gateway Subnet to the Virtual Network
az network vnet subnet create \
  --resource-group S2S-RG \
  --vnet-name S2S-VNet \
  --name GatewaySubnet \
  --address-prefix 10.1.255.0/27

# Create Public IP for the VPN Gateway
az network public-ip create \
  --resource-group S2S-RG \
  --name S2S-Gateway-PIP \
  --allocation-method Dynamic \
  --sku Standard \
  --location centralindia

# Create the VPN Gateway
az network vnet-gateway create \
  --resource-group S2S-RG \
  --name S2S-Gateway \
  --public-ip-addresses S2S-Gateway-PIP \
  --vnet S2S-VNet \
  --gateway-type Vpn \
  --vpn-type RouteBased \
  --sku VpnGw1 \
  --location centralindia
```

## Phase 2: Hyper-V and Routing Setup (On-Premises Simulation)

### Step 5. Create a Virtual Network in Hyper-V

1. Open **Hyper-V Manager**
2. Create an internal Virtual Switch (used for routing):
    - Go to **Virtual Switch Manager**
    - Create **Internal** switch named `OnPremSwitch`

### Step 6. Create a Virtual Machine to Act as Router

1. Create a new VM named `OnPremRouter`
2. Attach it to the `OnPremSwitch`
3. Install Windows Server (recommended: Server 2019 or 2022)
4. Configure a static IP:
    - Example: `10.2.0.4/24` with default gateway `10.2.0.1`

### Step 7. Enable Routing on the VM

1. Log in to `OnPremRouter`
2. Open **Server Manager** > Add Roles and Features
3. Install:
    - **Remote Access**
    - Under Role Services, select **Routing**
4. After installation, open **Routing and Remote Access**
5. Right-click server name > **Configure and Enable Routing and Remote Access**
6. Choose **Custom Configuration** > Select **VPN access** and **LAN routing**
7. Start the service

## Phase 3: Create and Configure the Local Network Gateway on Azure

### Step 8. Get the Public IP of On-Premises Router

1. Open browser in `OnPremRouter`
2. Visit https://whatismyipaddress.com
3. Note the public IP

### Step 9. Create Local Network Gateway on Azure

1. Go to **Local network gateways** > Click **Create**
2. Enter:
    - Name: `OnPremLocalGW`
    - IP address: `<Public IP of OnPremRouter>`
    - Address space: `10.2.0.0/24` (represents on-prem network)
    - Resource Group: `S2S-RG`
    - Region: Same as VPN Gateway
3. Click **Review + Create** > **Create**

## Phase 4: Establish Site-to-Site Connection

### Step 10. Create the VPN Connection in Azure

1. Go to **Virtual Network Gateway** > `AzureVPNGateway`
2. Under **Settings**, click **Connections** > **Add**
3. Enter:
    - Name: `S2SConnection`
    - Connection type: Site-to-site (IPSec)
    - Virtual network gateway: Pre-selected
    - Local network gateway: `OnPremLocalGW`
    - Shared key: Choose a secure pre-shared key (e.g., `P@ssw0rd123`)
4. Click **OK**

## Phase 5: Configure Site-to-Site VPN on Hyper-V Router

### Step 11. Configure Windows Routing and Remote Access for Site-to-Site

1. Go to **Routing and Remote Access** on `OnPremRouter`
2. Expand server > Expand **Network Interfaces** > Right-click > **New Demand-dial Interface**
3. Wizard
    - Name: `AzureTunnel`
    - Type: **VPN**
    - VPN Type: **IKEv2**
    - Destination IP: Azure VPN Gateway Public IP
    - Protocol: **Use pre-shared key**
    - Enter same key used in Azure
4. Add static routes:
    - Destination: `10.1.0.0`
    - Mask: `255.255.0.0`
    - Gateway: leave blank

## Phase 6: Test and Verify

### Step 12. Check VPN Tunnel Status

1. Go to Azure Portal > `S2SConnection`
2. Status should be **Connected**
3. On `OnPremRouter`, you can also ping Azure VNet VM IPs if present