

Project – 5

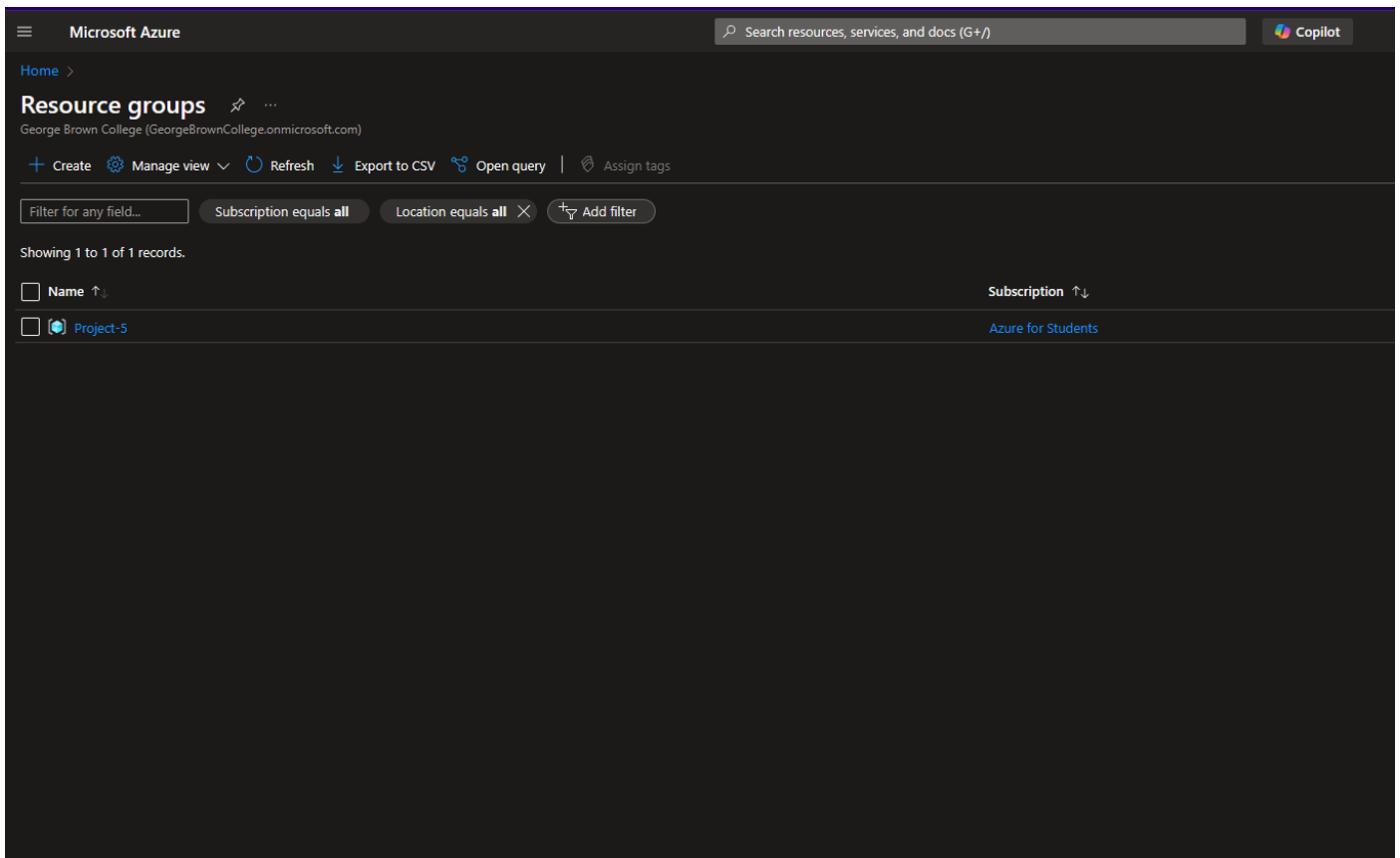
Objective: Establish connectivity between an Remote/on-premises network and an Azure Virtual Network to enable seamless communication and resource access across hybrid environments.

Step – 1

Assess On-premises Network Environment: Evaluate the existing on-premises network infrastructure, including network topology, IP addressing scheme, and connectivity requirements for applications and services hosted on-premises.

Step – 2

Create Azure Virtual Network: Provision an Azure Virtual Network (VNet) in the Azure portal, defining IP address ranges and subnets that align with your remote/on-premises network configuration. Choose an appropriate location and resource group for the VNet deployment.



Microsoft Azure

Search resources, services, and docs (G+/)

Copilot

Home > Virtual networks >

Create virtual network

...

Basics

Security

IP addresses

Tags

Review + create

Azure Virtual Network (VNet) is the fundamental building block for your private network in Azure. VNet enables many types of Azure resources, such as Azure Virtual Machines (VM), to securely communicate with each other, the internet, and on-premises networks. VNet is similar to a traditional network that you'd operate in your own data center, but brings with it additional benefits of Azure's infrastructure such as scale, availability, and isolation.

[Learn more.](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription *

Azure for Students

Resource group *

Project-5

[Create new](#)

Instance details

Virtual network name *

Vnet-1

Region * ⓘ

(Canada) Canada Central

[Deploy to an Azure Extended Zone](#)

Microsoft Azure

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⌵ ⓘ ⚙ ⌵ ⌵

Home > Virtual networks >

Create virtual network

...

Basics

Security

IP addresses

Tags

Review + create

Configure your virtual network address space with the IPv4 and IPv6 addresses and subnets you need. [Learn more](#)

Define the address space of your virtual network with one or more IPv4 or IPv6 address ranges. Create subnets to segment the virtual network address space into smaller ranges for use by your applications. When you deploy resources into a subnet, Azure assigns the resource an IP address from the subnet. [Learn more](#)

+ Add a subnet

10.0.0.0/16

10.0.0.0

/16

10.0.0.0 - 10.0.255.255

65,536 addresses

Delete address space

| Subnets | IP address range | Size | NAT gateway |
|---------|-----------------------|---------------------|-------------|
| default | 10.0.0.0 - 10.0.0.255 | /24 (256 addresses) | - |

Add IPv4 address space

Edit subnet

Select an address space and configure your subnet. You can customize a default subnet or select from subnets you've created. [Learn more](#)

Subnet purpose ⓘ

Default

Name ⓘ

Subnet-1

IPv4

Include an IPv4 address space

☒

IPv4 address range ⓘ

10.0.0.0/16

10.0.0.0 - 10.0.255.255

Starting address ⓘ

10.0.1.0

Size ⓘ

/24 (256 addresses)

Subnet address range ⓘ

10.0.1.0 - 10.0.1.255

IPv6

Include an IPv6 address space

☐ This virtual network has no IPv6 address ranges.

Private subnet

Private subnets enhance security by not providing default outbound access. To enable outbound connectivity to the internet, it is necessary to explicitly grant outbound access. A NAT gateway is the recommended way to do this for virtual machines in the subnet. [Learn more](#)

Enable private subnet (no default outbound access)

☐

Security

Simplify internet access for virtual machines by using a network address translation gateway. Filter subnet traffic. [Learn more](#)

NAT gateway ⓘ

None

[Create new](#)

ⓘ A NAT gateway is recommended for outbound internet access from subnets. Edit the subnet to add a NAT gateway.

Save

Cancel

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Home > Virtual networks >

Create virtual network ...

BasicsSecurityIP addressesTagsReview + create

[View automation template](#)

Basics

Subscription

Azure for Students

Resource Group

Project-5

Name

Vnet-1

Region

Canada Central

Security

Azure Bastion

Disabled

Azure Firewall

Disabled

Azure DDoS Network Protection

Disabled

IP addresses

Address space

10.0.0.0/16 (65,536 addresses)

Subnet

Subnet-1 (10.0.1.0/24) (256 addresses)

Tags

PreviousNextCreate

Microsoft Azure

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Copilot

Home >

Vnet-1-1734043156334 | Overview

Deployment

Search

DeleteCancelRedeployDownloadRefresh

Overview

Inputs

Outputs

Template

✔ Your deployment is complete

Deployment name : Vnet-1-1734043156334

Subscription : Azure for Students

Resource group : Project-5

Start time : 12/12/2024, 5:39:16 PM

Correlation ID : d092efda-06c6-4caf-a391-1efe2771cba9

> Deployment details

< Next steps

Go to resource

Give feedback

Tell us about your experience with deployment

Microsoft Azure

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Home > Vnet-1-1734043156334 | Overview >

Vnet-1

Virtual network

Search

MoveDeleteRefreshGive feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Address space

Connected devices

Subnets

Bastion

DDoS protection

Firewall

Microsoft Defender for Cloud

Network manager

DNS servers

Peerings

Service endpoints

Private endpoints

Properties

Locks

Monitoring

Alerts

Metrics

Diagnostic settings

Essentials

Resource group (move) : Project-5

Location (move) : Canada Central

Subscription (move) : Azure for Students

Subscription ID : 81db4b59-1d00-4887-a1d0-1d0f54b62ba2

Address space : 10.0.0.0/16

DNS servers : Azure provided DNS service

Flow timeout : Configure

BGP community string : Configure

Virtual network ID : 29c180e3-3f1e-4ca3-93c5-ca86a91

Tags (edit) : Add tags

Topology

Properties

Capabilities (5)

Recommendations

Tutorials

DDoS protection

Configure additional protection from distributed denial of service attacks.

Not configured

Azure Firewall

Protect your network with a stateful L3-L7 firewall.

Not configured

Peerings

Seamlessly connect two or more virtual networks.

Not configured

Microsoft Defender for Cloud

Strengthen the security posture of your environment.

Private endpoints

Private endpoints

Microsoft Azure

Search resources, services, and docs (G+/)

Copilot

Home > Vnet-1-1734043156334 | Overview > Vnet-1

Vnet-1 | Subnets

Virtual network

Search

+ Subnet Refresh | Manage users Delete

Create subnets to segment the virtual network address space into smaller ranges for use by your applications. When you deploy resources into a subnet, Azure assigns the resource an IP address from the subnet

Search subnets

| | Name ↑ | IPAM Pool ↑ | IPv4 ↑ | IPv6 ↑ | Available IPs ↑ | Delegated to ↑ |
|--|---------------|-------------|-------------|--------|-------------------------------|----------------|
| | Subnet-1 | - | 10.0.1.0/24 | - | 251 | - |
| | GatewaySubnet | - | 10.0.2.0/24 | - | availability dependent on ... | - |

Overview

Activity log

Access control (IAM)

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Diagnose and solve problems

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Diagnostic settings

Microsoft Azure

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Copilot

Home > Virtual machines >

Create a virtual machine

Help me create a low cost VM

Help me create a VM optimized for high availability

Help me choose the right VM size for my workload

Basics

Disks

Networking

Management

Monitoring

Advanced

Tags

Review + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. [Learn more](#)

This subscription may not be eligible to deploy VMs of certain sizes in certain regions.

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription *

Azure for Students

Resource group *

Project-5

Create new

Instance details

Virtual machine name *

VM-1

Region *

(Canada) Canada Central

Availability options

Availability zone

Zone options

Self-selected zone

Choose up to 3 availability zones, one VM per zone

Azure-selected zone (Preview)

Let Azure assign the best zone for your needs

Availability zone *

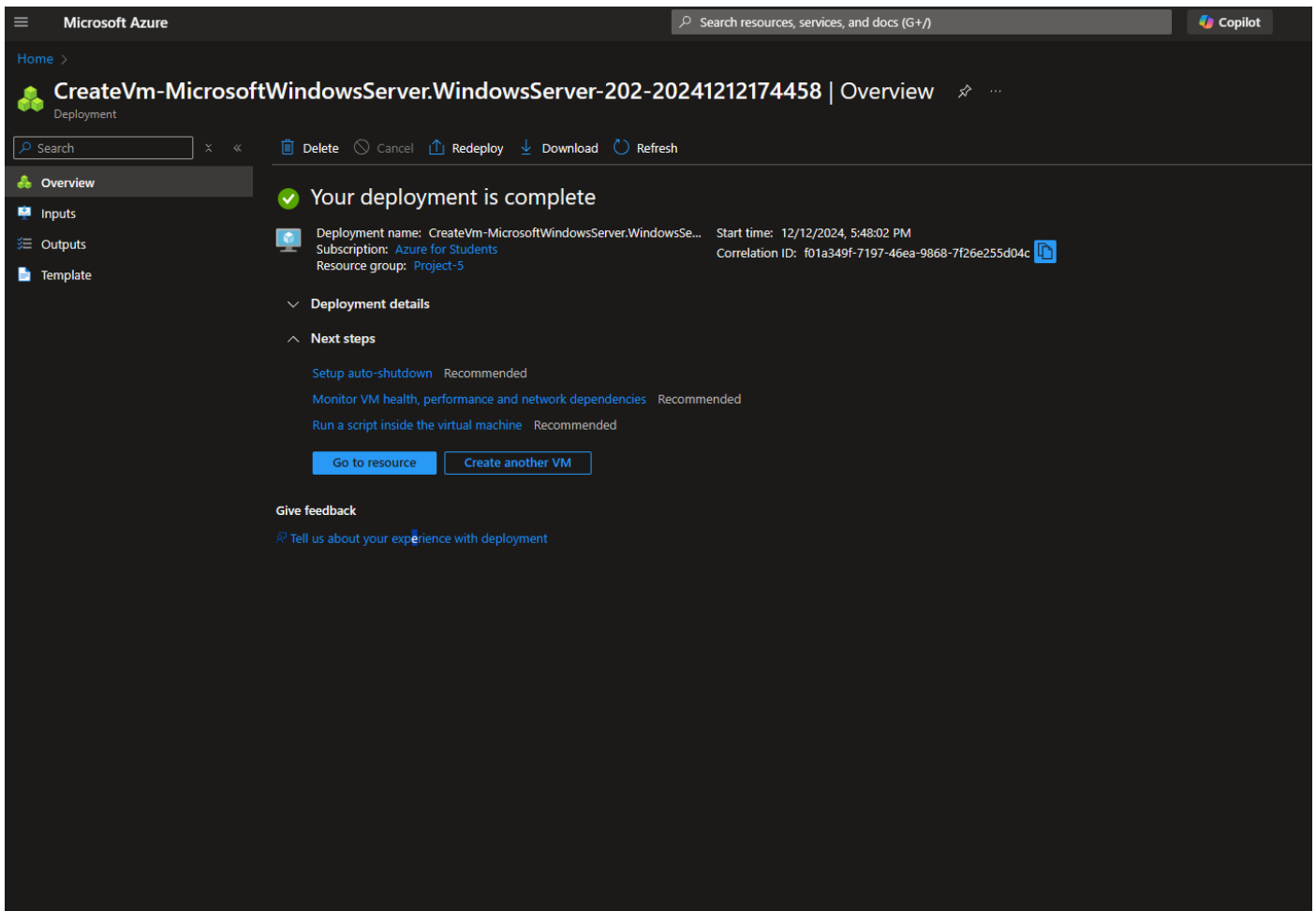
Zone 1

You can now select multiple zones. Selecting multiple zones will create one VM per zone. [Learn more](#)

< Previous

Next : Disks >

Review + create



Step - 3

Deploy Local Network Gateway: Create a Local Network Gateway (LNG) in Azure to represent the on-premises network. Specify the public IP address or address range of the on-premises VPN device, along with the corresponding private IP address range.

Step – 4

Configure On-premises VPN Device: Configure the VPN device on the on-premises network (e.g., VPN router, firewall) to establish a VPN tunnel with the Azure VPN Gateway. Ensure that the VPN device settings (IKEv2/IPsec parameters, pre-shared key) match the configuration of the Azure VPN Gateway.

Microsoft Azure

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Copilot

Home >

Virtual network gateways

George Brown College (GeorgeBrownCollege.onmicrosoft.com)

[+ Create](#) [Manage view](#) [Refresh](#) [Export to CSV](#) [Open query](#) | [Assign tags](#)

Filter for any field...

Subscription equals allResource group equals allLocation equals allAdd filter

Showing 0 to 0 of 0 records.

| Name ↑↓ | Virtual ... ↑↓ | Gatew... ↑↓ | Resource group ↑↓ | Location ↑↓ |
|---|----------------|-------------|-------------------|-------------|
| <div><div></div><div>No virtual network gateways to display</div><div>Azure VPN Gateway connects your on-premises networks to Azure through Site-to-Site VPNs in a similar way that you set up and connect to a remote branch office. The connectivity is secure and uses the industry-standard protocols Internet Protocol Security (IPsec) and Internet Key Exchange (IKE).</div><div>Create virtual network gateway</div><div>Learn more about Virtual network gateway</div></div> | | | | |

Microsoft Azure

Search resources, services, and docs (G+/)

Copilot

Home > Virtual network gateways >

Create virtual network gateway

BasicsTagsReview + create

Azure has provided a planning and design guide to help you configure the various VPN gateway options. [Learn more](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription *

Azure for Students

Resource group

Project-5 (derived from virtual network's resource group)

Instance details

Name *

VPN-GATEWAY

Region *

Canada Central

Deploy to an Azure Extended Zone

Gateway type * ⓘ

VPN

ExpressRoute

SKU * ⓘ

VpnGw1

Generation ⓘ

Generation1

Virtual network * ⓘ

Vnet-1

Create virtual network

Subnet ⓘ

GatewaySubnet (10.0.2.0/24)

Only virtual networks in the currently selected subscription and region are listed.

Public IP address

Public IP address * ⓘ

Create new

Use existing

Public IP address name *

VPNGW-PIP

Review + create

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Download a template for automation

Microsoft Azure

Search resources, services, and docs (G+/)

Copilot

[Home](#) > [Virtual network gateways](#) >

Create virtual network gateway ...

Validation passed

Basics

Tags

Review + create

Basics

Subscription

Resource group

Name

Region

SKU

Generation

Virtual network

Subnet

Gateway type

VPN type

Enable active-active mode

Configure BGP

Public IP address

SECOND PUBLIC IP ADDRESS

Azure for Students

Project-5

VPN-GATEWAY

Canada Central

VpnGw1

Generation1

Vnet-1

GatewaySubnet (10.0.2.0/24)

Vpn

RouteBased

Enabled

Disabled

VPNGW-PIP

VPNGW-PIP1

Tags

None

Create

Previous

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Microsoft Azure

Search resources, services, and docs (G+/)

Copilot

[Home](#) > [Microsoft.VirtualNetworkGateway-20241212184024](#) | [Overview](#) >

VPN-GATEWAY

Virtual network gateway

Search

Refresh

Move

Delete

Overview

Activity log

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Diagnose and solve problems

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Automation

CLI / PS

Tasks

Export template

Help

Essentials

Resource group (move) : [Project-5](#)

Location : [Canada Central](#)

Subscription (move) : [Azure for Students](#)

Subscription ID : 81db4b59-1d00-4887-a1d0-1d0f54b62ba2

Tags (edit) : [Add tags](#)

SKU : VpnGw1

Gateway type : VPN

VPN type : Route-based

Virtual network : [Vnet-1](#)

First public IP address : [52.233.47.208 \(VPN-GAT](#)

Health check

Perform a quick health check to detect possible gateway issues

Go to Resource health

Advisor Recommendations

Check Critical, Warning, and Informational Recommendations

Go to Advisor

Show data for last

1 hour

6 hours

12 hours

1 day

7 days

30 days

Total tunnel ingress

100B

90B

80B

70B

60B

50B

40B

30B

20B

10B

Total tunnel egress

100B

90B

80B

70B

60B

50B

40B

30B

20B

10B

Step – 5

Establish VPN Connection: Initiate the VPN connection between the Azure VPN Gateway and the on-premises VPN device. Verify the connectivity status and troubleshoot any connectivity issues using Azure VPN diagnostics and logs.

The screenshot displays the Microsoft Azure portal interface for configuring a VPN Gateway. The top navigation bar includes the Microsoft Azure logo, a search bar, and the Copilot icon. The breadcrumb trail shows the path: Home > Microsoft.VirtualNetworkGateway-20241212184024 | Overview > VPN-GATEWAY.

The main heading is **VPN-GATEWAY | Point-to-site configuration**, with a sub-label 'Virtual network gateway'. Below the heading is a search bar and a set of action buttons: Save, Discard, Delete, and Download VPN client.

The left-hand navigation pane is expanded, showing the following menu items:

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Settings
 - Configuration
 - Connections
 - Point-to-site configuration** (selected)
 - Maintenance
 - Properties
 - Locks
- Monitoring
 - Logs
 - Alerts
 - Metrics
 - BGP peers
 - Advisor Recommendations
- Automation
 - CLI / PS
 - Tasks
 - Export template
- Help

The main content area displays the message: **Point-to-site is not configured**, with a [Configure now](#) link below it.

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

Home > Microsoft.VirtualNetworkGateway-20241212184024 | Overview > VPN-GATEWAY

VPN-GATEWAY | Point-to-site configuration

Virtual network gateway

Search

SaveDiscardDeleteDownload VPN client

Overview

Activity log

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Point-to-site configuration

Maintenance

Properties

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Monitoring

Logs

Alerts

Metrics

BGP peers

Advisor Recommendations

Automation

CLI / PS

Tasks

Export template

Help

Address pool

192.168.1.0/24

Tunnel type

SSTP (SSL)

Authentication type

Azure certificate

Public IP address for User VPN configuration

A third public IP address is required to use a User VPN configuration with an availability zone SKU gateway in active-active mode.

Public IP address

Create newUse existing

P2S

Configure public IP address

SKU

Standard

Assignment

DynamicStatic

Root certificates

| Name | Public certificate data |
|------|-------------------------|
| | |

Revoked certificates

| Name | Thumbprint |
|------|------------|
| | |

Filter by title

VPN Gateway documentation

Overview

Tutorials

Create and manage a VPN gateway

Configure a site-to-site connection

Concepts

How-to guides

Create and manage a VPN gateway

Site-to-site (S2S)

Site-to-site with ExpressRoute

VNet-to-VNet

Point-to-site (P2S)

Certificate authentication

P2S gateway configuration

VPN client configuration

Generate self-signed certificates

.cer and .pfx files

Azure PowerShell

Makecert

.pem files

Install VPN client certificates

Microsoft Entra ID authentication

RADIUS authentication

Configure Always On tunnels

Move to OpenVPN or IKEv2 from SSTP

P2S session management

Advertise custom routes to P2S clients

Create custom IPsec policies for P2S

Download PDF

generated, you can upload them or install them on any supported client operating system.

If you don't have a computer that meets the operating system requirement, you can use [MakeCert](#) to generate certificates. The certificates that you generate using either method can be installed on any supported client operating system.

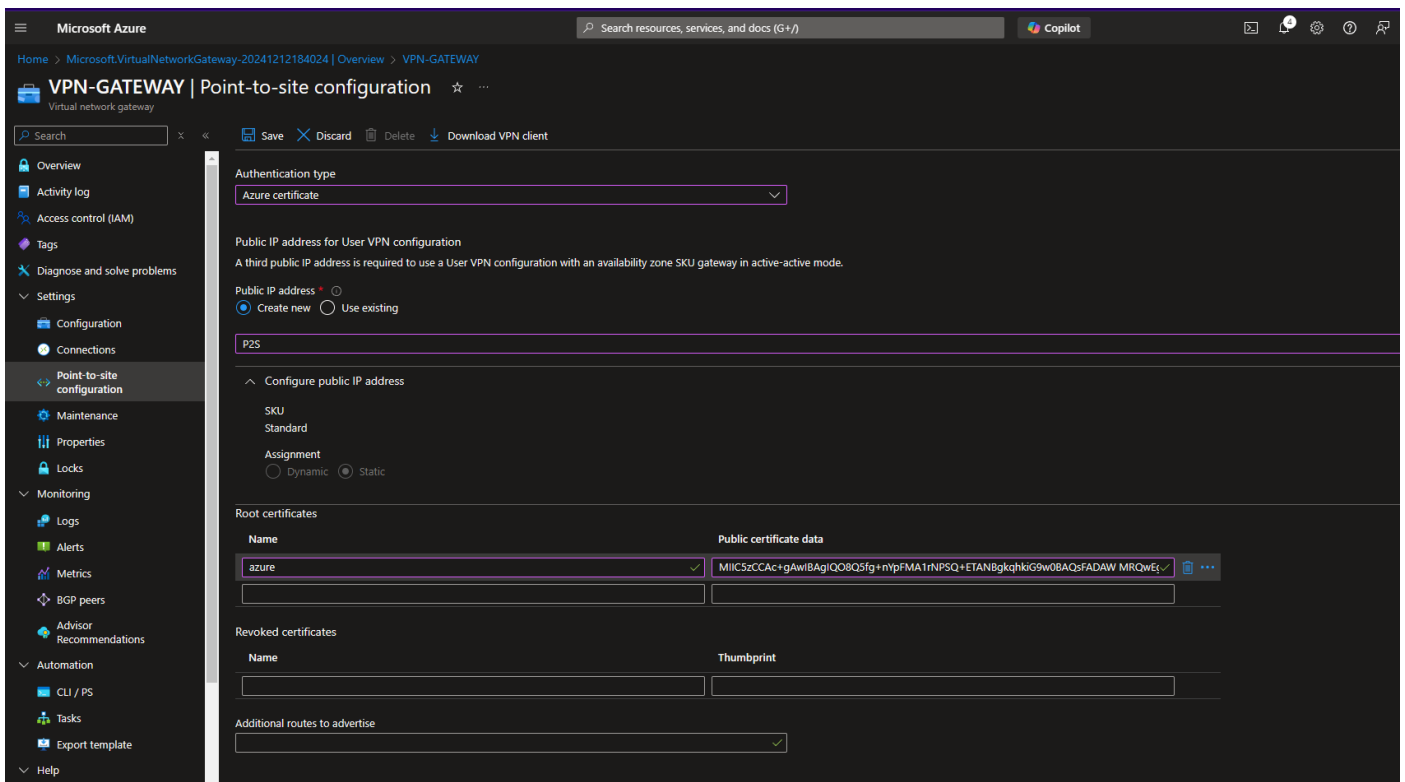
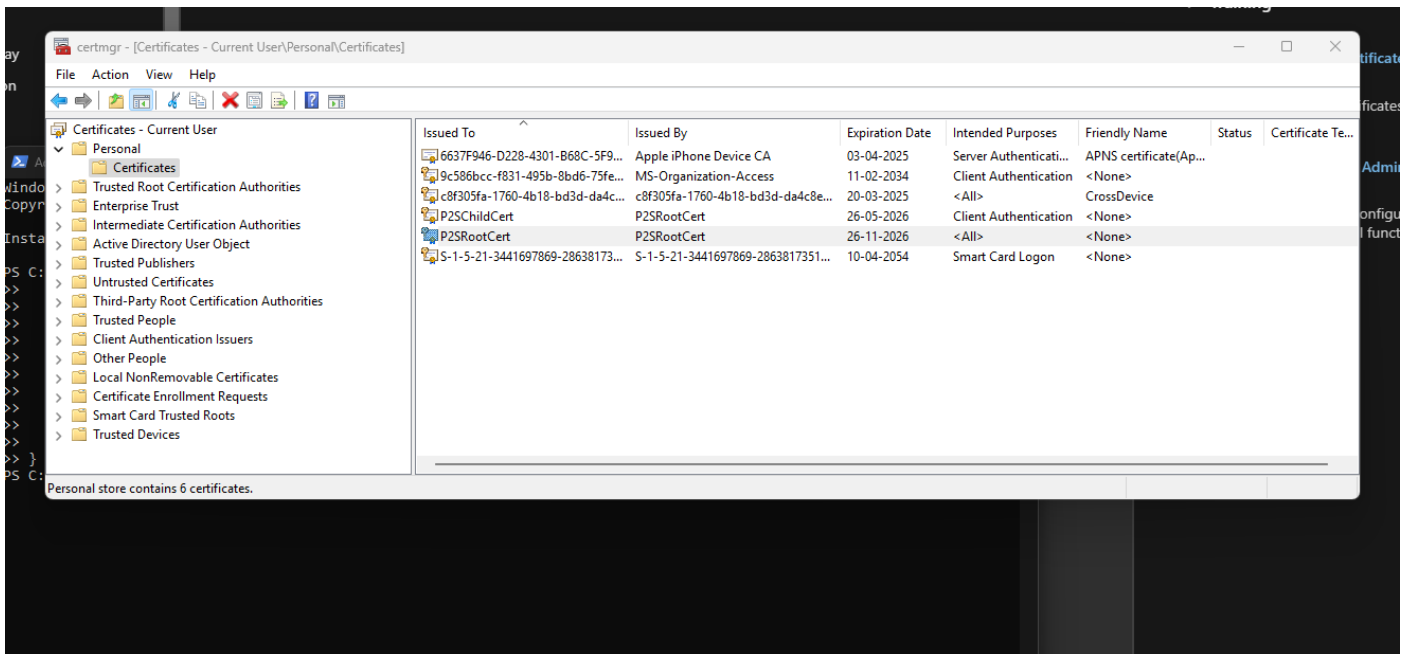
Create a self-signed root certificate

Use the `New-SelfSignedCertificate` cmdlet to create a self-signed root certificate. For additional parameter information, see [New-SelfSignedCertificate](#).

```
PS C:\WINDOWS\system32> $params = @{
    Type = 'Custom'
    Subject = 'CN=P2SRootCert'
    KeySpec = 'Signature'
    KeyExportPolicy = 'Exportable'
    KeyUsage = 'CertSign'
    KeyUsageProperty = 'Sign'
    KeyLength = 2048
    HashAlgorithm = 'sha256'
    NotAfter = (Get-Date).AddMonths(24)
    CertStoreLocation = 'Cert:\CurrentUser\My'
}
PS C:\WINDOWS\system32> $cert = New-SelfSignedCertificate @params
```

3. Leave the PowerShell console open and proceed with the next steps to generate a client certificate.

Generate a client certificate

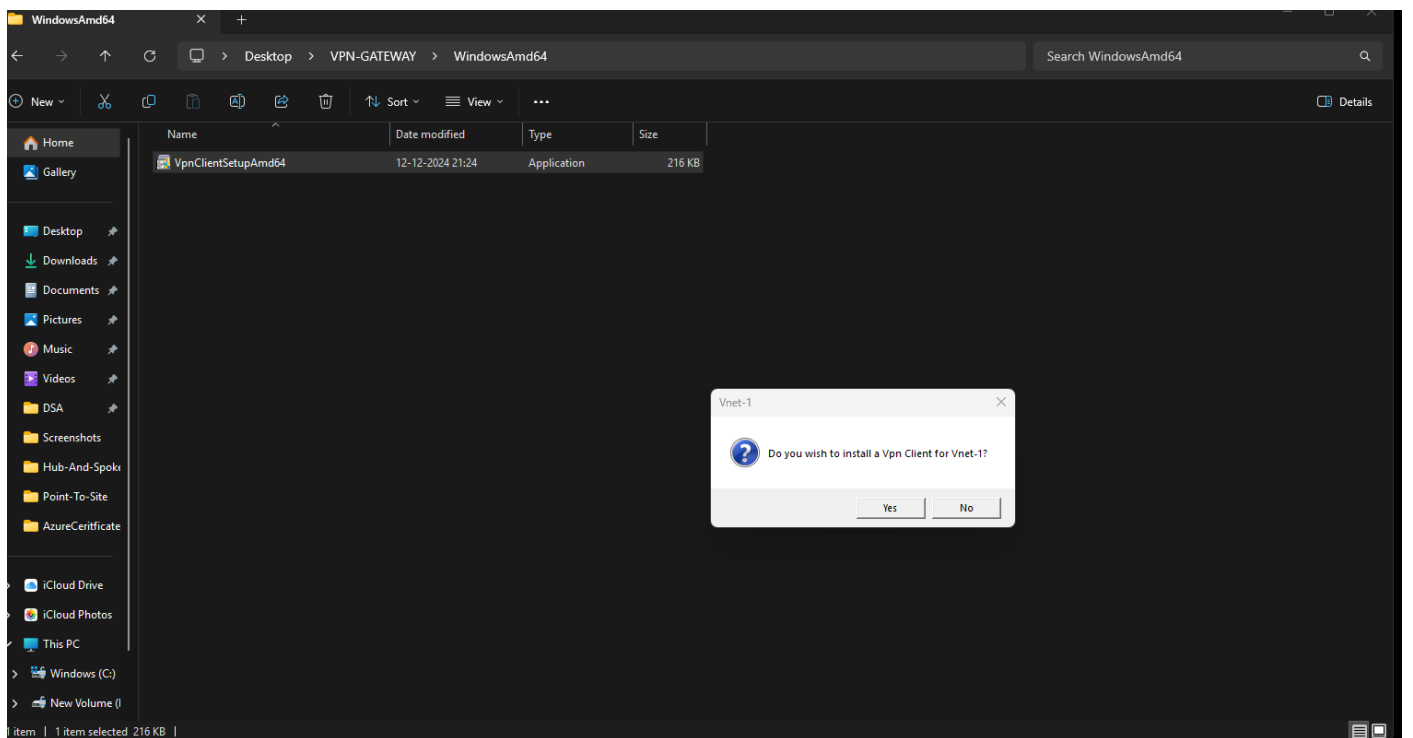
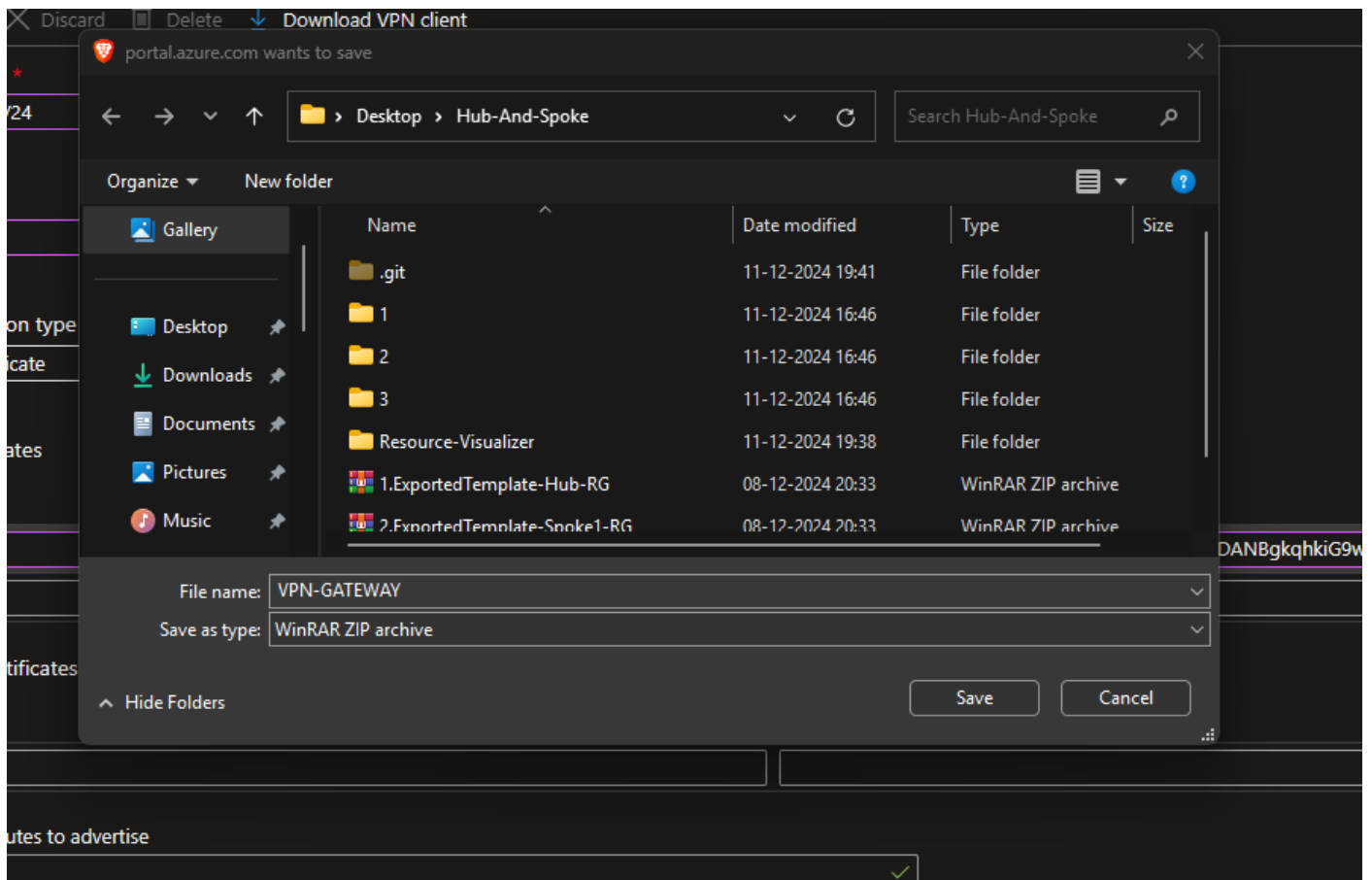


Step – 6

Configure Network Routing: Configure routing settings on both the Azure Virtual Network and the on-premises network to enable traffic flow between the two networks. Define route tables, user-defined routes, and network security rules to control traffic forwarding and filtering.

Step – 7

Test Connectivity and Resource Access: Validate the connectivity between resources hosted on the Azure Virtual Network and the on-premises network. Test access to on-premises applications, file shares, and services from Azure VMs, and vice versa.



Network & internet > VPN

VPN connections

Add VPN



Vnet-1

Not connected

Connect



Advanced settings for all VPN connections

Allow VPN over metered networks

On

Allow VPN while roaming

On

Related support



Help with VPN



Setting up a VPN



Get help



Give feedback

Network & internet > VPN

VPN connections

Add VPN



Vnet-1

Not connected

Connect



Advanced settings for all VPN connections

Allow VPN over metered networks

On

Allow VPN while roaming

On

Related support



Help with VPN



Setting up a VPN



Get help



Give feedback

