

Project Name: VNet Peering

To do: Build multiple Vnet connection in different 3 regions and connect each vm with another vm

Description: Virtual Network Peering in Microsoft Azure is a networking feature that allows you to connect two Azure Virtual Networks (VNets) together, enabling them to communicate with each other as if they were on the same network. This feature provides a simple and efficient way to create a network topology that meets your application's requirements without the need for a complex and expensive network architecture. Here are some key points about VNet peering in Azure:

1. **VNet Peering Basics**:

- VNet peering creates a direct, private connection between two VNets, allowing resources in each VNet to communicate with resources in the other VNet using private IP addresses.
- Peering is done without using a virtual network gateway, which means that data traffic flows directly between VNets.

2. **Benefits**:

- **Simplified Network Design**: VNet peering simplifies network architecture by eliminating the need for complex VPN gateways or dedicated connections.
- **Low Latency**: Since traffic doesn't traverse the public internet, VNet peering provides low-latency communication between resources in different VNets.
- **Transitive Routing**: Azure VNets can be peered in a hub-and-spoke topology, allowing traffic to flow through a hub VNet to reach other peered VNets. This enables transitive routing, which is useful for centralizing network services or security controls.

3. **Peering Constraints and Considerations**:

- **No Gateway Required**: As mentioned earlier, VNet peering doesn't require a virtual network gateway.
- **Region Compatibility**: VNets being peered can be in the same or different Azure regions, but both VNets must belong to the same Azure Active Directory tenant.
- **Address Space Overlap**: The address space of the peered VNets must not overlap; otherwise, peering won't work.
- **Hub-and-Spoke**: To enable traffic flow between peered VNets in a hub-and-spoke model, you typically create peering connections from the spokes to the hub and then peer the hub to other hubs or VNets.

4. **Steps to Set Up VNet Peering**:

- Create or identify the VNets you want to peer.
- Configure the peering relationship by specifying the target VNet and allowing or denying traffic between them.
- Repeat the process for both VNets to establish a bidirectional peering connection.
- Adjust route tables and Network Security Groups (NSGs) if needed to control traffic between peered VNets.

5. **Use Cases**:

- **Multi-tier Applications**: VNet peering is useful for dividing multi-tier applications into separate VNets while allowing them to communicate efficiently.
- **Shared Services**: You can centralize network services like DNS, Active Directory, or security appliances in a separate VNet and peer it to other VNets that need those services.
- **Regional Connectivity**: VNets in different Azure regions can be peered to create a global network architecture.

6. **Billing**: Data transfer between peered VNets is considered "inbound" data transfer for the receiving VNet and "outbound" data transfer for the sending VNet. Data transfer between peered VNets in the same region is typically free or comes at a very low cost.

In summary, Azure VNet peering is a powerful feature for building flexible, scalable, and efficient network architectures in Azure. It simplifies network design, reduces latency, and enhances security by allowing private communication between VNets in a straightforward manner.

## Steps to make peering between different networks.

### Step 1: Build 3 virtual networks in 3 different regions.

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the Azure logo, a search bar, and user information (21A91A6121@aec.edu.in). The main content area is titled 'vnet1 - Microsoft Azure'. The left sidebar lists 'Virtual networks' with items: 'vnet1' (selected), 'vnet2', and 'vnet3'. The right pane displays the 'Overview' of 'vnet1', showing details like Resource group (rg1), Location (West US 3), Subscription (Azure for Students), and Address space (10.0.0.0/16). The 'Capabilities (5)' tab is selected, showing options for DDoS protection, Azure Firewall, Microsoft Defender for Cloud, Private endpoints, and Peering. The bottom status bar shows system information: 31°C Partly sunny, 11:35, ENG, 09-09-2023.

This screenshot shows the Microsoft Azure portal interface, similar to the previous one but for a different virtual network. The top navigation bar and user information are identical. The main content area is titled 'vnet2 - Microsoft Azure'. The left sidebar lists 'Virtual networks' with items: 'vnet1', 'vnet2' (selected), and 'vnet3'. The right pane displays the 'Overview' of 'vnet2', showing details like Resource group (rg2), Location (East US 2), Subscription (Azure for Students), and Address space (20.0.0.0/16). The 'Capabilities (5)' tab is selected, showing the same five options as vnet1. The bottom status bar shows system information: 31°C Partly sunny, 11:36, ENG, 09-09-2023.

**vnet3** Virtual network

**Essentials**

- Resource group (move) : rg3
- Location (move) : France Central
- Subscription (move) : Azure for Students
- Subscription ID : 2dc11c06-dff8-4f53-ae3a-f17d684e9b52
- Address space : 30.0.0.0/16
- DNS servers : Azure provided DNS service
- Flow timeout : Configure
- BGP community string : Configure
- Virtual network ID : dbfd65a0-f1c4-46f4-ba67-99724f882553

**Capabilities (5)**

- DDoS protection**: Not configured
- Azure Firewall**: Not configured
- Peering**: Not configured
- Microsoft Defender for Cloud**: Not configured
- Private endpoints**: Not configured

## Step 2:

Create 3 Servers in 3 vnets separately.

**PublicServer1** Virtual machine

**Essentials**

- Resource group (move) : rg1
- Status : Running
- Location : West US 3 (Zone 1)
- Subscription (move) : Azure for Students
- Subscription ID : 2dc11c06-dff8-4f53-ae3a-f17d684e9b52
- Availability zone : 1
- Operating system : Linux (ubuntu 20.04)
- Size : Standard D2s v3 (2 vcpus, 8 GiB memory)
- Public IP address : 20.14.94.134
- Virtual network/subnet : vnet1/subnet11
- DNS name : Not configured
- Health state : -

**Properties**

Virtual machine	Networking
Computer name : PublicServer1	Public IP address : 20.14.94.134 ( Network interface publicserver183_x1 ) 20.125.69.213 ( Load balancer alb1 )
Operating system : Linux (ubuntu 20.04)	Public IP address (IPv6) : -
Image publisher : canonical	Private IP address : 10.0.0.4
Image offer : 0001-com-ubuntu-server-focal	Private IP address (IPv6) : -
Image plan : 20_04-lts-gen2	Virtual network/subnet : vnet1/subnet11
VM generation : V2	DNS name : Configure
VM architecture : x64	
Agent status : Ready	

PrivateServer1 - Microsoft Azure

https://portal.azure.com/#@aec.edu.in/resource/subscriptions/2dc11c06-dff8-4f53-ae3a-f17d684e9b52/resourceGroups/rg2/providers/Microsoft.Compute/virtualMachines/PrivateServer1

Microsoft Azure

Home > Virtual machines > PrivateServer1

Virtual machine

Search

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Overview Activity log Access control (IAM) Tags Diagnose and solve problems Settings Networking Connect Disks Size Microsoft Defender for Cloud Advisor recommendations Extensions + applications Availability + scaling Configuration Identity Properties

Essentials

Resource group (move) : rg2 Status : Running Location : East US 2 (Zone 1) Subscription (move) : Azure for Students Subscription ID : 2dc11c06-dff8-4f53-ae3a-f17d684e9b52 Availability zone : 1 Tags (edit) : Add tags

Operating system : Linux (ubuntu 20.04) Size : Standard B2s (2 vcpus, 4 GiB memory) Public IP address : - Virtual network/subnet : vnet2/subnet21 DNS name : - Health state : -

Properties Monitoring Capabilities (7) Recommendations Tutorials

Virtual machine

Computer name : PrivateServer1 Operating system : Linux (ubuntu 20.04) Image publisher : canonical Image offer : 0001-com-ubuntu-server-focal Image plan : 20\_04-lts-gen2 VM generation : V2 VM architecture : x64 Agent status : Ready

Networking

Public IP address : - Public IP address (IPv6) : - Private IP address : 20.0.0.5 Private IP address (IPv6) : - Virtual network/subnet : vnet2/subnet21 DNS name : -

Size

Standard B2s

31°C Partly sunny 11:38 09-09-2023

PrivateServer2 - Microsoft Azure

https://portal.azure.com/#@aec.edu.in/resource/subscriptions/2dc11c06-dff8-4f53-ae3a-f17d684e9b52/resourceGroups/rg3/providers/Microsoft.Compute/virtualMachines/PrivateServer2

Microsoft Azure

Home > Virtual machines > PrivateServer2

Virtual machine

Search

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Overview Activity log Access control (IAM) Tags Diagnose and solve problems Settings Networking Connect Disks Size Microsoft Defender for Cloud Advisor recommendations Extensions + applications Availability + scaling Configuration Identity Properties

Essentials

Resource group (move) : rg3 Status : Running Location : France Central (Zone 1) Subscription (move) : Azure for Students Subscription ID : 2dc11c06-dff8-4f53-ae3a-f17d684e9b52 Availability zone : 1 Tags (edit) : Add tags

Operating system : Linux (ubuntu 20.04) Size : Standard B2s (2 vcpus, 4 GiB memory) Public IP address : - Virtual network/subnet : vnet3/subnet31 DNS name : - Health state : -

Properties Monitoring Capabilities (7) Recommendations Tutorials

Virtual machine

Computer name : PrivateServer2 Operating system : Linux (ubuntu 20.04) Image publisher : canonical Image offer : 0001-com-ubuntu-server-focal Image plan : 20\_04-lts-gen2 VM generation : V2 VM architecture : x64 Agent status : Ready

Networking

Public IP address : - Public IP address (IPv6) : - Private IP address : 30.0.0.5 Private IP address (IPv6) : - Virtual network/subnet : vnet3/subnet31 DNS name : -

Size

Standard B2s

31°C Partly sunny 11:38 09-09-2023

### Step 3:

Now establish peering connection for all the 3 vnets.

**vnet1 | Peerings**

Name	Peering status	Peer	Gateway transit
vnet1_vnet2	Connected	vnet2	Disabled
vnet1_vnet3	Connected	vnet3	Disabled

**vnet2 | Peerings**

Name	Peering status	Peer	Gateway transit
vnet2_vnet1	Connected	vnet1	Disabled
vnet2_vnet3	Connected	vnet3	Disabled

The screenshot shows the Microsoft Azure portal interface. The user is navigating through the 'Virtual networks' section, specifically under the 'vnet3' network. On the left, there's a sidebar with various options like Bastion, DDoS protection, Firewall, Microsoft Defender for Cloud, Network manager, DNS servers, Peering (which is selected), Service endpoints, Private endpoints, Properties, Locks, Monitoring, Alerts, Metrics, Diagnostic settings, Logs, and Connection monitor (classic). The main content area shows a table of peering connections:

Name	Peering status	Peer	Gateway transit
vnet3_vnet2	Connected	vnet2	Disabled
vnet3_vnet1	Connected	vnet1	Disabled

At the bottom of the portal window, there's a search bar, a taskbar with icons for File Explorer, Edge, Mail, and others, and a system tray showing the date (09-09-2023), time (11:41), and weather (31°C Partly sunny).

#### Step 4:

Now connect the servers through each server.

The screenshot shows a terminal session in MobaXterm. The title bar indicates the session is connected to '20.14.94.134 (SaSamhitha)'. The terminal window displays a black background with white text. At the top, there's a menu bar with options like Terminal, Sessions, View, X server, Tools, Games, Sessions, View, Split, MultiTerm, Tunneling, Packages, Settings, Macros, Help, and a question mark icon. Below the menu is a toolbar with icons for Session, Servers, Tools, Games, Sessions, View, Split, MultiTerm, Tunneling, Packages, Settings, and Help. The main terminal area shows the command prompt 'SaSamhitha@PublicServer1:~\$'. To the left of the terminal is a file browser window showing the directory structure of '/home/SaSamhitha/'. The browser tree includes 'Name', 'cache', 'ssh', '.bash\_history', 'bash\_logout', 'bashrc', 'profile', '.sudo\_as\_admin\_successful', and 'xAuthority'. At the bottom of the terminal window, there's a status bar with the text 'UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: https://mobaxterm.mobatek.net'. The bottom of the screen also features a Windows-style taskbar with icons for File Explorer, Edge, Mail, and others, and a system tray showing the date (09-09-2023), time (11:42), and weather (31°C Partly sunny).

```
SaSamitha@20.14.94.134 (SaiSamitha)
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Game Sessions View Split MultiExec Tunneling Package Settings Help
Quick connect...
/home/SaiSamitha/
Name cache ssh bash_history bash_logout bashrc profile .sudo_as_admin_successful .Xauthority
SaSamitha@20.14.94.134 (SaiSamitha) ~$ ssh SaSamitha@20.0.0.5
The authenticity of host '20.0.0.5 (20.0.0.5)' can't be established.
EDSA key fingerprint is SHA256:N1w0aLBz1m4o0Kh/qFuz51l8KWPxy01fjy7qWjGk.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '20.0.0.5' (EDSA) to the list of known hosts.
SaSamitha@20.0.0.5's password:
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1045-azure x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

System information as of Sat Sep 9 06:13:51 UTC 2023

System load: 0.08 Processes: 110
Usage of /: 5.3% of 28.89GB Users logged in: 0
Memory usage: 7% IPv4 address for eth0: 20.0.0.5
Swap usage: 0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

SaSamitha@PrivateServer1:~$
```

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Windows Type here to search 33°C Partly sunny 11:44 ENG 09-09-2023

```
SaSamitha@20.14.94.134 (SaiSamitha)
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Game Sessions View Split MultiExec Tunneling Package Settings Help
Quick connect...
/home/SaiSamitha/
Name cache ssh bash_history bash_logout bashrc profile .sudo_as_admin_successful .Xauthority
SaSamitha@20.14.94.134 (SaiSamitha) ~$ ssh SaSamitha@30.0.0.5
The authenticity of host '30.0.0.5 (30.0.0.5)' can't be established.
EDSA key fingerprint is SHA256:APHYyuSm0YKZoyInpHrVMXLjd7M56qUYLmcAzh0Nq0.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '30.0.0.5' (EDSA) to the list of known hosts.
SaSamitha@30.0.0.5's password:
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1045-azure x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

System information as of Sat Sep 9 06:14:27 UTC 2023

System load: 0.08 Processes: 111
Usage of /: 5.2% of 28.89GB Users logged in: 0
Memory usage: 7% IPv4 address for eth0: 30.0.0.5
Swap usage: 0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
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individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

SaSamitha@PrivateServer2:~$
```

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

Windows Type here to search Hot weather 11:44 ENG 09-09-2023