

# Module 2 - Implementing and managing Azure networking

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# Overview

- ❖ Overview of Azure networking
- ❖ Implementing and managing Azure virtual networks
- ❖ Configuring Azure virtual networks
- ❖ Configuring Azure virtual network connectivity
- ❖ Overview of Azure classic networking

# Overview

- ❖ **Lab** : Using a deployment template to implement Azure virtual networks
- ❖ Creating an Azure virtual network by using a deployment template
- ❖ Creating a virtual network by using PowerShell
- ❖ Configure virtual networks

# Overview

- ❖ Lab : Configuring connectivity between classic and Azure Resource Manager virtual networks
- ❖ Using a PowerShell script to connect a classic VNet and an Azure Resource Manager VNet
- ❖ Configuring a point-to-site VPN
- ❖ Validating virtual network connectivity

# Overview

- ❖ After completing this module, students will be able to:
- ❖ Plan virtual networks in Azure.
- ❖ Explain how to implement and manage virtual networks.
- ❖ Use a deployment template and Azure PowerShell to implement Azure virtual networks.
- ❖ Explain how to configure an Azure virtual network.
- ❖ Describe Azure classic networking.

Using a deployment template and  
Azure PowerShell to implement  
Azure virtual networks

# Using a deployment template implement Azure virtual networks

- ❖ Creating an Azure virtual network by using a deployment template
    - ❖ Open <http://aka.ms/Mt32e4> or  
<https://github.com/Azure/azure-quickstart-templates/tree/master/101-vnet-two-subnets>
  - ❖ Open a GitHub template that you can use to create a virtual network with two subnets
    - ❖ Resource Group name: AdatumLabRG
    - ❖ Vnet Name : HQ
- Review setting and click on Purchase

# Creating a virtual network by using PowerShell

```
#Login to PowerShell
```

```
Login-AzureRmAccount
```

```
#Select the Azure Subscription Free Trial or Developer Program Benefit
```

```
Set-AzureRmContext -SubscriptionName "Developer Program Benefit"
```

```
#intialize the variable
```

```
$rgName = "AdatumTestRG"
```

```
$locName = "South India"
```

```
$vnetName = "AdatumTestVnet"
```

```
$vnetAddressprefix = "10.10.0.0/16"
```

```
$subnetName = "FrontEnd"
```

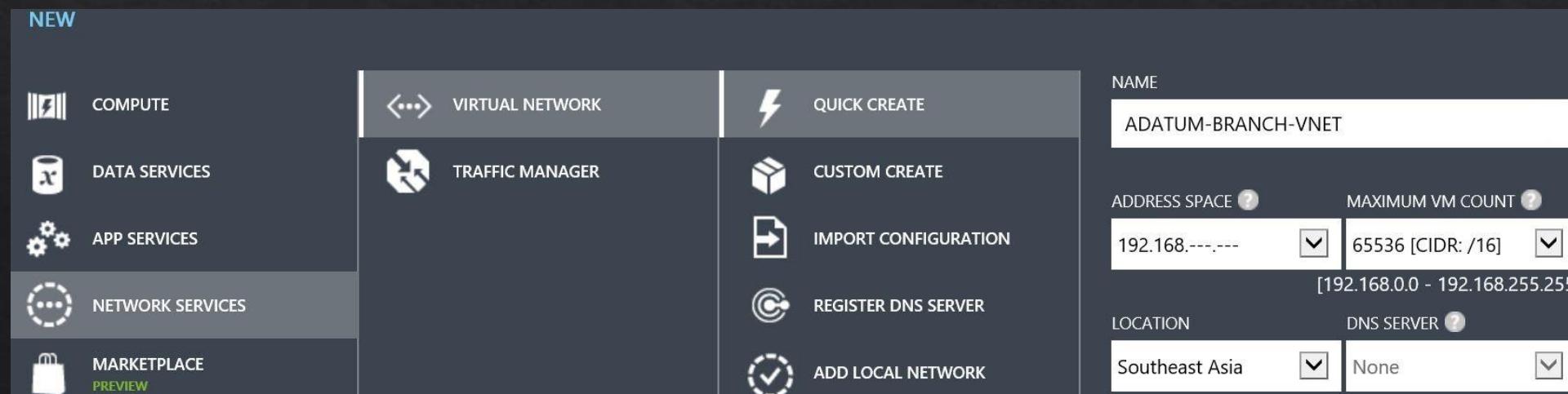
```
$subnetAddressprefix = "10.10.0.0/24"
```



2. Create\_IaaS\_V2\_Vnet\_usingPS.ps1

# Create IaaS V1 virtual network

- ❖ Create an IaaS v1 virtual network using Classic Portal
  - ❖ Switch to <http://manage.windowsazure.com>
  - ❖ Select Virtual Network from Navigation bar on the left
  - ❖ Create a new Vnet **ADATUM-BRANCH-VNET**
  - ❖ **Modify Vnet and create Subnet-1 with Address prefix 192.168.0.0/24**



# Export IaaS V1 virtual network configuration (Optional)

- ❖ Export IaaS V1 Vnet Configuration using PowerShell

```
#Export Azure IaaS V1 Vnet Configuration
```

```
Add-AzureAccount
```

```
Get-AzureSubscription
```

```
Select-AzureSubscription -SubscriptionName 'Developer Program Benefit'
```

```
Get-AzureVNetConfig -ExportToFile "$pwd\NetworkConfig.xml"
```



4. ExportIaaSV1Config.ps1

# Modify IaaS V1 virtual network

- ❖ Use PowerShell modify the virtual network configuration **ADATUM-BRANCH-VNET**
  - ❖ Create Local Network HQ
  - ❖ Add DNS server address 192.168.0.4
  - ❖ Add Gateway Subnet 192.168.3.0/29 into ADATUM-BRANCH-VNET

```
#Modify Azure IaaS V1 Vnet
```

```
Add-AzureAccount
```

```
Select-AzureSubscription -SubscriptionName 'Developer Program Benefit'
```

```
$netconfigpath = Join-Path $pwd "NetworkConfig.txt"
```

```
Set-AzureVNetConfig -ConfigurationPath $netconfigpath
```



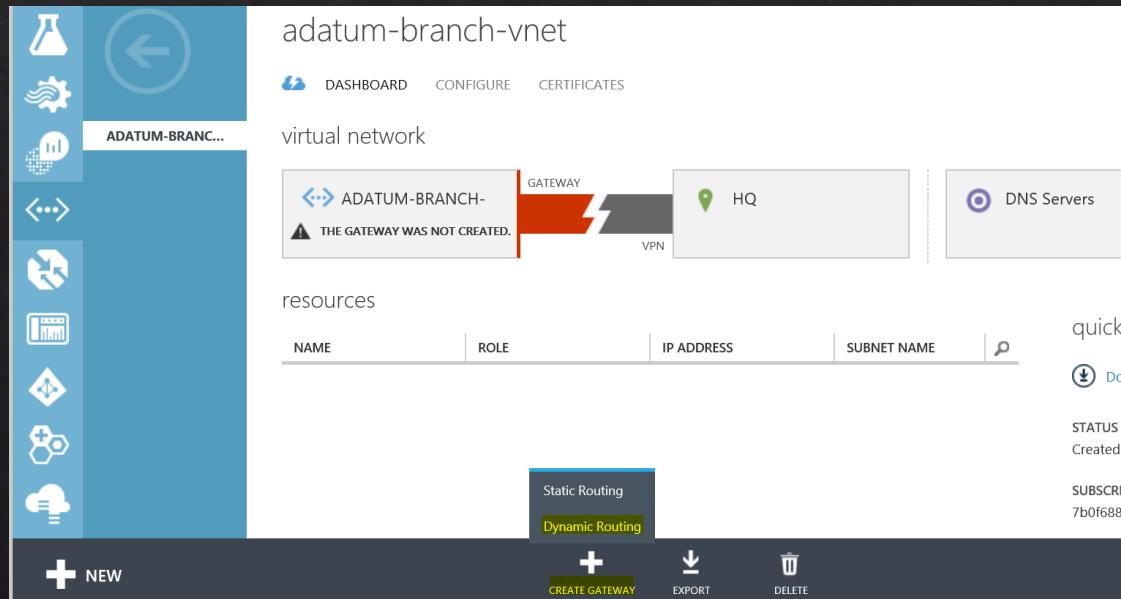
5. Modify\_GwSub\_LNet\_IaaSV1\_Vnet.ps1



NetworkConfig.txt

# Create an IaaS v1 virtual network gateway

- ❖ Create an IaaS v1 virtual network gateway
  - ❖ Switch to <http://manage.windowsazure.com>
  - ❖ Select Virtual Network from Navigation bar on the left
  - ❖ Select Vnet **ADATUM-BRANCH-VNET** -> Dashboard
  - ❖ In command ribbon below click on **Create Gateway**



# Deploy IaaS V1 VMs

- ❖ Deploy IaaS V1 VMS (CN1 and CN2) on cloud service WebC and Vnet 'ADATUM-BRANCH-VNET'

```
$servicename = "WebC"
```

```
$locName = "Southeast Asia"
```

```
$vnet = 'ADATUM-BRANCH-VNET'
```



7. Create\_IaaSV1\_Vms.ps1

# Deploy an IaaS v2 virtual machine into an IaaS v2 virtual network

- ❖ Run 8. ARM\_CreateVirtualMachine.ps1

```
# Set variables:
```

```
$rgName = "AdatumLabRG"  
$vnetName = "HQ"  
$vmName = "ARMSrv2"
```

```
# Store the start time
```

```
$starttime = Get-Date
```

```
Login-AzureRmAccount
```

```
Set-AzureRmContext -SubscriptionName "Developer Program Benefit"
```

```
$vnet = Get-AzureRmVirtualNetwork -Name $vnetName -ResourceGroupName  
$rgName
```



8. ARM\_CreateVirtualMachine.ps1

# Configuring connectivity between IaaS v1 and IaaS v2

- ❖ Modify the parameters and run the script ConfigureArmGateway.ps1 script

```
$subscriptionName = "Developer Program Benefit"
```



9. ConfigureARMGateway.ps1

# Configure classic virtual network

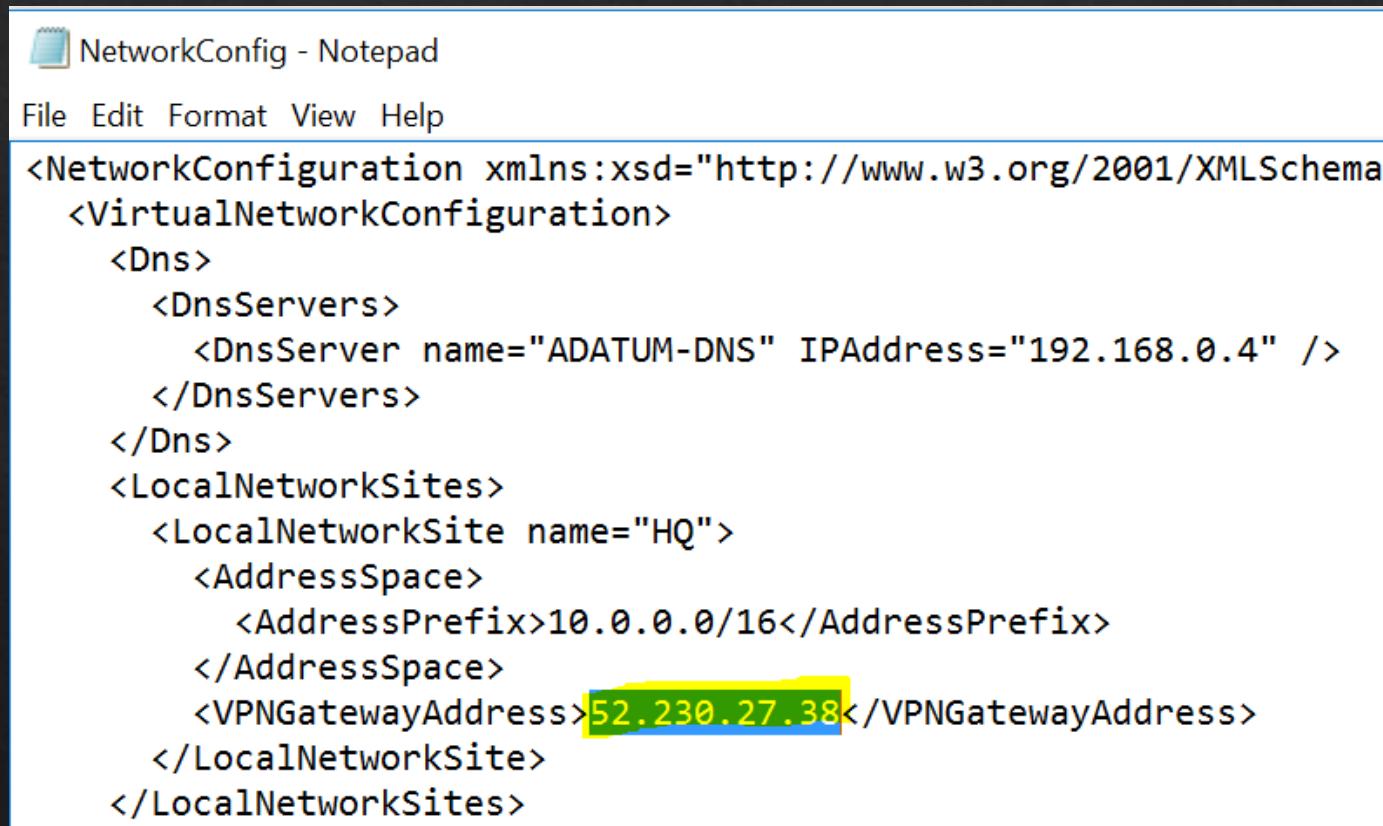
- ❖ Switch to <https://portal.azure.com>
- ❖ In the Hub menu select the virtual network and select the HQ
- ❖ In the HQ blade, in the **Connected devices** section, click on the **gatewayARM** device and note the value in the **Public IP address**

The screenshot shows the Azure portal interface for managing a Virtual Network Gateway named 'gatewayARM'. The left sidebar has a 'Virtual network gateway' icon and lists several tabs: Overview (selected), Activity log, Access control (IAM), Tags, and Diagnose and solve problems. The main content area is titled 'Essentials' and displays the following details:

Resource group ( <a href="#">change</a> )	Gateway type
<a href="#">AdatumLabRG</a>	VPN
Location	VPN type
Southeast Asia	Route-based
Subscription name ( <a href="#">change</a> )	Virtual network
<a href="#">Developer Program Benefit</a>	HQ
Subscription ID	Public IP address
7b0f6889-4efb-4bda-a918-480dd86c9aed	<b>52.230.27.38 (gatewayARMIP)</b>

# Configure classic virtual network (Contd.)

- ❖ Replace 1.1.1.1 with recorded Public IP address of the gateway in NetworkConfig.txt file



The screenshot shows a Notepad window titled "NetworkConfig - Notepad". The menu bar includes File, Edit, Format, View, and Help. The XML code in the main pane is as follows:

```
<NetworkConfiguration xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <VirtualNetworkConfiguration>
    <Dns>
      <DnsServers>
        <DnsServer name="ADATUM-DNS" IPAddress="192.168.0.4" />
      </DnsServers>
    </Dns>
    <LocalNetworkSites>
      <LocalNetworkSite name="HQ">
        <AddressSpace>
          <AddressPrefix>10.0.0.0/16</AddressPrefix>
        </AddressSpace>
        <VPNGatewayAddress>52.230.27.38</VPNGatewayAddress>
      </LocalNetworkSite>
    </LocalNetworkSites>
  </VirtualNetworkConfiguration>
</NetworkConfiguration>
```

The IP address 52.230.27.38 is highlighted with a yellow box.

# Configure classic virtual network (Contd.)

- ❖ Execute the script to modify the local network gateway public address

```
#Modify Azure IaaS V1 Vnet with Public address of the local network gateway in ADATUM-BRANCH-VNET
```

```
#Note replace the 1.1.1.1 with Public address of the local network gateway in NetworkConfig.txt file
```

```
Add-AzureAccount
```

```
Get-AzureSubscription
```

```
Select-AzureSubscription -SubscriptionName 'Developer Program Benefit'
```

```
$netconfigpath = Join-Path $pwd "NetworkConfig.txt"
```

```
Set-AzureVNetConfig -ConfigurationPath $netconfigpath
```



10. Modify\_IaaSV1\_Vnet\_with\_LGW\_addr.ps1

```
Set-AzureVNetGatewayKey -VnetName Adatum-Branch-Vnet -LocalNetworkSiteName HQ -SharedKey 12345
```

# Configure classic virtual network (Contd.)

- ❖ Verify the Vnets are connected from <https://manage.windowsazure.com> portal under Network ADATUM-BRANCH-VNET dashboard. You might need to click **CONNECT** in the menu bar or refresh the Internet Explorer page.

The screenshot shows the Windows Azure portal interface for managing a virtual network. The left sidebar contains icons for various services like Storage, Network, and Compute. The main dashboard for 'adatum-branch-vnet' is displayed, featuring a summary of network traffic and resources.

**Dashboard Summary:**

- virtual network:** Shows a diagram with 'ADATUM-BRANCH-' (Gateway), 'HQ' (VPN), and 'DNS Servers'.
- DATA IN:** 155.83 KB
- DATA OUT:** 40.33 KB
- GATEWAY IP ADDRESS:** 52.187.183.94

**Resources:**

NAME	ROLE	IP ADDRESS	SUBNET NAME
cn1	Virtual Machine	192.168.0.4	Subnet-1

**Actions:**

- NEW** button
- Icons for **DELETE GATEWAY**, **DISCONNECT**, **EXPORT**, **MANAGE KEY**, and **DELETE**.
- quick glance** section with a **Download VPN Device Script** link.

# Configure a point-to-site VPN

# Configure a VPN from a client to the Branch virtual network

- ❖ In <https://manage.windowsazure.com> portal under Network On **adatum-branch-vnet** page, click **CONFIGURE**. Select the **Configure point-to-site connectivity** checkbox and click on Save
- ❖ Select the **Configure point-to-site connectivity** checkbox

The screenshot shows the Azure portal interface for managing a virtual network. The left sidebar has icons for various services like DNS, Storage, and databases. The main panel shows the 'ADATUM-BRANC...' network configuration. At the top, there are tabs for DASHBOARD, CONFIGURE (which is selected), and CERTIFICATES. A warning message says 'THE NETWORK IS IN USE' with a note about modifying address space if it affects an in-use subnet. Below this, the 'dns servers' section lists 'ADATUM-DNS' with IP '192.168.0.4'. There are input fields for 'ENTER NAME' and 'IP ADDRESS'. The 'point-to-site connectivity' section has a 'CONNECTION' table with the following data:

ADDRESS SPACE	STARTING IP	CIDR (ADDRESS COUNT)	USABLE ADDRESS RANGE
172.16.0.0/24	172.16.0.0	/24 (254)	172.16.0.1 - 172.16.0.254

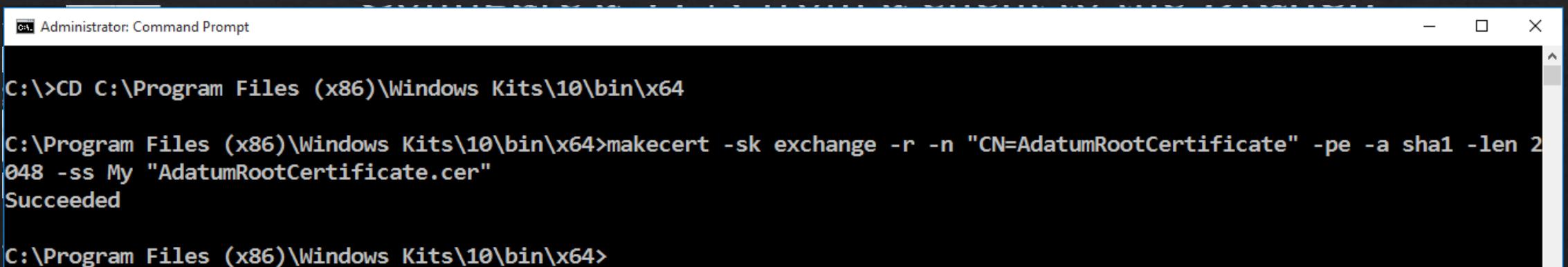
A green button at the bottom left says 'add address space'. At the bottom right, there are 'SAVE' and 'DISCARD' buttons.

# Configure a VPN from a client to the Branch virtual network

- ❖ Create AdatumRootCertificate using windows SDK makecert.exe command. Run as administrator CMD and run below command

```
CD C:\Program Files (x86)\Windows Kits\10\bin\x64
```

```
makecert -sk exchange -r -n "CN=AdatumRootCertificate" -pe -a sha1 -len 2048 -ss My  
"AdatumRootCertificate.cer"
```



The screenshot shows an 'Administrator: Command Prompt' window. The command line shows the user navigating to the Windows Kits bin directory and then executing the makecert command to generate a root certificate named 'AdatumRootCertificate.cer'. The command output indicates success.

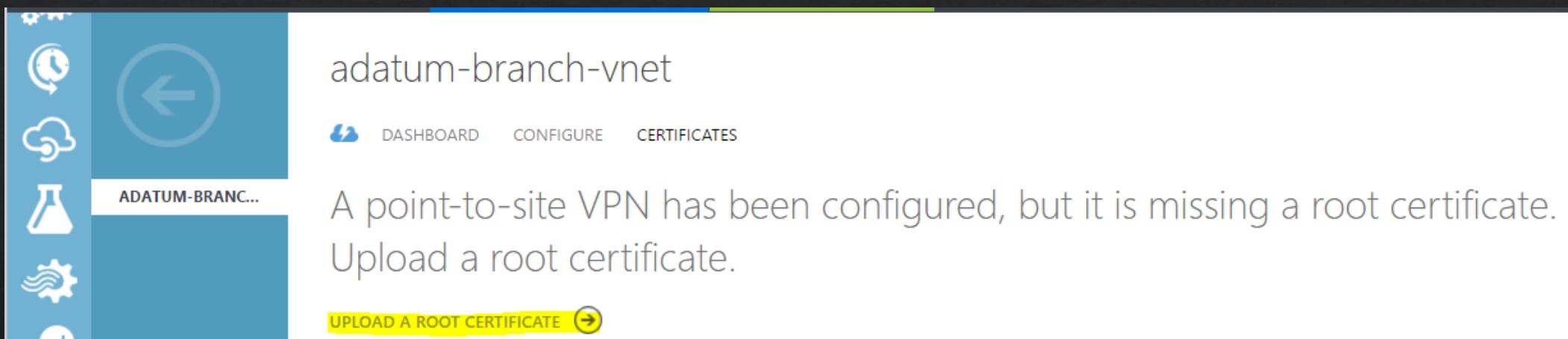
```
C:\>CD C:\Program Files (x86)\Windows Kits\10\bin\x64

C:\Program Files (x86)\Windows Kits\10\bin\x64>makecert -sk exchange -r -n "CN=AdatumRootCertificate" -pe -a sha1 -len 2048 -ss My "AdatumRootCertificate.cer"
Succeeded

C:\Program Files (x86)\Windows Kits\10\bin\x64>
```

# Configure a VPN from a client to the Branch virtual network

- ❖ <https://manage.windowsazure.com> portal on the **adatum-branch-vnet** page, click **CERTIFICATES**.
- ❖ Click **UPLOAD A ROOT CERTIFICATE** - C:\Program Files (x86)\Windows Kits\10\bin\x64\AdatumRootCertificate.cer



# Configure a VPN from a client to the Branch virtual network

- ❖ <https://manage.windowsazure.com> portal on the **adatum-branch-vnet** page, click **CERTIFICATES**.
- ❖ Click **UPLOAD A ROOT CERTIFICATE** - C:\Program Files (x86)\Windows Kits\10\bin\x64\AdatumRootCertificate.cer

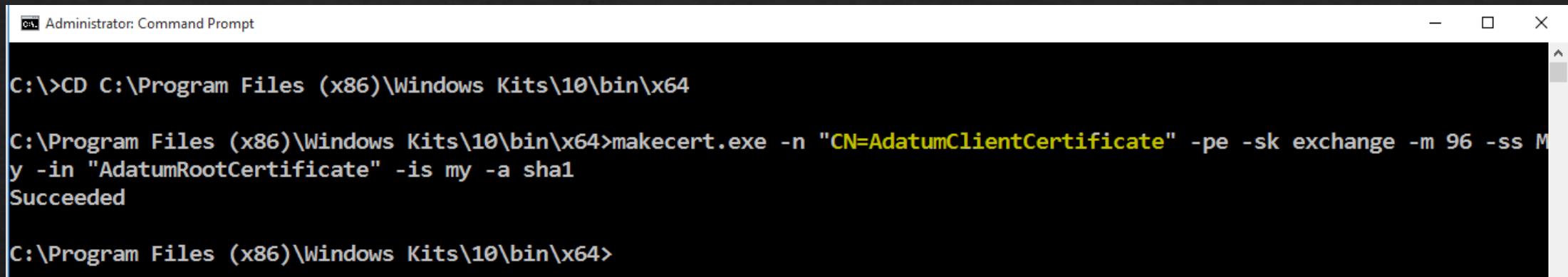
The screenshot shows two windows side-by-side. On the left is a modal dialog titled "Upload Certificate". It contains instructions about requiring certificates for client authentication and a link to learn more. Below this is a "CERTIFICATE" section with a file input field containing "AdatumRootCertificate.cer". At the bottom is a large yellow "Upload" button with a checkmark icon. On the right is the main Azure portal page for the virtual network "adatum-branch-vnet". The "CERTIFICATES" tab is selected. A table lists the uploaded certificate: Name is "AdatumRootCertificate", Status is "Created", Thumbprint is "BE430C968A5998A846D0E6D4843A339D6...", and Expires On is "01/01/2040".

NAME	STATUS	THUMBPRINT	EXPIRES ON
AdatumRootCertificate	✓ Created	BE430C968A5998A846D0E6D4843A339D6...	01/01/2040

# Configure a VPN from a client to the Branch virtual network

- ❖ Create client certificate (Note: copy this certificate to client)

```
makecert.exe -n "CN=AdatumClientCertificate" -pe -sk exchange -m 96 -ss My -in  
"AdatumRootCertificate" -is my -a sha1
```

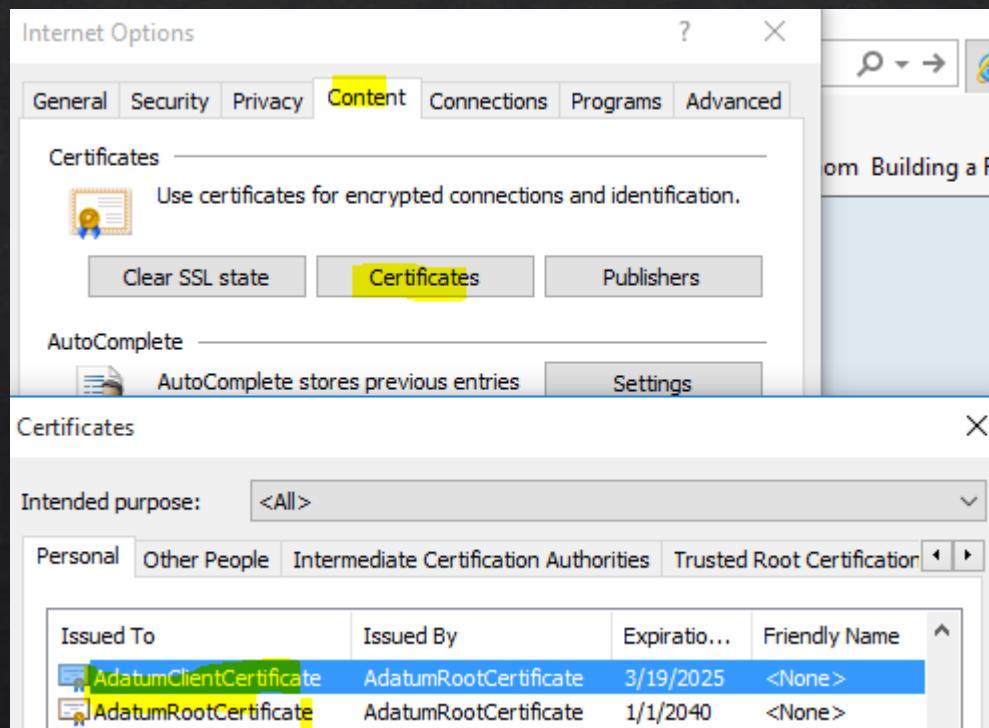


The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt". The command line shows the execution of the `makecert` command to generate a client certificate. The command includes parameters for the certificate name ("CN=AdatumClientCertificate"), key exchange type ("exchange"), message digest length ("m 96"), store location ("ss My"), subject alternative name ("in AdatumRootCertificate"), certificate identifier ("is my"), and hash algorithm ("a sha1"). The output indicates that the operation was successful ("Succeeded").

```
C:\>CD C:\Program Files (x86)\Windows Kits\10\bin\x64  
  
C:\Program Files (x86)\Windows Kits\10\bin\x64>makecert.exe -n "CN=AdatumClientCertificate" -pe -sk exchange -m 96 -ss My -in "AdatumRootCertificate" -is my -a sha1  
Succeeded  
  
C:\Program Files (x86)\Windows Kits\10\bin\x64>
```

# Configure a VPN from a client to the Branch virtual network

- ❖ In **Internet Options**, click the **Content** tab, and then click **Certificates**.
- ❖ Verify that both the **AdatumClientCertificate** and **AdatumRootCertificate** display in the Personal store.



# Configure a VPN from a client to the Branch virtual network

- ❖ click **Download the 64-bit Client VPN Package**

The screenshot shows the Azure portal interface for managing a virtual network. On the left, there's a vertical toolbar with various icons. The main area displays the 'adatum-branch-vnet' virtual network. The 'DASHBOARD' tab is selected. The central part of the screen shows a network diagram with a 'GATEWAY' box, a 'HQ' location box, and a 'Clients' box which is highlighted with a yellow border. Below the diagram, performance metrics are listed: 'DATA IN' (1.31MB), 'DATA OUT' (412.61KB), and 'GATEWAY IP ADDRESS' (52.187.183.94). A table titled 'resources' lists two virtual machines: 'cn1' and 'cn2'. In the bottom right corner, there's a 'quick glance' section with three download links, all of which are highlighted with yellow boxes: 'Download the 64-bit Client VPN Package', 'Download the 32-bit ClientVPN Package', and 'Download VPN Device Script'.

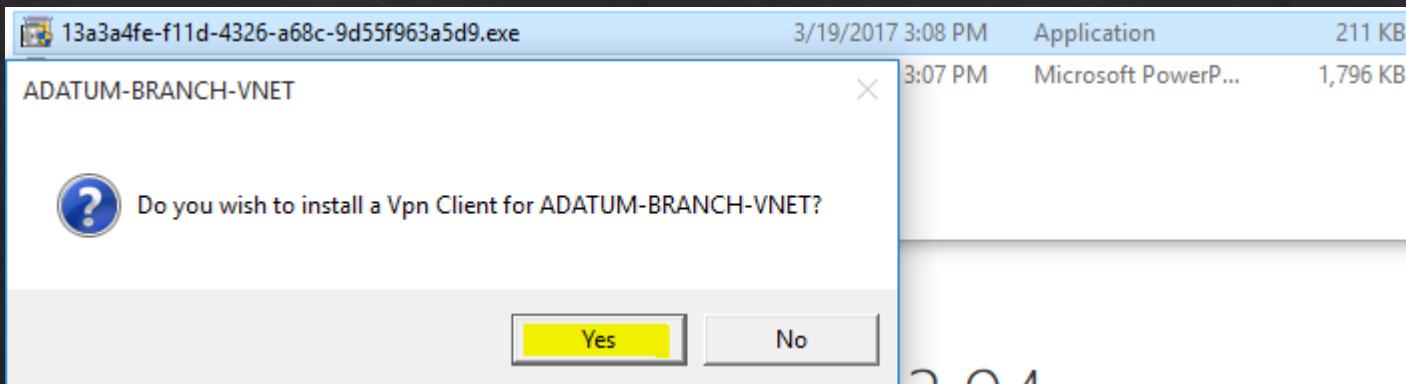
NAME	ROLE	IP ADDRESS	SUBNET NAME
cn1	Virtual Machine	192.168.0.4	Subnet-1
cn2	Virtual Machine	192.168.0.5	Subnet-1

quick glance

- [Download the 64-bit Client VPN Package](#)
- [Download the 32-bit ClientVPN Package](#)
- [Download VPN Device Script](#)

# Configure a VPN from a client to the Branch virtual network

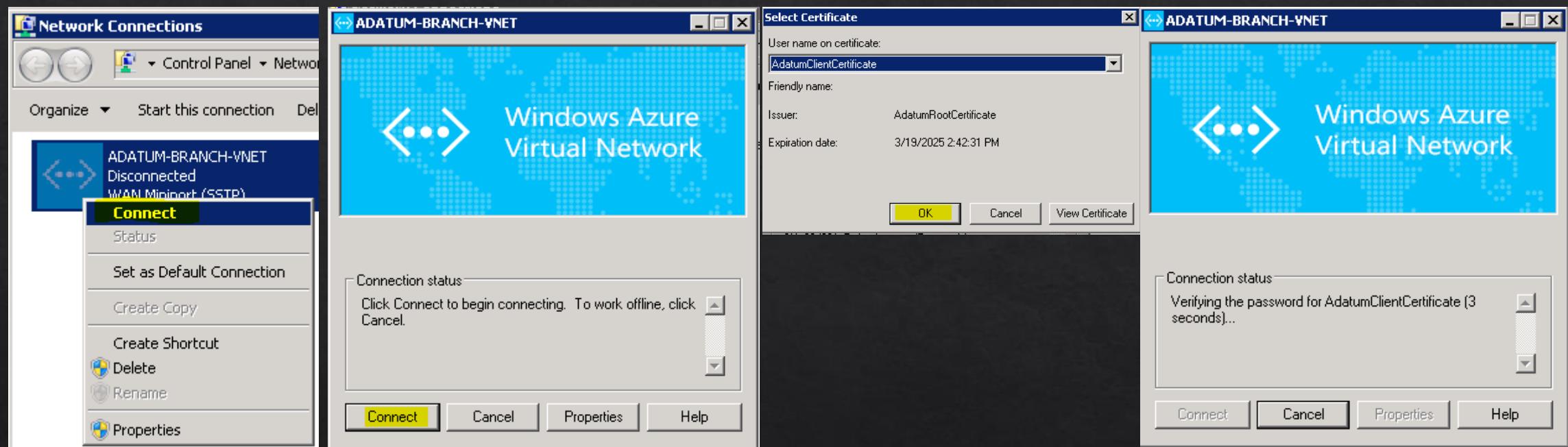
- ❖ click **Download the 64-bit Client VPN Package** and install on the client machine



- ❖ Export the client certificate **AdatumClientCertificate** from **makecert.exe** machine with Private key and import in Client machine (Usually Administrator Laptop)

# Configure a VPN from a client to the Branch virtual network

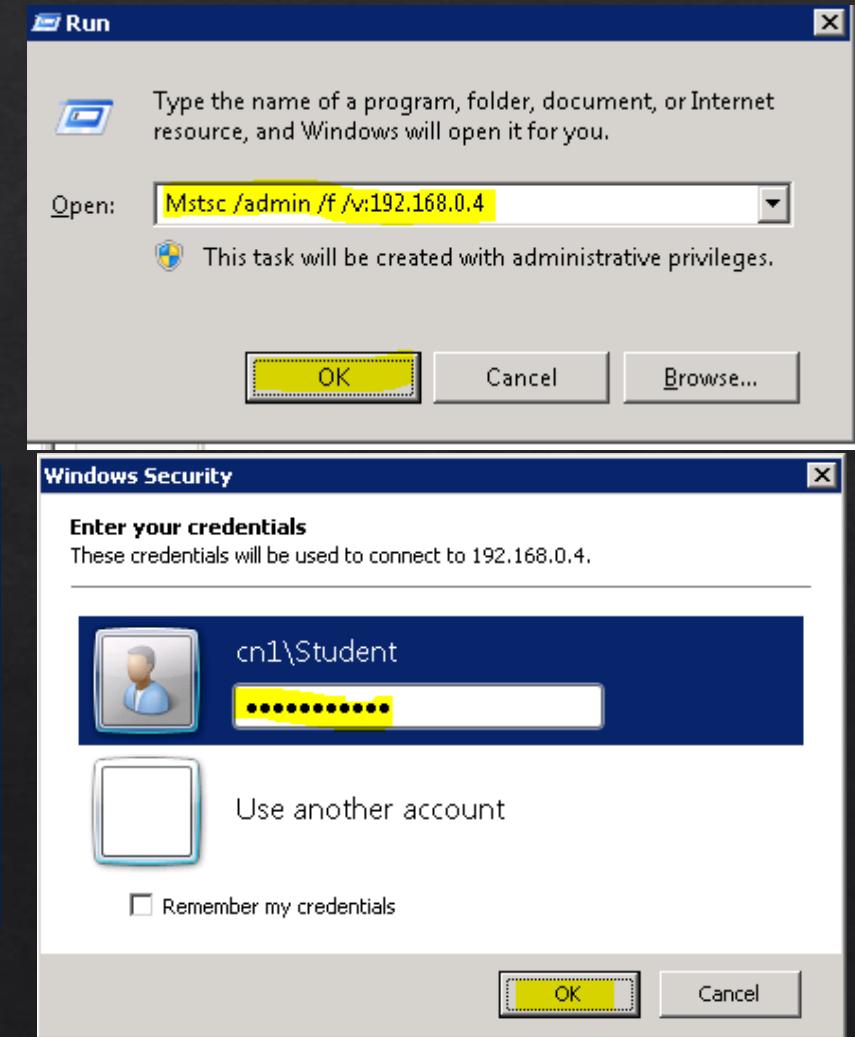
- ❖ Open Network Control panel and connect adatum-branch-vnet connection



# Configure a VPN from a client to the Branch virtual network

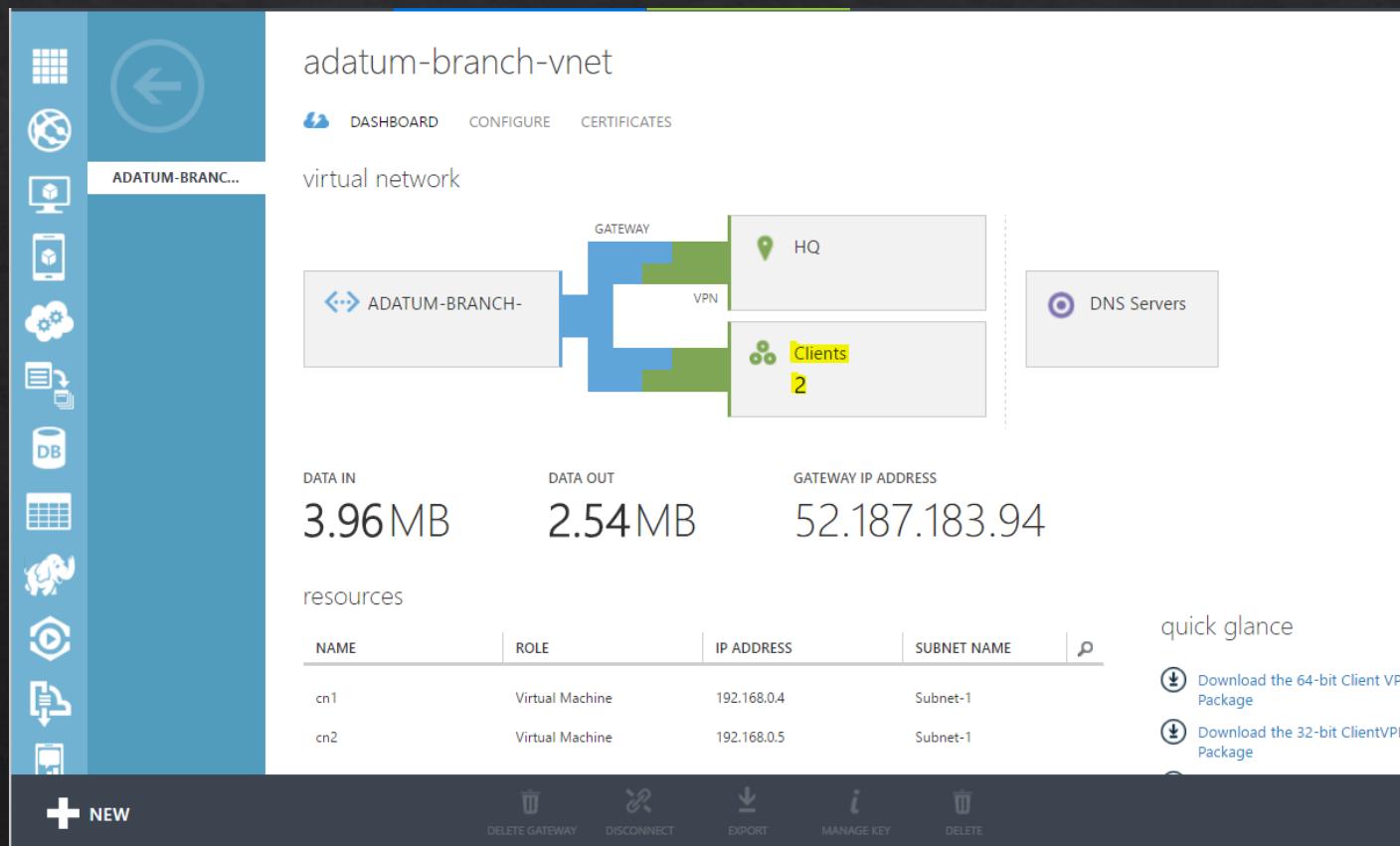
- ❖ Once connection established with Adatum Branch Vnet
- ❖ IPConfig /All – ensure connected to VPN Connection
- ❖ Mstsc /admin /f /v:192.168.0.4

```
PPP adapter ADATUM-BRANCH-VNET:  
  
Connection-specific DNS Suffix . . . . . : ADATUM-BRANCH-VNET  
Description . . . . . :  
Physical Address . . . . . :  
DHCP Enabled. . . . . : No  
Autoconfiguration Enabled . . . . . : Yes  
IPv4 Address. . . . . : 172.16.0.6(Preferred)  
Subnet Mask . . . . . : 255.255.255.255  
Default Gateway . . . . . :  
DNS Servers . . . . . : 192.168.0.4  
NetBIOS over Tcpip. . . . . : Enabled
```



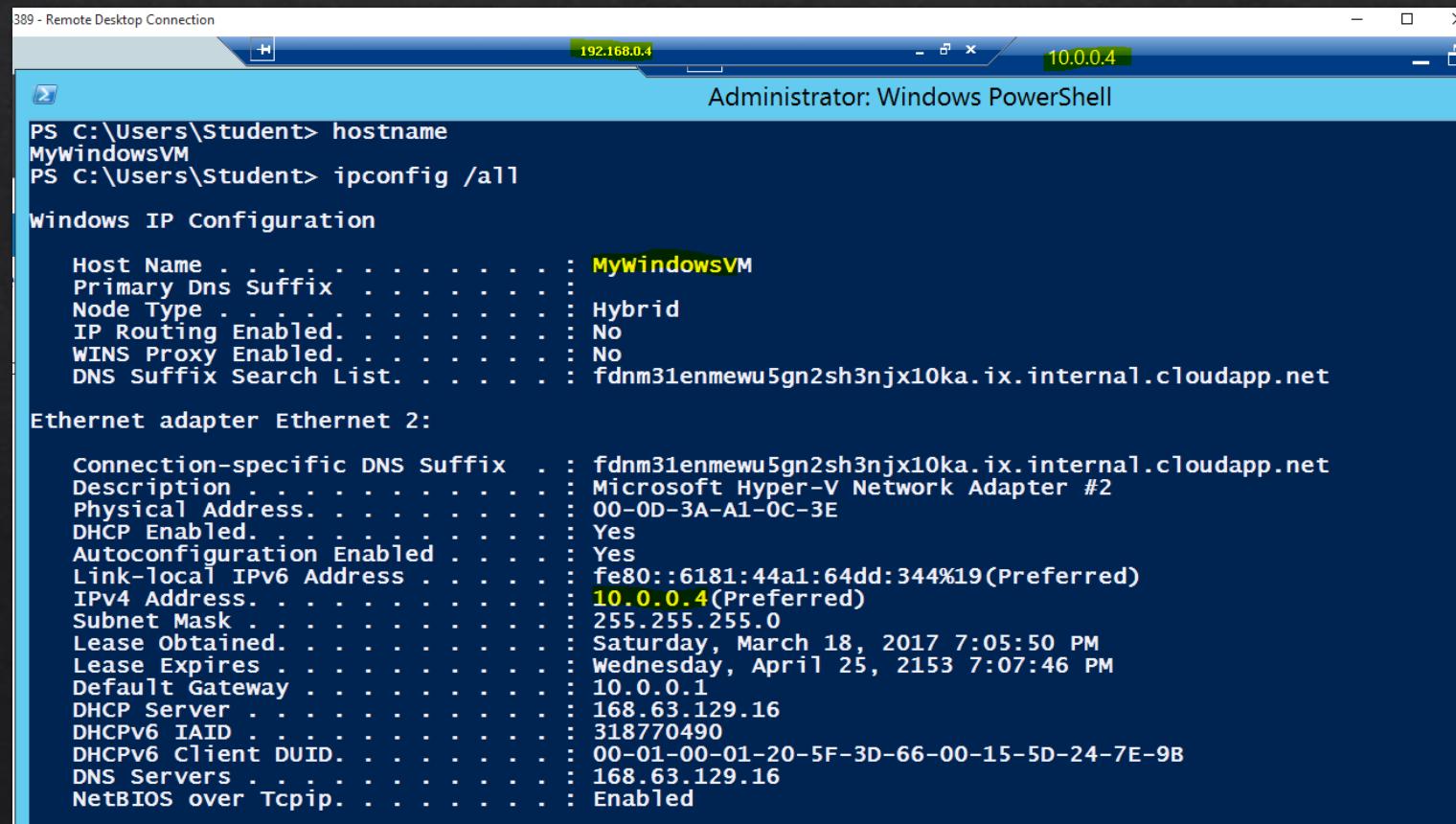
# Configure a VPN from a client to the Branch virtual network

- ❖ Ensure VPN Client is connected to Adatum branch Vnet



# Configure a VPN from a client to the Branch virtual network

- ◆ Connect to Mstsc /admin /f /v:10.0.0.4 machine present in HQ (Site to Site)



```
PS C:\Users\Student> hostname
MyWindowsVM
PS C:\Users\Student> ipconfig /all

Windows IP Configuration

Host Name . . . . . : MyWindowsVM
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : fdnm31enmewu5gn2sh3njx10ka.ix.internal.cloudapp.net

Ethernet adapter Ethernet 2:

Connection-specific DNS Suffix . . . . . : fdnm31enmewu5gn2sh3njx10ka.ix.internal.cloudapp.net
Description . . . . . : Microsoft Hyper-V Network Adapter #2
Physical Address. . . . . : 00-0D-3A-A1-0C-3E
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::6181:44a1:64dd:344%19(PREFERRED)
IPv4 Address. . . . . : 10.0.0.4(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : Saturday, March 18, 2017 7:05:50 PM
Lease Expires . . . . . : Wednesday, April 25, 2153 7:07:46 PM
Default Gateway . . . . . : 10.0.0.1
DHCP Server . . . . . : 168.63.129.16
DHCPv6 IAID . . . . . : 318770490
DHCPv6 Client DUID. . . . . : 00-01-00-01-20-5F-3D-66-00-15-5D-24-7E-9B
DNS Servers . . . . . : 168.63.129.16
NetBIOS over Tcpip. . . . . : Enabled
```

Thank You