

使用AzureCLI 2.0的Microsoft Azure上的CSR1000v HA冗餘部署指南

目錄

[簡介](#)

[必要條件](#)

[需求](#)

[採用元件](#)

[目標](#)

[拓撲](#)

[網路圖表](#)

[技術](#)

[限制](#)

[組態](#)

[概觀](#)

[步驟1.安裝AzureCLI 2.0。](#)

[步驟2.建立資源組。](#)

[步驟3.建立Vnet。](#)

[步驟4.建立路由表。](#)

[步驟5.建立子網。](#)

[步驟6.建立CSR1000v路由器。](#)

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[步驟7.建立第二台CSR1000v路由器。](#)

[步驟8.使用步驟6中的相同步驟建立主機VM。此範例使用UbuntuLTS。](#)

[步驟9.將路由新增到路由表和VM。](#)

[步驟10.配置CSR1000v路由器。](#)

[驗證高可用性](#)

[疑難排解](#)

[相關資訊](#)

簡介

本文檔提供了有關如何使用AzureCLI 2.0在Microsoft Azure雲中部署CSR1000v路由器以實現高可用性的分步配置指南。其目的是讓使用者實際瞭解HA並有能力部署一個全功能的測試平台。

在Azure上部署映像的方法多種多樣，大多數使用者最熟悉的方法是通過Web門戶。但是，一旦您熟悉AzureCLI，它就會成為一個快速且功能強大的工具。

有關Azure、如何通過Web門戶和HA部署CSR1000v的更深入背景，請參閱[Cisco CSR 1000v Deployment Guide for Microsoft Azure](#) and Related Information部分。

必要條件

需求

思科建議您瞭解以下主題：

- Microsoft Azure帳戶
- 2個CSR1000v和1個Windows/Linux虛擬機器
- AzureCLI 2.0

採用元件

本檔案中的資訊是根據Cisco IOS-XE® Denali 16.7.1

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設）的組態來啟動。如果您的網路運作中，請確保您瞭解任何指令可能造成的影響。

目標

部署2台CSR1000v路由器和1台虛擬機器(windows/linux)。模擬從專用資料中心(VM)到Internet(8.8.8.8)的連續流量。模擬HA故障轉移，通過確認Azure路由表已將流量從CSR-A切換到CSR-B的專用介面，觀察HA已成功完成。

拓撲

在開始配置之前，為了充分瞭解拓撲和設計非常重要。這有助於在以後排除任何潛在問題。

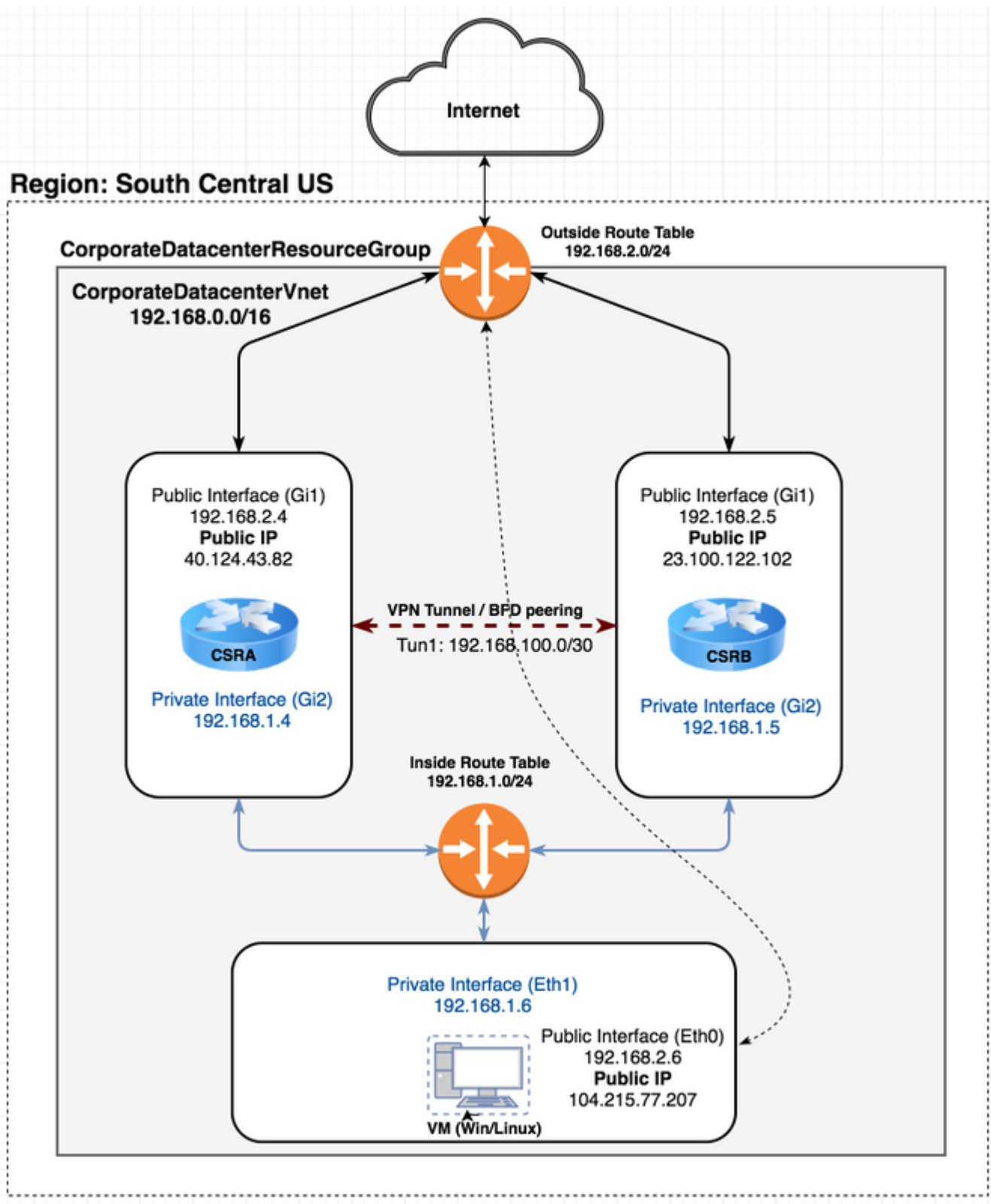
根據使用者要求，可以有各種HA部署方案。在本示例中，使用以下設定配置HA冗餘：

- 1x — 地區（美國中南部）
- 1x — 資源組(CorporateDatacenterResourceGroup)
- 1x - Vnet(CorporateDatacenterVnet)
- 6x — 網路介面（3x面向內和3x面向外）
- 2x — 路由表（InsideRoutetable和OutsideRoutetable）
- 2x - CSR1000v路由器(Cisco IOS-XE® Denali 16.7.1)
- 1個VM(Linux/Windows)

目前，通過公共介面的Internet訪問在VM上處於啟用狀態，以便您可以訪問和配置它。通常，所有正常流量都應通過專用路由表。以後可以禁用VM上的公共介面，以便不會意外洩漏任何流量。

通過從VM的專用介面→路由表內→CSRA→8.8.8執行ping操作來執行流量模擬。在故障轉移場景中，觀察專用路由表已將路由切換到指向CSRB的專用介面。

網路圖表



技術

- 資源組 — 這是Azure跟蹤所有資源（如虛擬機器和vnets）的一種方法。這通常用於管理所有專案並跟蹤費用。
- Vnet — 虛擬網路。（與AWS術語中的VPC類似）
- 路由表 — 它包含子網的規則，可以將特定流量轉發到IP地址或像VPN端點一樣工作。

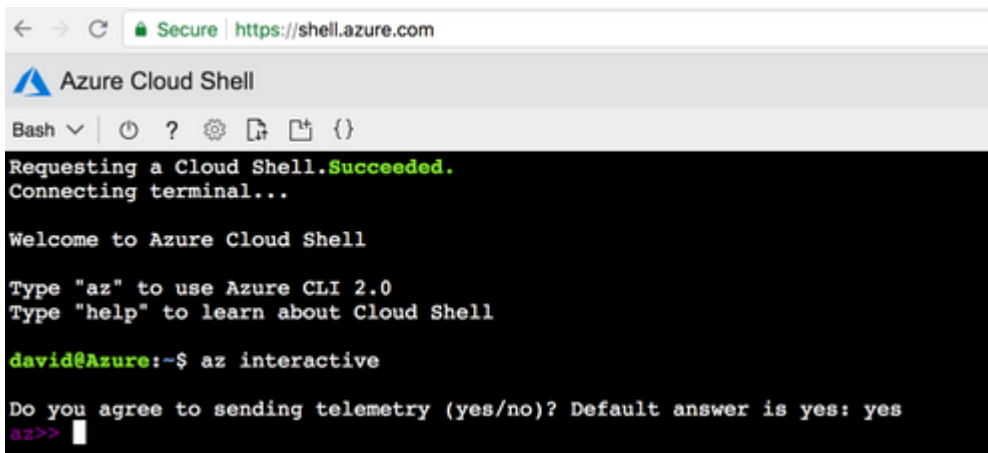
限制

- Azure本身可能會在HA故障轉移中引入大約40到50秒的延遲。

組態

在Azure上部署虛擬機器有幾種方法：

1. [Web門戶](#) - cisco.com上的HA文檔
2. Powershell — 用於管理Azure資源的基於命令列的模型。
3. [AzureCLI 2.0](#) - 也基於命令列。它是開源的，用python編寫，需要安裝在本地系統上。為了編寫此文檔，AzureCLI 2.0是最新版本。
4. [Azure雲外殼](#) — 選擇Bash shell選項而不是Powershell選項，以通過外殼使用AzureCLI。無需安裝此方法。



Powershell和AzureCLI類似，但AzureCLI的命令更簡單。兩者都可以在Windows、MacOS和Linux上運行。請參閱[為Azure選擇正確的工具，並排選擇Azure CLI和PowerShell命令](#)以進行比較。

在本示例中，使用AzureCLI或雲外殼部署所有資源。 AzureCLI可以使用稍有不同的步驟安裝在MacOS、Windows或Linux上。 AzureCLI和Azure Cloud Shell之間的其餘步驟中的配置沒有任何差異。

```
redundancy
cloud provider azure 100
bfd peer
route-table
default-gateway ip
cidr ip
app-key
subscription-id
app-id
tenant-id
resource-group
```



附註：此模板有助於跟蹤所有ID和配置，這些和配置稍後用於在CSR上配置HA。

概觀

步驟1.安裝AzureCLI 2.0。

1. 按照[AzureCLI 2.0](#)文檔中Windows、MacOS或Linux的[安裝步驟操作](#)。
2. 對於MacOS:

```
$ brew update && brew install azure-cli
```

3. 登入Azure並按照說明對您的會話進行身份驗證。

```
$ az login
```

4. 完成瀏覽器身份驗證後，將以JSON格式返回您的Azure訂閱資訊：

```
[
  {
    "cloudName": "AzureCloud",
    "id": "09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx",
    "isDefault": true,
    "name": "Microsoft Azure Enterprise",
    "state": "Enabled",
    "tenantId": "ae49849c-2622-xxxx-xxxx-xxxxxxxxxxxx",
    "user": {
      "name": "cisco@cisco.com",
      "type": "user"
    }
  }
]
```

5. 在開始執行其餘配置步驟之前，以下是AzureCLI上一些有用的命令和提示。

- 有關可用子命令及其操作的幫助，請使用-h選項。

```
$ az account -h
```

- 預設情況下以JSON格式返回所有輸出。為便於閱讀，可以使用—output table選項在表中顯示。

```
$ az account list-locations --output table
```

- 獲取所有可用虛擬機器的清單，或者將—all選項替換為下面的一個其他選項以篩選表。

```
$ az vm image list --all --output table
```

You are retrieving all the images from server which could take more than a minute. To shorten the wait,

- 請參閱Microsoft的[Azure CLI 2.0文檔](#)，瞭解有關所有配置命令的詳細資訊。

步驟2.建立資源組。

- 資源組是儲存Azure解決方案相關資源的容器。 為您的資源組指定一個名稱，然後選擇一個位置以部署容器。 本示例使用美國中南部。

```
$ az account list-locations --output table
```

DisplayName	Latitude	Longitude	Name
East Asia	22.267	114.188	eastasia
Southeast Asia	1.283	103.833	southeastasia
Central US	41.5908	-93.6208	centralus
East US	37.3719	-79.8164	eastus
East US 2	36.6681	-78.3889	eastus2
West US	37.783	-122.417	westus
North Central US	41.8819	-87.6278	northcentralus
South Central US	29.4167	-98.5	southcentralus

```
$ az group create --name CorporateDatacenterResourceGroup --location "South Central US"
```

```
{
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup",
  "location": "southcentralus",
  "managedBy": null,
  "name": "CorporateDatacenterResourceGroup",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null
}
```

- 模板 (新增資源組)

```
redundancy
cloud provider azure 100
bfd peer
route-table
default-gateway ip
cidr ip
app-key
subscription-id
```

```
app-id
tenant-id
resource-group CorporateDatacenterResourceGroup
```

步驟3.建立Vnet。

- Vnet是部署網路的IP地址空間。 然後，將此範圍拆分為更小的子網並分配給介面。 為vnet指定一個名稱，將其分配到步驟2中建立的資源組，並分配一個字首範圍。 如果不指定字首，Azure通常會分配給10.0.0.0/16。

```
$ az network vnet create --name CorporateDatacenterVnet --resource-group CorporateDatacenterResourceGroup
{
  "newVNet": {
    "addressSpace": {
      "addressPrefixes": [
        "192.168.0.0/16"
      ]
    },
    "ddosProtectionPlan": null,
    "dhcpOptions": {
      "dnsServers": []
    },
    "enableDdosProtection": false,
    "enableVmProtection": false,
    "etag": "W/\"7c39a7a9-46e5-4082-a016-xxxxxxxxxxxx\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/virtualNetworks/CorporateDatacenterVnet",
    "location": "southcentralus",
    "name": "CorporateDatacenterVnet",
    "provisioningState": "Succeeded",
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "resourceGuid": "3d95d732-e46a-4fae-a34b-xxxxxxxxxxxx",
    "subnets": [],
    "tags": {},
    "type": "Microsoft.Network/virtualNetworks",
    "virtualNetworkPeerings": []
  }
}
```

步驟4.建立路由表。

1. 為面向內部的介面建立路由表。

```
$ az network route-table create --name InsideRoutetable --resource-group CorporateDatacenterResourceGroup
{
  "disableBgpRoutePropagation": false,
  "etag": "W/\"45088005-cb6f-4356-bb18-xxxxxxxxxxxx\"",
  "location": "southcentralus",
  "name": "InsideRoutetable",
  "provisioningState": "Succeeded",
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "resourceId": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/routeTables/InsideRoutetable",
  "routeTableRoutes": [],
  "tags": {},
  "type": "Microsoft.Network/routeTables",
  "virtualNetworkPeerings": []
}
```

```

    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResou
    "location": "southcentralus",
    "name": "InsideRoutetable",
    "provisioningState": "Succeeded",
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "routes": [],
    "subnets": null,
    "tags": null,
    "type": "Microsoft.Network/routeTables"
  }
}

```

- 模板 (新增路由表)

```

redundancy
cloud provider azure 100
bfd peer
route-table InsideRoutetable
default-gateway ip
cidr ip
app-key
subscription-id
app-id
tenant-id
resource-group CorporateDatacenterResourceGroup

```

2. 為面向外部的介面建立路由表。

```

$ az network route-table create --name OutsideRoutetable --resource-group CorporateDatacenterResou
{
  "disableBgpRoutePropagation": false,
  "etag": "W/\"a89b6230-9542-468c-b4b2-xxxxxxxxxxxx\"\"",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResou
  "location": "southcentralus",
  "name": "OutsideRoutetable",
  "provisioningState": "Succeeded",
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "routes": [],
  "subnets": null,
  "tags": null,
  "type": "Microsoft.Network/routeTables"
}

```

步驟5.建立子網。

1. 從步驟3中為vnet分配的空間建立/24子網，然後將其分配給Inside Route Table。

```

$ az network vnet subnet create --address-prefix 192.168.1.0/24 --name InsideSubnet --resource-grou
{
  "addressPrefix": "192.168.1.0/24",
  "etag": "W/\"a0dbd178-3a45-48fb-xxxx-xxxxxxxxxxxx\"\"",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResou
  "ipConfigurations": null,
  "name": "InsideSubnet",

```

```

"networkSecurityGroup": null,
"provisioningState": "Succeeded",
"resourceGroup": "CorporateDatacenterResourceGroup",
"resourceNavigationLinks": null,
"routeTable": {
  "disableBgpRoutePropagation": null,
  "etag": null,
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
  "location": null,
  "name": null,
  "provisioningState": null,
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "routes": null,
  "subnets": null,
  "tags": null,
  "type": null
},
"serviceEndpoints": null
}

```

2. 從為vnet分配的空間建立另一個/24子網並將其分配給外部路由表。

```

$ az network vnet subnet create --address-prefix 192.168.2.0/24 --name OutsideSubnet --resource-gr
{
  "addressPrefix": "192.168.2.0/24",
  "etag": "W/\"874d1019-90a0-44fd-a09c-0aed8f2ede5b\"",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterRes",
  "ipConfigurations": null,
  "name": "OutsideSubnet",
  "networkSecurityGroup": null,
  "provisioningState": "Succeeded",
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "resourceNavigationLinks": null,
  "routeTable": {
    "disableBgpRoutePropagation": null,
    "etag": null,
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
    "location": null,
    "name": null,
    "provisioningState": null,
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "routes": null,
    "subnets": null,
    "tags": null,
    "type": null
  },
  "serviceEndpoints": null
}

```

步驟6.建立CSR1000v路由器。

每個VM需要有2個介面（內部和外部），這意味著每個VM有2個NIC。 建立2個NIC並將公共IP與外部NIC關聯。

1. 建立公用IP地址。

```
$ az network public-ip create --name CSRAPublicIP --resource-group CorporateDatacenterResourceGroup
{
  "publicIp": {
    "dnsSettings": null,
    "etag": "W/\"38306703-153b-456b-b2e4-xxxxxxxxxxxx\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/publicIPAddresses/CSRAPublicIP",
    "idleTimeoutInMinutes": 30,
    "ipAddress": "40.124.43.82",
    "ipConfiguration": null,
    "ipTags": [],
    "location": "southcentralus",
    "name": "CSRAPublicIP",
    "provisioningState": "Succeeded",
    "publicIpAddressVersion": "IPv4",
    "publicIpAllocationMethod": "Static",
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "resourceGuid": "610e1631-331a-4971-8502-xxxxxxxxxxxx",
    "sku": {
      "name": "Basic",
      "tier": "Regional"
    },
    "tags": null,
    "type": "Microsoft.Network/publicIPAddresses",
    "zones": null
  }
}
```

2. 建立外部NIC並將公用IP地址與其關聯。

```
$ az network nic create --name CSRAOutsideInterface --resource-group CorporateDatacenterResourceGroup
{
  "NewNIC": {
    "dnsSettings": {
      "appliedDnsServers": [],
      "dnsServers": [],
      "internalDnsNameLabel": null,
      "internalDomainNameSuffix": "plk2sxe5i0l1ccksytfab.jx.internal.cloudapp.net",
      "internalFqdn": null
    },
    "enableAcceleratedNetworking": false,
    "enableIpForwarding": false,
    "etag": "W/\"06fd60de-6547-4992-b506-xxxxxxxxxxxx\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/networkInterfaces/CSRAOutsideInterface",
    "ipConfigurations": [
      {
        "applicationGatewayBackendAddressPools": null,
        "applicationSecurityGroups": null,
        "etag": "W/\"06fd60de-6547-4992-xxxx-xxxxxxxxxxxx\"",
        "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ipConfigurations/CSRAOutsideInterface-ipconfig1",
        "loadBalancerBackendAddressPools": null,
        "loadBalancerInboundNatRules": null,
        "name": "ipconfig1",
        "networkInterface": "CSRAOutsideInterface",
        "subnet": "CSRAOutsideSubnet",
        "type": "Primary"
      }
    ]
  }
}
```

```

    "primary": true,
    "privateIpAddress": "192.168.2.4",
    "privateIpAddressVersion": "IPv4",
    "privateIpAllocationMethod": "Dynamic",
    "provisioningState": "Succeeded",
    "publicIpAddress": {
      "dnsSettings": null,
      "etag": null,
      "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDataa",
      "idleTimeoutInMinutes": null,
      "ipAddress": null,
      "ipConfiguration": null,
      "ipTags": null,
      "location": null,
      "name": null,
      "provisioningState": null,
      "publicIpAddressVersion": null,
      "publicIpAllocationMethod": null,
      "resourceGroup": "CorporateDatacenterResourceGroup",
      "resourceGuid": null,
      "sku": null,
      "tags": null,
      "type": null,
      "zones": null
    },
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "subnet": {
      "addressPrefix": null,
      "etag": null,
      "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDataa",
      "ipConfigurations": null,
      "name": null,
      "networkSecurityGroup": null,
      "provisioningState": null,
      "resourceGroup": "CorporateDatacenterResourceGroup",
      "resourceNavigationLinks": null,
      "routeTable": null,
      "serviceEndpoints": null
    }
  }
],
"location": "southcentralus",
"macAddress": null,
"name": "CSRAOutsideInterface",
"networkSecurityGroup": null,
"primary": null,
"provisioningState": "Succeeded",
"resourceGroup": "CorporateDatacenterResourceGroup",
"resourceGuid": "93413822-e819-4644-ac0d-xxxxxxxxxxxx",
"tags": null,
"type": "Microsoft.Network/networkInterfaces",
"virtualMachine": null
}
}

```

3. 建立內部網絡卡。

```

$ az network nic create --name CSRAInsideInterface --resource-group CorporateDatacenterResourceGro
{
  "NewNIC": {
    "dnsSettings": {

```

```

    "appliedDnsServers": [],
    "dnsServers": [],
    "internalDnsNameLabel": null,
    "internalDomainNameSuffix": "gllzklk2sxe5i0l1ccksytfab.jx.internal.cloudapp.net",
    "internalFqdn": null
  },
  "enableAcceleratedNetworking": false,
  "enableIpForwarding": false,
  "etag": "W/\"bebe539f-b5ff-40fa-a122-5c27951afeb1\"",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
  "ipConfigurations": [
    {
      "applicationGatewayBackendAddressPools": null,
      "applicationSecurityGroups": null,
      "etag": "W/\"bebe539f-b5ff-40fa-a122-5c27951afeb1\"",
      "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
      "loadBalancerBackendAddressPools": null,
      "loadBalancerInboundNatRules": null,
      "name": "ipconfig1",
      "primary": true,
      "privateIpAddress": "192.168.1.4",
      "privateIpAddressVersion": "IPv4",
      "privateIpAllocationMethod": "Dynamic",
      "provisioningState": "Succeeded",
      "publicIpAddress": null,
      "resourceGroup": "CorporateDatacenterResourceGroup",
      "subnet": {
        "addressPrefix": null,
        "etag": null,
        "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
        "ipConfigurations": null,
        "name": null,
        "networkSecurityGroup": null,
        "provisioningState": null,
        "resourceGroup": "CorporateDatacenterResourceGroup",
        "resourceNavigationLinks": null,
        "routeTable": null,
        "serviceEndpoints": null
      }
    }
  ],
  "location": "southcentralus",
  "macAddress": null,
  "name": "CSRAInsideInterface",
  "networkSecurityGroup": null,
  "primary": null,
  "provisioningState": "Succeeded",
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "resourceGuid": "0f7ae52a-47c3-4563-9fe0-b1484e88296e",
  "tags": null,
  "type": "Microsoft.Network/networkInterfaces",
  "virtualMachine": null
}
}

```

4. 列出Azure上可用的CSR1000v映像。 此範例使用cisco:cisco-csr-1000v:16_7:16.7.120171201的urn名稱。

```

az vm image list --all --publisher Cisco --offer cisco-csr-1000v
[

```

```
{
  "offer": "cisco-csr-1000v",
  "publisher": "cisco",
  "sku": "16_5",
  "urn": "cisco:cisco-csr-1000v:16_5:16.5.120170418",
  "version": "16.5.120170418"
},
{
  "offer": "cisco-csr-1000v",
  "publisher": "cisco",
  "sku": "16_5",
  "urn": "cisco:cisco-csr-1000v:16_5:16.5.220171128",
  "version": "16.5.220171128"
},
{
  "offer": "cisco-csr-1000v",
  "publisher": "cisco",
  "sku": "16_6",
  "urn": "cisco:cisco-csr-1000v:16_6:16.6.120170804",
  "version": "16.6.120170804"
},
{
  "offer": "cisco-csr-1000v",
  "publisher": "cisco",
  "sku": "16_6",
  "urn": "cisco:cisco-csr-1000v:16_6:16.6.220171219",
  "version": "16.6.220171219"
},
{
  "offer": "cisco-csr-1000v",
  "publisher": "cisco",
  "sku": "16_7",
  "urn": "cisco:cisco-csr-1000v:16_7:16.7.120171201",
  "version": "16.7.120171201"
},
{
  "offer": "cisco-csr-1000v",
  "publisher": "cisco",
  "sku": "3_16",
  "urn": "cisco:cisco-csr-1000v:3_16:3.16.420170208",
  "version": "3.16.420170208"
},
{
  "offer": "cisco-csr-1000v",
  "publisher": "cisco",
  "sku": "3_16",
  "urn": "cisco:cisco-csr-1000v:3_16:3.16.520170215",
  "version": "3.16.520170215"
},
{
  "offer": "cisco-csr-1000v",
  "publisher": "cisco",
  "sku": "csr-azure-byol",
  "urn": "cisco:cisco-csr-1000v:csr-azure-byol:16.40.120170206",
  "version": "16.40.120170206"
},
{
  "offer": "cisco-csr-1000v",
  "publisher": "cisco",
  "sku": "csr-azure-byol",
  "urn": "cisco:cisco-csr-1000v:csr-azure-byol:3.16.0",
  "version": "3.16.0"
}
```

```

    },
    {
      "offer": "cisco-csr-1000v",
      "publisher": "cisco",
      "sku": "csr-azure-byol",
      "urn": "cisco:cisco-csr-1000v:csr-azure-byol:3.16.2",
      "version": "3.16.2"
    }
  ]
}

```

5. 使用映像的urn名稱部署CSR1000v。

```

$ az vm create --resource-group CorporateDatacenterResourceGroup --name CSRA --location southcentralus --image cisco-csr-1000v:3.16.2
Running ..
{
  "fqdns": "",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Compute/virtualMachines/CSRA",
  "location": "southcentralus",
  "macAddress": "00-0D-3A-5D-83-58,00-0D-3A-5D-89-27",
  "powerState": "VM running",
  "privateIpAddress": "192.168.2.4,192.168.1.4",
  "publicIpAddress": "40.124.43.82",
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "zones": ""
}

```

幾分鐘後，新的CSR1000v將啟動。

```

$ az vm list --resource-group CorporateDatacenterResourceGroup --show-details --output table
Name                                ResourceGroup      PowerState      PublicIps      Fqdns      Location      Zones
-----
CSRA  CorporateDatacenterResourceGroup  VM running      40.124.43.82      southcentralus

```

6. 登入CSR1000v並驗證功能。

```

$ ssh cisco@40.124.43.82
The authenticity of host '40.124.43.82 (40.124.43.82)' can't be established.
RSA key fingerprint is SHA256:q33FHw7RlkDn
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '40.124.43.82' (RSA) to the list of known hosts.
Password:

CSRA#
CSRA#show ip interface brief
Interface IP-Address OK? Method Status Protocol
GigabitEthernet1 192.168.2.4 YES DHCP up up
GigabitEthernet2 192.168.1.4 YES DHCP up up

```

步驟7.建立第二台CSR1000v路由器。

1. 建立公用IP地址。

```
$ az network public-ip create --name CSRBPUBLICIP --resource-group CorporateDatacenterResourceGroup
{
  "publicIp": {
    "dnsSettings": null,
    "etag": "W/\"f0f98dac-ea56-4efe-8da6-81a221ac3474\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
    "idleTimeoutInMinutes": 30,
    "ipAddress": "23.100.122.102",
    "ipConfiguration": null,
    "ipTags": [],
    "location": "southcentralus",
    "name": "CSRBPUBLICIP",
    "provisioningState": "Succeeded",
    "publicIpAddressVersion": "IPv4",
    "publicIpAllocationMethod": "Static",
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "resourceGuid": "aa03bc26-22df-4696-bd77-ca29df029d7d",
    "sku": {
      "name": "Basic",
      "tier": "Regional"
    },
    "tags": null,
    "type": "Microsoft.Network/publicIPAddresses",
    "zones": null
  }
}
```

2. 建立外部NIC並將公用IP地址與其關聯。

```
$ az network nic create --name CSRBOutsideInterface --resource-group CorporateDatacenterResourceGroup
{
  "NewNIC": {
    "dnsSettings": {
      "appliedDnsServers": [],
      "dnsServers": [],
      "internalDnsNameLabel": null,
      "internalDomainNameSuffix": "g1lzkp1k2sxe5i01lcksytfab.jx.internal.cloudapp.net",
      "internalFqdn": null
    },
    "enableAcceleratedNetworking": false,
    "enableIpForwarding": false,
    "etag": "W/\"ee0a0b41-42f6-4ac2-91c2-xxxxxxxxxxxx\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
    "ipConfigurations": [
      {
        "applicationGatewayBackendAddressPools": null,
        "applicationSecurityGroups": null,
        "etag": "W/\"ee0a0b41-42f6-4ac2-91c2-xxxxxxxxxxxx\"",
        "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
        "loadBalancerBackendAddressPools": null,
        "loadBalancerInboundNatRules": null,
        "name": "ipconfig1",
        "primary": true,

```

```

    "privateIpAddress": "192.168.2.5",
    "privateIpAddressVersion": "IPv4",
    "privateIpAllocationMethod": "Dynamic",
    "provisioningState": "Succeeded",
    "publicIpAddress": {
      "dnsSettings": null,
      "etag": null,
      "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/publicIPAddresses/CSRBOtherPublicIP",
      "idleTimeoutInMinutes": null,
      "ipAddress": null,
      "ipConfiguration": null,
      "ipTags": null,
      "location": null,
      "name": null,
      "provisioningState": null,
      "publicIpAddressVersion": null,
      "publicIpAllocationMethod": null,
      "resourceGroup": "CorporateDatacenterResourceGroup",
      "resourceGuid": null,
      "sku": null,
      "tags": null,
      "type": null,
      "zones": null
    },
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "subnet": {
      "addressPrefix": null,
      "etag": null,
      "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/subnets/CSRBOtherSubnet",
      "ipConfigurations": null,
      "name": null,
      "networkSecurityGroup": null,
      "provisioningState": null,
      "resourceGroup": "CorporateDatacenterResourceGroup",
      "resourceNavigationLinks": null,
      "routeTable": null,
      "serviceEndpoints": null
    }
  },
  "location": "southcentralus",
  "macAddress": null,
  "name": "CSRBOtherInterface",
  "networkSecurityGroup": null,
  "primary": null,
  "provisioningState": "Succeeded",
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "resourceGuid": "c3f05156-ad07-4abd-a006-xxxxxxxxxxxx",
  "tags": null,
  "type": "Microsoft.Network/networkInterfaces",
  "virtualMachine": null
}
}

```

3. 建立內部網絡卡。

```

$ az network nic create --name CSRBIInsideInterface --resource-group CorporateDatacenterResourceGroup --vm-name CSRBOtherVM --subnet CSRBOtherSubnet --ip-address 192.168.2.5
{
  "NewNIC": {
    "dnsSettings": {
      "appliedDnsServers": [],

```

```

    "dnsServers": [],
    "internalDnsNameLabel": null,
    "internalDomainNameSuffix": "zklk2sxe5i0l1ccksytfab.jx.internal.cloudapp.net",
    "internalFqdn": null
  },
  "enableAcceleratedNetworking": false,
  "enableIpForwarding": false,
  "etag": "W/\"15edf738-fc77-431c-80f3-xxxxxxxxxxxx\"",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
  "ipConfigurations": [
    {
      "applicationGatewayBackendAddressPools": null,
      "applicationSecurityGroups": null,
      "etag": "W/\"15edf738-fc77-431c-80f3-xxxxxxxxxxxx\"",
      "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
      "loadBalancerBackendAddressPools": null,
      "loadBalancerInboundNatRules": null,
      "name": "ipconfig1",
      "primary": true,
      "privateIpAddress": "192.168.1.5",
      "privateIpAddressVersion": "IPv4",
      "privateIpAllocationMethod": "Dynamic",
      "provisioningState": "Succeeded",
      "publicIpAddress": null,
      "resourceGroup": "CorporateDatacenterResourceGroup",
      "subnet": {
        "addressPrefix": null,
        "etag": null,
        "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR",
        "ipConfigurations": null,
        "name": null,
        "networkSecurityGroup": null,
        "provisioningState": null,
        "resourceGroup": "CorporateDatacenterResourceGroup",
        "resourceNavigationLinks": null,
        "routeTable": null,
        "serviceEndpoints": null
      }
    }
  ],
  "location": "southcentralus",
  "macAddress": null,
  "name": "CSRBInsideInterface",
  "networkSecurityGroup": null,
  "primary": null,
  "provisioningState": "Succeeded",
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "resourceGuid": "085c88fc-9e78-49be-a5a7-xxxxxxxxxxxx",
  "tags": null,
  "type": "Microsoft.Network/networkInterfaces",
  "virtualMachine": null
}
}

```

4. 使用相同的映像cisco:cisco-csr-1000v:16_7:16.7.120171201部署第二個CSR1000v。

```
$ az vm create --resource-group CorporateDatacenterResourceGroup --name CSRB --location southcentralus --os-type Linux --generate-ssh-keys
{
  "fqdns": "",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Compute/virtualMachines/CSRB",
  "location": "southcentralus",
  "macAddress": "00-0D-3A-5D-8C-51,00-0D-3A-5D-85-2A",
  "powerState": "VM running",
  "privateIpAddress": "192.168.2.5,192.168.1.5",
  "publicIpAddress": "23.100.122.102",
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "zones": ""
}
```

步驟8.使用步驟6中的相同步驟建立主機VM。 此範例使用UbuntuLTS。

1. 建立公用IP地址。

```
$ az network public-ip create --name VMHostPublicIP --resource-group CorporateDatacenterResourceGroup --location southcentralus
{
  "publicIp": {
    "dnsSettings": null,
    "etag": "W/\"5943a230-1eeb-4cf0-b856-xxxxxxxxxxxx\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/publicIPAddresses/VMHostPublicIP",
    "idleTimeoutInMinutes": 30,
    "ipAddress": "104.215.77.207",
    "ipConfiguration": null,
    "ipTags": [],
    "location": "southcentralus",
    "name": "VMHostPublicIP",
    "provisioningState": "Succeeded",
    "publicIpAddressVersion": "IPv4",
    "publicIpAllocationMethod": "Static",
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "resourceGuid": "ea19c10a-2fd3-498f-b984-xxxxxxxxxxxx",
    "sku": {
      "name": "Basic",
      "tier": "Regional"
    },
    "tags": null,
    "type": "Microsoft.Network/publicIPAddresses",
    "zones": null
  }
}
```

2. 建立外部NIC並將OutsideSubnet和公共IP地址與其關聯。 當子網與NIC關聯時，IP地址會自動分配給NIC。在本示例中，OutsideSubnet為192.168.2.0/24，自動分配給NIC的IP地址為192.168.2.6。

```
$ az network nic create --name VMHostOutsideInterface --resource-group CorporateDatacenterResourceGroup --location southcentralus --subnet OutsideSubnet --ip-address 192.168.2.6
{
  "NewNIC": {
    "dnsSettings": {
      "appliedDnsServers": [],
      "dnsServers": [],
      "internalDnsNameLabel": null,
      "internalDomainNameSuffix": "gzkp1k2sxe5i0l1ccksytfab.jx.internal.cloudapp.net",
      "internalFqdn": null
    }
  }
}
```

```

},
"enableAcceleratedNetworking": false,
"enableIpForwarding": false,
"etag": "W/\\"2c70c97b-6470-42c8-b481-xxxxxxxxxxxx\\\"",
"id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR
"ipConfigurations": [
  {
    "applicationGatewayBackendAddressPools": null,
    "applicationSecurityGroups": null,
    "etag": "W/\\"2c70c97b-6470-42c8-b481-xxxxxxxxxxxx\\\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR
    "loadBalancerBackendAddressPools": null,
    "loadBalancerInboundNatRules": null,
    "name": "ipconfig1",
    "primary": true,
    "privateIpAddress": "192.168.2.6",
    "privateIpAddressVersion": "IPv4",
    "privateIpAllocationMethod": "Dynamic",
    "provisioningState": "Succeeded",
    "publicIpAddress": {
      "dnsSettings": null,
      "etag": null,
      "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR
      "idleTimeoutInMinutes": null,
      "ipAddress": null,
      "ipConfiguration": null,
      "ipTags": null,
      "location": null,
      "name": null,
      "provisioningState": null,
      "publicIpAddressVersion": null,
      "publicIpAllocationMethod": null,
      "resourceGroup": "CorporateDatacenterResourceGroup",
      "resourceGuid": null,
      "sku": null,
      "tags": null,
      "type": null,
      "zones": null
    },
  },
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "subnet": {
    "addressPrefix": null,
    "etag": null,
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterR
    "ipConfigurations": null,
    "name": null,
    "networkSecurityGroup": null,
    "provisioningState": null,
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "resourceNavigationLinks": null,
    "routeTable": null,
    "serviceEndpoints": null
  }
}
],
"location": "southcentralus",
"macAddress": null,
"name": "VMHostOutsideInterface",
"networkSecurityGroup": null,
"primary": null,
"provisioningState": "Succeeded",
"resourceGroup": "CorporateDatacenterResourceGroup",

```

```

    "resourceGuid": "89588a04-6ba6-467d-a86f-xxxxxxxxxxxx",
    "tags": null,
    "type": "Microsoft.Network/networkInterfaces",
    "virtualMachine": null
  }
}

```

3. 建立內部網絡卡。

```

$ az network nic create --name VMHostInsideInterface --resource-group CorporateDatacenterResourceGroup --location southcentralus --subnet VMHostSubnet --ip-configurations [{"id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/subnets/VMHostSubnet/ipConfigurations/ipconfig1"}]
{
  "NewNIC": {
    "dnsSettings": {
      "appliedDnsServers": [],
      "dnsServers": [],
      "internalDnsNameLabel": null,
      "internalDomainNameSuffix": "zkplk2sxe5i0l1ccksytfab.jx.internal.cloudapp.net",
      "internalFqdn": null
    },
    "enableAcceleratedNetworking": false,
    "enableIpForwarding": false,
    "etag": "W/\"dda7eacf-4670-40c2-999c-xxxxxxxxxxxx\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/networkInterfaces/VMHostInsideInterface",
    "ipConfigurations": [
      {
        "applicationGatewayBackendAddressPools": null,
        "applicationSecurityGroups": null,
        "etag": "W/\"dda7eacf-4670-40c2-999c-xxxxxxxxxxxx\"",
        "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/networkInterfaces/VMHostInsideInterface/ipConfigurations/ipconfig1",
        "loadBalancerBackendAddressPools": null,
        "loadBalancerInboundNatRules": null,
        "name": "ipconfig1",
        "primary": true,
        "privateIpAddress": "192.168.1.6",
        "privateIpAddressVersion": "IPv4",
        "privateIpAllocationMethod": "Dynamic",
        "provisioningState": "Succeeded",
        "publicIpAddress": null,
        "resourceGroup": "CorporateDatacenterResourceGroup",
        "subnet": {
          "addressPrefix": null,
          "etag": null,
          "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/subnets/VMHostSubnet",
          "ipConfigurations": null,
          "name": null,
          "networkSecurityGroup": null,
          "provisioningState": null,
          "resourceGroup": "CorporateDatacenterResourceGroup",
          "resourceNavigationLinks": null,
          "routeTable": null,
          "serviceEndpoints": null
        }
      }
    ],
    "location": "southcentralus",
    "macAddress": null,
    "name": "VMHostInsideInterface",
    "networkSecurityGroup": null,
    "primary": null,
    "provisioningState": "Succeeded",
    "resourceGroup": "CorporateDatacenterResourceGroup",
  }
}

```

```

    "resourceGuid": "8ef12cdd-cc31-432e-99cf-xxxxxxxxxxxx",
    "tags": null,
    "type": "Microsoft.Network/networkInterfaces",
    "virtualMachine": null
  }
}

```

4. 部署Ubuntu VM。此範例使用UbuntuLTS。

```

az vm image list --output table
You are viewing an offline list of images, use --all to retrieve an up-to-date list
Offer                Publisher                Sku                      Urn
-----
CentOS               OpenLogic                7.3                     OpenLogic:CentOS:7.3:latest
CoreOS               CoreOS                   Stable                  CoreOS:CoreOS:Stable:latest
Debian               credativ                 8                       credativ:Debian:8:latest
openSUSE-Leap        SUSE                     42.3                    SUSE:openSUSE-Leap:42.3:latest
RHEL                 RedHat                   7.3                     RedHat:RHEL:7.3:latest
SLES                 SUSE                     12-SP2                  SUSE:SLES:12-SP2:latest
UbuntuServer         Canonical                16.04-LTS               Canonical:UbuntuServer:16.04-LTS:latest
WindowsServer        MicrosoftWindowsServer   2016-Datacenter         MicrosoftWindowsServer:WindowsServer:2016-Datacenter
WindowsServer        MicrosoftWindowsServer   2012-R2-Datacenter      MicrosoftWindowsServer:WindowsServer:2012-R2-Datacenter
WindowsServer        MicrosoftWindowsServer   2012-Datacenter         MicrosoftWindowsServer:WindowsServer:2012-Datacenter
WindowsServer        MicrosoftWindowsServer   2008-R2-SP1             MicrosoftWindowsServer:WindowsServer:2008-R2-SP1

```

```

$ az vm create --resource-group CorporateDatacenterResourceGroup --name VmHost --location southcentralus
{
  "fqdns": "",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Compute/virtualMachines/VmHost",
  "location": "southcentralus",
  "macAddress": "00-0D-3A-5D-B7-CB,00-0D-3A-5D-B8-9B",
  "powerState": "VM running",
  "privateIpAddress": "192.168.2.6,192.168.1.6",
  "publicIpAddress": "104.215.77.207",
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "zones": ""
}

```

步驟9.將路由新增到路由表和VM。

1. 通過將下一跳IP地址設定為192.168.1.4，為內部子網新增預設路由以通過CSR A路由流量。
此操作在InsideRouteTable上完成。

```

$ az network route-table route create --address-prefix 8.8.8.8/32 --name default_route --next-hop-address 192.168.1.4
{
  "addressPrefix": "8.8.8.8/32",
  "etag": "W/\"ef9e650a-5d70-455d-b958-5a0efc07e7ad\"",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/routeTables/InsideRouteTable/routes/default_route",
  "name": "default_route",
  "nextHopIpAddress": "192.168.1.4",
  "nextHopType": "VirtualAppliance",
  "provisioningState": "Succeeded",
  "resourceGroup": "CorporateDatacenterResourceGroup"
}

```

```
}
```

2. 在OutsideRouteTable上為網路流量新增到達Internet的路由。

```
$ az network route-table route create --address-prefix 8.8.8.8/32 --name internet --next-hop-type
{
  "addressPrefix": "8.8.8.8/32",
  "etag": "W/\"d2c7e32e-8d32-4856-a3a6-xxxxxxxxxxxx\"",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterRes
  "name": "internet",
  "nextHopIpAddress": null,
  "nextHopType": "Internet",
  "provisioningState": "Succeeded",
  "resourceGroup": "CorporateDatacenterResourceGroup"
}
```

3. 登入到Ubuntu VM並新增路由，強制流量通過內部介面到8.8.8.8。 Azure路由表自動使用子網中的第一個IP作為其網關。 內部介面(eth1)子網為192.168.1.0/24，這意味著192.168.1.1是主機VM的預設gw地址。

```
$ ifconfig
eth0 Link encap:Ethernet HWaddr 00:0d:3a:5d:b7:cb
  inet addr:192.168.2.6 Bcast:192.168.2.255 Mask:255.255.255.0
  inet6 addr: fe80::20d:3aff:fe5d:b7cb/64 Scope:Link
  UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
  RX packets:3986 errors:0 dropped:0 overruns:0 frame:0
  TX packets:2881 errors:0 dropped:0 overruns:0 carrier:0
  collisions:0 txqueuelen:1000
  RX bytes:3475393 (3.4 MB) TX bytes:592740 (592.7 KB)
```

```
eth1 Link encap:Ethernet HWaddr 00:0d:3a:5d:b8:9b
  inet addr:192.168.1.6 Bcast:192.168.1.255 Mask:255.255.255.0
  inet6 addr: fe80::20d:3aff:fe5d:b89b/64 Scope:Link
  UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
  RX packets:2 errors:0 dropped:0 overruns:0 frame:0
  TX packets:14 errors:0 dropped:0 overruns:0 carrier:0
  collisions:0 txqueuelen:1000
  RX bytes:762 (762.0 B) TX bytes:1620 (1.6 KB)
```

```
$ sudo route add -host 8.8.8.8 gw 192.168.1.1 dev eth1
```

```
$ route -n
```

```
Kernel IP routing table
```

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
0.0.0.0	192.168.2.1	0.0.0.0	UG	0	0	0	eth0
8.8.8.8	192.168.1.1	255.255.255.255	UGH	0	0	0	eth1
168.63.129.16	192.168.2.1	255.255.255.255	UGH	0	0	0	eth0
169.254.169.254	192.168.2.1	255.255.255.255	UGH	0	0	0	eth0
192.168.1.0	0.0.0.0	255.255.255.0	U	0	0	0	eth1
192.168.2.0	0.0.0.0	255.255.255.0	U	0	0	0	eth0

- 模板 (新增cidr ip)

```
redundancy
cloud provider azure 100
bfd peer
route-table InsideRoutetable
default-gateway ip
cidr ip 8.8.8.8/32
app-key
subscription-id
app-id
tenant-id
resource-group CorporateDatacenterResourceGroup
```



附註：在步驟10中，必須在CSR1000v路由器上配置NAT，才能對網際網路(8.8.8.8)執行ping操作。



附註：步驟10-14介紹了為HA配置CSR1000v路由器。 [Cisco CSR 1000v Deployment Guide for Microsoft Azure的縮寫步驟從](#)配置信任池開始提供。有關完整詳細資訊，請訪問指南。

步驟10.配置CSR1000v路由器。

1. 在兩台CSR1000v路由器上配置信任池

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#crypto pki trustpool import url http://www.cisco.com/security/pki/trs/ios.p7b
Reading file from http://www.cisco.com/security/pki/trs/ios.p7b
Loading http://www.cisco.com/security/pki/trs/ios.p7b !!!
% PEM files import succeeded.
```

2. 在Cisco CSR 1000v路由器之間配置ipsec隧道，並在路由器之間的隧道上啟用雙向轉發檢測(BFD)和路由協定 (EIGRP或BGP) 以檢測對等故障。



附註：組態中的通道目的地地址是對等點CSR的公用IP地址。

• CSRA配置

```
crypto isakmp policy 1
  encr aes 256
  authentication pre-share
crypto isakmp key cisco address 0.0.0.0
!
crypto ipsec transform-set uni-perf esp-aes 256 esp-sha-hmac
  mode tunnel
!
crypto ipsec profile vti-1
  set security-association lifetime kilobytes disable
  set security-association lifetime seconds 86400
  set transform-set uni-perf
  set pfs group2
```

```

!
interface Tunnel1
 ip address 192.168.101.1 255.255.255.252
 bfd interval 500 min_rx 500 multiplier 3
 tunnel source GigabitEthernet1
 tunnel mode ipsec ipv4
 tunnel destination 23.100.122.102 /* Public IP of the peer CSR */
 tunnel protection ipsec profile vti-1
!
router eigrp 1
 bfd all-interfaces
 network 192.168.101.0

```

- CSRB配置

```

crypto isakmp policy 1
 encr aes 256
 authentication pre-share
crypto isakmp key cisco address 0.0.0.0
!
crypto ipsec transform-set uni-perf esp-aes 256 esp-sha-hmac
 mode tunnel
!
crypto ipsec profile vti-1
 set security-association lifetime kilobytes disable
 set security-association lifetime seconds 86400
 set transform-set uni-perf
 set pfs group2
!
interface Tunnel1
 ip address 192.168.101.2 255.255.255.252
 bfd interval 500 min_rx 500 multiplier 3
 tunnel source GigabitEthernet1
 tunnel mode ipsec ipv4
 tunnel destination 40.124.43.82 /* Public IP of the peer CSR */
 tunnel protection ipsec profile vti-1
!
router eigrp 1
 bfd all-interfaces
 network 192.168.101.0

```

3. 兩個CSR1000v路由器上使用相同的NAT和路由配置。這是為了通過內部介面實現VM Internet可達性。

```

interface GigabitEthernet1
 ip nat outside
!
interface GigabitEthernet2
 ip nat inside
!
ip nat inside source list 10 interface GigabitEthernet1 overload
access-list 10 permit 192.168.1.0 0.0.0.255 /* Translating the inside subnet of the VM */
!
ip route 0.0.0.0 0.0.0.0 192.168.2.1
ip route 192.168.1.0 255.255.255.0 GigabitEthernet2 192.168.1.1

```

4. 為路由表新增訪問控制(IAM)。 在AzureCLI中，允許應用程式 (CSRA和CSRB) 在故障轉移期間修改Azure中的InsideRouteTable。

- 記下InsideRouteTable的ID，該表將用作下節的 — scope選項。

```
$ az network route-table show --resource-group CorporateDatacenterResourceGroup --name InsideRouteTable
{
  "disableBgpRoutePropagation": false,
  "etag": "W/\"f0c85464-bba0-465a-992a-xxxxxxxxxxxx\"",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/routeTables/InsideRouteTable",
  "location": "southcentralus",
  "name": "InsideRouteTable",
  ...
}
```

- 模板 (正在新增訂閱ID)

```
redundancy
cloud provider azure 100
bfd peer
route-table InsideRouteTable
default-gateway ip
cidr ip 8.8.8.8/32
app-key
subscription-id 09e13fd4-xxxx-xxxx-xxxx-xxxxxxxxxxxx
app-id
tenant-id
resource-group CorporateDatacenterResourceGroup
```

5. 為InsideRouteTable建立IAM角色。-scope選項是從上一個輸出的id欄位中選擇的。

- 記下app-id、password (是app-key) 和tenant id。

```
$ az ad sp create-for-rbac -n "InsideRouteTableIAM" --role "network contributor" --scopes /subscriptions/09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx
{
  "appId": "576dd4f1-c08d-xxxx-xxxx-xxxxxxxxxxxx",
  "displayName": "InsideRouteTableIAM",
  "name": "http://InsideRouteTableIAM",
  "password": "aaafc573-e84e-42ac-b4e3-xxxxxxxxxxxx",
  "tenant": "ae49849c-2622-xxxx-xxxx-xxxxxxxxxxxx"
}
```

- 模板 (新增應用金鑰、應用ID和租戶ID)

```
redundancy
cloud provider azure 100
bfd peer
route-table InsideRouteTable
default-gateway ip
cidr ip 8.8.8.8/32
app-key aaafc573-e84e-42ac-b4e3-xxxxxxxxxxxx
subscription-id 09e13fd4-xxxx-xxxx-xxxx-xxxxxxxxxxxx
app-id 576dd4f1-c08d-46b9-cccc-xxxxxxxxxxxx
tenant-id ae49849c-2622-xxxx-xxxx-xxxxxxxxxxxx
```

resource-group CorporateDatacenterResourceGroup

6. 在兩台路由器上配置雲冗餘。兩台路由器上配置的唯一區別是bfd對等體和default-gateway。
- CSRA配置

```
redundancy
cloud provider azure 100
bfd peer 192.168.101.2
route-table InsideRoutetable
default-gateway ip 192.168.1.4
cidr ip 8.8.8.8/32
app-key aaafc573-e84e-42ac-b4e3-xxxxxxxxxxxxx
subscription-id 09e13fd4-xxxx-xxxx-xxxx-xxxxxxxxxxxxx
app-id 576dd4f1-c08d-46b9-cccc-xxxxxxxxxxxxx
tenant-id ae49849c-2622-xxxx-xxxx-xxxxxxxxxxxxx
resource-group CorporateDatacenterResourceGroup
```

- CSRB配置

```
redundancy
cloud provider azure 100
bfd peer 192.168.101.1
route-table InsideRoutetable
default-gateway ip 192.168.1.5
cidr ip 8.8.8.8/32
app-key aaafc573-e84e-42ac-b4e3-xxxxxxxxxxxxx
subscription-id 09e13fd4-xxxx-xxxx-xxxx-xxxxxxxxxxxxx
app-id 576dd4f1-c08d-46b9-cccc-xxxxxxxxxxxxx
tenant-id ae49849c-2622-xxxx-xxxx-xxxxxxxxxxxxx
resource-group CorporateDatacenterResourceGroup
```

驗證高可用性

1. 檢查BFD和雲配置。

```
CSRA#show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet1	192.168.2.4	YES	DHCP	up	up
GigabitEthernet2	192.168.1.4	YES	DHCP	up	up
Tunnel1	192.168.101.1	YES	manual	up	up

```
CSRB#show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet1	192.168.2.5	YES	DHCP	up	up
GigabitEthernet2	192.168.1.5	YES	DHCP	up	up
Tunnel1	192.168.101.2	YES	NVRAM	up	up

```
CSRA#show bfd neighbors
```

IPv4 Sessions				
NeighAddr	LD/RD	RH/RS	State	Int
192.168.101.2	4097/4097	Up	Up	Tu1

```
CSRA#show redundancy cloud provider azure 100
Cloud HA: work_in_progress=FALSE
Provider : AZURE node 100
  State : idle
  BFD peer      = 192.168.101.2
  BFD intf      = Tunnel1
  resource group = CorporateDatacenterResourceGroup
  subscription id = 09e13fd4-def2-46aa-xxxx-xxxxxxxxxxxx
  tenant id = ae49849c-2622-4d45-b95e-xxxxxxxxxxxx
  application id = 1e0f69c3-b6aa-46cf-b5f9-xxxxxxxxxxxx
  application key = aaafc573-e84e-42ac-b4e3-xxxxxxxxxxxx
  route-table   = InsideRoutetable
  cidr           = 8.8.8.8/32
  Default Gateway IP = 192.168.1.4
```

2. 從VM對目標運行ping和traceroute。確保ping通過內部eth1介面。

```
$ ping -I eth1 8.8.8.8
PING 8.8.8.8 (8.8.8.8) from 192.168.1.6 eth1: 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=54 time=10.5 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=54 time=10.6 ms
```

```
$ traceroute 8.8.8.8
traceroute to 8.8.8.8 (8.8.8.8), 30 hops max, 60 byte packets
 1  192.168.1.4 (192.168.1.4)  1.516 ms  1.503 ms  1.479 ms
```

```
cisco@VmHost:~$ ping -I eth1 8.8.8.8
PING 8.8.8.8 (8.8.8.8) from 192.168.1.6 eth1: 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=117 time=10.3 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=117 time=10.3 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=117 time=10.3 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=117 time=10.2 ms
```

3. Traceroute顯示從VM到8.8.8.8的路徑是通過CSRA的內部介面。

```
cisco@VmHost:~$ sudo traceroute -I 8.8.8.8
traceroute to 8.8.8.8 (8.8.8.8), 30 hops max, 60 byte packets
 1  192.168.1.4 (192.168.1.4)  34.003 ms  34.000 ms  33.998 ms
```

4. 關閉CSRA的tunnel 1介面以模擬故障切換。

```
CSRA#config t
Enter configuration commands, one per line.  End with CNTL/Z.
```

```
CSRA(config)#int tunnel1
CSRA(config-if)#sh
```

5. 觀察到，現在流量流經CSRB的專用介面。

```
cisco@VmHost:~$ sudo traceroute -I 8.8.8.8
traceroute to 8.8.8.8 (8.8.8.8), 30 hops max, 60 byte packets
 1  192.168.1.5 (192.168.1.5)  1.294 ms  1.291 ms  1.290 ms
```



附註：Azure雲可能會在故障轉移時引入延遲。延遲不應超過1分鐘。

疑難排解

- 啟用調試以在HA故障切換期間觀察消息。

```
CSRA#debug redundancy cloud all
CSRA#debug ip http all
```

- 身份驗證和憑據錯誤是由無效訪問控制造成的，該訪問控制允許CSR1000v對Azure路由表執行API呼叫。 再次檢查步驟10中是否配置了正確的ID。

```
*Jul 13 23:29:53.365: CLOUD-HA : res content iov_len=449 iov_base={"error":"invalid_client","error_desc":
Error validating credentials. AADSTS50012: Invalid client secret is provided.\r\nTrace ID: 56873e4b-3781-4ee6-8bd9-xxxxxxxxxxxx", "correlation_id": "cce94817-29eb-4ebd-833a-"}
Correlation ID: cce94817-29eb-4ebd-833a-\r\nTimestamp: 2018-07-13 23:29:54Z", "error_codes": [70002, 50012]
23:29:54Z", "trace_id": "56873e4b-3781-4ee6-8bd9-xxxxxxxxxxxx", "correlation_id": "cce94817-29eb-4ebd-833a-
```

相關資訊

- [Azure CLI 2.0](#)
- [適用於Microsoft Azure的Cisco CSR 1000v部署指南](#)
- [為Azure選擇正確的工具，並排選擇Azure CLI和PowerShell命令](#)

關於此翻譯

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