CSR1000v HA-implementatiegids voor redundantie bij Microsoft&KI met karweiCLI 2.0

Inhoud

Inleiding

Dit document biedt een stapsgewijze configuratiehandleiding voor het implementeren van CSR1000v-routers voor hoge beschikbaarheid in de Microsoft karwei-routerwolk met karwei-uurkli 2.0. Het is bedoeld om de gebruikers praktische kennis te geven van HA en de mogelijkheid om een volledig functioneel testbed in te zetten.

Er zijn verschillende methoden om afbeeldingen in de uurs te implementeren en de meest bekende methode voor de meeste gebruikers is via het webportaal. Maar, karwei is een snel en krachtig instrument zodra je er kennis van hebt.

Voor een grondiger achtergrondinformatie over de KRI, hoe een CSR1000v via het webportaal en HA kan worden ingezet, zie de [Cisco CSR 1000v Deployment Guide voor Microsoft](#) en Gerelateerde Informatie.

Voorwaarden

Vereisten

Cisco raadt kennis van de volgende onderwerpen aan:

- Een Microsoft karwei-account
- 2 CSR 1000v en 1 Windows/Linux virtuele machine
- LauraCLI 2.0

Gebruikte componenten

De informatie in dit document is gebaseerd op Cisco IOS-XE® Denali 16.7.1

De informatie in dit document is gebaseerd op de apparaten in een specifieke laboratoriumomgeving. Alle apparaten die in dit document worden beschreven, hadden een opgeschoonde (standaard)configuratie. Als uw netwerk levend is, zorg er dan voor dat u de mogelijke impact van om het even welke opdracht begrijpt.

doel

Plaats 2 CSR1000v-routers en 1 VM (vensters/linux). Simuleer continu verkeer van het particuliere datacenter naar het internet (8.8.8.8). Simuleer een HA-failover en observeer dat HA is geslaagd door te bevestigen dat de routingtabel het verkeer van CSR-A naar CSR-B's privé-interface heeft overgeschakeld.

Topologie

Om de topologie en het ontwerp volledig te begrijpen is belangrijk vóór het begin van de configuratie. Dit helpt om eventuele problemen later op te lossen.

Er kunnen verschillende scenario's van HA-implementaties zijn gebaseerd op de behoeften van de gebruiker. Stel bijvoorbeeld de HA redundantie in met deze instellingen:

- 1x - Regio (Zuid-Centraal-VS)
- 1x - Resource Group (CorporateDatacenterResourceGroup)
- 1x - Vnet (CorporateDatacenterVnet)
- 6x - Netwerkinterfaces (3x Facing en 3x Facing buiten)
- 2x - Routesubsidie (Binnenland en Buitenkant.
- 2x - CSR 1000v-routers (Cisco IOS-XE® Denali 16.7.1)
- 1x - VM (Linux/Windows)

Voorlopig blijft internettoegang via de openbare interface ingeschakeld op de VM, zodat u er toegang toe hebt en deze kunt configureren. Over het algemeen zou al het normale verkeer door de privé-route-tabel moeten stromen. De openbare interface op de VM kan later worden uitgeschakeld zodat er geen verkeer per ongeluk wordt uitgelekt.

Verkeerssimulatie wordt uitgevoerd door te pellen vanaf de privé-interface van de VM → binnen de routetabel → CSRA → 8.8.8.8. In een overvalscenario heeft u de privé-routetabel de route naar de

privé-interface van CSRB gewijzigd.

Netwerkdiagram
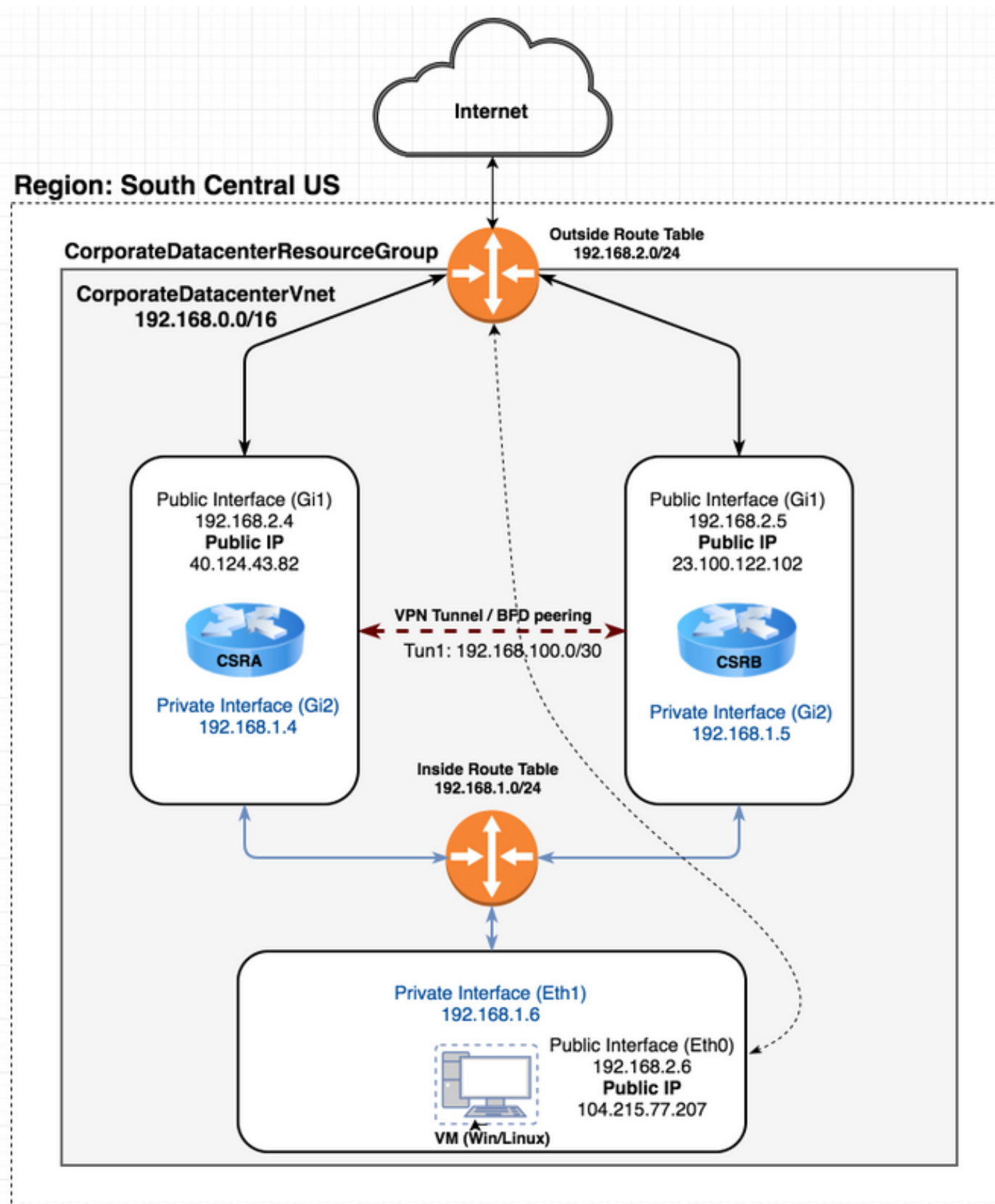
Terminologie

- Resource Group - Dit is een manier om in het uurprogramma al uw bronnen zoals virtuele machines en vetten te volgen. Dit wordt gewoonlijk gebruikt om alle posten te beheren en de lasten bij te houden.
- Vnet - Een virtueel netwerk (vergelijkbaar met VPC in de Windows-terminologie)
- Routeswitch - Dit bevat de regels voor een net en kan specifiek verkeer naar een IP-adres doorsturen of op een VPN-eindpunt handelen.

Beperkingen

- karwei zelf kan een vertraging van 40-50 seconden in een HA-failover invoeren.

Configuratie

Er zijn een paar methoden om VM's in de Kuurtijd in te zetten:

1. [Webex Portal](#) - HA-documentatie op cisco.com
2. Powershell - Op commando gebaseerd model voor het beheer van de middelen van de buren.
3. [karwei 2.0](#) - ook op opdrachtregel gebaseerd. Het is een open bron die in python is geschreven en die op uw lokale systeem moet worden geïnstalleerd. Om dit document te kunnen schrijven, is de karwei-2.0 de meest recente versie.
4. [Kon](#) de **schelp** van de **Bash** optie kiezen in plaats van de optie **Powershell** om de wijzer CLI door de shell te gebruiken. Voor deze methode is geen installatie vereist.

Krashell en Kuurkli zijn vergelijkbaar, maar de opdrachten voor Kuurkli zijn duidelijker. Beide kunnen op Windows, MacOS, Linux draaien. Raadpleeg de [keuze voor de juiste werkbalk voor de](#) vergelijking [van de opdrachten](#) van de [uur en de zijkant van de Klantenservice van de Klantenservice](#) en de PowerShell.

Stel bij dit voorbeeld alle bronnen in met de KRI of Cloud Shell. karwei kan worden geïnstalleerd op MacOS, Windows of Linux met iets verschillende stappen. Er is geen verschil in configuratie door de rest van de procedure tussen de Kuurklank-CLI en de KustShell.

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

> Opmerking: Deze sjabloon is behulpzaam om alle ID's en alle configuratie te volgen die later wordt gebruikt om HA op de CSR's te configureren.

Overzicht

Stap 1. Installeer de website van CLI 2.0.

1. Volg de installatiestappen voor Windows, MacOS of Linux in de documentatie [van](#) Klantenservice CLI 2.0.
2. Voor MacOS:
   ```
   $ brew update && brew install azure-cli
   ```
3. Aanmelden bij Kernenergie en volg de instructies om je sessie echt te maken.
   ```
   $ az login
   ```
4. Zodra de browser-verificatie is voltooid, wordt je abonnementsinformatie in JSON-formaat teruggegeven:
   ```
   [
     {
       "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. Voordat je start met de rest van de configuratie stappen, zijn hier een aantal nuttige opdrachten en tips op de karwei-CLI.

- Gebruik de optie **H** voor hulp bij beschikbare subopdrachten en het resultaat hiervan.

```
$ az account -h
```
- Alle output wordt standaard teruggegeven in JSON formaat. Voor een makkelijke leesbaarheid kunt u de optie —uitvoertabel gebruiken om in een tabel weer te geven.

```
$ az account list-locations --output table
```
- Ontvang een lijst van alle beschikbare vm's of vervang de —**all** optie door een van de andere

opties hieronder om de tabel te filteren.

```
$ 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, provide '--publisher', '--offer' or '--sku'. Partial name search is supported.
```

- Raadpleeg de [lokale CLI 2.0-](#)documentatie van Microsoft voor meer informatie over alle configuratieopdrachten.

Stap 2. Maak een resourcegroep.

- Een Resource Group is een container die over gerelateerde middelen beschikt voor een Koolmark-oplossing. Geef een naam aan uw Resourcegroep en kies een locatie om de container in te zetten. Dit voorbeeld gebruikt Zuid-Centraal-VS.

```
$ 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
}
```

- Sjabloon (hulpbron-groep toevoegen)

```
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
```

Stap 3. Maak een net.

- Een Net is een ruimte van ip adressen waar ons netwerk wordt ingezet. Deze bereik wordt dan verdeeld in kleinere subnetten en toegewezen aan interfaces. Geef een naam aan uw vnet, verdeel het in de middelgroep die in stap 2 wordt gecreëerd en geef een prefix bereik toe. Als je geen prefix specificeert, kent Kuurster jou over het algemeen 10.0.0.0/16 toe.

```
$ az network vnet create --name CorporateDatacenterVnet --resource-group
CorporateDatacenterResourceGroup --address-prefix 192.168.0.0/16
{
  "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/virtual
Networks/CorporateDatacenterVnet",
    "location": "southcentralus",
    "name": "CorporateDatacenterVnet",
    "provisioningState": "Succeeded",
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "resourceGuid": "3d95d732-e46a-4fae-a34b-xxxxxxxxxxxx",
    "subnets": [],
    "tags": {},
    "type": "Microsoft.Network/virtualNetworks",
    "virtualNetworkPeerings": []
  }
}
```

Stap 4. Maak routeswitches.

1. Maak een routeswitch-tabel voor de inkomende interfaces.

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

Sjabloon (routetabel toevoegen)

```
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. Maak een routeswitch-tabel voor de naar buiten gerichte interfaces.

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

Stap 5. Maak subnetten.

1. Maken een /24 subster van de ruimte die u in stap 3 voor vnet hebt toegewezen, dan verdeel het aan de Binnenlijst van de Route.

```
$ az network vnet subnet create --address-prefix 192.168.1.0/24 --name InsideSubnet --
resource-group CorporateDatacenterResourceGroup --vnet-name CorporateDatacenterVnet --
route-table InsideRoutetable
{
  "addressPrefix": "192.168.1.0/24",
  "etag": "W/\"a0dbd178-3a45-48fb-xxxx-xxxxxxxxxxxx\"",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/vi
rtualNetworks/CorporateDatacenterVnet/subnets/InsideSubnet",
  "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/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ro
uteTables/InsideRoutetable",
    "location": null,
    "name": null,
    "provisioningState": null,
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "routes": null,
```

```
      "subnets": null,
      "tags": null,
      "type": null
    },
    "serviceEndpoints": null
  }
```

2. Maken een andere /24 subster van de ruimte die u voor vnet hebt toegewezen en verdeel het aan de Tabel van de Uitgang.

```
$ az network vnet subnet create --address-prefix 192.168.2.0/24 --name OutsideSubnet --
resource-group CorporateDatacenterResourceGroup --vnet-name CorporateDatacenterVnet --
route-table OutsideRoutetable
{
  "addressPrefix": "192.168.2.0/24",
  "etag": "W/\"874d1019-90a0-44fd-a09c-0aed8f2ede5b\"",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/vi
rtualNetworks/CorporateDatacenterVnet/subnets/OutsideSubnet",
  "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/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ro
uteTables/OutsideRoutetable",
    "location": null,
    "name": null,
    "provisioningState": null,
    "resourceGroup": "CorporateDatacenterResourceGroup",
    "routes": null,
    "subnets": null,
    "tags": null,
    "type": null
  },
  "serviceEndpoints": null
}
```

Stap 6. Maak een CSR1000v router.

Elke VM moet beschikken over twee interfaces (binnen en buiten), wat neerkomt op 2 NIC's per VM. Maak de 2 NIC's en associeer een openbare IP aan de externe NIC.

1. Maak het openbare IP-adres.

```
$ az network public-ip create --name CSRAPublicIP --resource-group
CorporateDatacenterResourceGroup --idle-timeout 30 --allocation-method Static
{
  "publicIp": {
    "dnsSettings": null,
    "etag": "W/\"38306703-153b-456b-b2e4-xxxxxxxxxxxx\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/pu
blicIPAddresses/CSRA",
    "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-xxxxxxxxxxxxx",
      "sku": {
        "name": "Basic",
        "tier": "Regional"
      },
      "tags": null,
      "type": "Microsoft.Network/publicIPAddresses",
      "zones": null
    }
  }
```

2. Maak de externe NIC en associeer het openbare IP-adres hiermee.

```
$ az network nic create --name CSRAOutsideInterface --resource-group
CorporateDatacenterResourceGroup --subnet OutsideSubnet --vnet CorporateDatacenterVnet  --
public-ip-address CSRAPublicIP
{
  "NewNIC": {
    "dnsSettings": {
      "appliedDnsServers": [],
      "dnsServers": [],
      "internalDnsNameLabel": null,
      "internalDomainNameSuffix": "plk2sxe5i0l1ccksytfab.jx.internal.cloudapp.net",
      "internalFqdn": null
    },
    "enableAcceleratedNetworking": false,
    "enableIpForwarding": false,
    "etag": "W/\"06fd60de-6547-4992-b506-xxxxxxxxxxxxx\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ne
tworkInterfaces/CSRAOutsideInterface",
    "ipConfigurations": [
      {
        "applicationGatewayBackendAddressPools": null,
        "applicationSecurityGroups": null,
        "etag": "W/\"06fd60de-6547-4992-xxxx-xxxxxxxxxxxxx\"",
        "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ne
tworkInterfaces/CSRAOutsideInterface/ipConfigurations/ipconfig1",
        "loadBalancerBackendAddressPools": null,
        "loadBalancerInboundNatRules": null,
        "name": "ipconfig1",
        "primary": true,
        "privateIpAddress": "192.168.2.4",
        "privateIpAddressVersion": "IPv4",
        "privateIpAllocationMethod": "Dynamic",
        "provisioningState": "Succeeded",
        "publicIpAddress": {
          "dnsSettings": null,
          "etag": null,
          "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/pu
blicIPAddresses/CSRAPublicIP",
          "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/vi
    rtualNetworks/CorporateDatacenterVnet/subnets/OutsideSubnet",
            "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. Maak de binnenNIC.

```
$ az network nic create --name CSRAInsideInterface --resource-group
CorporateDatacenterResourceGroup --subnet InsideSubnet --vnet CorporateDatacenterVnet
{
  "NewNIC": {
    "dnsSettings": {
      "appliedDnsServers": [],
      "dnsServers": [],
      "internalDnsNameLabel": null,
      "internalDomainNameSuffix": "gllzkplk2sxe5i0l1ccksytfab.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/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ne
tworkInterfaces/CSRAInsideInterface",
```

```
      "ipConfigurations": [
        {
          "applicationGatewayBackendAddressPools": null,
          "applicationSecurityGroups": null,
          "etag": "W/\"bebe539f-b5ff-40fa-a122-5c27951afeb1\"",
          "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ne
tworkInterfaces/CSRAInsideInterface/ipConfigurations/ipconfig1",
          "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/CorporateDatacenterResourceGroup/providers/Microsoft.Network/vi
rtualNetworks/CorporateDatacenterVnet/subnets/InsideSubnet",
            "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. Lijst van de beschikbare CSR1000v-afbeeldingen in de uurtijd. Dit voorbeeld gebruikt de online naam van **cisco:cisco-csr-1000v:16_7:16.7.120171201**.

```
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. Hiermee implementeert u de CSR1000v met de urn naam van de afbeelding.

```
$ az vm create --resource-group CorporateDatacenterResourceGroup --name CSRA --location
southcentralus --image cisco:cisco-csr-1000v:16_7:16.7.120171201 --nics
```

```
CSRAOutsideInterface CSRAInsideInterface --admin-username cisco --admin-password
"Cisco1234567" --authentication-type password
 Running ..
{
  "fqdns": "",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Compute/vi
rtualMachines/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": ""
}
```

Na een paar minuten start de nieuwe CSR1000v-functie.

```
$ 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. Aanmelden bij de CSR1000v en functionaliteit controleren.

```
$ 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
```

Stap 7. Maak de tweede CSR1000v router.

1. Maak het openbare IP-adres.

```
$ az network public-ip create --name CSRBPublicIP --resource-group
CorporateDatacenterResourceGroup --idle-timeout 30 --allocation-method Static
{
  "publicIp": {
    "dnsSettings": null,
    "etag": "W/\"f0f98dac-ea56-4efe-8da6-81a221ac3474\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/pu
blicIPAddresses/CSRB",
    "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. Maak de externe NIC en associeer het openbare IP-adres hiermee.

```
$ az network nic create --name CSRBOutsideInterface --resource-group
CorporateDatacenterResourceGroup --subnet OutsideSubnet --vnet CorporateDatacenterVnet --
public-ip-address CSRBPublicIP
```

```
{
  "NewNIC": {
    "dnsSettings": {
      "appliedDnsServers": [],
      "dnsServers": [],
      "internalDnsNameLabel": null,
      "internalDomainNameSuffix": "gllzkplk2sxe5i0l1ccksytfab.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/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ne
tworkInterfaces/CSRBOutsideInterface",
    "ipConfigurations": [
      {
        "applicationGatewayBackendAddressPools": null,
        "applicationSecurityGroups": null,
        "etag": "W/\"ee0a0b41-42f6-4ac2-91c2-xxxxxxxxxxxx\"",
        "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ne
tworkInterfaces/CSRBOutsideInterface/ipConfigurations/ipconfig1",
        "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/pu
blicIPAddresses/CSRBPublicIP",
          "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/vi
rtualNetworks/CorporateDatacenterVnet/subnets/OutsideSubnet",
        "ipConfigurations": null,
        "name": null,
        "networkSecurityGroup": null,
        "provisioningState": null,
        "resourceGroup": "CorporateDatacenterResourceGroup",
        "resourceNavigationLinks": null,
        "routeTable": null,
        "serviceEndpoints": null
      }
    }
  ],
  "location": "southcentralus",
  "macAddress": null,
  "name": "CSRBOutsideInterface",
  "networkSecurityGroup": null,
  "primary": null,
  "provisioningState": "Succeeded",
  "resourceGroup": "CorporateDatacenterResourceGroup",
  "resourceGuid": "c3f05156-ad07-4abd-a006-xxxxxxxxxxxx",
  "tags": null,
  "type": "Microsoft.Network/networkInterfaces",
  "virtualMachine": null
  }
}
```

3. Maak de binnenNIC.

```
$ az network nic create --name CSRBInsideInterface --resource-group
CorporateDatacenterResourceGroup --subnet InsideSubnet --vnet CorporateDatacenterVnet
{
  "NewNIC": {
    "dnsSettings": {
      "appliedDnsServers": [],
      "dnsServers": [],
      "internalDnsNameLabel": null,
      "internalDomainNameSuffix": "zkplk2sxe5i0l1ccksytfab.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/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ne
tworkInterfaces/CSRBInsideInterface",
    "ipConfigurations": [
      {
        "applicationGatewayBackendAddressPools": null,
        "applicationSecurityGroups": null,
        "etag": "W/\"15edf738-fc77-431c-80f3-xxxxxxxxxxxx\"",
        "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
```

```
         xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ne
         tworkInterfaces/CSRBInsideInterface/ipConfigurations/ipconfig1",
                 "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/CorporateDatacenterResourceGroup/providers/Microsoft.Network/vi
         rtualNetworks/CorporateDatacenterVnet/subnets/InsideSubnet",
                   "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. Installeer de tweede CSR1000v met dezelfde afbeelding **cisco:cisco-csr-1000v:16_7:16.7.120171201**.

```
$ az vm create --resource-group CorporateDatacenterResourceGroup --name CSRB --location
southcentralus --image cisco:cisco-csr-1000v:16_7:16.7.120171201 --nics
CSRBOutsideInterface CSRBInsideInterface --admin-username cisco --admin-password
"Cisco1234567" --authentication-type password
{
  "fqdns": "",
  "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Compute/vi
rtualMachines/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": ""
}
```

Stap 8. Maak een host-VM met dezelfde procedure in stap 6. Dit voorbeeld gebruikt UbuntuLTS.

1. Maak het openbare IP-adres.

```
$ az network public-ip create --name VMHostPublicIP --resource-group
CorporateDatacenterResourceGroup --idle-timeout 30 --allocation-method Static
{
  "publicIp": {
    "dnsSettings": null,
    "etag": "W/\"5943a230-1eeb-4cf0-b856-xxxxxxxxxxxx\"",
    "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/pu
blicIPAddresses/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. Maak de externe NIC en associeer het OutsideSubnet en het openbare IP adres aan het. Wanneer subnetten met NIC's worden geassocieerd, wordt een IP-adres automatisch aan de NIC toegewezen. In dit voorbeeld is OutsideSubnet 192.168.2.0/24 en is het IP adres dat automatisch aan de NIC wordt toegewezen 192.168.2.6.

```
$ az network nic create --name VMHostOutsideInterface --resource-group
CorporateDatacenterResourceGroup --subnet OutsideSubnet --vnet CorporateDatacenterVnet --
public-ip-address VMHostPublicIP
{
  "NewNIC": {
    "dnsSettings": {
      "appliedDnsServers": [],
      "dnsServers": [],
      "internalDnsNameLabel": null,
      "internalDomainNameSuffix": "gzkplk2sxe5i0l1ccksytfab.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/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ne
tworkInterfaces/VMHostOutsideInterface",
    "ipConfigurations": [
      {
        "applicationGatewayBackendAddressPools": null,
        "applicationSecurityGroups": null,
        "etag": "W/\"2c70c97b-6470-42c8-b481-xxxxxxxxxxxx\"",
        "id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
```

```
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ne
tworkInterfaces/VMHostOutsideInterface/ipConfigurations/ipconfig1",
        "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/CorporateDatacenterResourceGroup/providers/Microsoft.Network/pu
blicIPAddresses/VMHostPublicIP",
          "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/vi
rtualNetworks/CorporateDatacenterVnet/subnets/OutsideSubnet",
          "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. Maak de binnenNIC.

```
$ az network nic create --name VMHostInsideInterface --resource-group
CorporateDatacenterResourceGroup --subnet InsideSubnet --vnet CorporateDatacenterVnet
```

```
{
  "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/ne
tworkInterfaces/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/ne
tworkInterfaces/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/vi
rtualNetworks/CorporateDatacenterVnet/subnets/InsideSubnet",
          "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. De Ubuntu VM implementeren. Dit voorbeeld gebruikt 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
UrnAlias            Version
------------    --------------------    -----------------   -----------------------------
----------------------------    ------------------  ---------
CentOS          OpenLogic               7.3                 OpenLogic:CentOS:7.3:latest
CentOS              latest
CoreOS          CoreOS                  Stable              CoreOS:CoreOS:Stable:latest
CoreOS              latest
Debian          credativ                8                   credativ:Debian:8:latest
Debian              latest
openSUSE-Leap   SUSE                    42.3                SUSE:openSUSE-Leap:42.3:latest
openSUSE-Leap       latest
RHEL            RedHat                  7.3                 RedHat:RHEL:7.3:latest
RHEL                latest
SLES            SUSE                    12-SP2              SUSE:SLES:12-SP2:latest
SLES                latest
UbuntuServer    Canonical               16.04-LTS           Canonical:UbuntuServer:16.04-
LTS:latest                          UbuntuLTS           latest
WindowsServer   MicrosoftWindowsServer  2016-Datacenter
MicrosoftWindowsServer:WindowsServer:2016-Datacenter:latest    Win2016Datacenter    latest
WindowsServer   MicrosoftWindowsServer  2012-R2-Datacenter
MicrosoftWindowsServer:WindowsServer:2012-R2-Datacenter:latest Win2012R2Datacenter  latest
WindowsServer   MicrosoftWindowsServer  2012-Datacenter
MicrosoftWindowsServer:WindowsServer:2012-Datacenter:latest    Win2012Datacenter    latest
WindowsServer   MicrosoftWindowsServer  2008-R2-SP1
MicrosoftWindowsServer:WindowsServer:2008-R2-SP1:latest        Win2008R2SP1         latest


$ az vm create --resource-group CorporateDatacenterResourceGroup --name VmHost --location
southcentralus --image UbuntuLTS --admin-user cisco --admin-password Cisco1234567 --nics
VMHostOutsideInterface VMHostInsideInterface --authentication-type password
{
"fqdns": "",
"id": "/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Compute/vi
rtualMachines/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": ""
}
```

Stap 9. Voeg routes toe aan routingtabellen en VM's.

1. Voeg een standaardroute voor binnenweg toe om verkeer door CSR A te leiden door het
   volgende IP adres van de hop als 192.168.1.4 te plaatsen. Dit wordt gedaan op
   InsideRouteTable.

```
$ az network route-table route create --address-prefix 8.8.8.8/32 --name default_route --
next-hop-type VirtualAppliance --resource-group CorporateDatacenterResourceGroup --route-
```

```
table-name InsideRouteTable --next-hop-ip-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/ro
uteTables/InsideRouteTable/routes/default_route",
  "name": "default_route",
  "nextHopIpAddress": "192.168.1.4",
  "nextHopType": "VirtualAppliance",
  "provisioningState": "Succeeded",
  "resourceGroup": "CorporateDatacenterResourceGroup"
}
```

2. Voeg een route voor verkeer in het netwerk toe om internet op OutsideRouteTable te bereiken.

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

3. Aanmelden bij de Ubuntu VM en een route toevoegen om het verkeer door de interne interface te forceren naar 8.8.8. routetabel gebruikt automatisch de eerste IP in een subtype als zijn gateway. The Inside Interface's (eth1) is 192.168.1.0/24 wat betekent dat 192.168.1.1 het standaard gw-adres is voor de host VM.

```
$ 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
```

Sjabloon (ip toevoegen)

```
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
```

Opmerking: NAT moet in Stap 10 op de CSR1000v-routers worden geconfigureerd om het internet te typen (8.8.8.8).Opmerking: De stappen 10-14 bestrijken de configuratie van de CSR1000v-routers voor HA. Afkortingen van de [Cisco CSR 1000v Deployment Guide voor Microsoft](#) worden vanaf het instellen van een Trustpool voorzien. Bezoek de handleiding voor volledige informatie.

Stap 10. Configuratie van de CSR1000v-routers.

1. Een pool op beide CSR1000v-routers configureren
```
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. Configureer een IPsec-tunnel tussen Cisco CSR 1000v-routers en stel Bi-directional Forwarding Detection (BFD) en een routingprotocol (DHCP of BGP) in in de tunnel tussen de routers voor detectie van peer-fouten. Opmerking: Het adres van de tunnelbestemming in de configuratie is het openbare IP-adres van de peer CSR.CSRA-configuratie
```
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-configuratie

```
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. Dezelfde configuratie voor NAT en routing worden gebruikt op beide CSR1000v-routers. Dit is voor VM internet bereikbaarheid via de interne interface.

```
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. Voeg toegangscontroles (IAM) toe voor een Routeswitch-tabel. In de in de KonCLI opgenomen KGoor de applicatie (CSRA en CSRB) de InsideRouteTable in de kassa van de KoKaR (KI) wijzigen. Merk op dat het **id** van de InsideRouteTable als de volgende sectie —**scopen**.

```
$ 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/ro
uteTables/InsideRoutetable",
  "location": "southcentralus",
  "name": "InsideRoutetable",

...
```

Sjabloon (abonnement toevoegen-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. Maak de IAM rol voor InsideRouteTable. De optie —bereik is uit het **id**-veld genomen van de vorige uitvoer. Let op de **app-id**, **het wachtwoord** (de app-toets) en **huurid**.

```
$ az ad sp create-for-rbac -n "InsideRouteTableIAM" --role "network contributor" --scopes
/subscriptions/09e13fd4-def2-46aa-xxxx-
xxxxxxxxxxxx/resourceGroups/CorporateDatacenterResourceGroup/providers/Microsoft.Network/ro
uteTables/InsideRoutetable --years 2099
{
"appId": "576dd4f1-c08d-xxxx-xxxx-xxxxxxxxxxxx",
"displayName": "InsideRouteTableIAM",
"name": "http://InsideRouteTableIAM",
"password": "aaafc573-e84e-42ac-b4e3-xxxxxxxxxxxx",
"tenant": "ae49849c-2622-xxxx-xxxx-xxxxxxxxxxxx"
}
```

Sjabloon (app-toets, app-id en huurder-id toevoegen)

```
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. Configureer wolredundantie op beide routers. Het enige verschil tussen de configuratie op beide routers zijn de kabelpeers en de standaardgateway. CSRA-configuratie

```
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-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
```

CSRB-configuratie

```
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-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
```

Controleer hoge beschikbaarheid

1. Controleer BFD- en cloudconfiguraties.
```
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-xxxxxxxxxxxxx
  route-table  = InsideRoutetable
  cidr         = 8.8.8.8/32
  Default Gateway IP = 192.168.1.4
```

2. Draai een ping en traceroute van de VM naar de bestemming. Zorg ervoor dat pingelen door de interface van binnen eth1 loopt.
```
$ 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 laat zien dat het pad van de VM naar 8.8.8.8 via de interne interface van CSRA loopt.
```
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. Sluit de CSRA tunnel 1 interface om een failover te simuleren.

```
CSRA#config t
Enter configuration commands, one per line.  End with CNTL/Z.
CSRA(config)#int tunnel1
CSRA(config-if)#sh
```

5. Let erop dat het verkeer nu door de privé-interface van het CSRB stroomt.

```
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
```

Opmerking: De "burenwolk" kan vertraging veroorzaken bij het overslaan van de tijd. Vertraging moet niet langer dan 1 minuut zijn.

Problemen oplossen

- Schakel debugs in om berichten tijdens HA-failover op te nemen.

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

- Verificatie- en crediteurenfouten zijn het gevolg van ongeldige toegangscontroles, die de CSR1000v in staat stellen API-oproepen naar de bereiktabel te maken. Controleer of de juiste id's in stap 10 zijn ingesteld.

```
*Jul 13 23:29:53.365: CLOUD-HA : res content iov_len=449
iov_base={"error":"invalid_client","error_description":"AADSTS70002:
Error validating credentials. AADSTS50012: Invalid client secret is provided.\r\nTrace ID:
56873e4b-3781-4ee6-8bd9-xxxxxxxxxxxxx\r\n
Correlation ID: cce94817-29eb-4ebd-833a-\r\nTimestamp: 2018-07-13
23:29:54Z","error_codes":[70002,50012],"timestamp":"2018-07-13
23:29:54Z","trace_id":"56873e4b-3781-4ee6-8bd9-xxxxxxxxxxxxx","correlation_id":"cce94817-29eb-
4ebd-833a"}
```

Gerelateerde informatie

- [CLI 2.0](#)
- [Cisco CSR 1000v implementatiegids voor Microsoft Outlook](#)
- [Kies de juiste werkbalk voor de opdrachten Kon en Naast de opdrachten Klantenservice CLI en PowerShell](#)