

DE-CIX Academy: Connecting to Microsoft Azure

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Links visited during the webinar

→ Microsoft Azure Portal: <https://portal.azure.com>

Explanation of Terms

Autonomous System (AS)

"An Autonomous System (AS) is a connected group of one or more IP prefixes run by one or more network operators which has a SINGLE and CLEARLY DEFINED routing policy."

An AS is identified by an Autonomous System Number - this is a 32bit (1 - 4294967294) number. If you want to participate in Internet routing, you can get a globally unique AS number from your regional Internet registry (in Europe this is [RIPE NCC](#)).

Private Autonomous System Number

If you just want to use an AS number to connect to Azure, you can use a [private AS number](#). Just choose a number between 64512 and 65534 (you cannot use this AS number to connect to the public Internet).

/30 subnet

A /30 IPv4 [subnet](#) is a IPv4 network address range with [30 bits](#) in the network part and 2 bits in the host part. It contains four IPv4 addresses, in case of Azure they are used for (using network 192.0.2.4/30 as an example):

- 192.0.2.4: Network address, not usable
- 192.0.2.5: Lowest usable address, to be configured on the router on customer side
- 192.0.2.6: Highest usable address, will be used by Microsoft on their side
- 192.0.2.7: Broadcast address, not usable.

As subnetworks start at address 0, a standard /24 IPv4 network contains 64 /30 networks, like:

- 192.0.2.0/30
- 192.0.2.4/30 (used in example above)
- 192.0.2.8/30
- 192.0.2.12/30
- and so on

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Private Subnet

If you do not have public IPv4 address space or do not want to use it, you can use a [private IPv4](#) subnet to connect to Azure Private Peering:

- 10.0.0.0/8 (10.0.0.0 - 10.255.255.255)
- 172.16.0.0/12 (172.16.0.0 - 172.31.255.255)
- 192.168.0.0/16 (192.168.0.0. - 192.168.255.255)

So for example choose:

- 10.1.2.0/30 for your primary connection
- 10.2.2.4/30 for your secondary connection.

VLAN ID (or VLAN tag)

A [VLAN ID](#) is a 12 bit (1 - 4094) number to identify an Ethernet [Virtual LAN](#). When connecting to Azure, the packets you send and receiver are [double-tagged](#):

- The outer VLAN tag is used to switch your packets through DE-CIX to Microsoft. You agree with your ISP and DE-CIX which outer VLAN tags (one for primary and one for secondary connection) you can use.
- The inner VLAN tag is to distinguish with Microsoft which Peering you are using. You configure the inner VLAN tag on the Azure portal and on your router.

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Example Configurations - Interface Configuration

In this examples we are using:

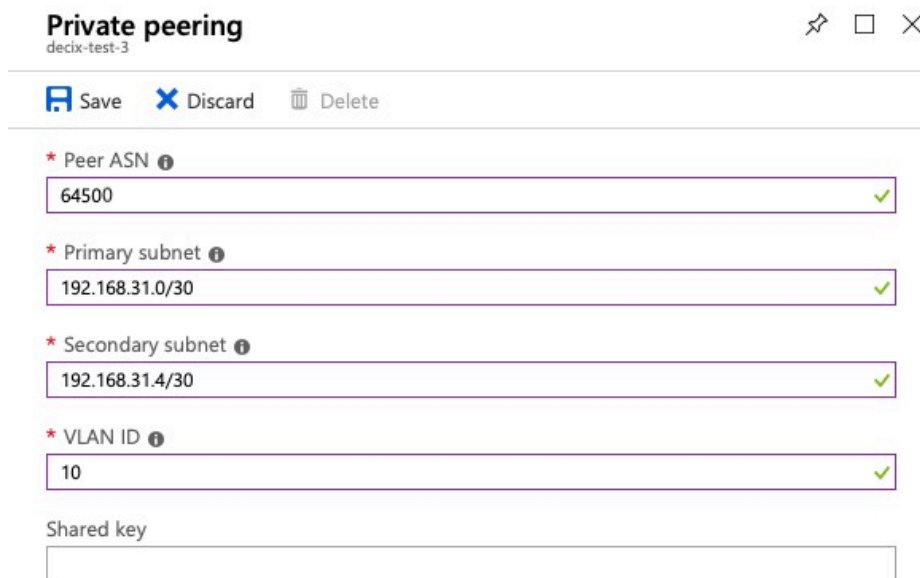
- Outer VLAN tag for the primary connection is 31
- Outer VLAN tag for the secondary connection is 32
- Customer AS is 64500 (this is an AS number set aside for documentation. **Do not use this** in your configuration!)
- Azure Private Peering
 - Inner VLAN tag for Azure Private Peering is 10
 - /30 Primary Subnet is 192.168.31.0/30
 - /30 Secondary Subnet is 192.168.31.4/30
- Microsoft Peering
 - Inner VLAN tag for Microsoft Peering is 11
 - /30 Primary Subnet is 192.0.2.0/30 (this is an example network set aside for documentation. **Do not use this** in your configuration!)
 - /30 Secondary Subnet is 192.0.2.4/30 (this is an example network set aside for documentation. **Do not use this** in your configuration!)
 - We need to configure the IPv4 range we want to announce to Microsoft, in this example we announce 203.0.113.0/28 (just a subnet).
 - We do not have a customer AS behind us we announce.
 - Our registry is [RIPENCC](#).

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Azure Private Peering

On the Azure portal we configure (see above for explanation of values):



The screenshot shows the 'Private peering' configuration page in the Azure portal. The page title is 'Private peering' with a sub-identifier 'decix-test-3'. Below the title are three action buttons: 'Save', 'Discard', and 'Delete'. The configuration fields are as follows:

- Peer ASN:** 64500 (with a green checkmark)
- Primary subnet:** 192.168.31.0/30 (with a green checkmark)
- Secondary subnet:** 192.168.31.4/30 (with a green checkmark)
- VLAN ID:** 10 (with a green checkmark)
- Shared key:** (empty field)

On our router we configure the interfaces to Azure (example is for Cisco IOS):

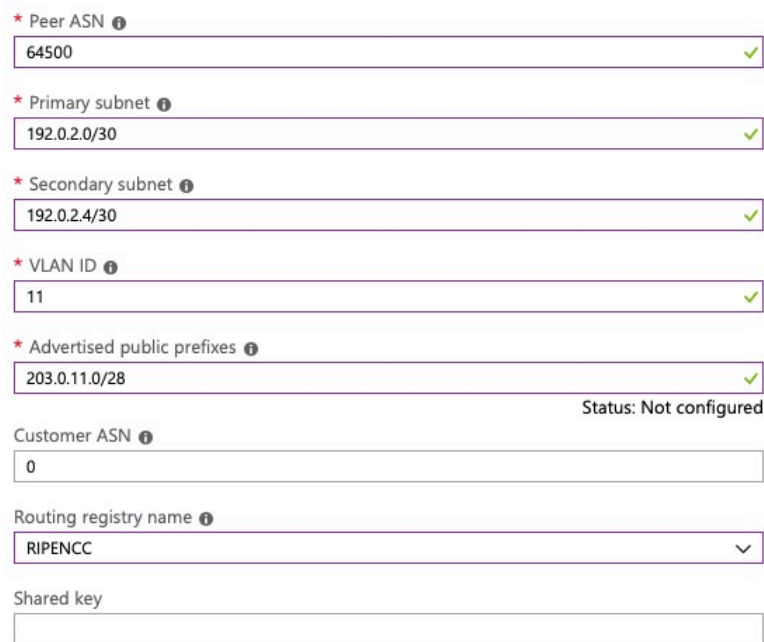
```
interface GigabitEthernet0/0
  description to DE-CIX Platform
  mtu 9000
  ip mtu 1500
!
interface GigabitEthernet0/0/0.31
  encapsulation dot1q 31 second-dot1q 10
  ip address 192.168.31.1 255.255.255.252
  ip mtu 1500
!
interface GigabitEthernet0/0/0.32
  encapsulation dot1q 32 second-dot1q 10
  ip address 192.168.31.5 255.255.255.252
  ip mtu 1500
```

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Microsoft Peering

See the screenshot of the Azure portal for configuration:



* Peer ASN ⓘ
64500 ✓

* Primary subnet ⓘ
192.0.2.0/30 ✓

* Secondary subnet ⓘ
192.0.2.4/30 ✓

* VLAN ID ⓘ
11 ✓

* Advertised public prefixes ⓘ
203.0.11.0/28 ✓

Status: Not configured

Customer ASN ⓘ
0

Routing registry name ⓘ
RIPENCC ✓

Shared key
[Empty field]

On our router the config for the Microsoft Peering interfaces looks like this (using the same parent interface GigabitEthernet 0/0/0 as on the private peering):

```
interface GigabitEthernet0/0/0.33
 dot1Q 31 second-dot1q 11
 ip address 192.0.2.1 255.255.255.252
 ip mtu 1500
!
interface GigabitEthernet0/0/0.34
 encapsulation dot1Q 32 second-dot1q 11
 ip address 192.0.2.5 255.255.255.252
 ip mtu 1500
```

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Testing your connection

Once you have configured your interface you should be able to ping the router on the Azure side of the connection. In this example, use the following pings:

- ping 192.168.31.2 - to test your Azure Private peering via the primary connection
- ping 192.168.31.6 - to test your Azure Private peering via the secondary connection
- ping 192.0.2.2 - to test your Microsoft peering via the primary connection
- ping 192.0.2.6 - to test your Microsoft peering via the secondary connection

You also can click on the Azure portal on the "Get ARP records" link to see if Microsoft sees your interface or the "Get route table" link to check if Microsoft receives your prefixes via BGP.

Example Configuration - BGP

You also have to configure BGP on your router. For Azure Private Peering you do not have to have an "official" Autonomous System - a private AS (AS number range 64512 - 65534) is also sufficient. For Microsoft Peering you need an official AS.

Example configuration for Azure Private Peering (Cisco IOS):

```
router bgp 64500
  neighbor azure peer-group
  neighbor azure remote-as 12076
  neighbor 192.168.31.2 peer-group azure
  neighbor 192.168.31.6 peer-group azure
address-family ipv4
  neighbor 192.168.31.2 activate
  neighbor 192.168.31.6 activate
exit-address-family
```

This is the absolute minimum configuration - you need to add filter rules etc. according to your local setup.