

CenturyLink IQ+ Cloud Port to Microsoft Azure via Azure Portal Azure Resource Manager (ARM)

Direct, Secure, Private Connection to Microsoft Azure

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April 1 , 2018

Purpose

The purpose of this document is to provide an end-to-end walk through for a customer setting up ExpressRoute for the first time via CenturyLink's IQ+ Cloud Port.

Information contained is provided to serve as a supplement to Microsoft documentation linked throughout this document. Users should check the provided links to obtain the most up-to-date information.

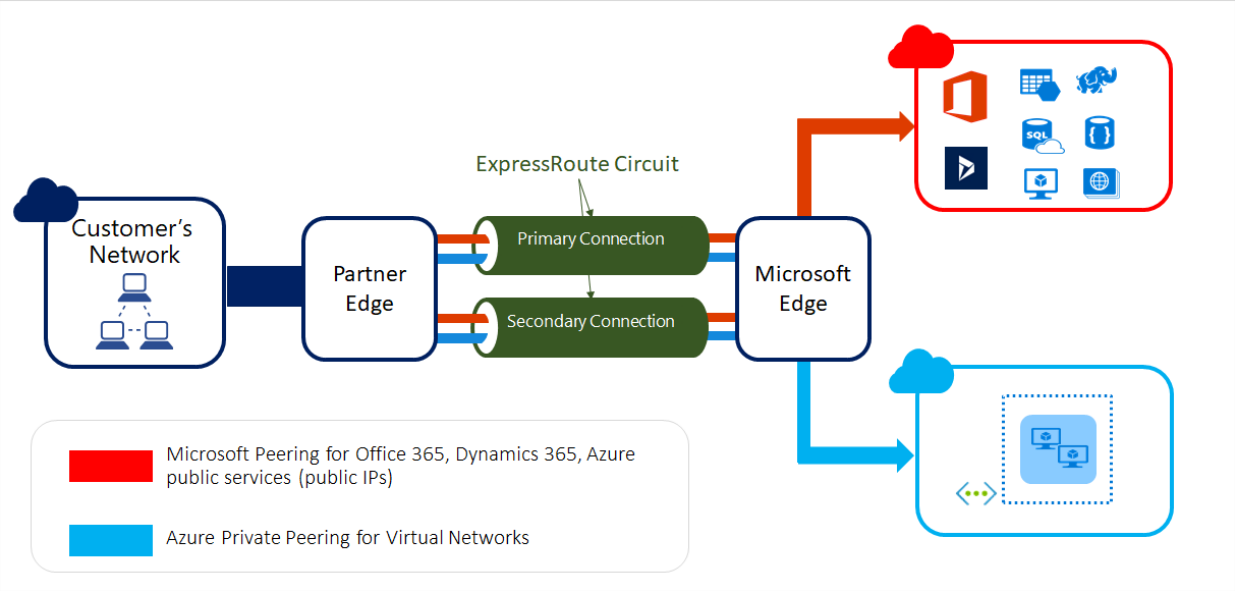
Disclaimer: The material in this guide is for informational purposes only and is taken from Microsoft Azure's website material. All Microsoft related configuration information is based off of the Azure Resource Manager (ARM) portal environment. Customer should work with their CenturyLink account team for specific detailed solutions.

Roles and Responsibilities

Roles and Responsibilities			
STEPS REQUIRED TO SET UP AZURE EXPRESSROUTE CONNECTIVITY	End Customer	CenturyLink	Microsoft Azure
SET UP PHYSICAL CONNECTIVITY TO AZURE EXPRESSROUTE LOCATION			
Order MSFT Azure ExpressRoute connection via MSFT Azure Portal, using 'Equinix' as the Service Provider name, with the appropriate bandwidth and location	X		
Provision dedicated circuit and provide the Service Key			X
Decide on the type of BGP peering required (Azure Private or Microsoft/O365)	X		
Order Layer 3 (MPLS) connection to Azure ExpressRoute location	X		
Provision Layer 3 (MPLS) Service device with BGP, connecting to MSFT Azure ExpressRoute		X	
ORDER VIRTUAL CIRCUITS(S) ON EQUINIX CLOUD EXCHANGE TOWARDS AZURE EXPRESSROUTE			
Create Virtual Circuit		X	
Monitor Virtual Circuit		X	
SET UP BGP PEERING BETWEEN CENTURYLINK PROVIDED CUSTOMER EDGE AND AZURE EDGE DEVICE			
Configure BGP Peering on Customer Edge		X	
Configure BGP Peering on Azure side	X		
*** Configure BGP Route Filtering (Optional for Azure Public, required for Microsoft Peering)	X		
LINK SERVICES ON AZURE TO THE DEDICATED CIRCUIT			
Link virtual Network to the dedicated circuit*	X		
*Connectivity to services hosted on Public IPs is enabled as soon as the dedicated circuit has been enabled			

Background Information

What is Microsoft ExpressRoute (<https://azure.microsoft.com/en-us/documentation/articles/expressroute-introduction/>)



	Private Peering	Microsoft Peering
Max. # prefixes supported per peering	4000 by default, 10,000 with ExpressRoute Premium	200
IP address ranges supported	Any valid IP address within your WAN.	Public IP addresses owned by you or your connectivity provider.
AS Number requirements	Private and public AS numbers. You must own the public AS number if you choose to use one.	Private and public AS numbers. However, you must prove ownership of public IP addresses.
IP protocols supported	IPv4 and IPv6	IPv4 and IPv6
Routing Interface IP addresses	RFC1918 and public IP addresses	Public IP addresses registered to you in routing registries.
MDS Hash support	Yes	Yes

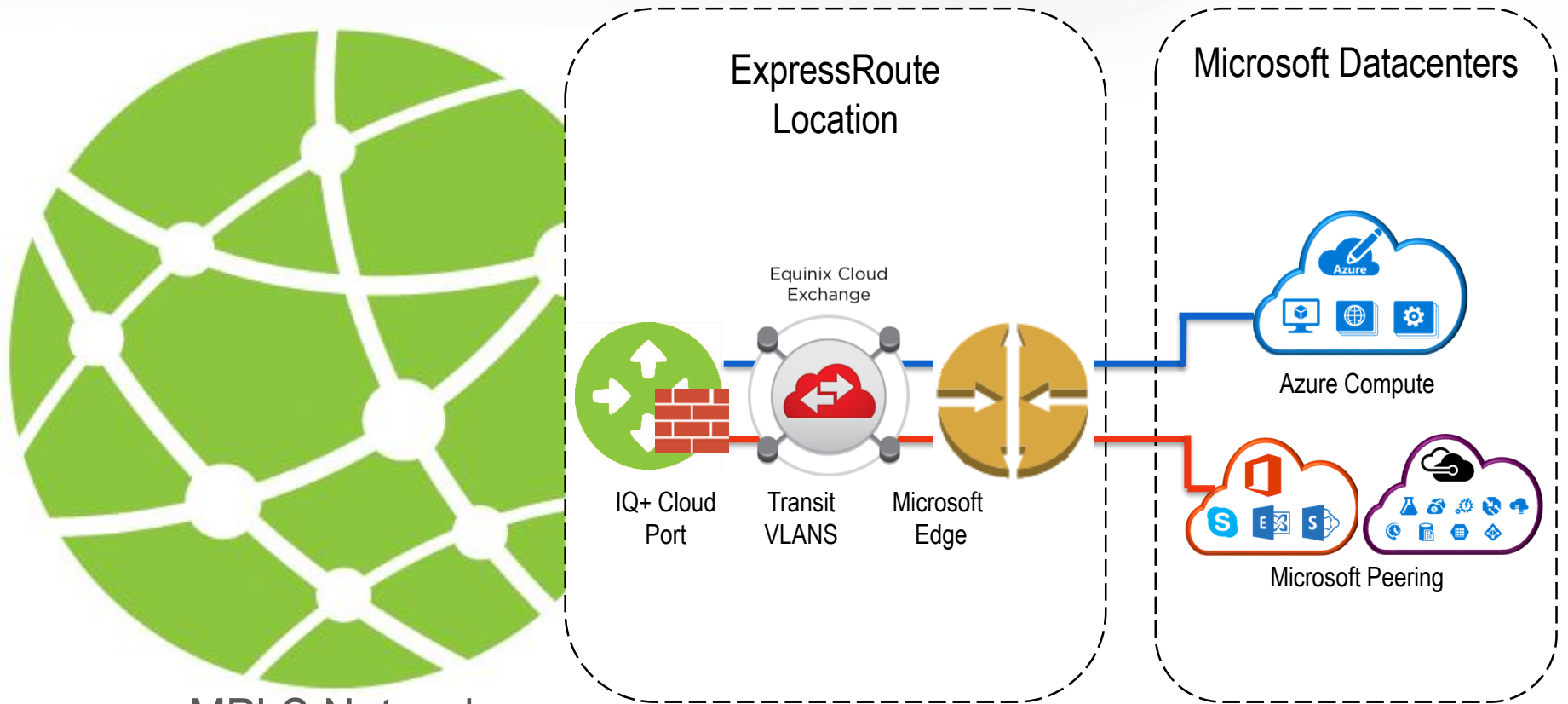
Microsoft Azure ExpressRoute lets you create private connections between Microsoft datacenters and the infrastructure that's in a co-location environment. ExpressRoute connections offer higher security, more reliability, faster speeds and lower latencies than typical connections over the Internet. In some cases, using ExpressRoute connections to transfer data between your on-premises network and Azure can also yield significant cost benefits.

Azure offers circuit bandwidths from 50 Mbps to 10 Gbps (50Mbps, 100Mbps, 200 Mbps, 500 Mbps, 1 Gbps, 2 Gbps, 5Gbps, and 10 Gbps).

Azure compute services, namely virtual machines (IaaS) and cloud services (PaaS) deployed within a virtual network can be connected through the Azure Private Peering domain.

Services such as Azure Storage, SQL databases and Websites are offered on public IP addresses. You can privately connect to services hosted on public IP addresses, including VIPs of your cloud services, through the Microsoft Peering routing domain. You can connect the Microsoft Peering domain to your extranet and connect to all Azure services on their public IP addresses from your WAN without having to connect through the Internet

IQ+ Cloud Port for Microsoft ExpressRoute



MPLS Network

Current Interconnect Locations

- Ashburn, VA
- Chicago, IL
- Dallas, TX
- San Jose, CA
- Secaucus, NJ

Private Peering 
Microsoft Peering 

High Level Step Review

1. **Customer signs into Azure portal**
2. **Customer creates a new ExpressRoute circuit**
3. **Customer views the circuits and properties**
4. **Customer requests CenturyLink IQ+ Cloud Port service**
5. **Customer sends the service key to CenturyLink for IQ+ Cloud Port provisioning**
6. **Customer periodically checks the status and state of the circuit key**
7. **CenturyLink provisions IQ+ Cloud Port connection to MS ExpressRoute**
8. **Customer completes logical routing configuration**

Source: <https://azure.microsoft.com/en-us/documentation/articles/expressroute-howto-circuit-portal-resource-manager/>

Customer signs into Azure portal

1. Sign into Azure @ <http://portal.azure.com/>

File Edit View Favorites Tools Help

Microsoft Azure

Work or school, or personal Microsoft account

Email or phone

Password

Keep me signed in

Sign in

Can't access your account?

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Microsoft

Customer creates a new ExpressRoute circuit

Create an ExpressRoute circuit by selecting the option to create a new resource.

The screenshot shows the Microsoft Azure Marketplace interface. The breadcrumb navigation at the top reads "New > Marketplace > Everything > ExpressRoute". The left-hand navigation pane is open, showing a list of categories. A callout bubble points to the "+" icon at the top of this pane, with the text "1. Click '+' for new service". The search bar in the center contains the text "expressroute", with a callout bubble pointing to it that says "2. Search for 'ExpressRoute'". Below the search bar, a table of search results is displayed. The first result, "ExpressRoute", is highlighted in blue. To the right of the search results, there is a sidebar with a description of Azure ExpressRoute, social media icons, and a "PUBLISHER" section. At the bottom right, a "Create" button is visible, with a callout bubble pointing to it that says "3. Click Create".

Microsoft Azure

New > Marketplace > Everything > ExpressRoute

Marketplace

Everything

Filter

1. Click '+' for new service

2. Search for 'ExpressRoute'

expressroute

Results

NAME	PUBLISHER	CATEGORY
ExpressRoute	Microsoft	Networking
Virtual network gateway	Microsoft	Networking
App Service Environment	Microsoft	Web + mobile
Connection	Microsoft	Networking
BizTalk360	Kovai Limited	Compute

ExpressRoute
Microsoft

Azure ExpressRoute enables you to connect your on-premises infrastructure that's on your private network to Azure services. Traffic does not go over the public Internet, providing more security than typical connections between on-premises and Azure services.

With ExpressRoute, you can establish a connection to Azure services (through a network service provider or a network service provider facility) or directly connect to Azure services.

PUBLISHER

USEFUL LINKS

3. Click Create

Create

Related to your search

- Elfiq Networks Cloud Connector
- Local network gateway
- App Service Plan

Customer creates a new ExpressRoute Circuit

After clicking ExpressRoute, portal will display **Create ExpressRoute circuit** blade. When filling in the values on this blade, some helpful tips:

- Select the Provider as **Equinix**, and available locations
 - Currently CenturyLink utilizes the Equinix Cloud Exchange for access to MSFT Azure
 - CenturyLink currently supports access to MSFT in Silicon Valley, Chicago, Dallas, Secaucus and Washington DC
- Make sure to specify the correct SKU for Tier and Data Metering:
 - **Tier** determines whether an ExpressRoute standard or an ExpressRoute premium add-on is enabled. Specify Standard to get the standard SKU or Premium for the premium add-on
 - **Data Metering** determines the billing type. Specify Metered for a metered data plan* and Unlimited for an unlimited data plan. Note that the billing type can be changed from Metered to Unlimited, but may not be changed from Unlimited to Metered
- Select the appropriate Subscription and Resource Group
 - User must have a subscription type set, such as Pay-As-You-Go
 - A Resource group is a collection of resources that share the same lifecycle, permissions, an policies.
 - Additional information can be found here: <https://azure.microsoft.com/en-us/documentation/articles/resource-group-portal/>
- Selecting 'Pin to dashboard' will display the ExpressRoute connection on the main Azure dashboard for easier reference

* Most customers selected Metered to reduce the potential monthly spend

Important:

Please be aware that the '**Peering Location**' indicates the physical location where you are peering with Microsoft. This is not linked to "**Location**" property, which refers to the geography where the Azure Network Resource Provider is located. While they are not related, it is a good practice to choose a Network Resource Provider geographically close to the Peering Location of the circuit.

Microsoft Azure New > Marketplace >

Create ExpressRoute cir... — □ ×

Create new or import from classic ⓘ

Create new Import

* Circuit name
Test_Circuit ✓

* Provider ⓘ
Equinix ▼

* Peering location ⓘ
Silicon Valley ▼

* Bandwidth ⓘ
50Mbps ▼

* SKU ⓘ
Standard Premium

* Billing model ⓘ
Unlimited Metered

Allow classic operations ⓘ

* Subscription
Pay-As-You-Go ▼

* Resource group ⓘ
 Create new Use existing

PSBTEST ▼

* Location
West US ▼

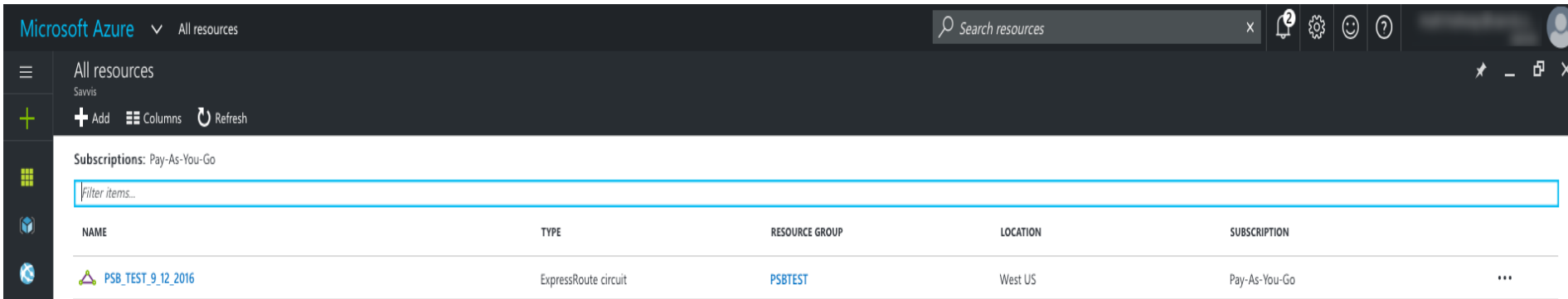
Pin to dashboard

Create Automation options

By clicking the create button, you understand that billing will start immediately upon creation of the ExpressRoute and you agree to accept the charges.

Customer views the circuits and properties

View all created ExpressRoute circuits by selecting **All resources** on the left-side menu.



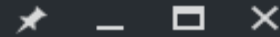
The screenshot shows the Microsoft Azure portal interface. At the top, there is a search bar labeled "Search resources" and a user profile icon. Below the search bar, the "All resources" menu is expanded, showing a list of resources. The first resource is highlighted, showing its details in a table. The table has columns for NAME, TYPE, RESOURCE GROUP, LOCATION, and SUBSCRIPTION. The resource listed is "PSB_TEST_9_12_2016", which is an "ExpressRoute circuit" located in the "PSBTEST" resource group in the "West US" location, under the "Pay-As-You-Go" subscription.

NAME	TYPE	RESOURCE GROUP	LOCATION	SUBSCRIPTION
PSB_TEST_9_12_2016	ExpressRoute circuit	PSBTEST	West US	Pay-As-You-Go

Customer views the circuits and properties



PSB_TEST_9_12_2016
ExpressRoute circuit



Delete

Search (Ctrl+/)

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems

SETTINGS

- Configuration
- Connections
- Peerings
- Properties
- Locks
- Automation script

SUPPORT + TROUBLESHOOTING

- New support request

Essentials ^

Resource group	PSBTEST	Provider	Equinix
Circuit status	Enabled	Provider status	Provisioned
Location	Not available	Peering location	Silicon Valley
Subscription name	Pay-As-You-Go	Bandwidth	50 Mbps
Subscription ID	[REDACTED]	Service key	[REDACTED]

Peerings

TYPE ^	STATUS ^	PRIMARY SUBNET ^	SECONDARY SUBNET ^	
Azure private	Disabled	-	-	...
Azure public	Disabled	-	-	...
Microsoft	Disabled	-	-	...

Customer sends the service key to CenturyLink for IQ+ Cloud Port for provisioning

- On this blade, Provider status provides information on the current state of provisioning on the service-provider (CenturyLink) side. Circuit status provides the state on the Microsoft side.
- When creating a new ExpressRoute circuit, the circuit will be in the following state:
 - Provider status: Not provisioned
 - Circuit status: Enabled
- The circuit will change to the following state when the connectivity provider (CenturyLink) is in the process of enabling it:
 - Provider status: Provisioning
 - Circuit status: Enabled
- To be able to use an ExpressRoute circuit, the circuit must be in the following state:
 - Provider status: Provisioned
 - Circuit status: Enabled

The screenshot displays the 'Essentials' section of an Azure ExpressRoute circuit. The 'Circuit status' is 'Enabled' and the 'Provider status' is 'Provisioned', both highlighted with a blue box. The 'Subscription ID' and 'Service key' are highlighted with a red box. Below this, the 'Peerings' section shows a table with columns for TYPE, STATUS, PRIMARY SUBNET, and SECONDARY SUBNET. Three peerings are listed: Azure private, Azure public, and Microsoft, all with a status of 'Disabled'.

Resource group	Provider
PSBTEST	Equinix
Circuit status	Provider status
Enabled	Provisioned
Location	Peering location
Not available	Silicon Valley
Subscription name	Bandwidth
Pay-As-You-Go	50 Mbps
Subscription ID	Service key

TYPE	STATUS	PRIMARY SUBNET	SECONDARY SUBNET
Azure private	Disabled	-	-
Azure public	Disabled	-	-
Microsoft	Disabled	-	-

Customer requests CenturyLink IQ+ Cloud Port service

- **To order a CenturyLink IQ+ Cloud Port, contact your CenturyLink Account Representative**
 - Contact your CenturyLink account rep to assist in ordering an IQ+ Cloud Port
 - Information needed by CenturyLink to complete connection:
 - MSFT Azure ExpressRoute Service Key completed in early steps
 - Azure Interconnect Location
 - Speed of MPLS Connection requested (typically matches ExpressRoute speed)
 - What Azure service(s) are you connecting to:
 - Azure Private Peering (Compute/IaaS)
 - Microsoft Peering (Azure PaaS, Office 365, Dynamics 365)
- Don't forget to discuss available billing modes including flat and precise burstable

Customer periodically checks status and state of the circuit key

- To view the properties of an ExpressRoute circuit, select it, then check the Provider status and ensure that it has moved to **Provisioned** before continuing.

The screenshot displays the 'Essentials' section of an ExpressRoute circuit in the Azure portal. The 'Circuit status' is 'Enabled' and the 'Provider status' is 'Provisioned', both highlighted with a blue box. The 'Subscription ID' and 'Service key' are highlighted with a red box. Below this, the 'Peerings' section shows a table with columns for TYPE, STATUS, PRIMARY SUBNET, and SECONDARY SUBNET. The table lists three peerings: Azure private, Azure public, and Microsoft, all with a status of 'Disabled'.

TYPE	STATUS	PRIMARY SUBNET	SECONDARY SUBNET
Azure private	Disabled	-	-
Azure public	Disabled	-	-
Microsoft	Disabled	-	-

CenturyLink provisions IQ+ Cloud Port to MS ExpressRoute

- **Upon network order submission, CenturyLink will provision a Layer 3 VPN connection to the requested interconnect point**
 - Turn up of Layer 3 VPN service to local ExpressRoute interconnect point
 - Layer 3 will be configured on CTL side; Customer will complete Layer 3 turn up on Azure side in a later step
 - Extension of Layer 2 VLAN(s) between CenturyLink and Microsoft
- **CenturyLink completes configuration, and provides Customer with necessary information required to complete Layer 3 turn up on Azure side per environment**
 - Primary & Secondary IP subnets
 - Autonomous System Number (ASN) Info
 - VLAN ID

Configuring ExpressRoute for Azure Private

Configuring ExpressRoute for Azure Private

To create Azure Private Peering:

1. Configure the ExpressRoute circuit. Ensure that the circuit is fully provisioned by CenturyLink before continuing.
2. Configure Azure private peering for the circuit. Make sure to have the following items before proceeding with the next steps:
 - A /30 subnet for the primary link. This must not be part of any address space reserved for virtual networks.
 - A /30 subnet for the secondary link. This must not be part of any address space reserved for virtual networks.
 - A valid VLAN ID to establish this peering on. Ensure that no other peering in the circuit uses the same VLAN ID.
 - AS number for peering. Both 2-byte and 4-byte AS numbers can be used. A private AS number for this peering can be used. Do not use ASN 65515.
 - An MD5 hash is optional.

The screenshot shows the 'Essentials' section of an Azure ExpressRoute circuit. The 'Circuit status' is 'Enabled' and the 'Provider status' is 'Provisioned'. The 'Subscription ID' and 'Service key' are highlighted with a red box. Below this, the 'Peerings' section shows a table with three rows: 'Azure private', 'Azure public', and 'Microsoft'. All are currently 'Disabled'.

Essentials ^				
Resource group	PSBTEST	Provider	Equinix	
Circuit status	Enabled	Provider status	Provisioned	
Location	Not available	Peering location	Silicon Valley	
Subscription name	Pay-As-You-Go	Bandwidth	50 Mbps	
Subscription ID	[REDACTED]	Service key	[REDACTED]	
Peerings				
TYPE ^	STATUS ^	PRIMARY SUBNET ^	SECONDARY SUBNET ^	
Azure private	Disabled	-	-	...
Azure public	Disabled	-	-	...
Microsoft	Disabled	-	-	...



Configuring ExpressRoute for Azure Private

To create Azure Private Peering (cont'd):

3. Select the Azure Private peering row, as shown below

The screenshot shows the Azure portal interface for configuring an ExpressRoute circuit. The 'Essentials' section displays circuit details such as Resource group (USWest-ER-Demo-RG), Provider (Equinix), and Bandwidth (200 Mbps). The 'Peerings' table lists three peering types: Azure private (Disabled), Azure public (Enabled), and Microsoft (Enabled). The 'Azure private' row is highlighted with a red rectangle. The right-hand pane shows configuration fields for the selected peering type, including Peer ASN (0), Primary subnet, Secondary subnet, and VLAN ID (0).

TYPE	STATUS	PRIMARY SUBNET	SECONDARY SUBNET
Azure private	Disabled	-	-
Azure public	Enabled	64.191.192.248/30	64.191.192.252/30
Microsoft	Enabled	64.191.192.240/30	64.191.192.244/30

4. Configure private peering

The 'Private peering' configuration dialog box is shown with the following values entered:

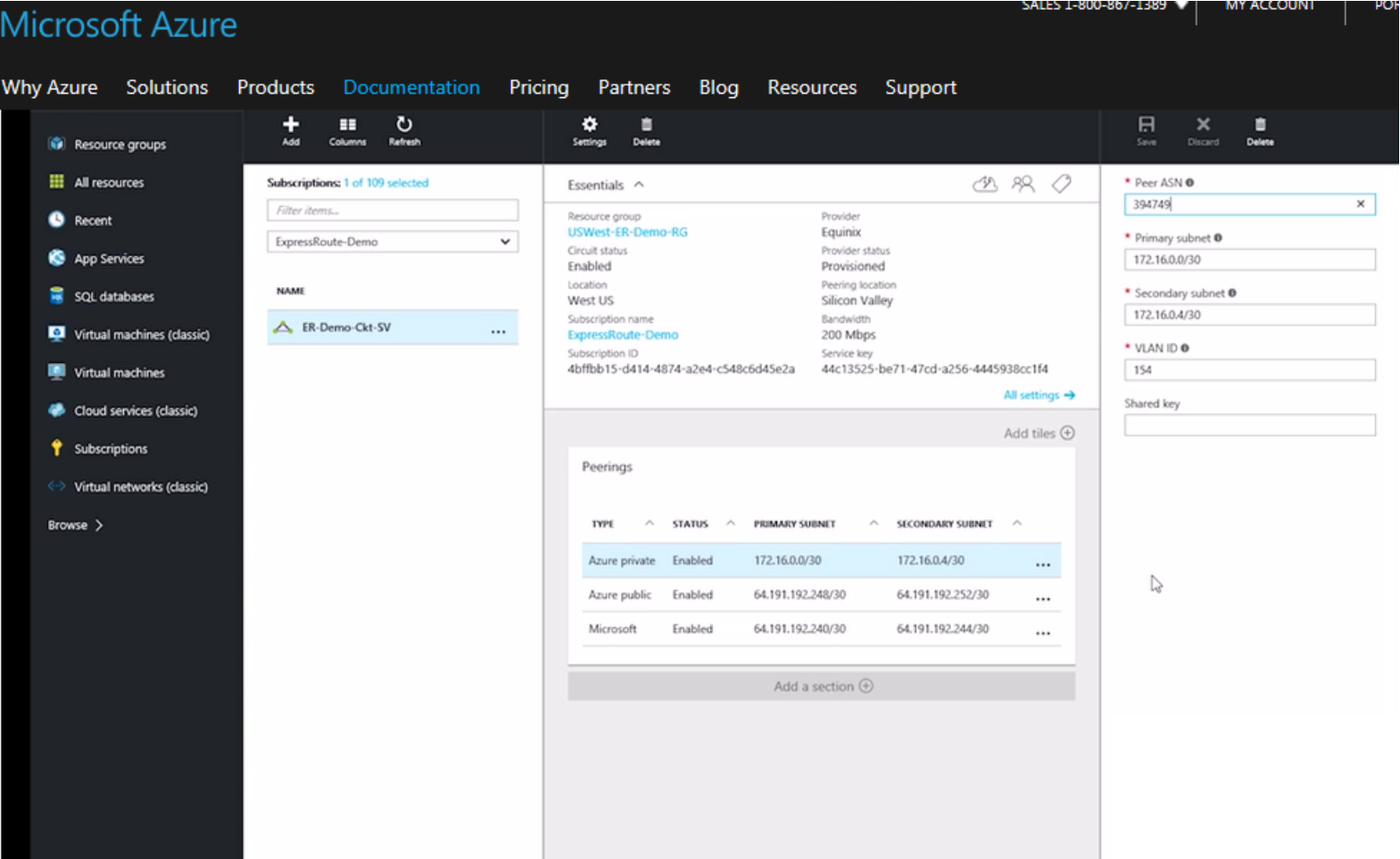
- Peer ASN: 394749
- Primary subnet: 172.16.0.0/30
- Secondary subnet: 172.16.0.4/30
- VLAN ID: 154



Configuring ExpressRoute for Azure Private

To create Azure Private Peering (cont'd):

- 5. Save the configuration once you have specified all parameters. Once the configuration has been accepted successfully, the portal will display something similar to the example below.



Create Virtual Network

- If not already created, customer must have a virtual network that will be used for their compute resources (aka the LAN)

The screenshot shows the Microsoft Azure portal interface for creating a virtual network. The page title is "Create virtual network" and the breadcrumb trail is "New > Virtual network > Create virtual network".

Callout 1: A red speech bubble points to the "Virtual network" header, containing the text: "1. Add 'Virtual Network'".

Callout 2: A red speech bubble points to the "Create" button at the bottom left, containing the text: "2. Click 'Create'".

Callout 3: A red speech bubble points to the configuration fields on the right, containing the text: "3. Name Network, select the address space, subscription, resource group and location, then click Create".

The configuration fields on the right include:

- Name: TEST-VN
- Address space: 10.1.0.0/16 (10.1.0.0 - 10.1.255.255 (65536 addresses))
- Subnet name: default
- Subnet address range: 10.1.0.0/24 (10.1.0.0 - 10.1.0.255 (256 addresses))
- Subscription: Pay-As-You-Go
- Resource group: PSBTEST
- Location: West US

The "Create" button is highlighted in blue. There is also a "Pin to dashboard" checkbox and an "Automation options" link at the bottom right.

Create Virtual Network Gateway

- Create a Virtual Network Gateway that will be used to connect the Virtual Network to the ExpressRoute
- Virtual Network Gateway FAQs at <https://docs.microsoft.com/en-us/azure/expressroute/expressroute-about-virtual-network-gateways>

The image shows a sequence of three screenshots from the Microsoft Azure portal illustrating the process of creating a Virtual Network Gateway. The first screenshot shows the 'Networking' category selected in the left-hand navigation pane. The second screenshot shows the 'Virtual network gateway' option selected in the 'New' section. The third screenshot shows the 'Create virtual network gateway' configuration page with various fields filled out and the 'ExpressRoute' gateway type selected. Red callout boxes with numbers 1 through 7 provide step-by-step instructions for each part of the process.

1. Select Networking
2. Select Virtual Network Gateway
3. Name your Gateway
4. Put it in the virtual network that you already have
5. Create an IP address
6. Specify ExpressRoute Gateway
7. Click Create

Tutorial: <https://azure.microsoft.com/en-us/documentation/videos/azure-expressroute-how-to-create-a-vpn-gateway-for-your-virtual-network/>

Create Connection from Virtual Network Gateway to Virtual Network

- To enable routing between the MPLS network and the compute resources on the Virtual Network, create a connection between the Virtual Network Gateway

The screenshot displays the Azure portal interface for managing a Virtual Network Gateway. It is divided into three main sections: the left-hand navigation pane, the central resource overview, and the right-hand configuration pane.

Left Pane (All resources): A list of resources is shown, with 'PSB_TEST_VN_GATEWAY' selected and highlighted in blue. A red callout bubble with the text '1. Select 'Virtual Network Gateway'' points to this selection.

Center Pane (PSB_TEST_VN_GATEWAY - Connections): The 'Connections' tab is active in the settings menu. A red callout bubble with the text '2. Select 'Connections'' points to this menu item. Below the settings, a table lists existing connections:

NAME	STATUS	CONNECTION TYPE	PEER
TESTRoute	Succeeded	ExpressRoute	PSB_TEST_9_12_2016 ...

A red callout bubble with the text '3. Select 'Add'' points to the '+ Add' button at the top of this pane.

Right Pane (Add connection): This pane shows the configuration form for a new connection. The fields are filled as follows:

- Name: Test-Route (with a green checkmark)
- Connection type: ExpressRoute (selected from a dropdown)
- Virtual network gateway: PSB_TEST_VN_GATEWAY (selected from a dropdown)
- ExpressRoute circuit: PSB_TEST_9_12_2016 (selected from a dropdown)
- Subscription: Pay-As-You-Go (selected from a dropdown)
- Resource group: PSBTEST (selected from a dropdown)
- Location: West US (selected from a dropdown)

A red callout bubble with the text '4. Name the Route, select ExpressRoute for the 'Connection Type', Select the Virtual Network Gateway, ExpressRoute circuit, and click 'OK' to build the route' points to the 'OK' button at the bottom of the configuration pane.

Verify Routes between CenturyLink and Azure Private

- Verify routes are being seen by Azure Private

The screenshot displays the Azure portal interface for an ExpressRoute circuit named 'PSB_TEST_9_12_2016'. The 'Private peering' section is active, showing configuration details for the peering with Equinix in Silicon Valley. The 'Peerings' table lists three peering connections: 'Azure private' (Enabled), 'Azure public' (Disabled), and 'Microsoft' (Disabled). The 'Route table (Primary)' section shows a table of routes with columns for Network, Next Hop, LocPrf, Weight, and Path. Two callouts provide instructions: '1. Click 'Get route table'' points to the 'Get route table' link, and '2. View Available routes. Note: By default, CenturyLink will announce a default route to Azure Private' points to the route table content.

Essentials

Resource group: PSBTEST
Circuit status: Enabled
Location: West US
Subscription name: Pay-As-You-Go
Subscription ID: 62f48e61-b9a4-476c-8c87-4dc60af3fe5a

Provider: Equinix
Provider status: Provisioned
Peering location: Silicon Valley
Bandwidth: 50 Mbps
Service key: cc5a2b62-47ab-421c-ae7a-80526e890642

Peerings

TYPE	STATUS	PRIMARY SUBNET	SECONDARY SUBNET	
Azure private	Enabled	10.173.131.0/30	10.173.131.4/30	...
Azure public	Disabled	-	-	...
Microsoft	Disabled	-	-	...

Private peering

Peer ASN: 650065
Primary subnet: 10.173.131.0/30
Secondary subnet: 10.173.131.4/30
VLAN ID: 205

Route table (Primary)

Showing only top 200 primary records, click Download above to see all.

NETWORK	NEXT HOP	LOCPRF	WEIGHT	PATH
0.0.0.0	10.173.131.1		0	650065 i
10.0.0.0/16	10.0.0.12		0	65515 i

1. Click 'Get route table'

2. View Available routes.
Note: By default, CenturyLink will announce a default route to Azure Private

Configuring ExpressRoute for Microsoft Peering

As of 4/01/18 Microsoft Peering consists of

- Azure PaaS
- Office 365
- Dynamics 365

Microsoft Peering (SaaS) now supports Azure Public (PaaS) services

- Microsoft has announced they are combining both their PaaS/SaaS services over a single connection (Microsoft Peering)
- Before April 1, 2018, ExpressRoute had three peering connections:
 - **Azure Private** peering for connecting to Azure Vnets
 - **Azure Public** (PaaS) peering to reach Azure PaaS services
 - **Microsoft Peering** (SaaS) for Office 365 and Dynamics 365
- To simplify ExpressRoute management and configuration Microsoft has merged Azure Public routes into the Microsoft Peering connection
 - Customers can now access Azure PaaS and Microsoft SaaS services via the Microsoft peering connection
 - Customers no longer have to have 3 separate connections to MSFT (Public / Private / MSFT Peering), but rather 2 connections going forward (Private / MSFT Peering)
 - Refer to the following to **move** a Public peering to Microsoft peering:
<https://docs.microsoft.com/en-us/azure/expressroute/how-to-move-peering>
- **Note:** While customers can receive all PaaS/SaaS services over MSFT Peering, the O365 service still requires customers to apply for approval to enable the O365 service via their ExpressRoute. All other services can be accessed via the MSFT Peering VLAN without a prior approval.

Configuring ExpressRoute for Microsoft Peering

To create Microsoft Peering:

1. Configure the ExpressRoute circuit. Ensure that the circuit is fully provisioned by CenturyLink before continuing.
2. Configure Microsoft peering for the circuit. Make sure to have the following items before proceeding with the next steps:
 - A /30 subnet for the primary link. This must be a customer-owned valid public IPv4 and registered in an RIR / IRR.
 - A /30 subnet for the secondary link. This must be a customer-owned valid public IPv4 prefix and registered in an RIR / IRR.
 - A valid VLAN ID to establish this peering on. Ensure that no other peering in the circuit uses the same VLAN ID.
 - AS number for peering. 2-byte and 4-byte AS numbers may be used.
 - Advertised prefixes: Provide a list of all prefixes to be advertised over the BGP session. Only public IP address prefixes are accepted. Send a comma separated list if you plan to send a set of prefixes. These prefixes must be registered to the customer in an RIR / IRR.
 - Customer ASN: If advertising prefixes that are not registered to the peering AS number, specify the AS number to which they are registered. This is optional.
 - Routing Registry Name: Specify the RIR / IRR against which the AS number and prefixes are registered. This is optional.
 - An MD5 hash is optional.

ER-Demo-Ckt-SV
ExpressRoute circuit

Settings Delete

Essentials ^

Resource group	Provider
USWest-ER-Demo-RG	Equinix
Circuit status	Provider status
Enabled	Provisioned
Location	Peering location
West US	Silicon Valley
Subscription name	Bandwidth
ExpressRoute-Demo	200 Mbps
Subscription ID	Service key
4bffbb15-d414-4874-a2e4-c548c6d45e2a	44c13525-be71-47cd-a256-4445938cc1f4

All settings →

Peerings Add tiles +

TYPE	STATUS	PRIMARY SUBNET	SECONDARY SUBNET	
Azure private	Disabled	-	-	...
Azure public	Disabled	-	-	...
Microsoft	Disabled	-	-	...

Add a section +

Source: <https://azure.microsoft.com/en-us/documentation/articles/expressroute-howto-routing-portal-resource-manager/>

Tutorial: <https://azure.microsoft.com/en-us/documentation/videos/azure-expressroute-how-to-set-up-microsoft-peering-for-your-expressroute-circuit/>

Configuring ExpressRoute for Microsoft Peering

To create Microsoft Peering (cont'd):

3. Select the Microsoft peering row, as shown below

The screenshot shows the Azure portal interface for an ExpressRoute circuit named 'ER-Demo-Ckt-SV'. The 'Peering' section is expanded, and the 'Microsoft' peering row is highlighted with a red box. The 'Peering' section contains a table with the following data:

TYPE	STATUS	PRIMARY SUBNET	SECONDARY SUBNET
Azure private	Enabled	172.16.0.0/30	172.16.0.4/30
Azure public	Enabled	64.191.192.248/30	64.191.192.252/30
Microsoft	Disabled	-	-

4. Configure Microsoft peering

The screenshot shows the 'Microsoft peering' configuration page in the Azure portal. The page contains the following fields:

- Peer ASN: 394749
- Primary subnet: 64.191.192.240/30
- Secondary subnet: 64.191.192.244/30
- VLAN ID: 152
- Advertised public prefixes: 64.191.192.224/28 (Status: Not configured)
- Customer ASN: 394749
- Routing registry name: ARIN
- Shared key: (empty)

Source: <https://azure.microsoft.com/en-us/documentation/articles/expressroute-howto-routing-portal-resource-manager/>



Configuring ExpressRoute for Microsoft Peering

To create Microsoft Peering (cont'd):

5. Save the configuration once all parameters have been specified. If the circuit gets to a Validation needed state (as shown below), you must open a support ticket with MSFT to show proof of ownership of the prefixes to their support team.

The screenshot shows the Microsoft Peering configuration interface. On the left, the configuration form is visible with a red box around the 'Status: Validation needed' message. A red arrow points from this message to the right. On the right, the 'Essentials' section shows the circuit details, including the provider (Equinix) and location (Silicon Valley). Below this, a table lists the peering configurations:

TYPE	STATUS	PRIMARY SUBNET	SECONDARY SUBNET	
Azure private	Disabled	-	-	...
Azure public	Enabled	64.191.192.248/30	64.191.192.252/30	...
Microsoft	Enabled	64.191.192.240/30	64.191.192.244/30	...

On the far right, a support menu is open, with a red box highlighting the 'New support request' button. A red arrow points from this button down to the support ticket creation form below.

A support ticket can be opened directly from the portal as shown at right

The screenshot shows the support ticket creation form. The left sidebar lists resource groups, and the main area shows the 'Basics' section with the following fields:

- 1 Basics >
- 2 Problem >
- 3 Contact information >

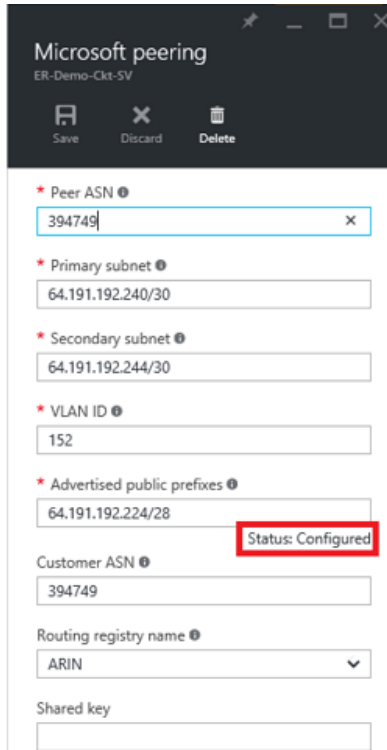
The form fields include:

- Issue type: Technical
- Subscription: ExpressRoute-Demo (4bfffbb15-d414-487...)
- Service: ExpressRoute
- Resource: ER-Demo-Ckt-SV
- Support plan: Azure Support Plan - Internal

Configuring ExpressRoute for Microsoft Peering

To create Microsoft Peering (cont'd):

6. Once the configuration has been accepted successfully, the portal will display something similar to the example below.



The screenshot shows a web portal window titled "Microsoft peering" with the sub-header "ER-Demo-Ckt-5V". Below the title bar are three buttons: "Save", "Discard", and "Delete". The main content area contains several configuration fields:

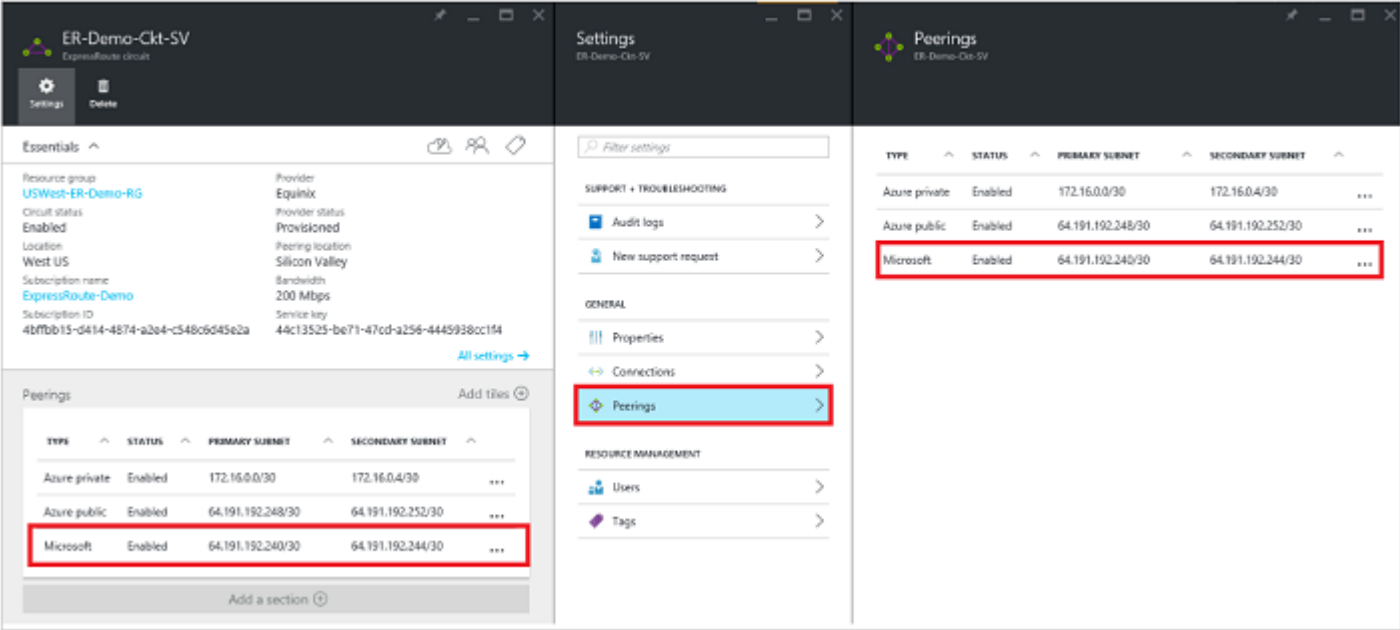
- * Peer ASN**: Input field containing "394749".
- * Primary subnet**: Input field containing "64.191.192.240/30".
- * Secondary subnet**: Input field containing "64.191.192.244/30".
- * VLAN ID**: Input field containing "152".
- * Advertised public prefixes**: Input field containing "64.191.192.224/28". A red box highlights the text "Status: Configured" to the right of this field.
- Customer ASN**: Input field containing "394749".
- Routing registry name**: Dropdown menu showing "ARIN".
- Shared key**: Empty input field.

7. To set up Office 365 services refer to <https://support.office.com/en-us/article/Deploy-Office-365-Enterprise-for-your-organization-ee73dafb-be54-492e-bcfd-0fbfb5f65e94?ui=en-US&rs=en-US&ad=US>.

Configuring ExpressRoute for Microsoft Peering

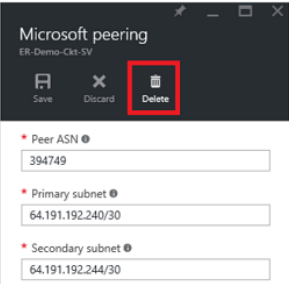
To view Microsoft Peering details:

You can view the properties of Azure public peering by selecting the peering.



To delete Microsoft peering

You can remove your peering configuration by selecting the delete icon, as shown in the following image:



Source: <https://azure.microsoft.com/en-us/documentation/articles/expressroute-howto-routing-portal-resource-manager/>

Configuring Route Filters for Microsoft Peering

About route filters

When Microsoft peering is configured on your ExpressRoute circuit, the Microsoft edge routers establish a pair of BGP sessions with the edge routers (yours or your connectivity provider's). No routes are advertised to your network. To enable route advertisements to your network, you must associate a route filter.

A route filter lets you identify services you want to consume through your ExpressRoute circuit's Microsoft peering. It is essentially a white list of all the BGP community values. Once a route filter resource is defined and attached to an ExpressRoute circuit, all prefixes that map to the BGP community values are advertised to your network.

To be able to attach route filters with Office 365 services on them, you must have authorization to consume Office 365 services through ExpressRoute. If you are not authorized to consume Office 365 services through ExpressRoute, the operation to attach route filters fails. For more information about the authorization process, see [Azure ExpressRoute for Office 365](#). Connectivity to Dynamics 365 services does NOT require any prior authorization.

Overview

- Route filters are a way to consume a subset of supported services through Microsoft peering
- The steps in this section help you configure and manage route filters for ExpressRoute circuits

Dynamics 365 services, and Office 365 services such as Exchange Online, SharePoint Online, and Skype for Business, and Azure services such as storage and SQL DB are accessible through Microsoft peering. When Microsoft peering is configured in an ExpressRoute circuit, all prefixes related to these services are advertised through the BGP sessions that are established. A BGP community value is attached to every prefix to identify the service that is offered through the prefix. For a list of the BGP community values and the services they map to, see [BGP communities](#).

If you require connectivity to all services, a large number of prefixes are advertised through BGP. This significantly increases the size of the route tables maintained by routers within your network. If you plan to consume only a subset of services offered through Microsoft peering, you can reduce the size of your route tables in two ways. You can:

- Filter out unwanted prefixes by applying route filters on BGP communities. This is a standard networking practice and is used commonly within many networks.
- Define route filters and apply them to your ExpressRoute circuit. A route filter is a new resource that lets you select the list of services you plan to consume through Microsoft peering. ExpressRoute routers only send the list of prefixes that belong to the services identified in the route filter.

Workflow

- To be able to successfully connect to services through Microsoft peering, you must complete the following configuration steps:
 - You must have an active ExpressRoute circuit that has Microsoft peering provisioned
You can use the following instructions to accomplish these tasks:
 - Create an ExpressRoute circuit and have the circuit enabled by your connectivity provider before you proceed. The ExpressRoute circuit must be in a provisioned and enabled state.
 - Create Microsoft peering if you manage the BGP session directly. Or, have your connectivity provider provision Microsoft peering for your circuit.
 - You must create and configure a route filter
 - Identify the services you wish to consume through Microsoft peering
 - Identify the list of BGP community values associated with the services
 - Create a rule to allow the prefix list matching the BGP community values
 - You must attach the route filter to the ExpressRoute circuit

Configuring Route Filters for Microsoft Peering

1. Get a list of BGP community values

- BGP community values associated with services accessible through Microsoft peering are available in the ExpressRoute routing requirements page at:

<https://docs.microsoft.com/en-us/azure/expressroute/expressroute-routing>

Example
Community
Strings

Microsoft Azure Region	BGP Community Value
North America	
East US	12076:51004
East US 2	12076:51005
West US	12076:51006
West US 2	12076:51026
West Central US	12076:51026
North Central US	12076:51007
South Central US	12076:51008
Central US	12076:51009
Canada Central	12076:51020
Canada East	12076:51021

Microsoft Service	BGP Community Value
Exchange Online	12076:5010
SharePoint Online	12076:5020
Skype For Business Online	12076:5030
Dynamics 365	12076:5040
Other Office 365 Online services	12076:5100

2. Make a list of the values that you want to use

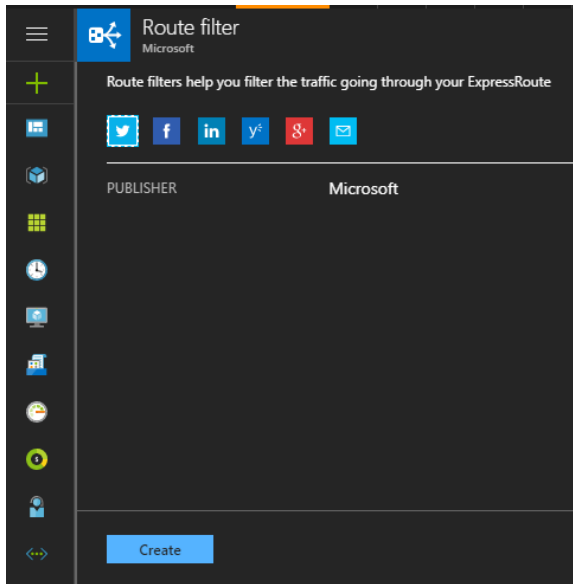
- Make a list of BGP community values you want to use in the route filter. As an example, the BGP community value for Dynamics 365 services is 12076:5040

Source: <https://docs.microsoft.com/en-us/azure/expressroute/how-to-route-filter-portal>

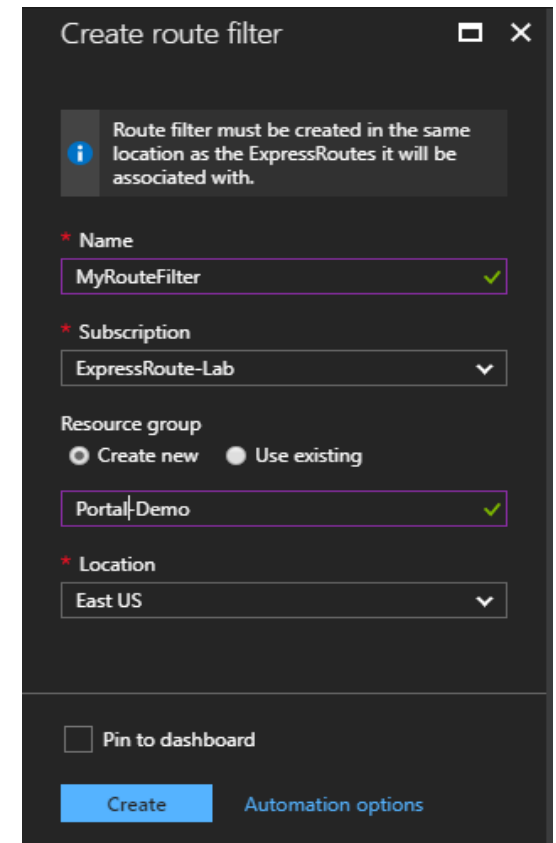
Configuring Route Filters for Microsoft Peering

1. Create a route filter

- You can create a route filter by selecting the option to create a new resource. Click **New > Networking > Route Filter**, as shown in the following image:.



- You must place the route filter in a resource group



Configuring Route Filters for Microsoft Peering

2. Create a filter rule

- You can add and update rules by selecting the manage rule tab for your route filter

The screenshot displays the Azure portal interface for a route filter named "MyRouteFilter". The "Manage rule" tab is highlighted with a red box. The interface shows the following details:

- Resource group:** Portal-Demo
- Status:** Succeeded
- Location:** East US
- Subscription:** ExpressRoute-Lab
- Subscription ID:** 4bfffbb15-d414-4874-a2e4-c548c6d45e2a

Below the details, there are two sections:

- Allowed service communities:** A search bar and a table with columns "NAME" and "VALUE". The table shows "No data".
- Circuits:** A search bar and a table with columns "NAME", "CIRCUIT STATUS", "PROVIDER STATUS", and "PROVIDER". The table shows "No data".

- You must place the route filter in a resource group

Configuring Route Filters for Microsoft Peering

- You can select the services you want to connect to from the drop down list and save the rule when done



Manage rule
AllowSPO

Save Discard

* Rule name
Rule1

* Allowed service communities
2 selected

- Select all
- Exchange (12076:5010)
- Other Office 365 Services (12076:5100)
- SharePoint Online (12076:5020)
- Skype For Business (12076:5030)
- CRM Online (12076:5040)
- Azure Australia East (12076:51015)
- Azure Australia Southeast (12076:510...)
- Azure Brazil South (12076:51014)
- Azure Canada Central (12076:51020)
- Azure Canada East (12076:51021)
- Azure Central India (12076:51017)
- Azure Central US (12076:51009)
- Azure Central US EUAP (12076:51009)
- Azure East Asia (12076:51010)
- Azure East US (12076:51004)
- Azure East US 2 (12076:51005)
- Azure East US 2 EUAP (12076:51005)
- Azure Japan East (12076:51012)
- Azure Japan West (12076:51013)
- Azure Korea Central (12076:51029)
- Azure Korea South (12076:51028)
- Azure North Central US (12076:51007)
- Azure North Europe (12076:51003)

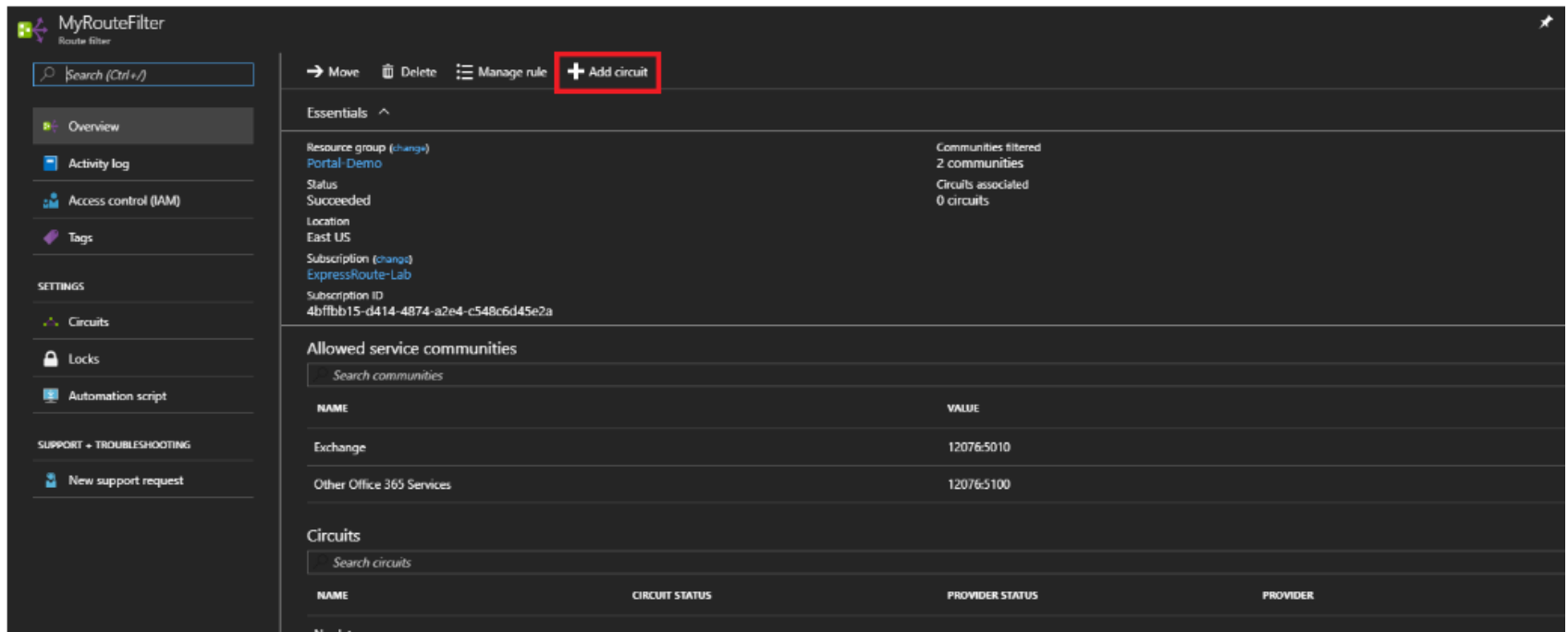
Note: ExpressRoute Premium is an add-on over the ExpressRoute Unlimited Data Plan/Metered Data Plan charges. The ExpressRoute Premium add-on provides the following capabilities:

- Increased route limits for public and private peering from 4,000 routes to 10,000 routes.
- Increased number of VNet links per ExpressRoute circuit from 10 to a larger limit (depending on the bandwidth of the circuit).

<https://azure.microsoft.com/en-us/pricing/details/expressroute/>

Configuring Route Filters for Microsoft Peering

- You can attach the route filter to a circuit by selecting the “Add Circuit” button and selecting the ExpressRoute circuit from the dropdown list.



The screenshot displays the MyRouteFilter portal interface. The left sidebar contains navigation options: Overview, Activity log, Access control (IAM), Tags, SETTINGS (Circuits, Locks, Automation script), and SUPPORT + TROUBLESHOOTING (New support request). The main content area shows the 'Essentials' section for a route filter, with the '+ Add circuit' button highlighted in red. Below this, the 'Allowed service communities' table is visible, listing Exchange and Other Office 365 Services with their respective values.

NAME	VALUE
Exchange	12076:5010
Other Office 365 Services	12076:5100

NAME	CIRCUIT STATUS	PROVIDER STATUS	PROVIDER
No data			

Configuring Route Filters for Microsoft Peering

- If the connectivity provider configures peering for your ExpressRoute circuit refresh the circuit from the ExpressRoute circuit blade before you select the “Add Circuit” button.

The screenshot displays the Azure portal interface for an ExpressRoute circuit named "NTT_SMC_Test". The left sidebar contains navigation options such as Overview, Activity log, Access control (IAM), Tags, and Diagnose and solve problems. The main content area shows the circuit's details, including its resource group, status (Enabled), location (Japan West), and subscription name (ExpressRoute-AggPartner-Testing). A table lists the peering configurations:

TYPE	STATUS	PRIMARY SUBNET	SECONDARY SUBNET
Azure private	Provisioned	10.7.2.0/30	10.7.3.0/30
Azure public	Not provisioned	-	-
Microsoft	Provisioned	[Redacted]	[Redacted]

The "Refresh" button in the top toolbar and the "Microsoft" peering row in the table are highlighted with red boxes.

Other Common Tasks for Route Filters

- **Viewing Properties** - You can view properties of a route filter when you open the resource in the portal
- **Update the properties of a route filter** - You can update the list of BGP community values attached to a circuit by selecting the "Manage rule" button
- **Detaching a route filter from an ExpressRoute circuit** - To detach a circuit from the route filter, right click on the circuit and click on "Disassociate"
- **Deleting a route filter** - You can delete a route filter by selecting the "Delete" button

Source: <https://docs.microsoft.com/en-us/azure/expressroute/how-to-routefilter-portal>

Microsoft ExpressRoute Resources

Introduction	https://azure.microsoft.com/en-us/documentation/articles/expressroute-introduction/
FAQ	https://azure.microsoft.com/en-us/documentation/articles/expressroute-faqs/
Pricing	http://azure.microsoft.com/pricing/details/expressroute/ <ul style="list-style-type: none">• Use Exchange Provider Pricing• There is a Premium if you need >4k routes or ability to reach other global regions
Prerequisites	https://azure.microsoft.com/en-us/documentation/articles/expressroute-prerequisites/
Circuits & routing domains	https://azure.microsoft.com/en-us/documentation/articles/expressroute-circuit-peering/
Partners & peering locations	https://azure.microsoft.com/en-us/documentation/articles/expressroute-locations/
Azure Regions	http://azure.microsoft.com/en-us/regions/
Designing Materials	<ul style="list-style-type: none">• https://azure.microsoft.com/en-us/documentation/articles/expressroute-routing/• https://azure.microsoft.com/en-us/documentation/articles/expressroute-nat/
Configuration Materials	<ul style="list-style-type: none">• https://azure.microsoft.com/en-us/documentation/articles/expressroute-howto-circuit-arm/• https://azure.microsoft.com/en-us/documentation/articles/expressroute-howto-routing-arm/• https://azure.microsoft.com/en-us/documentation/articles/expressroute-howto-linkvnet-arm/• https://azure.microsoft.com/en-us/documentation/articles/expressroute-howto-vnet-portal-arm/
Diversity	<ul style="list-style-type: none">• Single port includes diversity from IQ+ edge to Microsoft• PE/Path diversity available by ordering 2 IQ ports which would require only a single Express Route Subscription• Full diversity achieved by ordering at 2 separate locations which would require multiple Express Route Subscriptions
Notes	<ul style="list-style-type: none">• Azure Datacenter Public IP Blocks: http://www.microsoft.com/en-us/download/details.aspx?id=41653• Dynamic routing via BGP• Azure Compute supports bring your own private IP

Microsoft O365 Resources

Availability	https://blogs.office.com/2015/09/29/announcing-general-availability-of-expressroute-for-office-365/
Overview	https://support.office.com/en-us/article/Azure-ExpressRoute-for-Office-365-6d2534a2-c19c-4a99-be5e-33a0cee5d3bd?ui=en-US&rs=en-US&ad=US
O365 Traffic Mgt	https://support.office.com/en-us/article/Office-365-network-traffic-management-e1da26c6-2d39-4379-af6f-4da213218408?ui=en-US&rs=en-US&ad=US
Client Connectivity	https://support.office.com/en-us/article/Client-connectivity-4232abcf-4ae5-43aa-bfa1-9a078a99c78b
QOS	https://azure.microsoft.com/en-us/documentation/articles/expressroute-qos/
Office 365 Locations	https://www.microsoft.com/online/legal/v2/?docid=25 <ul style="list-style-type: none"> • O365 has a primary & DR site for each tenant. • Internet access will be proxied through the closest O365 location and backhauled on MS backbone
Address Blocks	https://support.office.com/en-us/article/Office-365-URLs-and-IP-address-ranges-8548a211-3fe7-47cb-abb1-355ea5aa88a2
CDN Usage	https://support.office.com/en-us/article/Content-delivery-networks-0140f704-6614-49bb-aa6c-89b75dcd7f1f
Network Planning	https://support.office.com/en-us/article/Network-planning-and-performance-tuning-for-Office-365-e5f1228c-da3c-4654-bf16-d163daee8848
Implementing ExpressRoute for Office 365	https://support.office.com/en-us/article/Implementing-ExpressRoute-for-Office-365-77735c9d-8b80-4d2f-890e-a8598547dea6
O365 Step-by-step installation	https://support.office.com/en-us/article/Download-and-install-or-reinstall-Office-365-Office-2016-or-Office-2013-on-your-PC-or-Mac-4414eaaf-0478-48be-9c42-23adc4716658?ui=en-US&rs=en-US&ad=US
Route Filters	https://docs.microsoft.com/en-us/azure/expressroute/how-to-routefilter-portal