CenturyLink® Cloud Connect: eLynk to Microsoft Azure via Azure Portal
Azure Resource Manager (ARM)

Direct, Secure, Private Connection to Microsoft Azure

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January 28th, 2020
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 Cloud Connect.

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 and for more details pertaining to Microsoft processes.

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.
## Roles and Responsibilities

### STEPS REQUIRED TO SET UP AZURE EXPRESSROUTE CONNECTIVITY

<table>
<thead>
<tr>
<th>SET UP PHYSICAL CONNECTIVITY TO AZURE EXPRESSROUTE LOCATION</th>
<th>End Customer</th>
<th>CenturyLink</th>
<th>Microsoft Azure (Automated via portal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decide on the type of BGP peering required (Azure Private Peering-IaaS or Microsoft Peering-PaaS/SaaS)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order Layer 2 eLynk Cloud Connect service to Azure ExpressRoute location from CenturyLink Account Team</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order MSFT Azure ExpressRoute connection via MSFT Azure Portal, using <strong>“CenturyLink Cloud Connect”</strong> as the Service Provider name, with the appropriate bandwidth and location. <em>see your Cloud Connect Solutions Architect for more details or direction.</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provision Layer 2 eLynk Service device with VLAN Tag, connecting to MSFT Azure ExpressRoute</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Provision ExpressRoute circuit and provide the ExpressRoute Service Key to CenturyLink</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

### SET UP BGP PEERING BETWEEN CUSTOMER EDGE ROUTER AND AZURE EDGE DEVICE

| Configure BGP Peering on Customer Routers | X            |             |                                        |
| Configure BGP Peering on Azure side      | X            |             |                                        |
| *** Configure BGP Route Filtering (**required for Microsoft Peering PaaS/SaaS** | X            |             |                                        |

### LINK SERVICES ON AZURE TO THE DEDICATED CIRCUIT

| Link virtual Network(s) 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/)

Microsoft Azure ExpressRoute lets you create private connections between Microsoft datacenters and the infrastructure that’s in a co-location environment or at a customer premise. ExpressRoute connections offer higher security, more reliability, faster speeds and predictable 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 virtual networks (VNETs) deployed within a virtual network can be connected through the Azure Private Peering domain.

PaaS Services such as Azure Storage, SQL databases and Web Apps 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 location without having to connect through the Internet.
Cloud Connect for Microsoft ExpressRoute

- For connections to Microsoft Azure, your equipment must support Q-in-Q (see page 14).
- Customer is responsible for express route costs and configuration.
- Firewall / NAT services must be provided by Customer when accessing Microsoft Peering for PaaS/SaaS Services.
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 Cloud Connect service
5. Upon request, customer sends the service key to CenturyLink Technical Design Engineer for Cloud Connect provisioning.
6. CenturyLink provisions Layer 2 from Customer to MS ExpressRoute
7. Customer completes Layer 3 configuration, attaching any VNET’s and/or accessing any Public/Office365 resources

1) Customer signs into Azure portal

Sign into Azure @ http://portal.azure.com/
2) Customer creates a new ExpressRoute Circuit

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

• Select the Provider as **CenturyLink Cloud Connect**

• Select the appropriate ExpressRoute location.
  • **Note**: Silicon Valley = San Jose

• Specify the correct SKU for Tier and Data Metering:
  • **SKU / Tier** determines whether an ExpressRoute standard or an ExpressRoute premium add-on is enabled.
  • **Billing Model / Data Metering** determines the billing type that Microsoft will use to bill the customer directly for ExpressRoute.
  • **Note**: 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, and policies.
  • Additional information can be found here: [https://azure.microsoft.com/en-us/documentation/articles/resource-group-portal/](https://azure.microsoft.com/en-us/documentation/articles/resource-group-portal/)

**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.*
2) Customer creates a new ExpressRoute circuit

Create an ExpressRoute circuit by selecting the option to create a new resource.
3) Customer views the circuits and properties

View all created ExpressRoute circuits by selecting **All resources** on the left-side menu.
(cont) 3) Customer views the circuits and properties

### Essentials

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource group</td>
<td>PSBTEST</td>
</tr>
<tr>
<td>Provider</td>
<td>CenturyLink Cloud Connect</td>
</tr>
<tr>
<td>Circuit status</td>
<td>Enabled</td>
</tr>
<tr>
<td>Provider status</td>
<td>Provisioned</td>
</tr>
<tr>
<td>Location</td>
<td>Silicon Valley</td>
</tr>
<tr>
<td>Not available</td>
<td></td>
</tr>
<tr>
<td>Subscription name</td>
<td></td>
</tr>
<tr>
<td>Pay-As-You-Go</td>
<td></td>
</tr>
<tr>
<td>Subscription ID</td>
<td></td>
</tr>
<tr>
<td>Service key</td>
<td></td>
</tr>
</tbody>
</table>

### Peerings

<table>
<thead>
<tr>
<th>Type</th>
<th>Status</th>
<th>Primary Subnet</th>
<th>Secondary Subnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azure private</td>
<td>Disabled</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Microsoft</td>
<td>Disabled</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
4) Customer requests CenturyLink Cloud Connect service

- To order a CenturyLink Cloud Connect, contact your CenturyLink Account Representative
  - Contact your CenturyLink account rep to assist in ordering a Cloud Connect to ExpressRoute.
  - Information needed by CenturyLink to complete connection:
    - MSFT Azure ExpressRoute Service Key completed during CenturyLink Provisioning steps
    - Customer requests Cloud Connect to the appropriate Azure ExpressRoute Location
    - Bandwidth of eLynk Connection requested (typically matches ExpressRoute speed) ** Note: eLynk Cloud Connect has max bandwidth of 3Gb. If your eLynk is 3Gb you would configure ExpressRoute for 5Gb (the next higher increment).

- What Azure service(s) are you connecting to:
  - Azure Private Peering (Compute/IaaS)
  - Microsoft Peering (Azure PaaS, Office 365, Dynamics 365, etc)

- Cloud Connect contractual term length
  - i.e. 1year, 3year, etc.
5) Upon request, customer sends the service key to CenturyLink for Cloud Connect provisioning

- The CenturyLink Technical Design Engineer will request the ExpressRoute Service Key from the customer prior to provisioning but after Order Entry.

- 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
6) CenturyLink provisions Cloud Connect to MS ExpressRoute

- Upon network order submission, CenturyLink will provision a Layer 2 eLynk connection from the customer premise to the requested ExpressRoute Location
  - Turn up of Layer 2 eLynk service to local ExpressRoute interconnect point
    - Layer 2 VLAN(s) between CenturyLink and Microsoft and between CenturyLink and the Customer will be configured by CenturyLink.

7) CenturyLink completes configuration and provides Customer with necessary layer 2 VLAN information for CPE and Azure configurations to be completed by the customer.

- Customer to configure appropriate Layer 2 VLAN tagging on CPE utilizing Q-in-Q tagging configuration. It is important to note that the CenturyLink EtherType specification of double-tagged frames is for both inner and outer tags to be 0x8100.
- Turn up of Layer 3 BGP/routing between customer and Azure
  - Layer 3/BGP will be configured by the customer on the customer router and on Azure side via the customers Azure portal account.
Microsoft Peering (SaaS) now supports Azure Public (PaaS) services

• Microsoft has announced they are combining both their PaaS/SaaS services over a single pair of BGP Peers (Microsoft Peering)

• Before April 1, 2018, ExpressRoute had three peering connections:
  – **Azure Private** (IaaS) 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 peering types to MSFT (Public / Private / MSFT Peering), but rather 2 peering types going forward (Private / MSFT Peering)
    • Refer to the following to **move** 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 Office365 service still requires customers to apply for approval directly with Microsoft to enable the Office365 service via ExpressRoute. All other services can be accessed via the MSFT Peering VLAN without a prior approval.

• Please reference these links for additional guidance and direction from Microsoft. **Azure ExpressRoute for Office 365** and here **Network connectivity to Office 365**
Workflow for Microsoft Peering

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.
  - Customer can then provision Microsoft peering for the 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

# Microsoft ExpressRoute Resources

|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
- Use Exchange Provider Pricing  
- There is a Premium if you need >4k routes or ability to reach other global regions |
| Diversity | • 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 |
• Dynamic routing via BGP  
• Azure Compute supports bring your own private IP |
<table>
<thead>
<tr>
<th>Microsoft's Office365 via ExpressRoute Approval Form</th>
<th><a href="https://forms.office.com/Pages/ResponsePage.aspx?id=v4j5cvGGGr0GRgy180BHbRyOZxByRF1dLgv7k6ye5z8pUQkdLRTQ5QkcyOTU3VkNEOFdOWk9IRDZTUy4u">https://forms.office.com/Pages/ResponsePage.aspx?id=v4j5cvGGGr0GRgy180BHbRyOZxByRF1dLgv7k6ye5z8pUQkdLRTQ5QkcyOTU3VkNEOFdOWk9IRDZTUy4u</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Client Connectivity</td>
<td><a href="https://support.office.com/en-us/article/Client-connectivity-4232abcf-4ae5-43aa-bfa1-9a078a99c78b">https://support.office.com/en-us/article/Client-connectivity-4232abcf-4ae5-43aa-bfa1-9a078a99c78b</a></td>
</tr>
<tr>
<td></td>
<td>• O365 has a primary &amp; DR site for each tenant.</td>
</tr>
<tr>
<td></td>
<td>• Internet access will be proxied through the closest O365 location and backhauled on MS backbone</td>
</tr>
<tr>
<td>Implementing ExpressRoute for Office 365</td>
<td><a href="https://support.office.com/en-us/article/Implementing-ExpressRoute-for-Office-365-77735c9d-8b80-4d2f-890e-a8598547dea6">https://support.office.com/en-us/article/Implementing-ExpressRoute-for-Office-365-77735c9d-8b80-4d2f-890e-a8598547dea6</a></td>
</tr>
<tr>
<td>Route Filters</td>
<td><a href="https://docs.microsoft.com/en-us/azure/expressroute/how-to-routefilter-portal">https://docs.microsoft.com/en-us/azure/expressroute/how-to-routefilter-portal</a></td>
</tr>
</tbody>
</table>

Microsoft Office365 Resources

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Microsoft's Office365 via ExpressRoute Approval Form

Overview

O365 Traffic Mgt

Client Connectivity

QOS

Office 365 Locations

Address Blocks

CDN Usage

Network Planning

Implementing ExpressRoute for Office 365

O365 Step-by-step installation

Route Filters