Ordering and deleting Single-node Trial for VMware vCenter Server on IBM Cloud instances

The Single-node Trial for VMware vCenter Server on IBM® Cloud is a single-tenant hosted private cloud that delivers the VMware vSphere stack as a service. While the client-managed environment is typically deployed with a minimum of three nodes, this single-node trial provides a low-cost path to experience benefits of a hybrid cloud implementation.

This trial is ideal for a proof of concept that demonstrates the speed of IBM's advanced automation for initial deployment and the ease of moving simple non-production workloads into the cloud. Using VMware Hybrid Cloud Extension (HCX), you can securely extend your on-premises data center network into the IBM Cloud Data Center while reducing network complexity of configuring the interconnect. HCX abstracts the underlying networking resources to tunnel across the public Internet so that you can seamlessly move workloads bidirectionally without the need to re-IP the virtual machines (VMs). With HCX, there's no need to have VMware NSX installed on-premises and it's backwards compatible with older versions of vSphere.

Important: The single-node trial is for proof of concepts only. Do not run production workloads on this environment. Management functions such as adding and removing hosts and clusters, ordering additional add-on services, and applying updates are not supported.

This trial is intended for use up to 90 days. When you are finished with the trial, you may delete this environment and then provision a highly available environment that meets your capacity needs.

For information about the architecture design, see HCX on IBM Cloud architecture design for the Single-node Trial for vCenter Server on IBM Cloud.

Technical specifications for Single-node Trial for vCenter Server instances
The following components are included in your Single-node Trial for vCenter Server instance:

Note: The availability and pricing of standardized hardware configurations might vary based on the IBM Cloud Data Center that is selected for deployment.

Bare Metal Server
A Dual Intel Xeon Gold 5120 (28 Cores, 2.20 GHz) processor with 384 GB RAM.

Networking specifications for Single-node Trial for vCenter Server instances

The following networking components are ordered:

- 10 Gbps dual public and private network uplinks
- Three VLANs (Virtual LANs): one public VLAN and two private VLANs
- One VXLAN (Virtual eXtensible LAN) with DLR (Distributed Logical Router) for potential east-west communication between local workloads that are connected to layer 2 (L2) networks. The VXLAN is deployed as a sample routing topology, which you can modify, build on it, or remove it. You can also add security zones by attaching additional VXLANs to new logical interfaces on the DLR.

- Two VMware NSX Edge Services Gateways:
  - A secure management services VMware NSX Edge Services Gateway (ESG) for outbound HTTPS management traffic, which is deployed by IBM as part of the management networking typology. This ESG is used by the IBM management VMs to communicate with specific external IBM management components that are related to automation.

    Important: This ESG is not accessible to you and you cannot use it. If you modify it, you might not be able to manage the Single-node Trial for vCenter Server instance from the IBM Cloud for VMware Solutions console. In addition, note that using a firewall or disabling the ESG communications to the external IBM management components will cause IBM Cloud for VMware Solutions to become unusable.

  - A secure customer-managed VMware NSX Edge Services Gateway for outbound and inbound HTTPS workload traffic, which is deployed by IBM as a template that can be modified by you to provide VPN access or public access.

Virtual Server Instances

The following virtual server instances (VSIs) are ordered:

- A VSI for IBM CloudBuilder, which is cancelled after the instance deployment is completed.
- A Microsoft Windows Server VSI for Microsoft Active Directory (AD) is deployed and can be looked up. The VSI functions as the DNS for the instance where the hosts and VMs are registered.

IBM-provided licenses and fees

The following licenses are included with your Single-node Trial for vCenter Server instance order.

- VMware vSphere Enterprise Plus 6.5
- VMware vCenter Server 6.5
- VMware NSX Service Providers Advanced Edition 6.4

Note: Single-node Trial for vCenter Server instances do not support Bring Your Own License.

Technical specifications for VMware HCX on IBM Cloud

The Single-node Trial for vCenter Server includes HCX on IBM Cloud. The following components are ordered and included in the HCX on IBM Cloud service.

Note: On-premises HCX instances include only licensing and activation.

An active/passive pair of VMware NSX Edge Services Gateways for HCX Management

- CPU: 6 vCPU
- RAM: 8 GB
- Disk: 3 GB VMDK

HCX Management Appliance - virtual machine

- CPU: 4 vCPU

- RAM: 12 GB
- Disk: 60 GB VMDK

Additional HCX appliances are deployed during configuration as necessary for L2 connectivity, WAN optimization, and gateway connections.

Networking specifications for the HCX on IBM Cloud service

- One public portable subnet with 16 IP addresses
- Two private portable subnets with 64 IP addresses
- Eight IP addresses from private portable vMotion subnet

Requirements and planning for ordering Single-node Trial for vCenter Server instances

- Ensure that you confirm the following requirements and complete the following tasks:
- Prerequisites for on-premises HCX instances:
  - Requires VMware vSphere and vCenter 5.5 or higher.
  - The vSphere environment must have distributed switches for the VMx that will be migrated to the IBM Cloud.
  - The HCX Manager Virtual Appliance must be able to be deployed on a private network in the on-premises environment and must be allowed to access the public Internet.
  - To use IBM Cloud for VMware Solutions to order instances, you must have an IBM Cloud infrastructure (SoftLayer) account. The cost of the components that are ordered in your instances is billed to that IBM Cloud account.
  - Configure the IBM Cloud infrastructure credentials on the **Settings** page. In the IBM Cloud for VMware Solutions console, click **Settings** from the left navigation pane.
  - Review the instance name requirements:
    - Only alphanumeric and dash (-) characters are allowed.
    - The instance name must start and end with an alphanumeric character.
    - The maximum length of the instance name is 10 characters.
    - The instance name must be unique within your account.

Procedure to order Single-node Trial for vCenter Server instances

1. On the Single-node Trial for VMware vCenter Server on IBM Cloud page, click Continue.
2. On the **Single-node Trial for VMware vCenter Server** page, complete the steps to request an IBM Cloud infrastructure account or provide your existing **User Name** and **API Key** and click **Retrieve.**
   Note: This section is hidden if the API key already exists.
3. Enter the instance name.
4. Select the IBM Cloud Data Center to host the instance.
   Note: By default, the DAL09 IBM Cloud Data Center is pre-selected. Select a different IBM Cloud Data Center location, if needed
5. On the **Order Summary** pane, verify the instance configuration before you place the order.
   a. Review the settings for the instance.
   b. Review the estimated cost of the instance. Click **Pricing details** to generate a PDF summary. To save or print your order summary, click the **Print** or **Download** icon on the upper right of the PDF window.

c. Click the link or links of the terms that apply to your order and confirm that you agree with these terms before you order the instance.

d. Click **Provision.**

Results

The deployment of the instance starts automatically and the on-premises HCX on IBM Cloud service activation key is ordered.

Deployment process for HCX on IBM Cloud

The deployment of HCX on IBM Cloud is automated. The following steps are completed by the IBM Cloud for VMware Solutions automation process:

1. Three subnets are ordered for HCX from the IBM Cloud infrastructure:
   - Two private portable subnet for HCX management.
   - One public portable subnet for activation and maintenance with VMware. This subnet is also used for HCX interconnects.

   Important: The IP addresses in the subnets that are ordered for HCX are intended to be managed by the VMware on IBM Cloud automation. These IP addresses cannot be assigned to VMware resources, such as VMs and NSX Edges, that are created by you. If you need additional IP addresses for your VMware artifacts, you must order your own subnets from IBM Cloud.

2. Three resource pools and VM folders for HCX are created, which are needed for the HCX interconnects, local HCX components, and remote HCX components.

3. A pair of VMware NSX Edge Services Gateways (ESGs) for the HCX management traffic is deployed and configured:
   - Public and private uplink interfaces are configured by using the ordered subnets.
   - The ESGs are configured as a pair of extra large edge appliances with High Availability (HA) enabled.
   - The firewall rules and network address translation (NAT) rules are configured to allow inbound and outbound HTTPS traffic to and from the HCX Manager.
   - The load balancer rules and resource pools are configured. These rules and resource pools are used to forward HCX-related inbound traffic to the appropriate virtual appliances of HCX Manager and vCenter Server (with embedded Platform Services Controller).
   - An SSL certificate to encrypt the HCX-related inbound HTTPS traffic that is coming through the ESGs is applied.

   Important: The HCX management edge is dedicated to the HCX management traffic between the on-premises HCX components and the cloud-side HCX components. Do not modify the HCX management edge or use it for HCX network extensions. Instead, create separate edges for network extensions. In addition, using a firewall or disabling the HCX management edge communications to the private IBM management components or public internet might adversely impact the HCX functionality.

4. The HCX Manager on IBM Cloud is deployed, activated, and configured:
   - The HCX Manager is registered with vCenter Server.
   - The HCX Manager, vCenter Server (with embedded Platform Services Controller), and NSX Manager are configured.

- The HCX fleet is configured.
- Local and remote HCX deployment containers are configured.

5. The host name and IP address of the HCX Manager is registered with the DNS server of VMware vCenter Server on IBM Cloud.

Viewing instance details

You can check the status of the deployment by viewing the instance details. Click **Deployed Instances** from the left navigation pane and locate the **vCenter Server Instances** or **On-premises HCX Instances** table to view information about the instances that you ordered.

When the instance is successfully deployed, the components that are described in the *Technical specifications* sections of this topic are installed on your VMware virtual platform and the on-premises HCX on IBM Cloud service activation key is listed in the **On-premises HCX Instances** table.

The status of the instance changes to **Ready to Use** and you receive a notification by email.

What to do next

Install the on-premises HCX Enterprise Manager and configure the connection to your HCX on IBM Cloud instance.

1. Locate the on-premises activation key on the **Deployed Instances** page.
   a. In the IBM Cloud for VMware Solutions console, click **Deployed Instances** from the left navigation pane.
   b. In the **vCenter Server Instances** table, review the **Type** column to locate the vCenter Server Single-node Trial instance and make note of the instance name.
   c. Scroll to the **On-premises HCX Instances** table and review the **Name** column to locate the instance that has the same name as the single-node instance that you ordered with the *-OnPrem* suffix.
   d. Make note of the key in the **Activation key** field.
2. Obtain the on-premises HCX Enterprise Manager Open Virtual Appliance (OVA) from the HCX on IBM Cloud HCX Manager console.
   a. Connect to the HCX Cloud Console.
      a. In the **vCenter Server Instances** table, click the single-node trial instance to view the instance details.
      b. Under **Access Information**, locate and make note of the vCenter credentials.
      c. Click **Services** from the left navigation pane.
      d. On the **Services** page, click **HCX on IBM Cloud**.
      e. On the **HCX on IBM Cloud** details page, locate and make note of the **HCX Cloud IP**.
      f. Ensure that you are connected to the VPN to access your IBM Cloud private network.
      g. Click **View HCX Cloud Console**.
   b. In the **HCX Cloud Console**, complete the following steps:
      a. Click the **Administration** tab.
      b. On the **System Updates** tab, click **REQUEST DOWNLOAD LINK**.
      c. Click **COPY LINK**, and then use this link to download the HCX Enterprise Client onto an on-premises environment with access to your on-premises vSphere environment.
3. In the VMware vSphere Web Client, deploy the HCX Enterprise Client as an HCX Manager virtual appliance (HCX Manager) into your on-premises environment. For more information, see Installing the HCX Enterprise Manager OVA.

Note: You must deploy the on-premises HCX Manager on a private network and allow it to access the public network. You can use an NSX Edge, Vyatta, or similar gateways to allow Internet access to the on-premises HCX Manager. If the gateways used for private network access and public network access are different, it is recommended that you use the default gateway to allow for public network access and the on-premises **HCX Manager Admin Console** to create a static route for private network access.

4. Use the on-premises activation key noted in step 1 to activate your on-premises HCX Enterprise Manager VM.
   a. Log into your on-premises HCX Enterprise Manager VM using the credentials specified when deploying the OVA.
   b. Enter the activation key when prompted.

   Note: For more information, see HCX Activation and Initial Configuration.

5. A self-signed SSL certificate was generated by the HCX on IBM Cloud service. You must import the certificate into the on-premises HCX Manager by completing the following steps:
   a. In the on-premises **HCX Manager Admin Console**, click the **Administration** tab.
   b. From the left navigation pane, click **Trusted CA Certificate**, and then click **IMPORT** on the right.
   c. Click **URL** and then enter the URL of the certificate you want to apply, that is the **HCX Cloud IP**(https://<cloud-side public IP>), which you can find on the HCX on IBM Cloud service details page in the IBM Cloud for VMware Solutions console.
   d. Click **Apply**.
6. Continue the initial configuration and build the interconnect. For more information, see Installing and Configuring VMware HCX Enterprise.
7. Extend networks in VMware HCX from on-premises to IBM Cloud. For more information, see Extending Networks with VMware HCX.

8. Migrate VMs between on-premises and IBM Cloud. For more information, see Migrating Virtual Machines with VMware HCX.

Important: You must manage the IBM Cloud for VMware Solutions infrastructure components that are created in your IBM Cloud account only from the IBM Cloud for VMware Solutions console, not the IBM Cloud infrastructure customer portal, or any other means outside of the console. If you change these components outside of the IBM Cloud for VMware Solutions console, the changes are not synchronized with the console and can make your environment unstable.

Procedure to delete Single-node Trial for vCenter Server instances

When you delete a Single-node Trial for vCenter Server instance, the following components are released sequentially:

1. All deployed services
2. VMware product licenses
3. ESXi servers
4. Subnets
5. VLANs

Because of resource dependencies, the components in your instance are not released immediately when you delete the instance. For example, the subnets and VLANs cannot be deleted until the

ESXi servers are fully reclaimed by IBM Cloud infrastructure, which happens at the end of the IBM Cloud infrastructure billing cycle. At the end of the IBM Cloud infrastructure billing cycle, which is typically 30 days, the subnets and VLANs are deleted and the instance deletion is completed.

Note: You are billed until the end of the IBM Cloud infrastructure billing cycle for the deleted instance.

Complete the following steps to delete a Single-node Trial for vCenter Server instance:

1. From the IBM Cloud for VMware Solutions console, click **Deployed Instances** from the left navigation pane.
2. In the **vCenter Server Instances** table, find the instance to delete.
3. In the **Actions** column, click the Delete icon. The status of the instance is changed to **Deleting**. When the instance is deleted successfully, the components of the instance are released, and the status of the instance is changed to **Deleted**.
4. If you want to remove the instance record from the IBM Cloud for VMware Solutions console, complete the following steps:
   a. In the **Actions** column, click the Delete icon again.
   b. In the **Delete Instance** window, click **OK**.

HCX on IBM Cloud architecture design for the Single-node Trial for vCenter Server on IBM Cloud

The VMware HCX on IBM® Cloud with Single-node Trial for VMware vCenter Server on IBM Cloud is a new offering that enables seamless connection between IBM Cloud for VMware Solutions instances and an on-premises VMware virtualized datacenter. While the recommendation for vCenter Server is a minimum of three nodes, the single-node trial provides a low-cost path to test and experience the benefits of a hybrid cloud implementation.

IBM Cloud for VMware Solutions includes fully automated, rapid deployments of vCenter Server configurations in the IBM Cloud. The Single-node Trial for vCenter Server offering complements the on-premises infrastructure and allows existing and future workloads to run in the IBM Cloud without conversion. The offering uses the same tools, skills, and processes used on-premises. For more information about IBM Cloud for VMware Solutions offerings, see the IBM Architecture Center.

The HCX on IBM Cloud service blends vCenter Server instances with existing on-premises virtualized datacenters by enabling the creation of seamless network extensions and bidirectional migration of workloads. HCX on IBM Cloud components, which are deployed as virtual machines (VMs) in the IBM Cloud VMware target site, enable the establishment of a connection with the HCX on IBM Cloud components that are installed in the peer on-premises source site.

Figure 1. HCX architecture
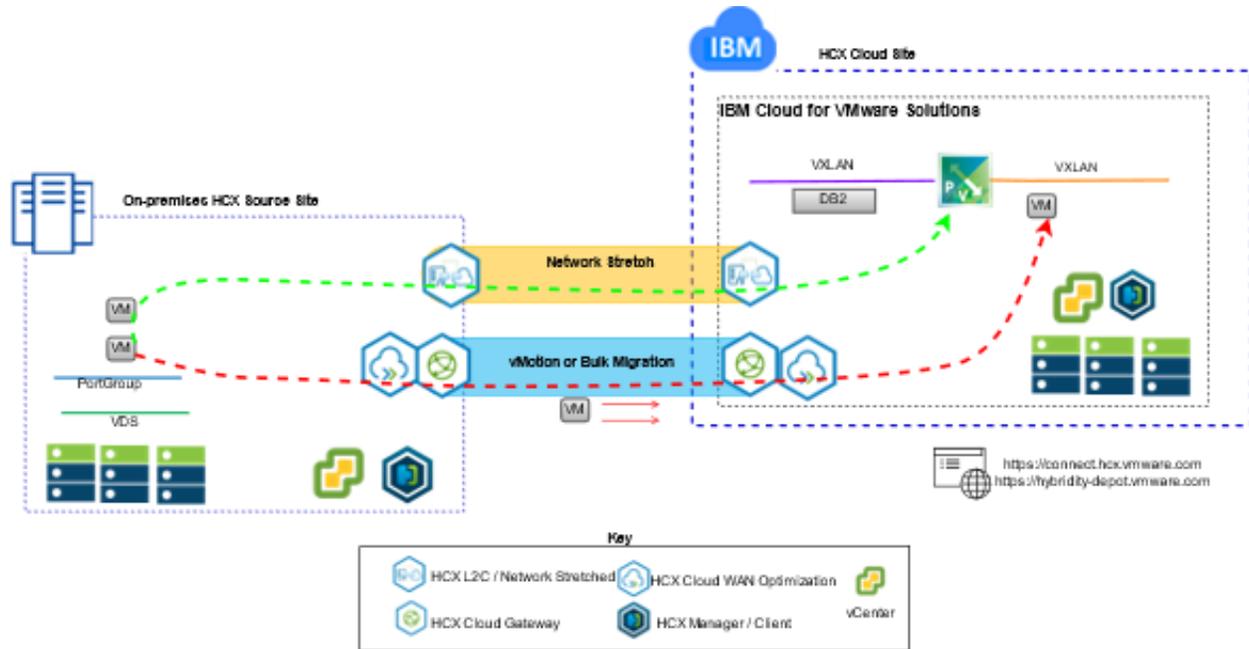
The following information provides the design of the HCX on IBM Cloud service implementation. It includes both the components on the target side IBM Cloud for VMware Solutions instance and the components that are deployed on the source, on-premises.

HCX on IBM Cloud overview

IBM Cloud seamlessly integrates on-premises vSphere vCenter networks into IBM Cloud for VMware Solutions deployments. Hybrid networking extends on-premises vSphere vCenter networks into the IBM Cloud, supporting bidirectional VM mobility.

HCX owns the source and destination encryption and decryption processes, which ensures consistent security and provides admission for hybrid workflows such as VM migration and network extension. This offering creates an optimized, software-defined wide area network (WAN) to increase stretched network performance, enabling performance approaching local area network (LAN) speed. HCX enables bidirectional workload and VMware NSX security policy migration to the IBM Cloud, integrates with vSphere vCenter, and is managed from the vSphere Web Client.

Layer 2 network extension

HCX allows an existing on-premises vSphere estate to securely stretch a network from its on-premises vCenter to an IBM Cloud Data Center running VMware Cloud Foundation on IBM Cloud or vCenter Server. The following items enable this feature:

- HCX provides an appliance that is called a Layer 2 Concentrator (L2C).
- Extended networks link to IBM Cloud NSX Edge appliances deployed on vCenter Server.
- The ability to deploy more than one standard Layer 2 concentrators to achieve scalability and increase throughput from the on-premises vCenter.

- VMs are migrated through the Cloud Gateway and over stretched Layer 2 can retain their IP and MAC addresses.

Virtual machine migration

HCX provides the following three methods of VM movement:

- Low-downtime migration
- vSphere vMotion migration
- Cold migration

Low-downtime migration

Low-downtime migration relies on vSphere Replication, which is a distributed technology that is implemented in the VMware ESX or VMware ESXi hypervisor. The on-premises HCX deployment creates a replica of a live VM in the IBM Cloud, performs a switchover to power off the source VM, and power on the migrated VM. The migration path is always through the Cloud Gateway. The transport can be the internet, a Layer 2 stretched network, or a Direct Connect line. You can migrate a VM more than one time in either direction.

vSphere vMotion migration

You can transfer live VMs by using vSphere vMotion migration across a network that is stretched to the IBM Cloud. vMotion migration is also called zero downtime migration, or cross-cloud vMotion.

Cold migration

Cold migration provides the ability to transfer a powered-off VM to the IBM Cloud over a stretched network created via the Layer 2 Concentrator.

Common migration features

The following features are available across all three types of migration:

- Software-defined WAN optimization that increases migration throughput and speed.
- Schedule your migration for a specified time.
- Keep the host name, VM name, or both.

Networking

The following networking features are built into the Cloud Gateway and the Layer 2 Concentrators.

Intelligent flow routing

Intelligent flow routing automatically selects the best connection based on the internet path, efficiently flooding the entire connection so that workloads are moved as fast as possible. When larger flows, such as backup or replication, cause CPU contention, smaller flows are routed to less busy CPUs, improving performance of interactive traffic.

Proximity routing

Proximity routing ensures that forwarding between VMs connected to stretched and routed networks, both on-premises and in the cloud, is symmetrical. This feature requires Advanced Networks Services with Dynamic Routing that is configured between the customer premises and the cloud.

When users extend their networks to the cloud, Layer 2 connectivity is stretched onto IBM Cloud networks. However, without route optimization, Layer 3 communication requests must return to the on-premises network origin to be routed. This return trip is called "tromboning" or "hairpinning."

Tromboning is inefficient because packets must travel back and forth between the network origin and the cloud, even when both source and destination VMs reside in the cloud.

If the forwarding path includes stateful firewalls or other inline equipment that must see both sides of the connection, communication might fail. VM communication, without route optimization, failure occurs when the egress path that is exiting the cloud is either the stretched Layer 2 network or the Organization Routed Network. The on-premises network doesn't know about the stretched network "shortcut." This problem is called asymmetric routing. The solution is to enable proximity routing so the on-premises network can learn the routes from the IBM Cloud.

The Cloud Gateway maintains an inventory of VMs in the cloud. It also understands the following VM states:

- Transferred to the IBM Cloud with vMotion (zero-downtime migration)
- Migrated to the cloud by using host-based replication (low-downtime migration)
- Created in the cloud (on a stretched network)

Security
The Cloud Gateway offers Suite B-compliant AES-GCM with IKEv2, AES-NI offload, and flow-based admission control. HCX also owns the source and destination encryption and decryption process, ensuring consistent security and administration for hybrid workflows such as VM migration and network extension. You can migrate security policies that are defined and assigned to a VM on-premises with the VM into the IBM Cloud.

The following conditions are required for policy migration:

- The on-premises data center is running NSX V6.2.2 or greater.
- In vSphere, the security policy is a single NSX Section that can have many rules.
- You can name a set of IP addresses or MAC addresses to participate in the policy.
- The name of the MAC Set or IP Set can't exceed 218 characters.
- Supported rules specify Layer 3 IP addresses or IP Sets, or Layer 2 MAC addresses or MAC Sets as the source or destination.

Components of HCX
The HCX on IBM Cloud service deploys four virtual appliances that are installed and configured on both the on-premises datacenter and the IBM Cloud target. The following information describes each of the four required virtual appliances. Optionally, edge devices might be required depending on the implementation design.

HCX Manager
The HCX Manager virtual appliance is an extension to the on-premises vCenter. The appliance is deployed as a VM and its file structure contains the other hybrid service virtual appliances. The HCX Manager oversees the deployment and configuration of the Cloud Gateway, the Layer 2 Concentrators, and WAN Optimization virtual appliance both on-premises and within the IBM Cloud.

Hybrid Cloud Gateway
The Hybrid Cloud Gateway (CGW) maintains a secure channel between the on-premises vSphere estate and the IBM Cloud. HCX uses strong encryption to bootstrap a site-to-site connection to the IBM Cloud. The secure channel between vSphere and the IBM Cloud prevents networking "middle mile" security problems. The Cloud Gateway also incorporates vSphere replication technology to perform bidirectional migration.

The WAN Optimization appliance is the component that performs WAN conditioning to reduce effects of latency. It also incorporates Forward Error Correction to negate packet loss scenarios, and deduplication of redundant traffic patterns. Altogether, these reduce bandwidth use and ensure the best use of available network capacity to expedite data transfer to and from the IBM Cloud.

Important: VM migration relies on the combination of Cloud Gateway and the WAN Optimization appliance to achieve unparalleled mobility between vSphere on-premises and the IBM Cloud. Additionally, Layer 2 extension benefits from WAN optimization when the data path is routed through the Cloud Gateway.

The Layer 2 Concentrators (L2C) appliances allow the extension of a Layer 2 network from the on-premises vSphere data center to the IBM Cloud.

The Layer 2 Concentrators have the following interfaces:

- **Internal trunk interface** This interface handles VM traffic on-premises for the extended networks by using a translational bridge mapping to a corresponding stretched network in IBM Cloud.
- **Uplink interface** HCX uses this interface to send encapsulated overlay traffic to and from IBM Cloud. Application data travels through the Uplink interface.

Deployment architecture

For information about HCX on IBM Cloud deployment, see VMware HCX on IBM Cloud Deployment and Operations.