UPGRADING VMWARE CLOUD FOUNDATION ON HPE SYNERGY

Steps for upgrading to VCF 4.2 in offline mode
EXECUTIVE SUMMARY

VMware® Cloud Foundation™ (VCF) is an integrated hybrid cloud platform that delivers a complete set of software-defined services for compute, storage, networking, security, and cloud management for the private and public cloud. VCF brings together VMware vSphere®, VMware vSAN™, VMware NSX®, and optionally, VMware vRealize® Suite components, into a natively integrated stack to deliver enterprise-ready cloud infrastructure. Further, VCF automates bring up, configuration, provision, and life cycle management (LCM) of the stack with SDDC Manager.

VMware typically releases a new version of general availability (GA) on a quarterly cadence and users are automatically notified from the SDDC Manager when upgrades become available.

Hewlett Packard Enterprise and VMware have collaborated to help customers accelerate the journey to hybrid cloud, bringing the promise of the software-defined data center to life. The VMware Cloud Foundation on HPE Synergy solution dramatically improves both the value and business outcomes of the customers, thus delivering a simplified and secure private cloud with industry-first integrated composability for VCF. This solution is flexible, easy to deploy, seamless to manage, simple to operate, and runs all your enterprise apps—both traditional and containerized—in cloud environments.

Hewlett Packard Enterprise releases technical papers that describe the best practices in deploying solutions on this combination that are based on the VCF version available at the time of publication. In some deployment's enterprise customers, to ensure secure operations, often deploy VCF management domain without internet access. This deployment scenario requires a methodology to perform an upgrade in offline mode. This technical paper provides validated comprehensive details—including prerequisites, step-by-step configuration, and best practices—for the customers to upgrade to the latest version of VCF along with the compatible infrastructure management software, drivers, and firmware for HPE Synergy in offline mode.

This technical paper provides the method to upgrade VCF 4.0.1 to 4.2 for HPE Synergy-based deployments on the solution upgrade tests performed in March 2021.

OVERVIEW

This technical paper describes the method to upgrade VMware Cloud Foundation (VCF) from 4.0 to 4.2 for HPE Synergy. This method is a unique and generally not the applicable method on VCF upgrades. For firmware versions of VCF 4.2 on HPE Synergy, see HPE Synergy Firmware and Software Compatibility Matrix for VMware Cloud Foundation. This technical paper only describes the method to upgrade the VMware Cloud Foundation components from VMware when the SDDC Manager VM does not have access to the internet, which is also known as “network isolated”.

VMware Cloud Foundation 4.2 requires VMware vSphere v7.0U1d as a prerequisite hypervisor version for deployments. Hewlett Packard Enterprise releases new OEM Custom Images whenever there is a need to update critical components of the image. The VMware v7.0U1d update did not meet the criteria for Hewlett Packard Enterprise to release a new OEM Custom Image. Hewlett Packard Enterprise recommends customers use the HPE OEM Custom image for VMware vSphere v7.0U1c (Jan2021) then update to v7.0U1d. However, the upgrade from VCF 4.0.x to 4.2 requires a sequential upgrade from VCF 4.0.x to 4.1.x before and then to VCF 4.2.

The HPE OEM image based on vSphere v7.0U1c (Jan2021) for HPE Synergy is not a supported release version for the VCF 4.1.x bill of materials from VMware. The purpose of this document is to provide in collaboration with VMware, the Hewlett Packard Enterprise upgrade sequence to allow HPE Synergy environments that do not have a supported HPE OEM image based on vSphere v7.0U1 (Oct2020) to complete the upgrade to VCF 4.2. Through the use of a command-line interface (CLI) API call for version aliasing, the requirement to complete the upgrade sequence for VCF 4.1 will be met by specifying the vSphere version and build number for HPE OEM image for Synergy based on vSphere v7.0b (Aug2020).

PATCHING AND UPGRADING VMWARE CLOUD FOUNDATION

SDDC Manager internally has Lifecycle Management (LCM) enabled, which performs automated updates on VMware Cloud Foundation components such as SDDC Manager and its internal services and also, on VMware components such as vCenter Server, VMware ESXi™, vRealize Suite, NSX-T, and VMware vRealize Suite Lifecycle Manager™ (vRLCM). SDDC Manager is configured to communicate with the VMware software repository provided the SDDC Manager VM has internet access and the VMware depot credentials are valid. High-level update workflow is as follows:

1. Receive notification of update availability.
2. Download update bundle.
3. Select update targets and schedule updates.

However, this technical paper intends to help administrators to understand how to perform VMware Cloud Foundation upgrade when SDDC Manager does not have access to the internet.

**VMWARE CLOUD FOUNDATION UPGRADE PATH FROM 4.0 TO 4.2**

<table>
<thead>
<tr>
<th>VCF Version</th>
<th>SDDC Version</th>
<th>NSX Manager</th>
<th>vCenter Server</th>
<th>ESXi Host</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.010</td>
<td>4.010</td>
<td>3.0.1016404613</td>
<td>7.0.10600-16620007</td>
<td>7.00-16324942</td>
</tr>
<tr>
<td>4.011</td>
<td>4.011</td>
<td>3.0.1016404613</td>
<td>7.0.10600-16620007</td>
<td>&lt;Do not Select&gt;</td>
</tr>
<tr>
<td>4.100</td>
<td>4.100</td>
<td>3.0.2016687200</td>
<td>7.0.10000-16860138</td>
<td>&lt;Do not Select&gt;</td>
</tr>
<tr>
<td>4.101</td>
<td>4.101</td>
<td>3.0.2016687200</td>
<td>7.0.10000-16860138</td>
<td>&lt;Do not Select&gt;</td>
</tr>
<tr>
<td>4.200</td>
<td>4.200</td>
<td>3.10017107167</td>
<td>7.0.100200-17327517</td>
<td>7.01-17551050</td>
</tr>
</tbody>
</table>

**OFFLINE VMWARE CLOUD FOUNDATION UPDATE**

This technical paper intends to describe how to upgrade your VMware Cloud Foundation system if the SDDC Manager VM does not have internet access. The paper goes into detail about how to use the Bundle Transfer utility to manually download the bundles from the VMware depot on your local computer with internet access and then upload them to SDDC Manager VM and update your VMware Cloud Foundation system.

**When to perform an offline update**

VMware Cloud Foundation update needs to be performed only after verifying if the underlying HPE Infrastructure including drivers and firmware are compatible with the version that is going to be installed. See HPE Synergy Firmware and Software Compatibility Matrix for VMware Cloud Foundation guide to check if the VCF version is listed as compatible along with the drivers and firmware.

**BUNDLE TYPES**

**Upgrade bundle**

An upgrade bundle contains bits to update the appropriate Cloud Foundation software components in your management domain or VI workload domain. In most cases, an upgrade bundle must be applied to the management domain before it can be applied to workload domains.

Some upgrade bundles are cumulative. With a cumulative upgrade bundle, you can directly upgrade the appropriate software in your workload domain to the version contained in the cumulative bundle rather than applying sequential upgrades to reach the target version. Cumulative bundles are available only for the vCenter Server®, and ESXi.

**NOTE**

You can apply a cumulative bundle to a workload domain only if the target release in the bundle is lower than or at the same version as the management domain. If the cumulative bundle is available for both the management domain and VI workload domains, you must apply it to the management domain before applying it to VI workload domains.

**Install bundles**

VMware Cloud Foundation includes the following install bundles:

- **VI workload domain install bundle** is used to deploy later versions of the software components instead of the versions that are already available in the VCF installation. It includes software bits for vCenter Server and NSX for vSphere.
- Individual install bundles for vRealize products are used for deploying vRealize components.
- **NSX-T install bundle** is used for deploying an NSX-T based VI workload domain.
- **Horizon 7 install bundle** is used for creating a Horizon domain.
UPGRADE SEQUENCE

You must upgrade the management domain before upgrading the workload domains. SDDC Manager makes each of the components available appropriately for upgrade only if the bundle is compatible and in sequence.

SDDC Manager bundle includes LCM and the SDDC UI update. Following components become available after the SDDC Manager update is completed.

1. NSX manager is available to upgrade for both management and workload domains.
2. vCenter Server is available to upgrade for both management and workload domains.
3. ESXi bundle becomes available to update on the domains.
4. vRealize Suite Lifecycle Manager (vRLCM) is available for update only if it is deployed in your existing VCF environment.

NOTE
ESXi upgrade should be performed using HPE Custom ISO and can be download from https://www.hpe.com/us/en/servers/hpe-esxi.html. See HPE Synergy Firmware and Software Compatibility Matrix for VMware Cloud Foundation document for compatibility. ESXi should only be upgraded after the domain is successfully upgraded to VCF 4.2.

UPGRADE PREREQUISITES

It is recommended that the following prerequisites are met before upgrading the system:

1. Back up of the SDDC Manager VM.
2. Snapshot of all the VMs in the Cloud Foundation system.
3. No other domain operations to be performed during the upgrade.
4. Verify there are no failed workflows in the SDDC Manager.
5. Verify there are no Cloud Foundation resources in error or activating state.


PRECHECK – HPE SYNERGY

This section describes the procedure to validate the HPE Synergy hardware’s firmware and software with the compatibility matrix. See HPE Synergy Firmware and Software Compatibility Matrix for VMware Cloud Foundation document.

1. Validate existing HPE Synergy firmware and software versions with HPE Synergy Firmware and Software Compatibility Matrix for VMware Cloud Foundation.
2. Validate the VCF version that you are upgrading to is supported by relevant drivers and firmware.
3. Follow the recommended firmware update order if it is determined that the firmware has to be updated:
   a. Update the firmware for HPE Synergy Composer.
   b. Update the firmware or managed shared infrastructure hardware.
   c. Update the compute modules.
4. After the firmware update, do the following:
   a. Check the firmware inventory to make sure that the firmware version matches your preferred version.
   b. Evaluate any critical alerts and warnings that might have been raised on the resources for any recommended actions.

For more information on updating firmware, refer to https://support.hpe.com/hpsc/doc/public/display?docId=c05212310.
PRECHECK - VMWARE

SDDC Manager allows prechecking the state of the domains to ensure that the system is ready to be upgraded. All the errors are cleared before running the upgrade of the VMware Cloud Foundation system to ensure the workflow does not fail.

1. Navigate to the **Updates/Patches** tab of the management domain and click **PRECHECK**.

2. Detailed tasks and their status can be seen by expanding each of the listed status checks.

3. vRealize Suite Lifecycle Manager is required to upgrade VMware vRealize Log Insight™, VMware vRealize Automation™, and VMware vRealize Operations™. If you do not plan to use any of the vRealize products in your VCF environment, you can ignore precheck failures related to vRealize Suite Lifecycle Manager not being present.

![PRECHECK](image1.png)

**FIGURE 1.** VCF Management Domain user interface for upgrade precheck

![PRECHECK](image2.png)

**FIGURE 2.** Precheck results in VCF SDDC Manager
The error displayed in Figure 3 indicates that the HPE Smart array controller P204i-c SR Gen10 driver is out of date. To clear the error, download and install the latest driver from VMware Compatibility Guide [https://www.vmware.com/resources/compatibility/search.php] for the affected controller. Click **Retry Precheck** to run the task again once the issue has been fixed.

**FIGURE 3.** VCF SDDC Manager expanded error message
ESX third-party VIBS check error, as shown in Figure 4, can be ignored for the hosts as this error indicates that the servers contain third-party VIBS which were installed as part of imaging HPE servers with HPE VMware custom ISO.

![FIGURE 4. VCF SDDC Manager displaying the alerts for hosts with third-party VIBs](image)

**UPGRADE VCF 4.0.X TO VCF 4.1**

The upgrade steps from VCF v4.0.x to VCF v4.2 are broken down into two sections that are as follows:

- Upgrade VCF v4.0.X to VCF v4.1
- Upgrade VCF 4.1 to VCF 4.2 and HPE ESXi custom ISO, which completes the VCF upgrade sequence

**NOTE**

For VMware Cloud Foundation online upgrade if the SDDC Manager has internet connectivity, all the upgrade bundles are required to download in the SDDC Manager and follow the “Apply the updates via SDDC Manager” section to upgrade the VCF environment.

**Offline bundle download for VCF 4.0.1.0 and 4.1.0.1**

Use the VMware Skip Level Upgrade CLI Tool to upgrade SDDC Manager from VCF v4.0.0.0 or v4.0.1.0 to VCF v4.1. If you are on VCF v4.0.1.1, you can upgrade SDDC Manager to VCF v4.1 from the SDDC Manager UI or public API.
NOTE
Do not upgrade the vSphere (ESXi) on the hosts that become available via the bundles.

1. Generate a marker file on the existing, using the VMware bundle transfer utility for the VCF v4.0.X system, follow these steps:
   a. Using SSH, log in to the SDDC Manager VM with the username vcf and password you specified in the deployment parameter sheet.
   b. Change directory:
      ```
      cd /opt/vmware/vcf/lcm/lcm-tools/bin
      ```
   c. Generate a marker file.
      ```
      ./lcm-bundle-transfer-util --generateMarker
      ```

      The marker file (markerFile) is a JSON file that contains information on the current software versions running on SDDC Manager. It also contains the bundle IDs for bundles that were downloaded before this file was generated. The markerFile.md5 contains the checksum for the marker file.

2. Copy the marker file to a computer with internet access.

   Copy the `/opt/vmware/vcf/lcm/lcm-tools` directory and the `markerFile` and `markerFile.md5` files from the location displayed in the output of step 1 to a computer with internet access. The `/opt/vmware/vcf/lcm/lcm-tools` directory includes the bundle transfer utility required for the next step.

3. Download bundles using the marker file. On the computer with internet access, run the following command:

   ```
   ./lcm-bundle-transfer-util -download
   ```

   ```plaintext
   -outputDirectory ${absolute-path-output-dir}
   -sku ${sku}
   -depotUser ${depotUser}
   -markerFile ${absolute-path-markerFile}
   -markerMd5File ${absolute-path-markerFile.md5}
   -p ${ specific product version }
   ```

**TABLE 2.** Bundle transfer utility parameters and values

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>DESCRIPTION AND EXAMPLE VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>absolute-path-output-dir</td>
<td>Path to the directory where the bundle files are to be downloaded. This directory folder must have 777 permissions. If you do not specify the download directory, bundles are downloaded to the default directory with 777 permissions</td>
</tr>
<tr>
<td>sku</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>SKU or service provider of the index file</td>
</tr>
<tr>
<td>depotUser</td>
<td>User name for my VMware depot. You are prompted to enter the depot user password. If there are any special characters in the password, specify the password within single quotes</td>
</tr>
<tr>
<td>markerFile</td>
<td>Absolute path to the marker file, as generated in the above step. If you do not specify the path to the marker file, all update bundles on the depot are downloaded</td>
</tr>
<tr>
<td>markerMd5File</td>
<td>Absolute path to the marker MD5 checksum file, as generated in the above step</td>
</tr>
<tr>
<td>P</td>
<td>Used to download bundles only for the specific product version. When run with the upload option, the tool uploads the bundles specific to the product</td>
</tr>
</tbody>
</table>

Use the following command to download the VCF v4.1.0.0 bundles specifically

```plaintext
./lcm-bundle-transfer-util -download -outputDirectory <DIRECTORY PATH> -depotUser <VMWARE DEPOT USERNAME> -markerFile <MARKER FILE DIRECTORY>
makerFile -markerMd5File <MARKER MD5 FILE DIRECTORY>
makerFile.md5 -p 4.1.0.0
```
Figure 5 shows the list of bundles that are being downloaded.

![Figure 5: VCF upgrade bundles being downloaded](image)

The Bundle Transfer utility generates a delta file (deltaFileDownloaded) in the download directory based on the software versions in the marker file and the update bundles available on the depot. The applicable bundles identified in the delta file are downloaded. The download progress for each bundle is displayed.

4. Copy the downloaded bundles to the SDDC Manager VM.
   - Copy the update bundle directory from the external computer to the SDDC Manager VM using the following command.
     
     ```bash
     scp -pr /root/vcfupgradebundle vcf@SDDC_MANAGER_IP:/nfs/vmware/vcf/nfs-mount/
     ```

     OR

     - Use WINSCP software to move the bundles to the SDDC Manager VM

     The `scp` command above creates a directory named `vcfupgradebundle` in the `/nfs/vmware/vcf/nfs-mount/` directory.

5. In the SDDC Manager VM, change the ownership and permissions of the uploaded bundle using the following command.

```bash
chmod -R 0777 /nfs/vmware/vcf/nfs-mount/vcfupgradebundle
```
6. In the SDDC Manager VM, upload the bundle files to the internal LCM repository. You must upload the upgrade and install bundles.

```bash
cd /opt/vmware/vcf/lcm/lcm-tools/bin/lcm-bundle-transfer-util -upload -bundleDirectory ${absolute-path-output-dir}
```

Where `absolute-path-output-dir` is the directory where the bundle files have been uploaded, or

```
/nfs/vmware/vcf/nfs-mount/vcfupgradebundle
```
as shown in the previous step. The utility uploads the bundles specified in the `deltaFileDownloaded` file. The console displays the upload status for each bundle.

![Bundle Management](image)

**FIGURE 6.** Upload and validation of the VCF upgrade bundles in progress
VMware Cloud Foundation update 4.1 bundles are available to update as shown in Figure 7.

### Bundle Management

<table>
<thead>
<tr>
<th>Bundles</th>
<th>Download History</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware Software Update 4.1.0</td>
<td>Released Oct 6, 2020. 301 MB</td>
</tr>
<tr>
<td>This VMware Software Upgrade contains VMware ESXi 7.0 Update 1. This patch contains critical security fixes. For more information, see <a href="https://docs.vmware.com/en/VMware-vSphere/7.0/m/vsphere-esxi-701-release-notes.html">https://docs.vmware.com/en/VMware-vSphere/7.0/m/vsphere-esxi-701-release-notes.html</a> View Details</td>
<td></td>
</tr>
<tr>
<td>VMware Software Update 4.1.0</td>
<td>Released Oct 6, 2020. 301 MB</td>
</tr>
<tr>
<td>This VMware Software Upgrade contains VMware vCenter Server 7.0 Update 1 install bundle. For more information, see <a href="https://docs.vmware.com/en/VMware-vSphere/7.0/m/vsphere-vcenter-server-701-release-notes.html">https://docs.vmware.com/en/VMware-vSphere/7.0/m/vsphere-vcenter-server-701-release-notes.html</a> View Details</td>
<td></td>
</tr>
<tr>
<td>VMware Software Update 4.1.0</td>
<td>Released Oct 6, 2020. 301 MB</td>
</tr>
<tr>
<td>This VMware Software Upgrade contains VMware vCenter Server 7.0 Update 1 install bundle. For more information, see <a href="https://docs.vmware.com/en/VMware-vSphere/7.0/m/vsphere-vcenter-server-701-release-notes.html">https://docs.vmware.com/en/VMware-vSphere/7.0/m/vsphere-vcenter-server-701-release-notes.html</a> View Details</td>
<td></td>
</tr>
<tr>
<td>VMware Software Update 4.1.0</td>
<td>Released Oct 6, 2020. 301 MB</td>
</tr>
<tr>
<td>This VMware Software Upgrade contains NSX-T 3.0.2 install. For more information, see <a href="https://docs.vmware.com/en/VMware-NSX-T-Data-Center/3.0/m/VMware-NSX-T-Data-Center-302-Release-Notes.html">https://docs.vmware.com/en/VMware-NSX-T-Data-Center/3.0/m/VMware-NSX-T-Data-Center-302-Release-Notes.html</a> View Details</td>
<td></td>
</tr>
</tbody>
</table>

**FIGURE 7.** Uploaded upgrade bundles listed in the VCF SDDC Manager repository

### Apply the updates via SDDC Manager

This section describes how to apply the SDDC Manager bundle. For more information, refer to the Upgrade Sequence section. SDDC Manager makes each of the components available appropriately for upgrade only if the bundle is compatible and in sequence.

**Update SDDC Manager**

1. Navigate to the Updates/Patches tab of the management domain to confirm the available update. Run the upgrade precheck. For more information, refer to the Precheck - VMware section.

2. The Available Updates section displays the offline bundle that you uploaded to SDDC Manager before starting the upgrade.

**FIGURE 8.** SDDC Manager displaying available updates
3. Click **Update Now** or **Schedule Update** and select the date and time for the bundle to be applied. The first available update would always be the SDDC Manager update. An update can be either scheduled or can be initiated immediately.

4. Click **View Update Activity** to view the detailed tasks.

5. After the upgrade is completed, a green bar with a checkmark is displayed. Click **Finish**

![VMware Cloud Foundation Update Status](image)

**FIGURE 9.** SDDC Manager successfully updated to 4.1.0.0

6. Confirm that the SDDC Manager is updated to 4.1.0.

![SDDC Manager Dashboard](image)

**FIGURE 10.** SDDC Manager version
7. Once the SDDC Manager upgrade is completed, return to the Lifecycle Management bundle management UI, and update the SDDC drift bundle as shown in Figure 11.

**FIGURE 11.** SDDC Manager drift bundle update in progress

**Update NSX Manager**

The NSX Manager update will become available after the SDDC Manager is updated to the required versions. Follow the same SDDC Manager bundle management update process to complete the NSX-T upgrade as shown in Figure 12.

**FIGURE 12.** vCenter Server update in progress

**Update vCenter Server**

The next available update in SDDC Manager is for the vCenter Server.

The VMware vCenter Server update becomes available after the NSX-T is updated to the required versions.
Figure 13 shows the successful vCenter Server update activity.

**Skip ESXi upgrade and update version aliases**

Once the VCF management domain is upgraded to v4.1.0.0 including SDDC Manager, NSX-T, and vCenter Server, the vSphere ESXi upgrade should be skipped as the HPE OEM image-based on vSphere v7.0U1c (Jan 2021) is not a supported release version for VCF 4.1.x bill of materials from VMware. To allow the upgrade to continue by delaying the vSphere ESXi upgrade option to a later step, complete the CLI API calls for version aliasing on the SDDC Manager virtual machine.

1. Generate an authentication token by using an SSH interactive login to the SDDC Manager VM and run the following command, where the SSO User ID and Password are the credentials used for the SDDC Manager VM.

```bash
```

**FIGURE 13.** vCenter Server update in progress

**FIGURE 14.** SDDC access token
2. Issue the API call to alias the vSphere 7.0 build version string to satisfy the vSphere 7.0U1 build version string requirement for a VCF 4.1 environment by executing the following command:

```
```

**FIGURE 15.** Aliases set for ESXi image

**Verify the VCF 4.1.0.0 upgrade bill of materials**

Once the VCF 4.1.0.0 component upgrade is completed, verify the VCF 4.1.0.0 current versions for the management domain and workload domain in the SDDC Manager **Update/Patches** as shown in Figure 16.

**NOTE**

Before upgrading the VCF to 4.2, upgrade the VCF version with 4.1.0.1, refer to the VMware VCF update sequence process section for the upgrade process.

**UPGRADE VCF 4.1 TO VCF 4.2**

To update from VCF 4.1.0.1 to VCF 4.2.0.0 download the required VCF 4.2 bundles via the bundle transfer utility version 4.2.
Offline bundle download for VCF 4.2

1. Use the following command to download the VCF 4.2.0.0 bundles specifically as shown in Figure 17.

   ```
   .\lcm-bundle-transfer-util -download -outputDirectory <DIRECTORY PATH> -depotUser <VMWARE DEPOT USERNAME> -markerFile <MARKER FILE DIRECTORY>\markerFile -markerMd5File <MARKER MD5 FILE DIRECTORY>\markerFile.md5 -p 4.2.0.0
   ```

2. Copy the downloaded bundles to the SDDC Manager VM.
   - Copy the update bundle directory from the external computer to the SDDC Manager VM using the following command.
     ```
     scp -pr /root/vcfupgradebundle vcf@SDDC_MANAGER_IP:/nfs/vmware/vcf/nfs-mount/
     ```
   - OR
     ```
     Use WINSCP software to move the bundles to the SDDC Manager VM.
     ```
   
3. In the SDDC Manager VM, change the ownership and permissions of the uploaded bundle using the following command.

   ```
   chmod -R 0777 /nfs/vmware/vcf/nfs-mount/vcfupgradebundle
   ```

4. In the SDDC Manager VM, upload the bundle files to the internal LCM repository. You must upload the upgrade and install bundles.

5. `cd /opt/vmware/vcf/lcm/lcm-tools/bin/lcm-bundle-transfer-util -upload -bundleDirectory ${absolute-path-output-dir}`

   Where `absolute-path-output-dir` is the directory where the bundle files have been uploaded, or `/nfs/vmware/vcf/nfs-mount/vcfupgradebundle` as shown in the previous step. The utility uploads the bundles specified in the `deltaFileDownloaded` file. The console displays the upload status for each bundle.

Apply the VCF 4.2 updates via SDDC Manager

This section describes how to apply the SDDC Manager bundle. For more information, refer to the Upgrade Sequence section. SDDC Manager makes each of the components available appropriately for upgrade only if the bundle is compatible and in sequence.

Update SDDC Manager

1. Navigate to the Updates/Patches tab of the management domain to confirm the available update. Run the upgrade precheck. For more information, refer to the Precheck - VMware section.
2. The **Available Updates** section displays the offline bundle that you uploaded to SDDC Manager before starting the upgrade.

![FIGURE 18. SDDC Manager displaying available updates](image)

3. Click **Update Now** or **Schedule Update** and select the date and time for the bundle to be applied. The first available update would always be the SDDC Manager update. An update can be either scheduled or can be initiated immediately as shown in Figure 19.

![FIGURE 19. SDDC Manager update/patch](image)

4. Click **View Update Activity** to view the detailed tasks.

5. After the upgrade is completed, a green bar with a checkmark is displayed. Click **Finish**
6. Confirm that the SDDC Manager is updated to 4.2 as shown in Figure 20.

```
<table>
<thead>
<tr>
<th>Current Versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDDC Manager</td>
</tr>
<tr>
<td>4.2.0.0-17039673</td>
</tr>
</tbody>
</table>

@amazo1vc01.amazon.local
7.0.1.00000-1686078

<table>
<thead>
<tr>
<th>ESXi Hosts</th>
<th>Third-Party Custom VIBs</th>
<th>NSX</th>
<th>NSX-T Management Cluster</th>
<th>NSX-T Upgrade Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM2-DMT-CLUSTER</td>
<td>All hosts on 7.0.0-18524942</td>
<td>3.0.2.0.0-66887200</td>
<td>3.0.2.0.0-66887200</td>
<td></td>
</tr>
</tbody>
</table>
```

**FIGURE 20.** SDDC Manager current versions

**NOTE**
Once the SDDC Manager update is completed, restart the SDDC LCM Service using `systemctl restart lcm`.

**Update NSX-T**

1. NSX-T Manager update becomes available after the SDDC Manager is updated automatically. Follow the same SDDC Manager update process to complete the NSX Manager update as shown in Figure 21.

```
```

**FIGURE 21.** NSX-T update in progress
Update vCenter Server
The next available update in SDDC Manager is for the vCenter Server.
1. vCenter Server update becomes available after the NSX-T Manager is updated automatically.

FIGURE 22. vCenter Server update progress

Upgrade VMware ESXi host
Once the SDDC Manager, NSX-T Manager, and vCenter Server are upgraded for both management and workload domain, the vSphere ESXi upgrade should be done through the VMware HPE OEM-based custom images.

Creating VMware HPE OEM based custom image
1. Download the appropriate server platform HPE OEM Add-on depot zip file from https://my.vmware.com/group/vmware/downloads/details?downloadGroup=ADDON_ESXI70U1_HPE&productId=974 HPE-701.0.10.6.5.12-Jan2021-Synergy-Addon-depot.zip
2. Download the VMware 7.0u1d update from VMware, https://my.vmware.com/group/vmware/patch#search Update bundle VMware-ESXi-7.0U1d-17551050-depot.zip

FIGURE 23. VMware 7.0U1d download

There are multiple methods to create the VMware HPE ESXi custom ISO. In this scenario, the HPE ESXi ISO image is created using the Life Cycle Manager method on the management domain vCenter server.
3. Import the HPE-701.0.0.10.6.5.12-Jan2021-Synergy-Addon-depot under the Image Depot option on the Life Cycle Manager and once the depot file is imported successfully, it will show into the Vendor Addons as shown in Figure 24.

![FIGURE 24. Import HPE-701.0.0.10.6.5.12-Jan2021-Synergy-Addon-depot](image)

4. Import both the VMware-ESXi-7.0U1d-17551050-depot depot files under the Image Depot option on the Lifecycle Manager as shown in Figure 25.

![FIGURE 25. Import depot files](image)

5. Create a new vCenter cluster to generate a VMware HPE ESXi 7U1d custom ISO image. Select ESXi version is 7.0 U1d – 17551050 and Vendor add-on is HPE Customization for HPE Synergy Servers shown in Figure 26.
FIGURE 26. Create custom image cluster on vCenter server

NOTE
If either the ESXi version or the Vendor Addon is not showing up while a vCenter cluster is creating, verify that the imported ISO and image depot file is uploaded properly.

6. Once the vCenter cluster is created, verify the ESXi version and "Vendor Addon" are added as per the VCF 4.2 BOM.

FIGURE 27. Verify ESXi version and Vendor Addon
NOTE
Leave the Firmware and Drivers Addon section to “None” and Components to “No additional components”.

7. Edit the image and validate it as shown in Figure 28. If the image is valid save it and continue to the next step.

   ![Figure 28. Image validation](image)

8. Once the Image validation is completed, export the HPE custom image as ISO format as shown in Figure 29.

   ![Figure 29. Custom ISO Export Image](image)

9. The VMware HPE custom ISO is created and downloaded. For more information, refer to the Upgrade ESXi with custom ISO image guide.

10. Log in to the SDDC Manager VM through SSH.
   a. Create a directory for the vendor ISO under the `/nfs/vmware/vcf/nfs-mount` directory.
      
      For example, `/nfs/vmware/vcf/nfs-mount/HPE-ESXi-upgrade`
b. Copy the HPE Custom ISO to the directory you created on the SDDC Manager VM. For example, you can copy the ISO to the `/nfs/vmware/vcf/nfs-mount/<HPE-ESXi-upgrade>` directory.

c. Change permissions on the directory where you copied the ISO. For example, `chmod -R 775 /nfs/vmware/vcf/nfs-mount/<HPE-ESXi-upgrade>`

d. Change owner to VCF.
```
chown -R vcf_lcm:vcf /nfs/vmware/vcf/nfs-mount/<HPE-ESXi-upgrade>/
```

e. Create an ESXi custom image JSON using the following template:

```json
{
  "esxCustomImageSpecList": [
    {
      "bundleId": "ID",
      "targetEsxVersion": "version",
      "useVcfBundle": false,
      "customIsoAbsolutePath": "Path_to_ISO"
    }
  ]
}
```

**TABLE 3. ESXi Custom JSON parameters and values**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description and Example Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>bundled</td>
<td>The ID of the ESXi upgrade bundle you downloaded. You can retrieve the bundle ID by navigating to the Repository &gt; Bundles page and clicking View Details to view the bundle ID. For example, 8c0de63d-b522-4db8-be6c-f1e0ab7ef554.</td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>If an incorrect bundle ID is provided, the upgrade will proceed with the Cloud Foundation stock ISO and replace the custom VIBs in your environment with the stock VIBs.</td>
</tr>
<tr>
<td>targetEsxVersion</td>
<td>ESXi version in the custom image to be applied.</td>
</tr>
<tr>
<td>useVcfBundle</td>
<td>Specifies whether the Cloud Foundation ESXi bundle is to be used for the upgrade. As the upgrade uses HPE VMware custom ISO, this value will be set to false.</td>
</tr>
<tr>
<td>customIsoAbsolutePath</td>
<td>Path to the custom ISO file on the SDDC Manager VM. For example, <code>/nfs/vmware/vcf/nfs-mount/&lt;HPE-ESXi-upgrade&gt;/VMware-ESXi-7.0.1-17325551-HPE-701.0.0.10.6.5.12-Jan2021-Synergy</code>.</td>
</tr>
</tbody>
</table>

Here is an example of a completed JSON template:

```json
{
  "esxCustomImageSpecList": [
    {
      "bundleId": "8f02df7c-f5f3-45df-9d95-a11d9b3dc5bd",
      "targetEsxVersion": "7.0.1-17551050",
      "useVcfBundle": false,
      "customIsoAbsolutePath": "/nfs/vmware/vcf/nfs-mount/<HPE-ESXi-upgrade>/VMware-ESXi-7.0.1-17325551-HPE-701.0.0.10.6.5.12-Jan2021-Synergy"
    }
  ]
}
```
Save the JSON file as `esx-custom-image-upgrade-spec.json` in the `/nfs/vmware/vcf/nfs-mount` directory.

**Note**
If the JSON file is not saved in the correct directory, the stock Cloud Foundation ISO is used for the upgrade and the custom VIBs are overwritten.


```bash
chmod -R 775 /nfs/vmware/vcf/nfs-mount/esx-custom-image-upgrade-spec.json
chown -R vcf_lcm:vcf /nfs/vmware/vcf/nfs-mount/esx-custom-image-upgrade-spec.json
```

g. Open the `/opt/vmware/vcf/lcm/lcm-app/conf/application-prod.properties` file.

In the `lcm.esx.upgrade.custom.image.spec-parameter` add the path to the JSON file.

For example,

```
```

**Deploy VMware HPE OEM based custom image**

1. Generate an authentication token. SSH to the SDDC Manager VM run following command, where the SSO User ID and Password are the credentials used for the SDDC Manager VM:

```bash
curl '<SDDC Manager FQDN>/v1/tokens' -i -X POST -H 'Content-Type: application/json' -H 'Accept: application/json' -d '{ "username" : "<SSO User ID>" , "password" : "<SSO Password>" }'
```

2. Call the “Update Version Aliases” API with the following inputs, providing the fully qualified domain name of the SDDC Manager and access token you generated in the previous step.

```bash
```
NOTE
As per VCF 4.2 BOM, the ESXi version is 7.0.1 U1d – 17551050, before upgrading the ESXi versions to 7.0.1 U1d – 17551050, the upgrade bundle for 7.0u1d states the previous version of the ESXi should be 7.0.1-17168206, so the CURL command set the ESXi version on the SDDC Manager to 7.0.1-17168206.

3. Now the VMware ESXi update option is available in Update/Patches as shown in Figure 31.

FIGURE 30. VMware ESXi 7.0 1d update bundle

FIGURE 31. VMware HPE ESXi custom ISO update bundle
4. Once the VMware HPE ESXi v7.0U1d custom image upgrade starts, the status can be viewed as shown in Figure 32.

![Image of VMware HPE ESXi custom ISO update status](image)

**FIGURE 32.** VMware HPE ESXi custom ISO update status

Once the VMware HPE ESXi custom image upgrade is completed, verify the bill of material for VCF 4.2 in the SDDC Manager release versions as shown in Figure 33.

![Image of SDDC Manager 4.2 verification on the Release Versions](image)

**FIGURE 33.** SDDC Manager 4.2 verification on the Release Versions

**APPENDIX A: VCF 4.2 BUNDLE CLEAN-UP**

Once the SDDC Manager is upgraded to 4.2, the upgrade bundles for NSX-T and vCenter Server may not show in the workload domain “Update/Patches” drop-down list. Clean up all the uploaded bundles in the SDDC Manager VM and re-upload VCF 4.2 downloaded bundles and follow the upgrade process.

If it is necessary to remove the previously uploaded bundles in the SDDC Manager VM, follow these steps for the clean-up process:
1. Go to the Bundles or Download History and get the **Bundle ID** in the Additional details of vCenter server and NSX-T as shown in Figure A1.

---

### Bundle Management

**VMware Software Install Bundle - vCenter Server 7.0.1.00200-17327517**

- **Version**: 4.0.15-1202034
- **Severity**: Critical
- **Vendor**: VMware
- **Bundle ID**: 9eb72ba97-9a55-452b-bb5d-0481f7f0a04a

**Software Component 1**

- **Description**: VMware vCenter Server Install Bundle
- **Update to Version**: 7.0.1.00200-17327517
- **Required Version**: 0.0.0.0
- **Release Date**: Feb 9, 2021
- **Vendor**: VMware

---

**FIGURE A1.** Get the Bundle id

### SDDC Manager VM

1. Login to the SDDC Manager VM.
3. Upload the downloaded VCF 4.2 offline bundles to the SDDC Manager VM under `/nfs/vmware/vcf/nfs-mount/<DIRECTORY>`.
4. Now both the NSX-T and vCenter Server bundles will be shown in **Update/Patches**.

---

### SUMMARY

Hewlett Packard Enterprise and VMware together deliver a hybrid cloud solution running on HPE Synergy infrastructure spanning across compute, storage, network, security, and cloud management. This technical paper demonstrates the upgrade of the VCF 4.0.0.1 to VCF 4.2.0.0 and discusses in detail the offline method to perform the step-by-step upgrade from VCF 4.0.0.1 to 4.2.0.0.
RESOURCES AND ADDITIONAL LINKS


HPE Software Delivery Repository with compatible HPE Bundles for VMware Image Builder, Update Manager and ESXCLI, http://vibsdepot.hpe.com/

HPE VMware ESXi 7.0 U1 Upgrade Pack, https://support.hpe.com/hpsc/swd/public/detail?swItemld=MTX_686ca271fcd54a2ca0644bc67f


HPE Reference Architectures, hpe.com/info/ra

HPE Servers, hpe.com/servers

HPE Storage, hpe.com/storage

HPE Networking, hpe.com/networking

HPE GreenLake Advisory and Professional Services, hpe.com/us/en/services/consulting.html

To help us improve our documents, please provide feedback at hpe.com/contact/feedback.