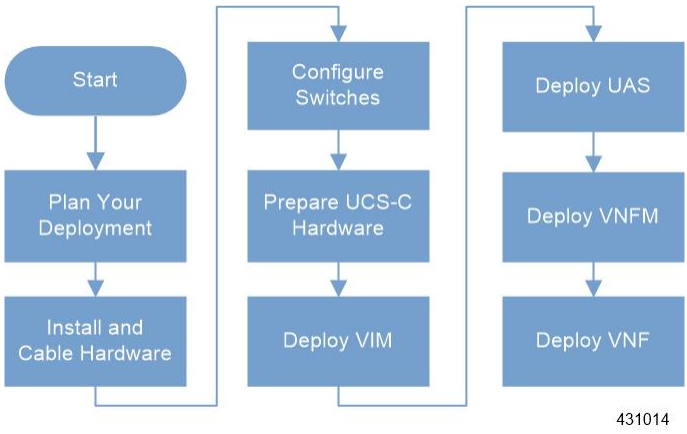
Deploying the Ultra M Solution

Ultra M is a multi-product solution. Detailed instructions for installing each of these products is beyond the scope of this document. Instead, the sections that follow identify the specific, non-default parameters that must be configured through the installation and deployment of those products in order to deploy the entire solution.

Deployment Workflow

The following figure illustrates the deployment workflow of VNF on CVIM in Ultra M C2.1 micropod model.

Figure 1: Ultra M C2.1 Deployment Workflow



Plan Your Deployment

Before deploying the Ultra M solution, it is very important to develop and plan your deployment.

Network Planning

Networking Overview provides a general overview and identifies basic requirements for networking the Ultra M solution.

See the Network Definitions (Layer 2 and 3) Appendix to help plan the details of your network configuration.

Install and Cable the Hardware

This section describes the procedure to install all the components included in the Ultra M Solution.

Related Documentation

To ensure hardware components of the Ultra M solution are installed properly, refer to the installation guides for the respective hardware components.

- Nexus 93108-TC-FX — https://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus9000/hw/n93108tcfx_hig/guide/b_c93108tc_fx_nxos_mode_hardware_install_guide/b_c93108tc_fx_nxos_mode_hardware_install_guide_chapter_01.html
- Nexus 9364C — https://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus9000/hw/n9364c_hig/guide/b_c9364c_nxos_mode_hardware_install_guide/b_c9364c_nxos_mode_hardware_install_guide_chapter_01.html
- UCS C220 M5SX Server — https://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/c/hw/C220M5/install/C220M5.html

Rack Layout

Table 1: Ultra M C2.1 Micropod Deployment Rack Layout, on page 2 provides details for the recommended rack layout for the Ultra M C2.1 micropod deployment model.

Table 1: Ultra M C2.1 Micropod Deployment Rack Layout

Rack Layout for C2.1 - Rack W8		
RU Numbering	**Rack**	
39	SW4	Nexus 9364C
38		
37	SW3	Nexus 9364C
36		

Rack Layout for C2.1 - Rack W8		
RU Numbering	**Rack**	
35	SW2	Nexus 93108TC-FX
34	SW1	Nexus 93108TC-FX
21 to 33	Empty	Empty
20	Compute16	UCSC-C220-M5SX
19	Compute15	UCSC-C220-M5SX
18	Compute14	UCSC-C220-M5SX
17	Compute13	UCSC-C220-M5SX
16	Compute12	UCSC-C220-M5SX
15	Compute11	UCSC-C220-M5SX
14	Compute10	UCSC-C220-M5SX
13	Compute9	UCSC-C220-M5SX
12	Compute8	UCSC-C220-M5SX
11	Compute7	UCSC-C220-M5SX
10	Compute6	UCSC-C220-M5SX
9	Compute5	UCSC-C220-M5SX
8	Compute4	UCSC-C220-M5SX
7	Compute3	UCSC-C220-M5SX
6	Compute2	UCSC-C220-M5SX
5	Compute1	UCSC-C220-M5SX
4	Micropod3	UCSC-C220-M5SX
3	Micropod2	UCSC-C220-M5SX
2	Micropod1	UCSC-C220-M5SX
1	CVIM Manager	UCSC-C220-M5SX

Cable the Hardware

After the hardware has been installed, install all power and network cabling for the hardware using the information and instructions in the documentation for the specific hardware product. Refer to Related

Documentation for links to the hardware product documentation. Ensure that you install your network cables according to your network plan.

Configure the Switches

All of the switches must be configured according to your planned network specifications.

Important Refer to Network Planning, on page 2 for information and consideration for planning your network.

Refer to the user documentation for each of the switches for configuration information and instructions:

- Nexus 93108-TC-FX: https://www.cisco.com/c/en/us/support/switches/nexus-93108tc-fx-switch/model.html
- Nexus 9364C: https://www.cisco.com/c/en/us/support/switches/nexus-9364c-switch/model.html

Prepare the UCS C-Series Hardware

UCS-C hardware preparation is performed through the Cisco Integrated Management Controller (CIMC).

Refer to the UCS C-series product documentation for more information:

- UCS C-Series Hardware — https://www.cisco.com/c/en/us/support/servers-unified-computing/ucs-c220-m5-rack-server/model.html
- CIMC Software — https://www.cisco.com/c/en/us/support/servers-unified-computing/ucs-c-series-integrated-management-controller/tsd-products-support-series-home.html

Important Part of the UCS server preparation is the configuration of virtual drives. If there are virtual drives present which need to be deleted, select the **Virtual Drive Info** tab, select the virtual drive you wish to delete, then click **Delete Virtual Drive**. Refer to the CIMC documentation for more information.

Important The information in this section assumes that the server hardware was properly installed per the information and instructions in Cable the Hardware, on page 3.

For servers based on UCS M5SX boxes set the following for BIOS parameters:

- All Onboard LOM Ports—Enabled
- LOM Port 1 OptionROM—Disabled
- LOM Port 2 OptionROM—Disabled
- PCIe Slot:1 OptionROM—Enabled
- PCIe Slot:2 OptionROM—Enabled

- MLOM OptionROM—Enabled
- MRAID OptionROM—Enabled

For other parameters, leave it at their default settings.

Additional steps should be performed to setup C-series pod with Intel NIC. In the Intel NIC testbed, each C-series server has 2, 4-port Intel 710 NIC cards. Ports A, B, and C for each Intel NIC card has to be connected to the respective TOR. Also, ensure that the PCI slot in which the Intel NIC cards are inserted are enabled in the BIOS setting (BIOS > Configure BIOS >Advanced > LOM and PCI Slot Configuration -> All PCIe Slots OptionROM-Enabled and enable respective slots). To identify the slots, check the slot-id information under the Network-Adapter tab listed under the Inventory link on the CIMC pane. All the Intel NIC ports should be displayed in the BIOS summary page under the Actual Boot Order pane, as IBA 40G Slot xyza with Device Type is set to PXE.

Table 2: Cisco UCS BIOS Options, on page 5 lists the non-default parameters that must be configured per server type.

Table 2: Cisco UCS BIOS Options

Parameters and Settings	Description
Processor Configuration	
Enhanced Intel Speedstep	Whether the processor uses Enhanced Intel SpeedStep Technology, which allows the system to dynamically adjust processor voltage and core frequency. This technology can result in decreased average power consumption and decreased average heat production. This can be one of the following: • disabled—The processor never dynamically adjusts its voltage or frequency. • enabled—The processor utilizes Enhanced Intel SpeedStep Technology and enables all supported processor sleep states to further conserve power. • Platform Default—The BIOS uses the value for this attribute contained in the BIOS defaults for the server type and vendor. **Default value**: disabled We recommend that you contact your operating system vendor to make sure the operating system supports this feature.

Parameters and Settings	Description
Turbo Boost	Whether the processor uses Intel Turbo Boost Technology, which allows the processor to automatically increase its frequency if it is running below power, temperature, or voltage specifications. This can be one of the following: • disabled—The processor does not increase its frequency automatically. • enabled—The processor utilizes Turbo Boost Technology if required. • Platform Default—The BIOS uses the value for this attribute contained in the BIOS defaults for the server type and vendor. **Default value**: disabled
Hyper Threading	Whether the processor uses Intel Hyper-Threading Technology, which allows multithreaded software applications to execute threads in parallel within each processor. This can be one of the following: • disabled—The processor does not permit hyperthreading. • enabled—The processor allows for the parallel execution of multiple threads. • Platform Default—The BIOS uses the value for this attribute contained in the BIOS defaults for the server type and vendor. **Default value**: enabled We recommend that you contact your operating system vendor to make sure the operating system supports this feature.

Parameters and Settings	Description
Core Multi Processing	Sets the state of logical processor cores in a package. If you disable this setting, Hyper Threading is also disabled. This can be one of the following: all—Enables multi processing on all logical processor cores. 1 through 10—Specifies the number of logical processor cores that can run on the server. To disable multi processing and have only one logical processor core running on the server, select 1. Platform Default—The BIOS uses the value for this attribute contained in the BIOS defaults for the server type and vendor. **Default value**: all We recommend that you contact your operating system vendor to make sure the operating system supports this feature.
Power/Performance	
CPU Performance	Sets the CPU performance profile for the server. This can be one of the following: • enterprise—All prefetchers and data reuse are disabled. • high-throughput—All prefetchers are enabled, and data reuse is disabled. • hpc—All prefetchers and data reuse are enabled. This setting is also known as high performance computing. • Platform Default—The BIOS uses the value for this attribute contained in the BIOS defaults for the server type and vendor. **Default value**: high-throughput
Workload Configuration	Set the value of this parameter as IO sensitive.

Parameters and Settings	Description
Fan Policy	Set the Fan Policy for the server to **High Power** as mentioned in the https://www.cisco.com/en/US/docs/unified_computing/ucs/c/sw/gui/config/guide/1.5/b_Cisco_UCS_C-series_GUI_Configuration_Guide.151_chapter_011.html#concept_8CB787DF70304E98BE25D120466418B9. This setting can be used for server configurations that require fan speeds ranging from 60% to 85%. This policy is ideal for servers that contain PCIe cards that overheat easily and have high temperatures. The minimum fan speed set with this policy varies for each server, but it is approximately in the range of 50 to 85%.
Memory	
NUMA	Whether the BIOS supports NUMA. This can be one of the following: • disabled—The BIOS does not support NUMA. • enabled—The BIOS includes the ACPI tables that are required for NUMA-aware operating systems. If you enable this option, the system must disable Inter-Socket Memory interleaving on some platforms. • Platform Default—The BIOS uses the value for this attribute contained in the BIOS defaults for the server type and vendor. **Default value**: enabled

Deploy the Virtual Infrastructure Manager

Within the Ultra M solution, Cisco Virtualized Infrastructure Manager (CVIM) functions as the virtual infrastructure manager (VIM).

The method by which the VIM is deployed depends on the architecture of your Ultra M model. For the micropod model, see the https://www.cisco.com/c/en/us/td/docs/net_mgmt/network_function_virtualization_Infrastructure/2_4_3/install_guide/Cisco_VIM_Install_Guide_2_4_3/Cisco_VIM_Install_Guide_2_4_3_chapter_00.html.

Deploying VNFs Using AutoVNF in Generic Mode

This section describes the following topics:

Introduction

USP-based VNFs can be deployed using a AutoVNF instance in generic mode. In this scenario, AutoVNF VM (in HA mode) is deployed on the VIM and is used to deploy VNFM and VNF(s).

Important AutoVNF deploys Cisco Elastic Services Controller (ESC) as the VNFM and is only supported VNFM in this release.

A single AutoVNF can deploy one or more VNFs in one or more tenants within the same VIM.

VNF Deployment Automation Overview

Figure 2: AutoVNF Deployment Automation Workflow for a Single VNF, on page 10 and Figure 3: AutoVNF Deployment Automation Workflow for a Multi-VNF, on page 11 provide an overview of the VNF deployment automation process for when using AutoVNF in generic mode. Details are provided in Table 3: VNF Deployment Automation Workflow Descriptions, on page 11.

NOTES:

- The workflow described in this section is supported only with VNF deployments performed through AutoVNF and that are based on OSP 10.
- This information assumes that you have deployed the NFVI and VIM.
- This information assumes that all artifacts required during configuration must be pre-created in OpenStack.

Figure 2: AutoVNF Deployment Automation Workflow for a Single VNF

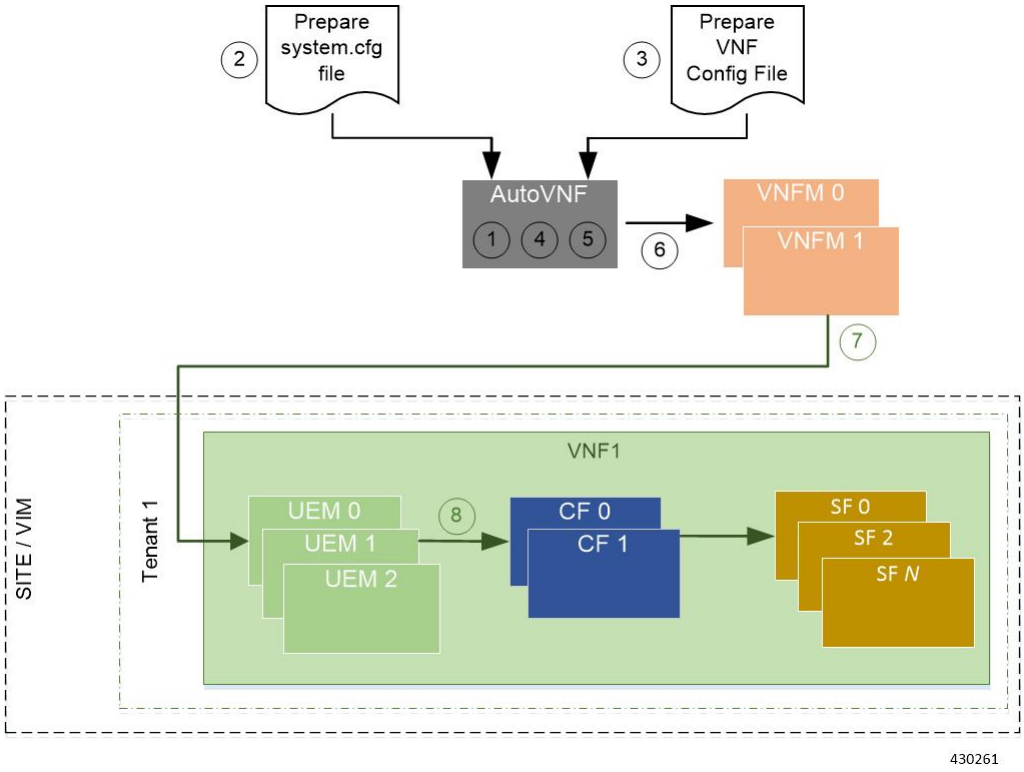


Figure 3: AutoVNF Deployment Automation Workflow for a Multi-VNF

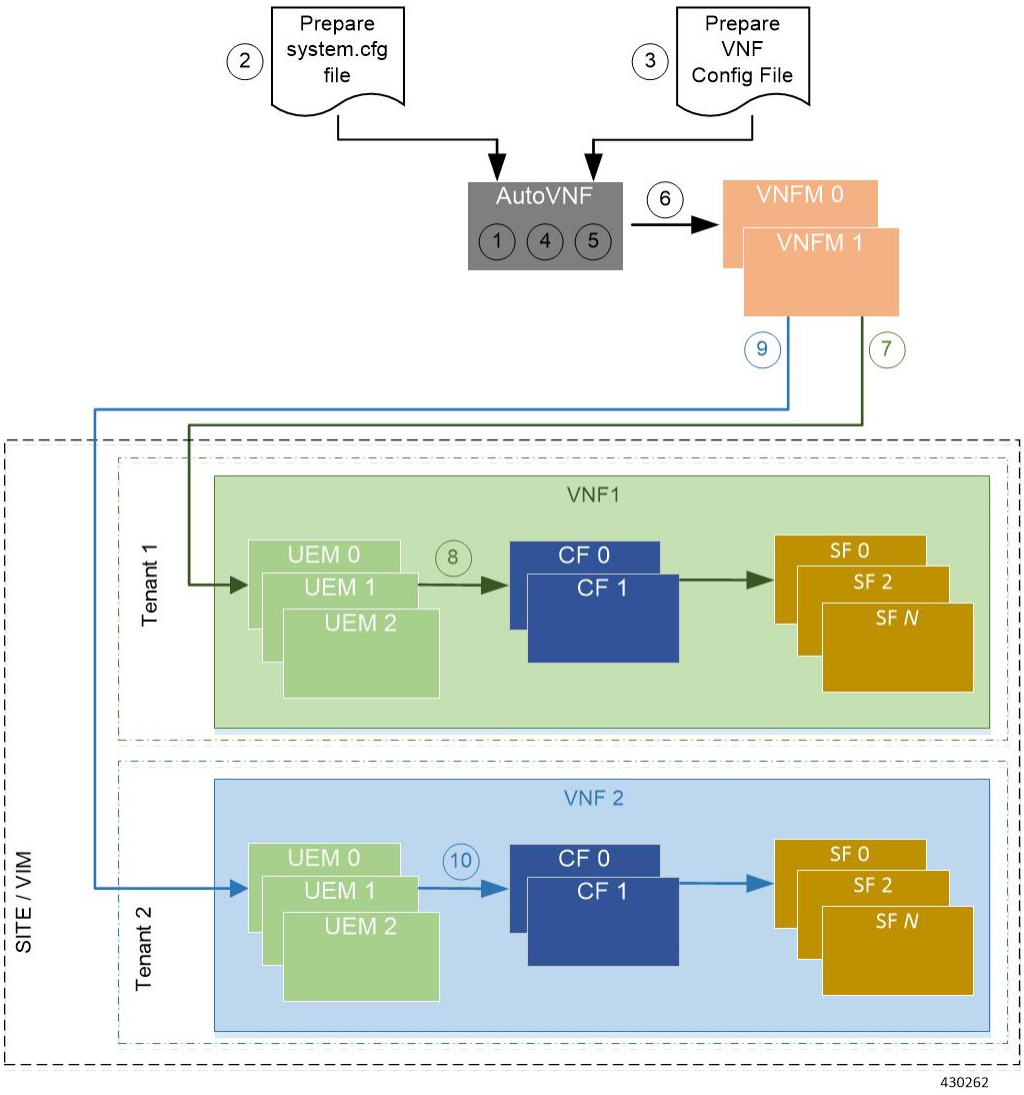


Table 3: VNF Deployment Automation Workflow Descriptions

Callout	Description
1	Deploy AutoVNF using the *boot_uas.py* script provided as part of the release ISO.
2	Prepare the *system.cfg* file to the AutoVNF VM. This file provides the VNF's Day-0 configuration.
3	Prepare the AutoVNF configuration file that is used by AutoVNF to initiate the VNFM and VNF deployment process. This file includes the configuration information required to deploy VNFM and all the VNF components (VNFCs) such as secure tokens, network catalogs, VDU catalogs, and VDUs.

Callout	Description
4	On the AutoVNF VM, load and commit the AutoVNF configuration file prepared in the previous step. Once commited, activate the loaded AutoVNF configuration file to deploy the VNFMs.
5	Once VNFMs are ready, AutoVNF pushes the artifacts to bring up the VNF.
6	AutoVNF passes the VNF configuration to the VNFM VM instance. **Note** In this deployment model, AutoVNF in NFVO mode brings up the VNFMs and they are not pre-created. It ensures that the various VM catalogs pertaining to other VNFCs are on-boarded by the VNFM. It accomplishes this through a number of YANG-based definitions which are then used to configure various aspects of the virtualized environment using REST and NETCONF APIs. That VNFM mounts the VNFC catalogs and works with AutoVNF to deploy the various components that comprise the desired VNF use-case (e.g. UGP).
7, 9	The VNFM leverages the VNFC information to deploy the UEM VMs cluster. Though the USP architecture represents a single VNF to other network elements, it is comprised of multiple VM types each having their own separate catalogs. The UEM component of the USP works with the VNFM to deploy these catalogs based on the intended VNF use case (e.g. UGP, etc.).
8, 10	The UEM processes the Day-0 configuration information it received from the VNFM and deploys the Control Function (CF) and Service Function (SF) VNFC VMs. Once all the VNF components (VNFCs) have been successfully deployed, AutoVNF notifies AutoDeploy. **Important** In a multi-VNF environment, the VNFs are deployed concurrently.

Pre-VNF Installation Verification

Prior to installing the USP, please ensure that the following is true:

- The prerequisite hardware is installed and operational with network connectivity.
- The prerequisite software is installed and configured and functioning properly:
  - You have administrative rights to the operating system.
  - VIM Orchestrator is properly installed and operational.
  - VIM components are properly installed and operational. This configuration includes networks, flavors, and sufficient quota allocations to the tenant.

Note Supported and/or required flavors and quota allocations are based on deployment models. Contact your Cisco representative for more information.

- You have administrative rights to the OpenStack setup.

- The Cisco USP software ISO has been downloaded and is accessible by you.

Deploy the USP-based VNF

The AutoVNF software roles within the Ultra Automation Services (UAS) is used to automate the USP-based VNF deployment. The automated deployment process through AutoVNF is described in VNF Deployment Automation Overview, on page 9.

To deploy the USP-based VNF using AutoDeploy:

1. Onboard the USP ISO, on page 13.
2. Extract the UAS Bundle, on page 14.
3. Deploy the AutoVNF VM, on page 15.
4. Activate the AutoVNF Configuration Files, on page 17.

Onboard the USP ISO

The files required to deploy the USP components are distributed as RPMs (called “bundles”) in a single ISO package. They are maintained using YUM on the Onboarding Server. The following bundles are part of the ISO:

USP Bundle Name	Description
usp-em-bundle	The Element Manager (EM) Bundle RPM containing images and metadata for the Ultra Element Manager (UEM) module.
usp-uas-bundle	The Ultra Automation Services Bundle RPM containing AutoIT, AutoDeploy, AutoVNF, Ultra Web Services (UWS), and other automation packages.
usp-ugp-bundle	The Ultra Gateway Platform (UGP) Bundle RPM containing images for Ultra Packet core (VPC-DI). This bundle contains non-trusted images.
usp-vnfm-bundle	The VNFM Bundle RPM containing an image and a boot-up script for ESC (Elastic Service Controller).
usp-yang-bundle	The Yang Bundle RPM containing YANG data models including the VNFD and VNFR.
usp-auto-it-bundle	The bundle containing the AutoIT packages required to deploy the UAS.
ultram-manager	This package contains the script and relevant files needed to deploy the Ultra Health Service.

In addition to the bundles, the ISO bundle also includes scripts used to deploy the bundles including UAS.

Before proceeding with these instructions, ensure that the prerequisites identified in *USP Installation Prerequisites* chapter of the *Cisco Ultra Services Platform Deployment Automation Guide* have been met.

To onboard the ISO package:

1. Log on to the Onboarding Server.
2. Download the USP ISO bundle and related files pertaining to the release.
3. Create a mount point on the Onboarding Server and mount the ISO package:

   mkdir /var/usp-iso
4. Mount the USP ISO.

   sudo mount -t iso9660 -o loop *<ISO_download_directory>/<ISO_package_name>* **/var/usp-iso**

   Example: The following command mounts the ISO bundle called *usp-5_5_0-1255.iso* located in a directory called *5_5_0-1283* to */var/usp-iso*:

   sudo mount -t iso9660 -o loop 5_5_0-1064/usp-5_5_0-1064.iso /var/usp-iso

   ```
   mount: /dev/loop1 is write-protected, mounting read-only
   ```
5. Verify the mount configuration.

   df –h

   Example output:

   ```
   Filesystem      Size  Used Avail Use% Mounted on
   /dev/sda2       187G  178G  316M 100% /
   devtmpfs         63G     0   63G   0% /dev
   tmpfs            63G  4.0K   63G   1% /dev/shm
   tmpfs            63G  1.4M   63G   1% /run
   tmpfs            63G     0   63G   0% /sys/fs/cgroup
   /dev/sda1       477M  112M  336M  25% /boot
   tmpfs            13G     0   13G   0% /run/user/0
   /dev/loop1      4.2G  4.2G     0 100% /var/usp-iso
   ```
6. Proceed to Extract the UAS Bundle, on page 14.

Extract the UAS Bundle

Once the USP ISO has been mounted, the UAS bundle must be extracted from the ISO in order to prepare the configuration files required for deployment.

These instructions assume you are already logged on to the Onboarding Server.

To extract the UAS bundle:

1. Navigate to the tools directory within the ISO mount.

   cd /var/usp-iso/tools/
2. Launch the *usp-uas-installer.sh* script.

   sudo ./usp-uas-installer.sh

   The script extracts the files that comprise the UAS bundle to */opt/cisco/usp/uas-installer*.
3. Verify that files have been extracted.

   Example output:

   ll /opt/cisco/usp/uas-installer

```
total 12
drwxr-xr-x. 5 root root 4096 May 11 08:04 common
drwxr-xr-x. 2 root root 4096 May 11 08:04 images
drwxr-xr-x. 2 root root 4096 May 11 08:04 scripts
```

ll /opt/cisco/usp/uas-installer/images/

```
total 707580
-rw-r--r--. 1 root root 723898880 May 10 15:40 usp-uas-1.0.0-601.qcow2
```

ll /opt/cisco/usp/uas-installer/scripts/

```
total 56
-rwxr-xr-x. 1 root root  5460 May 11 08:04 autoit-user.py
-rwxr-xr-x. 1 root root  4762 May 11 08:04 encrypt_account.sh
-rwxr-xr-x. 1 root root  3945 May 11 08:04 encrypt_credentials.sh
-rwxr-xr-x. 1 root root 13846 May 11 08:04 uas-boot.py
-rwxr-xr-x. 1 root root  5383 May 11 08:04 uas-check.py
-rwxr-xr-x. 1 root root 10385 May 11 08:04 usp-tenant.py
```

4. Proceed to Deploy the AutoVNF VM, on page 15.

Deploy the AutoVNF VM

The VM for AutoVNF is deployed using *boot_uas.py* script provided with the UAS bundle. The script is located in the following directory:

/opt/cisco/usp/bundles/uas-bundle/tools

This script includes a number of deployment parameters for the VM. These parameters are described in the help information pertaining to the script which can be accessed by executing the following command:

./boot_uas.py -h

For the help information, see the *boot_uas.py Help* Appendix in the *Cisco Ultra Services Platform Deployment Automation Guide*.

Important These instructions assume you are already logged on to the Onboarding Server.

To deploy the AutoVNF VM:

1. Navigate to the directory containing the *boot_uas.py* file.

   cd /opt/cisco/usp/bundles/uas-bundle/tools

2. Deploy the AutoVNF VM.

   ./boot_uas.py --autovnf --openstack --image *<image_name>* **--flavor** *<flavor_name>* **--net** *<network_name>*

   There are additional arguments that can be executed with this script based on your deployment scenario. For details, see the *boot_uas.py Help* Appendix in the *Cisco Ultra Services Platform Deployment Automation Guide*.

Important Both version 2 and 3 of OpenStack Keystone APIs are supported. You can specify the desired version using the **--os_identity_api_version** argument with this script. For example to specify the use of version 3, add the argument **--os_identity_api_version 3**. The default is version 2.

Upon executing the script, you are prompted to enter user crendentials for performing operations within the AutoVNF VM.

3. Provide the requested information.
   - **AutoVNF VM Login Password**: The password for the default user account, which is named *ubuntu*.
   - **AutoVNF API Access password for "admin"**: The password for the ConfD administrator user, which is named admin.
   - **AutoVNF API Access password for "oper"**: The password for the ConfD operator user, which is named oper.
   - **AutoVNF API Access password for "security"**: The password for the ConfD security administrator user, which is named security-admin.

Important Ensure that all passwords meet the requirements specified in *Password Requirements and Login Security* section in the *Cisco Ultra Services Platform Deployment Automation Guide*.

4. Log on to the AutoVNF VM as *ubuntu*. Use the password that was created earlier for this user.
5. Become the root user.

   ```
   sudo -i
   ```

6. Prepare the *system.cfg* file. This will serve as the Day-0 config for the VNF. Refer to Sample system.cfg File for an example configuration file.

Important Though administrative user credentials can be specified in clear text in the system.cfg file, it is not recommended. For security purposes, it is recommended that you configure a secure token for the user account in the VNF configuration file and reference that file as part of the VDU catalog pertaining to the CF using the **login-credential** parameter. In the *system.cfg* file, use the *$CF_LOGIN_USER* and *$CF_LOGIN_PASSWORD* variables as follows to call the values configured for the secure token:

```
configure
  context local
    administrator $CF_LOGIN_USER password $CF_LOGIN_PASSWORD ftp
```

7. Prepare the AutoVNF configuration file.

   This file provides the VNF configuration information used by AutoVNF during the deployment process. A sample configuration file is provided for reference in Sample AutoVNF Configuration File.
8. Save the AutoVNF configuration file to your home directory on the AutoVNF VM.
9. Upload the USP ISO to home directory on AutoVNF.
10. Proceed to Activate the AutoVNF Configuration Files, on page 17.

Activate the AutoVNF Configuration Files

Once you have completed preparing your AutoVNF configuration files, you must load the configuration and activate the deployment.

Important User credentials are configured through Secure Tokens specified in the configuration file. Ensure that passwords configured with Secure Token meet the requirements specified in the *Password Requirements and Login Security* section of *Cisco Ultra Services Platform Deployment Automation Guide*.

Once activated, AutoVNF proceeds with the deployment automation workflow as described in VNF Deployment Automation Overview, on page 9.

Important These instructions assume you are already logged on to the AutoVNF VM as the *root* user and that your configuration files have been prepared for your deployment as per the information and instructions in Deploy the AutoVNF VM, on page 15. These instructions also assume that AutoVNF has access to the VNFC image files (either locally or on a remote server) provided with the USP ISO.

To activate the USP deployment using AutoVNF:

1. Login to the ConfD CLI as the admin user.

   ```
   confd_cli -u admin -C
   ```

2. Enter the ConfD configuration mode.

   ```
   config
   ```

3. Load the AutoVNF configuration file to load the VNFM and VNF information into the AutoVNF database.

   ```
   load merge <your_autovnf_file_name> .cfg
   commit
   end
   ```

Important If you are performing this process as a result of an upgrade or redeployment, you must use the load replace variant of this command:

```
load replace <your_autovnf_file_name> .cfg
commit
end
```

4. Activate the AutoVNF configuration file.

   ```
   activate nsd <nsd_name>
   ```

Important The output of this command is a transaction-id which can be used to monitor the deployment progress. If need be, the VIM deployment can be deactivated using the **deactivate** variant of this command.

5. Once VNFM is deployed and ready, activate the VNF NSD configuration file.

```
activate nsd <nsd_name> vnfd <vnf>
```

Important The output of this command is a transaction-id which can be used to monitor the deployment progress. If need be, the VIM deployment can be deactivated using the **deactivate** variant of this command.

6. Monitor the progress of the deployment by viewing transaction logs:

   ```
   show log <transaction_id> | display xml
   ```

   transaction_id is the ID displayed as a result of the **activate-deployment** command.

   The logs display status messages for each node in each VNF that the configuration file defines. Example success messages for the different components deployed through AutoVNF are shown below:

   - VNF:

     ```
     Fri May 12 21:44:35 UTC 2017 [Task: 1494624612779/tb1vnfd2] Successfully completed
     all Vnf Deployments
     ```

   - Entire Deployment:

     ```
     Fri May 12 21:57:38 UTC 2017 [Task: 1494624612779] Success
     ```

Important If there are any issues seen when executing the above commands, see the *Monitoring and Troubleshooting the Deployment* section in the *Cisco Ultra Services Platform Deployment Automation Guide*.

Upgrading/Redeploying the Stand-alone AutoVNF VM Instance

Use the following procedure to upgrade or redeploy the AutoVNF software image in scenarios where AutoVNF was brought up as stand-alone instance.

Important These instructions assume you are already logged on to the Onboarding Server.

1. Delete the AutoVNF VM instance.

   ```
   ./boot_uas.py --openstack --autovnf --delete <transaction_id>
   ```

2. *Optional*. If required remove the OpenStack artifacts which were created manually to bring up AutoVNF.
3. Follow the procedures in Deploy the USP-based VNF, on page 13 to redeploy AutoVNF with the new software version.

Note Upgrading or redeploying the VNF can be performed as part of this process or it can be performed separately. For details and instructions, see the *Upgrading/Redeploying VNFs Deployed Through a Stand-alone AutoVNF Instance* section in the *Cisco Ultra Services Platform Deployment Automation Guide*.