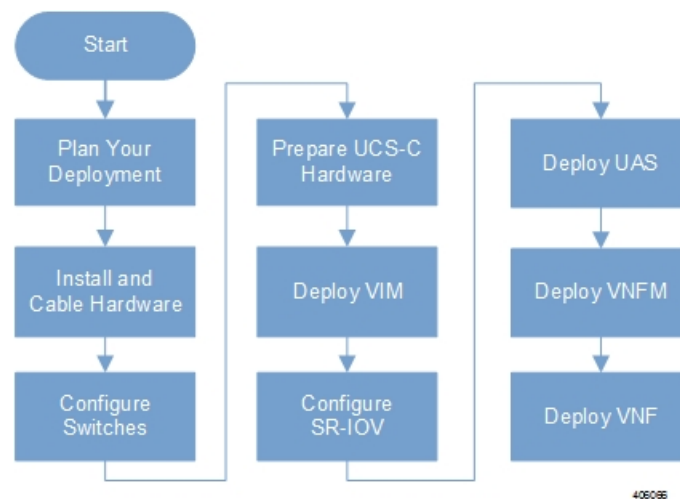# Deploying the Ultra M Solution

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

Figure 1: Ultra M 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.

With this background, use the tables in Network Definitions (Layer 2 and 3) 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.

- **Catalyst 2960-XR Switch** — http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst2960xr/hardware/installation/guide/b_c2960xr_hig.html

- **Catalyst 3850 48T-S Switch** — http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3850/hardware/installation/guide/b_c3850_hig.html

- **Nexus 93180-YC 48 Port** — http://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus9000/hw/n93180ycex_hig/guide/b_n93180ycex_nxos_mode_hardware_install_guide.html

- **Nexus 9236C 36 Port** — http://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus9000/hw/n9236c_hig/guide/b_c9236c_nxos_mode_hardware_install_guide.html

- **UCS C240 M4SX Server** — http://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/c/hw/C240M4/install/C240M4.html

Rack Layout

Hyper-converged Ultra M XS Single VNF Deployment

Table 1: Hyper-converged Ultra M XS Single VNF Deployment Rack Layout, on page 2 provides details for the recommended rack layout for the Hyper-converged Ultra M XS Single VNF deployment model.

Table 1: Hyper-converged Ultra M XS Single VNF Deployment Rack Layout

	Rack #1	Rack #2
RU-1	Empty	Empty

	Rack #1	Rack #2
RU-2	Spine EOR Switch A: Nexus 9236C	Spine EOR Switch B: Nexus 9236C
RU-3	Empty	Empty
RU-4	VNF Mgmt Switch: Catalyst C3850-48T-S OR C2960XR-48TD	Empty
RU-5	VNF Leaf TOR Switch A: Nexus 93180YC-EX	Empty
RU-6	VNF Leaf TOR Switch B: Nexus 93180YC-EX	Empty
RU-7/8	Ultra UEM 1A: UCS C240 M4 SFF	Empty
RU-9/10	Ultra UEM 1B: UCS C240 M4 SFF	Empty
RU-11/12	Empty	Empty
RU-13/14	Demux SF: UCS C240 M4 SFF	Empty
RU-15/16	Standby SF: UCS C240 M4 SFF	Empty
RU-17/18	Active SF 1: UCS C240 M4 SFF	Empty
RU-19/20	Active SF 2: UCS C240 M4 SFF	Empty
RU-21/22	Active SF 3: UCS C240 M4 SFF	Empty
RU-23/24	Active SF 4: UCS C240 M4 SFF	Empty
RU-25/26	Active SF 5: UCS C240 M4 SFF	Empty
RU-27/28	Active SF 6: UCS C240 M4 SFF	Empty
RU-29/30	Empty	Empty
RU-31/32	Empty	Empty
RU-33/34	Empty	Empty
RU-35/36	Ultra UEM 1C	OpenStack Control C: UCS C240 M4 SFF
RU-37/38	Ultra M Manager: UCS C240 M4 SFF	Empty
RU-39/40	OpenStack Control A: UCS C240 M4 SFF	OpenStack Control B: UCS C240 M4 SFF
RU-41/42	Empty	Empty
Cables	Controller Rack Cables	Controller Rack Cables
Cables	Spine Uplink/Interconnect Cables	Spine Uplink/Interconnect Cables

	Rack #1	Rack #2
Cables	Leaf TOR To Spine Uplink Cables	Empty
Cables	VNF Rack Cables	Empty

Hyper-converged Ultra M XS Multi-VNF Deployment

Table 2: Hyper-converged Ultra M XS Multi-VNF Deployment Rack Layout, on page 4 provides details for the recommended rack layout for the Hyper-converged Ultra M XS Multi-VNF deployment model.

Table 2: Hyper-converged Ultra M XS Multi-VNF Deployment Rack Layout

	Rack #1	Rack #2	Rack #3	Rack #4
RU-1	Empty	Empty	Empty	Empty
RU-2	Spine EOR Switch A: Nexus 9236C	Spine EOR Switch B: Nexus 9236C	Empty	Empty
RU-3	Empty	Empty	Empty	Empty
RU-4	VNF Mgmt Switch: Catalyst C3850-48T-S OR C2960XR-48TD	VNF Mgmt Switch: Catalyst C3850-48T-S OR C2960XR-48TD	VNF Mgmt Switch: Catalyst C3850-48T-S OR C2960XR-48TD	VNF Mgmt Switch: Catalyst C3850-48T-S OR C2960XR-48TD
RU-5	VNF Leaf TOR Switch A: Nexus 93180YC-EX	VNF Leaf TOR Switch A: Nexus 93180YC-EX	VNF Leaf TOR Switch A: Nexus 93180YC-EX	VNF Leaf TOR Switch A: Nexus 93180YC-EX
RU-6	VNF Leaf TOR Switch B: Nexus 93180YC-EX	VNF Leaf TOR Switch B: Nexus 93180YC-EX	VNF Leaf TOR Switch B: Nexus 93180YC-EX	VNF Leaf TOR Switch B: Nexus 93180YC-EX
RU-7/8	Ultra UEM 1A: UCS C240 M4 SFF	Ultra UEM 2A: UCS C240 M4 SFF	Ultra UEM 3A: UCS C240 M4 SFF	Ultra UEM 4A: UCS C240 M4 SFF
RU-9/10	Ultra UEM 1B: UCS C240 M4 SFF	Ultra UEM 2B: UCS C240 M4 SFF	Ultra UEM 3B: UCS C240 M4 SFF	Ultra UEM 4B: UCS C240 M4 SFF
RU-11/12	Empty	Empty	Empty	Empty
RU-13/14	Demux SF: UCS C240 M4 SFF	Demux SF: UCS C240 M4 SFF	Demux SF: UCS C240 M4 SFF	Demux SF: UCS C240 M4 SFF
RU-15/16	Standby SF: UCS C240 M4 SFF	Standby SF: UCS C240 M4 SFF	Standby SF: UCS C240 M4 SFF	Standby SF: UCS C240 M4 SFF
RU-17/18	Active SF 1: UCS C240 M4 SFF	Active SF 1: UCS C240 M4 SFF	Active SF 1: UCS C240 M4 SFF	Active SF 1: UCS C240 M4 SFF
RU-19/20	Active SF 2: UCS C240 M4 SFF	Active SF 2: UCS C240 M4 SFF	Active SF 2: UCS C240 M4 SFF	Active SF 2: UCS C240 M4 SFF

	Rack #1	**Rack #2**	**Rack #3**	**Rack #4**
RU-21/22	Active SF 3: UCS C240 M4 SFF	Active SF 3: UCS C240 M4 SFF	Active SF 3: UCS C240 M4 SFF	Active SF 3: UCS C240 M4 SFF
RU-23/24	Active SF 4: UCS C240 M4 SFF	Active SF 4: UCS C240 M4 SFF	Active SF 4: UCS C240 M4 SFF	Active SF 4: UCS C240 M4 SFF
RU-25/26	Active SF 5: UCS C240 M4 SFF	Active SF 5: UCS C240 M4 SFF	Active SF 5: UCS C240 M4 SFF	Active SF 5: UCS C240 M4 SFF
RU-27/28	Active SF 6: UCS C240 M4 SFF	Active SF 6: UCS C240 M4 SFF	Active SF 6: UCS C240 M4 SFF	Active SF 6: UCS C240 M4 SFF
RU-29/30	Empty	Empty	Empty	Empty
RU-31/32	Empty	Empty	Empty	Empty
RU-33/34	Empty	Empty	Empty	Empty
RU-35/36	Ultra UEM 1C,2C,3C,4C	OpenStack Control C: UCS C240 M4 SFF	Empty	Empty
RU-37/38	Ultra M Manager: UCS C240 M4 SFF	Empty	Empty	Empty
RU-39/40	OpenStack Control A: UCS C240 M4 SFF	OpenStack Control B: UCS C240 M4 SFF	Empty	Empty
RU-41/42	Empty	Empty	Empty	Empty
Cables	Controller Rack Cables	Controller Rack Cables	Controller Rack Cables	Empty
Cables	Spine Uplink/Interconnect Cables	Spine Uplink/Interconnect Cables	Empty	Empty
Cables	Leaf TOR To Spine Uplink Cables	Leaf TOR To Spine Uplink Cables	Leaf TOR To Spine Uplink Cables	Leaf TOR To Spine Uplink Cables
Cables	VNF Rack Cables	VNF Rack Cables	VNF Rack Cables	VNF Rack Cables

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, on page 2 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.

Note   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:

- **Catalyst C2960XR-48TD-I:** http://www.cisco.com/c/en/us/support/switches/catalyst-2960xr-48td-i-switch/model.html

- **Catalyst 3850 48T-S:** http://www.cisco.com/c/en/us/support/switches/catalyst-3850-48t-s-switch/model.html

- **Nexus 93180-YC-EX:** http://www.cisco.com/c/en/us/support/switches/nexus-93180yc-fx-switch/model.html

- **Nexus 9236C:** http://www.cisco.com/c/en/us/support/switches/nexus-9236c-switch/model.html

Prepare the UCS C-Series Hardware

UCS-C hardware preparation is performed through the Cisco Integrated Management Controller (CIMC). The tables in the following sections list the non-default parameters that must be configured per server type:

- Prepare the Staging Server/Ultra M Manager Node, on page 7

- Prepare the Controller Nodes, on page 7

- Prepare the Compute Nodes, on page 9

- Prepare the OSD Compute Nodes, on page 10

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-c240-m4-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.

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| **Important** | The information in this section assumes that the server hardware was properly installed per the information and instructions in Install and Cable the Hardware, on page 2. |

Prepare the Staging Server/Ultra M Manager Node

Table 3: Staging Server/Ultra M Manager Node Parameters

Parameters and Settings	**Description**
CIMC Utility Setup	
Enable IPV4 Dedicated No redundancy IP address Subnet mask Gateway address DNS address	Configures parameters for the dedicated management port.
Admin > User Management	
Username Password	Configures administrative user credentials for accessing the CIMC utility.
Admin > Communication Services	
IPMI over LAN Properties = Enabled	Enables the use of Intelligent Platform Management Interface capabilities over the management port.
Server > BIOS > Configure BIOS > Advanced	
Intel(R) Hyper-Threading Technology = Disabled	Disable hyper-threading on server CPUs to optimize Ultra M system performance.
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Info	
Status = *Unconfigured Good*	Ensures that the hardware is ready for use.

Prepare the Controller Nodes

Table 4: Controller Node Parameters

Parameters and Settings	**Description**
CIMC Utility Setup	

Parameters and Settings	Description
Enable IPV4 Dedicated No redundancy IP address Subnet mask Gateway address DNS address	Configures parameters for the dedicated management port.
Admin > User Management	
Username Password	Configures administrative user credentials for accessing the CIMC utility.
Admin > Communication Services	
IPMI over LAN Properties = Enabled	Enables the use of Intelligent Platform Management Interface capabilities over the management port.
Admin > Communication Services	
IPMI over LAN Properties = Enabled	Enables the use of Intelligent Platform Management Interface capabilities over the management port.
Server > BIOS > Configure BIOS > Advanced	
Intel(R) Hyper-Threading Technology = Disabled	Intel(R) Hyper-Threading Technology = Disabled
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Info	
Status = *Unconfigured Good*	Ensures that the hardware is ready for use.
Storage > Cisco 12G SAS Modular RAID Controller > Controller Info	
Virtual Drive Name = OS Read Policy = No Read Ahead RAID Level = RAID 1 Cache Policy: Direct IO Strip Size: 64KB Disk Cache Policy: Unchanged Access Policy: Read Write Size: 1143455 MB Write Policy: Write Through	Creates the virtual drives required for use by the operating system (OS).

Parameters and Settings	Description
Storage > Cisco 12G SAS Modular RAID Controller > Virtual Drive Info	
Initialize Type = Fast Initialize	Initializes this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and completes the initialization in the background.

Prepare the Compute Nodes

Table 5: Compute Node Parameters

Parameters and Settings	Description
CIMC Utility Setup	
Enable IPV4 Dedicated No redundancy IP address Subnet mask Gateway address DNS address	Configures parameters for the dedicated management port.
Admin > User Management	
Username Password	Configures administrative user credentials for accessing the CIMC utility.
Admin > Communication Services	
IPMI over LAN Properties = Enabled	Enables the use of Intelligent Platform Management Interface capabilities over the management port.
Server > BIOS > Configure BIOS > Advanced	
Intel(R) Hyper-Threading Technology = Disabled	Intel(R) Hyper-Threading Technology = Disabled
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Info	
Status = *Unconfigured Good*	Ensures that the hardware is ready for use.
Storage > Cisco 12G SAS Modular RAID Controller > Controller Info	

Parameters and Settings	Description
Virtual Drive Name = BOOTOS Read Policy = No Read Ahead RAID Level = RAID 1 Cache Policy: Direct IO Strip Size: 64KB Disk Cache Policy: Unchanged Access Policy: Read Write Size: 1143455 MB Write Policy: Write Through	Creates the virtual drives required for use by the operating system (OS).
Storage > Cisco 12G SAS Modular RAID Controller > Virtual Drive Info, BOOTOS	
Initialize Type = Fast Initialize	Initializes this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and completes the initialization in the background.
Set as Boot Drive	Sets the BOOTOS virtual drive as the system boot drive.

Prepare the OSD Compute Nodes

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Note   OSD Compute Nodes are only used in Hyper-converged Ultra M models as described in UCS C-Series Servers.

Table 6: OSD Compute Node Parameters

Parameters and Settings	Description
CIMC Utility Setup	
Enable IPV4 Dedicated No redundancy IP address Subnet mask Gateway address DNS address	Configures parameters for the dedicated management port.
Admin > User Management	

Parameters and Settings	Description
Username Password	Configures administrative user credentials for accessing the CIMC utility.
Admin > Communication Services	
IPMI over LAN Properties = Enabled	Enables the use of Intelligent Platform Management Interface capabilities over the management port.
Server > BIOS > Configure BIOS > Advanced	
Intel(R) Hyper-Threading Technology = Disabled	Intel(R) Hyper-Threading Technology = Disabled
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Info	
Status = *Unconfigured Good*	Ensures that the hardware is ready for use.
SLOT-HBA Physical Drive Numbers = 1 2 3 7 8 9 10	Ensure the UCS slot host-bus adapter for the drives are configured accordingly.
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Number = 1	
Virtual Drive Name = BOOTOS Read Policy = No Read Ahead RAID Level = RAID 1 Cache Policy: Direct IO Strip Size: 64KB Disk Cache Policy: Unchanged Access Policy: Read Write Size: 285148 MB Write Policy: Write Through	Creates a virtual drive leveraging the storage space available to physical drive number 1. **Note** Ensure that the size of this virtual drive is less than the size of the designated journal and storage drives.
Storage > Cisco 12G SAS Modular RAID Controller > Virtual Drive Info, BOOTOS, Physical Drive Number = 1	

Parameters and Settings	Description
Initialize Type = Fast Initialize	Initializes this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and completes the initialization in the background.
Set as Boot Drive	Sets the BOOTOS virtual drive as the system boot drive.
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Number = 2	
Virtual Drive Name = BOOTOS Read Policy = No Read Ahead RAID Level = RAID 1 Cache Policy: Direct IO Strip Size: 64KB Disk Cache Policy: Unchanged Access Policy: Read Write Size: 285148 MB Write Policy: Write Through	Creates a virtual drive leveraging the storage space available to physical drive number 2. **Note** Ensure that the size of this virtual drive is less than the size of the designated journal and storage drives.
Storage > Cisco 12G SAS Modular RAID Controller > Virtual Drive Info, BOOTOS, Physical Drive Number = 2	
Initialize Type = Fast Initialize	Initializes this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and completes the initialization in the background.
Set as Boot Drive	Sets the BOOTOS virtual drive as the system boot drive.
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Number = 3	
Virtual Drive Name = JOURNAL Read Policy = No Read Ahead RAID Level = RAID 0 Cache Policy: Direct IO Strip Size: 64KB Disk Cache Policy: Unchanged Access Policy: Read Write Size: 456809 MB Write Policy: Write Through	Creates a virtual drive leveraging the storage space available to physical drive number 3.
Storage > Cisco 12G SAS Modular RAID Controller > Virtual Drive Info, JOURNAL, Physical Drive Number = 3	

Parameters and Settings	Description
Initialize Type = Fast Initialize	Initializes this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and completes the initialization in the background.
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Number = 7	
Virtual Drive Name = OSD1 Read Policy = No Read Ahead RAID Level = RAID 0 Cache Policy: Direct IO Strip Size: 64KB Disk Cache Policy: Unchanged Access Policy: Read Write Size: 1143455 MB Write Policy: Write Through	Creates a virtual drive leveraging the storage space available to physical drive number 7.
Storage > Cisco 12G SAS Modular RAID Controller > Virtual Drive Info, OSD1, Physical Drive Number = 7	
Initialize Type = Fast Initialize	Initializes this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and completes the initialization in the background.
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Number = 8	
Virtual Drive Name = OSD2 Read Policy = No Read Ahead RAID Level = RAID 0 Cache Policy: Direct IO Strip Size: 64KB Disk Cache Policy: Unchanged Access Policy: Read Write Size: 1143455 MB Write Policy: Write Through	Creates a virtual drive leveraging the storage space available to physical drive number 8.
Storage > Cisco 12G SAS Modular RAID Controller > Virtual Drive Info, OSD2, Physical Drive Number = 8	
Initialize Type = Fast Initialize	Initializes this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and completes the initialization in the background.
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Number = 9	

Parameters and Settings	Description
Virtual Drive Name = OSD3 Read Policy = No Read Ahead RAID Level = RAID 0 Cache Policy: Direct IO Strip Size: 64KB Disk Cache Policy: Unchanged Access Policy: Read Write Size: 1143455 MB Write Policy: Write Through	Creates a virtual drive leveraging the storage space available to physical drive number 9.
Storage > Cisco 12G SAS Modular RAID Controller > Virtual Drive Info, OSD3, Physical Drive Number = 9	
Initialize Type = Fast Initialize	Initializes this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and completes the initialization in the background.
Storage > Cisco 12G SAS Modular RAID Controller > Physical Drive Number = 10	
Virtual Drive Name = OSD4 Read Policy = No Read Ahead RAID Level = RAID 0 Cache Policy: Direct IO Strip Size: 64KB Disk Cache Policy: Unchanged Access Policy: Read Write Size: 1143455 MB Write Policy: Write Through	Creates a virtual drive leveraging the storage space available to physical drive number 10.
Storage > Cisco 12G SAS Modular RAID Controller > Virtual Drive Info, OSD4, Physical Drive Number = 10	
Initialize Type = Fast Initialize	Initializes this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and completes the initialization in the background.

Deploy the Virtual Infrastructure Manager

Within the Ultra M solution, OpenStack Platform Director (OSP-D) functions as the virtual infrastructure manager (VIM).

The method by which the VIM is deployed depends on the architecture of your Ultra M model. Refer to the following section for information related to your deployment scenario.

Deploy the VIM for Hyper-Converged Ultra M Models

Deploying the VIM for Hyper-Converged Ultra M Models is performed using an automated workflow enabled through software modules within Ultra Automation Services (UAS). These services leverage user-provided configuration information to automatically deploy the VIM Orchestrator (Undercloud) and the VIM (Overcloud).

For information on using this automated process, in the *USP Deployment Automation Guide*, refer to the *Virtual Infrastructure Manager Installation Automation* section.

Deploy the USP-Based VNF

After the OpenStack Undercloud (VIM Orchestrator) and Overcloud (VIM) have been successfully deployed on the Ultra M hardware, you must deploy the USP-based VNF.

This process is performed through the Ultra Automation Services (UAS). UAS is an automation framework consisting of a set of software modules used to automate the USP-based VNF deployment and related components such as the VNFM.

For detailed information on the automation workflow, refer to the *Ultra Service Platform Deployment Automation Guide*.