Cisco Virtual Wireless Controller Deployment Guide, Release 7.5

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Contents

Cisco Systems, Inc.
www.cisco.com

Introduction

Prior to release 7.3, wireless LAN (WLAN) controller software ran on dedicated hardware you were expected to purchase. The Virtual Wireless LAN Controller (vWLC) runs on general hardware under an industry standard virtualization infrastructure. The vWLC is ideal for small and mid-size deployments with a virtual infrastructure and require an on-premises controller. Distributed branch environments can also benefit with a centralized virtual controller with fewer branches required (up to 200). This document is an update for vWLC based on the CUWN 7.5 software release.

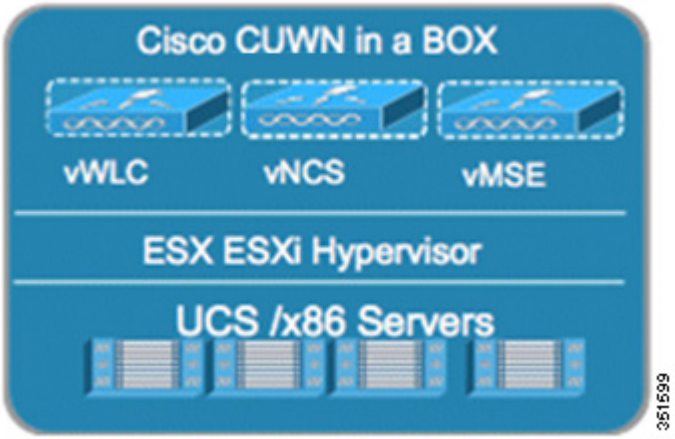
vWLCs are not a replacement of shipping hardware controllers. The function and features of the vWLC offer deployment advantages and benefits of controller services where data centers with virtualization infrastructure exist or are considered.

Advantages of the vWLC:

- Flexibility in hardware selection based on your requirements.
- Reduced cost, space requirements, and other overheads since multiple boxes can be replaced with single hardware running multiple instances of controllers, Prime Infrastructure (PI) and other servers (ISE, MSE, VSG / firewall).
- Independent and mutually exclusive instances allow administrators to use multiple virtual controllers to manage different campuses (or even to manage multiple customer sites) using the same hardware.
- Enable features provided by the virtualization software, including High Availability, failover protection, and ease of migration.

VMware benefits with the vWLC:

- vSphere: A virtualization infrastructure package from VMware, which includes ESX/ESXi hypervisor, vMotion, DRS, HA, Fault Tolerance, vSphere Distributed Switch, and more.
- vCenter Server: The VMware vCenter Server (formerly VMware VirtualCenter) provides a scalable and extensible platform that forms the foundation for virtualization management:
  - Centralized control and visibility at every level of virtual infrastructure
  - Pro-active management with vSphere
  - Scalable and extensible management platform with a broad partner ecosystem



Prerequisites

Virtual Controller Release 7.5 Support

- Platform: AIR-CTVM-K9
- Hardware: Cisco UCS, HP and IBM servers, Cisco Services-Ready Engine (SRE) or UCS E-Series Servers for Integrated Services Routers G2 (UCS-E)
- VMware OS: ESX/ESXi 4.x/5.x
- FlexConnect Mode: central and local switching
- Licensing: Node locked licenses to UDI (eval 60 days)
- Maximum number of access points (APs): 200
- Maximum number of Clients: 3000
- Maximum number of sites up to 200
- Throughput performance up to 500 Mbps per virtual controller
- Management with Cisco Prime Infrastructure 1.2 and above

Virtual WLAN Controller Release 7.5 Unsupported Features

- Internal DHCP server
- TrustSec SXP
- Access points in local mode
- Mobility/guest anchor
- Multicast

Note FlexConnect local switched multicast traffic is bridged transparently for both wired and wireless on the same VLAN. FlexConnect access points do not limit traffic that is based on IGMP or MLD snooping.

- High Availability
- PMIPv6
- WGB
- VideoStream
- Outdoor mesh access points

Note Outdoor AP in FlexConnect mode is supported.

- Indoor mesh access points
- Application Visibility and Control (AVC)
- Client downstream rate limiting for central switching

Virtual WLAN Controller Release 7.5 Enhancements

- Data DTLS
- AP Enforced Rate Limiting
- Additional FlexConnect Enhancements (see release notes for more information.)

Single Virtual Controller Resource Requirement

- CPU: 1 virtual CPU
- Memory: 2 GB
- Disk Space: 8 GB
- Network Interfaces: 2 or more virtual Network Interface cards (vNICs)

Suggested Hardware Recommendations for Hosting Cisco Virtual Controllers

- UCS R210-2121605W Rack Mount Server (2 RU):
  - 2 * Intel Xeon CPU X5670 @ 2.93 GHz
  - 16 G memory
- BM x3550 M3 Server:
  - 2 * Intel Xeon 5600 series processors with 4 cores each and each core capable of doing hyper threading which gives you 16 CPUs in total @3.6 GHz
  - 12G memory
- ISR G2 Services Ready Engine (SRE) :
  - SRE 700/710: Single Core Intel Core Duo 1.86 GHz with 4 GB memory
  - SRE 900/910: Dual Core Intel Core Duo 1.86 GHz with 4 GB memory (upgradable to 8 GB)
- UCS E-Series Servers
  - UCS E140/160 Single and Double-Wide Blade: 4-6 Cores with up to 48 GB memory.

AP Requirement

- All 802.11n APs with required software version 7.5 and above are supported.
- APs will be operating in FlexConnect mode only.
- AP autoconvert to FlexConnect is supported on controller.
- New APs ordered will ship with minimum 7.5 software from manufacturing.
- Existing APs must be upgraded to 7.5 software before joining a virtual controller.
- For Cisco 600 Series OEAP to associate with Cisco Virtual Wireless LAN Controller, follow these steps:

1. Configure the OEAP to associate with a physical controller that is using 7.5 or a later release and download the corresponding AP image.

2. Configure the OEAP so that the OEAP does not associate with the physical controller again; for example, you can implement an ACL in the network to block CAPWAP between the OEAP and the physical controller.
3. Configure the OEAP to associate with the Cisco Virtual Wireless LAN Controller.

Note The Virtual Controller in release 7.5 uses Self Signed Certificates (SSC) as against the Manufacturing Installed Certificates (MIC) in the traditional controller. The AP will be able to validate the SSC certificate provided by the virtual controller before joining. See AP Considerations in the following link: http://www.cisco.com/en/US/products/ps12723/products_tech_note09186a0080bd2d04.shtml#tshoot

Components Used

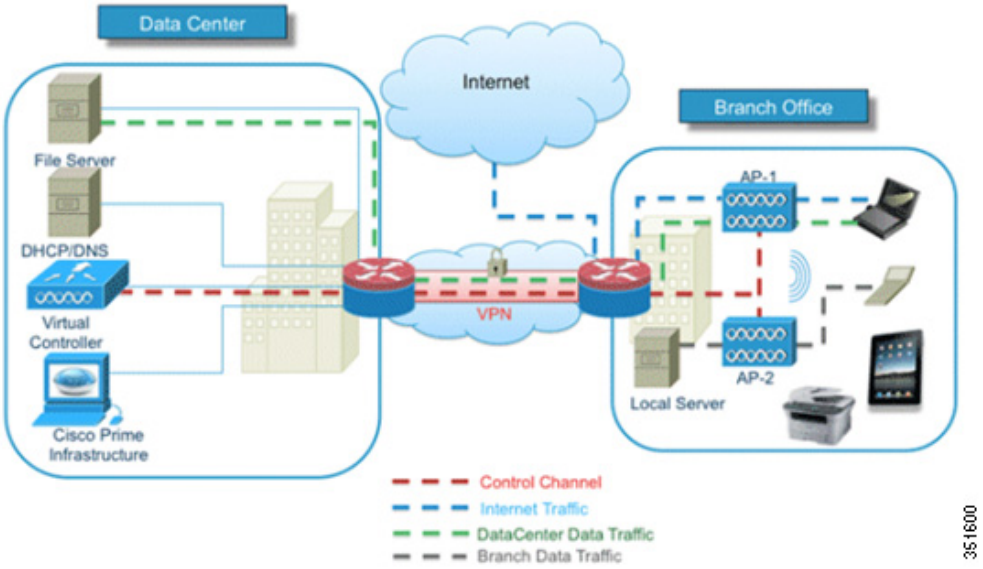
The information in this document is based on these software and hardware versions:

- Cisco Catalyst Switch
- Wireless LAN Controllers Virtual Appliance
- Wireless LAN Controller 7.5 Software
- Cisco Prime Infrastructure 1.4
- 802.11n Access Points in FlexConnect Mode
- DHCP server
- DNS Server
- NTP
- Wireless Client Laptop, Smartphone, and Tablets (Apple iOS, Android, Windows, and Mac)

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Topology

In order to properly implement and test the Cisco vWLC, a minimal network setup is required, similar to the diagram shown in this section. You need to simulate a location with a FlexConnect AP in a centrally switched deployment, and/or with the addition of local and remote sites with local DHCP (better if there is also a DNS and local access to Internet).



Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Release Notes

Cisco Unified Wireless Network (CUWN) 7.5 Release Notes contain important information about this release. Log in to Cisco.com for the latest release notes before loading and testing software.
http://www.cisco.com/en/US/docs/wireless/controller/release/notes/crn75.html

Deploying Virtual WLC on UCS-E Modules for ISR-G2

Complete GUI and CLI configuration guides for UCS-E modules can be found on the links below. This document only provides the instructions the user needs to perform to install vWLC on a new out of the box UCS-E module.

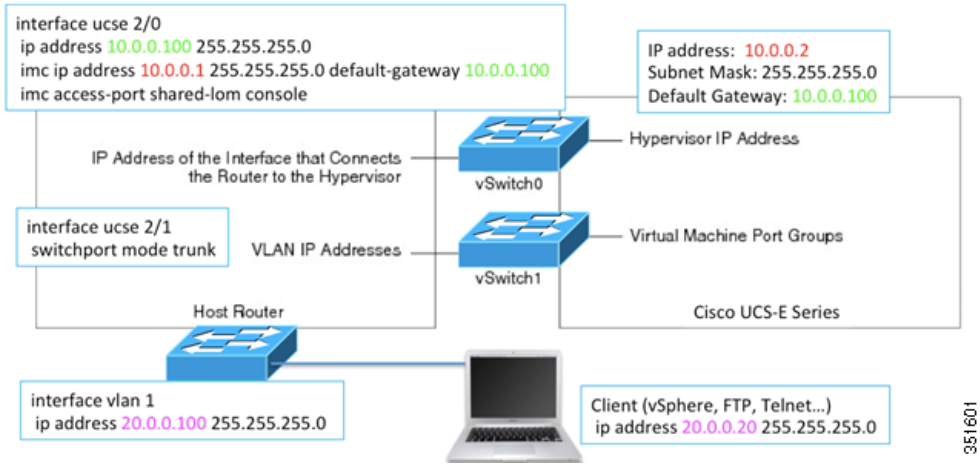
GUI

http://www.cisco.com/en/US/docs/unified_computing/ucs/e/1.0/sw/gui/config/guide/b_GUI_Configuration_Guide.html

CLI

http://www.cisco.com/en/US/docs/unified_computing/ucs/e/1.0/sw/cli/config/guide/b_CLI_Configuration_Guide.html

Figure 1 Configuration Example for Deploying UCS-E Module for the ISR-G2



Loading ISR-G2 Image

Complete these steps:

Step 1 Load an image on ISR-G2 that supports the UCE-E module. This example uses 15.2(4)M2 on c3900 platform.

```
Router#show ver
Cisco IOS Software, C3900 Software (C3900-UNIVERSALK9-M), Version 15.2(4)M2, RELEASE
SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2012 by Cisco Systems, Inc.
Compiled Wed 07-Nov-12 17:00 by prod_rel_team

ROM: System Bootstrap, Version 15.0(1r)M8, RELEASE SOFTWARE (fc1)
Router uptime is 46 minutes
System returned to ROM by power-on
System image file is "flash:c3900-universalk9-mz.SPA.152-4.M2.bin"
```

IP Address, Default Gateway, and Routing Configuration on UCS-E Modules

Step 2 To configure IP address and default gateway on the UCS-E module interface.

```
interface ucse2/0
 ip address 10.0.0.100 255.255.255.0
 imc ip address 10.0.0.1 255.255.255.0 default-gateway 10.0.0.100
 imc access-port shared-lom console
!
!
interface ucse2/1
```

```
 description Internal switch interface connected to Service Module
 switchport mode trunk
 no ip address
!
```

Step 3 To add UCS-E module's IP address routing to the ISR-G2 router.

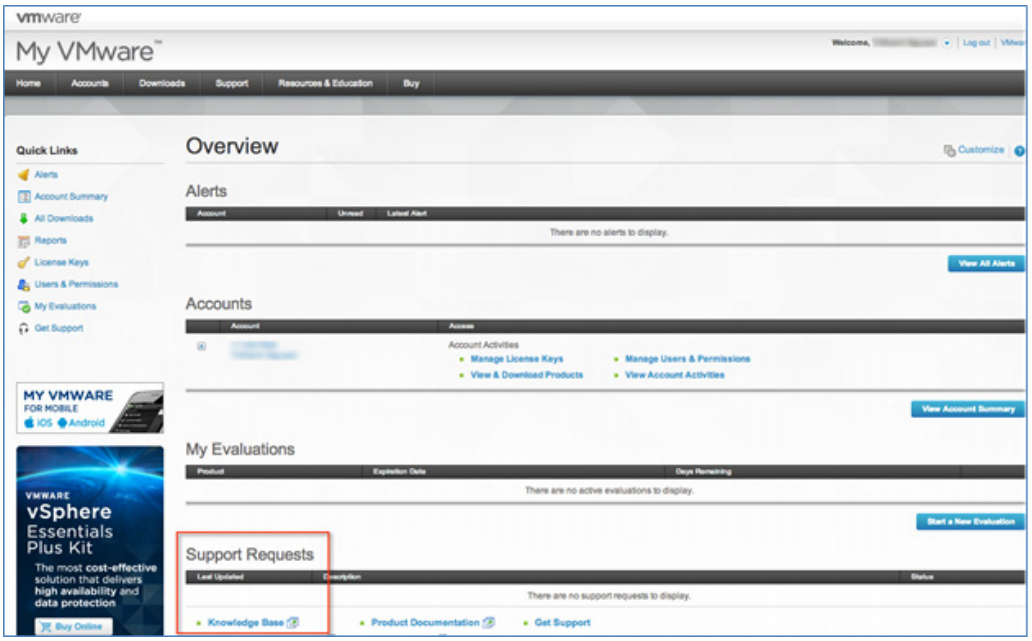
```
ip route 10.0.0.2 255.255.255.255 ucse2/0
```

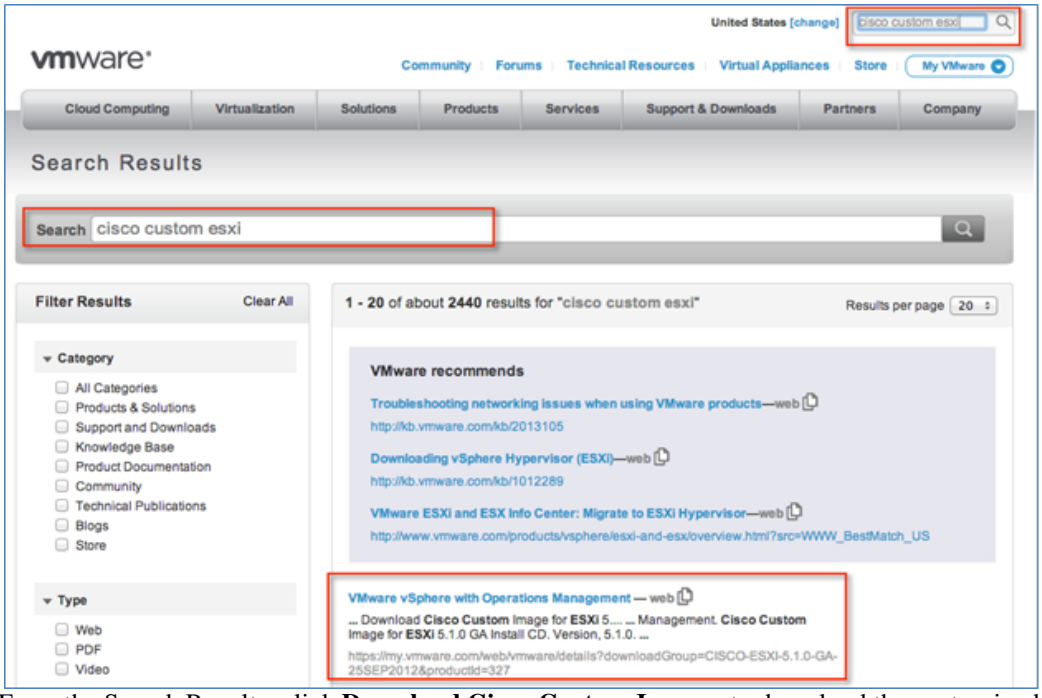
Download the Customized VMWare Hypervisor Image for UCS-E

Step 4 Go to https://my.vmware.com/web/vmware/login to get the customized Hypervisor image. The VMware login page appears.

a. Enter your VMware credentials, and then click **Log In**. If you do not have an account with VMware, click **Register** to create a free account.

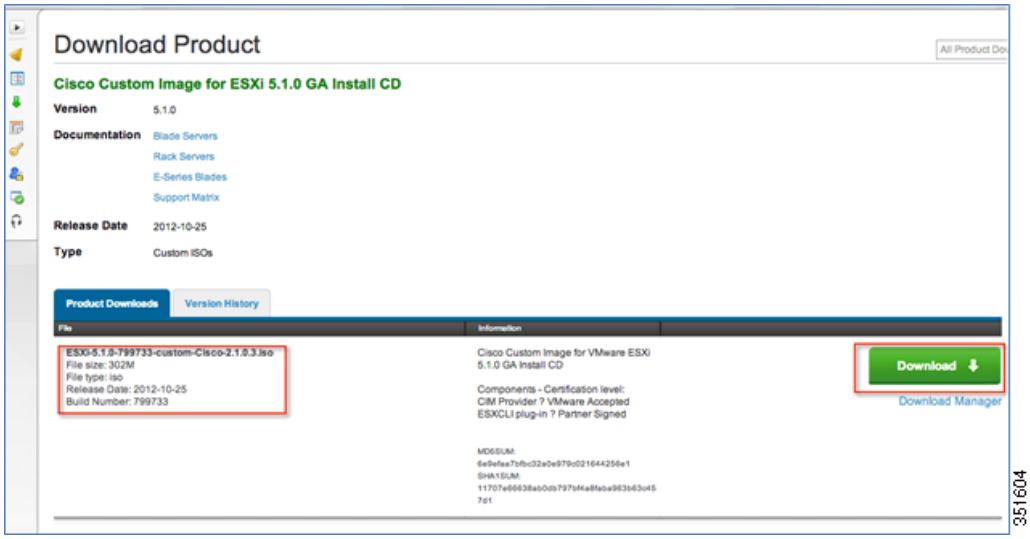
b. Under the **Support Requests** pane, click **Knowledge Base**. In the Search field located on the top right corner, enter **cisco custom esxi**, and then click **Search**.





Step 5 From the Search Results, click **Download Cisco Custom Image..** to download the customized VMware vSphere Hypervisor™ image. This has been tested with the following .iso:

- ESXi-5.0.0-623860-custom-Cisco-2.0.1.6.iso
- ESXi-5.1.0-799733-custom-Cisco-2.1.0.3.iso



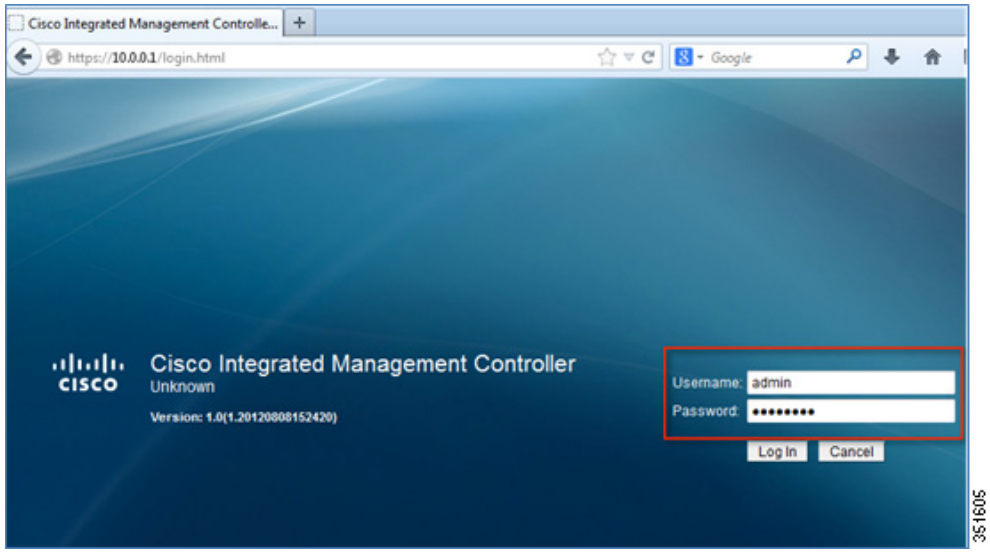
VMWare Hypervisor Image Installation on UCS-E Module

The user can use GUI method or CLI method to perform this procedure. Both methods are provided below.

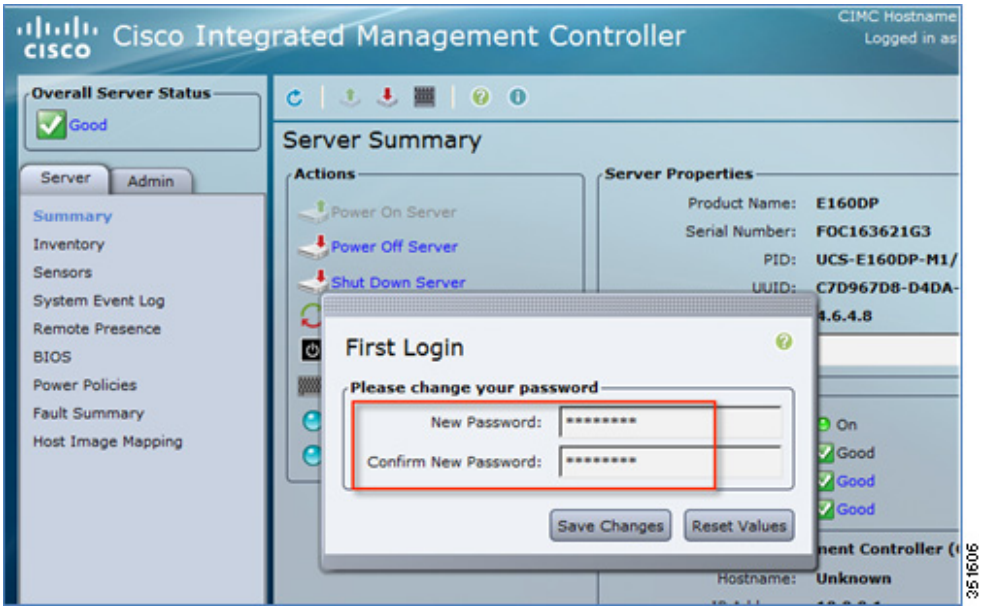
GUI Method using Cisco Integrated Management Controller (CIMC) Interface

Step 6 Open a browser and enter `http://<CIMC _ip address>` (e.g.10.0.0.1 as configured above).

a. For a new unit, enter **admin** as username and **password** as password.



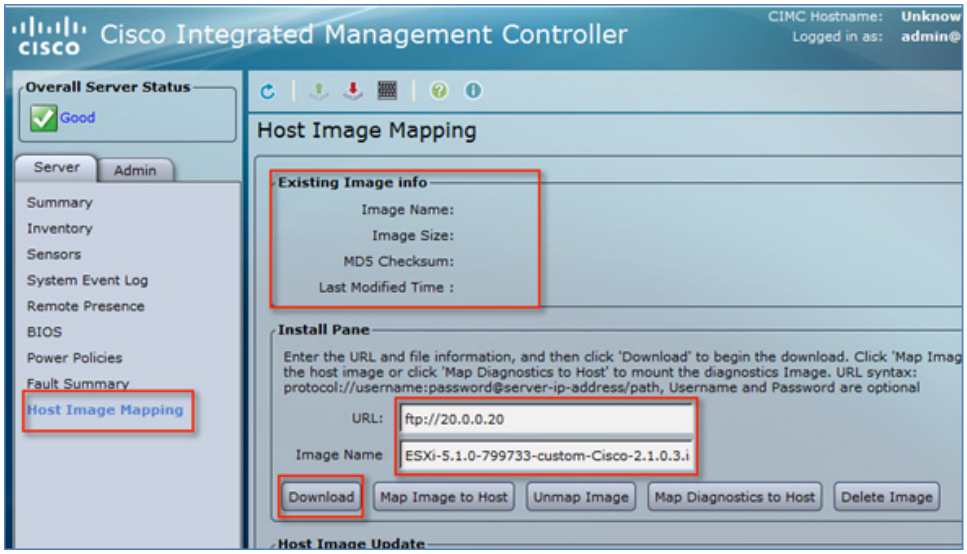
Step 7 CIMC will prompt for a new password – enter new password, then save changes.

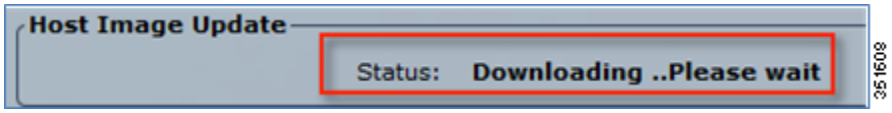


Step 8 Once successfully logged into the CIMC, navigate to **Host Image Mapping** option in the **Server** tab.

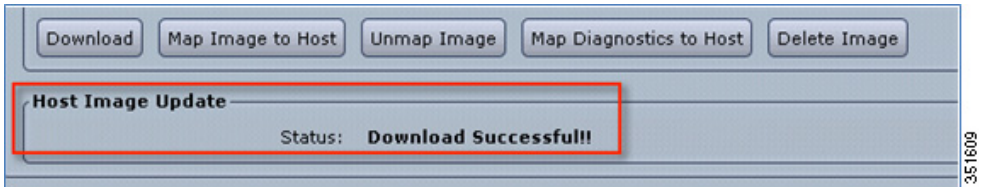
a. Enter the URL and path to download the Hypervisor image for UCS-E in the **Install** pane – in this example we are using an FTP server that is also hosting the ISO file.

b. Select download to begin the image download. **Host Image Update** status should indicate **Downloading**



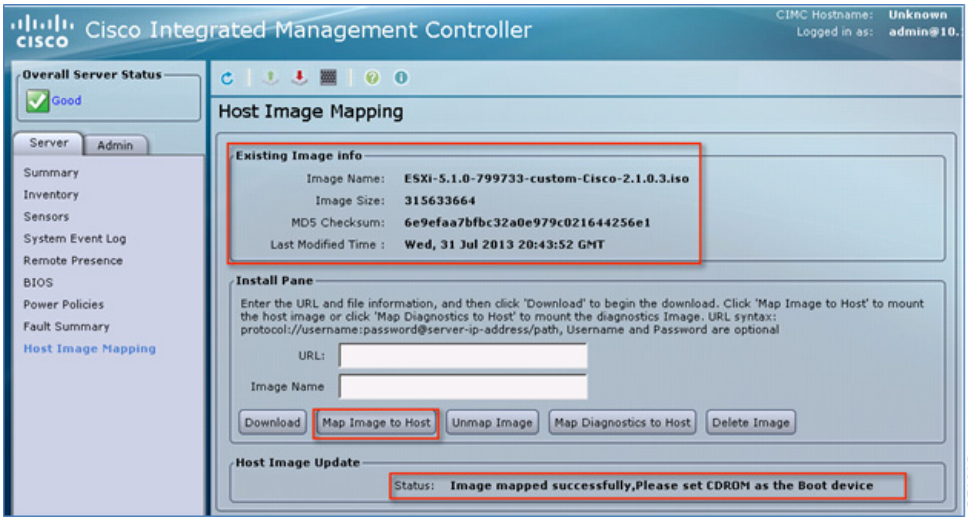


Step 9 Verify that download of the VMWare Hypervisor image on to the UCS-E is completed successfully as indicated in **Host Image Update** status.

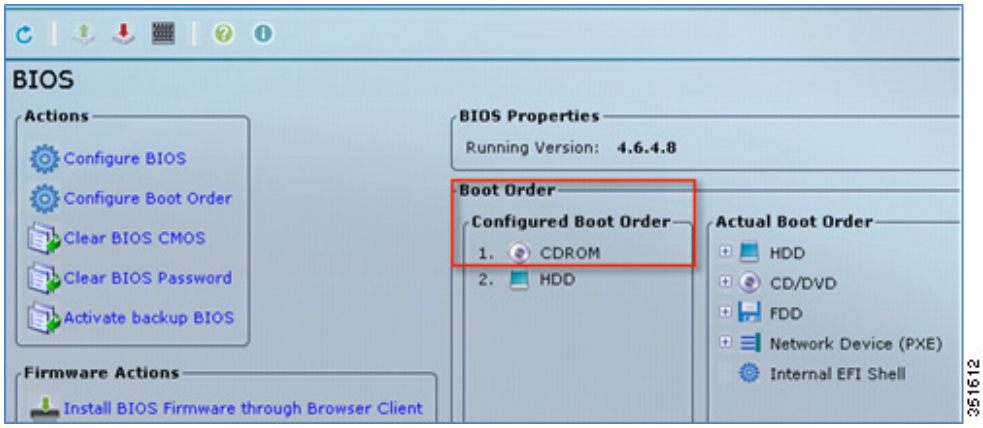


Step 10 Next, select **Map Image to Host** and verify that the image information is shown in **Existing Image Info**

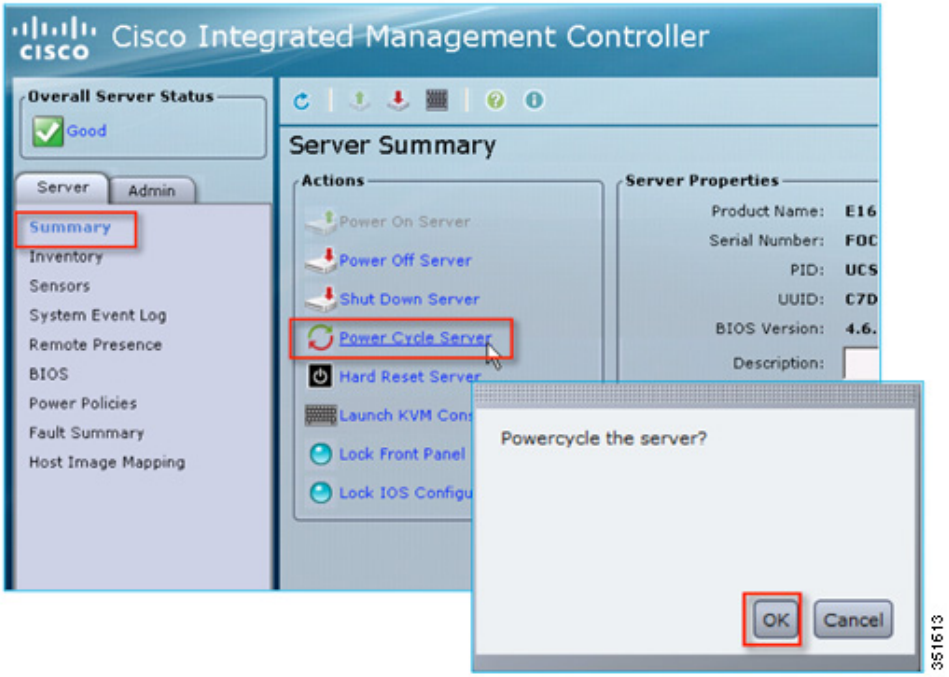
a. Verify that the image is successfully mapped by confirming the status under **Host Image Update** status section.



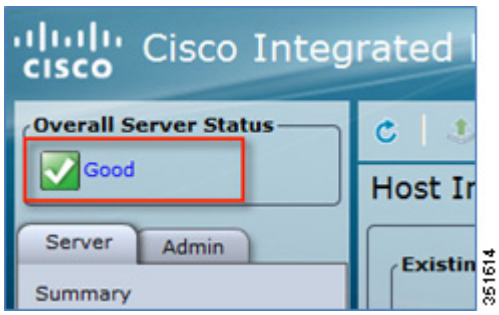
Step 11 Next, navigate to the **BIOS** option to configure the Boot Order to match the Host Image Update status. (to CDROM as the Boot device in this example)



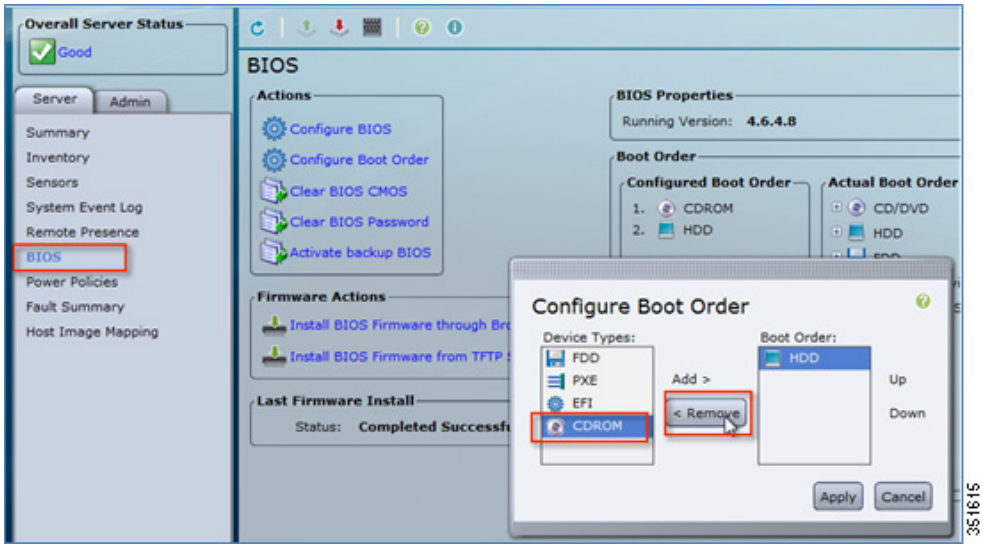
Step 12 After adding the CDROM as the primary device in the Boot Order, reboot the UCS-E server by navigating to **Summary > Power Cycle Server**

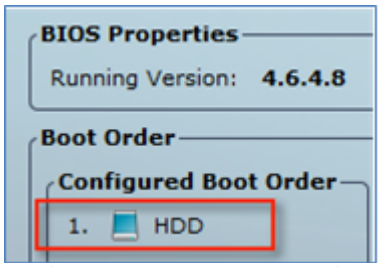


Step 13 Verify that the UCS-E server reboots successfully as indicated in **Overall Server Status** in **Good** state.

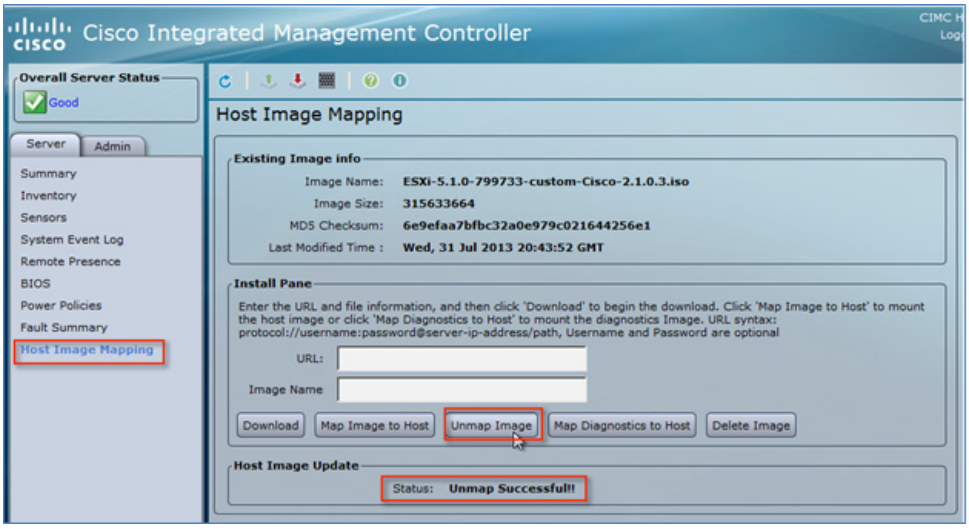


Step 14 Navigate back to **BIOS** option in the **Server** tab and change the Boot Order back to its original Boot Order (in this example, HDD is the primary Boot device.)





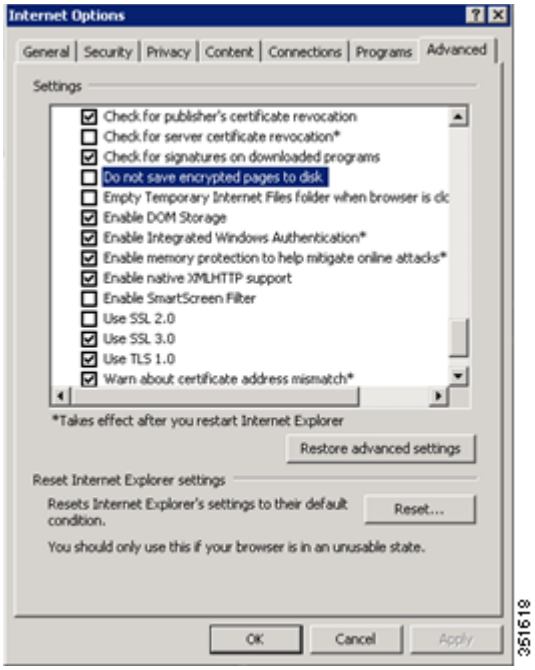
Step 15 Navigate to Host Image Mapping option and then select the **Unmap Image** option. **Host Image Update** Status will show **Unmap Successful.**



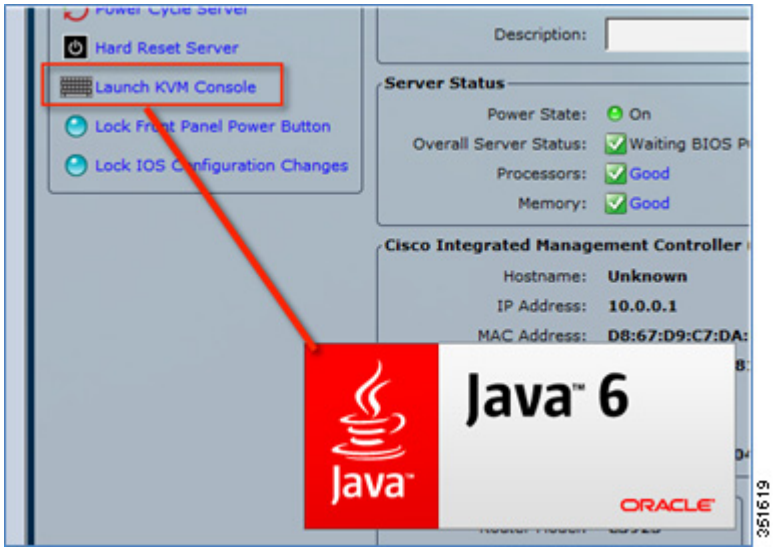
Installation with KVM Console on UCS-E Module

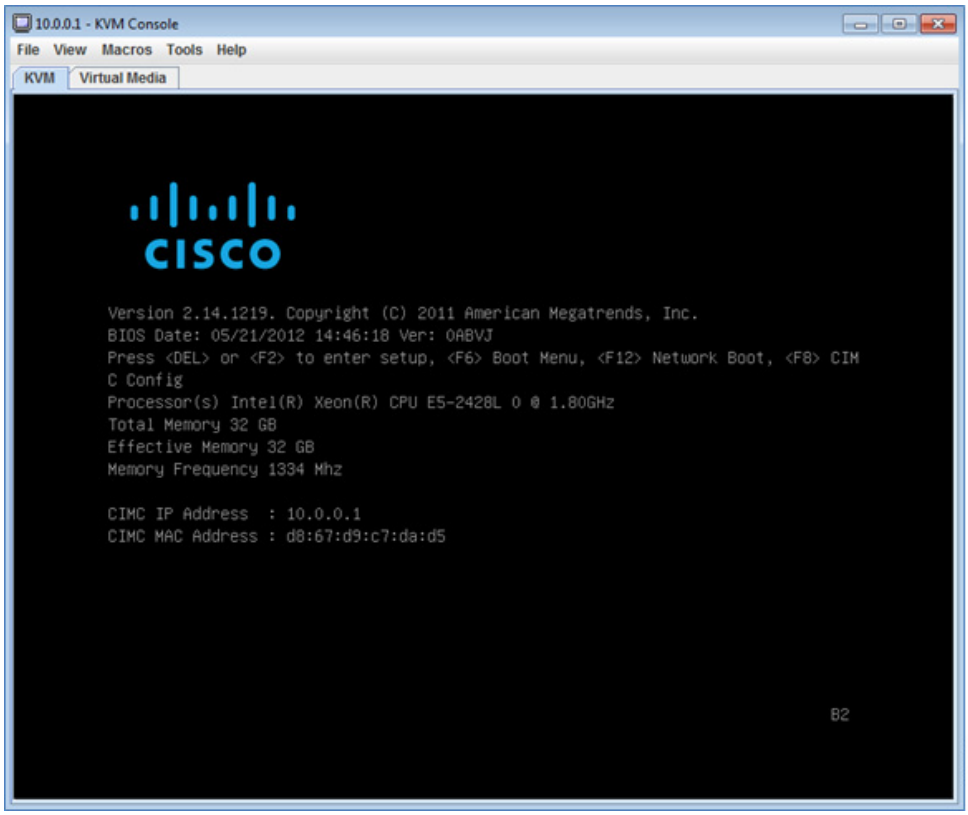
The UCS-E provides a VGA connection and USB ports from the front panel for monitor display and keyboard connection; however, in this example, the CIMC will be used to launch KVM console to assist with VMware installation. Note that Java software plugin is required with compatible browsers.

Step 16 If using IE explorer and KVM console session fails to launch with an error indicating unable to connect, navigate to **Tools > Internet Options > Advanced** and uncheck **Do not save encrypted pages to disk** option.

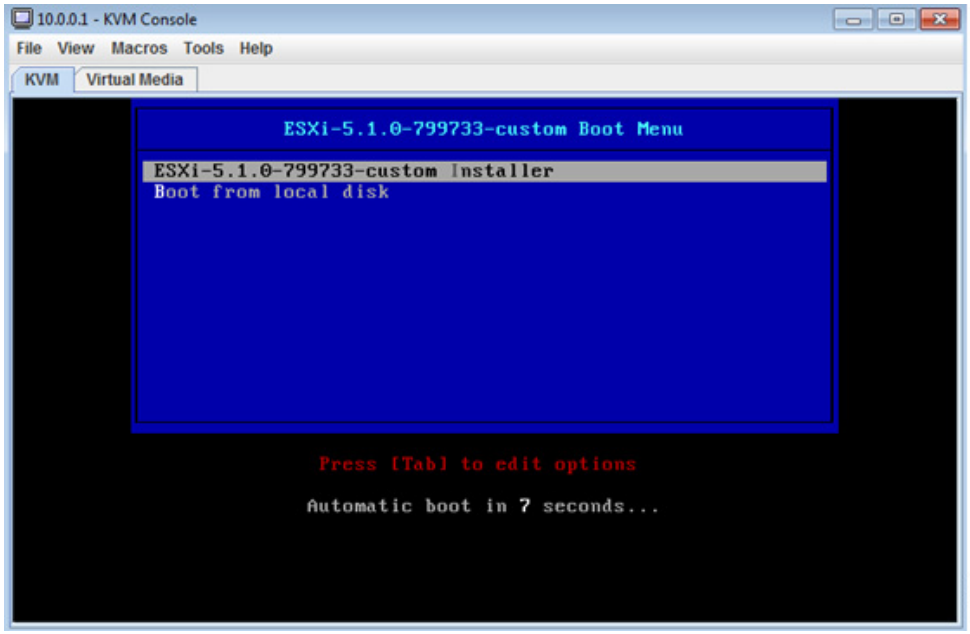


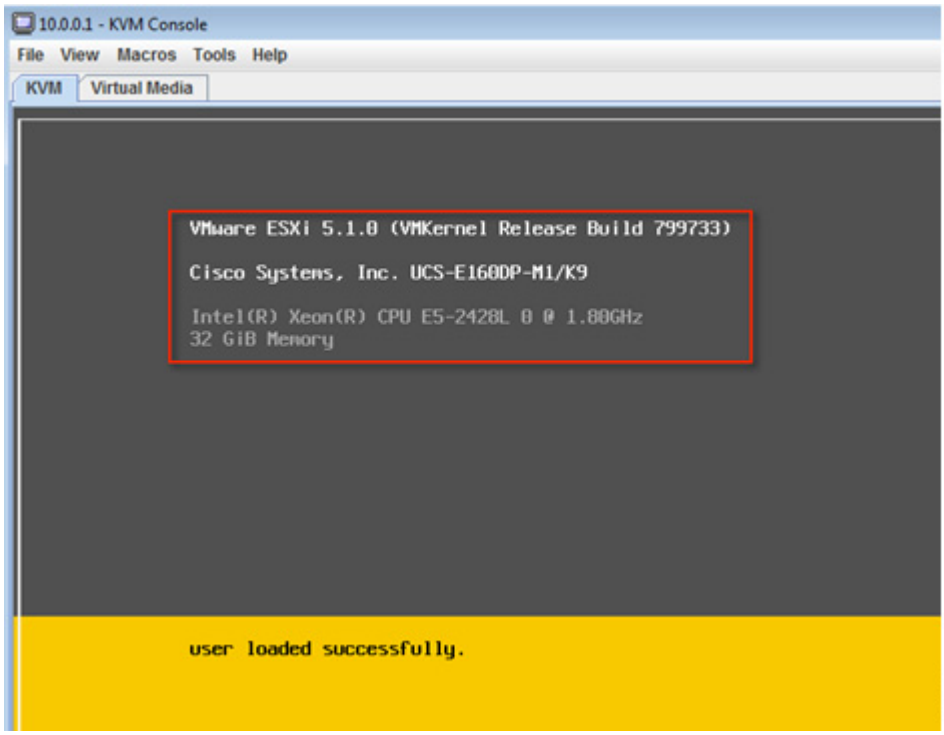
Step 17 From CIMC > Summary > launch KVM console.



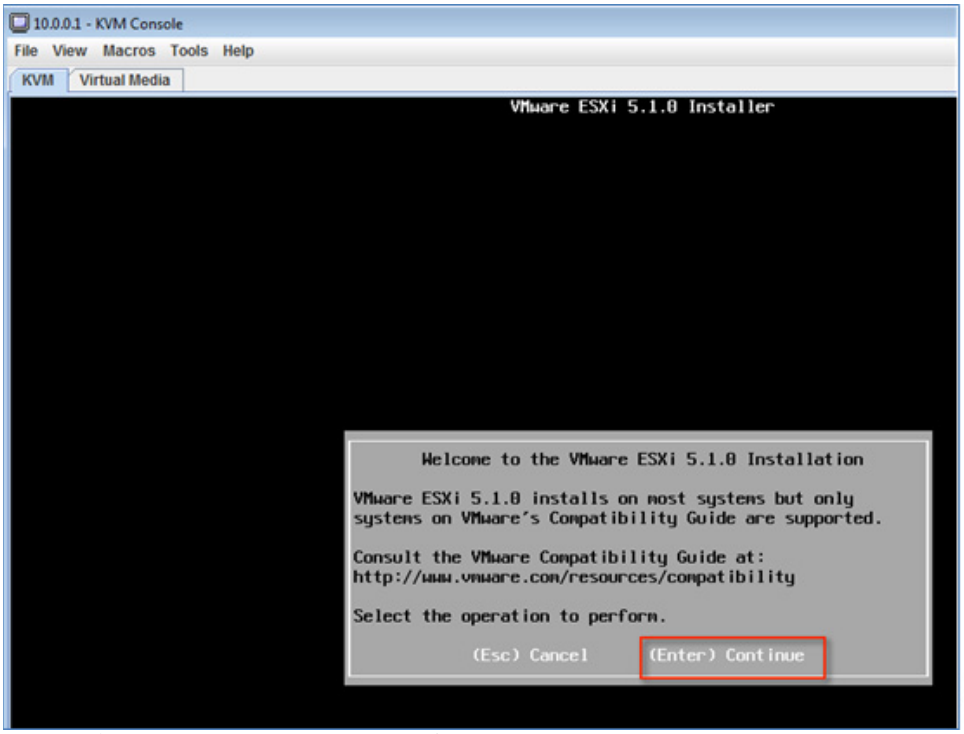


Step 18 In the KVM console, monitor the output throughout the VMware software installation.

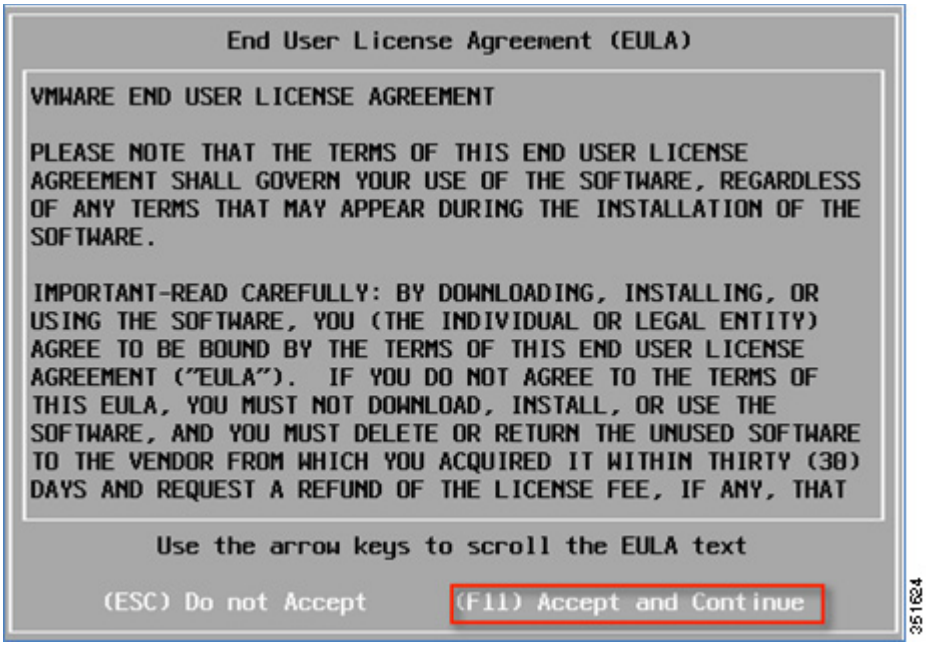




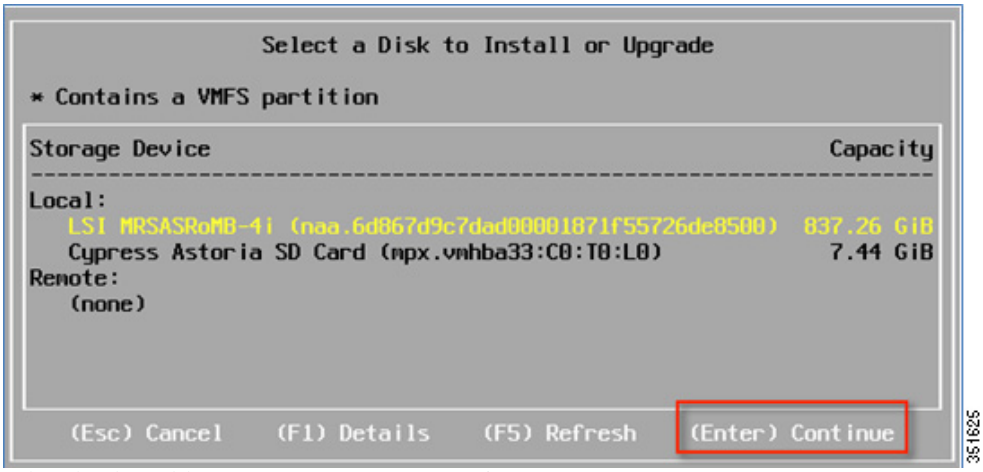
Step 19 VMware installer will prompt at the welcome screen to continue. Press **Enter**



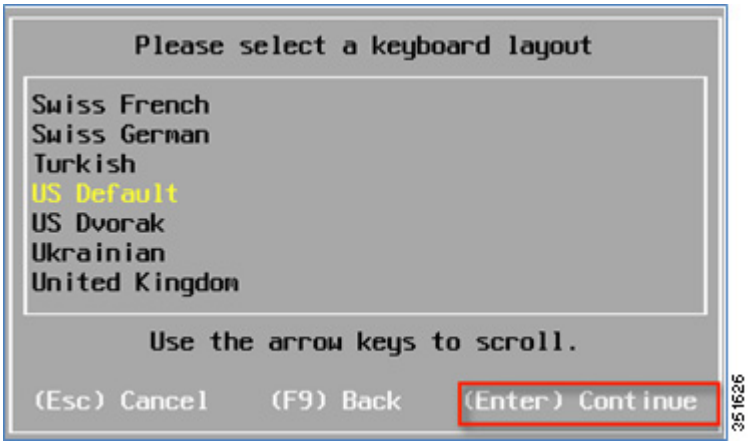
Step 20 Accept the EULA–press "F11" to continue.



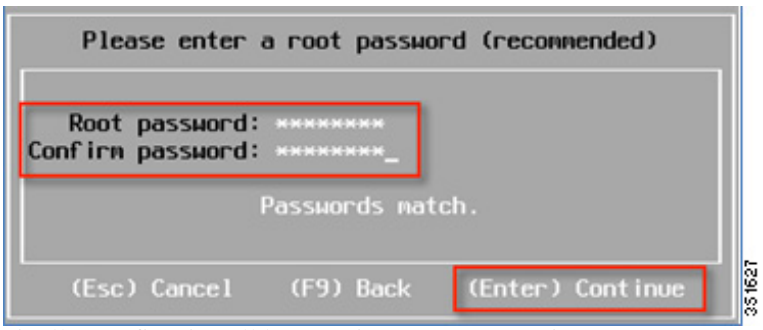
Step 21 Make a Disk (or accept default) selection to install, press **Enter** to continue.



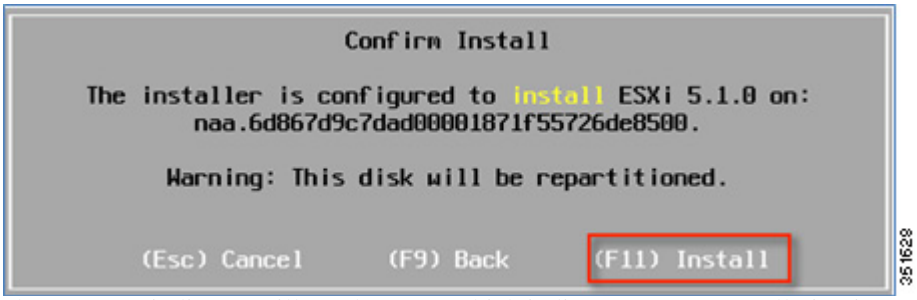
Step 22 Select keyboard layout, press **Enter** to continue.



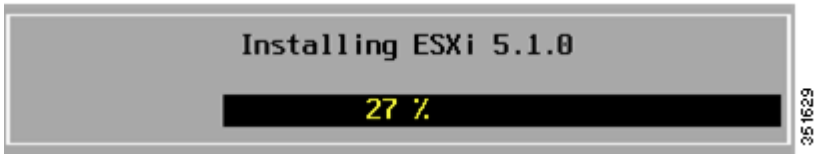
Step 23 Enter root password, press **Enter** to continue.

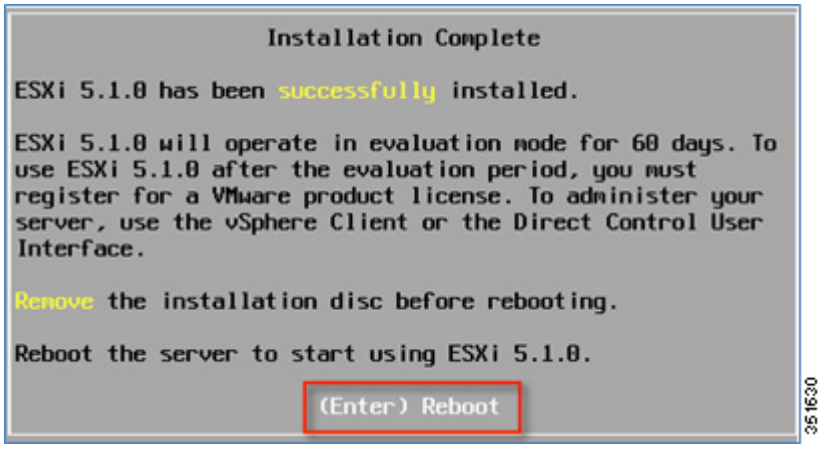


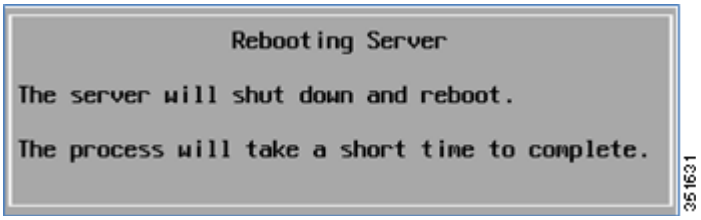
Step 24 Finally, confirm install by pressing “F11” to continue.



Step 25 The progress indicator will reach 100%, which indicates prompt Installation is Complete, press ‘Enter’ to continue with a Reboot.



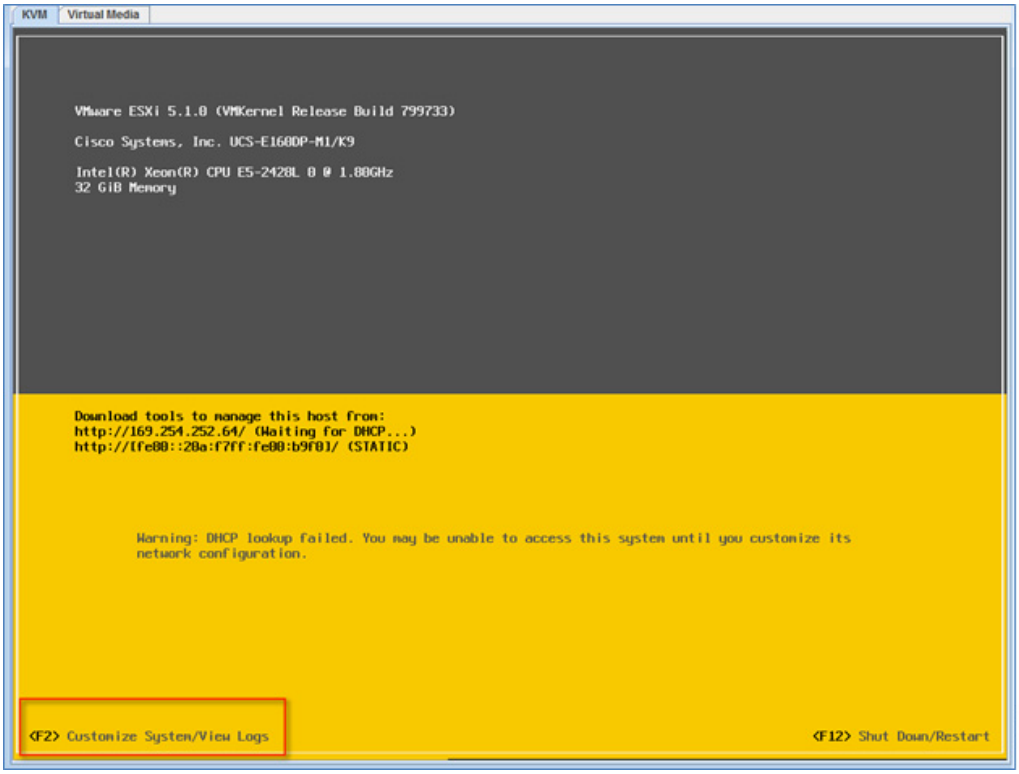


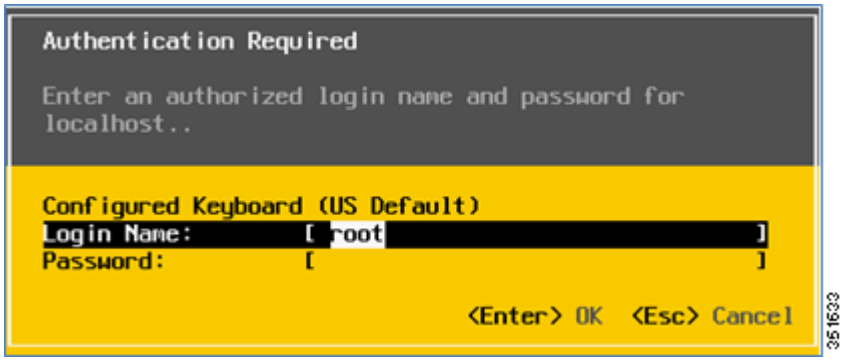


Assign Network and Static IP Address to the VMWare vSphere Hypervisor

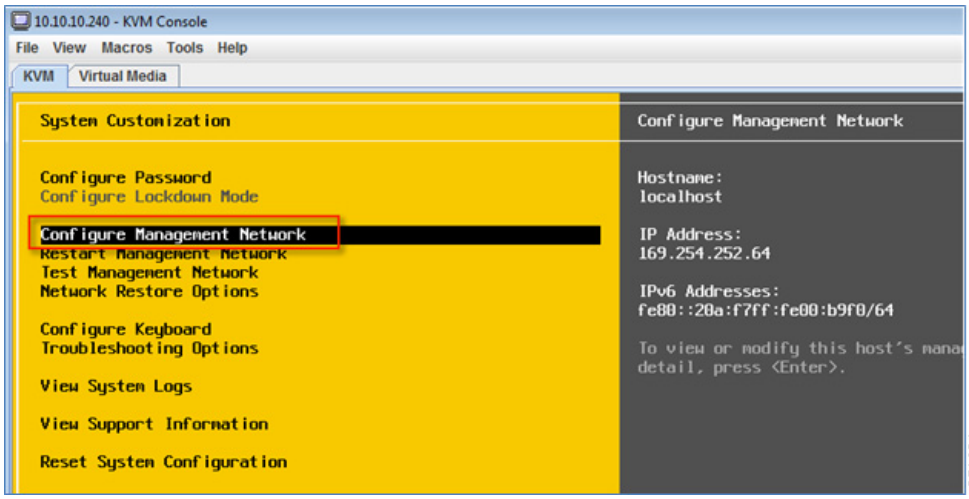
Step 26 Launch KVM console from the CIMC's Action area of the **Server** tab

a. Once the KVM console is successfully launched, enter "F2" to enter the Customize System option. Select username and password for vSphere Hypervisor (previously configured).





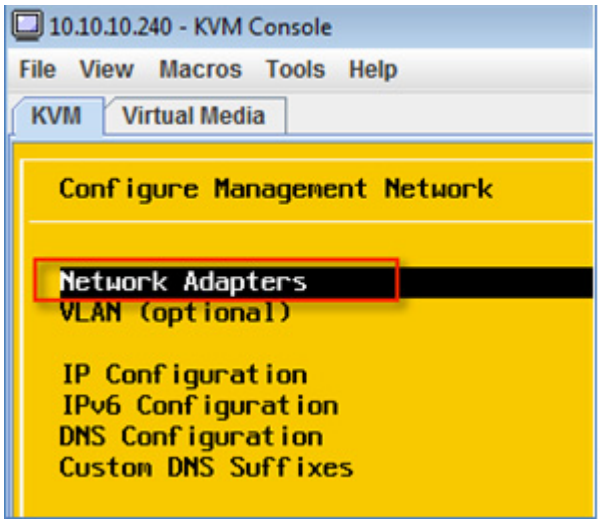
Step 27 Next, scroll down to the **Configure Management Network** option. This option will display the current network setting on the vSphere Hypervisor. Press **Enter** to configure the network settings.

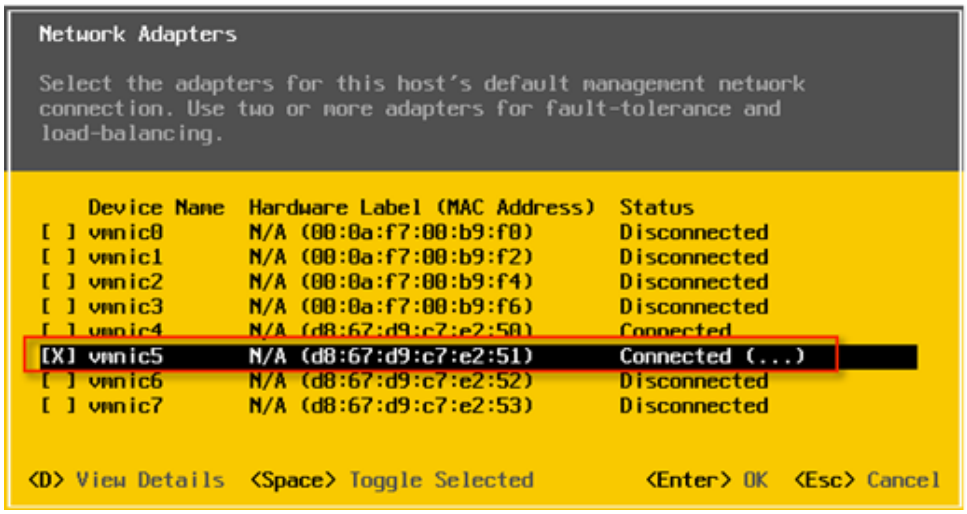


Step 28 Once inside the **Configure Management Network** option, scroll down to the **Network Adapters** option.

a. Press **Enter** and then select vmnic5.

b. Press **Enter** to continue after selection.

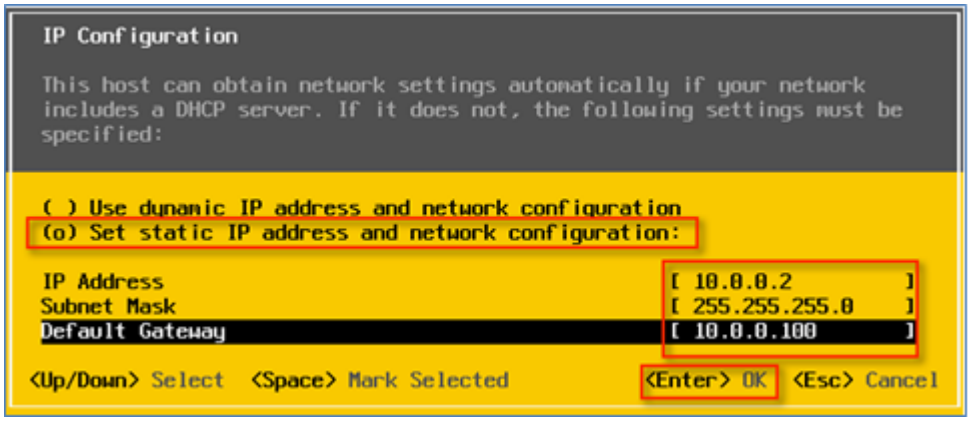


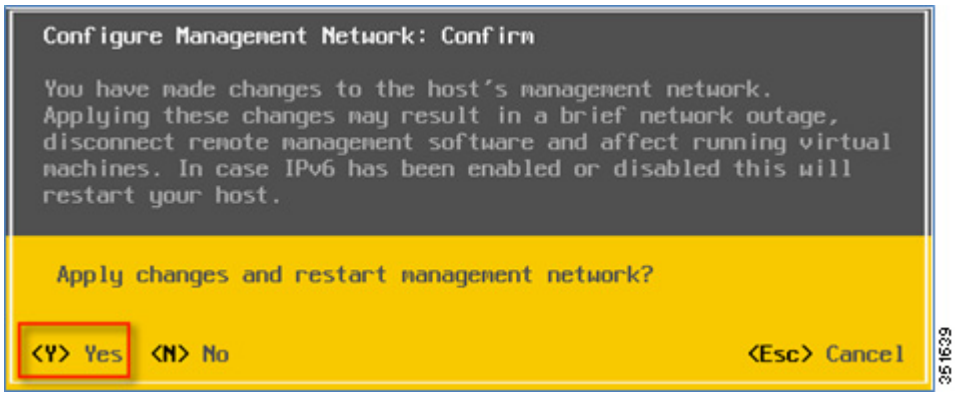


Still in **Configure Management Network** option, scroll down to the **IP Configuration** option.

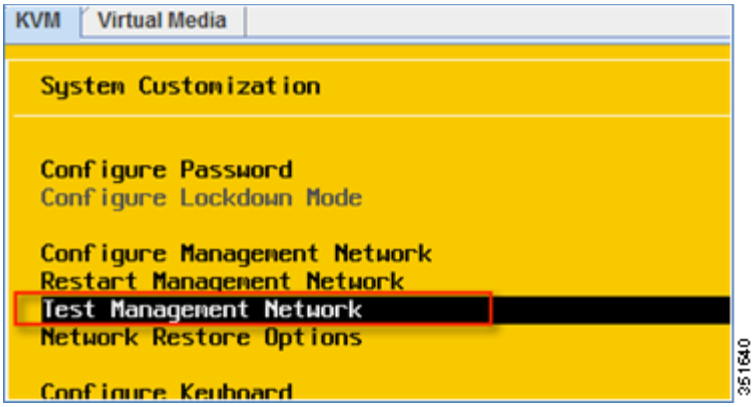
a. Press Enter, select **Set static IP address and network…**

b. Configure the IP address, subnet, and default gateway. Apply the changes and restart the management network.

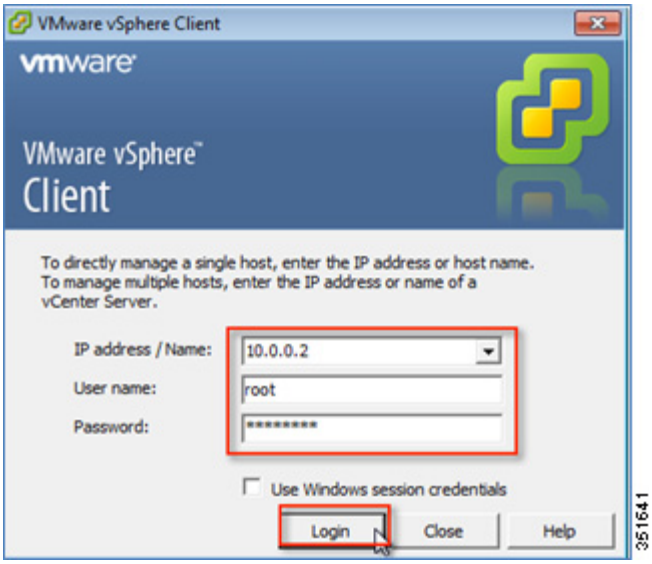




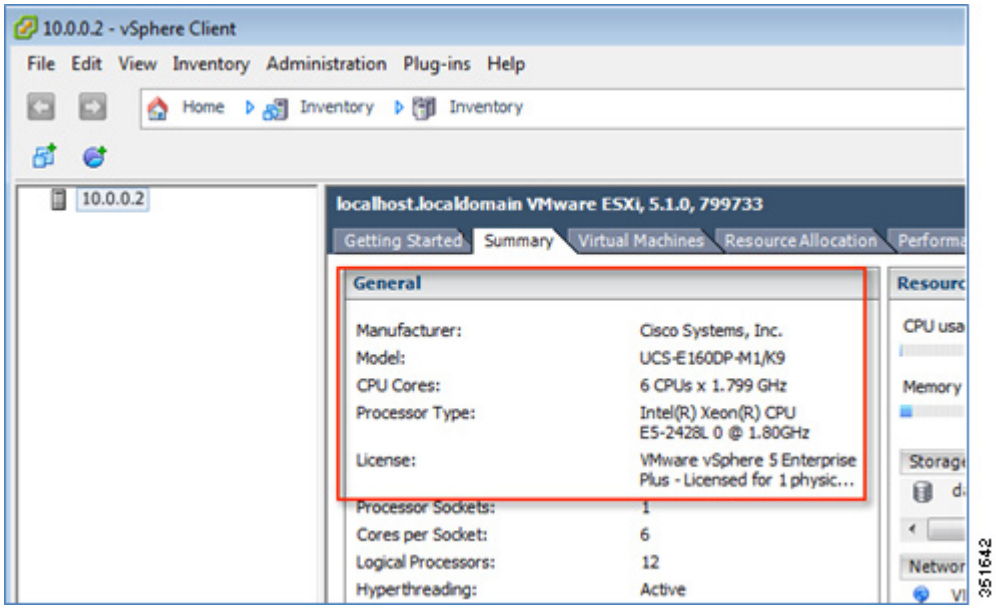
Step 29 Test Management Network–pings the gateway, DNS, and so on.



Step 30 Open VSphere client viewer and connect to the Hypervisor IP address (e.g. 10.0.0.2).



Step 31 The UCS-E has been installed with the VMware Hypervisor.



Install Virtual Wireless Lan Controller On UCS-E Module

Step 32 Follow the steps outlined in the below link to access the vSphere Hypervisor and install the vWLC on the UCS-E Module

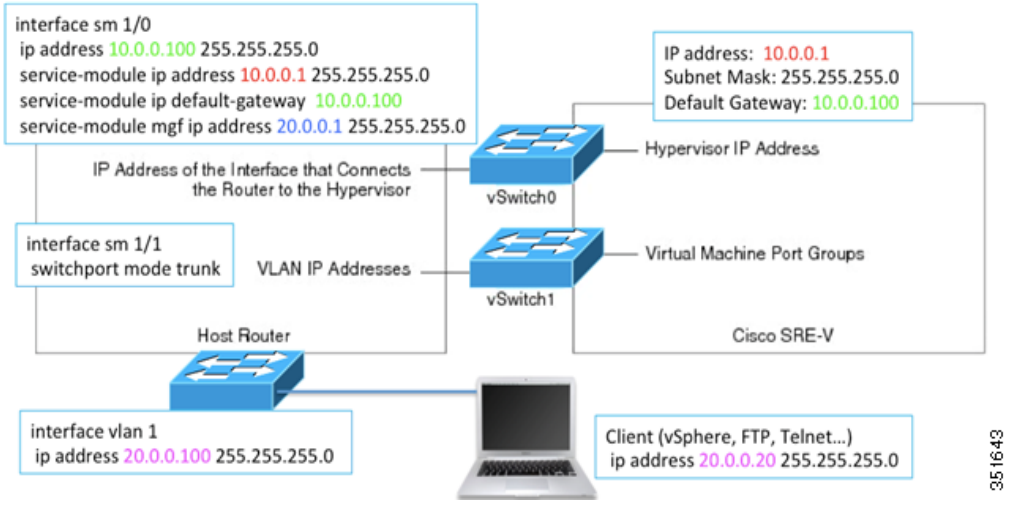
http://www.cisco.com/en/US/products/ps12723/products_tech_note09186a0080bd2d04.shtml

Deploying Virtual WLC on SRE Service Modules 710/910 for ISR-G2

Complete GUI and CLI configuration guides for SRE 710/910 service modules can be found on the links below. This document only provides the instructions the user needs to perform to install vWLC on a new out of the box SRE 710/910 service modules.

http://www.cisco.com/en/US/docs/interfaces_modules/services_modules/sre_v/2.0/user/guide/install_configure_srev.html

Figure 2 Configuration Example for Deploying SRE Service Module for the ISR-G2



Download the Software Package for SRE Service Module

Complete the steps:

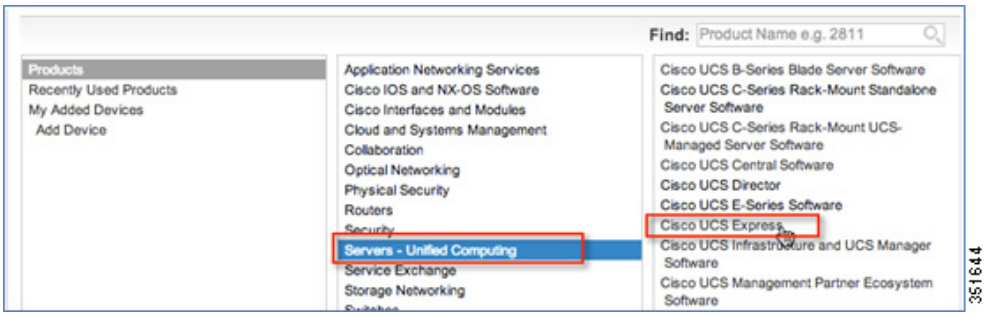
Step 1 Determine if SRE service module is 710 or 910.

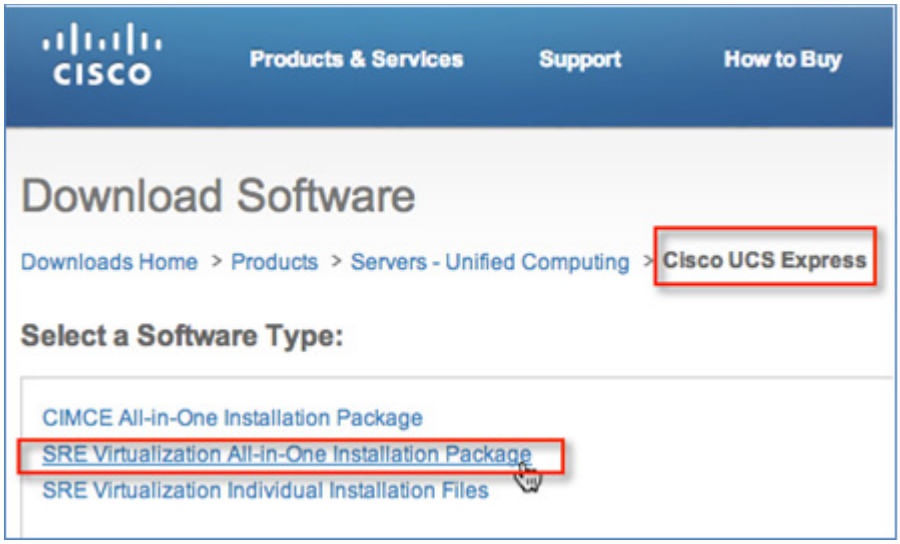
Step 2 Download the UCS installation script files onto a **http** or **ftp** server from the below link and then unzip it onto a ftp or http server. The latest version is 2.0.1 on CCO. This example uses an FTP server hosting appropriate files extracted below.

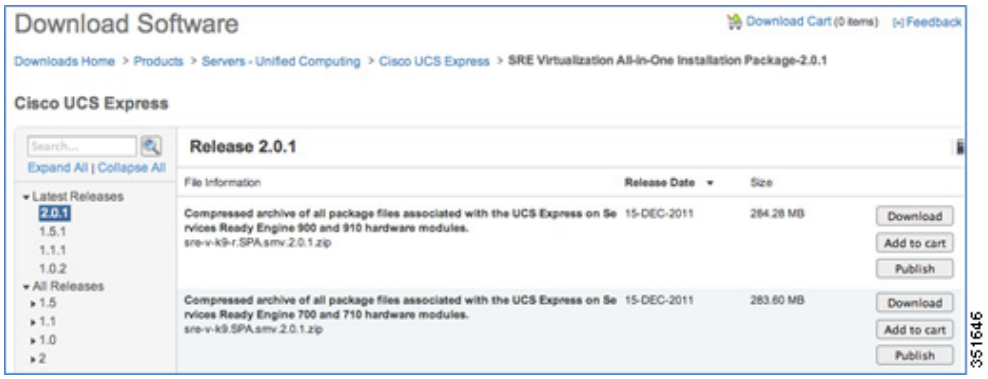
a. Go to http://www.cisco.com/go/ucse

b. Click **Download Software for this Product**, and navigate as shown in the below image and then click link to the Cisco **SRE Virtualization All-in-One Installation Package**.

c. Download the appropriate **Compressed archive of all package files associated with the UCS Express on Services Ready Engine** hardware modules. This will be a single ZIP file.





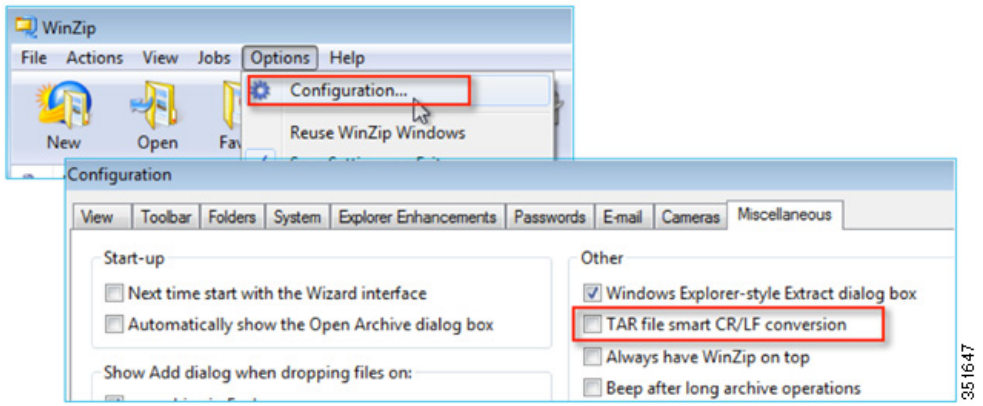


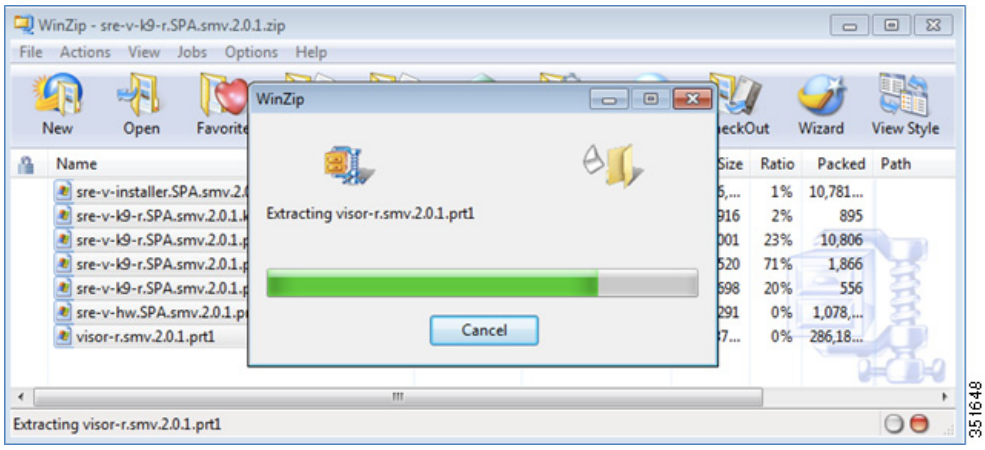
Extract the Software Files for SRE Service Module

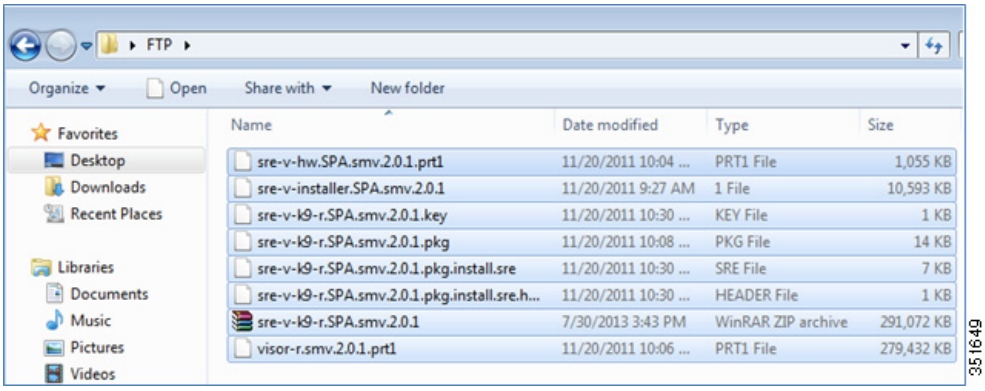
Step 3 Use an archive tool such as WinZip to open the compressed zip file.

a. When using WinZip, **UNCHECK** the **TAR file smart CR/LF conversion** located in configuration option > Miscellaneous.

b. Extract the files to the local directory (e.g. FTP file access directory)







Configure the SRE Service Module Interfaces

Step 4 Configure IP address and default gateway on the SRE service module interface.

```
interface sm1/0
 ip address 10.0.0.100 255.255.255.0
 service-module ip address 10.0.0.1 255.255.255.0
 service-module ip default-gateway 10.0.0.100
```

```
 service-module mgf ip address 20.0.0.1 255.255.255.0
 no shutdown
!
interface sm1/1
 description Internal switch interface connected to Service Module
 switchport mode trunk
!
```

Step 5 Add UCS-E module's IP address routing to the ISR-G2 router

```
ip route 10.0.0.2 255.255.255.255 sm1/0
```

Start the Hypervisor Install Script for SRE Service Module

Step 6 From the ISR router, use the `service-module install` command to load the UCS script files onto the SRE module. Please note that this step takes approximately 10 minutes to complete.

a. Example command from router console:

`service-module <sm number> install url <ftp/http:[ip_addr/path/file>`

b. Press **Enter** at two prompts (Proceed and Disk selection) to accept defaults to continue.

Actual Example Output

```
Router#service-module sm 1/0 install url ftp://20.0.0.20/sre-v-k9-r.SPA.smv.2.0.1.pkg
Proceed with installation? [no]: yes <<Press Enter>>
Loading sre-v-k9-r.SPA.smv.2.0.1.pkg.install.sre !
[OK - 6520/4096 bytes]

Service module installation
ios_version     15.2(4)M2,
ios_image       c3900-universalk9-mz
pkg_name        sre-v-k9-r.SPA.smv.2.0.1.pkg
key_file        sre-v-k9-r.SPA.smv.2.0.1.key
helper_file     sre-v-installer.SPA.smv.2.0.1
pid             SM-SRE-910-K9

Check target platform capabilities
cpu      1864
Please select disk configuration (-1 = nonraid, 0 = raid0, 1 = raid1 ) [-1]: <<Press
Enter>>
Resource check completed successfully. Proceeding to Install ...
Router#
*Aug  1 17:50:45.203: %SM_INSTALL-6-INST_RESET: SM1/0 is reset for software installation.
*Aug  1 17:52:14.323: %SM_INSTALL-6-INST_RBIP: SM1/0 received msg: RBIP Registration
Request
*Aug  1 17:52:14.327: %SM_INSTALL-6-INST_RBIP: SM1/0 received msg: RBIP File Request
*Aug  1 17:52:17.715: %SM_INSTALL-6-INST_RBIP: SM1/0 received msg: RBIP File Request
*Aug  1 17:52:23.543: %SM_INSTALL-6-INST_RBIP: SM1/0 received msg: RBIP File Request
*Aug  1 17:52:23.575: %SM_INSTALL-6-INST_RBIP: SM1/0 received msg: RBIP File Request
```

```
*Aug  1 17:52:51.811: %SRE_SM-6-STATE_CHANGE: SM1/0 changing state from
SERVICE_MODULE_STATE_ERRQ to SERVICE_MODULE_STATE_STDY

*Aug  1 17:53:02.799: %SM_INSTALL-6-INST_PROG: SM1/0 PROGRESSING: Validating package
signature ....

*Aug  1 17:53:02.915: %SM_INSTALL-6-INST_PROG: SM1/0 PROGRESSING: Parsing package
manifest files ....

*Aug  1 17:53:19.811: %SM_INSTALL-6-INST_PROG: SM1/0 PROGRESSING: Starting payload
download.

*Aug  1 17:53:21.067: %SM_INSTALL-6-INST_PROG: SM1/0 PROGRESSING: Starting payload
download.

*Aug  1 17:53:51.143: %SM_INSTALL-6-INST_PROG: SM1/0 PROGRESSING: Performing Hot install
....

*Aug  1 17:54:53.483: %SM_INSTALL-6-INST_PROG: SM1/0 PROGRESSING: Updating BIOS sata mode
to ahci .

Install successful on SM1/0. Please wait for module to reset before next operation.
<<SUCCESS>>


*Aug  1 17:55:01.395: %SM_INSTALL-6-INST_SUCC_RESET: SM1/0 SUCCESS: install-completed.
Please wait for module to reset before next operation

*Aug  1 17:55:15.247: %DTP-5-NONTRUNKPORTON: Port SM1/1 has become non-trunk

*Aug  1 17:55:16.247: %DTP-5-TRUNKPORTON: Port SM1/1 has become dot1q trunk

*Aug  1 17:56:30.803: %SM_INSTALL-6-INST_RBIP: SM1/0 received msg: RBIP Status Req

*Aug  1 17:56:30.803: %SM_INSTALL-6-RBIP_STATUS: SM1/0 RBIP status is at Secondary
Bootloader Verified Copying to Primary.

*Aug  1 17:57:02.439: %SM_INSTALL-6-INST_RBIP: SM1/0 received msg: RBIP Registration
Request

*Aug  1 17:57:02.439: %SM_INSTALL-6-INST_RESET_COMP: SM1/0: Module reset complete.
```

Step 7 To show the status of the service module.

a. Type in the command `service-module sm 1/0 status`

```
Router#service-module sm 1/0 status

Service Module is Cisco SM1/0

Service Module supports session via TTY line 67

Service Module is in Steady state

Service Module heartbeat-reset is enabled

Getting status from the Service Module, please wait..

Cisco SRE-V Software 2.0.1.0

VMware ESXi 5.0.0 build-474610 running on SRE <<This shows VMware Hypervisor has been
installed>>

No install/uninstall in progress
```

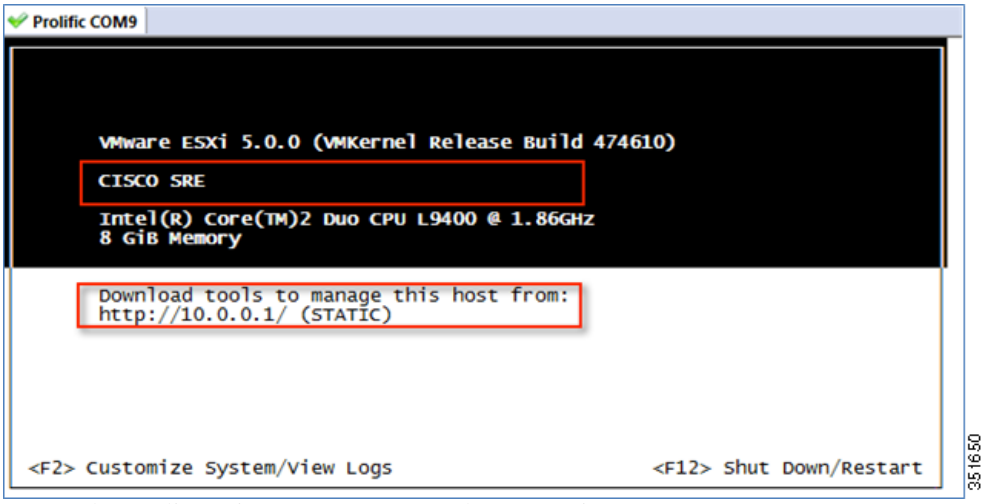
Connecting to Hypervisor on the SRE 710/910 Service Module on ISR G2

Step 8 Console access to hypervisor from the router with the command `service-module <sm number> session`

a. Note that VMware Hypervisor has been installed, showing on a CISCO SRE.

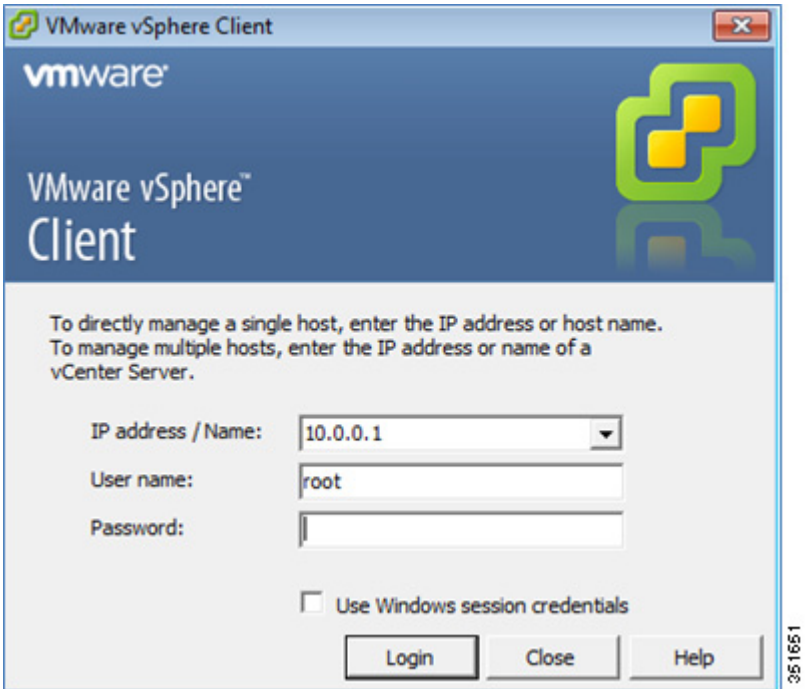
b. The IP address has been defined by the command in the interface configuration steps `service-module ip address`

```
Router#service-module sm 1/0 session
```

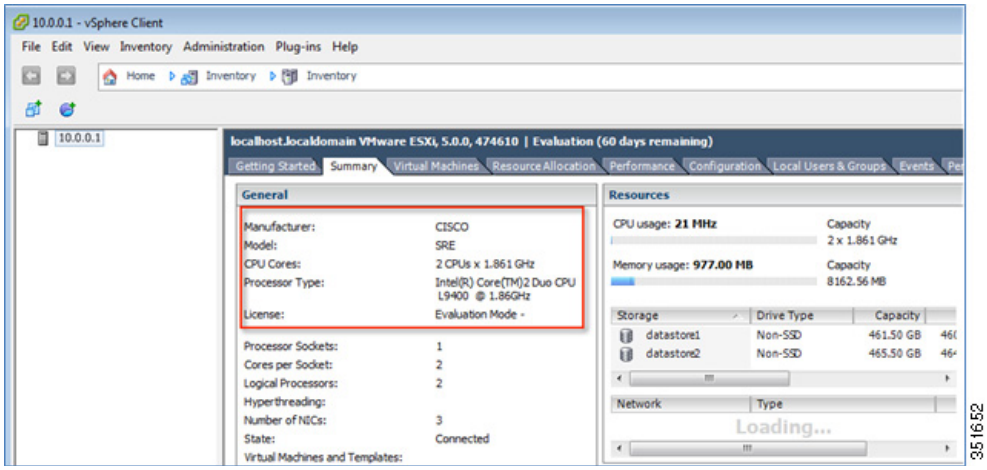


Step 9 Use vSphere Client viewer to connect to the Hypervisor.

a. Log in with default username **root**, there is no default password initially.



Step 10 The Hypervisor is successfully installed and configured on the SRE service module.



Install Virtual Wireless Lan Controller On SRE Service Module

Step 11 Follow the steps outlined in the below link to access the vSphere Hypervisor and install the vWLC on the SRE Service Module

http://www.cisco.com/en/US/products/ps12723/products_tech_note09186a0080bd2d04.shtml

Appendix

ISR-G2 Configuration with UCS-E Module Example

Note that this sample configuration intentionally contains both UCS-E and SRE SM. Both modules cannot be configured the same time, and intentionally added for reference, to show the similarity yet subtle difference in configuration between them.

```
Router#show run
Building configuration...

Current configuration : 2568 bytes
!
! Last configuration change at 18:10:20 UTC Thu Aug 1 2013
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router
!
boot-start-marker
```

```
boot system flash:c3900-universalk9-mz.SPA.152-4.M2.bin
boot-end-marker
!
no aaa new-model
!
ip cef
!
!
no ip domain lookup
no ipv6 cef
multilink bundle-name authenticated
!
!
license udi pid C3900-SPE100/K9 sn FOC14415CF8
hw-module sm 1
!
hw-module sm 2
!
!
csdb tcp synwait-time 30
csdb tcp idle-time 3600
csdb tcp finwait-time 5
csdb tcp reassembly max-memory 1024
csdb tcp reassembly max-queue-length 16
csdb udp idle-time 30
csdb icmp idle-time 10
csdb session max-session 65535
!
!
interface Embedded-Service-Engine0/0
 no ip address
 shutdown
!
interface GigabitEthernet0/0
 ip address 10.10.10.44 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface GigabitEthernet0/2
 no ip address
```

```
 shutdown
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/0
 no ip address
!
interface GigabitEthernet0/0/1
 no ip address
!
interface GigabitEthernet0/0/2
 no ip address
!
interface GigabitEthernet0/0/3
 no ip address
!
```

<<UCS-E module>>

```
interface ucse2/0
 ip address 10.0.0.100 255.255.255.0
 imc ip address 10.0.0.1 255.255.255.0 default-gateway 10.0.0.100
 imc access-port shared-lom console
!
!
interface ucse2/1
 description Internal switch interface connected to Service Module
 switchport mode trunk
 no ip address
```

<<End of UCS-E module>>

```
!
```

<<SRE SM module>>

```
interface sm 1/0
ip address 10.0.0.100 255.255.255.0
service-module ip address 10.0.0.1 255.255.255.0
service-module ip default-gateway 10.0.0.100
service-module mgf ip address 20.0.0.1 255.255.255.0
!
```

<<End of SRE SM module>>

```
interface sm 1/1
```

<<SRE SM module>>

```
description Internal switch interface connected to Service Module
```

```
 switchport mode trunk
 no ip address
```
<<End of SRE SM module>>
```
!
interface Vlan1
 ip address 20.0.0.100 255.255.255.0
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
ip route 10.0.0.2 255.255.255.255 ucse2/0 
```
–//UCS-E module
```
ip route 10.0.0.2 255.255.255.255 sm 1/0 
```
–// SRE SM module
```
!
control-plane
!
!
!
line con 0
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line 67
 no activation-character
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line 131
 no activation-character
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
 speed 9600
 flowcontrol software
```

```
line vty 0 4
 login
 transport input all
!
scheduler allocate 20000 1000
!
end
```

CLI option Using UCS-E Console Access for Reference

This is an alternative to GUI option of accessing the UCS-E.

Session into UCS-E from ISR-G2 Router's Console

```
router#ucse 2 session imc
```

Install the Custom vSphere Hypervisor Image and Confirm Successful Image Download

```
Unknown# scope remote-install
Unknown /remote-install # download-image ftp 10.10.10.33/vmware/
ESXi-5.0.0-623860-custom-Cisco-2.0.1.6.iso
Unknown /remote-install # show detail
Host Image Information:
Name : ESXi-5.0.0-623860-custom-Cisco-2.0.1.6.iso
Size: 309778432
MD5 Checksum: 9dc2a7749ce797c69c58d338687fb8c0
Last Modified Time: Fri, 08 Mar 2013 19:21:58 GMT
Host Image Status: Download Successful!!
```

MAP Downloaded Image

```
Unknown /remote-install # map-image
---
status: ok
---
Unknown /remote-install # show detail
Host Image Info:
    Name : ESXi-5.0.0-623860-custom-Cisco-2.0.1.6.iso
    Size: 309778432
    MD5 Checksum: 9dc2a7749ce797c69c58d338687fb8c0
    Last Modified Time: Fri, 08 Mar 2013 19:21:58 GMT
    Host Image Status: Image mapped successfully,Please set CDROM as the Boot device
```

Change BOOT Order of UCS-E Module and Reboot

```
Unknwon# scope bios
Unknown /bios # set boot-order cdrom,hdd,fdd,pxe,efi
Unknown /bios # commit
Unknown /bios #  show detail
BIOS:
```

```
    Boot Order: CDROM,HDD,FDD,PXE,EFI
Unknown /bios #
Unknown# scope chassis
Unknown /chassis # power cycle
This operation will change the server's power state.
Continue?[y|N]y
```

Unmap Image After UCS-E Reload

```
Unknown /remote-install # show detail
Host Image Info:
    Name : ESXi-5.0.0-623860-custom-Cisco-2.0.1.6.iso
    Size: 309778432
    MD5 Checksum: 9dc2a7749ce797c69c58d338687fb8c0
    Last Modified Time: Fri, 08 Mar 2013 19:21:58 GMT
    Host Image Status: Unmap Successful!!
Unknown /remote-install #
```

Change the BOOT Order to Original Setting

```
Unknwon# scope bios
Unknown /bios # set boot-order hdd,cdrom,fdd,pxe,efi
Unknown /bios # commit
Unknown /bios #  show detail
BIOS:
    Boot Order: HDD,CDROM,FDD,PXE,EFI
Unknown /bios #
```