

Cisco Virtual Wireless Controller Deployment Guide, Release 7.5

Last Updated: January, 2018

Contents

- Introduction
- Prerequisites
- Deploying Virtual WLC on UCS-E Modules for ISR-G2
 - Loading ISR-G2 Image
 - Download the Customized VMWare Hypervisor Image for UCS-E
 - VMWare Hypervisor Image Installation on UCS-E Module
 - Installation with KVM Console on UCS-E Module
 - Assign Network and Static IP Address to the VMWare vSphere Hypervisor
 - Install Virtual Wireless Lan Controller On UCS-E Module
- Deploying Virtual WLC on SRE Service Modules 710/910 for ISR-G2
 - Download the Software Package for SRE Service Module
 - Extract the Software Files for SRE Service Module
 - Configure the SRE Service Module Interfaces
 - Start the Hypervisor Install Script for SRE Service Module
 - Connecting to Hypervisor on the SRE 710/910 Service Module on ISR G2
 - Install Virtual Wireless Lan Controller On SRE Service Module
- Appendix
 - ISR-G2 Configuration with UCS-E Module Example
 - CLI option Using UCS-E Console Access for Reference



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:

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- 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

Cisc	o CUWN in a	a BOX
WLC	VNCS	VMSE
ESX	ESXi Hype	rvisor
U III	CS /x86 Se	orvers

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 4.1/5.x
- FlexConnect Mode: Local switching only
- 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
- FlexConnect central switching



FlexConnect local switching is supported.

- 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



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Outdoor AP in FlexConnect mode is supported.

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

Limitations

When multiple VM instances are rebooted simultaneously from the system, it is possible that access points may disconnect from the network even if the primary vWLC instance is active. This is a VMware limitation and not a product issue of vWLC.

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 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_Configura tion_Guide.html

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CLI

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

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



Loading ISR-G2 Image

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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 10.0.0.100 255.255.2
	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 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**.

vmware			
My VMware [*]			Wetcome, Territoria + Ligital Vileo
Home Accounts Downig	oeda Support Haecuroes &	Education Buy	
Quick Links	Overview		16 Customice 0
Alens Account Burnmany	Alerts		
All Downloads	Account	United Lanual Rate	
🥑 License Keys			View A2 Alerta
S My Evaluations	Accounts		
C Get Support	Annual III	Access Account Activities • Minnage License Kays • View & Downlawd Products • View & Downlawd Products	
MY VMWARE FOR MOBILE			Yes Assess berney
	My Evaluations	Experient Days Homening	
VMWARE VSphere		There are no active evaluations to display.	
Essentials Plus Kit	Support Requests		Bart a New Evaluation
The most cost-effective solution that delivers high availability and data protection	Last Updated C	There are no support requests to display.	Tinte Co
THE Bury Cristere	• Knowledge Base 🛞	Product Documentation Get Support	o E



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

Cisco Custo	m Image for ESXi 5.1.0 GA Install	CD	
Version	610		
December 1	5.1.0		
Documentation	Blade Servers		
	Rack Servers		
	E-cenes blaces		
	Support Matrix		
Release Date	2012-10-25		
Туре	Custom ISOs		
Product Downlog	Version History		
Product Downloa	eds Version History	biteration	
Product Downlos File ESX0-5.1.0-7997: File size: 302M	Not Version History	Elementon Cisco Custom Image for VMware ESXI 5.1.0 GA Install CD	Download \$
Product Downlos File ESXI-51.0-79977 File size: 302M File type: Iso Release Date: 20 Build Number: 79	Varsion History 33-custom-Cisco-2.1.8.3.3e 012-10-25 07733	Information Cisco Custom Image for VMware ESXI 5.1.0 GA Install CO Components - Certification Ievel: CIM Provider VMware Accepted ESXICLI plug-In ? Partner Signed	Download 4 Download Manag

VMWare Hypervisor Image Installation on UCS-E Module

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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.

Good			
	Server Summary		
Server Admin	Actions	Server Properties	
summary nventory iensors	Power On Server	Product Name: Serial Number: PID:	E160DP F0C163621G3 UCS-E160DP-M1 C7096708-D404
System Event Log	d d	Units.	1.6.4.8
lemote Presence 1105 Iower Policies	First Login	00 rd	
ault Summary Iost Image Mapping	Confirm New Password:		D On Good Good



- B 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

cisco Integ	rated Management Controller	CIMC Hostname: Logged in as:	Unknow admin@
Overall Server Status	c 达 🛃 📕 🖗 0 Host Image Mapping		
Server Admin Summary Inventory Sensors System Event Log Remote Presence	Existing Image info Image Name: Image Size: MD5 Checksum: Last Modified Time :		
BIOS Power Policies Fault Summary Host Image Mapping	Install Pane Enter the URL and file information, and then click 'Download' to beg the host image or click 'Map Diagnostics to Host' to mount the diag protocol://usermame:password@server-ip-address/path, Username URL: ftp://20.0.0.20 Image Name ESXi-5.1.0-799733-custom-Cisco-2.1.0.3.i Download Map Image to Host Unmap Image Map Diagno	in the download. Click nostics Image. URL syn and Password are opti stics to Host	Map Imag lax: onal



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

	Download Map Image to Host	Unmap Image	Map Diagnostics to Host Delete Image	
Į	Host Image Update	Download Succe	essfull	51609

Step 10

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- 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.

Overall Server Status	ר 🕹 📕 😥 🛛 🖕		
Good	Host Image Mapping		
Server Admin Summary Inventory Sensors System Event Log	Existing Image info Image Name: ESXI-5.1.0-799733-custom-Cisco-2.1.0.3.iso Image Size: 315633664 MDS Checksum: 6e9efaa7bfbc32a0e979c021644256e1 Last Modified Time: Wed, 31 Jul 2013 20:43:52 GMT		
Remote Presence BIOS Power Policies Fault Summary Host Image Mapping	Install Pane Enter the URL and file information, and then click 'Download' to begin the download. C the host image or click 'Map Diagnostics to Host' to mount the diagnostics Image. URL protocol://username.gasword@server-ip-address/path, Username and Password are URL: Image Name	lick 'Map Image to Host' t syntax: optional	o mount

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Step 11Next, 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)

cisco Cisco Integ	rated Management	Controller		CIM	C Hostname: Ui Logged in as: ac
Cisco Overall Server Status Good Server Admin Summary Inventory Sensors System Event Log Remote Presence BIOS Power Policies	C Configure BIOS Configure BIOS Configure BIOS Clear BIOS CMOS Clear BIOS Password Activate backup BIOS		BIOS Properties Running Version: 4.6.4 Boot Order Configured Boot Orde 1. HDD	Actual Boo Actual Boo Boo CD/C	t Order VD k: Device (PXE)
Fault Summary Host Image Mapping	Firmware Actions Install BIOS Firmware throu Install BIOS Firmware from Last Firmware Install Status: Completed Succ	Configure E Device Types: FDD FXE © EFI	Add > COR	er: OM Down Apply Cancel	al EFI Shell

BIOS	BIOS Properties	
Configure BIOS	Running Version: 4.6.4.8	
Configure Boot Order	Configured Boot Order	Actual Boot Order
Clear BIOS Password Activate backup BIOS	2. 🗮 HDD	CD/DVD FDD Network Device (PXE) Internal EFI Shell

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**

Overall Server Status	פו 🛎 🤳 ופ	0
Server Admin Summary Inventory Sensors System Event Log Remote Presence BIOS Power Policies	Server Summary Actions Power On Server Power Off Server Shut Down Server Power Cycle Server Hard Reset Server	Server Properties Product Name: E16 Serial Number: FOC PID: UCS UUID: C7D BIOS Version: 4.6. Description:
ault Summary fost Image Mapping	Lock Front Panel	wercycle the server?

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



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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.)

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Good	BIOS	
Server Admin	Actions	BIOS Properties
Summary Inventory Sensors System Event Log	Configure BIOS	Boot Order Configured Boot Order 1. C CDROM
Remote Presence BIOS Power Policies Fault Summary Host Image Mapping	Clear BIOS Password Activate backup BIOS Firmware Actions Install BIOS Firmware through Bro Install BIOS Firmware from TFTP	Configure Boot Order 0 Device Types: Boot Order: 0 Device Types: Boot Order: 0 Device Types: Boot Order: 0 Device Types: 0 Device Type: 0 Device T
	Last Firmware Install Status: Completed Successfu	PXE Add > Up Down

BIOS Properties	
Running Version: 4.6.4.8	
Boot Order	
Configured Boot Order	
1. 📕 HDD	1616

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

liulu Cisco Inte	grated Management Controller
Overall Server Status	C 3. 4 🖩 0. 0
Good	Host Image Mapping
Server Admin Summary Inventory Sensors System Event Log	Existing Image info Image Name: ESXI-5.1.0-799733-custom-Cisco-2.1.0.3.iso Image Size: 315633664 MD5 Checkum: 669efaa7bfbc32a0e979c021644256e1 Last Modified Time: Wed, 31 Jul 2013 20:43:52 GMT
ende Presence JOS ower Policies ault Summary Sost Image Mapping	Install Pane Enter the URL and file information, and then click 'Download' to begin the download. Click 'Map Image to Host' to mount the host image or click 'Map Disgnostics to Host' to mount the diagnostics Image. URL syntax: protocol://username:password@server-ip-address/path, Username and Password are optional URL:
	Image Name Download Map Image to Host Unmap Image Map Diagnostics to Host Delete Image Host Image Update Status: 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.

General Security Privacy Content Connections Programs Advanced	L
Settinos	
Check for publisher's certificate revocation	
Check for signatures on downloaded programs	
Do not save encrypted pages to disk.	
Empty Temporary Internet Files folder when browser is ck	
Enable DOM Storage	
Enable Integrated Windows Authentication*	
Enable memory protection to help mogate online attacks*	
Enable SmartScreen Fiber	
Use SSL 2.0	
✓ Use SSL 3.0	
Use TLS 1.0	
Warn about certificate address mismatch*	
*Takes effect after you restart Internet Evoluter	
Parters advanced cettings	
Rescure auvanced seconds	
Reset Internet Explorer settings	
Resets Internet Explorer's settings to their default Reset	
You should only use this if your browser is in an unusable state.	
OK Cancel Apply.	l

Step 17 From CIMC > Summary > launch KVM console.

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Step 18 In the KVM console, monitor the output throughout the VM ware 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.

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	End User License Agreement (EULA)
VMWAR	RE END USER LICENSE AGREEMENT
PLEAS AGREE OF AN SOF TH	E NOTE THAT THE TERMS OF THIS END USER LICENSE MENT SHALL GOVERN YOUR USE OF THE SOFTHARE, REGARDLESS BY TERMS THAT MAY APPEAR DURING THE INSTALLATION OF THE MARE.
IMPOR USING AGREE AGREE THIS SOFTH TO TH DAYS	RTANT-READ CAREFULLY: BY DOWNLOADING, INSTALLING, OR THE SOFTWARE, YOU (THE INDIVIDUAL OR LEGAL ENTITY) TO BE BOUND BY THE TERMS OF THIS END USER LICENSE MENT ("EULA"). IF YOU DO NOT AGREE TO THE TERMS OF EULA, YOU MUST NOT DOWNLOAD, INSTALL, OR USE THE WARE, AND YOU MUST DELETE OR RETURN THE UNUSED SOFTWARE WE VENDOR FROM WHICH YOU ACQUIRED IT WITHIN THIRTY (30) AND REQUEST A REFUND OF THE LICENSE FEE, IF ANY, THAT
	Use the arrow keys to scroll the EULA text
	(ESC) Do not Accept (E11) Accept and Continue

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

Storage Device				Сарас	city
LSI MRSASRoMB-4 Cypress Astoria Remote: (none)	i (naa.6d867d9c SD Card (mpx.vr	7dad99091871(557 xhba33:C0:T0:L0)	26de8588)	837.26 7.44	G i E

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

	Please	select a	keyboard	layout	
Swiss Swiss Turkis US De US Dvo Ukrain United	French German sh faolt orak nian d Kingdo	n			
	Use t	he arrow k	eys to so	roll.	

Step 23 Enter root password, press Enter to continue.

Root password				
Confirm password	: *********			
	Passwords	match.		

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

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



instatiation complete	
ESXi 5.1.0 has been successfully installed.	
ESXi 5.1.0 will operate in evaluation mode for 60 use ESXi 5.1.0 after the evaluation period, you mu register for a VMware product license. To administ server, use the vSphere Client or the Direct Contr Interface. Remove the installation disc before rebooting.	days. To ist er your ol User
Reboot the server to start using ESXi 5.1.0.	
(Enter) Reboot	
Reboot ing Server	1
Rebooting Server The server will shut down and 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).

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Authentication	Required
Enter an author localhost	ized login name and password for
Configured Keyb	
Login Name:	
Login Name: Password:	[]

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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.



Network Adapters		
Select the adapt connection. Use load-balancing.	ers for this host's default ma two or more adapters for fault	nagement network -tolerance and
Device Name [] vmnic8 [] vmnic1 [] vmnic2 [] vmnic3 [] vmnic4 [X] vmnic5	Hardware Label (MAC Address) N/A (00:0a:f7:00:b9:f0) N/A (00:0a:f7:00:b9:f2) N/A (00:0a:f7:00:b9:f4) N/A (00:0a:f7:00:b9:f6) N/A (d8:67:d9:c7:e2:50) N/A (d8:72:d9:c7:e2:51)	Status Disconnected Disconnected Disconnected Connected Connected
[] vnnic6 [] vnnic7	N/A (d8:67:d9:c7:e2:52) N/A (d8:67:d9:c7:e2:53)	Disconnected Disconnected
View Details	<pre><space> Toggle Selected</space></pre>	<pre> (Enter) OK (Esc) Cancel </pre>

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

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

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

Configure Management Network	IP Configuration
Network Adapters VLAN (optional) IP Configuration DNS Configuration Custon DNS Suffixes	Automatic IP Address: 169.254.252.64 Subnet Mask: 255.255.0.0 Default Gateway: Not set This host can obtain an IP addr parameters automatically if you server. If not, ask your networ appropriate settings.
IP Configuration This host can obtain network settings automati includes a DHCP server. If it does not, the fo specified:	cally if your network llowing settings must be
() Use dynamic IP address and network configu (c) Set static IP address and network configur IP Address Submet Mask	ration ration: [10.0.0.2] [255.255.25.0]
Default Gateway <pre> Cup/Down> Select <space> Mark Selected </space></pre>	(Enter> OK (Esc> Cance1







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

m ware [.]	_	
/Mware vSphere		5
Client		
to direcuy manage a sing	pe nost, enter the p-address or nost name.	
To barecey manage a sing To manage multiple hosts vCenter Server. IP address / Name:	a nost, enter the IP address or nost name, , enter the IP address or name of a	
To manage a sing To manage multiple hosts vCenter Server. IP address / Name: User name: Password:	Inter the IP address or nost hand.	

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



Install Virtual Wireless Lan Controller On UCS-E Module

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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_c onfigure_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.

		Find: Product Name e.g. 2811 Q
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Starth_	Release 2.0.1				1
Expand All Collapse All	File Information	Release Date	•	See	
- Latest Periodases 201 1.5.1 1.1.1 1.0.2	Compressed archive of all package files associated with the UCS Express on Se	15-DEC-2011		264.28 MB	Download
	srev-k9-r.SPAsmv.20.1.zp			(Add to cart
				[Publish
+ All Releases	Compressed archive of all package files associated with the UCS Express on Se	15-DEC-2011		283.60 MB	Download
+1.1	srev-k9.SPA.smv 2.0.1.zp				Add to cart
+2					Publish

Extract the Software Files for SRE Service Module

ſ

- **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)





1 1111 11170	e Characuith e Maudaldas			
Favorites	Name	Date modified	Туре	Size
E Desktop	sre-v-hw.SPA.smv.2.0.1.prt1	11/20/2011 10:04	PRT1 File	1,055 KB
Downloads	sre-v-installer.SPA.smv.2.0.1	11/20/2011 9:27 AM	1 File	10,593 KB
Secent Places	sre-v-k9-r.SPA.smv.2.0.1.key	11/20/2011 10:30	KEY File	1 KB
	sre-v-k9-r.SPA.smv.2.0.1.pkg	11/20/2011 10:08	PKG File	14 KE
🥽 Libraries	sre-v-k9-r.SPA.smv.2.0.1.pkg.install.sre	11/20/2011 10:30	SRE File	7 KE
Documents	sre-v-k9-r.SPA.smv.2.0.1.pkg.install.sre.h	11/20/2011 10:30	HEADER File	1 KB
J Music	sre-v-k9-r.SPA.smv.2.0.1	7/30/2013 3:43 PM	WinRAR ZIP archive	291,072 KE
Pictures	visor-r.smv.2.0.1.prt1	11/20/2011 10:06	DRT1 File	270 432 KF

Configure the SRE Service Module Interfaces

Step 4

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.

Aug 1 17.57.02.455. SM_INSTALL 0 INST_RESELECTION SMI/0. Module reset

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

1000



Use vSphere Client viewer to connect to the Hypervisor.

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

VMware vSphere Client		
vm ware [.]		
VMware vSphere		
Client		
IP address / Name:	10.0.0.1	-
User name:	root	_
Password:	1	
Password:	Use Windows session cred	entials



Γ

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.

I

```
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
1
!
no ip domain lookup
no ipv6 cef
multilink bundle-name authenticated
!
I.
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
!
1
interface Embedded-Service-Engine0/0
no ip address
shutdown
I.
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
I.
interface GigabitEthernet0/2
 no ip address
```

```
shutdown
 duplex auto
 speed auto
I.
interface GigabitEthernet0/0/0
no ip address
I.
interface GigabitEthernet0/0/1
no ip address
I.
interface GigabitEthernet0/0/2
no ip address
I.
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
!
I.
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
T
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
1
!
ı
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 #
```

Appendix

1