

# **Remote PC Guide Series - Volume 2**

## Installing and Configuring VMware vSphere 5.1

Please be aware that a more recent edition of the Remote PC Guide Series, Volume 2, Installation that is specific to **VMware ESXi version 6.0 with vCenter** is available.

#### Document Version: 2014-06-02



This guide covers features available in NETLAB+ version **2011.R2** and later. The details of this guide are specific to **VMware ESXi version 5.1 with vCenter.** 

<u>Learn more about the Remote PC Guide Series</u> or see the <u>Documentation Library</u> for a list of all NETLAB+ guides.

This guide will lead you through the process of adding remotely accessible PC or servers into your NETLAB+ equipment pods using the <u>VMware</u> ESXi and vCenter virtualization products.

This guide is part of a multi-volume series, designed to provide you with the guidance needed to implement remote PCs on your NETLAB+ system

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## 1 Background

NETLAB+ remote PCs and servers in a pod can be implemented using virtual machines running on VMware vSphere 5.1. This guide is designed to help you setup your virtual machine infrastructure for use with NETLAB+.

This guide assumes you are familiar with the Remote PC concept behind NETLAB+. Please review the <u>Remote PC Guide Series - Volume 1, Introduction and Planning for</u> <u>Remote PC Implementation with NETLAB+.</u>

This guide is designed to help you install and configure vSphere 5.1 for using with NETLAB+. You will be installing VMware ESXi 5.1 and VMware vCenter 5.1 Server Appliance.

This guide also assumes that you have configured the NDG supported servers, the Dell R710, R720. Please refer to the appropriate model-specific guide:

- <u>Remote PC Guide Series Volume 2a Dell R710 BIOS and RAID Configuration</u>
- Remote PC Guide Series Volume 2b Dell R720 BIOS and RAID Configuration

The basics of a NETLAB+ infrastructure consist of a NETLAB+ Appliance, Management Server, vCenter Appliance and ESXi Host Server. The following image illustrates how these all work together:





## 2 VMware ESXi Planning

Physical VMware ESXi servers host the virtual machines in your pods. Virtualization using ESXi is performed on separate physical servers, not included with NETLAB+. You can interface with multiple ESXi servers if necessary.

NETLAB+ is compatible with VMware ESXi versions 4.1U2 and 5.1. For new installations, version 5.1 is recommended. The hardware you use for your ESXi server(s) must be compatible with the version of ESXi you select.

#### 2.1 VMware ESXi Host Requirements

Please refer to our host server specifications page for the latest information on recommended ESXi Host servers. Currently NDG supports the Dell R710 and Dell R720. Use the following link to get detailed requirements:

http://netdevgroup.com/support/remote pc.html#vm host server specifications

Please search the VMware Compatibility guide to ensure your ESXi host hardware is compatible with the VMware version you wish to use.

#### http://www.vmware.com/resources/compatibility/search.php

#### **NDG Equipment Selection Disclaimer**

NDG offers no warranties (expressed or implied) or performance guarantees (current or future) for third party products, including those products NDG recommends. Due to the dynamic nature of the IT industry, our recommended specifications are subject to change at any time.

NDG recommended equipment specifications are based on actual testing performed by NDG. To achieve comparable compatibility and performance, we strongly encourage you to utilize the same equipment, exactly as specified and configure the equipment as directed in our setup documentation. Choosing other hardware with similar specifications may or may not result in the same compatibility and performance. The customer is responsible for compatibility testing and performance validation of any hardware that deviates from NDG recommendations. NDG has no obligation to provide support for any hardware that deviates from our recommendations, or for configurations that deviate from our standard setup documentation.



#### 2.2 Hardware Assisted Virtualization Technology

Hardware Assisted Virtualization (Intel VT-x) is **REQUIRED** on any host you use for the VMware IT Academy Install, Configure, Manage (ICM) course and many others.

Virtualization courses, such as the VMware IT Academy labs, have not been tested on AMD processors and are not supported on AMD processors. VMs available from CSSIA were created on the Intel platform. As such, they will not work correctly on an AMD processor.

#### 2.3 Obtaining VMware ESXi and Licenses for NDG Supported Servers – Dell R710 and R720

If you are not using the NDG recommended host servers, the Dell R710 and Dell R720, please skip to Section 2.4 for Obtaining VMware ESXi and Licenses for non-supported servers.

Guidance on navigating licensing is available on *the <u>VMware Product Licensing Through</u> <u>VMware Academic Subscription (VMAS)</u> chart.* 

It is very important that you download the software from Dell, as they have customized the installer ISO with drivers for the server platform, including networking and storage adapters.



#### 2.3.1 Downloading ESXi software from Dell

The following procedure assumes you are using a Dell R710 or Dell R720 server:

- 1. Go to Dell's website at <u>http://www.dell.com</u>.
- 2. Click on **Technical Support** in the upper-right hand corner.
- 3. The easiest way is to enter your Dell Service Tag, usually found on the front of your Dell Server. It may be on a plastic pullout (Dell R720). Enter your service tag and click **Submit**.
- If you cannot locate your Dell Service Tag, choose Servers, Storage & Networking under choose a product category. Select PowerEdge and select your server model, PowerEdge R710 or PowerEdge R720 respectively.
- 5. Click on **Drivers and Downloads** from the tabs listed in the middle.
- 6. Under **Refine your results**, change the **Operating System** to **VMware ESXi 5.1**.
- 7. In the list of categories below, select Enterprise Solutions (1).
- 8. Click on **Download File** on the right-hand side.
- 9. Click **Continue** to begin the download.
- 10. This should point you to the following link, however it is strongly recommended that you use the steps above to make sure you are getting the latest copy: <u>http://downloads-us.dell.com/FOLDER00953628M/1/VMware-VMvisor-Installer-</u> <u>5.1.0-799733.x86 64-Dell Customized RecoveryCD A01.iso</u>

### 2.3.2 Obtain licenses for VMware IT Academy Program (vITA)

Licensing considerations will vary, depending on your school's participation in the <u>VMware IT Academy Program (VITA)</u> program and/or the <u>VMware Academic</u> <u>Subscription (VMAS)</u>.

Guidance on navigating licensing is available on *the <u>VMware Product Licensing Through</u> <u>VMware Academic Subscription (VMAS)</u> chart.* 



#### 2.3.3 Obtain licenses for VMware Academic Program (VMAP)

Licensing considerations will vary, depending on your school's participation in the <u>VMware IT Academy Program (VITA)</u> program and/or the <u>VMware Academic</u> <u>Subscription (VMAS)</u>.

Guidance on navigating licensing is available on *the <u>VMware Product Licensing Through</u> <u>VMware Academic Subscription (VMAS)</u> chart.* 

The following procedure assumes you are a registered member of the VMware Academic Program (VMAP). Non-members can obtain evaluation copies of VMware vCenter and ESXi software from <a href="http://www.vmware.com">http://www.vmware.com</a> and purchase through retail partners.

When downloading ESXi it is important to select a version that is compatible with NETLAB+.

- NETLAB+ is compatible with VMware ESXi versions 4.1 U2 and 5.1.
- For new installations, version 5.1 is recommended.
- VMware ESXi 5.1 is a required component if you plan to use your NETLAB+ system to teach future virtualization courses.
- 1. Follow the link provided to you by VMware when you registered in the VMware Academic Alliance Program. This will take you to the academic software store.
- Click on Faculty/Staff at the top to see the available downloads. You must be a registered Faculty/Staff user. For more information, contact the VMware Academy contact at your school.

Sign In	6	English		
	Sign In	Sign In   I	Sign In   English	Sign In   English



3. Click on **VMware vSphere 5**, which is marked with a red box in the picture below. This is the first of two software items you will obtain from the e-academy website. These items are marked with "Yes" in the picture below.





4. Click on **Add to Cart.** 

Aware vSphere	5 Enterprise - Download	
VIIIware	Manufacturer: VMware, Inc.	Free
	Available to: Faculty/Staff In Stock	Quantity: 1
		🛒 Add To Cart
		Are you eliqible?

- 5. Sign in with your registered login if necessary.
- 6. Click on **Check Out** to continue.

Your Car	t			
	VMware vSphere 5 Enterprise - Download         Date Added:       2013-01-08 9:33 AM         Extended Access Guarantee (24 months) - 24 months of access to your download and/or kei extend the duration of time-limited licenses (if a	Quantity 1 • Included y. This does not pplicable).	Unit Price Pr Free F	rice Free Remove
	(	Update Cart	Subtotal: \$0	).00
		🌰 Con	tinue Shopping	✔ Check Out

- 7. Read and accept the EULA.
- 8. On the confirmation page, click on Proceed With Order.



9. On the receipt page, record the serial number found under **Items**. You will need this serial number for the installation later.

Items All prices are in US Dollars	Start Download
VMware vSphere 5 Enterprise - Download  Extended Access Guarantee (24 months) - Included 24 months of access to your download and/or key. This does not extend the duration of time-limited licenses (if applicable). Expires 2015-01-08  Activation Code: 5M2AL1473N  Messages:  VMware EULA Agreement Number:	Quantity Unit Price Amount 1 \$0.00 \$0.00
	Subtotal: <b>\$0.00</b> Taxes: <u>\$0.00</u> Total: <b>\$0.00</b>



#### 2.4 Obtaining VMware ESXi and Licenses for Non-Supported Servers

If you are using the NDG recommended host servers, the Dell R710 and Dell R720, please go to Section 2.3 for Obtaining VMware ESXi and Licenses for NDG Supported Servers – Dell R710 and R720.

If you are using servers other than NDG's recommendation of Dell R710 and R720, it is strongly recommended you contact your vendor to find out if there is a customized version of VMware ESXi needed for your hardware. The following information will point you to the generic VMware ESXi installable ISO.

If you are part of the VMware IT Academy Program (vITA), the keys provided on the community website are valid for VMware ESXi 5.1 installs. They also provide a link for obtaining VMware ESXi 5.1.

If you are part of the VMware Academic Program (VMAP), please follow Section 2.3.3 for Obtaining Licenses for VMware Academic Program. That section will provide you with the key. Perform these additional steps to download a copy of the ISO:

1. You may download the ISO image by clicking on **Start Download**.





2. Click the Download link for VMware ESXi 5.1 (CD ISO) Installable.

Items		? Need Help?
	VMware vSphere 5 Enterprise Extended Access Guarantee (24 months) - Included Expires 2015-01-08 File: VMware Tools 5.1 Download Size: 63 MB File: VMware ESXi 5.1 (CD ISO) Installable Download Size: 301 MB File: VMware ESXi 5.1.0a (CD ISO) Installable Download Size: 300 MB	



## 3 VMware vCenter Planning

VMware vCenter Server enables you to manage the resources of multiple ESXi hosts and allows you to monitor and manage your physical and virtual infrastructure. Starting with software version 2011.R2, NETLAB+ integrates with VMware vCenter Server to assist the administrator with installing, replicating and configuring virtual machine pods.

#### 3.1 VMware vCenter Server Requirements

As of vSphere 5.1, NDG only supports the VMware vCenter Appliance. The physical server on which vCenter resides should be a dedicated "management server" to provide ample compute power. It is strongly recommended you follow our server recommendations listed below to provide ample compute power now and in the future.

#### http://www.netdevgroup.com/support/remote pc.html#vcenter server specifications

NDG does not support configurations where vCenter is running on a heavily loaded ESXi host and/or an ESXi host that is also used to host virtual machines for NETLAB+ pods. Such configurations have exhibited poor performance, API timeouts, and sporadic errors in NETLAB+ operations.

The vCenter server must have network access to your ESXi servers. You will use the VMware vSphere Client to access vCenter Server. As of vSphere 5.1, there is a vSphere Web Client, however this is currently not used by NDG for setup and configuration.

Below is a list of reasons why NDG will only support the VMware vCenter Server Appliance:

- Starting with vCenter 5.1, the appliance now uses Postgres databases. This allows the appliance to be able to handle multiple VMs and multiple ESXi hosts compared to the 5 ESXi hosts and 50 VM limit that the vCenter 5.0 Appliance had.
- The vCenter Appliance is a standalone VM that runs on SUSE Linux, instead of Microsoft Windows Server. This eliminates the need for Microsoft licensing for both Microsoft Windows Server and SQL Server.
- The Windows version of vCenter 5.1 now requires multiple databases. It also requires an Active Directory setup in order to work with the VMware Single Sign-On feature that is embedded in the appliance. Because of the complexity of configuring an Active Directory and multiple databases, NDG no longer recommends nor supports the Windows version. Based on our research, VMware is migrating to the appliance version in the future.
- The quick and easy deployment of the vCenter Appliance makes the infrastructure configuration much easier to deploy for NETLAB+ administrators.
- NDG strongly recommends and only supports the use of the vCenter Appliance on a separate Management Server. NDG has Management Server



recommendations that will not only support the vCenter Appliance but also future versions of the NETLAB+ software.

#### 3.2 Obtaining VMware vCenter Server Appliance

Follow the instructions at the following link in order to obtain the NDG Optimized vCenter Server v5.1 Appliance OVA from CSSIA.org: <u>http://www.netdevgroup.com/support/documentation/CSSIA%20Preconfigured%20Virtual%20Machine%20Requests.pdf</u>

When filling out the form, the "vCenter 5.1 Appliance NETLAB+ Optimized" entry is at the bottom of the page. Be sure to select the version for ESXi 5.1 hosts.

The vCenter Server virtual appliance downloaded from VMware has a 5 host / 50 active VM limit. We applied changes to the default vCenter Server appliance to support a much larger 50 host / 500 VM limit, expanded the filesystem, and adjusted the RAM and CPU settings. This optimized version has been packaged as an OVA and given to CSSIA.org for distribution. Note, this 500 limit is active VMs and exceeds the limits of any one NETLAB AE (80 active VM) or PE (160 active VM) system.

#### 3.3 Obtaining VMware Licenses

Please review the following flowchart that helps with VMware product licensing: <u>VMware Product Licensing Through VMware Academic Subscription (VMAS)</u>

If you are part of the VMware IT Academy Program (vITA), the keys provided on the community website are valid for VMware vCenter Server 5 installs. They also provide a link for obtaining VMware vSphere 5 software. You will want to obtain an OVA file of the vCenter Server Appliance, not the ISO for installing on Windows. NDG no longer recommends installing on a Windows machine for vCenter Server.

If you are a part of the VMware Academic Program the following procedure will assist you in obtaining the license key as well as downloading the OVA file. You will later deploy that image use VMware vSphere Client.

1. Follow the link provided to you by VMware when you registered the academy. This will take you to the academic license software store.



2. Click on **Faculty/Staff** at the top to see the available downloads. You must be a registered Faculty/Staff user. For more information, contact your VMware academy contact at your school.



3. Click on **VMware vCenter Server 5 Standard,** which is marked with a red box in the picture below. This is the second of two software items you will obtain from the e-academy website. These items are marked with "Yes" in the picture below.

Students Faculty/S	taff		<
VMware   More Software			
VMware, Inc.			1
VMware Certified Professional Discount Code	VMware eLearning	VMware ESX vSphere 4 Advanced	VMware Fusion 3 (for Mac OS X)
VMware Fusion 4 (for Mac OS X)	VMware Fusion 5 (for Mac OS X)	Where Paper	VMware Player 4
VMware Player 5	VMWare' SALES PROFESSIONAL VMware Sales Professional	VMware vCenter Lab Manager 4	VMware vCenter Server 5 Standard
VMware vCenter Server Standard	VMware vCloud Director	VMware vSphere 5	VMware vSphere ESXi Server
VMware Workstation 7	VMware Workstation 8	VMWare Workstation 9	



4. Click on **Add To Cart**.

	Manufacturer: VMware, Inc.	Eree
Viniware	Delivery Type: Download	Free
	Available to: Faculty/Staff	1
In Stock	Quantity: 1	
		🛒 Add To Cart
		Are you eligible?

- 5. Sign in with your registered login.
- 6. Click on Check Out to continue.

Your Car	t			
	VMware vCenter Server 5.0 Standard - Download Date Added: 2013-01-18 11:39 AM Extended Access Guarantee (24 months) - 1 24 months of access to your download and/or key. extend the duration of time-limited licenses (if application of the duration of time-limited licenses (if application of time-limited licenses)	Quantity 1 Included This does not plicable). Update Cart	Unit Price P Free Subtotal: \$	Free Remove
		🌰 Cont	inue Shopping	✓ Check Out

- 7. Read and accept the EULA.
- 8. On the confirmation page, click on Proceed With Order.
- 9. On the receipt page, record the serial number found under **Items** next to Activation Code. You will need this code for installation later.

Items All prices are in US Dollars	K	Start Dov	vnload
	Quantity	Unit Price	Amount
VMware vCenter Server 5.0 Standard - Download Extended Access Guarantee (24 months) - Included 24 months of access to your download and/or key. This does not extend the duration of time-limited licenses (if applicable). Expires 2015-01-18	1	\$0.00	\$0.00
Activation Code: 4M221- 0WG03 Instructions: http://e3.onthehub.com/d.ashx?s=vs7l2cbfv0			
Messages: • <u>VMmmre EULA</u>			
Agreement Number:		Subtotal: Taxes: Total:	\$0.00 \$0.00 \$0.00

10. You do not need to download the vCenter Server software from this screen. You will use the key with the NDG Optimized vCenter Server Appliance you downloaded from CSSIA.org.



#### 4 Network Planning

This section is designed to help you plan your networking infrastructure. Please review the "*Networking Models*" section of the <u>Remote PC Guide Series - Volume 1, Introduction</u> <u>and Planning for Remote PC Implementation with NETLAB+.</u>

Remember, dual-homed is only necessary and required if you plan to use real physical lab devices, such as pods for the Cisco Networking Academy.

The IP addressing and DNS servers will be dictated by the model you select. Please fill out the appropriate table below to help assist you with configuration.

It is strongly recommended that you print out your table in order to have it available for easy reference throughout the installation and configuration of your Virtual Machine Infrastructure.

Single-Homed Model				
vCenter Outside IP Address				
ESXi Management Server Outside IP Address				
ESXi Host Server 1 Outside IP Address				
ESXi Host Server 2 Outside IP Address				
ESXi Host Server 3 Outside IP Address				
ESXi Host Server 4 Outside IP Address				
Subnet Mask				
Default Gateway				
Primary DNS Server				
Secondary DNS Server				

	NETLAB+		vCenter Appliance		ESXi Management Server		ESXi Host 1 Server	
	Outside	Inside	Outside	Inside	Outside	Inside	Outside	Inside
IP Address	Campus		Campus		Campus		Campus	
Subnet Mask	Campus		Campus		Campus		Campus	
Gateway	Campus		Campus		Campus		Campus	
vSwitch			vSwitch0		vSwitch0		vSwitch0	
Management Path			*		*		*	



Dual-Homed Model – Real Equipment Pods				
vCenter Outside IP Address				
ESXi Management Server Outside IP Address				
ESXi Host Server 1 Outside IP Address				
ESXi Host Server 1 Inside IP Address	169.254.0.241			
ESXi Host Server 2 Outside IP Address				
ESXi Host Server 2 Inside IP Address	169.254.0.242			
ESXi Host Server 3 Outside IP Address				
ESXi Host Server 3 Inside IP Address	169.254.0.243			
ESXi Host Server 4 Outside IP Address				
ESXi Host Server 4 Inside IP Address	169.254.0.244			
Outside Subnet Mask				
Inside Subnet Mask	255.255.255.0			
Outside Default Gateway				
Inside Default Gateway	None			
Primary DNS Server				
Secondary DNS Server				

	NETLAB+		vCenter Appliance		ESXi Management Server		ESXi Host 1 Server	
	Outside	Inside	Outside	Inside	Outside	Inside	Outside	Inside
IP Address	Campus	169.254.0.254	Campus		Campus		Campus	169.254.0.241
Subnet Mask	Campus	255.255.255.0	Campus		Campus		Campus	255.255.255.0
Gateway	Campus	not set	Campus		Campus		Campus	not set
vSwitch			vSwitch0		vSwitch0		vSwitch0	vSwitch1
Management Path			*		*		*	



#### 5 VMware ESXi Server Setup

This section describes the software installation on a VMware ESXi host server.

All tasks in this section are performed on **separate dedicated physical servers** that you provide. Do not perform any of the tasks in this section on the NETLAB+ server appliance, as this will delete the NETLAB+ software, requiring you to return it to NDG for re-installation.

There should be a minimum of two (2) ESXi host servers. One will be used for management, referred to, as the Management Server, and the other will be your ESXi Host Server, which will hold the virtual machines for the pods. You may have one or multiple ESXi Host servers depending on the courses you plan to teach.

NDG supports the Dell R710 and the Dell R720 as a Management Server and as an ESXi Host Server. Please refer to the NDG requirements website for the latest supported server configurations:

http://www.netdevgroup.com/support/remote\_pc.html#vm\_host\_server\_specifications

#### 5.1 Preparing the ESXi Server

NDG recommends the Dell R710 and R720 server platforms. If you are using nonsupported servers, please contact your vendor for assistance in configuring the BIOS and RAID options.

Please refer to the appropriate guide for each respective server for instructions on BIOS and RAID configuration:

- <u>Remote PC Guide Series Volume 2a Dell R710 BIOS and RAID Configuration</u>
- <u>Remote PC Guide Series Volume 2b Dell R720 BIOS and RAID Configuration</u>

It is highly recommended that you read your server hardware section completely, prior to making changes to your system.



#### 5.2 Installing ESXi on Host Server

This section will walk you through installing VMware ESXi to your Management Server and to each ESXi Host Servers. Please note that the content in the images below will vary based on your system. The instructional steps are the same.

If you have not done so already, burn a copy of the ESXi 5.1 Installable ISO.

Instructions for installing ESXi:

- 1. Turn on or restart your system.
- 2. Insert your ESXi 5.1 media to install the ESXi Installable.
- 3. You are presented with the Installation screen below.



- 4. Press Enter to continue.
- 5. You are prompted with the User Agreement. Press F11 to Accept and Continue.





- 6. On the Select a Disk screen, choose the available Dell PERC drive. The size will vary depending on your configuration and server. Press **Enter** to continue.
- 7. Make sure **US Default** is selected for keyboard layout and press **Enter** to continue.

Please s	elect a	keyboar	d layou	Jt
Swiss French Swiss German Turkish US Default US Dvorak Ukrainian United Kingdom				
Use the	аггон	keys to	scroll	•
(Esc) Cancel	(F9) B	ack (	Enter)	Cont inue

8. You will be prompted to set the root password. Enter your custom password in the **Root password** and **Confirm password** fields.

Please	enter a	root	password	(recom	nended)
Root pa Confirm pa	issword: issword:				
(Esc) C	ancel	(F9)	Back	(Enter)	Cont inue

Be sure to record this password in a safe place. You will need it to integrate the ESXi host with the vCenter Server.

- 9. Press **F11** to begin the installation. Installation can take 1-10 minutes depending on hardware.
- 10. When the **Installation Complete** window appears, press **Enter** to reboot the machine.



#### Installation Complete

ESXi 5.1.0 has been successfully installed.

ESXi 5.1.0 will operate in evaluation mode for 60 days. To use ESXi 5.1.0 after the evaluation period, you must register for a VMware product license. To administer your server, use the vSphere Client or the Direct Control User Interface.

Remove the installation disc before rebooting.

Reboot the server to start using ESXi 5.1.0.

(Enter) Reboot

11. As stated before, you will need to complete these steps on your Management Server, and on all ESXi Host servers that will be used to host virtual machines for the pods.



#### 6 Basic Network Configuration

This section will assist you in the setup of basic network configuration on an ESXi host. This will need to be performed on the Management Server and on each ESXi Host Server.

1. When the ESXi host server is booted, you are prompted with the console screen. The information on this screen will vary based on your setup.



- 2. Press F2 to begin setting up the host.
- 3. When prompted with the login screen, make sure the username is **root** and enter the password you created in Section 5.2.



4. From the System Customization menu, select **Configure Management Network** and press **Enter.** 



5. Select IP Configuration and press Enter.



 Select Set Static IP address and network configuration and set IP Address, Subnet Mask and Default Gateway to an inside or outside IP configuration to fit your network configuration and model. Use the table you filled out in Section 10. Press Enter to save settings.



 If you are not using IPv6, it is strongly recommended that you disable it to prevent possible networking issues in a production environment. Select IPv6 Configuration from the Configure Management Network menu.



8. Make sure **Enable IPv6 (restart required)** is highlighted and press the **Spacebar** to remove the **X** from the checkbox. Make sure the window matches the one below and then press **Enter** to save settings.

IPv6 Configuration				
This host can obtain network settings automatically if your network includes a DHCPv6 server or supports Router Advertisement. If it does not, the following settings must be specified:				
[ ] Enable IPv6 (restart required)				
( ) Do not use automatic configuration ( ) Use DHCP stateful configuration (o) Use ICMP stateless configuration (AUTOCONF)				
Static address #1 [	1			
Static address #2 [ Static address #2 [	1			
Default gateway	1			
<pre><up down=""> Select <space> Mark Selected <enter> OK <esc> (</esc></enter></space></up></pre>	Cancel			



9. Next, select **DNS Configuration** from the **Configuration Management Network** menu.



10. Set the appropriate **Primary DNS Server, Alternate DNS Server,** and **Hostname** based on the table you filled out in Section 10. Press **Enter** to save settings.



11. Press Enter to confirm changes and return to the Configure Management Network window.



12. Press **ESC** to exit. When prompted to **Apply changes and restart management** press **Y** to continue.

Cc	onfigure Management Network: Confirm	
Yo Ap di ma re	ou have made changes to the host's management networ oplying these changes may result in a brief network isconnect remote management software and affect runr achines. In case IPv6 has been enabled or disabled f estart your host.	`k. outage, ning virtual this will
P	Apply changes and restart management network?	
<b>(</b> Y)	Yes <n> No</n>	<pre>Kesc&gt; Cancel</pre>



## 7 Management Console

The VMware vCenter Server Appliance can be managed through any web browser or the vSphere client. This configuration requires a "management console" in order to configure the vCenter Server appliance, ESXi Host Servers and virtual machines. The management console can be a Windows Server or Windows Desktop operating system. The management console can be either a virtual machine or a physical host like a workstation or laptop. The management console will need to be on the same network as the ESXi hosts and vCenter Server appliance.

NDG recommends deploying a Windows Server or Windows Desktop virtual machine on the Management Server. This virtual machine should be configured with one NIC regardless of your networking model choice.

The management console will also be where you want to download any virtual machine images for pod deployment. As such, it is strongly recommended that you have plenty of storage available to this virtual machine.



## 8 vCenter Server Appliance Deployment

In this section, you will deploy and configure the NDG Optimized vCenter Server Appliance.

Starting with VMware ESXi 5.1, NDG strongly recommends using the NDG Optimized VMware vCenter Server Appliance. This appliance is a virtual machine that runs on ESXi 5.1. The physical server on which vCenter resides should be a dedicated "management server" to provide ample computing power.

NDG does not support configurations where vCenter is running on a heavily loaded ESXi host and/or an ESXi host that is also used to host virtual machines for NETLAB+ pods. Such configurations have exhibited poor performance, API timeouts, and sporadic errors in NETLAB+ operations.

#### 8.1 Installing the vSphere Client

In order to manage the vSphere infrastructure, you must install the vSphere Client on the Windows PC you will use to manage your vCenter Server.

- 1. Open a web browser and go to http://your-esxi-management-server-ip-address.
- Depending on your browser, you will be prompted with a security certificate issue. This issue exists because the certificate on the ESXi server is not signed. Click on the option to ignore, proceed anyway, or otherwise agree to the nontrusted security certificate. Below is an example of Google Chrome:

The site's security certificate is not trusted!
You attempted to reach but the server presented a certificate issued by an entity that is not trusted by your computer's operating system. This may mean that the server has generated its own security credentials, which Google Chrome cannot rely on for identity information, or an attacker may be trying to intercept your communications.
You should not proceed, especially if you have never seen this warning before for this site.
Proceed anyway Back to safety
► Help me understand



3. Click on the **Download vSphere Client** hyperlink.



- 4. Save the installer to your desktop. Once the file is saved, double-click the installer file to start the installation.
- 5. You may be prompted with a **Security Warning**. Click on **Run** to start the install.

Open File	- Security Warning					
Do you want to run this file?						
	Name:tor\Desktop\NETLAB Training\VMware-viclient.exe					
	Publisher: VMware, Inc.					
	Type: Application					
	From: C:\Users\Administrator\Desktop\NETLAB Training\V					
	Run Cancel					
🔽 Alwa	ays ask before opening this file					
۲	While files from the Internet can be useful, this file type can potentially harm your computer. Only run software from publishers you trust. What's the risk?					

6. The installer will begin extracting the setup files. When prompted, make sure **English** is selected and click **OK**.

VMware	e vSphere Client 5.1 - InstallShield Wizard	×
ځ	Select the language for the installation from the choices below.	
	English (United States)	] 



- 7. Click **Next** to continue.
- 8. Click **Next** to Accept the End-User Patent Agreement.
- 9. Click I agree to the terms in the license agreement and click Next to continue.

🙀 VMware vSphere Client 5.1	×
License Agreement	
Please read the following license agreement carefully.	
VMWARE END USER LICENSE AGREEMENT	
PLEASE NOTE THAT THE TERMS OF THIS END USER LICENSE AGREEMENT SHALL GOVERN YOUR USE OF THE SOFTWARE, REGARDLESS OF ANY TERMS THAT MAY APPEAR DURING THE INSTALLATION OF THE SOFTWARE.	
IMPORTANT-READ CAREFULLY: BY DOWNLOADING, INSTALLING, OR USING THE SOFTWARE, YOU (THE INDIVIDUAL OR LEGAL ENTITY)	•
I agree to the terms in the license agreement	
O I do not agree to the terms in the license agreement	
InstallShield	
< Back Next > Cance	el 🛛

- 10. Click **Next** to accept the default Destination Folder.
- 11. Click Install to continue installation.
- 12. Click **Finish** to finish installation.

#### 8.2 Deploying vCenter Server Appliance

In this section, you will be deploying the NDG Optimized vCenter Server Appliance on the ESXi Management Server. Make sure you have downloaded the NDG Optimized vCenter Server Appliance from Section 3 to your desktop.

1. Double-click the VMware vSphere Client shortcut on the desktop.





2. Enter the IP address of your ESXi Management Server (use the table you filled out in Section 10, User Name is **root**, and the Password is the one you set during installation in Section 5.2.

🛃 VMware vSphere Client	×
vmvvare <sup>.</sup> VMware vSphere <sup></sup> Client	R
To directly manage a single To manage multiple hosts, e vCenter Server.	host, enter the IP address or host name. enter the IP address or name of a
IP address / Name:	Your ESXi Management Server
User name:	root
Password:	Your Password
	Use Windows session credentials

3. If a Security Warning window appears, click the checkbox **Install this certificate** and do not display any security warnings for "*yourserverip*" and click Ignore.

Security Warning				
Certificate Warnings				
An untrusted SSL certificate is installed on " and secure communication cannot be guaranteed. Depending on your security policy, this issue might not represent a security concern. You may need to install a trusted SSL certificate on your server to prevent this warning from appearing.				
The certificate received from " "was issued for " ". Secure communication with " cannot be guaranteed. Ensure that the fully-qualified domain name on the certificate matches the address of the server you are trying to connect to.				
Click Ignore to continue using the current SSL certificate.				
View Certificate	Ignore	Cancel		
Install this certificate and do not display any security warnings for "".				



4. When prompted with the VMware Evaluation Notice click OK to continue.



5. Click the **Inventory** icon.



6. Make sure the ESXi host is highlighted on the left. Click **File** menu and select **Deploy OVF Template...** 





7. When the Source window appears, click on Browse...

🛃 Deploy OVF Template	
Source Select the source location.	
Source OVF Template Details Name and Location Disk Format Ready to Complete	Deploy from a file or URL Browse Enter a URL to download and install the OVF package from the Internet, or specify a location accessible from your computer, such as a local hard drive, a network share, or a CD/DVD drive.

8. In the **Open** window, click **Desktop** in the left pane, then click the OVA file you downloaded from Section 3. Click **Open**.

🕑 Open			×
🔆 🔿 - 📕 - 👘 👘	n 🗆 Mana inana inana ina 🗸 🚺 Se	earch VMware vCenter Appli	. 😢
Organize 🔻 New folder		III 👻 🗂	
🔆 Favorites	Name ^	Date modified Typ	pe
Nesktop	VMware-vCenter-Server-Appliance-5.1.0.52	11/21/2012 8:53 AM OV	A File
Downloads			
Recent Places			
浸 Libraries			
Documents			
Music     Dictures			
Videos			
🖳 Computer			
📬 Network			
1			
	<u>  </u>		<u> </u>
File r	ame: VMware-vCenter-Server-Appliance-	/F packages (*.ovf;*.ova)	•
		Open Cance	a [
			//



- 9. Click **Next** to continue.
- 10. On the **OVF Template Details** window, review the information and click **Next** to continue.
- 11. On the **Name and Location** window, in the **Name** field, enter **VCENTER** and click **Next**.

🛃 Deploy OVF Template	
Name and Location Specify a name and loc	ation for the deployed template
Source OVF Template Details Name and Location Disk Format Ready to Complete	Name: VCENTER The name can contain up to 80 characters and it must be unique within the inventory folder.
<u>`</u>	
Help	< Back Next > Cancel

12. On the **Disk Format** window, select **Thin Provision** and click **Next**.

Deploy OVF Template				<u>_    ×</u>
Disk Format In which format do you	want to store the virtual disks?			
Source OVF Template Details Name and Location Disk Format Ready to Complete	Datastore: Available space (GB):	datastore 1		
سی بن ای	C Thick Provision Lazy 2 C Thick Provision Eager C Thin Provision	Zeroed	and and the	a ya ya ya
Help	harmon		< Back	Vext > Cancel



- 13. On the **Ready to Complete** window, click **Finish** to deploy the appliance.
- 14. Wait for the progress window to complete; this will take a few minutes. Click on **Close** when it has completed.

🛃 5% Deploying VCENTER	_ IX
Deploying VCENTER	
Deploying disk 1 of 2	
3 minutes and 32 seconds remaining	
Close this dialog when completed	Cancel
Peployment Completed Successfully	
Deploying VCENTER	
Completed Successfully	
	Close


# 8.3 Configuring Basic Network Connectivity

In this section, you will be configuring the IP address via the console on **VCENTER**. By default, the appliance is set for DHCP. If you have DHCP running on your management network, the appliance will initially pull an IP address. NDG strongly recommends you use a static IP address. These steps will walk you through configuring an IP address.

1. In the vSphere Client, expand the ESXi host on the left to display the **VCENTER** VM.



2. Right-click the VCENTER VM, and select Open Console.





3. Click the **Power On** button in the toolbar to power on the VM.



4. When the appliance has finished loading you will see the following screen. This screen may vary if you have DHCP enabled on your management network:



5. We must configure the network settings manually to set a static address. Make sure **Login** is selected and press **Enter.** 



6. Enter root for the username and enter vmware for the password.



7. Enter the following command:

localhost:~# /opt/vmware/share/vami/vami\_config\_net

<b>VCENTER</b>	l on	2
File View	VM	ş
localho	st.localdom login: root	Ē
Passwor	d:	f
localho	st:~ # /opt/vmware/share/vami/vami_config_net	F
Main M	enu	5
na m	cha	þ
0)	Show Current Configuration (scroll with Shift-PgUp/PgDown)	ĺ.
1)	Exit this program	6
2)	Default Gateway	5
3)	Hostname	5
4)	DNS	è
	Proxy Server	k
DJ Futon a	IF Hadress Hilocation for ethe	ľ
Encer a		ľ
		÷
Contra - America	أرجيك ومستعلقاتهم فالمطالبتهم ومعرية ومطلق والمحال ومعر بالدرجان ويقرب والمتعرفات التك	~

- 8. Type **6** and press **Enter** to set the IP Address Allocation for eth0.
- 9. When prompted to "Configure an IPv6 address for eth0?" press Enter to select the default answer.
- 10. When prompted to "Configure an IPv4 address for eth0?" type y then press Enter.
- 11. When prompted to "Use a DHCPv4 Server instead of a static IPv4 address?" type n and press Enter.
- 12. Enter *youripaddress* for the **IPv4 Address** and press **Enter**. Please use your table from Section 10 for reference.
- 13. Enter *yoursubnetmask* for the **Netmask** and press **Enter**. Please use your table from Section 10 for reference.
- 14. When asked "Is this Correct?" press Enter to say yes.



- 15. Type 2 and press **Enter** to set the Default Gateway.
- 16. When prompted to select the interface, press Enter to select the default.
- 17. Enter the IPv4 Default Gateway, *yourdefaultgateway* and press Enter. Please use your table from Section 10 for reference.
- 18. Leave IPv6 Default Gateway blank and press Enter.
- 19. After the changes have been made, type **1** at the Main Menu then press **Enter** to exit.

## 8.4 Creating NETLAB+ user on the vCenter Appliance

In this section, you will be creating a NETLAB+ user account and setting the password for NETLAB+ to access **VCENTER**.

1. While still in the command prompt of the vCenter Server Appliance, enter the following command to add the NETLAB+ user:

localhost:~# useradd -m NETLAB

2. Enter the following command to change the password:

localhost:~# passwd NETLAB

3. Enter a password and retype the new password. It is important that you write this information down, as it is needed when connecting NETLAB+ to your vSphere Infrastructure.



4. Enter the following command to change the user password expiry information:

localhost:~# chage NETLAB



5. Enter the following information:



6. Type exit and press Enter at the console to log out.

localhost:~# **exit** 

- 7. Press **CTRL+ALT** to release the mouse from the window. You may need to press this a couple of times and move the mouse. When a mouse cursor appears, you can continue.
- 8. Click the File menu, and select Exit to close the console.





## 8.5 Initial Configuration on the vCenter Appliance

For this section, you will be doing the initial configuration on the vCenter Appliance.

- 1. Open an Internet Browser.
- In the address bar, enter https://yourvcenteripaddress:5480. When prompted with a security warning, accept this certificate based on your browser. This error is because the default certificate for the vCenter appliance is not signed. Below is an example of Google Chrome:

The site's security certificate is not trusted!
You attempted to reach but the server presented a certificate issued by an entity that is not trusted by your computer's operating system. This may mean that the server has generated its own security credentials, which Google Chrome cannot rely on for identity information, or an attacker may be trying to intercept your communications.
You should not proceed, especially if you have never seen this warning before for this site.
Proceed anyway Back to safety
► Help me understand

3. Enter the default credentials, root for the username and vmware for the password and click Login.

w VMware vCenter Se	rver Appliance
Login	
	User name: root
	Password:
	Login
La company and the second seco	



4. Click the checkbox to Accept license agreement and click Next.

vCenter Server Setup		
Accept EULA		•
Configure Options	VMWARE END USER LICENSE AGREEMENT	
Database settings	DI FASE NOTE THAT THE TEDMS OF THIS END LICENSE	
SSO settings	AGREEMENT SHALL GOVERN YOUR USE OF THE SOFTWARE,	
Active Directory settings	REGARDLESS OF ANY TERMS THAT MAY APPEAR DURING THE	
Review configuration	INSTALLATION OF THE SOFTWARE.	
Configure	<b>IMPORTANT-READ CAREFULLY:</b> BY DOWNLOADING, INSTALLING, OR USING THE SOFTWARE, YOU (THE INDIVIDUAL OR LEGAL ENTITY) AGREE TO BE BOUND BY THE TERMS OF THIS END USER LICENSE AGREEMENT ("EULA"). IF YOU DO NOT AGREE TO THE TERMS OF THIS EULA, YOU MUST NOT DOWNLOAD, INSTALL, OR USE THE SOFTWARE, AND YOU MUST DELETE OR RETURN THE UNUSED SOFTWARE TO THE VENDOR FROM WHICH YOU ACQUIRED IT WITHIN THIRTY (30) DAYS AND REQUEST A REFUND OF THE LICENSE FEE, IF ANY, THAT YOU PAID FOR THE SOFTWARE.	•
Г	Accept license agreement	
L	Cancel < Prev Next >	



5. Select **Configure with default settings** and click **Next**.

vCenter Server Setup						
Accept EULA	To configure this virtual appliance with a static IP address, you must first configure the hostname. To do this, cancel this wizard, go to the network address settings. and enter the hostname. Once the hostname is configured, relaunch and complete this setup					
Configure Options						
Database settings	wizard.					
SSO settings	If the hostname is already configured, or if you do not want to use a static IP address, select an option below.					
Active Directory settings						
Review configuration	Configure with default settings					
Configure						
	<ul> <li>○ Upgrade from previous version</li> <li>✓ Use default SSO configuration</li> <li>○ Upload configuration file</li> <li>Browse</li> </ul>					
	Cancel < Prev Next >					



6. Review the information and click **Start** to configure vCenter with default settings. This may take a few minutes to complete as it configures the various databases and starts the services.

vCenter Server Setup			
Accept EULA	vCenter Database:		<b></b>
Configure Options	Туре:	embedded	
Detabase actions	Host:		
Database settings	Port:		
SSO settings	Instance:		
Active Directory settings	Login:		
Active Directory Settings	DB Reset:	no	
Review configuration	SSO:		
Configure	Deployment type:	embedded	
-	Administrator account:		
	Is a group:		
	Lookup service:		
		A	
	Lookup service thumbprint:		
		<b>v</b>	
	SSO Database:		
	Туре:	embedded	
	Host:		
	Port:		-
			<u> </u>
		Cancel < Prev	Start

7. Click **Close** to finish vCenter Setup.

vCenter Server Setup	
Accept EULA	
Configure Options	
Database settings	
SSO settings	
Active Directory settings	
Review configuration	
Configure	<ul> <li>✓ Configuring database</li> <li>✓ Configuring SSO</li> <li>✓ Starting vCenter Server</li> </ul>
January game	and and from and many and
	Cancel < Prev Close



8. You will be presented with the Summary screen. Wait until everything has loaded, all spinning wheels should disappear.

vCenter Server Ne	twork Syst	em Update	Upgrade	Admin		Help   Logout user roo
Summary Databas	e SSO	Authentication	Services S	Storage		
ummary						
vCenter				Storage U	Jsage	
Server:	Running		Stop	System:		44%
Inventory Service:	Running		Stop	Database	c	2%
Database:	embedded			Logs:		1%
SSO:	embedded			Coredum	ps:	1%
Configure Database   Cor	nfigure SSO			Utilities		
Authentication				Support b	oundle	Download
Active Directory:	Disabled			Configure	ation file	Download
Configure Authentication				Comigure	aborrine	Download
				Setup wiz	tard	Launch
Services				Sysprep f	files	Upload
Sphere Web Client	Running		Stop			
Log Browser:	Running		Stop			
ESXi Dump Collector:	Running		Stop			
Syslog Collector:	Running		Stop			
vSphere Auto Deploy:	Stopped		Start			
Configure Services				_		



## 8.6 Setting the hostname and changing the root password

For this section, we will be changing the hostname of the vCenter Appliance, enabling Certificate Regeneration, and changing the root password.

- 1. Click on the **Network** tab at the top.
- 2. Click on the **Address** tab below.
- 3. In the Hostname field, enter VCENTER.
- Click Save Settings, under Actions on the right-hand side. You will get a confirmation in green, "Network settings saved" above the Nameserver Source field.

Mware vCenter Server Appliance									
vCenter Server	Network	System	Update	Upgrade	Admin		Help   Logout user root		
Status Ado	dress	Proxy							
Network Address	s Settings.	Please rest	art the appl	liance after o	hanging the	e network co	onfiguration.		
Network settings	saved.								
Nameserver Source	F	rom Configurati	ion			I	Actions		
Hostname		CENTER					Save Settings		
IPv4 Default Gateway							Cancel Changes		
IPv6 Default Gateway									
monor		and a second			Anna		manner		

5. Click on the **Admin** tab at the top.

The Admin tab does not display in some versions of Firefox. If you do not see the Admin tab, it may be necessary to use a different browser. The Admin tab displays properly in Internet Explorer 9.

- 6. Change the administrator password:
  - a. Type vmware in the Current administrator password field.
  - b. Type *yournewpassword* in the **New administrator password** field and in the **Retype new administrator password** field. This will be now new root password for the vCenter Appliance, so please write this down in a safe place.
  - c. Click on the **Change password** button on the right.

💑 VMware vCenter Server Appliance									
vCenter Server	vCenter Server Network System Update Upgrade Admin								
Administration settings									
Current administrator					Actions				
New administrator password:		•••••	•••			Change password			
Retype new administrator password:		•••••	••••			Toggle SSH setting			
Administrator SSH login enabled: Ves			· · · · · · · · · · · · · · · · · · ·			Toggle certificate setting			
Certificate regeneratio	on enabled:	no							



- 7. Click on Toggle certificate setting to change the Certificate regeneration enabled option to yes. This will generate a new certificate after changing the hostname. You will notice that the Certification regeneration enabled option changed to yes and a green confirmation message "Operation was successful" will appear above the Current administrator password field.
- 8. Click **Logout user root** in the upper-right hand corner.

∞o <sup>o</sup> VMware vCenter Server Appliance								
vCenter Server	Network	System	Update	Upgrade	Admin	Help   Logout user root		
Administration settings								
Operation was su	Operation was successful. Actions							
Current administrator	password:					Change password		
New administrator pa	issword:					Toggle SSH setting		
Retype new administrator password:						Toggle certificate setting		
Administrator SSH log	gin enabled:	yes						
Certificate regeneration	on enabled:	yes						
m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	have a second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man and a second and		

- 9. Close your browser and maximize vSphere Client.
- 10. Right-click VCENTER in the inventory list and select Open Console.

🛃 - v	5phere Client								
File Edit View Inventory Administration Plug-ins Help									
🖸 🗈 [	Home 👂 💦 Inventory 👂 🗊 Inventory	$\rightarrow$							
	6 🔯 🕼 🗊 🖻 🅪 🧇								
	Power	Res							
	Guest	▶ 🛛 🛬							
	Snapshot	, chine							
	📴 Open Console	soft							
Edit Settings									
Upgrade Virtual Hardware									
	Add Permission Ctrl+R	est							

11. Click the **Restart Guest** button to restart the VCENTER VM.





12. If a **Confirm Reboot** window pops up, click **Yes**.



13. Watch the console to **VCENTER** to monitor the reboot. This will take a few minutes. After the VM has rebooted and you are prompted with the Summary screen, close the console and exit vSphere Client.





# 8.7 Configure Automatic Startup for vCenter

For this section, you will configure vCenter to automatically start with the ESXi Management Server. This is important because if not set and the ESXi Management Server powers off or is rebooted, the vCenter Appliance will not start up causing NETLAB+ failure and possible loss of administration.

- 1. Click on your ESXi host in the left pane.
- 2. Click the **Configuration** tab at the top.
- 3. Under the software section click on Virtual Machine Startup/Shutdown.

Software
Licensed Features
Time Configuration
DNS and Routing
Authentication Services
Power Management
Virtual Machine Startup/Shutdown
Virtual Machine Swapfile Location
Security Profile
Host Cache Configuration
System Resource Allocation
Agent VM Settings
Advanced Settings

4. Click on **Properties** in the upper right.

Hardware	Virtua	l Mach	ine Startup and S	hutdown			Properties	
Processors	Start	and St	op Virtual Machines	with the sys	tem Er	nabled		
Memory	Defa	ult Star	tup Delay		2	minutes		
Memory	Defa	ult Shu	tdown Delay		2	minutes		
Storage	Startu	p Orde	er					
Networking	Order	Virtuz	al Machine	Startun	Startun Delav	Shutdown	Shutdown Delay	-
Storage Adapters	Auton	atic Ct	ta etua	Jocarcap	Dearcop Deady	Shacaowin	Shacdown Delay	
Network Adapters	Auton		larup	Fachlad	120	D0	120	
Advanced Settings		<u> </u>	And the second second second	Enabled	120 seconds	Power U	120 seconds	
Power Management	Any O	rder		Frahlad	100	D	120	
			Contract of Contraction	Enabled	120 seconds	Power 0	120 seconds	
oftware			The second secon	Enabled	120 seconds	Power 0	120 seconds	
Licensed Features	Manua	t ⊂t - art	AND DESCRIPTION OF THE	Enabled	120 seconds	Power U	120 seconds	
Time Configuration	Fianua	Li Start	up	Disabled	120 seconds	Power O	120 seconds	
DNS and Routing		E C	State of Street, Stree	Disabled	120 seconds	Power 0	120 seconds	
Authentication Services		8	the other last of	Disabled	120 seconds	Power 0	120 seconds	
Power Management		B	10101 - Hill - Andrews	Disabled	120 seconds	Power O	120 seconds	
Virtual Machine Startup/Shutdown		a l	OF THE A	Disabled	120 seconds	Power O	120 seconds	
Virtual Machine Swapfile Location		Ā	ALC CONTRACTOR CARDING	Disabled	120 seconds	Power O	120 seconds	1
Security Profile								
Host Cache Configuration								
Hose councies mguradon								



- 5. Click the checkbox to Allow virtual machines to start and stop automatically with the system.
- 6. Select your vCenter VM in the list and click **Move Up** until it is under **Automatic Startup**.
- 7. Click OK.

Allow vir	ettin rtual i	<b>gs</b> machines to start and s	stop automa	tically with the sys	tem			
Default Sta	artup	Delay			Default Sh	nutdown Delay —		
For each v	virtua	l machine, delay startı	up for:		For each \	/irtual machine, del	lay shutdown for:	
120	se	econds			120	seconds		
							D 0//	
Conti	inue	immediately if the VMw	are Tools st	art	Shutdow	in Action:	Power Off	<b>_</b>
bwer on th	rder ne spo	ecified virtual machines	s when the s	ystem starts. Duri	ng shutdown,	they will be stoppe	d in the opposite or	der.
tartup Or ower on th Order	rder ne spo Virtu tic S	ecified virtual machines al Machine tartup	s when the s	ystem starts. Duri Startup Delay	ng shutdown,	they will be stoppe Shutdown Delay	ed in the opposite or	rder.
tartup Or ower on th Order \ Automat	rder ne spo Virtu tic S	ecified virtual machines al Machine <b>tartup</b> VCENTER	s when the s Startup Enabled	ystem starts. Duri Startup Delay 120 seconds	ng shutdown, Shutdown Power O	they will be stoppe Shutdown Delay 120 seconds	d in the opposite or	Move Up
tartup Or ower on th Order 1 Automa 1 Any Ord	rder ne spo Virtu tic S	ecified virtual machines al Machine <b>tartup</b> VCENTER	s when the s Startup Enabled	ystem starts. Durii Startup Delay 120 seconds	ng shutdown, Shutdown Power O	they will be stoppe Shutdown Delay 120 seconds	ed in the opposite or	Move Up
Corder Manual S	rder he spo Virtu tic S ber Star	ecified virtual machines al Machine tartup VCENTER tup	s when the s Startup Enabled	ystem starts. Duri Startup Delay 120 seconds	ng shutdown, Shutdown Power 0	they will be stoppe Shutdown Delay 120 seconds	ed in the opposite or	Move Up
tartup Or ower on the Order 1 Automat 1 Any Orde Manual S	rder he spo tic S ler Star	edfied virtual machines al Machine tartup VCENTER tup	s when the s Startup Enabled	ystem starts. Duri Startup Delay 120 seconds	ng shutdown, Shutdown Power O	they will be stoppe Shutdown Delay 120 seconds	d in the opposite or	Move Up Move Down Edit
tartup Or ower on the Order 1 Automat 1 Any Orde Manual S	rder he spo tic S ler Star	edfied virtual machines al Machine tartup VCENTER tup	s when the s Startup Enabled	ystem starts. Duri Startup Delay 120 seconds	ng shutdown, Shutdown Power O Power G Power G	they will be stoppe Shutdown Delay 120 seconds	ed in the opposite or	der. Move Up Move Down Edit
tartup Or ower on th Order 1 Automat 1 Any Orde Manual S	virtu Virtu tic S er Star	edfied virtual machines al Machine tartup VCENTER tup	s when the s Startup Enabled	ystem starts. Duri Startup Delay 120 seconds	ng shutdown, Shutdown Power O	they will be stoppe Shutdown Delay 120 seconds	ed in the opposite or	der. Move Up Move Down Edit
tartup Or ower on the Order 1 Automa 1 Any Orde Manual 9	Virtu tic S ler Star	edified virtual machines al Machine tartup VCENTER tup	s when the s Startup Enabled	ystem starts. Duri Startup Delay 120 seconds	ng shutdown, Shutdown Power O	they will be stoppe Shutdown Delay 120 seconds	ed in the opposite or	der. Move Up Move Down Edit
tartup Or ower on th Order 1 Automa 1 Any Ord Manual S	rder he spo tic S b ler Star b c b c b c b c b c c c c c c c c c c	edified virtual machines al Machine tartup VCENTER	s when the s Startup Enabled	ystem starts. Duri Startup Delay 120 seconds	ng shutdown, Shutdown Power O Fower Gas Fower Gas Fower Gas	they will be stoppe Shutdown Delay 120 seconds	d in the opposite or	der. Move Up Move Down Edit

8. Close vSphere client.



## 9 Datacenter Configuration

In this section, you will be:

- Setting up and configuring a NETLAB+ datacenter
- Setting up and configuring a NETLAB+ role
- Adding your ESXi Host Servers to the datacenter
- Allowing Remote PC Viewer sessions in the ESXi firewall
- vSwitch Configurations

#### 9.1 Create NETLAB+ datacenter in vCenter

In this section, we will be creating a NETLAB+ datacenter on the vCenter.

- Using vSphere client, log into the vCenter using the IP address you set in Section 8.3.
- 2. Right-click the vCenter host, localhost, on the left and select Rename.



3. Set the hostname to **VCENTER** and press Enter.



4. Right-click on the VCENTER host and select New Datacenter.

🛃 VCENTER - vSp	here Client	
File Edit View	Inventory Administration Plug-ins H	elp 💡
🖸 🗈 🔮	Home 👂 🚮 Inventory 👂 👘 H	losts and Cluster
r 🖬 🗌		wh _
VCENTER	VCENTER.	VMN
	📁 New Folder Ct	rl+F
	It New Datacenter Ct	rl+D
	Add Permission Ct	rl+P er
	Alarm	
	Open in New Window Ctrl+A	ter 🖠
	Remove	up v
	Rename	er.
L	A datacent	er contains a

5. Set the datacenter name to **NETLAB** and press **Enter**.



#### 9.2 Create a NETLAB+ role in vCenter

In this section, you will be creating a NETLAB+ role in vCenter to map to the NETLAB+ user you created in Section 8.4.

1. To create a vCenter role for NETLAB+, click on **View > Administration > Roles** from the menu.

🛃 vc	ENTE	R - v5	phere Clier	ıt						
File	Edit	View	Inventory	Administ	tration	Plug-ins	Help	)		<
			Back		Alt+L	.eft	Hos	sts and Clusters		~
_			Forward		Alt+Ri	ght				
			Home		Alt+Ho	me				}
□ 6	P VC	<b>~</b>	Navigation I	Bar				VMware	vCenter Serve	r, 5.1.0, 88
		~	Toolbar				rted	Datacenters Virt	ual Machines	Hosts Tar
		~	Status Bar							
		~	Show VMs in	n Invento	ry		a dat	acenter 2 A	dd a host	E Add
			Show Temp	lates in Ir	nvento	ry		ected the Hosts	and Cluster	Ç inventor
	_	æ	Inventory			•	c 30	ected the hosts	and Cluster:	sinventois
		8	Administrati	ion		•	88	Roles	Ctrl+Shift+R	ter. Tr
		J	Managemer	π		•	2	Sessions	Ctrl+Shift+S	- 1
			Filtering					Licensing	Ctrl+Shift+L	
						+		System Logs	Ctrl+Shift+O	<u>m</u> }
						i	<b>P</b>	Server Settings	Ctrl+Shift+I	
								Solutions Manager	Ctrl+Shift+A	
							<b>B</b>	Storage Providers	Ctrl+Shift+Z	5
							08	vCenter Service Sta	atus	
h		~~~	<u> </u>		L	~~~~~	~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~	

2. Right-click on the Administrator Role and select Clone.



- 3. Type **NETLAB** in for the new role name and press **Enter**.
- 4. On the menu click **View > Inventory > Hosts and Clusters**.

VCENTER - v	iphere Clier	ıt			
File Edit View	Inventory	Administration Plug	ins He	p	
	Back	Alt+Left	88	Roles 🕨 🛃 VCENTER	
	Forward	Alt+Right		_	
Add I	Home	Alt+Home			
Roles 🗸	Navigation	Bar	ige:	lo access	
Name 🗸	Toolbar		1	This role is not in use	
No access 🖌	Status Bar				
Read-only	Show VMs in	Inventory			
Virtual ma	Show Temp	ates in Inventory			
Virtual ma	Inventory	,		Search	Ctrl+Shift+E
Resource	Administrati	00	<ul> <li>Rail</li> </ul>	Heats and Chattare	Childhift
VMware C 🔛	Managemer	+		Hosts and Clusters	Certanint+n
Datastore 🖃	managemen	n.	- 2	VMs and Templates	Ctrl+Shift+V
Network a	Filtering			Datastores and Datastore Clusters	Ctrl+Shift+D
NETLAB			۲	Networking	Ctrl+Shift+N
-		anna Maria			



5. Right-click on NETLAB and select Add Permission...

伊 VCENTER - vSpher	e Client		- <
File Edit View Inve	ntory Administration Plug-ins Help		5
🔄 🗈 [ 🟠 н	ome 👂 🚮 Inventory 👂 🗊 Hosts	and Clusters	
r 🖬 🗌			
	VCENTER,	VMwa	are vCer
	🕈 New Folder	Ctrl+F	Virtual F
6	New Cluster	Ctrl+L	
ę	New Datastore Cluster		Add &
	Add Host	Ctrl+H	
E	New Virtual Machine	Ctrl+N	sts ang
	New vSphere Distributed Switch	Ctrl+K	host to
	Add Datastore		the day
	Rescan for Datastores		
E	Migrate Virtual Machine Networking.		create
	Add Permission	Ctrl+P	the Is
	Alarm	•	
	Open in New Window Ctr	+Alt+N	Long



6. In the Assign Permissions window, click the Add... button.

🛃 Assig	n Permissions								×
To ass one of Users These object	ign a permission t more of the nam and Groups users and groups according to the	to an individual or g es and assign a ro s can interact with selected role.	group of users, ad le. the current	ld the	eir names to the Use Assigned Role Selected users and object according to	rs and Groups list groups can intera the chosen role a	below. Then s act with the cu and privileges.	rrent	
Nam	e (	Role	Propagate	1	Read-only	es senter ore cluster uted switch group gent Manager sion	ew its	•	
	lp	Add	Remove		Propagate to	Child Objects	Car	icel	



7. Select the **NETLAB** account in the user list and click **Add** then click **OK**.

Select Users and Select users and grou Check Names feature	Groups ps to include in this ro to validate your entri	ole. You can also manually enter ies against the directory.	names and use the
Domain:	(server)		•
Users and Groups -			
Show Users First			Search
Name	A.	Description / Full Name	
8 modem netdumper 8 netdumper		VMware User	_
8 NETLAB	7		
A news			
s nobody		nobody	•
Add Users: NETLAB Groups: Note: Se	parate multiple name	s with semicolons.	
Check Names			
		ОК	Cancel



8. In the Assign Permissions window, select NETLAB from the drop box in the Assigned Role area and then click OK.

Assign Permissions To assign a permission to an individual one or more of the names and assign a	or group of users, add a role.	their names to the Users and Groups list below. Then select
Users and Groups These users and groups can interact v object according to the selected role.	with the current	Assigned Role Selected users and groups can interact with the current object according to the chosen role and privileges.
Name Role	Propagate	
NETLAB NETLAB	Yes	Image: Select a privilege to view its description
Add	Remove	Propagate to Child Objects
Help		OK Cancel



## 9.3 Adding ESXi hosts to the NETLAB+ datacenter

In this section, you will be adding ESXi Host Servers to the NETLAB+ datacenter so that they may be managed by vCenter.

You will <u>NOT</u> add the Management Server to vCenter. You will only add your ESXi Host Servers that will house the virtual machines for the pods.

1. Right-click on the datacenter **NETLAB**, and select **Add Host**. The Add Host wizard appears.



- 2. First, we are going to add your first ESXi-host, enter the IP address you from your table in Section 10.
- Enter the username root and the password you setup in Section 5.2 and click Next.

Add Host Wizard Specify Connection Settings Type in the information used to	connect to this host.
Connection Settings Host Summary Virtual Machine Location Ready to Complete	Connection Enter the name or IP address of the host to add to vCenter. Host: Authorization Enter the administrative account information for the host. vSphere Client will use this information to connect to the host and establish a permanent account for its operations. Username: Password:
Help	< Back Next > Cancel



4. When prompted with a Security Alert window, click Yes to add the Host.



- 5. On the Host Summary page, review the information and click Next.
- 6. On the Assign License page, select Enter Key.
- 7. Enter the key you received from VMware in Section 2.
- 8. On the Lockdown mode page, leave the default settings and click Next.
- 9. On the Virtual Machine Location page, make sure NETLAB is selected and click Next.
- 10. On the Ready to Complete page, review the information and click Finish.
- 11. Click the + sign next to the **NETLAB** datacenter on the left and wait for the IP address of the host you entered to be added. Review the **Recent Tasks** pane at the bottom to make sure the status goes to **Completed.**
- 12. Repeat steps 1-10 to add any additional remaining hosts.



### 9.4 Allowing Remote PC Viewer sessions in ESXi firewall

In this section, you will be enabling a specific port range in the ESXi firewall to allow Remote PC Viewer sessions to have access to the virtual machine console.

- 1. Select your first ESXi host in the **Inventory** pane on the left.
- 2. Click on the **Configuration** tab.



3. In the **Software** box click on **Security Profile**. Then click on the **Properties...** hyperlink to review the built-in ESXi firewall settings.

oftware	vprobed SSH			
Licensed Features	Direct Console UI			
Time Configuration	CIM Server		P. ()	
DNS and Routing	Firewall		Refresh	Properties
Authentication Services	Incoming Connections	902 443 (TCP)	ΔII	
Power Management	CIM SLP	427 (UDP.TCP)	All	
Virtual Machine Startup/Shutdown	SSH Server	22 (TCP)	All	
Virtual Machine Swapfile Location	vSphere Web Access	80 (TCP)	All	
Security Profile	CIM Server	5988 (TCP)	All	
Host Cache Configuration	CIM Secure Server	5989 (TCP)	All	
host cache configuration	SNMP Server	161 (UDP)	All	



4. In the **Firewall Properties** window, scroll to the bottom of the list and click the checkbox for **VM serial port connected over net...** Click **OK** to save settings.

pen		e closed, or as configured.			
	Label	Incoming Ports	Outgoing Ports	Protocols	Daemon
	Active Directory All		88,123,137,139,389,	UDP,TCP	N/A
	FTP Client	20	21	TCP	N/A
	http Client		80,443	TCP	N/A
~	VMware vCenterAgent		902	UDP	Running
~	vMotion	8000	8000	TCP	N/A
	gdbserver	1000-9999,50000-5		TCP	N/A
	IKED	500	500	UDP	N/A
~	DHCP Client	68	68	UDP	N/A
~	VM serial portconnected over net.	23,1024-65535	0-65535	TCP	N/A
2	CIM SLP	427	427	UDP,TCP	N/A
•					
Ser	vice Properties				
Ge	neral				
		107			
e.,	ervice; aan aen	ver			
Se					
Se Pa	ackage Information:				
Se Pa	ackage Information:				
Se Pa Fire	ackage Information: ewall Settings				
Se Pa Fire	ackage Information: ewall Settings llowed IP Addresses: All				
Se Pa Fire Al	ackage Information: ewall Settings llowed IP Addresses: All				
Se Pa Fire Al	ackage Information: ewall Settings llowed IP Addresses: All				

- 5. Repeat Steps 1-4 for each ESXi host.
- 6. Close the vSphere client.



# 9.5 vSwitch Configuration

This section is designed to configure the vSwitches on the ESXi Host Servers. To review, a virtual switch (vSwitch) on the physical ESXi host bridges between physical networks, virtual machines, and the ESXi host kernel. Each vSwitch is an internal LAN, implemented entirely in software by the ESXi kernel.



Your ESXi host(s) may connect to the outside network, inside network, or both depending on the network model you are using. The following table indicates which virtual switches are used for outside and inside connections.

Network Model	OUTSIDE vSwitch	INSIDE vSwitch
Single-Homed	vSwitch0	
Dual-Homed	vSwitch0	vSwitch1



# 9.5.1 Verifying vSwitch0 Configuration

vSwitch0 is automatically created during the ESXi software installation (Section 5.2). Using vCenter, confirm that networking on vSwitch0 is properly configured (refer to the red numbered items in the screen below):

- 1. vSwitch0 is bound to the correct physical NIC (vmnic).
- 2. The physical NIC is connected and with correct speed/duplex.
- 3. The VMkernel port has the IP address you assigned when configuring your ESXi host. The IP address should be a campus LAN address.





## 9.5.2 Inside Network Configuration

In this section, you will perform the final setup of ESXi host inside networking. This section only applies to the dual-homed networking configuration that connects the ESXi host(s) to the inside network (see table below). This section describes various ESXi host networking components. We recommend reviewing this section even if inside networking is not used in your ESXi host configuration.

Networking Configuration	Inside Networking
Single-Homed Networking	No
Dual-Homed Networking	Yes

Repeat the setup tasks in this section for each ESXi host in your Virtual Machine Infrastructure





There is only one type of network traffic can flow across the ESXi inside network connection, remote PC traffic between virtual machines and real equipment (VLANs 100 - 899).

The following diagram and table describes the various components of inside networking.



#	Component	Description
1	ESXi Host	The physical server where, your virtual machines run.
2	Inside Physical NIC	The physical network interface on the ESXi Host (1) that connects virtual machines to the inside physical network.
3	vSwitch	A virtual switch on the physical ESXi host that bridges between physical networks (2,8,9), virtual machines (7), and the ESXi host kernel (4). Each vSwitch is an internal LAN, implemented entirely in software by the ESXi kernel.
4	Kernel Port	A virtual network interface on the ESXi host (1) that provides connectivity between the ESXi host kernel and other components such as NETLAB+.
5	Virtual Network Adapter (vNIC)	A virtualized networking adapter inside of a virtual machine that connects the virtual machine to a virtual switch.
6	Port Groups	A template for creating virtual network switch ports with a particular set of specifications. A port group allows a virtual network adapter (5) to be placed in a particular virtual LAN (VLAN). Port groups with specific VLAN IDs to connect virtual machines to real equipment.



Virtual Machines	In NETLAB+, a <i>virtual machine</i> is a remote PC or remote server that runs on virtualized hardware. Although the hardware is virtualized, real operating systems and real application software can still be used.
Uplink / Trunk	An uplink is a physical connection between ESXi Host (1,2) and a NETLAB+ control switch (9). If you are interfacing with real equipment pods (i.e. Cisco Networking Academy), your ESXi inside physical interface and the control switch port to which it is connected are configured in 802.1q trunk mode. Trunks allow multiple virtual LANs (VLANs) to exist on a single physical connection. VLAN assignments and the VLAN database on the control switch are managed by NETLAB+.
Control Switch	A NETLAB+ control switch provides connectivity between the NETLAB+ server, ESXi host servers, asynchronous access servers, and switched outlet devices. Control switches are not accessed by lab users. There are three types of ports: reserved, assigned, and unassigned.
	An NDG supported control switch is required. See the NDG website for a list of supported control switches.
NETLAB+ Inside Connection	The NETLAB+ server inside interface connects to a designated reserved port on a control switch (9). The fixed addresses 169.254.0.254/24 and 169.254.1.1/24 are assigned to the inside interface (these cannot be changed).
	802.1q trunk mode should NOT be enabled on the control switch port for this connection.
Real Equipment Pods	Real lab equipment (optional) is connected to one or more control switches (9).
Reserved Ports	Reserved ports are ports on a control switch (9) that are reserved to provide connectivity between the NETLAB+ server, ESXi host servers, asynchronous access servers, and switched outlet devices.
	Virtual Machines Uplink / Trunk Control Switch NETLAB+ Inside Connection Real Equipment Pods Reserved Ports



The following table summarizes the traffic types that will flow over the ESXi inside network.

Networking Configuration	Management Traffic (VLAN 1)	Remote Display (VLAN 1)	802.1q Trunk
Single-Homed Networking	n/a	n/a	n/a
Dual-Homed Networking	No	No	Real Gear*

\* ESXi interface and corresponding control port is configured as 802.1q trunk when interfacing with real equipment.

#### 9.5.3 Creating vSwitch1 and Binding to Physical NIC

If your ESXi host is dual-homed (connected to both outside and inside networks), you must create an inside virtual switch (vSwitch 1), bind a physical NIC to vSwitch1, and create a VMkernel port for management traffic. These tasks are performed through vCenter.

- 1. Login to vCenter using the vSphere client.
- 2. Navigate to Home > Inventory > Hosts and Clusters.
- 3. Click on the ESXi host to configure in the left sidebar.
- 4. Click on the **Configuration tab**.
- 5. Click on **Networking** in the Hardware group box.
- 6. Click on the Virtual Switch view button if not already selected.
- 7. Click on Add Networking.





8. Add a VMkernel port to allow the ESXi host kernel to communicate with the inside network. Select the **VMkernel** radio button, and then click **Next**.

Connection Type Networking hardwa	are can be partitioned to accommodate each service that requires connectivity.	
Connection Type Network Access Connection Settings Summary	Connection Types          C       Virtual Machine         Add a labeled network to handle virtual machine network traffic.         Image: Constraint of the VMkernel         The VMkernel TCP/IP stack handles traffic for the following ESXi services: VMware VMotion, iSCSI, NFS and host management.	, ,
Help		Cancel
Add Network Wizard VMkernel - Network A The VMkernel reach	Access es networks through uplink adapters attached to virtual switches.	
Add Network Wizard VMkernel - Network A The VMkernel reach Connection Type Network Access Connection Settings	Access es networks through uplink adapters attached to virtual switches. Select which virtual switch will handle the network traffic for this connection. You may also create a new virtual using the unclaimed network adapters listed below.	switch
Add Network Wizard VHkernel - Network A The VHkernel reach Connection Type Network Access Connection Settings Summary	Access es networks through uplink adapters attached to virtual switches. Select which virtual switch will handle the network traffic for this connection. You may also create a new virtual using the unclaimed network adapters listed below.  Create a virtual switch Speed Networks  DO Still Neose	switch
Add Network Wizard VHkernel - Network / The VMkernel reach Connecton Type Network Access Connection Settings Summary	Access es networks through uplink adapters attached to virtual switches. Select which virtual switch will handle the network traffic for this connection. You may also create a new virtual using the unclaimed network adapters listed below.  Create a virtual switch Speed Networks  V W virtual switch Speed Networks  V W Virtual Switch Speed Networks  V W Virtual SWITCH Speed Networks  V Virtual SWITCH Speed Networks  V Virtual SWITCH Speed Networks  V Virtual SWITCH Speed Networks  Virtual SWIT	switch
Add Network Wizard VHkernel - Network / The VMkernel reach Connection Type Network Access Connection Settings Summary	Access es networks through uplink adapters attached to virtual switches. Select which virtual switch will handle the network traffic for this connection. You may also create a new virtual using the unclaimed network adapters listed below.           Create a virtual switch         Speed         Networks           Create a virtual switch         Speed         Networks           Vmnic1         1000 Full         None           Vmnic2         1000 Full         None           Use vSwitch0         Speed         Networks           Vmnic0         1000 Full	switch
Add Network Wizard VMkernel - Network / The VMkernel reach Connection Type Network Access Connection Settings Summary	Access es networks through uplink adapters attached to virtual switches. Select which virtual switch will handle the network traffic for this connection. You may also create a new virtual using the unclaimed network adapters listed below.           Image: Create a virtual switch         Speed         Networks	switch
Add Network Wizard VHkernel - Network / The VMkernel reach Connection Type Network Access Connection Settings Summary	Access es networks through uplink adapters attached to virtual switches. Select which virtual switch will handle the network traffic for this connection. You may also create a new virtual using the unclaimed network adapters listed below.           Image: Create a virtual switch         Speed         Networks           Image: Create a virtual switch         Speed         Networks           Image: Virtual Speed         Networks         Image: Virtual Speed           Image: Virtual Speed         Networks         Image: Virtual Speed           Image: Virtual Speed         Networks         Image: Virtual Speed           Image: Virtual Speed         Networks         Image: Virtual Speed <t< td=""><td>switch</td></t<>	switch

- 9. Select the **"Create a virtual switch"** radio button. The new switch will be named vSwitch1.
- 10. Select the physical NIC that will connect vSwitch1 to the control switch. We recommend using vmnic1 for inside connections (vmnic0 should already be connected to the outside network).



🚱 Add Network Wizard		
VMkernel - Connection Use network labels to i	Settings dentify VMkernel connections while r	managing your hosts and datacenters.
Connection Type Network Access Connection Settings IP Settings Summary	Port Group Properties	VMkernel None (0) Use this port group for vMotion Use this port group for Fault Tolerance logging V Use this port group for management traffic
	Preview: VMkernel Port VMkernel	Physical Adapters
Help		≤Back Next ≥ Cancel

- 11. Enter the port group properties as shown above.
  - a. Network Label: "NETLAB Inside"
  - b. VLAN ID: None(0) (default)
  - c. Check option "Use this port group for management traffic"
- 12. Click Next.
- 13. The VMkernel IP Connection Settings dialog appears.

🕜 Add Network Wizard			
VMkernel - IP Connecti Specify VMkernel IP se	on Settings ettings		
Connection Type Network Access Connection Settings IP Settings Summary	C Obtain IP settings automatically C Use the following IP settings: IP Address: Subnet Mask: VMkernel Default Gateway: Preview:	169.254.0.       241 to 249         255.255.255.0       Edit	
Help	VMkernel Port VMkernel @	Physical Adapters wmnic1 ≤ Back Next ≥	Cancel

#### 14. Enter a unique inside IP address and subnet mask from the following table.

Inside Interface	IP Address	Subnet Mask
ESXi Server 1 Inside	169.254.0.241	255.255.255.0
ESXi Server 2 Inside	169.254.0.242	255.255.255.0
ESXi Server 3 Inside	169.254.0.243	255.255.255.0



ESXi Server 4 Inside	169.254.0.244	255.255.255.0
ESXi Server 5 Inside	169.254.0.245	255.255.255.0
ESXi Server 6 Inside	169.254.0.246	255.255.255.0
ESXi Server 7 Inside	169.254.0.247	255.255.255.0
ESXi Server 8 Inside	169.254.0.248	255.255.255.0
ESXi Server 9 Inside	169.254.0.249	255.255.255.0

No changes to the VMkernel Default Gateway setting should be necessary. This should already be set to the default gateway on your campus LAN.

- 15. Click **Next** to continue.
- 16. Confirm that vSwitch1 appears as follows (IP varies for each host).
  - a. VMkernel port (vmk1) has correct IP address.
  - b. vSwitch1 is bound to physical adapter (vmnic1)
  - c. Physical adapter is up (speed and duplex are detected)



A × mark displayed near the Physical Adapter indicates that the connection has not yet been physically cabled or the corresponding control switch port is shut down.




## 9.5.4 Increasing the Inside vSwitch Port Count

By default, a vSwitch is provisioned with 56 virtual ports. This means that 56 virtual network adapters can be connected to the virtual switch, regardless of which port group the adapter is connected. For most NETLAB AE setups, this is sufficient for the inside vSwitch. For large NETLAB PE setups or systems with custom real equipment pods, you may need to increase this value to accommodate more virtual machine connections to the inside vSwitch.

This discussion applies to virtual machines that are part of real equipment pods. Pods that contain only virtual machines are usually placed on separate vSwitches that do not connect to the inside network / real equipment.

To calculate the number of inside vSwitch ports required on a particular ESXi host, add up the number of virtual machines in real equipment pods that are assigned to the host. This is the number of virtual ports required on the inside vSwitch (assuming one connection per VM). If this number exceeds 50, you should select the next highest port count setting (120). In special cases, an even higher setting may be required. Note: 50 is not an error; 6 extra ports were subtracted (from 56) to allow for VMkernel ports and other possible connections. Higher port count settings consume additional host resources, so you should set this value to the lowest possible setting that provides enough ports for every virtual machine connecting to the inside vSwitch.

There is no warning when the number of virtual ports is exceeded and the problem is not obvious. Some of the virtual machines will fail to communicate for no apparent reason. The only clue may be a disconnected network status from the guest operating system.

The following procedure is used to increase the number of virtual ports on the inside virtual switch. The same procedure can be used on any virtual switch should the need arise.

- 1. Login to vCenter using the vSphere client.
- 2. Navigate to Home > Inventory > Hosts and Clusters.
- 3. Click on the ESXi host where the pod's virtual machines will run.
- 4. Click on the **Configuration tab**.
- 5. Click on **Networking** in the Hardware group box.
- 6. Click on the Virtual Switch view button if not already selected.



7. Click **Properties** on the INSIDE vSwitch. The inside vSwitch is the one that is connected to the control switch (vSwitch1).

VCENTER - vSphere Clie	nt 1		
Eile Edit View Inventor	ry Administration Plug-ins Help		
🖸 🖸 🛕 Home	🕽 👸 Inventory 🌢 🛐 Hosts and Cluster	s 2	Search Inventory Q
	10.0.0.38 VH ware ESXi, 4.0.0, 208167 Getting Started Summary Virtual Mad	hines Resource Allocation Perform	4 ance Configuration Tasks & Events Alarms Permission
	Hardware	View: vSphere Standard Sw	itch vSphere Distributed Switch
	Processors Memory Storage • Networking 5 Storage Adapters Network Adapters Advanced Settings Software	Networking 6 Virtual Switch: vSwitch0 Virtual Machine Port Group TDA 10.0.0.0 NET Vificanal Port Management Network vmic0 : 10.0.0.38	Refresh Add Networking Properties  Remove Properties  Physical Adapters vmnic0 000 Full 7. Select the INSIDE vSwitch E
	Licensed Features Time Configuration DNS and Routing Power Management Virtual Machine Startup/Shutdown	Virtual Switch: vSwitch1	Remove Properties

- 8. Click on the **vSwitch** configuration item.
- 9. Click the Edit button.

orts Network Adapters				
Configuration	Summary	vSwitch Properties		
vSwitch	56 Ports	Number of Ports:	56	
🧕 Management Net	VMotion and IP	Defection between		
		Default Policies		
		Draming your Made	Deiest	
		Promiscuous Mode:	Reject	
		MAC Address Changes:	Accept	
		Forged Transmits:	Accept	
		Traffic Shaping		
		Average Bandwidth:		
		Peak Bandwidth:		
		Burst Size:		
		Failover and Load Balancing		
		Load Balancing:	Port ID	
		Network Failure Detection:	Link Status only	
		Notify Switches:	Yes	
		Failback:	Yes	
		Active Adapters:	vmnic0	
		Standby Adapters:	None	
Add	Edit Remove	Unused Adapters:	None	



10. Increase the number of ports, but not higher than needed.

General Security Traffic Shaping NI	C Teamir	) g					
Number of Ports:	56	•	I				
🥐 Changes will not take effect until	, 24 56	*	started.				
	120 248 504 1016 2040 4088	T					
USE LOWEST VALUE THAT WIL		омо	DATE INS	IDE V	IRTUA	L MA	CHINES
		r		_			

## 11. Click **OK**.

The ESXi host must be restarted for the change to take effect. Make sure there are no active NETLAB+ reservations that affect this host, or virtual machines running on this host as user work may be affected.

12. Right click on the ESXi host in the left sidebar to activate the context menu.

13. Select Reboot.





## 9.5.5 Create a Safe Staging Network

In this section, you will be creating a Safe Staging Network called "safety net", to temporarily connect our VMs. The Safe Staging Network consists of a virtual switch and a port group that is not connected to any other networks (virtual or real). Should the virtual machine be powered on, its traffic will be confined to the safety net. This ensures that the virtual machine will not pose a security risk to your campus LAN or interfere with other pods, until it is relocated to its final network via automatic or manual networking.

- 1. Select your first ESXi host in the **Inventory** pane on the left.
- 2. Click on the **Configuration** tab.

File Edit View Inventory Administration Plug-ins Help	
💽 🔯 Home 🕨 👸 Inventory 🕨 関 Hosts and Cl	usters
5 C 8	
VCENTER VMware ES	XI, 5.1.0, 799733   Evaluation (60 days remaining) y Virtual Machines Resource Allocation Performance Configuration T
Hardware	Processors

3. In the **Hardware** box click on **Networking**. Then click on the **Add Networking**... hyperlink to create a new virtual switch.





4. On the **Connection Type** page, select **Virtual Machine** and click **Next**.

Add Network Wizard Connection Type Networking hardware car	n be partitioned to accommodate each service that requires connectivity.	<u> </u>
Connection Type Network Access Connection Settings Summary	Connection Types  Virtual Machine  Add a labeled network to handle virtual machine network traffic.  VMkernel  The VMkernel TCP/IP stack handles traffic for the following ESXi services: vSphere vMotion, iSCSI, NFS, and host management.	
Help	< Back Next > C	ancel

5. On the Network Access page, select Create a vSphere standard switch and click Next.

**UNCHECK** any vmnics under the radio button; this virtual switch should not be bound to any real network adapters on the ESXi host.

	vsphere standard switch using the unclaimed he	twork adapter	rs listed below.
Connection Settings Summary	• Create a vSphere standard switch	Speed	Networks
	C Use vSwitch0 Intel Corporation 82545EM Gigabit	Speed Ethernet Co 1000 Full	Networks ontroller (Copper)



6. On the **Connection Settings** page, enter **SAFETY NET** in the Port Group's **Network Label** property and then click **Next.** 

🛃 Add Network Wizard			
Virtual Machines - Connection Use network labels to identi	on Settings fy migration compatible connection	tions common to two or more hosts.	
Connection Type	Port Group Properties		
Connection Settings	Network Label:	SAFETY NET	
Summary	VLAN ID (Optional):	None (0)	
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Help		< Back Next > Ca	incel

- 7. On the **Summary** page, review the information and click **Finish.**
- 8. Repeat steps 1-7 for each ESXi host server.
- SAFETY NET is now available for use as a safe temporary network location for new virtual machines.

The safety network is an ideal place to bind the network interface(s) of master virtual machines. Automatic networking will the bind network interfaces of cloned VMs to their runtime networks when their respective pods are started.